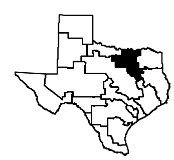
2006
Region C
Water Plan

January 2006

Prepared for
Region C Water
Planning Group



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2006 Region C Water Plan

JANUARY 2006

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2006 REGION C WATER PLAN

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APPENDIX B

BIBLIOGRAPHY OF PREVIOUS WATER PLANS IN REGION C

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Southeast Kaufman Water Supply Corporation: *Drought Contingency Plan*, adopted August 21, 2000.

South Ellis County Water Supply Corporation: *Drought Contingency Plan*, June 21, 2000.

City of Southlake: *Ordinance No. 662*, establishing a water conservation policy and drought contingency plan, effective August 9, 1996.

Southwest Fannin County Water Supply Corporation: *Drought Contingency Plan*, February, 2000.

Southlake Park Services, Inc.: *Drought Contingency Plan*, August 27, 2000.

City of Springtown: *Drought Contingency Plan*, January, 2000.

Starr Water Supply Corporation: *Drought Contingency Plan*, March, 2000.

Town of Sunnyvale: *Water Conservation Plan*, adopted August 18, 1984.

Talty Water Supply Corporation: *Drought Contingency Plan*, adopted August 15, 2000.

Tarrant Regional Water District: *Water Conservation and Drought Contingency Plan*, April 19, 2005.

Tecon Water Companies, Inc. and its subsidiaries: *Drought Contingency and Water Conservation Plan*, September, 2000.

City of Terrell: *Water Conservation and Drought Contingency Plan*, June 17, 2003.

Texas Water Systems Inc.: *Drought Contingency Plan*, August 25, 2000.

City of The Colony: *Drought Contingency Plan*, May 17, 2005.

The Oaks Water System: *Drought Contingency Plan*, August 31, 2000.

City of Tioga: *Water Conservation and Drought Contingency Plan*, October, 2000.
City of Tioga: *Drought Contingency Plan*, July 2005.

City of Tom Bean: *Drought Contingency Plan*, May 9, 2005.

Treetop Utilities, Inc.: *Drought Contingency Plan*, August 23, 2000.

City of Trinidad: *Drought Contingency Plan*, August 3, 2000.

Bardwell Reservoir: *Water Conservation Plan/Drought Contingency Plan*, prepared by Trinity River Authority of Texas, September 24, 1999.

Central Regional Wastewater System: *Water Conservation and Emergency Water Demand Management Plan*, prepared by the Trinity River Authority of Texas, January 19, 1998.

Trophy Club Municipal Utility District: *Drought Contingency Plan*.

Two Way Special Utility District: *Drought Contingency Plan*, May 31, 2005.

Two Way Water Supply Corporation: *Drought Contingency Plan*, July, 2000.

Thompson Heights Development Company: *Drought Contingency Plan*, July 2, 2001.

Thompson Water and Construction: *Drought Management Plan*, no date provided.

Ten Mile Creek Regional Wastewater System: *Water Conservation and Emergency Water Demand Management Plan*, June 18, 1996.

Union Hill Water Company: *Drought Contingency Plan*, August 15, 2000.

City of University Park: *Water Conservation and Drought Contingency Plan*, April 20, 2005.

Upper Neches River Municipal Water Authority: *Water Conservation and Emergency Demand Management Plan*, April, 1997.

Upper Trinity Regional Water District: *Water Conservation and Drought Contingency Plan*, March 2005.

Regional Treated Water System: *Water Conservation Plan and Emergency Water Demand Management Plan*, prepared by Upper Trinity Regional Water District, February, 2002.

Vacation Village Water Supply: *Drought Contingency Plan*, August 18, 2000.

City of Van Alsytne: *Drought Contingency Plan*, April 2005.

Virginia Hill Water Supply Corporation: *Drought Contingency Plan*, August 15, 2000.

The Wallace Group, Inc.: *Draft City of Palmer Preliminary Constituents Report,* November 2001.

Walter J. Carroll Water Co.: *Drought Contingency Plan*, September 7, 2000.

Walnut Bend Independent School District: *Drought Contingency Plan*, July 12, 2005.

Walnut Creek Water Supply Corporation: *Water Conservation Plan*, adopted January 12, 1988.

Walnut Creek Special Utility District: *Drought Contingency Plan*, April 30, 2000.

City of Watauga: *Water Conservation and Emergency Water Demand Management Plan*, adopted June 24, 1996.

City of Watauga: *Water Conservation and Emergency Water Demand/Drought Contingency Plan,* April 2005.

Water Association of NorthLake: *Drought Contingency Plan*, August 30, 2000.

City of Waxahachie: *Water Conservation Plan and Drought Contingency Plan*, June 17, 2002.

City of Weatherford: *Water Conservation and Drought Contingency Plan*, August, 2002.

West Cedar Creek MUD: *Water Conservation Plan*, adopted March 16, 1989.

West Cedar Creek MUD: *Drought Contingency Plan*, August 5, 1999.

West Leonard Water Supply Corporation: *Drought Contingency Plan*, May, 2000.

West Wise Rural Water Supply Corporation: *Drought Contingency Plan*, August 10, 1999.

Westwood Utility Corporation: *Drought Contingency Plan*, July 5, 2000.

City of Whitesboro: *Emergency Water Demand Management Plan*, no date provided.

City of White Settlement: *Drought Contingency Plan*, revised December, 2001.

White Shed Water Supply Corporation: *Drought Contingency Plan*, adopted August 12, 2000.

City of Whitewright: *Drought Contingency Plan*, June 7, 2005.

Wildewood Water Company, Inc.: *Drought Contingency Plan*, August 10, 2000.

Town of Windom: *Drought Contingency Plan*, December 4, 1999.

Woodbine Water Supply Corp.: *Drought Contingency Plan*, August 15, 2000.
Woodvale Water Inc.: *Drought Contingency Plan*, September 1, 2000.

City of Wortham: *Water Conservation and Emergency Water Demand Management Plan*, July, 1998.

WSWS Company: *Drought Contingency Plan*, August 31, 2000.

City of Wylie: *Draft Drought Contingency Plan*, 2002.

APPENDIX C

QUESTIONNAIRES ON POPULATION PROJECTIONS AND WATER PLANNING ISSUES

APPENDIX C
QUESTIONNAIRES ON POPULATION PROJECTIONS AND WATER PLANNING ISSUES

The following attached questionnaires represent the surveys sent to each of the Region C Water User Groups as part of the population projection surveys. The Water User Groups were categorized based on available information. A description of these categories is included below. Lists of the Water User Groups within each category are included following the descriptions. The attached questionnaires are examples taken from the first Water User Group listed within each category.

Descriptions:

City: Water User Groups within this category include cities that supply water to retail customers only (not a wholesale water provider).

Council of Governments: Entities within this category include the various Council of Governments located within the region and do not supply any water.

County: Water User Groups within this category include the sixteen counties within the Region C planning area. These entities supply water to retail customers included in the "County Other" populations.

Noncity Retail: Water User Groups within this category include water providers that are not cities (such as Water Supply Corporations, Special Utility Districts, etc.) and only supply water to retail customers (not a wholesale water provider).

Wholesale Water Provider: Water User Groups within this category include water providers that supply water to other Water User Groups only, and do not supply water to any retail customers.

Wholesale Water Provider & City: Water User Groups within this category include cities that are both retail and wholesale water providers. These entities supply water to retail customers and other Water User Groups.

Wholesale Water Provider & Noncity: Water User Groups within this category include entities that are not cities (such as Water Supply Corporations, Special Utility Districts, etc.), and are both retail and wholesale water providers. These entities supply water to retail customers and other Water User Groups.

City (Pages C-5 to C-9)**:**

City of Aledo
City of Allen
City of Alvord
City of Anna
City of Annetta
City of Arlington
City of Aurora
City of Azle
City of Balch Springs
City of Bardwell
City of Bartonville
City of Bedford
City of Benbrook
City of Berryville
City of Blooming Grove
City of Blue Mound
City of Blue Ridge
City of Bonham
City of Boyd
City of Burleson
City of Carrollton
City of Cockrell Hill
City of Collinsville
City of Combine
City of Coppell
City of Copper Canyon
City of Corinth
City of Cross Roads
City of Crowley
City of Dalworthington Gardens
City of Dawson
City of Decatur
City of Double Oak
City of Duncanville
City of Ector
City of Euless
City of Eustace
City of Everman
City of Fairfield
City of Fairview
City of Farmers Branch
City of Ferris
City of Flower Mound
City of Forest Hill
City of Forney
City of Frisco
City of Frost
City of Grand Prairie
City of Gun Barrel City
City of Gunter
City of Hackberry
City of Haltom City
City of Haslet
City of Hebron
City of Hickory Creek
City of Highland Village
City of Honey Grove
City of Howe
City of Hudson Oaks
City of Hurst
City of Hutchins
City of Keller
City of Kemp
City of Kennedale
City of Kerens
City of Krugerville
City of Krum
City of Ladonia
City of Lake Dallas
City of Lakeside
City of Lancaster
City of Leonard
City of Lincoln Park
City of Log Cabin
City of Lowry Crossing
City of Lucas
City of Mabank
City of Malakoff
City of Mansfield
City of Maypearl
City of McLendon-Chisholm
City of Melissa
City of Milford
City of Muenster
City of Nevada
City of New Fairview
City of New Hope
City of Newark
City of Northlake
City of Oak Grove
City of Oak Leaf
City of Oak Point
City of Palmer
City of Parker
City of Payne Springs
City of Pecan Hill
City of Pilot Point
City of Pottsboro
City of Red Oak
City of Reno
City of Rhome
City of Rice
City of Richland Hills
City of Roanoke
City of Royse City
City of Sachse
City of Saginaw
City of Saint Paul
City of Sansom Park
City of Seagoville
City of Seven Points
City of Sherman
City of Southlake
City of Southmayd
City of Springtown
City of Teague
City of Tom Bean
City of Tool
City of Trenton
City of Trophy Club
City of Valley View
City of Weston
City of Westover Hills
City of Westworth Village
City of Whitesboro
City of Whitewright
City of Willow Park
City of Wilmer
City of Wylie
Town of Lindsay
Town of Pantego
Town of Ponder

Town of Shady Shores
Town of Sunnyvale
Town of Talty
City of Athens
City of Aubrey
City of Bells
City of Bryson
City of Chico
City of Ennis
City of Farmersville
City of Garland
City of Heath
City of Josephine
City of Murphy
City of Plano
City of Richardson
City of Rowlett
City of Savoy
City of Trinidad
City of Van Alstyne
City of White Settlement
Town of Addison
City of Argyle
City of Bridgeport
City of Celina
City of Colleyville
City of Crandall
City of Denison
City of DeSoto
City of Gainesville
City of Glenn Heights
City of Grapevine
City of Irving
City of Italy
City of Jacksboro
City of Justin
City of Kaufman
City of Lake Worth
City of Mesquite
City of Ovilla
City of Pelican Bay
City of Princeton
City of Prosper
City of River Oaks
City of Runaway Bay
City of Sanger
City of The Colony
City of Tioga
City of University Park
City of Watauga
City of Wortham
Town of Edgecliff Village
Town of Highland Park
Town of Little Elm

Council of Governments (Pages C-10 to C-13)**:**
East Texas Council of Governments
Heart of Texas Council of Governments
Nortex Regional Planning Commission
North Central Texas Council of Governments
Texoma Council of Governments

County (Pages C-14 to C-16)**:**
Collin County
Cooke County
Dallas County
Denton County
Ellis County
Fannin County
Freestone County
Grayson County
Henderson County
Jack County
Kaufman County
Navarro County
Parker County
Rockwall County
Tarrant County
Wise County

Noncity Retail (Pages C-17 to C-21)**:**

Annetta South
Argyle WSC
Bartonville WSC
Bethesda WSC
Blackland WSC
Bolivar WSC
Brandon Irene WSC
Caddo Basin SUD
Cash SUD
Chatfield WSC
Combine WSC
Community WSC
Culleoka WSC
Danville WSC
Denton County FWSD #1
Files Valley WSC
Flo Community WSC
Forney Lake WSC
Gunter Rural WSC
Hickory Creek SUD
High Point WSC
Johnson Co. SUD
Lavon WSC
Luella WSC
Mac Bee WSC
Milligan WSC
Mountain Peak WSC
Mt Zion WSC
Mustang WSC
North Hunt WSC
R.C.H. WSC
Rice WSC
Rockett SUD
Sardis-Lone Elm WSC
South Grayson WSC
Turlington WSC
Two Way SUD
Virginia Hill WSC
Able Springs WSC
Bethel-Ash WSC
Buena Vista – Bethel SUD
Community Water Company
Deer Creek Waterworks
East Fork SUD
Kiowa Homeowners WSC
M.E.N. WSC
North Collin WSC
Southwest Fannin County SUD
West Wise SUD
Woodbine WSC
Benbrook Sewer and Water Authority
College Mound WSC
East Cedar Creek FWSD
Gastonia-Scurry WSC
Mustang WSC
Walnut Creek SUD
West Cedar Creek MUD

Wholesale Water Provider (Pages C-22 to C-27)**:**

Tarrant Regional Water District
Sabine River Authority
Upper Neches MWA
Sulphur River Water District
Greater Texoma Utility Auth.
Dallas County Park Cities MUD
Midlothian Water District
Parker County UD #1
Wise County WSD
Palo Pinto County MWD #1
Athens MWA
Lake Cities MUA
North Texas Municipal Water District
Trinity River Authority
Upper Trinity Regional Water District

Wholesale Water Provider & City (Pages C-28 to C-33)**:**

City of Cedar Hill
City of Corsicana
City of Lewisville
City of McKinney
City of Mineral Wells
City of Weatherford
City of Rockwall
City of Dallas
City of Denton
City of Fort Worth
City of Midlothian
City of North Richland Hills
City of Terrell
City of Waxahachie

Wholesale Water Provider & Noncity (Pages C-34 to C-39)**:**

Dallas County WCID #6
Trophy Club MUD #1

REGION C WATER PLANNING GROUP

Senate Bill One Second Round of Regional Water Planning - Texas Water Development Board

c/o NTMWD
505 E. Brown Street
P. O. Box 2408
Wylie, Texas 75098-2408
972/442-5405
972/442-5405/Fax
NTMWD@airmail.net

[Date]

City

Ms. Daphne Richardson
City of Aledo
200 Old Annetta Road
Aledo, TX 76008

Subject: Population Projections and Data Survey – Please respond by September 30, 2002

Dear Ms. Richardson:

Senate Bill One, passed by the Legislature in June 1997, requires that Regional Water Planning Groups update approved Water Plans at least every five years. The effort to update our region's plan has begun and we are seeking your input in the planning process. Your city is located in Region C and the Board Members of the Region C Water Planning Group are listed on this letter. The enclosed brochure shows a map of Region C and gives more information about the regional planning update process now underway.

The Region C Water Planning Group has selected a team of consultants led by Freese and Nichols, Inc., to help with the update of the regional water plan. Other members of the consulting team include, Alan Plummer Associates, Cooksey Communications, and Chiang, Patel & Yerby.

As instructed by the legislature, the Texas Water Development Board (TWDB) has formulated regulations governing the preparation of regional plans. These regulations require that regional water plans be based on projections of populations and water needs developed by the TWDB, unless the regional water planning group can provide convincing evidence that those projections should be modified. **With this letter, we are attaching a survey seeking information from you to help us determine whether the TWDB population projections are appropriate for your city or whether they should be revised.** We are also seeking other information important for planning. The TWDB is scheduled to provide initial water needs projections by the end of September. When we receive this information, we will provide it to you and seek your input. Please fill out the attached survey and return it to Ed Motley of Chiang, Patel and Yerby by no later than September 30, 2002. To maintain our schedule, information must be provided by the due date to be included in the updated Regional Water Plan.

To help you fill out the survey, attached is some information on historical and projected populations in Region C.

Table of Historical and Projected Population for Your City. This table presents the historical and projected population for your city developed by the TWDB. The projections are for values within your city limits.

Table of Historical and Projected Population for Your County. This table presents the TWDB historical and projected population for the cities in county(ies) in which you are located.

If you have any questions or need additional information to complete the survey, please contact Mr. Ed Motley, Project Engineer at Chiang, Patel & Yerby, at (214) 638-0500.

Thank you in advance for your timely completion of the survey as this information will provide the basis for updating the water plan for Region C.

Yours very truly,

Terrace Stewart
Chair, Region C Water Planning Group

C: Jim Parks, Vice Chair
Roy Eaton, Secretary

Attachments: Population Projection Survey
Historical and Projected Population Tables
Brochure

Region C Water Planning Group
Population Projection Survey of Cities
Please Return by September 30, 2002

City:________________________________Contact Person:_______________________
Telephone Number:____________________FAX:_______________________________
Email Address:____
Mailing Address:____

1. Are the TWDB projections of population for your city reasonable? If not, what changes would you suggest? What is the basis for your suggested changes? Please provide any available supporting data. Examples of supporting data include:
   - Documentation of undercount in 2000 census.
   - Documentation of higher migration into county over past several years than experienced between 1990 and 2000.
   - Changes in city boundaries, including annexation.

2. Please give your comments on the TWDB population projections for your county(ies).

3. Does your city have conservation and drought contingency plan(s)? If so, please provide a copy(ies).

4. What conservation measures does your city use? Are these measures effective? What is the cost of each water conservation measure your city employs?

5. What source(s) of water supply does your city currently use? If you have a contract for water supply, is there a contractual limit? Is there an option to increase the contractual amount? Please also note if you are having any problems with water quantity or water quality.

6. If groundwater is part or all of your water supply, please list:

- The number of water wells in operation.
- The number of usable water wells not currently in operation.
- The aquifer(s) being used.
- Their location (county and basin).
- Their depth.
- The production capacity of each well.

  Please also note if you are having any problems with current well production, either quantity or quality.

7. How do you plan to meet future water needs?

8. Is your city planning to develop additional source(s) of water supply in the future? If so, please provide quantity in each source and location of each source. If your city is not planning to develop additional water supply, would you please tell us why not?

9. Please provide a copy of any water supply plan(s) developed for your city.

10. Do you currently provide raw water or treated water to any other water suppliers? Please list other suppliers for which you provide water and the amount you provided to each of them in 2000. Please note if you are providing raw or treated water next to each customer. Please include contractual amounts and contract expiration dates, if any, for these customers.

11. Do you expect to discontinue providing water to any of these suppliers? If so, what changes do you expect?

12. Do you expect to begin providing water to any additional suppliers? If so, please list those entities you plan to supply, the amount of water you plan to supply, and the expiration date of the water supply contract, if applicable. What changes do you expect?

13. If you treat your own potable water, what is the current capacity of water treatment plant(s)? What are your plans for plant expansion?

14. Does your city currently use or sell treated wastewater for reuse? If so, how much on an annual basis and for what purposes?

15. Does your city have plans to begin using or to increase the amount of reuse applied in the future? If so, what increases do you expect to see and what is the expected timing of these increases? For what purposes will the reuse water be used?

16. Please give any other comments you have on the regional water planning process. Use the back (or other sheets) if needed.

Please return by September 30, 2002, to:
Ed Motley
Chiang, Patel and Yerby, Inc.
1820 Regal Row, Suite 200
Dallas, TX 75235
FAX: (214) 638-372

REGION C WATER PLANNING GROUP

Senate Bill One Second Round of Regional Water Planning - Texas Water Development Board

[Date]

Mr. Glynn Knight
East Texas Council of Governments
3800 Stone Rd.
Kilgore, TX 75662

COG

Subject: Population Projections and Data Survey – Please respond by September 30, 2002

Dear Mr. Knight:

Senate Bill One, passed by the Legislature in June 1997, requires that Regional Water Planning Groups update approved Water Plans at least every five years. The effort to update our region's plan has begun and we are seeking your input in the planning process. At least part of your service area is located in Region C and the Board Members of the Region C Water Planning Group are listed on this letter. The enclosed brochure shows a map of Region C and gives more information about the regional planning update process now underway.

The Region C Water Planning Group has selected a team of consultants led by Freese and Nichols, Inc., to help with the update of the regional water plan. Other members of the consulting team include, Alan Plummer Associates, Cooksey Communications, and Chiang, Patel & Yerby.

As instructed by the legislature, the Texas Water Development Board (TWDB) has formulated regulations governing the preparation of regional plans. These regulations require that regional water plans be based on projections of populations and water needs developed by the TWDB, unless the regional water planning group can provide convincing evidence that those projections should be modified. **With this letter, we are attaching a survey seeking information from you to help us determine whether the TWDB population projections are appropriate for your area or whether they should be revised.** We are also seeking other information important for planning. The TWDB is scheduled to provide initial water needs projections by the end of September. When we receive this information, we will provide it to you and seek your input. Please fill out the attached survey and return it to Ed Motley of Chiang, Patel and Yerby by no later than September 30, 2002. To maintain our schedule, information must be provided by the due date to be included in the updated Regional Water Plan.

c/o NTMWD
505 E. Brown Street
P. O. Box 2408
Wylie, Texas 75098-2408
972/442-5405
972/442-5405/Fax
NTMWD@airmail.net

To help you fill out the survey, attached is some information on historical and projected populations in Region C.

Table of Historical and Projected Population by City in Your County(ies). This table presents the historical and projected populations of cities in the counties your serve, as developed by the TWDB.

If you have any questions or need additional information to complete the survey, please contact

Mr. Ed Motley, Project Engineer at Chiang, Patel & Yerby, at (214) 638-0500.

Thank you in advance for your timely completion of the survey as this information will provide the basis for updating the water plan for Region C.

Yours very truly,

Terrace Stewart
Chair, Region C Water Planning Group

C: Jim Parks, Vice Chair
Roy Eaton, Secretary

Attachments: Population Projection Survey
Historical and Projected Population Tables
Brochure

Region C Water Planning Group
Population Projection Survey of Councils of Government (COG)
Please Return by September 30, 2002

Name of COG:________________________Contact Person:________________________
Telephone Number:____________________FAX:________________________________
Email Address:____
Mailing Address:____

1. Are the TWDB projections of population for the Region C counties you serve reasonable? If not, what changes would you suggest? What is the basis for your suggested changes? Please provide any available supporting data. Examples of supporting data include:
   - Documentation of undercount in 2000 census.
   - Documentation of higher migration into county over past several years than experienced between 1990 and 2000.
   - Changes in city boundaries, including annexation.

2. Please provide any population projections you may have for your member cities.

3. Do you know of any special concerns regarding water supply (quantity or quality) within your regional area?

4. Please provide copies of any reports or water supply plans your entity has prepared which you would like to have considered in the development of a water supply plan for your region.

5. Please give any other comments you have on the regional water planning process. Use the back (or other sheets) if needed.

Please return by September 30, 2002, to:
Ed Motley
Chiang, Patel and Yerby, Inc.
1820 Regal Row, Suite 200
Dallas, TX 75235
FAX: (214)638-3723

REGION C WATER PLANNING GROUP

Senate Bill One Second Round of Regional Water Planning - Texas Water Development Board

c/o NTMWD
505 E. Brown Street
P. O. Box 2408
Wylie, Texas 75098-2408
972/442-5405
972/442-5405/Fax
NTMWD@airmail.net

[Date]

County

The Honorable Ron Harris
Collin County-Other
Collin County Courthouse
210 South McDonald Street, #626
McKinney, TX 75069

Subject: Population Projections and Data Survey – Please respond by September 30, 2002

Dear Judge Harris:

Senate Bill One, passed by the Legislature in June 1997, requires that Regional Water Planning Groups update approved Water Plans at least every five years. The effort to update our region's plan has begun and we are seeking your input in the planning process. Your service area is located in Region C and the Board Members of the Region C Water Planning Group are listed on this letter. The enclosed brochure shows a map of Region C and gives more information about the regional planning update process now underway.

The Region C Water Planning Group has selected a team of consultants led by Freese and Nichols, Inc., to help with the update of the regional water plan. Other members of the consulting team include, Alan Plummer Associates, Cooksey Communications, and Chiang, Patel & Yerby.

As instructed by the legislature, the Texas Water Development Board (TWDB) has formulated regulations governing the preparation of regional plans. These regulations require that regional water plans be based on projections of populations and water needs developed by the TWDB, unless the regional water planning group can provide convincing evidence that those projections should be modified. **With this letter, we are attaching a survey seeking information from you to help us determine whether the TWDB population projections are appropriate for your county or whether they should be revised.** We are also seeking other information important for planning. The TWDB is scheduled to provide initial water needs projections by the end of September. When we receive this information, we will provide it to you and seek your input. Please fill out the attached survey and return it to Ed Motley of Chiang, Patel and Yerby by no later than September 30, 2002. To maintain our schedule, information must be provided by the due date to be included in the updated Regional Water Plan.

To help you fill out the survey, attached is some information on historical and projected populations in Region C.

Table of Historical and Projected Population for Your County. This table presents the historical and projected population for cities in your county developed by the TWDB

If you have any questions or need additional information to complete the survey, please contact

Mr. Ed Motley, Project Engineer at Chiang, Patel & Yerby, at (214) 638-0500.

Thank you in advance for your timely completion of the survey as this information will provide the basis for updating the water plan for Region C.

Yours very truly,

Terrace Stewart
Chair, Region C Water Planning Group

C: Jim Parks, Vice Chair
Roy Eaton, Secretary

Attachments: Population Projection Survey
Historical and Projected Population Tables
Brochure

Region C Water Planning Group
Population Projection Survey of Counties
Please Return by September 30, 2002

County:______________________________Contact Person:________________________
Telephone Number:____________________FAX:________________________________
Email Address:____
Mailing Address:____

1. Are the TWDB projections of population for your county reasonable? If not, what changes would you suggest? What is the basis for your suggested changes? Please provide any available supporting data and/or contact information.

2. Are you aware of plans to develop additional source(s) of water supply for your county in the future? If so, please provide the quantity and location of each source. Please provide the contact name and telephone number of the developer, if applicable.

3. Please provide copies of any water supply plans for your county that you would like to have considered in the development of a regional water supply plan.

4. Please give any other comments you have on the regional water planning process. Use the back (or other sheets) if needed.

Please return by September 30, 2002, to:
Ed Motley
Chiang, Patel and Yerby, Inc.
1820 Regal Row, Suite 200
Dallas, TX 75235
FAX: (214) 638-3723

REGION C WATER PLANNING GROUP

Senate Bill One Second Round of Regional Water Planning - Texas Water Development Board

c/o NTMWD
505 E. Brown Street
P. O. Box 2408
Wylie, Texas 75098-2408
972/442-5405
972/442-5405/Fax
NTMWD@airmail.net

[Date]

Noncity

Mayor Kenneth Sanders
Annetta South
511 McFarland Ranch Road
Aledo, TX 76008

Subject: Population Projections and Data Survey – Please respond by September 30, 2002

Dear Mayor Sanders:

Senate Bill One, passed by the Legislature in June 1997, requires that Regional Water Planning Groups update approved Water Plans at least every five years. The effort to update our region's plan has begun and we are seeking your input in the planning process. At least part of your service area is located in Region C and the Board Members of the Region C Water Planning Group are listed on this letter. The enclosed brochure shows a map of Region C and gives more information about the regional planning update process now underway.

The Region C Water Planning Group has selected a team of consultants led by Freese and Nichols, Inc., to help with the update of the regional water plan. Other members of the consulting team include, Alan Plummer Associates, Cooksey Communications, and Chiang, Patel & Yerby.

As instructed by the legislature, the Texas Water Development Board (TWDB) has formulated regulations governing the preparation of regional plans. These regulations require that regional water plans be based on projections of populations and water needs developed by the TWDB, unless the regional water planning group can provide convincing evidence that those projections should be modified. **With this letter, we are attaching a survey seeking information from you to help us determine whether the TWDB population projections are appropriate for your area or whether they should be revised.** We are also seeking other information important for planning. The TWDB is scheduled to provide initial water needs projections by the end of September. When we receive this information, we will provide it to you and seek your input. Please fill out the attached survey and return it to Ed Motley of Chiang, Patel and Yerby by no later than September 30, 2002. To maintain our schedule, information must be provided by the due date to be included in the updated Regional Water Plan.

To help you fill out the survey, attached is some information on historical and projected populations in Region C.

Table of Historical and Projected Population for Your Entity. This table presents the historical and projected population for your entity developed by the TWDB. The projections are for values within your service area excluding cities you serve with populations greater than 500.

Table of Historical and Projected Population for Your County. This table presents the TWDB historical and projected population for cities in the county(ies) you serve.

If you have any questions or need additional information to complete the survey, please contact

Mr. Ed Motley, Project Engineer at Chiang, Patel & Yerby, at (214) 638-0500.

Thank you in advance for your timely completion of the survey as this information will provide the basis for updating the water plan for Region C.

Yours very truly,

Terrace Stewart
Chair, Region C Water Planning Group

C: Jim Parks, Vice Chair
Roy Eaton, Secretary

Attachments: Population Projection Survey
Historical and Projected Population Tables
Brochure

Region C Water Planning Group
Population Projection Survey of Non-City Retail Suppliers
Please Return by September 30, 2002

Name of Supplier:____________________________Contact Person:__________________
Telephone Number:____________________FAX:________________________________
Email Address:____
Mailing Address:____

1. Are the TWDB projections of population for your entity reasonable? If not, what changes would you suggest? What is the basis for your suggested changes? Please provide any available supporting data. Examples of supporting data include:
    - Documentation of undercount in 2000 census.
    - Documentation of higher migration into service area over past several years than experienced between 1990 and 2000.
    - Changes in service area boundaries.

2. Please give your comments on the TWDB population projections for the county(ies) you serve.

3. Does your entity have a conservation and drought contingency plan? If so, please provide a copy.

4. What conservation measures does your entity use? Are these measures effective? What is the cost of each water conservation measure your entity employs?

5. What source(s) of water supply does your entity currently use? If you have a contract for water supply, is there a contractual limit? If so, what is the limit and is there an option to increase the contractual amount? Please also note if you are having any problems with water quantity or water quality.

6. If groundwater is part or all of your water supply, please list:

- The number of water wells in operation.
- The number of usable water wells not currently in operation.
- The aquifer(s) being used.
- Their location (county and basin).
- Their depth.
- The production capacity of each well.

Please also note if you are having any problems with current well production, either quantity or quality.

7. How do you plan to meet future water needs?

8. Is your entity planning to develop additional source(s) of water supply in the future? If so, please provide quantity in each source and location. If your entity is not planning to develop additional water supply, would you please tell us why not?

9. Please provide a copy of any water supply plan(s) developed for your entity.

10. Do you currently provide raw water or treated water to any other water suppliers? Please list other suppliers for which you provide water and the amount you provided to each of them in 2000. Please note if you are providing raw or treated water next to each customer. Please include contractual amounts and contract expiration dates, if any, for these customers.

11. Do you expect to discontinue providing water to any of these suppliers? If so, what changes do you expect?

12. Do you expect to begin providing water to any additional suppliers? If so, please list those entities you plan to supply, the amount of water you plan to supply, and the expiration date of the water supply contract, if applicable. What changes do you expect?

13. If you treat your own potable water, what is the current capacity of water treatment plant(s)? What are your plans for plant expansion?

14. Does your entity currently use or sell treated wastewater for reuse? If so, how much on an annual basis and for what purposes?

15. Does your entity have plans to begin using or to increase the amount of reuse applied in the future? If so, what increases do you expect to see and what is the expected timing of these increases? For what purposes will the reuse water be used?

16. Please give any other comments you have on the regional water planning process. Use the back (or other sheets) if needed.

Please return by September 30, 2002, to:
Ed Motley
Chiang, Patel and Yerby, Inc.
1820 Regal Row, Suite 200
Dallas, TX 75235
FAX: (214) 638-3723

REGION C WATER PLANNING GROUP

Senate Bill One Second Round of Regional Water Planning - Texas Water Development Board

c/o NTMWD
505 E. Brown Street
P. O. Box 2408
Wylie, Texas 75098-2408
972/442-5405
972/442-5405/Fax
NTMWD@airmail.net

[Date]

WWP

Mr. Jim Oliver
Tarrant Regional Water District
P.O. Box 4508
Fort Worth, TX 76164-0508

Subject: Population Projections and Data Survey – Please respond by September 30, 2002

Dear Mr. Oliver:

Senate Bill One, passed by the Legislature in June 1997, requires that Regional Water Planning Groups update approved Water Plans at least every five years. The effort to update our region's plan has begun and we are seeking your input in the planning process. At least part of your service area is located in Region C, and the Board Members of the Region C Water Planning Group are listed on this letter. The enclosed brochure shows a map of Region C and gives more information about the regional planning process which is now underway.

The Region C Water Planning Group has selected a team of consultants led by Freese and Nichols, Inc., to help with the update of the regional water plan. Other members of the consulting team include, Alan Plummer Associates, Cooksey Communications, and Chiang, Patel & Yerby.

As instructed by the legislature, the Texas Water Development Board (TWDB) has formulated regulations governing the preparation of regional plans. These regulations require that regional water plans be based on projections of populations and water needs developed by the TWDB, unless the regional water planning group can provide convincing evidence that those projections should be modified. **With this letter, we are attaching a survey seeking information from you to help us determine whether the TWDB population projections are appropriate for your area or whether they should be revised.** We are also seeking other information important for planning. The TWDB is scheduled to provide initial water needs projections by the end of September. When we receive this information, we will provide it to you and seek your input. Please fill out the attached survey and return it to Ed Motley of Chiang, Patel and Yerby by no later than September 30, 2002. To maintain our schedule, information must be provided by the due date to be included in the updated Regional Water Plan.

Your city meets the TWDB definition of a wholesale water provider (WWP). Due to this unique designation, we are including questions in the survey that pertain to both your city and the entities to whom you provide water.

To help you fill out the survey, attached is some information on historical and projected populations in Region C.

Table of Historical and Projected Population for the Region C Cities. This table presents the TWDB historical and projected populations for Region C cities.

If you have any questions or need additional information to complete the survey, please contact Mr. Ed Motley, Project Engineer at Chiang, Patel & Yerby, at (214) 638-0500.

Thank you in advance for your timely completion of the survey as this information will provide the basis for updating the water plan for Region C.

Yours very truly,

Terrace Stewart
Chair, Region C Water Planning Group

C: Jim Parks, Vice Chair
Roy Eaton, Secretary

Attachments: Population Projection Survey
Historical and Projected Population Tables
Brochure

Region C Water Planning Group
Population Projection Survey of Wholesale Water Providers (WWP)
(not surveyed as any other group)
Please Return by September 30, 2002

Name of WWP:________________________ Contact Person:________________________
Telephone Number:____________________ FAX:________________________________
Email Address:____
Mailing Address:____

1. Are the TWDB projections of population for the entities in the county(ies) you serve reasonable? If not, what changes would you suggest? What is the basis for your suggested changes? Please provide any available supporting data.

2. Please give your comments on the TWDB population projections for the entities and counties you serve.

3. Does your entity have a conservation and drought contingency plan? If so, please provide a copy.

4. What conservation measures does your entity use? Are these measures effective? What is the cost of each water conservation measure your entity employs?

5. Please provide copies of any reports or water supply plans your entity has prepared which you would like to have considered in the development of a water supply plan for your region.

6. What source(s) of water supply does your city currently use? If you have a contract for water supply, is there a contractual limit? If so, what is the limit and is there an option to increase the contractual amount? Please also note if you are having any problems with water quantity or water quality.

7. If groundwater is part or all of your water supply, please list:

    - The number of water wells in operation.
    - The number of usable water wells not currently in operation.
    - The aquifer(s) being used.
    - Their location (county and basin).
    - Their depth.
    - The production capacity of each well.

    Please also note if you are having any problems with current well production, either quantity or quality.

8. How do you plan to meet future water needs?

9. Is your entity planning to develop additional source(s) of water supply in the future? If so, please provide quantity in each source and location. If your entity is not planning to develop additional water supply, would you please tell us why not?

10. Please provide a copy of any water supply plan(s) developed for your entity.

11. Do you currently provide raw water or treated water to any other water suppliers? Please list other suppliers for which you provide water and the amount you provided to each of them in 2000. Please note if you are providing raw or treated water next to each customer. Please include contractual amounts and contract expiration dates, if any, for these customers.

12. Do you expect to discontinue providing water to any of these suppliers? If so, what changes do you expect?

13. Do you expect to begin providing water to any additional suppliers? If so, please list those entities you plan to supply, the amount of water you plan to supply, and the expiration date of the water supply contract, if applicable. What changes do you expect?

14. If you treat your own potable water, what is the current capacity of water treatment plant(s)? What are your plans for plant expansion?

15. Does your entity currently use or sell treated wastewater for reuse? If so, how much on an annual basis and for what purposes?

16. Does your entity have plans to begin using or to increase the amount of reuse applied in the future? If so, what increases do you expect to see and what is the expected timing of these increases? For what purposes will the reuse water be used?

17. Please give any other comments you have on the regional water planning process. Use the back (or other sheets) if needed.

Please return by September 30, 2002, to:
Ed Motley
Chiang, Patel and Yerby, Inc.
1820 Regal Row, Suite 200
Dallas, TX 75235
FAX: (214) 638-3723

REGION C WATER PLANNING GROUP

Senate Bill One Second Round of Regional Water Planning - Texas Water Development Board

c/o NTMWD
505 E. Brown Street
P. O. Box 2408
Wylie, Texas 75098-2408
972/442-5405
972/442-5405/Fax
NTMWD@airmail.net

[Date]

WWP & City

Mr. Jim Sparks
City of Cedar Hill
P. O. Box 96
Cedar Hill, TX 75106-0096

Subject: Population Projections and Data Survey – Please respond by September 30, 2002

Dear Mr. Sparks:

Senate Bill One, passed by the Legislature in June 1997, requires that Regional Water Planning Groups update approved Water Plans at least every five years. The effort to update our region's plan has begun and we are seeking your input in the planning process. Your city is located in Region C and the Board Members of the Region C Water Planning Group are listed on this letter. The enclosed brochure shows a map of Region C and gives more information about the regional planning process which is now underway.

The Region C Water Planning Group has selected a team of consultants led by Freese and Nichols, Inc., to help with the update of the regional water plan. Other members of the consulting team include, Alan Plummer Associates, Cooksey Communications, and Chiang, Patel & Yerby.

As instructed by the legislature, the Texas Water Development Board (TWDB) has formulated regulations governing the preparation of regional plans. These regulations require that regional water plans be based on projections of populations and water needs developed by the TWDB, unless the regional water planning group can provide convincing evidence that those projections should be modified. **With this letter, we are attaching a survey seeking information from you to help us determine whether the TWDB population projections are appropriate for your area or whether they should be revised.** We are also seeking other information important for planning. The TWDB is scheduled to provide initial water needs projections by the end of September. When we receive this information, we will provide it to you and seek your input. Please fill out the attached survey and return it to Ed Motley of Chiang, Patel and Yerby by no later than September 30, 2002. To maintain our schedule, information must be provided by the due date to be included in the updated Regional Water Plan.

Your city meets the TWDB definition of a wholesale water provider (WWP). Due to this unique designation, we are including questions in the survey that pertain to both your city and the entities to whom you provide water.

To help you fill out the survey, attached is some information on historical and projected populations in Region C.

Table of Historical and Projected Population for Your City. This table presents the historical and projected population for your city developed by the TWDB. The projections are for values within your city limits.

Table of Historical and Projected Population for the Region C Counties. This table presents the TWDB historical and projected population for the county(ies) in which you are located.

If you have any questions or need additional information to complete the survey, please contact Mr. Ed Motley, Project Engineer at Chiang, Patel & Yerby, at (214) 638-0500.

Thank you in advance for your timely completion of the survey as this information will provide the basis for updating the water plan for Region C.

Yours very truly,

Terrace Stewart
Chair, Region C Water Planning Group

C: Jim Parks, Vice Chair
Roy Eaton, Secretary

Attachments: Population Projection Survey
Historical and Projected Population Tables
Brochure

Region C Water Planning Group
Population Projection Survey of Cities Who Serve As Wholesale Water Providers
Please Return by September 30, 2002

Name of City:___________________Contact Person:________________________
Telephone Number:____________________FAX:________________________________
Email Address:____
Mailing Address:____

1. Are the TWDB projections of population for your city reasonable? If not, what changes would you suggest? What is the basis for your suggested changes? Please provide any available supporting data. Examples of supporting data include:
    - Documentation of undercount in 2000 census.
    - Documentation of Higher migration into county over past several years than experienced between 1990 and 2000.
    - Changes in city boundaries, including annexation.

2. Does your city have conservation and drought contingency plan(s)? If so, please provide a copy(ies).

3. What conservation measures does your city use? Are these measures effective? What is the cost of each water conservation measure your city employs?

4. Are the TWDB projections of population for the entities in the county(ies) you serve reasonable? If not, what changes would you suggest? What is the basis for your suggested changes? Please provide any available supporting data.

5. Please give your comments on the TWDB population projections for the entities and counties you serve.

6. Please provide copies of any reports or water supply plans your entity has prepared which you would like to have considered in the development of a water supply plan for your region.

7. Please provide a copy of any water supply plan(s) developed for your city.

8. What source(s) of water supply does your city currently use? If you have a contract for water supply, is there a contractual limit? Is there an option to increase the contractual amount? Please also note if you are having any problems with water quantity or water quality.

9. If groundwater is part or all of your water supply, please list:
    - The number of water wells in operation.
    - The number of usable water wells not currently in operation.
    - The aquifer(s) being used.
    - Their location (county and basin).
    - Their depth.
    - The production capacity of each well.

    Please also note if you are having any problems with current well production, either quantity or quality.

10. How do you plan to meet future water needs?

11. Is your city planning to develop additional source(s) of water supply in the future? If so, please provide quantity in each source and location of each source. If your city is not planning to develop additional water supply, would you please tell us why not?

12. Do you currently provide raw water or treated water to any other water suppliers? Please list other suppliers for which you provide water and the amount you provided to each of them in 2000. Please note if you are providing raw or treated water next to each customer. Please include contractual amounts and contract expiration dates, if any, for these customers.

13. Do you expect to discontinue providing water to any of these suppliers? If so, what changes do you expect?

14. Do you expect to begin providing water to any additional suppliers? If so, please list those entities you plan to supply, the amount of water you plan to supply, and the expiration date of the water supply contract, if applicable. What changes do you expect?

15. If you treat your own potable water, what is the current capacity of water treatment plant(s)? What are your plans for plant expansion?

16. Does your city currently use or sell treated wastewater for reuse? If so, how much on an annual basis and for what purposes?

17. Does your city have plans to begin using or to increase the amount of reuse applied in the future? If so, what increases do you expect to see and what is the expected timing of these increases? For what purposes will the reuse water be used?

18. Please give your comments on the TWDB water needs projections for the entities and counties you serve.

19. Please give any other comments you have on the regional water planning process. Use the back (or other sheets) if needed.

Please return by September 30, 2002, to:
Ed Motley
Chiang, Patel and Yerby, Inc.
1820 Regal Row, Suite 200
Dallas, TX 75235
FAX: (214) 638-3723

REGION C WATER PLANNING GROUP

Senate Bill One Second Round of Regional Water Planning - Texas Water Development Board

c/o NTMWD
505 E. Brown Street
P. O. Box 2408
Wylie, Texas 75098-2408
972/442-5405
972/442-5405/Fax
NTMWD@airmail.net

[Date]

Mr. Don Hamon
Dallas County WCID #6
P. O. Box 800040
Balch Springs, TX 75180-0040

WWP & Noncity

Subject: Population Projections and Data Survey – Please respond by September 30, 2002

Dear Mr. Hamon:

Senate Bill One, passed by the Legislature in June 1997, requires that Regional Water Planning Groups update approved Water Plans at least every five years. The effort to update our region's plan has begun and we are seeking your input in the planning process. At least part of your service area is located in Region C, and the Board Members of the Region C Water Planning Group are listed on this letter. The enclosed brochure shows a map of Region C and gives more information about the regional planning process which is now underway.

The Region C Water Planning Group has selected a team of consultants led by Freese and Nichols, Inc., to help with the update of the regional water plan. Other members of the consulting team include, Alan Plummer Associates, Cooksey Communications, and Chiang, Patel & Yerby.

As instructed by the legislature, the Texas Water Development Board (TWDB) has formulated regulations governing the preparation of regional plans. These regulations require that regional water plans be based on projections of populations and water needs developed by the TWDB, unless the regional water planning group can provide convincing evidence that those projections should be modified. **With this letter, we are attaching a survey seeking information from you to help us determine whether the TWDB population projections are appropriate for your area or whether they should be revised.** We are also seeking other information important for planning. The TWDB is scheduled to provide initial water needs projections by the end of September. When we receive this information, we will provide it to you and seek your input. Please fill out the attached survey and return it to Ed Motley of Chiang, Patel and Yerby by no later than September 30, 2002. To maintain our schedule, information must be provided by the due date to be included in the updated Regional Water Plan.

Your city meets the TWDB definition of a wholesale water provider (WWP). Due to this unique designation, we are including questions in the survey that pertain to both your city and the entities to whom you provide water.

To help you fill out the survey, attached is some information on historical and projected populations in Region C.

Table of Historical and Projected Population for Your Entity. This table presents the historical and projected population for your entity developed by the TWDB. The projections are for values within your service area excluding cities you serve with populations greater than 500.

Table of Historical and Projected Population for the Region C Counties. This table presents the TWDB historical and projected populations by city for the Region C counties you serve.

If you have any questions or need additional information to complete the survey, please contact Mr. Ed Motley, Project Engineer at Chiang, Patel & Yerby, at (214) 638-0500.

Thank you in advance for your timely completion of the survey as this information will provide the basis for updating the water plan for Region C.

Yours very truly,

Terrace Stewart
Chair, Region C Water Planning Group

C: Jim Parks, Vice Chair
Roy Eaton, Secretary

Attachments: Population Projection Survey
Historical and Projected Population Tables
Brochure

Region C Water Planning Group
Population Projection Survey of Non-City Retail Suppliers also Serving as Wholesale Water Providers (WWP)
Please Return by September 30, 2002

Name of Supplier:______________________Contact Person:________________________
Telephone Number:_____________________FAX:_______________________________
Email Address:____
Mailing Address:____

1. Are the TWDB projections of population for your entity reasonable? If not, what changes would you suggest? What is the basis for your suggested changes? Please provide any available supporting data. Examples of supporting data include:
   - Documentation of undercount in 2000 census.
   - Documentation of higher migration into service area over past several years than experienced between 1990 and 2000.
   - Changes in service area boundaries.

2. Please provide a copy of any water supply plan(s) developed for your entity.

3. We have a copy of your entity's drought contingency plan dated 1994. If you have more recent conservation and drought contingency plan(s) for your entity, please provide a copy(ies).

4. What conservation measures does your entity use? Are these measures effective? What is the cost of each water conservation measure your entity employs?

5. Are the TWDB projections of population for the entities in the county(ies) you serve reasonable? If not, what changes would you suggest? What is the basis for your suggested changes? Please provide any available supporting data.

6. Please give your comments on the TWDB population projections for the entities and counties you serve.

7. Please provide copies of any reports or water supply plans your entity has prepared which you would like to have considered in the development of a water supply plan for your region.

8. What source(s) of water supply does your entity currently use? If you have a contract for water supply, is there a contractual limit? If so, what is the limit and is there an option to increase the contractual amount? Please also note if you are having any problems with water quantity or water quality.

9. If groundwater is part or all of your water supply, please list:
   - The number of water wells in operation.
   - The number of usable water wells not currently in operation.
   - The aquifer(s) being used.
   - Their location (county and basin).
   - Their depth.
   - The production capacity of each well.

   Please also note if you are having any problems with current well production, either quantity or quality.

10. How do you plan to meet future water needs?

11. Is your entity planning to develop additional source(s) of water supply in the future? If so, please provide quantity in each source and location. If your entity is not planning to develop additional water supply, would you please tell us why not?

12. Do you currently provide raw water or treated water to any other water suppliers? Please list other suppliers for which you provide water and the amount you provided to each of them in 2000. Please note if you are providing raw or treated water next to each customer. Please include contractual amounts and contract expiration dates, if any, for these customers.

13. Do you expect to discontinue providing water to any of these suppliers? If so, what changes do you expect?

14. Do you expect to begin providing water to any additional suppliers? If so, please list those entities you plan to supply, the amount of water you plan to supply, and the expiration date of the water supply contract, if applicable. What changes do you expect?

15. If you treat your own potable water, what is the current capacity of water treatment plant(s)? What are your plans for plant expansion?

16. Does your entity currently use or sell treated wastewater for reuse? If so, how much on an annual basis and for what purposes?

17. Does your entity have plans to begin using or to increase the amount of reuse applied in the future? If so, what increases do you expect to see and what is the expected timing of these increases? For what purposes will the reuse water be used?

18. Please give any other comments you have on the regional water planning process. Use the back (or other sheets) if needed.

Please return by September 30, 2002, to:
Ed Motley
Chiang, Patel and Yerby, Inc.
1820 Regal Row, Suite 200
Dallas, TX 75235
FAX: (214) 638-3723

APPENDIX D

POPULATION PROJECTIONS

Table D.1
Adopted Water User Group Population Projections

REGION	WATER USER GROUP	COUNTY NAME	2000 Census [1]	Projected Populations for						Region Split Pop.[2]	County Split Pop.[3]
				2010	2020	2030	2040	2050	2060		
C	ALLEN	COLLIN	43,554	88,000	101,647	119,646	125,617	128,145	129,215		
C	ANNA	COLLIN	1,225	6,720	12,000	18,000	24,000	32,000	50,000		
C	BLUE RIDGE	COLLIN	672	2,000	4,000	7,000	11,000	16,000	18,000		
C	CADDO BASIN SUD	COLLIN	2,850	4,710	5,869	7,307	8,781	10,324	11,966	P	P
C	CELINA	COLLIN	1,861	5,000	22,675	48,000	85,000	130,000	150,000		
C	COUNTY-OTHER	COLLIN	6,149	6,408	5,981	5,600	5,208	4,801	4,369		
C	CULLEOKA WSC	COLLIN	6,186	8,534	11,264	13,682	16,161	18,754	21,515		
C	DALLAS	COLLIN	45,155	56,316	62,938	66,867	69,199	70,582	72,600		P
C	DANVILLE WSC	COLLIN	3,069	4,570	6,315	7,860	9,444	11,101	12,865		
C	EAST FORK SUD	COLLIN	2,919	3,935	5,116	6,162	7,234	8,356	9,550		P
C	FAIRVIEW	COLLIN	2,644	4,615	6,196	8,000	12,000	20,000	35,000		
C	FARMERSVILLE	COLLIN	3,118	3,683	7,000	10,000	15,000	22,000	30,000		
C	FRISCO	COLLIN	30,312	90,000	145,000	156,000	167,000	178,000	184,500		P
C	GARLAND	COLLIN	0	0	0	0	0	0	0		P
C	GUNTER RURAL WSC	COLLIN	2,738	4,500	6,000	7,053	8,479	9,971	11,560		P
C	HICKORY CREEK SUD	COLLIN	51	71	94	115	136	158	182	P	P
C	JOSEPHINE	COLLIN	575	679	2,000	2,000	2,000	2,000	2,000	P	P
C	LAVON WSC	COLLIN	2,250	3,422	4,784	7,000	14,000	22,000	30,000		P
C	LOWRY CROSSING	COLLIN	1,229	1,624	2,083	2,490	2,907	3,343	12,635		
C	LUCAS	COLLIN	2,890	6,400	9,849	12,000	15,500	22,000	30,000		
C	MCKINNEY	COLLIN	54,369	93,492	147,235	215,118	292,231	348,508	400,000		
C	MELISSA	COLLIN	1,350	14,400	20,000	26,000	32,000	40,000	50,000		
C	MILLIGAN WSC	COLLIN	1,621	1,621	1,621	1,621	1,621	1,621	1,621		
C	MURPHY	COLLIN	3,099	7,500	28,500	28,500	28,500	28,500	28,500		
C	NEVADA	COLLIN	563	690	1,500	1,800	3,600	6,000	15,000		
C	NEW HOPE	COLLIN	662	826	1,200	2,000	3,000	4,500	10,000		
C	NORTH COLLIN WSC	COLLIN	3,784	5,044	6,510	7,808	9,138	10,530	12,012		
C	PARKER	COLLIN	1,379	5,000	10,900	16,000	26,000	38,000	52,000		
C	PLANO	COLLIN	219,890	248,191	257,309	267,300	277,250	287,200	297,150		P
C	PRINCETON	COLLIN	3,477	5,000	10,000	18,000	30,000	50,000	75,000		
C	PROSPER	COLLIN	2,097	8,000	27,000	39,000	44,000	47,000	50,000		P
C	RICHARDSON	COLLIN	20,972	22,000	34,000	34,000	34,000	34,000	34,000		P
C	ROYSE CITY	COLLIN	188	1,500	5,000	8,000	12,000	16,000	18,000		P
C	SACHSE	COLLIN	1,660	3,393	5,409	6,266	6,630	6,785	6,900		P
C	SAINT PAUL	COLLIN	630	1,000	2,500	5,000	8,000	9,500	10,000		
C	SOUTH GRAYSON WSC	COLLIN	1,440	1,500	1,550	1,600	1,625	1,650	1,675		P
C	WESTON	COLLIN	635	2,000	4,000	7,000	20,000	35,000	60,000		
C	WYLIE	COLLIN	14,511	33,744	48,128	60,000	84,000	88,000	96,166		P
		COLLIN TOTAL	**491,774**	**756,088**	**1,033,173**	**1,249,795**	**1,512,261**	**1,762,329**	**2,033,981**		
C	BOLIVAR WSC	COOKE	1,493	1,666	1,787	1,849	1,859	1,859	1,858		P
C	COUNTY-OTHER	COOKE	8,504	9,487	10,181	10,533	10,590	10,586	10,586		
C	GAINESVILLE	COOKE	15,538	18,601	20,251	22,500	24,500	26,500	29,000		
C	KIOWA HOMEOWNERS WSC	COOKE	2,980	3,324	3,567	3,691	3,711	3,710	3,709		
C	LINDSAY	COOKE	788	879	943	976	981	981	981		
C	MUENSTER	COOKE	1,556	1,900	2,200	2,430	2,700	3,000	3,300		
C	TWO WAY SUD	COOKE	75	84	90	93	93	93	93		P
C	VALLEY VIEW	COOKE	737	1,500	3,000	5,000	7,000	12,000	15,000		

Table D.1
Adopted Water User Group Population Projections

REGION	WATER USER GROUP	COUNTY NAME	2000 Census (1)	Projected Populations for 2010	2020	2030	2040	2050	2060	Region Split Pop.(2)	County Split Pop.(3)
C	WOODBINE WSC	COOKE	4,692	5,234	5,773	6,307	6,839	7,370	7,901		P
		COOKE TOTAL	**36,363**	**42,675**	**47,792**	**53,379**	**58,273**	**66,099**	**72,428**		
C	ADDISON	DALLAS	14,166	17,919	20,534	22,358	23,629	24,515	25,133		
C	BALCH SPRINGS	DALLAS	19,375	21,083	22,564	23,849	24,963	25,930	26,768		
C	CARROLLTON	DALLAS	49,822	50,500	51,000	51,800	52,320	52,850	53,400		P
C	CEDAR HILL	DALLAS	32,044	46,206	59,075	69,878	78,946	86,558	92,949		P
C	COCKRELL HILL	DALLAS	4,443	4,782	4,947	5,028	5,067	5,086	5,095		
C	COMBINE	DALLAS	624	846	1,048	1,168	1,287	1,442	1,649		P
C	COMBINE WSC	DALLAS	900	1,392	1,840	2,106	2,370	2,714	3,173		P
C	COPPELL	DALLAS	35,734	40,000	40,000	40,000	40,000	40,000	40,000		P
C	COUNTY-OTHER	DALLAS	1,899	1,474	1,143	887	687	533	412		
C	DALLAS	DALLAS	1,121,131	1,229,768	1,360,736	1,429,400	1,499,354	1,664,187	1,956,134		P
C	DALLAS COUNTY WCID #6	DALLAS	2,850	4,728	6,434	7,447	8,453	9,765	11,513		
C	DE SOTO	DALLAS	37,646	47,649	57,243	65,849	73,881	82,923	85,400		
C	DUNCANVILLE	DALLAS	36,081	37,100	38,069	38,988	39,862	40,692	41,480		
C	EAST FORK SUD	DALLAS	768	816	860	886	912	946	991		P
C	FARMERS BRANCH	DALLAS	27,508	30,470	33,161	35,608	37,833	39,855	41,693		
C	GARLAND	DALLAS	215,768	235,020	255,000	272,000	287,000	300,000	300,000		P
C	GLENN HEIGHTS	DALLAS	5,618	7,332	8,919	10,390	11,752	13,013	14,182		P
C	GRAND PRAIRIE	DALLAS	99,760	138,883	165,711	194,459	231,089	273,547	317,251		P
C	GRAPEVINE	DALLAS	0	0	0	0	0	0	0		P
C	HIGHLAND PARK	DALLAS	8,842	8,937	9,025	9,106	9,181	9,249	9,313		
C	HUTCHINS	DALLAS	2,805	5,000	10,000	16,000	24,000	32,000	34,000		
C	IRVING	DALLAS	191,615	219,238	240,099	255,853	267,751	276,736	283,521		
C	LANCASTER	DALLAS	25,894	50,000	80,000	100,000	120,000	136,000	146,000		
C	LEWISVILLE	DALLAS	2	2	2	2	2	2	2		P
C	MESQUITE	DALLAS	124,522	160,000	195,000	225,000	242,000	249,000	250,600		P
C	OVILLA	DALLAS	251	368	540	792	1,162	1,704	2,500		P
C	RICHARDSON	DALLAS	70,804	80,880	82,000	82,000	82,000	82,000	82,000		P
C	ROCKETT SUD	DALLAS	1,781	2,469	3,094	3,465	3,833	4,313	4,954		P
C	ROWLETT	DALLAS	37,462	51,671	63,171	72,480	80,014	86,111	91,047		P
C	SACHSE	DALLAS	8,091	10,760	13,183	15,384	17,382	19,197	20,845		P
C	SARDIS-LONE ELM WSC	DALLAS	36	36	36	36	36	36	36		P
C	SEAGOVILLE	DALLAS	10,816	16,651	19,156	21,315	23,651	25,474	27,438		P
C	SUNNYVALE	DALLAS	2,693	5,000	7,000	9,000	11,000	13,000	13,300		
C	UNIVERSITY PARK	DALLAS	23,324	24,092	24,647	25,046	25,335	25,543	25,693		
C	WILMER	DALLAS	3,393	5,500	7,500	8,800	10,500	14,000	22,000		
C	WYLIE	DALLAS	306	580	827	1,048	1,246	1,426	1,584		P
		DALLAS TOTAL	**2,218,774**	**2,557,152**	**2,883,564**	**3,117,428**	**3,338,498**	**3,640,347**	**4,032,056**		
C	ARGYLE	DENTON	2,365	7,081	11,935	14,983	16,550	18,282	20,000		
C	ARGYLE WSC	DENTON	3,937	4,007	4,012	4,012	4,012	4,012	4,012		
C	AUBREY	DENTON	1,500	3,300	5,375	8,755	11,767	15,814	21,252		
C	BARTONVILLE	DENTON	1,093	5,000	10,000	14,000	16,500	17,500	18,000		
C	BARTONVILLE WSC	DENTON	1,172	1,400	1,604	1,786	1,948	2,094	2,224		
C	BOLIVAR WSC	DENTON	5,435	7,201	8,937	18,000	40,000	65,000	87,999		P
C	CARROLLTON	DENTON	59,754	70,500	73,000	76,700	79,000	80,600	81,400		P
C	COPPELL	DENTON	224	415	577	715	832	932	1,016		P
C	COPPER CANYON	DENTON	1,216	1,442	2,000	3,000	4,450	5,200	5,600		

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Adopted Water User Group Population Projections

REGION	WATER USER GROUP	COUNTY NAME	2000 Census [1]	Projected Populations for						Region Split Pop.[2]	County Split Pop.[3]
				2010	2020	2030	2040	2050	2060		
C	CORINTH	DENTON	11,325	16,983	21,319	24,643	28,000	30,000	31,500		
C	COUNTY-OTHER	DENTON	21,332	34,643	43,946	52,910	61,209	69,294	77,612		
C	CROSS ROADS	DENTON	602	1,500	3,899	6,351	10,594	16,500	20,600		
C	DALLAS	DENTON	22,273	26,219	28,183	29,162	29,649	29,891	30,012		P
C	DENTON	DENTON	80,537	145,000	199,000	250,000	295,000	363,586	498,488		
C	DENTON COUNTY FWSD	DENTON	1,200	3,092	4,952	6,701	8,501	10,328	12,240		
C	DOUBLE OAK	DENTON	2,179	2,800	3,100	3,300	3,500	3,700	3,900		
C	FLOWER MOUND	DENTON	50,702	64,000	85,000	100,000	115,000	124,000	130,089		
C	FORT WORTH	DENTON	44	5,000	30,000	45,000	65,000	95,000	125,000		P
C	FRISCO	DENTON	3,402	47,115	55,000	88,000	102,000	112,000	115,500		P
C	HACKBERRY	DENTON	544	1,086	1,619	2,120	2,361	2,477	2,533		
C	HEBRON	DENTON	874	961	1,500	2,500	5,000	7,500	8,100		
C	HICKORY CREEK	DENTON	2,078	3,500	5,300	6,500	8,000	10,500	13,500		
C	HIGHLAND VILLAGE	DENTON	12,173	15,148	16,868	17,862	18,437	18,769	19,000		
C	JUSTIN	DENTON	1,891	2,710	4,480	7,228	11,878	14,500	16,000		
C	KRUGERVILLE	DENTON	903	1,326	1,521	1,767	2,300	3,000	4,300		
C	KRUM	DENTON	1,979	3,271	4,212	5,222	7,000	9,000	11,500		
C	LAKE DALLAS	DENTON	6,166	7,902	9,102	9,933	10,507	10,904	11,179		
C	LEWISVILLE	DENTON	77,735	105,688	132,410	152,000	165,314	175,000	185,000		P
C	LINCOLN PARK	DENTON	517	880	1,236	1,571	1,916	2,266	2,632		
C	LITTLE ELM	DENTON	3,646	27,600	40,000	47,477	47,477	47,477	47,477		
C	MUSTANG WSC	DENTON	3,205	6,580	9,897	13,015	16,225	19,484	22,894		
C	NORTHLAKE	DENTON	921	4,974	5,753	11,059	16,364	19,684	21,195		
C	OAK POINT	DENTON	1,747	3,485	5,193	6,799	8,452	10,130	11,886		
C	PILOT POINT	DENTON	3,538	8,000	10,500	12,000	13,290	14,100	15,000		
C	PLANO	DENTON	2,140	5,417	7,623	7,700	7,750	7,800	7,850		P
C	PONDER	DENTON	507	1,800	5,000	10,000	16,000	18,500	19,000		
C	PROSPER	DENTON	0	2,000	8,000	14,000	21,000	23,000	25,000		P
C	ROANOKE	DENTON	2,810	4,692	6,999	11,000	15,000	20,000	24,094		
C	SANGER	DENTON	4,534	12,623	15,051	17,947	21,400	23,998	25,000		
C	SHADY SHORES	DENTON	1,461	2,117	2,762	3,368	3,992	4,625	5,288		
C	SOUTHLAKE	DENTON	434	1,000	2,000	3,000	4,000	5,800	6,000		P
C	THE COLONY	DENTON	26,531	42,800	56,000	63,000	65,000	67,000	67,600		
C	TROPHY CLUB	DENTON	6,350	7,806	8,803	9,658	10,400	11,200	12,000		
		DENTON TOTAL	**432,976**	**720,064**	**953,668**	**1,184,744**	**1,392,575**	**1,610,447**	**1,870,472**		
C	BARDWELL	ELLIS	583	838	1,075	1,308	1,546	1,813	2,107		
C	BRANDON-IRENE WSC	ELLIS	69	79	89	99	109	120	132	P	P
C	BUENA VISTA - BETHEL	ELLIS	2,100	2,938	3,620	3,970	4,513	5,193	5,981		
C	CEDAR HILL	ELLIS	49	49	49	49	49	49	49		P
C	COMMUNITY WATER COMPANY	ELLIS	832	1,134	1,414	1,690	1,972	2,288	2,636	P	P
C	COUNTY-OTHER	ELLIS	10,707	10,707	10,707	10,707	10,707	10,707	10,707		
C	ENNIS	ELLIS	16,045	20,539	26,290	33,655	43,081	55,148	70,596		
C	FERRIS	ELLIS	2,175	2,175	2,175	2,175	2,175	2,175	2,175		
C	FILES VALLEY WSC	ELLIS	620	688	751	813	876	947	1,025	P	P
C	GLENN HEIGHTS	ELLIS	1,606	2,660	3,638	4,602	5,587	6,689	7,905		P
C	GRAND PRAIRIE	ELLIS	46	450	2,105	5,269	8,854	13,082	18,461		P
C	ITALY	ELLIS	1,993	2,376	2,731	3,081	3,438	3,838	4,279		

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REGION	WATER USER GROUP	COUNTY NAME	2000 Census [1]	Projected Populations for 2010	2020	2030	2040	2050	2060	Region Split Pop.[2]	County Split Pop.[3]
C	JOHNSON COUNTY SUD	ELLIS	145	217	283	348	415	490	573	P	P
C	MANSFIELD	ELLIS	129	460	991	1,729	2,695	3,985	5,675	P	P
C	MAYPEARL	ELLIS	746	746	746	746	746	746	746		
C	MIDLOTHIAN	ELLIS	7,480	13,600	21,700	32,100	39,130	45,412	50,163		
C	MILFORD	ELLIS	685	685	685	685	685	685	685		
C	MOUNTAIN PEAK WSC	ELLIS	4,312	6,691	7,509	7,964	9,194	11,305	14,031	P	P
C	OAK LEAF	ELLIS	1,209	1,502	1,774	2,042	2,316	2,622	2,960		
C	OVILLA	ELLIS	3,154	4,983	6,681	8,354	9,346	9,346	9,346		P
C	PALMER	ELLIS	1,774	1,924	2,063	2,200	2,340	2,497	2,670		
C	PECAN HILL	ELLIS	672	813	943	1,072	1,203	1,350	1,512		
C	RED OAK	ELLIS	4,301	5,833	7,254	8,655	10,086	11,688	13,455		
C	RICE WSC	ELLIS	650	1,027	1,377	1,722	2,075	2,470	2,905		P
C	ROCKETT SUD	ELLIS	21,673	30,203	37,155	40,698	46,231	53,151	61,185		P
C	SARDIS-LONE ELM WSC	ELLIS	6,179	8,029	8,273	8,327	9,265	11,061	13,408		P
C	VENUS	ELLIS	0	0	0	0	0	0	0	P	P
C	WAXAHACHIE	ELLIS	21,426	28,281	36,202	46,342	59,322	75,937	97,206		
		ELLIS TOTAL	**111,360**	**149,627**	**188,280**	**230,402**	**277,956**	**334,794**	**402,573**		
C	BONHAM	FANNIN	9,990	11,516	12,603	16,000	22,000	30,000	37,000		
C	COUNTY-OTHER	FANNIN	11,488	11,610	11,568	11,391	11,091	10,735	10,322		
C	ECTOR	FANNIN	600	652	691	720	741	763	786		
C	HICKORY CREEK SUD	FANNIN	150	173	191	204	213	222	233	P	P
C	HONEY GROVE	FANNIN	1,746	1,858	1,978	2,105	2,241	2,386	2,539		
C	LADONIA	FANNIN	667	1,500	1,600	2,000	2,200	2,500	3,000		
C	LEONARD	FANNIN	1,846	2,149	2,502	3,500	5,500	8,000	10,000		
C	NORTH HUNT WSC	FANNIN	317	380	427	462	488	514	542	P	P
C	SAVOY	FANNIN	850	869	889	910	930	952	974		
C	SOUTHWEST FANNIN COUNTY SUD	FANNIN	2,911	5,113	6,562	7,569	8,474	9,279	10,085		P
C	TRENTON	FANNIN	662	1,000	1,500	2,500	4,000	6,000	8,000		
C	WHITEWRIGHT	FANNIN	15	22	28	32	35	38	41		P
		FANNIN TOTAL	**31,242**	**36,842**	**40,539**	**47,393**	**57,913**	**71,389**	**83,522**		
C	COUNTY-OTHER	FREESTONE	8,893	9,298	9,717	9,935	9,998	9,998	9,998		
C	FAIRFIELD	FREESTONE	3,094	5,000	5,500	6,000	6,500	7,000	7,500		
C	FLO COMMUNITY WSC	FREESTONE	241	252	263	269	271	271	271	P	P
C	TEAGUE	FREESTONE	4,557	5,201	5,846	6,450	7,135	7,779	8,424		
C	WORTHAM	FREESTONE	1,082	1,131	1,182	1,209	1,217	1,217	1,217		
		FREESTONE	**17,867**	**20,882**	**22,508**	**23,863**	**25,121**	**26,265**	**27,410**		
C	BELLS	GRAYSON	1,190	1,800	2,300	2,750	3,250	3,700	4,000		
C	COLLINSVILLE	GRAYSON	1,235	2,035	2,835	3,635	4,435	5,235	6,035		
C	COUNTY-OTHER	GRAYSON	26,766	26,925	26,799	26,482	25,160	23,185	20,727		
C	DENISON	GRAYSON	22,773	25,000	28,000	30,000	31,000	32,000	33,000		
C	GUNTER	GRAYSON	1,230	3,000	5,000	6,000	7,000	8,000	9,000		
C	GUNTER RURAL WSC	GRAYSON	245	800	1,200	1,600	2,200	3,500	5,000		P
C	HOWE	GRAYSON	2,478	3,899	5,730	7,552	8,764	9,772	10,781		
C	LUELLA WSC	GRAYSON	2,900	3,930	4,420	4,760	4,950	5,080	5,770		
C	POTTSBORO	GRAYSON	1,579	3,000	5,000	7,000	9,000	11,000	12,000		
C	SHERMAN	GRAYSON	35,082	39,300	44,400	50,600	57,700	67,000	80,000		
C	SOUTH GRAYSON WSC	GRAYSON	482	1,200	1,900	2,500	3,200	4,000	5,000		P

REGION	WATER USER GROUP	COUNTY NAME	2000 Census (1)	Projected Populations for						Region Split Pop.(2)	County Split Pop.(3)
				2010	2020	2030	2040	2050	2060		
C	SOUTHMAYD	GRAYSON	992	1,600	3,000	3,800	4,500	5,100	5,600		
C	SOUTHWEST FANNIN COUNTY SUD	GRAYSON	391	391	391	391	391	391	391		P
C	TIOGA	GRAYSON	754	1,100	2,500	3,500	4,000	4,400	4,600		
C	TOM BEAN	GRAYSON	941	1,320	1,500	1,700	1,800	1,900	2,000		
C	TWO WAY SUD	GRAYSON	3,474	4,997	6,630	8,158	9,726	11,289	12,852		P
C	VAN ALSTYNE	GRAYSON	2,502	5,014	11,000	15,000	17,000	18,500	19,200		
C	WHITESBORO	GRAYSON	3,760	6,000	7,500	8,500	9,250	9,750	10,000		
C	WHITEWRIGHT	GRAYSON	1,725	2,500	3,500	4,500	5,500	6,500	7,500		P
C	WOODBINE WSC	GRAYSON	96	102	106	109	110	111	112		P
		GRAYSON TOTAL	**110,595**	**133,913**	**163,711**	**188,537**	**208,936**	**230,413**	**253,568**		
C	ATHENS	HENDERSON	11,061	13,208	15,807	18,967	22,795	27,398	32,921	P	
C	BETHEL-ASH WSC	HENDERSON	1,611	2,025	2,474	2,917	3,371	3,925	4,625	P	P
C	COUNTY-OTHER	HENDERSON	1,329	1,328	1,327	1,326	1,326	1,325	1,324	P	
C	EAST CEDAR CREEK	HENDERSON	10,421	13,623	17,096	20,521	24,034	28,320	33,730		
C	EUSTACE	HENDERSON	798	881	971	1,060	1,151	1,262	1,402		
C	GUN BARREL CITY	HENDERSON	5,145	6,131	7,201	8,256	9,338	10,658	12,324		
C	LOG CABIN	HENDERSON	733	883	1,046	1,200	1,200	1,200	1,200		
C	MABANK	HENDERSON	318	341	365	389	414	444	482		P
C	MALAKOFF	HENDERSON	2,257	2,390	2,535	2,678	2,824	3,003	3,228		
C	PAYNE SPRINGS	HENDERSON	683	730	781	831	882	945	1,024		
C	SEVEN POINTS	HENDERSON	1,145	1,402	1,681	1,956	2,238	2,582	3,016		
C	TOOL	HENDERSON	2,275	2,618	2,990	3,357	3,733	4,192	4,771		
C	TRINIDAD	HENDERSON	1,091	1,112	1,135	1,158	1,181	1,210	1,246		
C	VIRGINIA HILL WSC	HENDERSON	3,117	3,131	3,146	3,161	3,176	3,195	3,219		
C	WEST CEDAR CREEK MUD	HENDERSON	10,000	12,701	15,631	18,520	21,484	25,100	29,664		P
		HENDERSON	**51,984**	**62,504**	**74,186**	**86,297**	**99,147**	**114,759**	**134,176**	**P**	
C	BRYSON	JACK	528	542	559	570	570	570	570		
C	COUNTY-OTHER	JACK	3,702	4,375	4,918	5,448	5,948	6,448	6,948		
C	JACKSBORO	JACK	4,533	4,650	4,798	4,897	4,897	4,897	4,897		
		JACK TOTAL	**8,763**	**9,567**	**10,275**	**10,915**	**11,415**	**11,915**	**12,415**		
C	ABLE SPRINGS WSC	KAUFMAN	3,046	4,809	6,529	8,297	10,257	12,683	15,693	P	P
C	COLLEGE MOUND WSC	KAUFMAN	7,956	10,530	13,042	15,624	18,485	22,027	26,421		
C	COMBINE	KAUFMAN	1,164	1,547	1,921	2,306	2,732	3,260	3,914		P
C	COMBINE WSC	KAUFMAN	1,534	2,730	3,897	5,096	6,425	8,071	10,112		P
C	COUNTY-OTHER	KAUFMAN	10,239	14,426	14,426	14,426	14,426	14,426	14,426		
C	CRANDALL	KAUFMAN	2,774	4,373	5,933	7,537	9,314	11,515	14,245		
C	DALLAS	KAUFMAN	0	0	0	0	0	0	0		P
C	FORNEY	KAUFMAN	5,588	12,000	24,000	30,000	35,000	39,000	42,803		
C	FORNEY LAKE WSC	KAUFMAN	598	10,200	11,000	11,500	12,000	12,500	13,000		P
C	GASTONIA-SCURRY	KAUFMAN	5,017	8,000	10,000	11,648	14,122	17,186	20,986		
C	HIGH POINT WSC	KAUFMAN	3,510	4,761	5,982	7,237	8,628	10,350	12,486		P
C	KAUFMAN	KAUFMAN	6,490	8,256	10,864	13,020	14,753	16,484	19,883		
C	KEMP	KAUFMAN	1,133	1,133	1,133	1,133	1,133	1,133	1,133		
C	MABANK	KAUFMAN	1,833	2,367	2,889	3,425	4,019	4,755	5,667		P
C	MAC BEE WSC	KAUFMAN	204	277	348	421	502	602	726	P	P
C	MESQUITE	KAUFMAN	1	2	3	4	6	8	10		P
C	OAK GROVE	KAUFMAN	710	928	1,141	1,360	1,602	1,902	2,274		

REGION	WATER USER GROUP	COUNTY NAME	2000 Census (1)	Projected Populations for						Region Split Pop.(2)	County Split Pop.(3)
				2010	2020	2030	2040	2050	2060		
C	SEAGOVILLE	KAUFMAN	7	17	27	37	48	62	79		P
C	TALTY	KAUFMAN	1,028	2,447	3,832	5,256	6,834	8,788	11,211		
C	TERRELL	KAUFMAN	13,606	15,196	18,642	21,664	23,650	25,599	28,445		
C	WEST CEDAR CREEK MUD	KAUFMAN	4,875	8,972	12,971	17,081	21,635	27,274	34,269		P
		KAUFMAN TOTAL	**71,313**	**112,971**	**148,580**	**177,072**	**205,571**	**237,625**	**277,783**		
C	BLOOMING GROVE	NAVARRO	833	833	833	833	833	833	833		
C	BRANDON-IRENE WSC	NAVARRO	205	221	238	256	276	299	328	P	P
C	CHATFIELD WSC	NAVARRO	3,308	5,285	6,708	8,190	9,799	11,718	14,075		
C	COMMUNITY WATER COMPANY	NAVARRO	833	1,041	1,301	1,626	2,032	2,541	3,176	P	P
C	CORSICANA	NAVARRO	24,485	25,537	26,674	27,858	29,144	30,678	32,563		
C	COUNTY-OTHER	NAVARRO	1,760	1,760	1,760	1,760	1,760	1,760	1,760		
C	DAWSON	NAVARRO	852	909	971	1,036	1,106	1,190	1,293		
C	FROST	NAVARRO	648	694	744	796	852	919	1,002		
C	KERENS	NAVARRO	1,681	1,681	1,681	1,681	1,681	1,681	1,681		
C	M E N WSC	NAVARRO	2,100	3,421	3,755	4,137	4,477	4,762	5,180		
C	NAVARRO MILLS WSC	NAVARRO	2,569	3,213	4,016	5,020	6,274	7,843	9,804		
C	RICE	NAVARRO	798	954	1,123	1,299	1,490	1,718	1,998		
C	RICE WSC	NAVARRO	5,052	6,640	8,357	10,145	12,086	14,402	17,247		P
		NAVARRO TOTAL	**45,124**	**52,189**	**58,161**	**64,637**	**71,810**	**80,344**	**90,940**		
C	ALEDO	PARKER	1,726	2,612	3,473	4,426	5,264	6,165	7,162		
C	ANNETTA	PARKER	1,108	1,579	1,972	2,289	2,564	2,856	3,176		
C	ANNETTA SOUTH	PARKER	555	708	836	939	1,028	1,123	1,227		
C	AZLE	PARKER	1,563	2,191	2,795	3,473	4,060	4,682	5,362		P
C	COUNTY-OTHER	PARKER	42,671	38,144	37,824	38,905	39,396	37,396	35,396		
C	FORT WORTH	PARKER	0	12,000	52,000	80,000	92,000	105,000	115,000		P
C	HUDSON OAKS	PARKER	1,637	2,960	4,262	5,673	6,943	8,330	9,884		
C	MINERAL WELLS	PARKER	2,176	4,000	4,000	4,000	4,000	4,000	4,000	P	P
C	RENO	PARKER	2,441	2,569	2,676	2,763	2,838	2,918	3,005		
C	SPRINGTOWN	PARKER	2,062	3,000	4,000	5,000	6,000	7,000	8,000		
C	WALNUT CREEK SUD	PARKER	10,707	16,522	21,373	25,294	28,686	32,293	36,245		P
C	WEATHERFORD	PARKER	19,000	25,412	32,161	38,365	43,389	48,773	54,799		
C	WILLOW PARK	PARKER	2,849	3,832	4,764	5,829	6,736	7,688	8,722		
		PARKER TOTAL	**88,495**	**115,529**	**172,136**	**216,956**	**242,904**	**268,224**	**291,978**		
C	BLACKLAND WSC	ROCKWALL	2,807	4,280	5,786	7,093	8,500	10,160	12,106	P	P
C	CASH SUD	ROCKWALL	421	638	860	1,053	1,260	1,505	1,792	P	P
C	COUNTY-OTHER	ROCKWALL	962	1,816	1,816	1,816	1,816	1,816	1,816		
C	DALLAS	ROCKWALL	21	21	21	21	21	21	21		P
C	EAST FORK SUD	ROCKWALL	58	58	58	58	58	58	58		P
C	FORNEY LAKE WSC	ROCKWALL	486	8,000	11,000	11,500	12,000	12,500	13,000		P
C	HEATH	ROCKWALL	4,149	6,971	9,857	12,362	15,058	18,238	21,968		
C	HIGH POINT WSC	ROCKWALL	281	457	637	793	961	1,159	1,391		P
C	LAVON WSC	ROCKWALL	1,459	3,103	4,785	6,245	7,815	9,668	11,841		P
C	MCLENDON-CHISHOLM	ROCKWALL	914	1,285	1,664	1,993	2,347	2,765	3,255		
C	MT ZION WSC	ROCKWALL	1,329	1,700	2,500	2,800	3,100	3,400	3,500		
C	R-C-H WSC	ROCKWALL	2,092	2,317	2,548	2,748	2,963	3,217	3,515		
C	ROCKWALL	ROCKWALL	17,976	32,000	55,000	71,000	80,000	82,113	82,113		
C	ROWLETT	ROCKWALL	7,041	7,600	7,685	7,698	7,700	7,700	7,700		P

Table D.1
Adopted Water User Group Population Projections

REGION	WATER USER GROUP	COUNTY NAME	2000 Census (1)	Projected Populations for 2010	2020	2030	2040	2050	2060	Region Split Pop.(2)	County Split Pop.(3)
C	ROYSE CITY	ROCKWALL	2,769	11,625	20,767	20,446	25,184	29,646	30,146		P
C	WYLIE	ROCKWALL	315	676	1,045	1,365	1,710	2,117	2,250		P
		ROCKWALL TOTAL	**43,080**	**82,547**	**126,029**	**148,991**	**170,493**	**186,083**	**196,472**		
C	ARLINGTON	TARRANT	332,969	390,000	453,656	485,000	500,000	510,000	515,000		
C	AZLE	TARRANT	8,037	9,917	14,000	20,000	27,000	34,000	40,000		P
C	BEDFORD	TARRANT	47,152	50,001	52,395	54,407	56,098	57,519	58,713		
C	BENBROOK	TARRANT	20,208	21,000	25,000	30,000	36,000	43,000	51,000		
C	BETHESDA WSC	TARRANT	7,889	10,585	13,110	15,707	18,447	21,735	25,620	P	P
C	BLUE MOUND	TARRANT	2,388	2,500	2,500	2,500	2,500	2,500	2,500		
C	BURLESON	TARRANT	3,462	4,885	6,218	7,589	9,035	10,770	12,820	P	P
C	COLLEYVILLE	TARRANT	19,636	26,183	28,856	29,947	30,393	30,575	30,649		
C	COMMUNITY WSC	TARRANT	3,341	3,396	3,447	3,500	3,556	3,623	3,702		P
C	COUNTY-OTHER	TARRANT	23,911	23,911	23,911	23,911	23,911	23,911	23,911		
C	CROWLEY	TARRANT	7,467	9,000	11,000	14,000	19,000	23,000	25,000		
C	DALWORTHINGTON GARDENS	TARRANT	2,186	2,467	2,650	2,771	2,850	2,902	2,935		
C	EDGECLIFF	TARRANT	2,550	2,550	2,550	2,550	2,550	2,550	2,550		
C	EULESS	TARRANT	46,005	53,446	60,416	63,854	65,550	66,386	66,798		
C	EVERMAN	TARRANT	5,836	6,500	7,100	7,700	8,300	8,900	9,000		
C	FOREST HILL	TARRANT	12,949	14,339	15,641	16,980	18,392	20,000	21,000		
C	FORT WORTH	TARRANT	534,650	613,940	694,306	814,237	993,901	1,253,264	1,578,759		P
C	GRAND PRAIRIE	TARRANT	27,621	36,654	45,116	50,617	54,194	56,519	58,031		P
C	GRAPEVINE	TARRANT	42,059	51,352	58,023	62,812	66,250	68,718	70,490		P
C	HALTOM CITY	TARRANT	39,018	44,855	50,322	53,058	54,428	55,113	55,456		
C	HASLET	TARRANT	1,134	2,000	4,000	7,000	7,000	7,000	7,000		
C	HURST	TARRANT	36,273	38,829	41,224	42,841	43,932	44,669	45,167		
C	JOHNSON COUNTY SUD	TARRANT	1,609	2,189	2,732	3,290	3,879	4,586	5,421	P	P
C	KELLER	TARRANT	27,345	40,285	48,097	48,097	48,097	48,097	48,097		
C	KENNEDALE	TARRANT	5,850	7,509	9,064	10,114	10,824	11,303	11,626		
C	LAKE WORTH	TARRANT	4,618	4,854	5,400	6,000	6,600	7,200	7,500		
C	LAKESIDE	TARRANT	1,040	1,252	1,451	1,655	1,871	2,130	2,436		
C	MANSFIELD	TARRANT	27,280	50,000	70,000	90,000	110,000	122,000	122,000	P	P
C	NORTH RICHLAND HILLS	TARRANT	55,635	64,861	73,503	79,341	83,286	85,951	87,751		
C	PANTEGO	TARRANT	2,318	2,318	2,318	2,318	2,318	2,318	2,318		
C	PELICAN BAY	TARRANT	1,505	1,727	1,935	2,149	2,374	2,644	2,963		
C	RICHLAND HILLS	TARRANT	8,132	8,400	9,000	9,600	10,300	10,700	10,850		
C	RIVER OAKS	TARRANT	6,985	7,100	7,100	7,100	7,100	7,100	7,100		
C	SAGINAW	TARRANT	12,374	15,995	19,387	21,859	23,660	24,973	25,930		
C	SANSOM PARK VILLAGE	TARRANT	4,181	4,376	4,527	4,644	4,734	4,804	4,857		
C	SOUTHLAKE	TARRANT	21,085	34,578	41,543	45,138	46,993	47,951	48,445		P
C	WATAUGA	TARRANT	21,908	23,423	24,632	25,596	26,365	26,979	27,468		
C	WESTOVER HILLS	TARRANT	658	658	658	658	658	658	658		
C	WESTWORTH VILLAGE	TARRANT	2,124	2,250	2,375	2,525	2,700	2,900	3,200		
C	WHITE SETTLEMENT	TARRANT	14,831	15,800	17,000	18,500	19,000	20,500	22,000		
		TARRANT TOTAL	**1,446,219**	**1,705,885**	**1,956,163**	**2,189,565**	**2,454,046**	**2,779,448**	**3,146,721**		
C	ALVORD	WISE	1,007	1,157	1,280	1,399	1,517	1,651	1,806		
C	AURORA	WISE	853	1,096	1,295	1,489	1,680	1,896	2,147		
C	BOLIVAR WSC	WISE	1,247	1,519	1,741	1,957	2,867	3,989	5,979		P

Table D.1
Adopted Water User Group Population Projections

REGION	WATER USER GROUP	COUNTY NAME	2000 Census (1)	Projected Populations for						Region Split Pop.(2)	County Split Pop.(3)
				2010	2020	2030	2040	2050	2060		
C	BOYD	WISE	1,099	1,500	2,000	2,200	2,200	2,200	2,200		
C	BRIDGEPORT	WISE	4,309	6,803	8,352	12,001	14,296	16,657	19,936		
C	CHICO	WISE	947	1,300	1,500	1,800	2,200	2,700	3,300		
C	COMMUNITY WSC	WISE	139	140	141	142	143	144	145		P
C	COUNTY-OTHER	WISE	26,129	32,364	35,909	35,909	35,909	35,909	35,909		
C	DECATUR	WISE	5,201	6,804	8,508	11,738	15,253	19,751	23,225		
C	FORT WORTH	WISE	0	2,000	10,000	14,000	18,000	24,000	30,000		P
C	NEW FAIRVIEW	WISE	877	1,587	2,167	2,732	3,290	3,921	4,654		
C	NEWARK	WISE	887	1,137	1,772	2,339	3,302	4,458	6,216		
C	RHOME	WISE	551	2,300	4,519	6,461	8,263	9,863	11,825		
C	RUNAWAY BAY	WISE	1,104	1,532	1,881	2,221	2,557	2,937	3,378		
C	WALNUT CREEK SUD	WISE	1,323	2,027	2,602	3,162	3,715	4,340	5,066		P
C	WEST WISE SUD	WISE	3,120	3,581	3,957	4,323	4,684	5,093	5,568		
		WISE TOTAL	**48,793**	**66,847**	**87,624**	**103,873**	**119,876**	**139,509**	**161,354**		
		REGION C TOTAL	**5,254,722**	**6,625,282**	**7,966,389**	**9,093,847**	**10,246,795**	**11,559,990**	**13,087,849**		

1) The year 2000 populations for cities and county totals are from the 2000 Census. For utilities, TWDB staff estimated the population served by the utility in 2000. Some of the 2000 population estimates for utilities were revised by the Regional Water Planning Groups. The County-Other population was derived by summing all of the city and utility population within a county and subtracting it from the county total population.
2) If "P" is present in this column, the Water User Group (WUG) is located in more than one Region and the projections listed in the row represent only the WUG's population projections within that particular Region, not the WUG's total population projections. If the "P" is present for a county total entry, then the county has been split by Regional boundaries and the projections listed in the row represent only the county's populations within the particular Region, not the county's total population projections.
3) If "P" is present in this column, the Water User Group (WUG) is located in more than one county and the projections listed in the row represent only the WUG's population projections within thi particular county, not the WUG's total population projections.

Projections last updated 7/26/2004

Table D.2
Totals for Multi-County Water User Groups

REGION	WATER USER GROUP	COUNTY NAME	2000 Census (1)	Population Projections for 2010	2020	2030	2040	2050	2060	Region Split Pop.(2)	County Split Pop.(3)
C	AZLE	PARKER	1,563	2,191	2,795	3,473	4,060	4,682	5,362		P
C	AZLE	TARRANT	8,037	9,917	14,000	20,000	27,000	34,000	40,000		P
	AZLE TOTAL		**9,600**	**12,108**	**16,795**	**23,473**	**31,060**	**38,682**	**45,362**		
C	BOLIVAR WSC	COOKE	1,493	1,666	1,787	1,849	1,859	1,859	1,858		P
C	BOLIVAR WSC	DENTON	5,435	7,201	8,937	18,000	40,000	65,000	87,999		P
C	BOLIVAR WSC	WISE	1,247	1,519	1,741	1,957	2,867	3,989	5,979		P
	BOLIVAR WSC TOTAL		**8,175**	**10,386**	**12,465**	**21,806**	**44,726**	**70,848**	**95,836**		
C	BRANDON-IRENE WSC	ELLIS	69	79	89	99	109	120	132	P	P
C	BRANDON-IRENE WSC	NAVARRO	205	221	238	256	276	299	328	P	P
	BRANDON-IRENE WSC TOTAL		**274**	**300**	**327**	**355**	**385**	**419**	**460**		
C	CARROLLTON	DALLAS	49,822	50,500	51,000	51,800	52,320	52,850	53,400		P
C	CARROLLTON	DENTON	59,754	70,500	73,000	76,700	79,000	80,600	81,400		P
	CARROLLTON TOTAL		**109,576**	**121,000**	**124,000**	**128,500**	**131,320**	**133,450**	**134,800**		
C	CEDAR HILL	DALLAS	32,044	46,206	59,075	69,878	78,946	86,558	92,949		P
C	CEDAR HILL	ELLIS	49	49	49	49	49	49	49		P
	CEDAR HILL TOTAL		**32,093**	**46,255**	**59,124**	**69,927**	**78,995**	**86,607**	**92,998**		
C	COMBINE	DALLAS	624	846	1,048	1,168	1,287	1,442	1,649		P
C	COMBINE	KAUFMAN	1,164	1,547	1,921	2,306	2,732	3,260	3,914		P
	COMBINE TOTAL		**1,788**	**2,393**	**2,969**	**3,474**	**4,019**	**4,702**	**5,563**		
C	COMBINE WSC	DALLAS	900	1,392	1,840	2,106	2,370	2,714	3,173		P
C	COMBINE WSC	KAUFMAN	1,534	2,730	3,897	5,096	6,425	8,071	10,112		P
	COMBINE WSC TOTAL		**2,434**	**4,122**	**5,737**	**7,202**	**8,795**	**10,785**	**13,285**		
C	COMMUNITY WATER COMPANY	ELLIS	832	1,134	1,414	1,690	1,972	2,288	2,636	P	P
C	COMMUNITY WATER COMPANY	NAVARRO	833	1,041	1,301	1,626	2,032	2,541	3,176	P	P
	COMMUNITY WATER COMPANY TOTAL		**1,665**	**2,175**	**2,715**	**3,316**	**4,004**	**4,829**	**5,812**		

Table D.2
Totals for Multi-County Water User Groups

REGION	WATER USER GROUP	COUNTY NAME	2000 Census (1)	Population Projections for 2010	2020	2030	2040	2050	2060	Region Split Pop.(2)	County Split Pop.(3)
C	COMMUNITY WSC	TARRANT	3,341	3,396	3,447	3,500	3,556	3,623	3,702		P
C	COMMUNITY WSC	WISE	139	140	141	142	143	144	145		P
	COMMUNITY WSC TOTAL		**3,480**	**3,536**	**3,588**	**3,642**	**3,699**	**3,767**	**3,847**		
C	COPPELL	DALLAS	35,734	40,000	40,000	40,000	40,000	40,000	40,000		P
C	COPPELL	DENTON	224	415	577	715	832	932	1,016		P
	COPPELL TOTAL		**35,958**	**40,415**	**40,577**	**40,715**	**40,832**	**40,932**	**41,016**		
C	DALLAS	COLLIN	45,155	56,316	62,938	66,867	69,199	70,582	72,600		P
C	DALLAS	DALLAS	1,121,131	1,229,768	1,360,736	1,429,400	1,499,354	1,664,187	1,956,134		P
C	DALLAS	DENTON	22,273	26,219	28,183	29,162	29,649	29,891	30,012		P
C	DALLAS	KAUFMAN	0	0	0	0	0	0	0		P
C	DALLAS	ROCKWALL	21	21	21	21	21	21	21		P
	DALLAS TOTAL		**1,188,580**	**1,312,324**	**1,451,878**	**1,525,450**	**1,598,223**	**1,764,681**	**2,058,767**		
C	EAST FORK SUD	COLLIN	2,919	3,935	5,116	6,162	7,234	8,356	9,550		P
C	EAST FORK SUD	DALLAS	768	816	860	886	912	946	991		P
C	EAST FORK SUD	ROCKWALL	58	58	58	58	58	58	58		P
	EAST FORK SUD TOTAL		**3,745**	**4,809**	**6,034**	**7,106**	**8,204**	**9,360**	**10,599**		
C	FORNEY LAKE WSC	KAUFMAN	598	10,200	11,000	11,500	12,000	12,500	13,000		P
C	FORNEY LAKE WSC	ROCKWALL	486	8,000	11,000	11,500	12,000	12,500	13,000		P
	FORNEY LAKE WSC TOTAL		**1,084**	**18,200**	**22,000**	**23,000**	**24,000**	**25,000**	**26,000**		
C	FORT WORTH	DENTON	44	5,000	30,000	45,000	65,000	95,000	125,000		P
C	FORT WORTH	PARKER	0	12,000	52,000	80,000	92,000	105,000	115,000		P
C	FORT WORTH	TARRANT	534,650	613,940	694,306	814,237	993,901	1,253,264	1,578,759		P
C	FORT WORTH	WISE	0	2,000	10,000	14,000	18,000	24,000	30,000		P
	FORT WORTH TOTAL		**534,694**	**632,940**	**786,306**	**953,237**	**1,168,901**	**1,477,264**	**1,848,759**		
C	FRISCO	COLLIN	30,312	90,000	145,000	156,000	167,000	178,000	184,500		P
C	FRISCO	DENTON	3,402	47,115	55,000	88,000	102,000	112,000	115,500		P
	FRISCO TOTAL		**33,714**	**137,115**	**200,000**	**244,000**	**269,000**	**290,000**	**300,000**		
C	GARLAND	COLLIN	0	0	0	0	0	0	0		P
C	GARLAND	DALLAS	215,768	235,020	255,000	272,000	287,000	300,000	300,000		P
	GARLAND TOTAL		**215,768**	**235,020**	**255,000**	**272,000**	**287,000**	**300,000**	**300,000**		

Table D.2
Totals for Multi-County Water User Groups

REGION	WATER USER GROUP	COUNTY NAME	2000 Census [1]	Population Projections for 2010	2020	2030	2040	2050	2060	Region Split Pop.[2]	County Split Pop.[3]
C	GLENN HEIGHTS	DALLAS	5,618	7,332	8,919	10,390	11,752	13,013	14,182		P
C	GLENN HEIGHTS	ELLIS	1,606	2,660	3,638	4,602	5,587	6,689	7,905		P
	GLENN HEIGHTS TOTAL		**7,224**	**9,992**	**12,557**	**14,992**	**17,339**	**19,702**	**22,087**		
C	GRAND PRAIRIE	DALLAS	99,760	138,883	165,711	194,459	231,089	273,547	317,251		P
C	GRAND PRAIRIE	ELLIS	46	450	2,105	5,269	8,854	13,082	18,461		P
C	GRAND PRAIRIE	TARRANT	27,621	36,654	45,116	50,617	54,194	56,519	58,031		P
	GRAND PRAIRIE TOTAL		**127,427**	**175,987**	**212,932**	**250,345**	**294,137**	**343,148**	**393,743**		
C	GRAPEVINE	DALLAS	0	0	0	0	0	0	0		P
C	GRAPEVINE	TARRANT	42,059	51,352	58,023	62,812	66,250	68,718	70,490		P
	GRAPEVINE TOTAL		**42,059**	**51,352**	**58,023**	**62,812**	**66,250**	**68,718**	**70,490**		
C	GUNTER RURAL WSC	COLLIN	2,738	4,500	6,000	7,053	8,479	9,971	11,560		P
C	GUNTER RURAL WSC	GRAYSON	245	800	1,200	1,600	2,200	3,500	5,000		P
	GUNTER RURAL WSC TOTAL		**2,983**	**5,300**	**7,200**	**8,653**	**10,679**	**13,471**	**16,560**		
C	HICKORY CREEK SUD	COLLIN	51	71	94	115	136	158	182	P	P
C	HICKORY CREEK SUD	FANNIN	150	173	191	204	213	222	233	P	P
	HICKORY CREEK SUD TOTAL		**201**	**244**	**285**	**319**	**349**	**380**	**415**		
C	HIGH POINT WSC	KAUFMAN	3,510	4,761	5,982	7,237	8,628	10,350	12,486		P
C	HIGH POINT WSC	ROCKWALL	281	457	637	793	961	1,159	1,391		P
	HIGH POINT WSC TOTAL		**3,791**	**5,218**	**6,619**	**8,030**	**9,589**	**11,509**	**13,877**		
C	JOHNSON COUNTY RURAL WSC	ELLIS	145	217	283	348	415	490	573	P	P
C	JOHNSON COUNTY RURAL WSC	TARRANT	1,609	2,189	2,732	3,290	3,879	4,586	5,421	P	P
	JOHNSON COUNTY RURAL WSC TOTAL		**1,754**	**2,406**	**3,015**	**3,638**	**4,294**	**5,076**	**5,994**		
C	LAVON WSC	COLLIN	2,250	3,422	4,784	7,000	14,000	22,000	30,000		P
C	LAVON WSC	ROCKWALL	1,459	3,103	4,785	6,245	7,815	9,668	11,841		P
	LAVON WSC TOTAL		**3,709**	**6,525**	**9,569**	**13,245**	**21,815**	**31,668**	**41,841**		

Table D.2
Totals for Multi-County Water User Groups

REGION	WATER USER GROUP	COUNTY NAME	2000 Census (1)	Population Projections for 2010	2020	2030	2040	2050	2060	Region Split Pop.(2)	County Split Pop.(3)
C	LEWISVILLE	DALLAS	2	2	2	2	2	2	2		P
C	LEWISVILLE	DENTON	77,735	105,688	132,410	152,000	165,314	175,000	185,000		P
	LEWISVILLE TOTAL		**77,737**	**105,690**	**132,412**	**152,002**	**165,316**	**175,002**	**185,002**		
C	MABANK	HENDERSON	318	341	365	389	414	444	482		P
C	MABANK	KAUFMAN	1,833	2,367	2,889	3,425	4,019	4,755	5,667		P
	MABANK TOTAL		**2,151**	**2,708**	**3,254**	**3,814**	**4,433**	**5,199**	**6,149**		
C	MANSFIELD	ELLIS	129	460	991	1,729	2,695	3,985	5,675	P	P
C	MANSFIELD	TARRANT	27,280	50,000	70,000	90,000	110,000	122,000	122,000	P	P
	MANSFIELD TOTAL		**27,409**	**50,460**	**70,991**	**91,729**	**112,695**	**125,985**	**127,675**		
C	MESQUITE	DALLAS	124,522	160,000	195,000	225,000	242,000	249,000	250,600		P
C	MESQUITE	KAUFMAN	1	2	3	4	6	8	10		P
	MESQUITE TOTAL		**124,523**	**160,002**	**195,003**	**225,004**	**242,006**	**249,008**	**250,610**		
C	OVILLA	DALLAS	251	368	540	792	1,162	1,704	2,500		P
C	OVILLA	ELLIS	3,154	4,983	6,681	8,354	9,346	9,346	9,346		P
	OVILLA TOTAL		**3,405**	**5,351**	**7,221**	**9,146**	**10,508**	**11,050**	**11,846**		
C	PLANO	COLLIN	219,890	248,191	257,309	267,300	277,250	287,200	297,150		P
C	PLANO	DENTON	2,140	5,417	7,623	7,700	7,750	7,800	7,850		P
	PLANO TOTAL		**222,030**	**253,608**	**264,932**	**275,000**	**285,000**	**295,000**	**305,000**		
C	PROSPER	COLLIN	2,097	8,000	27,000	39,000	44,000	47,000	50,000		P
C	PROSPER	DENTON	0	2,000	8,000	14,000	21,000	23,000	25,000		P
	PROSPER TOTAL		**2,097**	**10,000**	**35,000**	**53,000**	**65,000**	**70,000**	**75,000**		
C	RICE WSC	ELLIS	650	1,027	1,377	1,722	2,075	2,470	2,905		P
C	RICE WSC	NAVARRO	5,052	6,640	8,357	10,145	12,086	14,402	17,247		P
	RICE WSC TOTAL		**5,702**	**7,667**	**9,734**	**11,867**	**14,161**	**16,872**	**20,152**		
C	RICHARDSON	COLLIN	20,972	22,000	34,000	34,000	34,000	34,000	34,000		P
C	RICHARDSON	DALLAS	70,804	80,880	82,000	82,000	82,000	82,000	82,000		P
	RICHARDSON TOTAL		**91,776**	**102,880**	**116,000**	**116,000**	**116,000**	**116,000**	**116,000**		
C	ROCKETT SUD	DALLAS	1,781	2,469	3,094	3,465	3,833	4,313	4,954		P
C	ROCKETT SUD	ELLIS	21,673	30,203	37,155	40,698	46,231	53,151	61,185		P
	ROCKETT SUD TOTAL		**23,454**	**32,672**	**40,249**	**44,163**	**50,064**	**57,464**	**66,139**		

Table D.2
Totals for Multi-County Water User Groups

REGION	WATER USER GROUP	COUNTY NAME	2000 Census [1]	Population Projections for 2010	2020	2030	2040	2050	2060	Region Split Pop.[2]	County Split Pop.[3]
C	ROWLETT	DALLAS	37,462	51,671	63,171	72,480	80,014	86,111	91,047		P
C	ROWLETT	ROCKWALL	7,041	7,600	7,685	7,698	7,700	7,700	7,700		P
	ROWLETT TOTAL		**44,503**	**59,271**	**70,856**	**80,178**	**87,714**	**93,811**	**98,747**		
C	ROYSE CITY	COLLIN	188	1,500	5,000	8,000	12,000	16,000	18,000		P
C	ROYSE CITY	ROCKWALL	2,769	11,625	20,767	20,446	25,184	29,646	30,146		P
	ROYSE CITY TOTAL		**2,957**	**13,125**	**25,767**	**28,446**	**37,184**	**45,646**	**48,146**		
C	SACHSE	COLLIN	1,660	3,393	5,409	6,266	6,630	6,785	6,900		P
C	SACHSE	DALLAS	8,091	10,760	13,183	15,384	17,382	19,197	20,845		P
	SACHSE TOTAL		**9,751**	**14,153**	**18,592**	**21,650**	**24,012**	**25,982**	**27,745**		
C	SARDIS-LONE ELM WSC	DALLAS	36	36	36	36	36	36	36		P
C	SARDIS-LONE ELM WSC	ELLIS	6,179	8,029	8,273	8,327	9,265	11,061	13,408		P
	SARDIS-LONE ELM WSC TOTAL		**6,215**	**8,065**	**8,309**	**8,363**	**9,301**	**11,097**	**13,444**		
C	SEAGOVILLE	DALLAS	10,816	16,651	19,156	21,315	23,651	25,474	27,438		P
C	SEAGOVILLE	KAUFMAN	7	17	27	37	48	62	79		P
	SEAGOVILLE TOTAL		**10,823**	**16,668**	**19,183**	**21,352**	**23,699**	**25,536**	**27,517**		
C	SOUTH GRAYSON WSC	COLLIN	1,440	1,500	1,550	1,600	1,625	1,650	1,675		P
C	SOUTH GRAYSON WSC	GRAYSON	482	1,200	1,900	2,500	3,200	4,000	5,000		P
	SOUTH GRAYSON WSC TOTAL		**1,922**	**2,700**	**3,450**	**4,100**	**4,825**	**5,650**	**6,675**		
C	SOUTHLAKE	DENTON	434	1,000	2,000	3,000	4,000	5,800	6,000		P
C	SOUTHLAKE	TARRANT	21,085	34,578	41,543	45,138	46,993	47,951	48,445		P
	SOUTHLAKE TOTAL		**21,519**	**35,578**	**43,543**	**48,138**	**50,993**	**53,751**	**54,445**		
C	SOUTHWEST FANNIN COUNTY SUD	FANNIN	2,911	5,113	6,562	7,569	8,474	9,279	10,085		P
C	SOUTHWEST FANNIN COUNTY SUD	GRAYSON	391	391	391	391	391	391	391		P
	SOUTHWEST FANNIN COUNTY SUD TOTAL		**3,302**	**5,504**	**6,953**	**7,960**	**8,865**	**9,670**	**10,476**		
C	TWO WAY WSC	COOKE	75	84	90	93	93	93	93		P
C	TWO WAY WSC	GRAYSON	3,474	4,997	6,630	8,158	9,726	11,289	12,852		P
	TWO WAY WSC TOTAL		**3,549**	**5,081**	**6,720**	**8,251**	**9,819**	**11,382**	**12,945**		

Table D.2
Totals for Multi-County Water User Groups

REGION	WATER USER GROUP	COUNTY NAME	2000 Census (1)	Population Projections for 2010	2020	2030	2040	2050	2060	Region Split Pop.(2)	County Split Pop.(3)
C	WALNUT CREEK SUD	PARKER	10,707	16,522	21,373	25,294	28,686	32,293	36,245		P
C	WALNUT CREEK SUD	WISE	1,323	2,027	2,602	3,162	3,715	4,340	5,066		P
	WALNUT CREEK SUD TOTAL		**12,030**	**18,549**	**23,975**	**28,456**	**32,401**	**36,633**	**41,311**		
C	WEST CEDAR CREEK MUD	HENDERSON	10,000	12,701	15,631	18,520	21,484	25,100	29,664		P
C	WEST CEDAR CREEK MUD	KAUFMAN	4,875	8,972	12,971	17,081	21,635	27,274	34,269		P
	WEST CEDAR CREEK MUD TOTAL		**14,875**	**21,673**	**28,602**	**35,601**	**43,119**	**52,374**	**63,933**		
C	WHITEWRIGHT	FANNIN	15	22	28	32	35	38	41		P
C	WHITEWRIGHT	GRAYSON	1,725	2,500	3,500	4,500	5,500	6,500	7,500		P
	WHITEWRIGHT TOTAL		**1,740**	**2,522**	**3,528**	**4,532**	**5,535**	**6,538**	**7,541**		
C	WOODBINE WSC	COOKE	4,692	5,234	5,773	6,307	6,839	7,370	7,901		P
C	WOODBINE WSC	GRAYSON	96	102	106	109	110	111	112		P
	WOODBINE WSC TOTAL		**4,788**	**5,336**	**5,879**	**6,416**	**6,949**	**7,481**	**8,013**		
C	WYLIE	COLLIN	14,511	33,744	48,128	60,000	84,000	88,000	96,166		P
C	WYLIE	DALLAS	306	580	827	1,048	1,246	1,426	1,584		P
C	WYLIE	ROCKWALL	315	676	1,045	1,365	1,710	2,117	2,250		P
	WYLIE TOTAL		**15,132**	**35,000**	**50,000**	**62,413**	**86,956**	**91,543**	**100,000**		

1) The year 2000 populations for cities and county totals are from the 2000 Census. For utilities, TWDB staff estimated the population served by the utility in 2000. Some of the 2000 population estimates for utilities were revised by the Regional Water Planning Groups. The County-Other population was derived by summing all of the city and utility population within a county and subtracting it from the county total population.
2) If "P" is present in this column, the Water User Group (WUG) is located in more than one Region and the projections listed in the row represent only the WUG's population projections within that particular Region, not the WUG's total population projections. If the "P" is present for a county total entry, then the county has been split by Regional boundaries and the projections listed in the row represent only the county's populations within the particular Region, not the county's total population projections.
3) If "P" is present in this column, the Water User Group (WUG) is located in more than one county and the projections listed in the row represent only the WUG's populati projections within that particular county, not the WUG's total population projections.

Projections last updated 7/26/2004

APPENDIX E

QUESTIONNAIRES ON WATER DEMAND PROJECTIONS

APPENDIX E
QUESTIONNAIRES ON WATER DEMAND PROJECTIONS

The following attached questionnaires represent the surveys sent to each of the Region C Water User Groups as part of the water demand projection surveys. The Water User Groups were categorized based on available information. A description of these categories is included below. Lists of the Water User Groups within each category are included following the descriptions. The attached questionnaires are examples taken from the first Water User Group listed within each category.

Descriptions:

Agriculture Extension Service: Entities within this category include the County Agriculture Extension Service for each of the sixteen counties within the Region C planning area. These entities do not supply any water.

City: Water User Groups within this category include cities that supply water to retail customers only.

Council of Governments: Entities within this category include the various Council of Governments located within Region C and do not supply any water.

County: Water User Groups within this category include the sixteen counties within the Region C planning area. These entities supply water to retail customers included in the "County Other" populations.

Noncity Retail: Water User Groups within this category include water providers that are not cities (such as Water Supply Corporations, Special Utility Districts, etc.) and only supply water to retail customers.

Wholesale Water Provider: Water User Groups within this category include water providers that supply water to other Water User Groups only, and do not supply water to any retail customers.

Wholesale Water Provider & City: Water User Groups within this category include cities that are both retail and wholesale water providers. These entities supply water to retail customers and other Water User Groups.

Wholesale Water Provider & Noncity: Water User Groups within this category include entities that are not cities (such as Water Supply Corporations, Special Utility Districts, etc.) and are both retail and wholesale water providers. These entities supply water to retail customers and other Water User Groups.

Agriculture Extension Service (Pages E-6 to E-10)**:**

Collin County Extension Agent
Cooke County Extension Agent
Dallas County Extension Agent
Denton County Extension Agent
Ellis County Extension Agent
Fannin County Extension Agent
Freestone County Extension Agent
Grayson County Extension Agent
Henderson County Extension Agent
Jack County Extension Agent
Kaufman County Extension Agent
Navarro County Extension Agent
Parker County Extension Agent
Rockwall County Extension Agent
Tarrant County Extension Agent
Wise County Extension Agent

City (Pages E-11 to E-13)**:**

City of Aledo
City of Allen
City of Alvord
City of Anna
City of Annetta
City of Argyle
City of Arlington
City of Athens
City of Aubrey
City of Aurora
City of Azle
City of Balch Springs
City of Bardwell
City of Bartonville
City of Bedford
City of Bells
City of Benbrook
City of Berryville
City of Blooming Grove
City of Blue Mound
City of Blue Ridge
City of Bonham
City of Boyd
City of Bridgeport
City of Bryson
City of Burleson
City of Carrollton
City of Celina
City of Chico
City of Cockrell Hill
City of Colleyville
City of Collinsville
City of Combine
City of Coppell
City of Copper Canyon
City of Corinth
City of Crandall
City of Cross Roads
City of Crowley
City of Dalworthington Gardens
City of Dawson
City of Decatur
City of Denison
City of DeSoto
City of Double Oak
City of Duncanville
City of Ector
City of Ennis
City of Euless
City of Eustace
City of Everman
City of Fairfield
City of Fairview
City of Farmers Branch
City of Farmersville
City of Ferris
City of Flower Mound
City of Forest Hill
City of Forney
City of Frisco
City of Frost
City of Gainesville
City of Garland
City of Glenn Heights
City of Grand Prairie
City of Grapevine
City of Gun Barrel City
City of Gunter
City of Hackberry
City of Haltom City
City of Haslet
City of Heath
City of Hebron
City of Hickory Creek
City of Highland Village
City of Honey Grove
City of Howe
City of Hudson Oaks
City of Hurst
City of Hutchins
City of Irving
City of Italy
City of Jacksboro
City of Josephine
City of Justin
City of Kaufman
City of Keller
City of Kemp
City of Kennedale
City of Kerens
City of Krugerville
City of Krum
City of Ladonia
City of Lake Dallas
City of Lake Worth
City of Lakeside
City of Lancaster
City of Leonard
City of Lincoln Park

City of Log Cabin
City of Lowry Crossing
City of Lucas
City of Mabank
City of Malakoff
City of Mansfield
City of Maypearl
City of McLendon-Chisholm
City of Melissa
City of Mesquite
City of Milford
City of Muenster
City of Murphy
City of Nevada
City of New Fairview
City of New Hope
City of Newark
City of Northlake
City of Oak Grove
City of Oak Leaf
City of Oak Point
City of Ovilla
City of Palmer
City of Parker
City of Payne Springs
City of Pecan Hill
City of Pelican Bay
City of Pilot Point
City of Plano
City of Pottsboro
City of Princeton
City of Prosper
City of Red Oak
City of Reno
City of Rhome
City of Rice
City of Richardson
City of Richland Hills
City of River Oaks
City of Roanoke
City of Rowlett
City of Royse City
City of Runaway Bay
City of Sachse
City of Saginaw
City of Saint Paul
City of Sanger
City of Sansom Park
City of Savoy
City of Seagoville
City of Seven Points
City of Sherman
City of Southlake
City of Southmayd
City of Springtown
City of Teague
City of The Colony
City of Tioga
City of Tom Bean
City of Tool
City of Trenton
City of Trinidad
City of Trophy Club
City of University Park
City of Valley View
City of Van Alstyne
City of Watauga
City of Weston
City of Westover Hills
City of Westworth Village
City of White Settlement
City of Whitesboro
City of Whitewright
City of Willow Park
City of Wilmer
City of Wortham
City of Wylie
Town of Addison
Town of Edgecliff Village
Town of Highland Park
Town of Lindsay
Town of Little Elm
Town of Pantego
Town of Ponder
Town of Shady Shores
Town of Sunnyvale
Town of Talty

Council of Governments (Pages E-14 to E-16)**:**
East Texas Council of Governments
Heart of Texas Council of Governments
Nortex Regional Planning Commission
North Central Texas Council of Governments
Texoma Council of Governments

County (Pages E-17 to E-19)**:**

Collin County
Cooke County
Dallas County
Denton County
Ellis County
Fannin County
Freestone County
Grayson County
Henderson County
Jack County
Kaufman County
Navarro County
Parker County
Rockwall County
Tarrant County
Wise County

Noncity Retail (Pages E-20 to E-22)**:**

Able Springs WSC
Annetta South
Argyle WSC
Bartonville WSC
Benbrook Sewer and Water Authority
Bethel-Ash WSC
Bethesda WSC
Blackland WSC
Bolivar WSC
Brandon Irene WSC
Buena Vista – Bethel SUD
Caddo Basin SUD
Cash SUD
Chatfield WSC
College Mound WSC
Combine WSC
Community Water Company Community WSC
Culleoka WSC
Danville WSC
Deer Creek Waterworks
Denton County FWSD #1
East Cedar Creek FWSD
East Fork SUD
Files Valley WSC
Flo Community WSC
Forney Lake WSC
Gastonia-Scurry WSC
Gunter Rural WSC
Hickory Creek SUD
High Point WSC
Johnson County SUD
Kiowa Homeowners WSC
Lavon WSC
Luella WSC
M.E.N. WSC
Mac Bee WSC
Milligan WSC
Mountain Peak WSC
Mt Zion WSC
Mustang WSC
North Collin WSC
North Hunt WSC
R.C.H. WSC
Rice WSC
Rockett SUD
Sardis-Lone Elm WSC
South Grayson WSC
Southwest Fannin County SUD
Turlington WSC
Two Way SUD
Virginia Hill WSC
Walnut Creek SUD
West Cedar Creek MUD
West Wise SUD
Woodbine WSC

Wholesale Water Provider (Pages E-23 to E-25)**:**

Athens MWA
Dallas County Park Cities MUD
Greater Texoma Utility Authority
Lake Cities MUA
Midlothian Water District
North Texas Municipal Water District
Palo Pinto County MWD #1
Parker County UD #1
Sabine River Authority
Sulphur River Water District
Tarrant Regional Water District
Trinity River Authority
Upper Neches Municipal Water Authority
Upper Trinity Regional Water District
Wise County WSD

Wholesale Water Provider & City (Pages E-26 to E-28)**:**

City of Cedar Hill
City of Corsicana
City of Dallas
City of Denton
City of Fort Worth
City of Lewisville
City of McKinney
City of Midlothian
City of Mineral Wells
City of North Richland Hills
City of Rockwall
City of Terrell
City of Waxahachie
City of Weatherford

Wholesale Water Provider & Noncity (Pages E-29 to E-31)**:**

Dallas County WCID #6
Trophy Club MUD #1

REGION C WATER PLANNING GROUP

Senate Bill One Second Round of Regional Water Planning - Texas Water Development Board

c/o NTMWD
505 E. Brown Street
P. O. Box 2408
Wylie, Texas 75098-2408
972/442-5405
972/442-5405/Fax
jparks@ntmwd.com

January 31, 2003

Ag. Extension

Mr. Eddie Baggs
Collin County Extension Agent
Texas Agriculture Extension Service
825 N. McDonald, Suite 150
McKinney, TX 75069

Subject: Water Needs Projections and Data for Regional Water Planning

Dear Mr. Baggs:

We are beginning the second round of regional water planning under Senate Bill One, which was passed by the Legislature in 1997. Senate Bill One called for the regional water planning groups to take the lead in local planning efforts. The county you serve is located in Region C, and the members of the Region C Water Planning Group are listed on this letter. The enclosed brochure shows a map of Region C and gives more information about the regional planning process, which is now underway. The Region C Water Planning Group has selected a team of consultants led by Freese and Nichols, Inc., to help with the development of a regional water plan. Other members of the consulting team include, Alan Plummer Associates, Cooksey Communications, and Chiang, Patel & Yerby, Inc.

As instructed by the legislature, the Texas Water Development Board has formulated regulations governing the preparation of regional plans. These regulations require that regional water plans be based on projections of population and water needs developed by the TWDB, unless the regional water planning group can provide convincing evidence that those projections should be modified.

With this letter, we are attaching a survey seeking information from you to help us determine whether the draft TWDB agricultural water needs projections are appropriate for your county or whether they should be revised. This information is very important because the projections of water needs will be the basis for all of our water planning efforts. Please fill out the attached survey and return it to Ed Motley of Chiang, Patel and Yerby, Inc. by <u>February 28, 2003.</u>

To help you fill out the survey, we are providing some information on historical water use and projected water needs in Region C:

Table of Historical Per Capita Municipal Water Use and Projected Per Capita Water Needs for Your County. This table lists the TWDB historical per capita municipal water use and projected per capita municipal water needs for the county in which your organization is located. Per capita municipal water needs do not include industrial water needs, which are projected separately. They do include residential, commercial and institutional water needs, expressed as gallons per person per day.

Table of Region C Recommended County Population Projections. This table lists the Region C recommended population projections for the county in which your organization is located. These populations are currently under review with TWDB.

Table of Historical Water Use and Projected Water Needs for Your County. This table presents the TWDB historical water use and projected water needs by category for the county in which your organization is located. The water use is calculated with recommended TWDB per capita use and recommended Region C population projections. Municipal water use is water use for residential, commercial, and institutional customers. It does not include industrial water even if it is provided by your organization. Industrial use is included in a separate county-wide projection of water needs. Projections of municipal needs are for a dry (high-use) year. Manufacturing includes manufacturing water supplied by cities.

If you have any questions or want additional information as you review these data and fill out the questionnaire, please call Ed Motley at (214) 638-0500. We greatly appreciate your attention and cooperation in reviewing these data, which will provide the basis for long range water supply planning in Region C.

Yours very truly,

James (Jim) M. Parks
Chair, Region C Water Planning Group

C: Roy Eaton, Secretary
Judge Harris, Collin County

Region C Water Planning Group
Water Needs Projection Survey of County Extension Agents
Please Return by February 28, 2003

County:______________________________Contact Person:________________________
Telephone Number:____________________FAX:_________________________________
Email Address:____
Mailing Address:____

1. Do you agree that the TWDB projections of irrigation and livestock water needs for your county are appropriate? If not, what changes would you suggest? What is the basis for your suggested changes?

2. How many acres of cultivated land are in your county?

3. How many acres of idle land are in your county?

4. Are you aware of any trend in changes of crop type?

5. Is there a trend in your county to move from cultivated to urban land use and/or rural residential use? If so, how much acreage do you expect to see converted?

6. How many acres of land are available for livestock in your county? How many acres of land are currently being used for livestock?

7. What is the approximate number of head of livestock within your county? How many Confined Animal Feeding Operations (CAFOs) are in your county and what is the head count? Are you aware of any proposed CAFOs for your county, and what is the expected head count?

8. What is your projected change in livestock over the next 10 years?

9. In your opinion, are there any Natural Resource Conservation Service (formerly Soil Conservation Service) structures that need to be repaired or dredged in your county? If so, approximately how many, what are the sizes of the structures, and where are they located within the county?

10. Is anyone in your county experiencing water shortages for livestock? If so, are the shortages occurring in particular areas or county-wide? Are these shortages due to lack of surface water or lack of groundwater?

11. Is there any other information you think might be helpful in this planning effort?

12. Is anyone in your county practicing brush control for the purposes of water conservation? If so, how many people are using this method and how many acres of land are involved? In your opinion, has there been any benefit from brush control as a water conservation strategy?

13. Please provide your historical total water usage for the following years:

    1998:____________________________

    1999:____________________________

    2000:____________________________

    2001:____________________________

    2002:____________________________

14. Please give any other comments you have on the regional water planning process.

Use the back (or other sheets) if needed.

Please return by February 28, 2003 to:
Ed Motley
Chiang, Patel and Yerby, Inc.
1820 Regal Row, Suite 200
Dallas, TX 75235
FAX: (214)638-3723

REGION C WATER PLANNING GROUP

Senate Bill One Second Round of Regional Water Planning - Texas Water Development Board

January 31, 2003

Ms. Daphne Richardson
City Administrator
City of Aledo
200 Old Annetta Road
Aledo, TX 76008

City

Subject: Water Needs Projections for Regional Water Planning

Dear Ms. Richardson:

In September of last year, the Region C Water Planning Group sent you a survey regarding population projections developed by the Texas Water Development Board (TWDB). We have reviewed the responses to that survey and developed requests for revisions of the draft population projections. The input received from that survey was an essential element of the requested revisions.

We have attached our follow-up survey regarding the TWDB's recently released draft water needs projections. These draft water needs projections are based on the draft population figures developed by TWDB, which may change in response to the comments on population projections that we are developing.

As instructed by the legislature, the TWDB has formulated regulations governing the preparation of regional plans. These regulations require that regional water plans be based on projections of populations and water needs developed by the TWDB, unless the regional water planning group can provide convincing evidence that those projections should be modified. With this letter, we are attaching a survey seeking information from you to help us determine whether the draft TWDB water needs projections are appropriate for your city or whether they should be revised. Please complete the attached survey and return it to Ed Motley of Chiang, Patel and Yerby, Inc. by <u>February 28, 2003</u>.

To help you fill out the survey, we are providing some information on historical water use and projected water needs in Region C:

Table of Historical Per Capita Municipal Water Use and Projected Per Capita Water Needs for Your City. This table lists the TWDB historical per capita municipal water use and projected per capita municipal water needs for your city. Per capita municipal water needs do not include industrial water needs, which are projected separately. They do include residential, commercial and institutional water needs, expressed as gallons per person per day.

c/o NTMWD
505 E. Brown Street
P. O. Box 2408
Wylie, Texas 75098-2408
972/442-5405
972/442-5405/Fax
jparks@ntmwd.com

Table of Region C Recommended Subcounty Population Projections for Your City. This table lists the Region C recommended population projections for your city. These populations are currently under review with TWDB.

Table of Historical Water Use and Projected Municipal Water Needs for Your City. This table presents the historical water use and projected municipal water needs of your city. The water use is calculated with recommended TWDB per capita use and recommended Region C population projections. Municipal water use is water use for residential, commercial, and institutional customers. It does not include industrial water even if it is provided by your city. Industrial use is included in a separate county-wide projection of water needs. Projections of municipal needs are for a dry (high-use) year.

Table of Historical Per Capita Use and Projected Per Capita Needs for Your County. This table lists the TWDB historical per capita use and projected per capita needs for the county(ies) in which your city is located.

Table of Region C Recommended County Population Projections. This table lists the Region C recommended population projections for the county(ies) in which your city is located. These populations are currently under review with TWDB.

Table of Historical Water Use and Projected Water Needs for Your County. This table presents the TWDB historical water use and projected water needs by category for the county(ies) in which your city is located. Manufacturing includes manufacturing water supplied by cities.

If you have any questions or want additional information as you review these data and fill out the questionnaire, please call Ed Motley at (214) 638-0500. We greatly appreciate your attention and cooperation in reviewing these data, which will provide the basis for long range water supply planning in Region C.

Yours very truly,

James (Jim) M. Parks
Chair, Region C Water Planning Group

CC: Roy Eaton, Secretary

Region C Water Planning Group
Water Needs Projection Survey of Cities
Please Return by February 28, 2003

City:________________________________ Contact Person:_______________________
Telephone Number:____________________ FAX:________________________________
Email Address:____
Mailing Address:____

1. Do you agree that the TWDB projections of municipal water needs and per capita needs are appropriate for your city? If not, what changes would you suggest? What is the basis for your suggested changes?

2. Please give your comments on the TWDB water needs projections for your county(ies).

3. Please provide your historical total water usage for the following years:

   1998:__________________________

   1999:__________________________

   2000:__________________________

   2001:__________________________

   2002:__________________________

4. Please give any other comments you have on the regional water planning process. Use the back (or other sheets) if needed.

Please return by February 28, 2003 to:
Ed Motley
Chiang, Patel and Yerby, Inc.
1820 Regal Row, Suite 200
Dallas, TX 75235

FAX: (214)638-3823

REGION C WATER PLANNING GROUP

Senate Bill One Second Round of Regional Water Planning - Texas Water Development Board

January 31, 2003

Mr. Mike Murray
East Texas Council of Governments
3800 Stone Rd.
Kilgore, TX 75662

COG

Subject: Water Needs Projections for Regional Water Planning

Dear Mr. Murray:

In September of last year, the Region C Water Planning Group sent you a survey regarding population projections developed by the Texas Water Development Board (TWDB). We have reviewed the responses to that survey and developed requests for revisions of the draft population projections. The input received from that survey was an essential element of the requested revisions.

We have attached our follow-up survey regarding the TWDB's recently released draft water needs projections. These draft water needs projections are based on the draft population figures developed by TWDB, which may change in response to the comments on population projections that we are developing.

As instructed by the legislature, the TWDB has formulated regulations governing the preparation of regional plans. These regulations require that regional water plans be based on projections of populations and water needs developed by the TWDB, unless the regional water planning group can provide convincing evidence that those projections should be modified. With this letter, we are attaching a survey seeking information from you to help us determine whether the draft TWDB water needs projections are appropriate for your area or whether they should be revised. Please complete the attached survey and return it to Ed Motley of Chiang, Patel and Yerby, Inc. by February 28, 2003.

To help you fill out the survey, we are providing some information on historical water use and projected water needs in Region C:

Table of Historical Per Capita Municipal Water Use and Projected Per Capita Water Needs for Cities in Your Service Area. This table lists the TWDB historical per capita municipal water use and projected per capita water needs for the cities in your service area. Per capita municipal water needs do not include industrial water needs, which are projected separately. They do include residential, commercial and institutional water needs, expressed as gallons per person per day. The tables are presented with County summary tables.

c/o NTMWD
505 E. Brown Street
P. O. Box 2408
Wylie, Texas 75098-2408
972/442-5405
972/442-5405/Fax
jparks@ntmwd.com

Table of Region C Recommended County Population Projections. This table lists the Region C recommended population projections for the cities in your service area. The tables are presented with County summary tables. These populations are currently under review with TWDB.

Table of Historical Water Use and Projected Water Needs for Cities in Your Service Area. This table presents the TWDB historical water use and projected water needs by category for the cities in your service area. The water use is calculated with recommended TWDB per capita use and recommended Region C population projections. Municipal water use is water use for residential, commercial, and institutional customers. It does not include industrial water even if it is provided by your city. Industrial use is included in a separate county-wide projection of water needs. Projections of municipal needs are for a dry (high-use) year. Manufacturing includes manufacturing water supplied by cities.

If you have any questions or want additional information as you review these data and fill out the questionnaire, please call Ed Motley at (214) 638-0500. We greatly appreciate your attention and cooperation in reviewing these data, which will provide the basis for long range water supply planning in Region C.

Yours very truly,

James (Jim) M. Parks
Chair, Region C Water Planning Group

C: Roy Eaton, Secretary

Region C Water Planning Group
Water Needs Projection Survey of Councils of Government (COG)
Please Return by February 28, 2003

Name of COG:________________________Contact Person:________________________
Telephone Number:____________________FAX:_________________________________
Email Address:____
Mailing Address:____

1. Do you agree that the TWDB projections of water needs for Region C counties you serve are appropriate? If not, what changes would you suggest? What is the basis for your suggested changes?

2. Please provide any water needs projections you may have for your member cities.

3. Please provide your historical total water usage for the following years:

   1998:__________________________

   1999:__________________________

   2000:__________________________

   2001:__________________________

   2002:__________________________

4. Please give any other comments you have on the regional water planning process. Use the back (or other sheets) if needed.

Please return by February 28, 2003 to:
Ed Motley
Chiang, Patel and Yerby, Inc.
1820 Regal Row, Suite 200
Dallas, TX 75235
FAX: (214) 638-3723

REGION C WATER PLANNING GROUP

Senate Bill One Second Round of Regional Water Planning - Texas Water Development Board

c/o NTMWD
505 E. Brown Street
P. O. Box 2408
Wylie, Texas 75098-2408
972/442-5405
972/442-5405/Fax
jparks@ntmwd.com

January 31, 2003

County

The Honorable Ron Harris
County Judge
Collin County Courthouse
McKinney, TX 75069

Subject: Water Needs Projections for Regional Water Planning

Dear Judge Harris:

In September of last year, the Region C Water Planning Group sent you a survey regarding population projections developed by the Texas Water Development Board (TWDB). We have reviewed the responses to that survey and developed requests for revisions of the draft population projections. The input received from that survey was an essential element of the requested revisions.

We have attached our follow-up survey regarding the TWDB's recently released draft water needs projections. These draft water needs projections are based on the draft population figures developed by TWDB, which may change in response to the comments on population projections that we are developing. We are also including a copy of the survey we are sending to your local county extension agent regarding agricultural water needs. Please complete as much of that survey as possible and/or encourage your local county extension agent to complete the survey.

As instructed by the legislature, the TWDB has formulated regulations governing the preparation of regional plans. These regulations require that regional water plans be based on projections of populations and water needs developed by the TWDB in 2001, unless the regional water planning group can provide convincing evidence that those projections should be modified. With this letter, we are attaching a survey seeking information from you to help us determine whether the draft TWDB water needs projections are appropriate for your county or whether they should be revised. Please complete the attached survey and return it to Ed Motley of Chiang, Patel and Yerby, Inc. by February 28, 2003.

To help you fill out the survey, we are providing some information on historical water use and projected water needs in Region C:

Table of Historical Per Capita Municipal Water Use and Projected Per Capita Water Needs for Your County. This table lists the TWDB historical per capita municipal water use and projected per capita water needs for your county. Per capita municipal water needs do not include industrial water needs, which are projected separately. They do include residential, commercial and institutional water needs, expressed as gallons per person per day.

Table of Region C Recommended County Population Projections. This table lists the Region C recommended population projections for your county. These populations are currently under review with TWDB.

Table of Historical Water Use and Projected Water Needs for Your County. This table presents the TWDB historical water use and projected water needs by category for your county. The water use is calculated with recommended TWDB per capita use and recommended Region C population projections. Municipal water use is water use for residential, commercial, and institutional customers. It does not include industrial water even if it is provided by your city. Industrial use is included in a separate county-wide projection of water needs. Projections of municipal needs are for a dry (high-use) year. Manufacturing includes manufacturing water supplied by cities.

If you have any questions or want additional information as you review these data and fill out the questionnaire, please call Ed Motley at (214) 638-0500. We greatly appreciate your attention and cooperation in reviewing these data, which will provide the basis for long range water supply planning in Region C.

Yours very truly,

James (Jim) M. Parks
Chair, Region C Water Planning Group

C: Roy Eaton, Secretary

Region C Water Planning Group
Water Needs Projection Survey of Counties
Please Return by February 28, 2003

County:______________________________Contact Person:________________________
Telephone Number:____________________FAX:_________________________________
Email Address:____
Mailing Address:____

1. Do you agree that the TWDB projections of water needs are appropriate for your county? If not, what changes would you suggest? What is the basis for your suggested changes?

2. Please provide your historical total water usage for the following years:

   1998:__________________________

   1999:__________________________

   2000:__________________________

   2001:__________________________

   2002:__________________________

3. Please give any other comments you have on the regional water planning process. Use the back (or other sheets) if needed.

Please return by February 28, 2003 to:
Ed Motley
Chiang, Patel and Yerby, Inc.
1820 Regal Row, Suite 200
Dallas, TX 75235
FAX: (214)638-3723

REGION C WATER PLANNING GROUP

Senate Bill One Second Round of Regional Water Planning - Texas Water Development Board

January 31, 2003

Noncity

Mrs. Toni Flannigan
Able Springs WSC
30100 FM 429
Terrell, TX 75161

Subject: Water Needs Projections for Regional Water Planning

Dear Mrs. Flanigan:

In September of last year, the Region C Water Planning Group sent you a survey regarding population projections developed by the Texas Water Development Board (TWDB). We have reviewed the responses to that survey and developed requests for revisions of the draft population projections. The input received from that survey was an essential element of the requested revisions.

We have attached our follow-up survey regarding the TWDB's recently released draft water needs projections. These draft water needs projections are based on the draft population figures developed by TWDB, which may change in response to the comments on population projections that we are developing.

As instructed by the legislature, the TWDB has formulated regulations governing the preparation of regional plans. These regulations require that regional water plans be based on projections of populations and water needs developed by the TWDB, unless the regional water planning group can provide convincing evidence that those projections should be modified. With this letter, we are attaching a survey seeking information from you to help us determine whether the draft TWDB water needs projections are appropriate for your area or whether they should be revised. Please complete the attached survey and return it to Ed Motley of Chiang, Patel and Yerby, Inc. by February 28, 2003.

To help you fill out the survey, we are providing some information on historical water use and projected water needs in Region C:

Table of Historical Per Capita Municipal Water Use and Projected Per Capita Water Needs for Your Entity. This table lists the TWDB historical per capita municipal water use and projected per capita municipal water needs for your entity. Per capita municipal water needs do not include industrial water needs, which are projected separately. They do include residential, commercial and institutional water needs, expressed as gallons per person per day.

c/o NTMWD
505 E. Brown Street
P. O. Box 2408
Wylie, Texas 75098-2408
972/442-5405
972/442-5405/Fax
jparks@ntmwd.com

Table of Region C Recommended Subcounty Population Projections for Your Entity. This table lists the Region C recommended population projections for your entity. These populations are currently under review with TWDB.

Table of Historical Water Use and Projected Municipal Water Needs for Your Entity. This table presents the historical water use and projected municipal water needs of your entity. The water use is calculated with recommended TWDB per capita use and recommended Region C population projections. Municipal water use is water use for residential, commercial, and institutional customers. It does not include industrial water even if it is provided by your entity. Industrial use is included in a separate county-wide projection of water needs. Projections of municipal needs are for a dry (high-use) year.

Table of Historical Per Capita Use and Projected Per Capita Needs for Your County. This table lists the TWDB historical per capita use and projected per capita needs for the county(ies) in which your entity is located.

Table of Region C Recommended County Population Projections. This table lists the Region C recommended population projections for the county(ies) in which your entity is located. These populations are currently under review with TWDB.

Table of Historical Water Use and Projected Water Needs for Your County. This table presents the TWDB historical water use and projected water needs by category for the county(ies) in which your entity is located. Manufacturing includes manufacturing water supplied by cities.

If you have any questions or want additional information as you review these data and fill out the questionnaire, please call Ed Motley at (214) 638-0500. We greatly appreciate your attention and cooperation in reviewing these data, which will provide the basis for long range water supply planning in Region C.

Yours very truly,

James (Jim) M. Parks
Chair, Region C Water Planning Group

C: Roy Eaton, Secretary

Region C Water Planning Group
Water Needs Projection Survey of Non-City Retail Suppliers
Please Return by February 28, 2003

Name of Supplier:____________________________Contact Person:__________________
Telephone Number:_____________________FAX:_________________________________
Email Address:____
Mailing Address:____

1. Do you agree that the TWDB projections of municipal water needs are appropriate for your entity? If not, what changes would you suggest? What is the basis for your suggested changes?

2. Please give your comments on the TWDB water needs projections for your county(ies).

3. Please provide your historical total water usage for the following years:

   1998:___________________________

   1999:___________________________

   2000:___________________________

   2001:___________________________

   2002:___________________________

4. Please give any other comments you have on the regional water planning process. Use the back (or other sheets) if needed.

Please return by February 28, 2003 to:
Ed Motley
Chiang, Patel and Yerby, Inc.
1820 Regal Row, Suite 200
Dallas, TX 75235
FAX: (214) 638-3723

REGION C WATER PLANNING GROUP

Senate Bill One Second Round of Regional Water Planning - Texas Water Development Board

January 31, 2003

Mr. Chip Perryman
Board President
Athens MWA
508 East Tyler Street
Athens, TX 75751

WWP

Subject: Water Needs Projections for Regional Water Planning

Dear Mr. Perryman:

In September of last year, the Region C Water Planning Group sent you a survey regarding population projections developed by the Texas Water Development Board (TWDB). We have reviewed the responses to that survey and developed requests for revisions of the draft population projections. The input received from that survey was an essential element of the requested revisions.

We have attached our follow-up survey regarding the TWDB's recently released draft water needs projections. These draft water needs projections are based on the draft population figures developed by TWDB, which may change in response to the comments on population projections that we are developing.

As instructed by the legislature, the TWDB has formulated regulations governing the preparation of regional plans. These regulations require that regional water plans be based on projections of populations and water needs developed by the TWDB, unless the regional water planning group can provide convincing evidence that those projections should be modified. With this letter, we are attaching a survey seeking information from you to help us determine whether the draft TWDB water needs projections are appropriate for your area or whether they should be revised. Please complete the attached survey and return it to Ed Motley of Chiang, Patel and Yerby, Inc. by February 28, 2003.

To help you fill out the survey, we are providing some information on historical water use and projected water needs in Region C:

Table of Historical Per Capita Municipal Water Use and Projected Per Capita Water Needs for the Region C Counties. This table lists the TWDB historical per capita municipal water use and projected per capita municipal needs for the Region C counties. Per capita municipal water needs do not include industrial water needs, which are projected separately. They do include residential, commercial and institutional water needs, expressed as gallons per person per day.

c/o NTMWD
505 E. Brown Street
P. O. Box 2408
Wylie, Texas 75098-2408
972/442-5405
972/442-5405/Fax
jparks@ntmwd.com

Table of Region C Recommended County Population Projections. This table lists the Region C recommended population projections. These populations are currently under review with TWDB.

Table of Historical Water Use and Projected Water Needs for the Region C Counties. This table presents the TWDB historical water use and projected water needs by category for the Region C counties. The water use is calculated with recommended TWDB per capita use and recommended Region C population projections. Municipal water use is water use for residential, commercial, and institutional customers. It does not include industrial water even if it is provided by your organization. Industrial use is included in a separate county-wide projection of water needs. Projections of municipal needs are for a dry (high-use) year. Manufacturing includes manufacturing water supplied by cities.

If you have any questions or want additional information as you review these data and fill out the questionnaire, please call Ed Motley at (214) 638-0500. We greatly appreciate your attention and cooperation in reviewing these data, which will provide the basis for long range water supply planning in Region C.

Yours very truly,

James (Jim) M. Parks
Chair, Region C Water Planning Group

C: Roy Eaton, Secretary

Region C Water Planning Group
Water Needs Projection Survey of Wholesale Water Providers (WWP)
Please Return by February 28, 2003

Name of Supplier:______________________Contact Person:________________________
Telephone Number:_____________________FAX:_________________________________
Email Address:____
Mailing Address:____

1. Do you agree that the TWDB projections of municipal water needs are appropriate for your entity? If not, what changes would you suggest? What is the basis for your suggested changes?

2. Are the TWDB projections of water needs for your county reasonable? If not, what changes would you suggest? What is the basis for your suggested changes?

3. Please provide your historical total water usage for the following years:

   1998:____________________________

   1999:____________________________

   2000:____________________________

   2001:____________________________

   2002:____________________________

4. Please give any other comments you have on the regional water planning process. Use the back (or other sheets) if needed.

Please return by February 28, 2003 to:
Ed Motley
Chiang, Patel and Yerby, Inc.
1820 Regal Row, Suite 200
Dallas, TX 75235
FAX: (214) 638-3723

REGION C WATER PLANNING GROUP

Senate Bill One Second Round of Regional Water Planning - Texas Water Development Board

January 31, 2003

Mr. Jim Sparks
Director of Public Works
City of Cedar Hill
P. O. Box 96
Cedar Hill, TX 75106

WWP & City

Subject: Water Needs Projections for Regional Water Planning

Dear Mr. Sparks:

In September of last year, the Region C Water Planning Group sent you a survey regarding population projections developed by the Texas Water Development Board (TWDB). We have reviewed the responses to that survey and developed requests for revisions of the draft population projections. The input received from that survey was an essential element of the requested revisions.

We have attached our follow-up survey regarding the TWDB's recently released draft water needs projections. These draft water needs projections are based on the draft population figures developed by TWDB, which may change in response to the comments on population projections that we are developing.

As instructed by the legislature, the TWDB has formulated regulations governing the preparation of regional plans. These regulations require that regional water plans be based on projections of populations and water needs developed by the TWDB, unless the regional water planning group can provide convincing evidence that those projections should be modified. With this letter, we are attaching a survey seeking information from you to help us determine whether the draft TWDB water needs projections are appropriate for your city or whether they should be revised. Please complete the attached survey and return it to Ed Motley of Chiang, Patel and Yerby, Inc. by <u>February 28, 2003</u>.

Your city meets the TWDB definition of a wholesale water provider (WWP). Due to this unique designation, we are including questions in the survey that pertain to both your city and the entities to whom you provide water.

To help you fill out the survey, we are providing some information on historical water use and projected water needs in Region C:

c/o NTMWD
505 E. Brown Street
P. O. Box 2408
Wylie, Texas 75098-2408
972/442-5405
972/442-5405/Fax
jparks@ntmwd.com

Table of Historical Per Capita Municipal Water Use and Projected Per Capita Water Needs for Your City. This table lists the TWDB historical per capita municipal water use and projected per capita municipal water needs for your city. Per capita municipal water needs do not include industrial water needs, which are projected separately. They do include residential, commercial and institutional water needs, expressed as gallons per person per day.

Table of Region C Recommended Subcounty Population Projections for Your City. This table lists the Region C recommended population projections for your city. These populations are currently under review with TWDB.

Table of Historical Water Use and Projected Municipal Water Needs for Your City. This table presents the historical water use and projected municipal water needs of your city. The water use is calculated with recommended TWDB per capita use and recommended Region C population projections. Municipal water use is water use for residential, commercial, and institutional customers. It does not include industrial water even if it is provided by your city. Industrial use is included in a separate county-wide projection of water needs. Projections of municipal needs are for a dry (high-use) year.

Table of Historical Per Capita Use and Projected Per Capita Needs for Your County. This table lists the TWDB historical per capita use and projected per capita needs for the county(ies) in which your city is located.

Table of Region C Recommended County Population Projections. This table lists the Region C recommended population projections for the county(ies) in which your city is located. These populations are currently under review with TWDB.

Table of Historical Water Use and Projected Water Needs for Your County. This table presents the TWDB historical water use and projected water needs by category for the county(ies) in which your city is located. Manufacturing includes manufacturing water supplied by cities.

If you have any questions or want additional information as you review these data and fill out the questionnaire, please call Ed Motley at (214) 638-0500. We greatly appreciate your attention and cooperation in reviewing these data, which will provide the basis for long range water supply planning in Region C.

Yours very truly,

James (Jim) M. Parks
Chair, Region C Water Planning Group

C: Roy Eaton, Secretary

Region C Water Planning Group
Water Needs Projection Survey of Cities Who Serve As Wholesale Water Providers
Please Return by February 28, 2003

Name of City:__________________Contact Person:_______________________
Telephone Number:____________________FAX:______________________________
Email Address:____
Mailing Address:____

1. Do you agree that the TWDB projections of municipal water needs and per capita needs are appropriate for your city? If not, what changes would you suggest? What is the basis for your suggested changes?

2. Please give your comments on the TWDB water needs projections for your county(ies).

3. Please provide your historical total water usage for the following years:

   1998:__________________________

   1999:__________________________

   2000:__________________________

   2001:__________________________

   2002:__________________________

4. Please give any other comments you have on the regional water planning process. Use the back (or other sheets) if needed.

Please return by February 28, 2003 to:
Ed Motley
Chiang, Patel and Yerby, Inc.
1820 Regal Row, Suite 200
Dallas, TX 75235
FAX: (214) 638-3723

REGION C WATER PLANNING GROUP

Senate Bill One Second Round of Regional Water Planning - Texas Water Development Board

January 31, 2003

Mr. Don Hammon
General Manager
Dallas County WCID #6
P. O. Box 800040
Balch Springs, TX 75180-0040

WWP & Noncity

Subject: Water Needs Projections for Regional Water Planning

Dear Mr. Hammon:

In September of last year, the Region C Water Planning Group sent you a survey regarding population projections developed by the Texas Water Development Board (TWDB). We have reviewed the responses to that survey and developed requests for revisions of the draft population projections. The input received from that survey was an essential element of the requested revisions.

We have attached our follow-up survey regarding the TWDB's recently released draft water needs projections. These draft water needs projections are based on the draft population figures developed by TWDB, which may change in response to the comments on population projections that we are developing.

As instructed by the legislature, the TWDB has formulated regulations governing the preparation of regional plans. These regulations require that regional water plans be based on projections of populations and water needs developed by the TWDB, unless the regional water planning group can provide convincing evidence that those projections should be modified. With this letter, we are attaching a survey seeking information from you to help us determine whether the draft TWDB water needs projections are appropriate for your area or whether they should be revised. Please complete the attached survey and return it to Ed Motley of Chiang, Patel and Yerby, Inc. by <u>February 28, 2003</u>.

Your entity meets the TWDB definition of a wholesale water provider (WWP). Due to this unique designation, we are including questions in the survey that pertain to both your entity and the entities to whom you provide water.

To help you fill out the survey, we are providing some information on historical water use and projected water needs in Region C:

c/o NTMWD
505 E. Brown Street
P. O. Box 2408
Wylie, Texas 75098-2408
972/442-5405
972/442-5405/Fax
jparks@ntmwd.com

Table of Historical Per Capita Municipal Use and Projected Per Capita Needs for the Region C Counties. This table lists the TWDB historical per capita municipal water use and projected per capita municipal water needs for the Region C counties. Per capita municipal water needs do not include industrial water needs, which are projected separately. They do include residential, commercial and institutional water needs, expressed as gallons per person per day.

Table of Region C Recommended County Population Projections. This table lists the Region C recommended population projections. These populations are currently under review with TWDB.

Table of Historical Water Use and Projected Water Needs for the Region C Counties. This table presents the TWDB historical water use and projected water needs by category for the Region C counties. The water use is calculated with recommended TWDB per capita use and recommended Region C population projections. Municipal water use is water use for residential, commercial, and institutional customers. It does not include industrial water even if it is provided by your city. Industrial use is included in a separate county-wide projection of water needs. Projections of municipal needs are for a dry (high-use) year. Manufacturing includes manufacturing water supplied by cities.

If you have any questions or want additional information as you review these data and fill out the questionnaire, please call Ed Motley at (214) 638-0500. We greatly appreciate your attention and cooperation in reviewing these data, which will provide the basis for long range water supply planning in Region C.

Yours very truly,

James (Jim) M. Parks
Chair, Region C Water Planning Group

C: Roy Eaton, Secretary

Region C Water Planning Group
Water Needs Projection Survey of Non-City Retail Suppliers also Serving as Wholesale Water Providers (WWP)
Please Return by February 28, 2003

Name of Supplier:______________________Contact Person:________________________
Telephone Number:_____________________FAX:________________________________
Email Address:____
Mailing Address:____

1. Do you agree that the TWDB projections of municipal water needs are appropriate for your entity? If not, what changes would you suggest? What is the basis for your suggested changes?

2. Are the TWDB projections of water needs for your county reasonable? If not, what changes would you suggest? What is the basis for your suggested changes?

3. Please provide your historical total water usage for the following years:

   1998:___________________________

   1999:___________________________

   2000:___________________________

   2001:___________________________

   2002:___________________________

4. Please give any other comments you have on the regional water planning process. Use the back (or other sheets) if needed.

Please return by February 28, 2003 to:
Ed Motley
Chiang, Patel and Yerby, Inc.
1820 Regal Row, Suite 200
Dallas, TX 75235
FAX: (214) 638-3723

APPENDIX F

REGION C ADJUSTMENTS TO WATER DEMAND PROJECTIONS

Table F.1
Region C Projected Per Capita Muncipal Water Use With and Without Water Savings from Low-Flow Plumbing Fixtures

Water User Group	County Name	Basin Name	Partial	2000 Census	Projected GPCD with Reductions for Plumbing Code Savings						Projected GPCD without Reductions for Plumbing Code Savings					
					2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
Allen	Collin	Trinity		224	240	253	252	251	251	251	245	260	260	260	260	260
Anna	Collin	Trinity		127	164	188	187	187	187	187	175	200	200	200	200	200
Blue Ridge	Collin	Trinity		114	136	140	139	138	138	138	140	150	150	150	150	150
Caddo Basin SUD[1]	Collin	Sabine	P	115	115	115	115	115	115	115	115	115	115	115	115	115
Caddo Basin SUD[1]	Collin	Trinity	P	115	115	115	115	115	115	115	115	115	115	115	115	115
Celina	Collin	Trinity		156	170	187	186	186	186	186	180	200	200	200	200	200
County-Other	Collin	Sabine	P	117	114	111	108	105	103	103	117	117	117	117	117	117
County-Other	Collin	Trinity	P	117	114	111	108	105	103	103	117	117	117	117	117	117
Culleoka WSC	Collin	Trinity		82	95	107	106	104	104	104	100	115	115	115	115	115
Dallas	Collin	Trinity	P	262	265	262	259	257	256	256	269	269	269	269	269	269
Danville WSC	Collin	Trinity		170	165	163	161	160	160	160	170	170	170	170	170	170
East Fork SUD	Collin	Trinity	P	131	126	123	121	120	119	119	131	131	131	131	131	131
Fairview	Collin	Trinity		339	333	330	329	327	327	327	339	339	339	339	339	339
Farmersville	Collin	Trinity		142	137	132	129	128	128	128	142	142	142	142	142	142
Frisco	Collin	Trinity	P	291	297	295	295	295	295	295	300	300	300	300	300	300
Garland	Collin	Trinity		159	163	160	158	156	155	155	168	168	168	168	168	168
Gunter Rural WSC	Collin	Trinity	P	101	110	108	106	105	105	105	115	115	115	115	115	115
Hickory Creek SUD[1]	Collin	Trinity	P	155	152	149	146	145	144	144	155	155	155	155	155	155
Josephine	Collin	Trinity		135	131	126	123	121	121	121	135	135	135	135	135	135
Lavon WSC	Collin	Trinity	P	86	96	109	108	107	107	107	100	115	115	115	115	115
Lowry Crossing	Collin	Trinity		177	172	168	166	165	164	164	177	177	177	177	177	177
Lucas	Collin	Trinity		99	144	139	136	135	135	135	150	150	150	150	150	150
McKinney	Collin	Trinity		220	236	244	243	242	242	242	240	250	250	250	250	250
Melissa	Collin	Trinity		57	144	193	192	192	192	192	150	200	200	200	200	200
Milligan WSC	Collin	Trinity		112	111	108	105	102	101	101	115	115	115	115	115	115
Murphy	Collin	Trinity		157	185	182	181	180	180	180	190	190	190	190	190	190
Nevada	Collin	Sabine	P	325	320	314	313	311	311	311	325	325	325	325	325	325
Nevada	Collin	Trinity	P	325	320	314	313	311	311	311	325	325	325	325	325	325
New Hope	Collin	Trinity		294	289	285	282	281	281	281	294	294	294	294	294	294
North Collin WSC	Collin	Trinity		160	155	153	151	149	149	149	160	160	160	160	160	160
Parker	Collin	Trinity		326	342	334	332	332	332	332	347	347	347	347	347	347
Plano	Collin	Trinity	P	256	255	253	251	250	249	249	260	260	260	260	260	260
Princeton	Collin	Trinity		94	119	140	138	137	137	137	125	150	150	150	150	150
Prosper	Collin	Trinity	P	196	223	241	241	241	241	241	230	250	250	250	250	250
Richardson	Collin	Trinity	P	282	281	278	277	274	272	272	285	285	285	285	285	285
Royse City	Collin	Sabine	P	182	186	188	187	187	187	187	195	200	200	200	200	200
Sachse	Collin	Trinity	P	185	191	193	192	190	190	190	195	200	200	200	200	200
Saint Pau	Collin	Trinity		177	171	167	166	165	165	165	177	177	177	177	177	177
South Grayson WSC	Collin	Trinity	P	131	126	124	122	121	120	120	131	131	131	131	131	131
Weston	Collin	Trinity		72	112	150	189	189	189	189	120	160	200	200	200	200
Wylie	Collin	Trinity	P	148	175	192	191	190	190	190	180	200	200	200	200	200
Bolivar WSC	Cooke	Trinity	P	102	110	122	138	137	137	137	115	130	150	150	150	150

Table F.1
Region C Projected Per Capita Muncipal Water Use With and Without Water Savings from Low-Flow Plumbing Fixtures

Water User Group	County Name	Basin Name	Partial	2000 Census	Projected GPCD with Reductions for Plumbing Code Savings						Projected GPCD without Reductions for Plumbing Code Savings					
					2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
County-Other	Cooke	Red	P	88	101	108	106	104	103	103	105	115	115	115	115	115
County-Other	Cooke	Trinity	P	88	101	108	106	104	103	103	105	115	115	115	115	115
Gainesville	Cooke	Red	P	143	180	176	174	171	170	170	183	183	183	183	183	183
Gainesville	Cooke	Trinity	P	143	180	176	174	171	170	170	183	183	183	183	183	183
Kiowa Homeowners WSC	Cooke	Trinity		138	135	133	131	129	128	128	138	138	138	138	138	138
Lindsay	Cooke	Trinity		155	156	152	150	147	146	146	159	159	159	159	159	159
Muenster	Cooke	Trinity		151	178	174	172	169	168	168	181	181	181	181	181	181
Two Way SUD	Cooke	Red	P	90	101	108	106	105	104	104	105	115	115	115	115	115
Valley View	Cooke	Trinity		102	111	108	106	103	102	102	115	115	115	115	115	115
Woodbine WSC	Cooke	Red	P	104	112	108	106	103	102	102	115	115	115	115	115	115
Woodbine WSC	Cooke	Trinity	P	104	112	108	106	103	102	102	115	115	115	115	115	115
Addison	Dallas	Trinity		441	441	438	436	435	434	434	445	445	445	445	445	445
Balch Springs	Dallas	Trinity		110	111	108	105	102	101	101	115	115	115	115	115	115
Carrollton	Dallas	Trinity	P	189	191	188	186	184	183	183	196	196	196	196	196	196
Cedar Hill	Dallas	Trinity	P	159	154	151	150	148	148	148	159	159	159	159	159	159
Cockrell Hill	Dallas	Trinity		117	122	124	121	118	117	117	125	130	130	130	130	130
Combine	Dallas	Trinity	P	89	105	107	104	103	102	102	110	115	115	115	115	115
Combine WSC	Dallas	Trinity	P	87	100	107	106	105	105	105	105	115	115	115	115	115
Coppell	Dallas	Trinity	P	203	224	222	220	219	218	218	227	227	227	227	227	227
County-Other	Dallas	Trinity		109	115	114	111	105	101	101	115	115	115	115	115	115
Dallas	Dallas	Trinity	P	262	265	262	259	257	256	256	269	269	269	269	269	269
Dallas County WCID #6	Dallas	Trinity		100	109	107	106	105	105	105	115	115	115	115	115	115
De Soto	Dallas	Trinity		190	200	201	199	198	197	197	205	210	210	210	210	210
Duncanville	Dallas	Trinity		172	191	193	189	186	185	185	195	200	200	200	200	200
East Fork SUD	Dallas	Trinity	P	131	126	123	121	120	119	119	131	131	131	131	131	131
Farmers Branch	Dallas	Trinity		333	329	326	323	321	320	320	333	333	333	333	333	333
Garland	Dallas	Trinity		159	163	160	158	156	155	155	168	168	168	168	168	168
Glenn Heights	Dallas	Trinity	P	115	110	108	106	105	104	104	115	115	115	115	115	115
Grand Prairie	Dallas	Trinity	P	153	148	145	143	142	141	141	153	153	153	153	153	153
Grapevine	Dallas	Trinity	P	223	235	242	240	238	237	237	240	250	250	250	250	250
Highland Park	Dallas	Trinity		416	425	422	419	416	414	414	428	428	428	428	428	428
Hutchins	Dallas	Trinity		217	216	212	211	210	210	210	224	224	224	224	224	224
Irving	Dallas	Trinity		220	226	223	220	218	217	217	230	230	230	230	230	230
Lancaster	Dallas	Trinity		142	134	131	129	128	128	128	142	142	142	142	142	142
Lewisville	Dallas	Trinity	P	167	176	173	172	171	170	170	180	180	180	180	180	180
Mesquite	Dallas	Trinity	P	160	160	157	154	153	152	152	165	165	165	165	165	165
Ovilla	Dallas	Trinity	P	188	182	180	178	177	177	177	188	188	188	188	188	188
Richardson	Dallas	Trinity	P	282	281	278	277	274	272	272	285	285	285	285	285	285
Rockett SUD	Dallas	Trinity	P	123	118	115	113	112	111	111	123	123	123	123	123	123
Rowlett	Dallas	Trinity	P	166	185	193	191	190	189	189	190	200	200	200	200	200
Sachse	Dallas	Trinity	P	185	191	193	192	190	190	190	195	200	200	200	200	200
Sardis-Lone Elm WSC	Dallas	Trinity	P	191	186	184	182	180	179	179	191	191	191	191	191	191
Seagoville	Dallas	Trinity	P	132	132	128	127	125	125	125	138	138	138	138	138	138

Table F.1
Region C Projected Per Capita Muncipal Water Use With and Without Water Savings from Low-Flow Plumbing Fixtures

Water User Group	County Name	Basin Name	Partial	2000 Census	Projected GPCD with Reductions for Plumbing Code Savings						Projected GPCD without Reductions for Plumbing Code Savings					
					2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
Sunnyvale	Dallas	Trinity		324	316	313	311	310	310	310	324	324	324	324	324	324
University Park	Dallas	Trinity		257	270	267	264	261	260	260	274	274	274	274	274	274
Wilmer	Dallas	Trinity		97	104	107	105	104	104	104	110	115	115	115	115	115
Wylie	Dallas	Trinity	P	148	175	192	191	190	190	190	180	200	200	200	200	200
Argyle	Denton	Trinity		269	292	290	290	289	289	289	300	300	300	300	300	300
Argyle WSC	Denton	Trinity		192	189	187	184	181	180	180	192	192	192	192	192	192
Aubrey	Denton	Trinity		103	125	142	140	138	138	138	130	150	150	150	150	150
Bartonville	Denton	Trinity		144	168	187	186	186	186	186	180	200	200	200	200	200
Bartonville WSC	Denton	Trinity		202	196	193	190	188	187	187	202	202	202	202	202	202
Bolivar WSC	Denton	Trinity	P	102	110	122	138	137	137	137	115	130	150	150	150	150
Carrollton	Denton	Trinity	P	189	191	188	186	184	183	183	196	196	196	196	196	196
Coppel	Denton	Trinity	P	203	224	222	220	219	218	218	227	227	227	227	227	227
Copper Canyon	Denton	Trinity		223	245	241	238	236	236	236	250	250	250	250	250	250
Corinth	Denton	Trinity		201	198	196	195	194	194	194	201	201	201	201	201	201
County-Other	Denton	Trinity		191	186	183	181	180	180	180	191	191	191	191	191	191
Cross Roads	Denton	Trinity		405	342	290	289	289	289	289	350	300	300	300	300	300
Dallas	Denton	Trinity	P	262	265	262	259	257	256	256	269	269	269	269	269	269
Denton	Denton	Trinity		189	182	179	177	176	176	176	189	189	189	189	189	189
Denton County FWSD #1A	Denton	Trinity		291	286	285	284	284	284	284	291	291	291	291	291	291
Double Oak	Denton	Trinity		200	213	210	208	207	206	206	220	220	220	220	220	220
Flower Mound	Denton	Trinity		198	236	234	232	231	231	231	240	240	240	240	240	240
Fort Worth	Denton	Trinity	P	215	211	207	205	203	202	202	215	215	215	215	215	215
Frisco	Denton	Trinity	P	291	297	295	295	295	295	295	300	300	300	300	300	300
Hackberry	Denton	Trinity		121	117	116	116	115	115	115	121	121	121	121	121	121
Hebron	Denton	Trinity		208	204	199	196	194	194	194	208	208	208	208	208	208
Hickory Creek	Denton	Trinity		108	135	139	138	136	136	136	142	150	150	150	150	150
Highland Village	Denton	Trinity		205	200	197	195	193	192	192	205	205	205	205	205	205
Justin	Denton	Trinity		149	165	172	170	169	169	169	170	180	180	180	180	180
Krugerville	Denton	Trinity		84	109	106	103	102	101	101	115	115	115	115	115	115
Krum	Denton	Trinity		117	128	140	138	136	136	136	135	150	150	150	150	150
Lake Dallas	Denton	Trinity		132	139	145	143	142	141	141	142	150	150	150	150	150
Lewisville	Denton	Trinity	P	167	176	173	172	171	170	170	180	180	180	180	180	180
Lincoln Park	Denton	Trinity		123	134	141	140	139	139	139	140	150	150	150	150	150
Little Elm	Denton	Trinity		162	176	185	184	184	184	184	180	190	190	190	190	190
Mustang SUD	Denton	Trinity		123	125	133	133	132	132	132	130	140	140	140	140	140
Northlake	Denton	Trinity		122	141	145	145	145	145	145	145	150	150	150	150	150
Oak Point	Denton	Trinity		111	131	144	144	143	143	143	135	150	150	150	150	150
Pilot Point	Denton	Trinity		122	135	142	141	139	139	139	140	150	150	150	150	150
Plano	Denton	Trinity	P	256	255	253	251	250	249	249	260	260	260	260	260	260
Ponder	Denton	Trinity		319	308	306	305	305	305	305	319	319	319	319	319	319
Prosper	Denton	Trinity	P	196	223	241	241	241	241	241	230	250	250	250	250	250
Roanoke	Denton	Trinity		194	224	242	240	239	239	239	230	250	250	250	250	250
Sanger	Denton	Trinity		146	156	164	163	162	162	162	165	175	175	175	175	175

Table F.1
Region C Projected Per Capita Muncipal Water Use With and Without Water Savings from Low-Flow Plumbing Fixtures

Water User Group	County Name	Basin Name	Partial	2000 Census	Projected GPCD with Reductions for Plumbing Code Savings						Projected GPCD without Reductions for Plumbing Code Savings					
					2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
Shady Shores	Denton	Trinity		113	129	141	139	138	137	137	135	150	150	150	150	150
Southlake	Denton	Trinity	P	279	297	296	295	294	294	294	300	300	300	300	300	300
The Colony	Denton	Trinity		98	108	105	103	102	101	101	115	115	115	115	115	115
Trophy Club	Denton	Trinity		313	308	306	304	303	303	303	313	313	313	313	313	313
Bardwell	Ellis	Trinity		95	110	108	106	105	105	105	115	115	115	115	115	115
Brandon-Irene WSC[(2)]	Ellis	Trinity	P	113	109	106	103	100	99	99	115	115	115	115	115	115
Buena Vista - Bethel SUD	Ellis	Trinity		173	168	165	163	162	161	161	173	173	173	173	173	173
Cedar Hill	Ellis	Trinity	P	159	154	151	150	148	148	148	159	159	159	159	159	159
Community Water Company	Ellis	Trinity	P	76	91	108	106	104	103	103	95	115	115	115	115	115
County-Other	Ellis	Trinity		170	168	167	165	164	163	163	170	170	170	170	170	170
Ennis	Ellis	Trinity		156	152	148	146	144	143	143	156	156	156	156	156	156
Ferris	Ellis	Trinity		137	136	133	130	127	125	125	140	140	140	140	140	140
Files Valley WSC	Ellis	Trinity		188	185	182	179	176	175	175	188	188	188	188	188	188
Glenn Heights	Ellis	Trinity	P	115	110	108	106	105	104	104	115	115	115	115	115	115
Grand Prairie	Ellis	Trinity	P	153	148	145	143	142	141	141	153	153	153	153	153	153
Italy	Ellis	Trinity		92	106	108	105	103	102	102	110	115	115	115	115	115
Johnson County SUD[(1)]	Ellis	Trinity	P	171	171	174	178	184	190	190	175	181	187	195	201	201
Mansfield	Ellis	Trinity	P	212	236	244	242	241	241	241	240	250	250	250	250	250
Maypearl	Ellis	Trinity		134	173	170	167	164	162	162	176	176	176	176	176	176
Midlothian	Ellis	Trinity		192	186	183	182	181	181	181	192	192	192	192	192	192
Milford	Ellis	Trinity		103	112	109	106	103	101	101	115	115	115	115	115	115
Mountain Peak WSC	Ellis	Trinity		166	161	159	158	156	156	156	166	166	166	166	166	166
Oak Leaf	Ellis	Trinity		147	201	198	196	194	193	193	206	206	206	206	206	206
Ovilla	Ellis	Trinity	P	188	182	180	178	177	177	177	188	188	188	188	188	188
Palmer	Ellis	Trinity		103	111	108	105	102	101	101	115	115	115	115	115	115
Pecan Hill	Ellis	Trinity		147	176	173	171	169	168	168	180	180	180	180	180	180
Red Oak	Ellis	Trinity		156	169	171	169	168	167	167	175	180	180	180	180	180
Rice WSC	Ellis	Trinity	P	102	110	107	106	104	104	104	115	115	115	115	115	115
Rockett SUD	Ellis	Trinity	P	123	118	115	113	112	111	111	123	123	123	123	123	123
Sardis-Lone Elm WSC	Ellis	Trinity	P	191	186	184	182	180	179	179	191	191	191	191	191	191
Waxahachie	Ellis	Trinity		190	204	201	199	197	196	196	208	208	208	208	208	208
Bonham	Fannin	Red		215	212	209	207	206	205	205	215	215	215	215	215	215
County-Other	Fannin	Red	P	118	115	112	109	106	104	104	118	118	118	118	118	118
County-Other	Fannin	Sulphur	P	118	115	112	109	106	104	104	118	118	118	118	118	118
County-Other	Fannin	Trinity	P	118	115	112	109	106	104	104	118	118	118	118	118	118
Ector	Fannin	Red		134	131	128	125	123	122	122	134	134	134	134	134	134
Hickory Creek SUD[(1)]	Fannin	Sulphur	P	155	152	149	146	145	144	144	155	155	155	155	155	155
Hickory Creek SUD[(1)]	Fannin	Trinity	P	155	152	149	146	145	144	144	155	155	155	155	155	155
Honey Grove	Fannin	Red	P	168	202	198	195	192	191	191	206	206	206	206	206	206
Honey Grove	Fannin	Sulphur	P	168	202	198	195	192	191	191	206	206	206	206	206	206
Ladonia	Fannin	Sulphur		328	325	322	319	316	314	314	328	328	328	328	328	328
Leonard	Fannin	Sulphur	P	106	126	122	119	117	116	116	130	130	130	130	130	130

Table F.1
Region C Projected Per Capita Muncipal Water Use With and Without Water Savings from Low-Flow Plumbing Fixtures

Water User Group	County Name	Basin Name	Partial	2000 Census	Projected GPCD with Reductions for Plumbing Code Savings						Projected GPCD without Reductions for Plumbing Code Savings					
					2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
Leonard	Fannin	Trinity	P	106	126	122	119	117	116	116	130	130	130	130	130	130
North Hunt WSC[1]	Fannin	Sulphur		115	115	115	115	115	115	115	115	115	115	115	115	115
Savoy	Fannin	Red		101	111	108	104	101	100	100	115	115	115	115	115	115
Southwest Fannin County SUD	Fannin	Red	P	72	86	104	107	106	105	105	90	110	115	115	115	115
Southwest Fannin County SUD	Fannin	Trinity	P	72	86	104	107	106	105	105	90	110	115	115	115	115
Trenton	Fannin	Trinity		187	184	180	177	174	173	173	187	187	187	187	187	187
Whitewright	Fannin	Red	P	180	196	193	190	187	186	186	200	200	200	200	200	200
County-Other	Freestone	Brazos	P	124	121	117	114	111	110	110	124	124	124	124	124	124
County-Other	Freestone	Trinity	P	124	121	117	114	111	110	110	124	124	124	124	124	124
Fairfield	Freestone	Trinity		204	200	196	193	190	189	189	204	204	204	204	204	204
Flo Community WSC[2]	Freestone	Trinity		75	70	68	66	65	64	64	75	75	75	75	75	75
Teague	Freestone	Brazos	P	74	92	110	107	105	104	104	95	115	115	115	115	115
Teague	Freestone	Trinity	P	74	92	110	107	105	104	104	95	115	115	115	115	115
Turlington WSC[3]	Freestone	Trinity		79	92	109	106	103	102	102	95	115	115	115	115	115
Wortham	Freestone	Trinity		119	194	191	188	185	184	184	198	198	198	198	198	198
Bells	Grayson	Red		122	118	115	113	111	110	110	122	122	122	122	122	122
Collinsville	Grayson	Trinity		124	142	139	137	134	133	133	147	147	147	147	147	147
County-Other	Grayson	Red	P	118	115	113	110	107	106	106	118	118	118	118	118	118
County-Other	Grayson	Trinity	P	118	115	113	110	107	106	106	118	118	118	118	118	118
Denison	Grayson	Red		200	196	193	190	187	186	186	200	200	200	200	200	200
Gunter	Grayson	Trinity		120	121	119	117	115	114	114	124	124	124	124	124	124
Gunter Rural WSC	Grayson	Trinity	P	101	110	108	106	105	105	105	115	115	115	115	115	115
Howe	Grayson	Red	P	118	136	143	141	138	137	137	140	150	150	150	150	150
Howe	Grayson	Trinity	P	118	136	143	141	138	137	137	140	150	150	150	150	150
Luella WSC	Grayson	Trinity		103	111	108	106	105	104	104	115	115	115	115	115	115
Pottsboro	Grayson	Red		143	150	152	150	148	147	147	155	160	160	160	160	160
Sherman	Grayson	Red		222	229	244	241	238	237	237	232	250	250	250	250	250
South Grayson WSC	Grayson	Trinity	P	131	126	124	122	121	120	120	131	131	131	131	131	131
Southmayd	Grayson	Red		115	111	109	107	105	104	104	115	115	115	115	115	115
Southwest Fannin County SUD	Grayson	Red	P	72	86	104	107	106	105	105	90	110	115	115	115	115
Tioga	Grayson	Trinity		122	156	153	150	148	147	147	159	159	159	159	159	159
Tom Bean	Grayson	Red	P	213	210	207	204	201	200	200	213	213	213	213	213	213
Tom Bean	Grayson	Trinity	P	213	210	207	204	201	200	200	213	213	213	213	213	213
Two Way SUD	Grayson	Red	P	90	101	108	106	105	104	104	105	115	115	115	115	115
Two Way SUD	Grayson	Trinity	P	90	101	108	106	105	104	104	105	115	115	115	115	115
Van Alstyne	Grayson	Trinity		135	172	190	188	187	187	187	180	200	200	200	200	200
Whitesboro	Grayson	Red	P	143	155	152	150	147	146	146	159	159	159	159	159	159
Whitesboro	Grayson	Trinity	P	143	155	152	150	147	146	146	159	159	159	159	159	159
Whitewright	Grayson	Red	P	180	196	193	190	187	186	186	200	200	200	200	200	200
Woodbine WSC	Grayson	Trinity	P	104	112	108	106	103	102	102	115	115	115	115	115	115
Athens	Henderson	Trinity		167	182	179	176	172	171	171	185	185	185	185	185	185
Bethel-Ash WSC[1]	Henderson	Trinity		77	72	70	68	67	66	66	77	77	77	77	77	77

Table F.1
Region C Projected Per Capita Muncipal Water Use With and Without Water Savings from Low-Flow Plumbing Fixtures

Water User Group	County Name	Basin Name	Partial	2000 Census	Projected GPCD with Reductions for Plumbing Code Savings						Projected GPCD without Reductions for Plumbing Code Savings					
					2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
County-Other	Henderson	Trinity		180	176	173	170	167	166	166	180	180	180	180	180	180
East Cedar Creek FWSD	Henderson	Trinity		156	152	149	148	146	146	146	156	156	156	156	156	156
Eustace	Henderson	Trinity		132	151	148	145	142	141	141	155	155	155	155	155	155
Gun Barrel City	Henderson	Trinity		128	183	180	177	176	175	175	187	187	187	187	187	187
Log Cabin	Henderson	Trinity		86	97	109	107	106	105	105	100	115	115	115	115	115
Mabank	Henderson	Trinity	P	168	195	192	189	188	187	187	200	200	200	200	200	200
Malakoff	Henderson	Trinity		125	157	154	151	148	147	147	161	161	161	161	161	161
Payne Springs	Henderson	Trinity		195	202	199	196	193	192	192	207	207	207	207	207	207
Seven Points	Henderson	Trinity		109	111	109	107	106	105	105	115	115	115	115	115	115
Tool	Henderson	Trinity		130	138	135	133	131	130	130	143	143	143	143	143	143
Trinidad	Henderson	Trinity		128	147	144	141	137	136	136	151	151	151	151	151	151
Virginia Hill WSC	Henderson	Trinity		101	112	109	106	103	101	101	115	115	115	115	115	115
West Cedar Creek MUD	Henderson	Trinity	P	80	90	103	106	105	105	105	95	110	115	115	115	115
Bryson	Jack	Brazos		130	158	155	151	148	147	147	161	161	161	161	161	161
County-Other	Jack	Brazos	P	102	112	109	106	103	102	102	115	115	115	115	115	115
County-Other	Jack	Trinity	P	102	112	109	106	103	102	102	115	115	115	115	115	115
Jacksboro	Jack	Trinity		126	132	130	127	125	124	124	135	135	135	135	135	135
Able Springs WSC	Kaufman	Trinity		81	95	107	105	104	104	104	100	115	115	115	115	115
College Mound WSC	Kaufman	Trinity		64	74	91	104	103	102	102	80	100	115	115	115	115
Combine	Kaufman	Trinity	P	89	105	107	104	103	102	102	110	115	115	115	115	115
Combine WSC	Kaufman	Trinity	P	87	100	107	106	105	105	105	105	115	115	115	115	115
County-Other	Kaufman	Sabine	P	139	135	134	133	132	131	131	139	139	139	139	139	139
County-Other	Kaufman	Trinity	P	139	135	134	133	132	131	131	139	139	139	139	139	139
Crandall	Kaufman	Trinity		140	149	151	149	148	148	148	155	160	160	160	160	160
Dallas	Kaufman	Trinity	P	262	265	262	259	257	256	256	269	269	269	269	269	269
Forney	Kaufman	Trinity		130	144	150	148	147	147	147	150	160	160	160	160	160
Forney Lake WSC	Kaufman	Trinity	P	147	195	192	190	188	187	187	200	200	200	200	200	200
Gastonia-Scurry WSC	Kaufman	Trinity		86	94	107	105	103	103	103	100	115	115	115	115	115
High Point WSC	Kaufman	Trinity	P	83	95	107	105	104	103	103	100	115	115	115	115	115
Kaufman	Kaufman	Trinity		113	125	141	138	137	136	136	130	150	150	150	150	150
Kemp	Kaufman	Trinity		134	143	140	137	134	132	132	146	146	146	146	146	146
Mabank	Kaufman	Trinity	P	168	195	192	189	188	187	187	200	200	200	200	200	200
Mac Bee WSC[1]	Kaufman	Sabine		115	115	115	115	115	115	115	119	122	124	126	127	127
Mesquite	Kaufman	Trinity	P	160	160	157	154	153	152	152	165	165	165	165	165	165
Oak Grove	Kaufman	Trinity		83	119	116	113	112	111	111	125	125	125	125	125	125
Seagoville	Kaufman	Trinity	P	132	132	128	127	125	125	125	138	138	138	138	138	138
Talty	Kaufman	Trinity		316	315	314	314	314	314	314	316	316	316	316	316	316
Terrell	Kaufman	Trinity		209	210	206	203	201	200	200	214	214	214	214	214	214
West Cedar Creek MUD	Kaufman	Trinity	P	80	90	103	106	105	105	105	95	110	115	115	115	115
Blooming Grove	Navarro	Trinity		163	160	157	154	151	149	149	163	163	163	163	163	163
Brandon-Irene WSC[2]	Navarro	Trinity	P	113	109	106	103	100	99	99	115	115	115	115	115	115
Chatfield WSC	Navarro	Trinity		77	91	108	107	105	105	105	95	115	115	115	115	115

Table F.1
Region C Projected Per Capita Muncipal Water Use With and Without Water Savings from Low-Flow Plumbing Fixtures

Water User Group	County Name	Basin Name	Partial	2000 Census	Projected GPCD with Reductions for Plumbing Code Savings						Projected GPCD without Reductions for Plumbing Code Savings					
					2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
Community Water Company	Navarro	Trinity	P	76	91	108	106	104	103	103	95	115	115	115	115	115
Corsicana	Navarro	Trinity		208	204	201	198	195	194	194	208	208	208	208	208	208
County-Other	Navarro	Trinity		130	127	124	121	118	116	116	130	130	130	130	130	130
Dawson	Navarro	Trinity		154	174	170	168	165	164	164	177	177	177	177	177	177
Frost	Navarro	Trinity		110	112	109	106	103	102	102	115	115	115	115	115	115
Kerens	Navarro	Trinity		215	212	209	206	203	201	201	215	215	215	215	215	215
M E N WSC	Navarro	Trinity		119	115	112	110	108	107	107	119	119	119	119	119	119
Navarro Mills WSC	Navarro	Trinity		86	95	107	104	103	102	102	100	115	115	115	115	115
Rice	Navarro	Trinity		218	214	211	209	208	207	207	218	218	218	218	218	218
Rice WSC	Navarro	Trinity	P	102	110	107	106	104	104	104	115	115	115	115	115	115
Aledo	Parker	Trinity		141	150	152	150	149	149	149	155	160	160	160	160	160
Annetta	Parker	Trinity		105	110	107	106	105	104	104	115	115	115	115	115	115
Annetta South	Parker	Trinity		114	110	107	105	103	102	102	115	115	115	115	115	115
Azle	Parker	Trinity	P	130	144	140	137	135	135	135	149	149	149	149	149	149
County-Other	Parker	Brazos	P	106	112	109	107	105	104	104	115	115	115	115	115	115
County-Other	Parker	Trinity	P	106	112	109	107	105	104	104	115	115	115	115	115	115
Fort Worth	Parker	Trinity	P	215	211	207	205	203	202	202	215	215	215	215	215	215
Hudson Oaks	Parker	Trinity		105	109	107	106	105	105	105	115	115	115	115	115	115
Mineral Wells(1)	Parker	Brazos		175	171	168	166	163	162	162	175	175	175	175	175	175
Reno	Parker	Trinity		99	111	107	104	101	100	100	115	115	115	115	115	115
Springtown	Parker	Trinity		136	150	147	144	143	142	142	155	155	155	155	155	155
Walnut Creek SUD	Parker	Trinity	P	106	109	107	105	104	104	104	115	115	115	115	115	115
Weatherford	Parker	Brazos	P	183	183	179	177	176	175	175	188	188	188	188	188	188
Weatherford	Parker	Trinity	P	183	183	179	177	176	175	175	188	188	188	188	188	188
Willow Park	Parker	Trinity		151	146	142	140	139	138	138	151	151	151	151	151	151
Blackland WSC	Rockwall	Sabine	P	88	100	107	105	104	104	104	105	115	115	115	115	115
Blackland WSC	Rockwall	Trinity	P	88	100	107	105	104	104	104	105	115	115	115	115	115
Cash SUD(1)	Rockwall	Sabine		115	115	115	115	115	115	115	115	115	115	115	115	115
County-Other	Rockwall	Sabine	P	192	189	189	189	188	188	188	192	192	192	192	192	192
County-Other	Rockwall	Trinity	P	192	189	189	189	188	188	188	192	192	192	192	192	192
Dallas	Rockwall	Trinity	P	262	265	262	259	257	256	256	269	269	269	269	269	269
East Fork SUD	Rockwall	Trinity	P	131	126	123	121	120	119	119	131	131	131	131	131	131
Forney Lake WSC	Rockwall	Trinity	P	147	195	192	190	188	187	187	200	200	200	200	200	200
Heath	Rockwall	Trinity		214	225	232	231	230	230	230	230	240	240	240	240	240
High Point WSC	Rockwall	Trinity	P	83	95	107	105	104	103	103	100	115	115	115	115	115
Lavon WSC	Rockwall	Trinity	P	86	96	109	108	107	107	107	100	115	115	115	115	115
McLendon-Chisholm WSC	Rockwall	Trinity		142	135	132	130	129	128	128	142	142	142	142	142	142
Mt Zion WSC	Rockwall	Trinity		235	232	229	226	223	221	221	235	235	235	235	235	235
R-C-H WSC	Rockwall	Trinity		162	158	154	152	149	148	148	162	162	162	162	162	162
Rockwall	Rockwall	Trinity		221	235	243	241	240	240	240	240	250	250	250	250	250
Rowlett	Rockwall	Trinity	P	166	185	193	191	190	189	189	190	200	200	200	200	200
Royse City	Rockwall	Sabine	P	182	186	188	187	187	187	187	195	200	200	200	200	200

Table F.1
Region C Projected Per Capita Muncipal Water Use With and Without Water Savings from Low-Flow Plumbing Fixtures

Water User Group	County Name	Basin Name	Partial	2000 Census	Projected GPCD with Reductions for Plumbing Code Savings						Projected GPCD without Reductions for Plumbing Code Savings					
					2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
Wylie	Rockwall	Trinity	P	148	175	192	191	190	190	190	180	200	200	200	200	200
Arlington	Tarrant	Trinity		165	182	179	177	175	174	174	187	187	187	187	187	187
Azle	Tarrant	Trinity	P	130	144	140	137	135	135	135	149	149	149	149	149	149
Bedford	Tarrant	Trinity		186	181	178	175	172	171	171	186	186	186	186	186	186
Benbrook	Tarrant	Trinity		211	208	203	200	198	197	197	211	211	211	211	211	211
Bethesda WSC	Tarrant	Trinity		134	129	126	124	123	122	122	134	134	134	134	134	134
Blue Mound	Tarrant	Trinity		97	106	107	105	102	101	101	110	115	115	115	115	115
Burleson[1]	Tarrant	Trinity		150	146	142	140	138	137	137	150	150	150	150	150	150
Colleyville	Tarrant	Trinity		267	296	293	291	290	289	289	300	300	300	300	300	300
Community WSC	Tarrant	Trinity	P	107	112	109	106	102	101	101	115	115	115	115	115	115
County-Other	Tarrant	Trinity		132	130	127	125	122	121	121	132	132	132	132	132	132
Crowley	Tarrant	Trinity		141	135	131	129	127	126	126	141	141	141	141	141	141
Dalworthington Gardens	Tarrant	Trinity		283	279	275	273	270	269	269	283	283	283	283	283	283
Edgecliff	Tarrant	Trinity		158	161	158	155	152	150	150	165	165	165	165	165	165
Euless	Tarrant	Trinity		159	162	159	156	154	153	153	167	167	167	167	167	167
Everman	Tarrant	Trinity		107	111	108	105	102	101	101	115	115	115	115	115	115
Forest Hill	Tarrant	Trinity		104	111	108	105	103	102	102	115	115	115	115	115	115
Fort Worth	Tarrant	Trinity	P	215	211	207	205	203	202	202	215	215	215	215	215	215
Grand Prairie	Tarrant	Trinity	P	153	148	145	143	142	141	141	153	153	153	153	153	153
Grapevine	Tarrant	Trinity	P	223	235	242	240	238	237	237	240	250	250	250	250	250
Haltom City	Tarrant	Trinity		146	142	139	137	135	134	134	146	146	146	146	146	146
Haslet	Tarrant	Trinity		157	184	181	180	179	179	179	191	191	191	191	191	191
Hurst	Tarrant	Trinity		176	173	170	167	164	163	163	178	178	178	178	178	178
Johnson County SUD[1]	Tarrant	Trinity	P	171	171	174	178	184	190	190	175	181	187	195	201	201
Keller	Tarrant	Trinity		207	203	201	200	198	198	198	207	207	207	207	207	207
Kennedale	Tarrant	Trinity		165	160	157	155	154	153	153	165	165	165	165	165	165
Lake Worth	Tarrant	Trinity		166	171	167	164	161	160	160	175	175	175	175	175	175
Lakeside	Tarrant	Trinity		324	319	315	313	311	310	310	324	324	324	324	324	324
Mansfield	Tarrant	Trinity	P	212	236	244	242	241	241	241	240	250	250	250	250	250
North Richland Hills	Tarrant	Trinity		163	172	168	166	164	163	163	176	176	176	176	176	176
Pantego	Tarrant	Trinity		253	250	247	244	241	239	239	253	253	253	253	253	253
Pelican Bay	Tarrant	Trinity		67	81	93	105	103	102	102	85	100	115	115	115	115
Richland Hills	Tarrant	Trinity		123	141	137	134	131	130	130	144	144	144	144	144	144
River Oaks	Tarrant	Trinity		131	127	124	120	117	116	116	131	131	131	131	131	131
Saginaw	Tarrant	Trinity		152	161	163	161	160	159	159	165	170	170	170	170	170
Sansom Park Village	Tarrant	Trinity		123	123	120	117	114	113	113	127	127	127	127	127	127
Southlake	Tarrant	Trinity	P	279	297	296	295	294	294	294	300	300	300	300	300	300
Watauga	Tarrant	Trinity		119	131	128	125	122	121	121	135	135	135	135	135	135
Westover Hills	Tarrant	Trinity		379	375	372	369	366	364	364	379	379	379	379	379	379
Westworth Village	Tarrant	Trinity		77	97	108	105	102	101	101	100	115	115	115	115	115
White Settlement	Tarrant	Trinity		146	143	139	136	133	132	132	146	146	146	146	146	146
Alvord	Wise	Trinity		108	133	129	126	124	123	123	137	137	137	137	137	137

Table F.1
Region C Projected Per Capita Muncipal Water Use With and Without Water Savings from Low-Flow Plumbing Fixtures

Water User Group	County Name	Basin Name	Partial	2000 Census	Projected GPCD with Reductions for Plumbing Code Savings						Projected GPCD without Reductions for Plumbing Code Savings					
					2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
Aurora	Wise	Trinity		111	111	108	106	105	104	104	116	116	116	116	116	116
Bolivar WSC	Wise	Trinity	P	102	110	122	138	137	137	137	115	130	150	150	150	150
Boyd	Wise	Trinity		132	128	124	121	118	117	117	132	132	132	132	132	132
Bridgeport	Wise	Trinity		173	206	203	201	199	199	199	212	212	212	212	212	212
Chico	Wise	Trinity		123	143	140	137	135	134	134	148	148	148	148	148	148
Community WSC	Wise	Trinity	P	107	112	109	106	102	101	101	115	115	115	115	115	115
County-Other	Wise	Trinity		94	106	108	107	105	104	104	110	115	115	115	115	115
Decatur	Wise	Trinity		199	215	211	209	207	207	207	219	219	219	219	219	219
Fort Worth	Wise	Trinity	P	215	211	207	205	203	202	202	215	215	215	215	215	215
New Fairview	Wise	Trinity		114	113	112	111	111	111	111	115	115	115	115	115	115
Newark	Wise	Trinity		101	121	117	115	113	113	113	126	126	126	126	126	126
Rhome	Wise	Trinity		220	223	221	220	220	220	220	234	234	234	234	234	234
Runaway Bay	Wise	Trinity		192	187	185	183	182	181	181	192	192	192	192	192	192
Walnut Creek SUD	Wise	Trinity	P	106	109	107	105	104	104	104	115	115	115	115	115	115
West Wise SUD	Wise	Trinity		129	124	121	118	116	115	115	129	129	129	129	129	129

Notes:

(1) Majority of WUG's population resides in neighboring region. Region C demand was adjusted to match assumptions used in neighboring regio

(2) TWDB adjusted demand

(3) Turlington WSC has been removed from the TWDB Approved population and demand tables and has been included in Freestone County Other.

Table F.2
Region C Projected Municipal Water Demands With and Without the Water Savings from Low-Flow Plumbing Fixtures

Water User Group	County Name	Basin Name	Partial	2000 Census	Projected Water Needs with Reductions for Plumbing Code Savings						Projected Water Needs without Reductions for Plumbing Code Savings					
					2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
Allen	Collin	Trinity		10,928	23,657	28,806	33,773	35,318	36,029	36,330	24,150	29,603	34,845	36,584	37,321	37,632
Anna	Collin	Trinity		174	1,234	2,527	3,770	5,027	6,703	10,473	1,317	2,688	4,033	5,377	7,169	11,201
Blue Ridge	Collin	Trinity		86	305	627	1,090	1,700	2,473	2,782	314	672	1,176	1,848	2,688	3,024
Caddo Basin SUD[1]	Collin	Sabine	P	251	415	517	644	774	909	1,054	415	517	644	774	909	1,054
Caddo Basin SUD[1]	Collin	Trinity	P	116	192	239	298	358	420	487	192	239	298	358	420	487
Celina	Collin	Trinity		325	952	4,750	10,001	17,709	27,085	31,252	1,008	5,080	10,753	19,042	29,124	33,604
County-Other	Collin	Sabine	P	13	12	11	10	9	8	7	12	12	11	10	9	8
County-Other	Collin	Trinity	P	792	806	732	667	604	546	497	827	772	723	673	620	564
Culleoka WSC	Collin	Trinity		568	908	1,350	1,625	1,883	2,185	2,506	956	1,451	1,762	2,082	2,416	2,771
Dallas	Collin	Trinity	P	13,252	16,717	18,471	19,399	19,921	20,240	20,819	16,969	18,964	20,148	20,851	21,268	21,876
Danville WSC	Collin	Trinity		584	845	1,153	1,417	1,693	1,990	2,306	870	1,203	1,497	1,798	2,114	2,450
East Fork SUD	Collin	Trinity	P	428	555	705	835	972	1,114	1,273	577	751	904	1,062	1,226	1,401
Fairview	Collin	Trinity		1,004	1,721	2,290	2,948	4,395	7,326	12,820	1,752	2,353	3,038	4,557	7,595	13,291
Farmersville	Collin	Trinity		496	565	1,035	1,445	2,151	3,154	4,301	586	1,113	1,591	2,386	3,499	4,772
Frisco	Collin	Trinity	P	9,881	29,941	47,914	51,549	55,184	58,819	60,967	30,244	48,726	52,423	56,119	59,816	62,000
Garland	Collin	Trinity		0	0	0	0	0	0	0	0	0	0	0	0	0
Gunter Rural WSC	Collin	Trinity	P	310	554	726	837	997	1,173	1,360	580	773	909	1,092	1,284	1,489
Hickory Creek SUD[1]	Collin	Trinity	P	9	12	16	19	22	25	29	12	16	20	24	27	32
Josephine	Collin	Trinity		87	100	282	276	271	271	271	103	302	302	302	302	302
Lavon WSC	Collin	Trinity	P	217	368	584	847	1,678	2,637	3,596	383	616	902	1,803	2,834	3,864
Lowry Crossing	Collin	Trinity		244	313	392	463	537	614	2,321	322	413	494	576	663	2,505
Lucas	Collin	Trinity		320	1,032	1,533	1,828	2,344	3,327	4,537	1,075	1,655	2,016	2,604	3,696	5,041
McKinney	Collin	Trinity		13,398	24,715	40,242	58,554	79,216	94,472	108,430	25,134	41,231	60,241	81,835	97,595	112,014
Melissa	Collin	Trinity		86	2,323	4,324	5,592	6,882	8,603	10,753	2,420	4,481	5,825	7,169	8,961	11,201
Milligan WSC	Collin	Trinity		203	202	196	191	185	183	183	209	209	209	209	209	209
Murphy	Collin	Trinity		545	1,554	5,810	5,778	5,746	5,746	5,746	1,596	6,066	6,066	6,066	6,066	6,066
Nevada	Collin	Sabine	P	147	177	352	421	836	1,393	3,484	180	364	437	874	1,456	3,640
Nevada	Collin	Trinity	P	58	70	176	210	418	697	1,742	71	182	218	437	728	1,820
New Hope	Collin	Trinity		218	267	383	632	944	1,416	3,148	272	395	659	988	1,482	3,293
North Collin WSC	Collin	Trinity		678	876	1,116	1,321	1,525	1,757	2,005	904	1,167	1,399	1,638	1,887	2,153
Parker	Collin	Trinity		504	1,915	4,078	5,950	9,669	14,132	19,338	1,943	4,237	6,219	10,106	14,770	20,212
Plano	Collin	Trinity	P	63,055	70,892	72,920	75,153	77,640	80,105	82,880	72,283	74,938	77,848	80,746	83,643	86,541
Princeton	Collin	Trinity		366	666	1,568	2,782	4,604	7,673	11,509	700	1,680	3,024	5,041	8,401	12,602
Prosper	Collin	Trinity	P	460	1,998	7,289	10,528	11,878	12,688	13,498	2,061	7,561	10,921	12,322	13,162	14,002
Richardson	Collin	Trinity	P	6,625	6,925	10,588	10,550	10,435	10,359	10,359	7,023	10,854	10,854	10,854	10,854	10,854
Royse City	Collin	Sabine	P	38	313	1,053	1,676	2,514	3,351	3,770	328	1,120	1,792	2,688	3,584	4,033
Sachse	Collin	Trinity	P	344	726	1,169	1,348	1,411	1,444	1,469	741	1,212	1,404	1,485	1,520	1,546
Saint Paul	Collin	Trinity		125	192	468	930	1,479	1,756	1,848	198	496	991	1,586	1,884	1,983
South Grayson WSC	Collin	Trinity	P	211	212	215	219	220	222	225	220	227	235	238	242	246
Weston	Collin	Trinity		51	251	672	1,482	4,234	7,410	12,702	269	717	1,568	4,481	7,841	13,442
Wylie	Collin	Trinity	P	2,406	6,615	10,351	12,837	17,877	18,729	20,467	6,804	10,782	13,442	18,818	19,715	21,544
	Collin Total			129,603	202,093	277,630	329,895	391,260	449,184	513,544	206,020	285,838	341,841	407,503	469,000	536,769
Bolivar WSC	Cooke	Trinity	P	171	205	244	286	285	285	285	215	260	311	312	312	312
County-Other	Cooke	Red	P	185	237	272	276	272	269	270	246	289	299	301	301	301
County-Other	Cooke	Trinity	P	653	837	960	975	962	952	952	870	1,022	1,057	1,063	1,063	1,063
Gainesville	Cooke	Red	P	2	2	2	2	2	2	2	2	2	2	2	2	2
Gainesville	Cooke	Trinity	P	2,487	3,748	3,990	4,383	4,691	5,044	5,520	3,811	4,149	4,610	5,020	5,430	5,942
Kiowa Homeowners WSC	Cooke	Trinity		461	503	531	542	536	532	532	514	551	571	574	573	573
Lindsay	Cooke	Trinity		137	154	161	164	162	160	160	157	168	174	175	175	175
Muenster	Cooke	Trinity		263	379	429	468	511	565	621	385	446	493	547	608	669
Two Way SUD	Cooke	Red	P	8	10	11	11	11	11	11	10	12	12	12	12	12
Valley View	Cooke	Trinity		84	187	363	594	808	1,371	1,714	193	386	644	902	1,546	1,932
Woodbine WSC	Cooke	Red	P	11	13	14	14	13	13	13	14	15	15	15	15	15
Woodbine WSC	Cooke	Trinity	P	536	643	685	735	776	829	889	661	729	798	866	934	1,003
	Cooke Total			4,998	6,918	7,662	8,450	9,029	10,033	10,969	7,078	8,029	8,986	9,789	10,971	11,999

Table F.2
Region C Projected Municipal Water Demands With and Without the Water Savings from Low-Flow Plumbing Fixtures

Water User Group	County Name	Basin Name	Partial	2000 Census	Projected Water Needs with Reductions for Plumbing Code Savings						Projected Water Needs without Reductions for Plumbing Code Savings					
					2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
Addison	Dallas	Trinity		6,998	8,852	10,074	10,919	11,514	11,918	12,218	8,932	10,235	11,145	11,778	12,220	12,528
Balch Springs	Dallas	Trinity		2,387	2,621	2,730	2,805	2,852	2,934	3,028	2,716	2,907	3,072	3,216	3,340	3,448
Carrollton	Dallas	Trinity	P	10,548	10,804	10,740	10,792	10,783	10,834	10,946	11,087	11,197	11,373	11,487	11,603	11,724
Cedar Hill	Dallas	Trinity	P	5,707	7,971	9,992	11,741	13,088	14,350	15,409	8,229	10,521	12,445	14,061	15,416	16,554
Cockrell Hill	Dallas	Trinity		582	653	687	681	670	667	668	670	720	732	738	741	742
Combine	Dallas	Trinity	P	62	100	126	136	148	165	188	104	135	150	166	186	212
Combine WSC	Dallas	Trinity	P	88	156	221	250	279	319	373	164	237	271	305	350	409
Coppell	Dallas	Trinity	P	8,126	10,036	9,947	9,857	9,812	9,768	9,768	10,171	10,171	10,171	10,171	10,171	10,171
County-Other	Dallas	Trinity		231	189	145	109	80	59	46	189	146	113	87	68	52
Dallas	Dallas	Trinity	P	329,027	365,042	399,346	414,694	431,629	477,217	560,935	370,552	410,015	430,705	451,783	501,451	589,420
Dallas County WCID #6	Dallas	Trinity		319	577	771	884	994	1,149	1,354	609	829	959	1,089	1,258	1,483
De Soto	Dallas	Trinity		8,012	10,675	12,888	14,678	16,386	18,298	18,845	10,942	13,465	15,490	17,379	19,506	20,089
Duncanville	Dallas	Trinity		6,952	7,937	8,230	8,254	8,305	8,432	8,596	8,104	8,529	8,734	8,930	9,116	9,293
East Fork SUD	Dallas	Trinity	P	113	115	118	120	123	126	132	120	126	130	134	139	145
Farmers Branch	Dallas	Trinity		10,261	11,229	12,109	12,883	13,603	14,286	14,945	11,366	12,369	13,282	14,112	14,866	15,552
Garland	Dallas	Trinity		38,429	42,911	45,702	48,139	50,151	52,087	52,087	44,227	47,987	51,186	54,009	56,455	56,455
Glenn Heights	Dallas	Trinity	P	724	903	1,079	1,234	1,382	1,516	1,652	944	1,149	1,338	1,514	1,676	1,827
Grand Prairie	Dallas	Trinity	P	17,097	23,024	26,915	31,149	36,757	43,204	50,107	23,802	28,400	33,327	39,604	46,881	54,371
Grapevine	Dallas	Trinity	P	0	0	0	0	0	0	0	0	0	0	0	0	0
Highland Park	Dallas	Trinity		4,120	4,255	4,266	4,274	4,278	4,289	4,319	4,285	4,327	4,366	4,402	4,434	4,465
Hutchins	Dallas	Trinity		682	1,210	2,375	3,782	5,646	7,527	7,998	1,255	2,509	4,015	6,022	8,029	8,531
Irving	Dallas	Trinity		47,220	55,501	59,975	63,050	65,382	67,267	68,916	56,483	61,857	65,916	68,982	71,296	73,044
Lancaster	Dallas	Trinity		4,119	7,505	11,739	14,450	17,205	19,499	20,933	7,953	12,725	15,906	19,087	21,632	23,223
Lewisville	Dallas	Trinity	P	1	1	1	1	1	1	1	1	1	1	1	1	1
Mesquite	Dallas	Trinity	P	22,317	28,676	34,293	38,813	41,474	42,395	42,668	29,572	36,041	41,585	44,727	46,021	46,317
Ovilla	Dallas	Trinity	P	53	75	109	158	230	338	496	77	114	167	245	359	526
Richardson	Dallas	Trinity	P	22,366	25,458	25,535	25,443	25,167	24,984	24,984	25,820	26,178	26,178	26,178	26,178	26,178
Rockett SUD	Dallas	Trinity	P	245	326	399	439	481	536	616	340	426	477	528	594	683
Rowlett	Dallas	Trinity	P	6,966	10,708	13,657	15,507	17,029	18,230	19,275	10,997	14,152	16,238	17,925	19,291	20,397
Sachse	Dallas	Trinity	P	1,677	2,302	2,850	3,309	3,699	4,086	4,436	2,350	2,953	3,446	3,894	4,301	4,670
Sardis-Lone Elm WSC	Dallas	Trinity	P	8	8	7	7	7	7	7	8	8	8	8	8	8
Seagoville	Dallas	Trinity	P	1,599	2,462	2,747	3,032	3,312	3,567	3,842	2,574	2,961	3,295	3,656	3,938	4,241
Sunnyvale	Dallas	Trinity		977	1,770	2,454	3,135	3,820	4,514	4,618	1,815	2,540	3,266	3,992	4,718	4,827
University Park	Dallas	Trinity		6,714	7,286	7,371	7,407	7,407	7,439	7,483	7,394	7,565	7,687	7,776	7,840	7,886
Wilmer	Dallas	Trinity		369	641	899	1,035	1,223	1,631	2,563	678	966	1,134	1,353	1,803	2,834
Wylie	Dallas	Trinity	P	51	114	178	224	265	303	337	117	185	235	279	319	355
	Dallas Total			565,147	652,093	720,675	763,391	805,182	873,942	974,789	664,647	744,646	798,543	849,618	926,205	1,032,661
Argyle	Denton	Trinity		713	2,316	3,877	4,867	5,358	5,918	6,474	2,380	4,011	5,035	5,562	6,144	6,721
Argyle WSC	Denton	Trinity		847	848	840	827	813	809	809	862	863	863	863	863	863
Aubrey	Denton	Trinity		173	462	855	1,373	1,819	2,445	3,285	481	903	1,471	1,977	2,657	3,571
Bartonville	Denton	Trinity		176	941	2,095	2,917	3,438	3,646	3,750	1,008	2,240	3,136	3,696	3,921	4,033
Bartonville WSC	Denton	Trinity		265	307	347	380	410	439	466	317	363	404	441	474	503
Bolivar WSC	Denton	Trinity	P	621	887	1,221	2,782	6,138	9,975	13,504	928	1,301	3,024	6,721	10,921	14,786
Carrollton	Denton	Trinity	P	12,650	15,083	15,373	15,980	16,282	16,522	16,686	15,478	16,027	16,839	17,344	17,696	17,871
Coppell	Denton	Trinity	P	51	104	143	176	204	228	248	106	147	182	212	237	258
Copper Canyon	Denton	Trinity		304	396	540	800	1,176	1,375	1,480	404	560	840	1,246	1,456	1,568
Corinth	Denton	Trinity		2,550	3,767	4,681	5,383	6,085	6,519	6,845	3,824	4,800	5,548	6,304	6,754	7,092
County-Other	Denton	Trinity		4,564	7,218	9,008	10,727	12,341	13,971	15,649	7,412	9,402	11,320	13,096	14,825	16,605
Cross Roads	Denton	Trinity		273	575	1,267	2,056	3,430	5,341	6,669	588	1,310	2,134	3,560	5,545	6,922
Dallas	Denton	Trinity	P	6,537	7,783	8,271	8,460	8,535	8,571	8,606	7,900	8,492	8,787	8,934	9,007	9,043
Denton	Denton	Trinity		17,050	29,561	39,901	49,566	58,158	71,679	98,275	30,698	42,130	52,927	62,454	76,974	105,533
Denton County FWSD #1A	Denton	Trinity		391	991	1,581	2,132	2,704	3,286	3,894	1,008	1,614	2,184	2,771	3,367	3,990
Double Oak	Denton	Trinity		488	668	729	769	812	854	900	690	764	813	863	912	961
Flower Mound	Denton	Trinity		11,245	16,919	22,280	25,987	29,757	32,085	33,661	17,205	22,851	26,883	30,916	33,335	34,972
Fort Worth	Denton	Trinity	P	11	1,182	6,956	10,333	14,780	21,496	28,284	1,204	7,225	10,837	15,654	22,879	30,104
Frisco	Denton	Trinity	P	1,109	15,674	18,174	29,079	33,705	37,010	38,166	15,833	18,482	29,572	34,276	37,637	38,813

Table F.2
Region C Projected Municipal Water Demands With and Without the Water Savings from Low-Flow Plumbing Fixtures

Water User Group	County Name	Basin Name	Partial	2000 Census	Projected Water Needs with Reductions for Plumbing Code Savings						Projected Water Needs without Reductions for Plumbing Code Savings					
					2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
Hackberry	Denton	Trinity		74	142	210	275	304	319	326	147	219	287	320	336	343
Hebron	Denton	Trinity		204	220	334	549	1,087	1,630	1,760	224	349	582	1,165	1,747	1,887
Hickory Creek	Denton	Trinity		251	529	825	1,005	1,219	1,600	2,057	557	891	1,092	1,344	1,764	2,268
Highland Village	Denton	Trinity		2,795	3,394	3,722	3,902	3,986	4,037	4,086	3,478	3,873	4,102	4,234	4,310	4,363
Justin	Denton	Trinity		316	501	863	1,376	2,249	2,745	3,029	516	903	1,457	2,395	2,924	3,226
Krugerville	Denton	Trinity		85	162	181	204	263	339	486	171	196	228	296	386	554
Krum	Denton	Trinity		259	469	661	807	1,066	1,371	1,752	495	708	877	1,176	1,512	1,932
Lake Dallas	Denton	Trinity		912	1,230	1,478	1,591	1,671	1,722	1,766	1,257	1,529	1,669	1,765	1,832	1,878
Lewisville	Denton	Trinity	P	14,541	20,836	25,659	29,285	31,665	33,324	35,229	21,309	26,697	30,647	33,332	35,285	37,301
Lincoln Park	Denton	Trinity		71	132	195	246	298	353	410	138	208	264	322	381	442
Little Elm	Denton	Trinity		662	5,441	8,289	9,785	9,785	9,785	9,785	5,565	8,513	10,104	10,104	10,104	10,104
Mustang SUD	Denton	Trinity		442	921	1,474	1,939	2,399	2,881	3,385	958	1,552	2,041	2,544	3,055	3,590
Northlake	Denton	Trinity		126	786	934	1,796	2,658	3,197	3,443	808	967	1,858	2,750	3,307	3,561
Oak Point	Denton	Trinity		217	511	838	1,097	1,354	1,623	1,904	527	873	1,142	1,420	1,702	1,997
Pilot Point	Denton	Trinity		483	1,210	1,670	1,895	2,069	2,195	2,335	1,255	1,764	2,016	2,233	2,369	2,520
Plano	Denton	Trinity	P	614	1,547	2,160	2,165	2,170	2,176	2,189	1,578	2,220	2,243	2,257	2,272	2,286
Ponder	Denton	Trinity		181	621	1,714	3,416	5,466	6,320	6,491	643	1,787	3,573	5,717	6,611	6,789
Prosper	Denton	Trinity	P	0	500	2,160	3,779	5,669	6,209	6,749	515	2,240	3,921	5,881	6,441	7,001
Roanoke	Denton	Trinity		611	1,177	1,897	2,957	4,016	5,354	6,450	1,209	1,960	3,080	4,201	5,601	6,747
Sanger	Denton	Trinity		741	2,206	2,765	3,277	3,883	4,355	4,537	2,333	2,950	3,518	4,195	4,704	4,901
Shady Shores	Denton	Trinity		185	306	436	524	617	710	811	320	464	566	671	777	888
Southlake	Denton	Trinity	P	136	333	663	991	1,317	1,910	1,976	336	672	1,008	1,344	1,949	2,016
The Colony	Denton	Trinity		2,912	5,178	6,586	7,269	7,427	7,580	7,648	5,513	7,214	8,115	8,373	8,631	8,708
Trophy Club	Denton	Trinity		2,226	2,693	3,017	3,289	3,530	3,801	4,073	2,737	3,086	3,386	3,646	3,927	4,207
	Denton Total			89,062	156,727	206,870	258,013	302,113	347,705	400,328	160,915	215,320	270,575	318,575	367,531	423,718
Bardwell	Ellis	Trinity		62	103	130	155	182	213	248	108	138	168	199	234	271
Brandon-Irene WSC [2]	Ellis	Trinity	P	9	10	11	11	12	13	15	10	11	13	14	15	17
Buena Vista - Bethel SUD	Ellis	Trinity		407	553	669	725	819	937	1,079	569	702	769	875	1,006	1,159
Cedar Hill	Ellis	Trinity	P	9	8	8	8	8	8	8	9	9	9	9	9	9
Community Water Company	Ellis	Trinity	P	71	116	171	201	230	264	304	121	182	218	254	295	340
County-Other	Ellis	Trinity		2,039	2,015	2,003	1,979	1,967	1,955	1,955	2,039	2,039	2,039	2,039	2,039	2,039
Ennis	Ellis	Trinity		2,804	3,497	4,358	5,504	6,949	8,834	11,308	3,589	4,594	5,881	7,528	9,637	12,336
Ferris	Ellis	Trinity		334	331	324	317	309	305	305	341	341	341	341	341	341
Files Valley WSC	Ellis	Trinity		131	143	153	163	173	186	201	145	158	171	184	199	216
Glenn Heights	Ellis	Trinity	P	207	328	440	546	657	779	921	343	469	593	720	862	1,018
Grand Prairie	Ellis	Trinity	P	8	75	342	844	1,408	2,066	2,916	77	361	903	1,517	2,242	3,164
Italy	Ellis	Trinity		205	282	330	362	397	439	489	293	352	397	443	494	551
Johnson County SUD [1]	Ellis	Trinity	P	28	42	55	69	86	104	122	43	57	73	91	110	129
Mansfield	Ellis	Trinity	P	31	122	271	469	728	1,076	1,532	124	278	484	755	1,116	1,589
Maypearl	Ellis	Trinity		112	145	142	140	137	135	135	147	147	147	147	147	147
Midlothian	Ellis	Trinity		1,609	2,834	4,448	6,544	7,933	9,207	10,170	2,925	4,667	6,904	8,416	9,767	10,788
Milford	Ellis	Trinity		79	86	84	81	79	77	77	88	88	88	88	88	88
Mountain Peak WSC	Ellis	Trinity		802	1,207	1,337	1,409	1,607	1,975	2,452	1,244	1,396	1,481	1,710	2,102	2,609
Oak Leaf	Ellis	Trinity		199	338	393	448	503	567	640	347	409	471	534	605	683
Ovilla	Ellis	Trinity	P	664	1,016	1,347	1,666	1,853	1,853	1,853	1,049	1,407	1,759	1,968	1,968	1,968
Palmer	Ellis	Trinity		205	239	250	259	267	282	302	248	266	283	301	322	344
Pecan Hill	Ellis	Trinity		111	160	183	205	228	254	285	164	190	216	243	272	305
Red Oak	Ellis	Trinity		752	1,104	1,389	1,638	1,898	2,186	2,517	1,143	1,463	1,745	2,034	2,357	2,713
Rice WSC	Ellis	Trinity	P	74	127	165	204	242	288	338	132	177	222	267	318	374
Rockett SUD	Ellis	Trinity	P	2,986	3,992	4,786	5,151	5,800	6,609	7,607	4,161	5,119	5,607	6,370	7,323	8,430
Sardis-Lone Elm WSC	Ellis	Trinity	P	1,322	1,673	1,705	1,698	1,868	2,218	2,688	1,718	1,770	1,782	1,982	2,366	2,869
Waxahachie	Ellis	Trinity		4,560	6,462	8,151	10,330	13,090	16,672	21,341	6,589	8,435	10,797	13,821	17,693	22,648
	Ellis Total			19,820	27,008	33,645	41,126	49,430	59,502	71,808	27,766	35,225	43,561	52,850	63,927	77,145

Table F.2
Region C Projected Municipal Water Demands With and Without the Water Savings from Low-Flow Plumbing Fixtures

Water User Group	County Name	Basin Name	Partial	2000 Census	Projected Water Needs with Reductions for Plumbing Code Savings						Projected Water Needs without Reductions for Plumbing Code Savings					
					2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
Bonham	Fannin	Red		2,406	2,735	2,950	3,710	5,076	6,889	8,496	2,773	3,035	3,853	5,298	7,225	8,911
County-Other	Fannin	Red	P	1,153	1,136	1,102	1,056	1,000	950	913	1,165	1,161	1,143	1,113	1,078	1,036
County-Other	Fannin	Sulphur	P	186	183	178	170	161	153	147	188	187	184	179	173	167
County-Other	Fannin	Trinity	P	180	177	172	164	156	148	142	182	181	178	173	168	161
Ector	Fannin	Red		90	96	99	101	102	104	107	98	104	108	111	115	118
Hickory Creek SUD [1]	Fannin	Sulphur	P	15	17	18	19	19	20	21	17	19	20	21	22	23
Hickory Creek SUD [1]	Fannin	Trinity	P	11	13	14	15	15	16	17	13	15	16	16	17	18
Honey Grove	Fannin	Red	P	80	102	106	111	117	124	132	104	111	118	125	133	142
Honey Grove	Fannin	Sulphur	P	249	319	332	348	365	387	412	325	346	368	392	417	444
Ladonia	Fannin	Sulphur		245	546	577	715	779	879	1,055	551	588	735	808	919	1,102
Leonard	Fannin	Sulphur	P	4	5	6	9	14	21	26	5	6	10	16	23	29
Leonard	Fannin	Trinity	P	216	298	336	457	706	1,019	1,273	308	358	499	785	1,142	1,427
North Hunt WSC [1]	Fannin	Sulphur		41	49	55	60	63	66	70	49	55	60	63	66	70
Savoy	Fannin	Red		96	108	108	106	105	107	109	112	115	117	120	123	125
Southwest Fannin County SUD	Fannin	Red	P	232	487	757	899	997	1,082	1,176	510	801	966	1,082	1,185	1,288
Southwest Fannin County SUD	Fannin	Trinity	P	3	5	7	8	9	9	10	5	8	9	10	10	11
Trenton	Fannin	Trinity		139	206	302	496	780	1,163	1,550	209	314	524	838	1,257	1,676
Whitewright	Fannin	Red	P	3	5	6	7	7	8	9	5	6	7	8	9	9
	Fannin Total			5,349	6,487	7,125	8,451	10,471	13,145	15,665	6,619	7,410	8,915	11,158	14,082	16,757
County-Other	Freestone	Brazos	P	191	195	197	196	192	191	191	200	209	214	215	215	215
County-Other	Freestone	Trinity	P	1,007	1,027	1,038	1,034	1,013	1,004	1,004	1,053	1,100	1,125	1,132	1,132	1,132
Fairfield	Freestone	Trinity		707	1,120	1,208	1,297	1,383	1,482	1,588	1,143	1,257	1,371	1,485	1,600	1,714
Flo Community WSC [2]	Freestone	Trinity		20	20	20	20	20	19	19	21	22	23	23	23	23
Teague	Freestone	Brazos	P	147	209	281	301	327	353	383	216	294	324	358	391	423
Teague	Freestone	Trinity	P	231	327	439	472	512	553	599	338	459	507	561	611	662
Turlington WSC [3]	Freestone	Trinity		24	29	36	35	35	34	34	30	38	38	39	39	39
Wortham	Freestone	Trinity		144	246	253	255	252	251	251	251	262	268	270	270	270
	Freestone Total			2,471	3,173	3,472	3,610	3,734	3,887	4,069	3,252	3,641	3,870	4,083	4,281	4,478
Bells	Grayson	Red		163	238	296	348	404	456	493	246	314	376	444	506	547
Collinsville	Grayson	Trinity		172	324	441	558	666	780	899	335	467	599	730	862	994
County-Other	Grayson	Red	P	3,090	3,029	2,963	2,850	2,634	2,404	2,149	3,108	3,094	3,057	2,904	2,676	2,393
County-Other	Grayson	Trinity	P	448	439	430	413	382	349	312	451	449	443	421	388	347
Denison	Grayson	Red		5,102	5,489	6,053	6,385	6,493	6,667	6,875	5,601	6,273	6,721	6,945	7,169	7,393
Gunter	Grayson	Trinity		165	407	666	786	902	1,022	1,149	417	694	833	972	1,111	1,250
Gunter Rural WSC	Grayson	Trinity	P	28	99	145	190	259	412	588	103	155	206	283	451	644
Howe	Grayson	Red	P	86	106	117	119	118	118	120	110	123	126	128	130	131
Howe	Grayson	Trinity	P	241	487	801	1,074	1,237	1,381	1,535	502	840	1,143	1,344	1,512	1,680
Luella WSC	Grayson	Trinity		335	489	535	565	582	592	672	506	569	613	638	654	743
Pottsboro	Grayson	Red		253	504	851	1,176	1,492	1,811	1,976	521	896	1,255	1,613	1,971	2,151
Sherman	Grayson	Red		8,724	10,081	12,135	13,660	15,382	17,787	21,238	10,213	12,434	14,170	16,158	18,762	22,403
South Grayson WSC	Grayson	Trinity	P	71	169	264	342	434	538	672	176	279	367	470	587	734
Southmayd	Grayson	Red		128	199	366	455	529	594	652	206	386	490	580	657	721
Southwest Fannin County SUD	Grayson	Red	P	32	38	46	47	46	46	46	39	48	50	50	50	50
Tioga	Grayson	Trinity		103	192	428	588	663	725	757	196	445	623	712	784	819
Tom Bean	Grayson	Red	P	33	47	52	58	61	64	67	47	54	61	64	68	72
Tom Bean	Grayson	Trinity	P	191	264	296	330	344	362	381	268	304	345	365	385	406
Two Way SUD	Grayson	Red	P	228	366	519	629	744	855	973	380	553	683	814	945	1,076
Two Way SUD	Grayson	Trinity	P	123	199	283	339	400	460	524	207	301	368	438	509	579
Van Alstyne	Grayson	Trinity		378	966	2,341	3,159	3,561	3,875	4,022	1,011	2,464	3,360	3,808	4,145	4,301
Whitesboro	Grayson	Red	P	223	595	816	958	1,054	1,122	1,157	610	854	1,015	1,140	1,222	1,260
Whitesboro	Grayson	Trinity	P	380	447	461	471	470	472	479	458	482	499	508	514	521
Whitewright	Grayson	Red	P	348	549	757	958	1,152	1,354	1,563	560	784	1,008	1,232	1,456	1,680
Woodbine WSC	Grayson	Trinity	P	11	13	13	13	13	13	13	13	14	14	14	14	14
	Grayson Total			21,056	25,736	32,075	36,471	40,022	44,259	49,312	26,284	33,276	38,425	42,775	47,528	52,909

Table F.2
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Water User Group	County Name	Basin Name	Partial	2000 Census	Projected Water Needs with Reductions for Plumbing Code Savings						Projected Water Needs without Reductions for Plumbing Code Savings					
					2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
Athens	Henderson	Trinity		2,069	2,693	3,169	3,739	4,392	5,248	6,306	2,737	3,276	3,930	4,724	5,678	6,822
Bethel-Ash WSC (1)	Henderson	Trinity		139	163	194	222	253	290	342	175	213	252	291	339	399
County-Other	Henderson	Trinity		268	262	257	253	248	246	246	268	268	267	267	267	267
East Cedar Creek FWSD	Henderson	Trinity		1,821	2,319	2,853	3,402	3,931	4,631	5,516	2,381	2,987	3,586	4,200	4,949	5,894
Eustace	Henderson	Trinity		118	149	161	172	183	199	221	153	169	184	200	219	243
Gun Barrel City	Henderson	Trinity		738	1,257	1,452	1,637	1,841	2,089	2,416	1,284	1,508	1,729	1,956	2,232	2,581
Log Cabin	Henderson	Trinity		71	96	128	144	142	141	141	99	135	155	155	155	155
Mabank	Henderson	Trinity	P	60	74	78	82	87	93	101	76	82	87	93	99	108
Malakoff	Henderson	Trinity		316	420	437	453	468	494	532	431	457	483	509	542	582
Payne Springs	Henderson	Trinity		149	165	174	182	191	203	220	169	181	193	205	219	237
Seven Points	Henderson	Trinity		140	174	205	234	266	304	355	181	217	252	288	333	389
Tool	Henderson	Trinity		331	405	452	500	548	610	695	419	479	538	598	671	764
Trinidad	Henderson	Trinity		156	183	183	183	181	184	190	188	192	196	200	205	211
Virginia Hill WSC	Henderson	Trinity		353	393	384	375	366	361	364	403	405	407	409	412	415
West Cedar Creek MUD	Henderson	Trinity	P	896	1,280	1,803	2,199	2,527	2,952	3,489	1,352	1,926	2,386	2,767	3,233	3,821
	Henderson Total			7,625	10,033	11,930	13,777	15,624	18,045	21,134	10,316	12,495	14,645	16,862	19,553	22,888
Bryson	Jack	Brazos		77	96	97	96	94	94	94	98	101	103	103	103	103
County-Other	Jack	Brazos	P	153	173	173	172	167	165	165	177	183	187	187	187	187
County-Other	Jack	Trinity	P	270	376	427	475	519	571	628	386	451	515	580	644	708
Jacksboro	Jack	Trinity		640	688	699	697	686	680	680	703	726	741	741	741	741
	Jack Total			1,140	1,333	1,396	1,440	1,466	1,510	1,567	1,364	1,461	1,546	1,611	1,675	1,739
Able Springs WSC	Kaufman	Trinity		276	512	783	976	1,195	1,478	1,828	539	841	1,069	1,321	1,634	2,022
College Mound WSC	Kaufman	Trinity		570	873	1,329	1,820	2,133	2,517	3,019	944	1,461	2,013	2,381	2,837	3,403
Combine	Kaufman	Trinity	P	116	182	230	269	315	372	447	191	247	297	352	420	504
Combine WSC	Kaufman	Trinity	P	149	306	467	605	756	949	1,189	321	502	656	828	1,040	1,303
County-Other	Kaufman	Sabine	P	290	398	395	392	389	386	386	409	409	409	409	409	409
County-Other	Kaufman	Trinity	P	1,304	1,784	1,771	1,758	1,744	1,731	1,731	1,837	1,837	1,837	1,837	1,837	1,837
Crandall	Kaufman	Trinity		435	730	1,004	1,258	1,544	1,909	2,362	759	1,063	1,351	1,669	2,064	2,553
Dallas	Kaufman	Trinity	P	0	0	0	0	0	0	0	0	0	0	0	0	0
Forney	Kaufman	Trinity		814	1,936	4,033	4,973	5,763	6,422	7,048	2,016	4,301	5,377	6,273	6,990	7,671
Forney Lake WSC	Kaufman	Trinity	P	98	2,228	2,366	2,448	2,527	2,618	2,723	2,285	2,464	2,576	2,688	2,800	2,912
Gastonia-Scurry WSC	Kaufman	Trinity		483	842	1,199	1,370	1,629	1,983	2,421	896	1,288	1,500	1,819	2,214	2,703
High Point WSC	Kaufman	Trinity	P	326	507	717	851	1,005	1,194	1,441	533	771	932	1,111	1,333	1,608
Kaufman	Kaufman	Trinity		821	1,156	1,716	2,013	2,264	2,511	3,029	1,202	1,825	2,188	2,479	2,770	3,341
Kemp	Kaufman	Trinity		170	181	178	174	170	168	168	185	185	185	185	185	185
Mabank	Kaufman	Trinity	P	345	517	621	725	846	996	1,187	530	647	767	900	1,065	1,270
Mac Bee WSC (1)	Kaufman	Sabine		26	36	45	54	65	78	94	37	48	58	71	86	103
Mesquite	Kaufman	Trinity	P	0	0	1	1	1	1	2	0	1	1	1	1	2
Oak Grove	Kaufman	Trinity		66	124	148	172	201	236	283	130	160	190	224	266	318
Seagoville	Kaufman	Trinity	P	1	3	4	5	7	9	11	3	4	6	7	10	12
Talty	Kaufman	Trinity		364	863	1,348	1,849	2,404	3,091	3,943	866	1,356	1,860	2,419	3,111	3,968
Terrell	Kaufman	Trinity		3,185	3,575	4,302	4,926	5,325	5,735	6,372	3,643	4,469	5,193	5,669	6,136	6,819
West Cedar Creek MUD	Kaufman	Trinity	P	437	904	1,497	2,028	2,545	3,208	4,031	955	1,598	2,200	2,787	3,513	4,414
	Kaufman Total			10,276	17,657	24,154	28,667	32,828	37,592	43,715	18,281	25,477	30,665	35,430	40,721	47,357
Blooming Grove	Navarro	Trinity		152	149	146	144	141	139	139	152	152	152	152	152	152
Brandon-Irene WSC (2)	Navarro	Trinity	P	26	27	28	30	31	33	36	28	31	33	36	39	42
Chatfield WSC	Navarro	Trinity		285	539	812	982	1,153	1,378	1,655	562	864	1,055	1,262	1,509	1,813
Community Water Company	Navarro	Trinity	P	71	106	157	193	237	293	366	111	168	209	262	327	409
Corsicana	Navarro	Trinity		5,705	5,835	6,006	6,179	6,366	6,667	7,076	5,950	6,215	6,491	6,790	7,148	7,587
County-Other	Navarro	Trinity		256	250	244	239	233	229	229	256	256	256	256	256	256
Dawson	Navarro	Trinity		147	177	185	195	204	219	238	180	193	205	219	236	256
Frost	Navarro	Trinity		80	87	91	95	98	105	114	89	96	103	110	118	129
Kerens	Navarro	Trinity		405	399	394	388	382	378	378	405	405	405	405	405	405
M E N WSC	Navarro	Trinity		280	441	471	510	542	571	621	456	501	551	597	635	690

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Water User Group	County Name	Basin Name	Partial	2000 Census	Projected Water Needs with Reductions for Plumbing Code Savings						Projected Water Needs without Reductions for Plumbing Code Savings					
					2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
Navarro Mills WSC	Navarro	Trinity		247	342	481	585	724	896	1,120	360	517	647	808	1,010	1,263
Rice	Navarro	Trinity		195	229	265	304	347	398	463	233	274	317	364	420	488
Rice WSC	Navarro	Trinity	P	577	818	1,002	1,205	1,408	1,678	2,009	855	1,077	1,307	1,557	1,855	2,222
	Navarro Total			8,426	9,399	10,282	11,049	11,866	12,984	14,444	9,637	10,749	11,731	12,818	14,110	15,712
Aledo	Parker	Trinity		273	439	591	744	879	1,029	1,195	454	622	793	943	1,105	1,284
Annetta	Parker	Trinity		130	195	236	272	302	333	370	203	254	295	330	368	409
Annetta South	Parker	Trinity		71	87	100	110	119	128	140	91	108	121	132	145	158
Azle	Parker	Trinity	P	228	353	438	533	614	708	811	366	466	580	678	781	895
County-Other	Parker	Brazos	P	1,915	2,276	2,420	2,745	2,987	2,959	2,959	2,337	2,554	2,951	3,271	3,271	3,271
County-Other	Parker	Trinity	P	3,151	2,509	2,198	1,918	1,647	1,398	1,165	2,576	2,319	2,061	1,803	1,546	1,288
Fort Worth	Parker	Trinity	P	0	2,836	12,057	18,370	20,920	23,758	26,021	2,890	12,523	19,266	22,156	25,287	27,696
Hudson Oaks	Parker	Trinity		193	361	511	674	817	980	1,163	381	549	731	894	1,073	1,273
Mineral Wells [1]	Parker	Brazos		427	766	753	744	730	726	726	784	784	784	784	784	784
Reno	Parker	Trinity		271	319	321	322	321	327	337	331	345	356	366	376	387
Springtown	Parker	Trinity		314	504	659	807	961	1,113	1,272	521	694	868	1,042	1,215	1,389
Walnut Creek SUD	Parker	Trinity	P	1,271	2,017	2,562	2,975	3,342	3,762	4,222	2,128	2,753	3,258	3,695	4,160	4,669
Weatherford	Parker	Brazos	P	171	237	294	361	418	479	547	243	309	383	447	514	588
Weatherford	Parker	Trinity	P	3,724	4,972	6,154	7,246	8,136	9,082	10,194	5,108	6,464	7,696	8,690	9,757	10,952
Willow Park	Parker	Trinity		482	627	758	914	1,049	1,188	1,348	648	806	986	1,139	1,300	1,475
	Parker Total			12,621	18,498	30,052	38,735	43,242	47,970	52,470	19,061	31,550	41,129	46,370	51,682	56,518
Blackland WSC	Rockwall	Sabine	P	194	336	486	585	694	829	988	353	522	640	767	917	1,093
Blackland WSC	Rockwall	Trinity	P	83	143	208	250	296	354	422	151	223	273	328	392	467
Cash SUD [1]	Rockwall	Sabine		54	82	111	136	162	194	231	82	111	136	162	194	231
County-Other	Rockwall	Sabine	P	133	247	247	247	246	246	246	251	251	251	251	251	251
County-Other	Rockwall	Trinity	P	74	138	138	138	137	137	137	140	140	140	140	140	140
Dallas	Rockwall	Trinity	P	6	6	6	6	6	6	6	6	6	6	6	6	6
East Fork SUD	Rockwall	Trinity	P	9	8	8	8	8	8	8	9	9	9	9	9	9
Forney Lake WSC	Rockwall	Trinity	P	80	1,747	2,366	2,448	2,527	2,618	2,723	1,792	2,464	2,576	2,688	2,800	2,912
Heath	Rockwall	Trinity		995	1,757	2,562	3,199	3,879	4,699	5,660	1,796	2,650	3,323	4,048	4,903	5,906
High Point WSC	Rockwall	Trinity	P	26	49	76	93	112	134	160	51	82	102	124	149	179
Lavon WSC	Rockwall	Trinity	P	141	334	584	755	937	1,159	1,419	348	616	804	1,007	1,245	1,525
McLendon-Chisholm WSC	Rockwall	Trinity		145	194	246	290	339	396	467	204	265	317	373	440	518
Mt Zion WSC	Rockwall	Trinity		350	442	641	709	774	842	866	447	658	737	816	895	921
R-C-H WSC	Rockwall	Trinity		380	410	440	468	495	533	583	420	462	499	538	584	638
Rockwall	Rockwall	Trinity		4,450	8,423	14,971	19,167	21,507	22,075	22,075	8,603	15,402	19,883	22,403	22,995	22,995
Rowlett	Rockwall	Trinity	P	1,309	1,575	1,661	1,647	1,639	1,630	1,630	1,617	1,722	1,725	1,725	1,725	1,725
Royse City	Rockwall	Sabine	P	565	2,422	4,373	4,283	5,275	6,210	6,315	2,539	4,652	4,580	5,642	6,642	6,754
Wylie	Rockwall	Trinity	P	52	133	225	292	364	451	479	136	234	306	383	474	504
	Rockwall Total			9,046	18,446	29,349	34,721	39,397	42,521	44,415	18,945	30,469	36,307	41,410	44,761	46,774
Arlington	Tarrant	Trinity		61,541	79,508	90,961	96,159	98,013	99,402	100,376	81,692	95,026	101,591	104,733	106,828	107,875
Azle	Tarrant	Trinity	P	1,170	1,600	2,195	3,069	4,083	5,141	6,049	1,655	2,337	3,338	4,506	5,675	6,676
Bedford	Tarrant	Trinity		9,824	10,138	10,447	10,665	10,808	11,017	11,246	10,418	10,916	11,336	11,688	11,984	12,233
Benbrook	Tarrant	Trinity		4,776	4,893	5,685	6,721	7,984	9,489	11,254	4,963	5,909	7,091	8,509	10,163	12,054
Bethesda WSC	Tarrant	Trinity		1,184	1,530	1,850	2,182	2,542	2,970	3,501	1,589	1,968	2,358	2,769	3,262	3,846
Blue Mound	Tarrant	Trinity		259	297	300	294	286	283	283	308	322	322	322	322	322
Burleson [1]	Tarrant	Trinity		582	799	989	1,190	1,397	1,653	1,967	821	1,045	1,275	1,518	1,810	2,154
Colleyville	Tarrant	Trinity		5,873	8,681	9,471	9,762	9,873	9,898	9,922	8,799	9,697	10,063	10,213	10,275	10,299
Community WSC	Tarrant	Trinity	P	400	426	421	416	406	410	419	437	444	451	458	467	477
County-Other	Tarrant	Trinity		3,535	3,482	3,402	3,348	3,268	3,241	3,241	3,535	3,535	3,535	3,535	3,535	3,535
Crowley	Tarrant	Trinity		1,179	1,361	1,614	2,023	2,703	3,246	3,528	1,421	1,737	2,211	3,001	3,633	3,949
Dalworthington Gardens	Tarrant	Trinity		693	771	816	847	862	874	884	782	840	878	903	920	930
Edgecliff	Tarrant	Trinity		451	460	451	443	434	428	428	471	471	471	471	471	471
Euless	Tarrant	Trinity		8,194	9,698	10,760	11,158	11,308	11,377	11,448	9,998	11,302	11,945	12,262	12,418	12,496
Everman	Tarrant	Trinity		699	808	859	906	948	1,007	1,018	837	915	992	1,069	1,146	1,159
Forest Hill	Tarrant	Trinity		1,508	1,783	1,892	1,997	2,122	2,285	2,399	1,847	2,015	2,187	2,369	2,576	2,705

Table F.2
Region C Projected Municipal Water Demands With and Without the Water Savings from Low-Flow Plumbing Fixtures

Water User Group	County Name	Basin Name	Partial	2000 Census	Projected Water Needs with Reductions for Plumbing Code Savings						Projected Water Needs without Reductions for Plumbing Code Savings					
					2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
Fort Worth	Tarrant	Trinity	P	128,760	145,105	160,989	186,973	226,002	283,575	357,224	147,856	167,210	196,093	239,362	301,825	380,214
Grand Prairie	Tarrant	Trinity	P	4,734	6,077	7,328	8,108	8,620	8,927	9,165	6,282	7,732	8,675	9,288	9,686	9,945
Grapevine	Tarrant	Trinity	P	10,506	13,518	15,729	16,886	17,662	18,243	18,713	13,805	16,249	17,590	18,552	19,244	19,740
Haltom City	Tarrant	Trinity		6,381	7,135	7,835	8,142	8,231	8,272	8,324	7,336	8,230	8,677	8,901	9,013	9,069
Haslet	Tarrant	Trinity		199	412	811	1,411	1,404	1,404	1,404	428	856	1,498	1,498	1,498	1,498
Hurst	Tarrant	Trinity		7,151	7,524	7,850	8,014	8,070	8,156	8,247	7,742	8,219	8,542	8,759	8,906	9,006
Johnson County SUD[(1)]	Tarrant	Trinity	P	308	419	532	656	799	976	1,154	429	554	689	847	1,033	1,221
Keller	Tarrant	Trinity		6,340	9,160	10,829	10,775	10,667	10,667	10,667	9,341	11,152	11,152	11,152	11,152	11,152
Kennedale	Tarrant	Trinity		1,081	1,346	1,594	1,756	1,867	1,937	1,992	1,388	1,675	1,869	2,001	2,089	2,149
Lake Worth	Tarrant	Trinity		859	930	1,010	1,102	1,190	1,290	1,344	952	1,059	1,176	1,294	1,411	1,470
Lakeside	Tarrant	Trinity		377	447	512	580	652	740	846	454	527	601	679	773	884
Mansfield	Tarrant	Trinity	P	6,478	13,218	19,132	24,397	29,695	32,934	32,934	13,442	19,603	25,203	30,804	34,164	34,164
North Richland Hills	Tarrant	Trinity		10,158	12,496	13,832	14,753	15,300	15,693	16,022	12,787	14,491	15,642	16,419	16,945	17,300
Pantego	Tarrant	Trinity		657	649	641	634	626	621	621	657	657	657	657	657	657
Pelican Bay	Tarrant	Trinity		113	157	202	253	274	302	339	164	217	277	306	341	382
Richland Hills	Tarrant	Trinity		1,120	1,327	1,381	1,441	1,511	1,558	1,580	1,355	1,452	1,548	1,661	1,726	1,750
River Oaks	Tarrant	Trinity		1,025	1,010	986	954	931	923	923	1,042	1,042	1,042	1,042	1,042	1,042
Saginaw	Tarrant	Trinity		2,107	2,885	3,540	3,942	4,240	4,448	4,618	2,956	3,692	4,162	4,505	4,755	4,938
Sansom Park Village	Tarrant	Trinity		576	603	609	609	605	608	615	623	644	661	673	683	691
Southlake	Tarrant	Trinity	P	6,589	11,504	13,774	14,916	15,476	15,791	15,954	11,620	13,960	15,168	15,792	16,114	16,280
Watauga	Tarrant	Trinity		2,920	3,437	3,532	3,584	3,603	3,657	3,723	3,542	3,725	3,871	3,987	4,080	4,154
Westover Hills	Tarrant	Trinity		279	276	274	272	270	268	268	279	279	279	279	279	279
Westworth Village	Tarrant	Trinity		183	244	287	297	308	328	362	252	306	325	348	374	412
White Settlement	Tarrant	Trinity		2,425	2,531	2,647	2,818	2,831	3,031	3,253	2,584	2,780	3,026	3,107	3,353	3,598
	Tarrant Total			303,194	368,645	417,969	464,453	517,871	587,070	668,255	376,889	434,790	488,467	550,239	626,628	713,176
Alvord	Wise	Trinity		122	172	185	197	211	227	249	178	196	215	233	253	277
Aurora	Wise	Trinity		106	136	157	177	198	221	250	142	168	193	218	246	279
Bolivar WSC	Wise	Trinity	P	142	187	238	303	440	612	918	196	254	329	482	670	1,005
Boyd	Wise	Trinity		162	215	278	298	291	288	288	222	296	325	325	325	325
Bridgeport	Wise	Trinity		835	1,570	1,899	2,702	3,187	3,713	4,444	1,616	1,983	2,850	3,395	3,956	4,734
Chico	Wise	Trinity		130	208	235	276	333	405	495	216	249	298	365	448	547
Community WSC	Wise	Trinity	P	17	18	17	17	16	16	16	18	18	18	18	19	19
County-Other	Wise	Trinity		2,751	3,843	4,344	4,304	4,223	4,183	4,183	3,988	4,626	4,626	4,626	4,626	4,626
Decatur	Wise	Trinity		1,159	1,639	2,011	2,748	3,537	4,580	5,385	1,669	2,087	2,879	3,742	4,845	5,697
Fort Worth	Wise	Trinity	P	0	473	2,319	3,215	4,093	5,430	6,788	482	2,408	3,372	4,335	5,780	7,225
New Fairview	Wise	Trinity		112	201	272	340	409	488	579	204	279	352	424	505	600
Newark	Wise	Trinity		100	154	232	301	418	564	787	160	250	330	466	629	877
Rhome	Wise	Trinity		136	575	1,119	1,592	2,036	2,431	2,914	603	1,184	1,694	2,166	2,585	3,099
Runaway Bay	Wise	Trinity		237	321	390	455	521	595	685	329	405	478	550	632	726
Walnut Creek SUD	Wise	Trinity	P	157	247	312	372	433	506	590	261	335	407	479	559	653
West Wise SUD	Wise	Trinity		451	497	536	571	609	656	717	517	572	625	677	736	805
	Wise Total			6,617	10,456	14,544	17,868	20,955	24,915	29,288	10,801	15,310	18,991	22,501	26,814	31,494
	Region C Total			1,196,451	1,534,702	1,828,830	2,060,117	2,294,490	2,574,264	2,915,772	1,567,875	1,895,686	2,158,197	2,423,592	2,729,469	3,092,094

Notes:

(1) Majority of WUG's population resides in neighboring region. Region C demand was adjusted to match assumptions used in neighboring regions.

(2) TWDB adjusted demand

(3) Turlington WSC has been removed from the TWDB Approved

Table F.3
Supporting Documentation for Per Capita Water Use Adjustments

Water User Group	County Name	Basin Name	Partial	TWDB Base GPCD	2060 Projections with Plumbing		2060 per Capita Projections after Accounting for Each Change						TWDB 2060 Population Projection	2060 Water Need Projections after Accounting for Each Change							Change in 2060 per Capita Projections due to Each Change						Change in 2060 Demand Projections due to Each Change						
				2000	TWDB	Draft Region C	Data Correction	Other Peak Years	Increasing Trend	Rapid Growth	Commercialization	115 gpcd Minimum		Initial TWDB	Data Correction	Other Peak Years	Increasing Trend	Rapid Growth	Commercialization	115 gpcd Minimum	Data Correction	Other Peak Years	Increasing Trend	Rapid Growth	Commercialization	115 gpcd Minimum	Data Correction	Other Peak Years	Increasing Trend	Rapid Growth	Commercialization	115 gpcd Minimum	Overall Change
Allen	Collin	Trinity		224	215	251	215	215	251	251	251	251	129,215	31,119	31,119	31,119	36,330	36,330	36,330	36,330	0	0	36	0	0	0	0	0	5,211	0	0	0	**5,211**
Anna	Collin	Trinity		127	114	187	114	114	114	187	187	187	50,000	6,385	6,385	6,385	6,385	10,473	10,473	10,473	0	0	0	73	0	0	0	0	0	4,088	0	0	**4,088**
Blue Ridge	Collin	Trinity		114	102	138	102	123	123	138	138	138	18,000	2,057	2,057	2,480	2,480	2,782	2,782	2,782	0	21	0	15	0	0	0	423	0	302	0	0	**725**
Caddo Basin SUD[1]	Collin	Sabine	P	115	89	115	89	89	89	89	89	115	8,183	816	816	816	816	816	816	1,054	0	0	0	0	0	26	0	0	0	0	0	238	**238**
Caddo Basin SUD[1]	Collin	Trinity	P	115	89	115	89	89	89	89	89	115	3,783	377	377	377	377	377	377	487	0	0	0	0	0	26	0	0	0	0	0	110	**110**
Celina	Collin	Trinity		156	142	186	142	142	142	186	186	186	150,000	23,859	23,859	23,859	23,859	31,252	31,252	31,252	0	0	0	44	0	0	0	0	0	7,393	0	0	**7,393**
County-Other	Collin	Sabine	P	117	103	103	103	103	103	103	103	103	63	7	7	7	7	7	7	7	0	0	0	0	0	0	0	0	0	0	0	0	**0**
County-Other	Collin	Trinity	P	117	103	103	103	103	103	103	103	103	4,306	497	497	497	497	497	497	497	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Culleoka WSC	Collin	Trinity		82	71	104	71	71	71	71	71	104	21,515	1,711	1,711	1,711	1,711	1,711	1,711	2,506	0	0	0	0	0	33	0	0	0	0	0	795	**795**
Dallas	Collin	Trinity	P	198	185	256	249	256	256	256	256	256	72,600	15,045	20,249	20,819	20,819	20,819	20,819	20,819	64	7	0	0	0	0	5,204	570	0	0	0	0	**5,774**
Danville WSC	Collin	Trinity		170	160	160	160	160	160	160	160	160	12,865	2,306	2,306	2,306	2,306	2,306	2,306	2,306	0	0	0	0	0	0	0	0	0	0	0	0	**0**
East Fork SUD	Collin	Trinity	P	131	119	119	119	119	119	119	119	119	9,550	1,273	1,273	1,273	1,273	1,273	1,273	1,273	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Fairview	Collin	Trinity		339	327	327	327	327	327	327	327	327	35,000	12,820	12,820	12,820	12,820	12,820	12,820	12,820	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Farmersville	Collin	Trinity		142	128	128	128	128	128	128	128	128	30,000	4,301	4,301	4,301	4,301	4,301	4,301	4,301	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Frisco	Collin	Trinity	P	291	286	295	286	286	295	295	295	295	184,500	59,107	59,107	59,107	60,967	60,967	60,967	60,967	0	0	9	0	0	0	0	0	1,860	0	0	0	**1,860**
Garland	Collin	Trinity		159	146	155	146	155	155	155	155	155	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	**0**
Gunter Rural WSC	Collin	Trinity	P	101	91	105	91	91	91	91	91	105	11,560	1,178	1,178	1,178	1,178	1,178	1,178	1,360	0	0	0	0	0	14	0	0	0	0	0	182	**182**
Hickory Creek SUD[1]	Collin	Trinity	P	155	90	144	144	144	144	144	144	144	182	18	29	29	29	29	29	29	54	0	0	0	0	0	11	0	0	0	0	0	**11**
Josephine	Collin	Trinity		135	121	121	121	121	121	121	121	121	2,000	271	271	271	271	271	271	271	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Lavon WSC	Collin	Trinity	P	86	78	107	78	78	78	78	78	107	30,000	2,621	2,621	2,621	2,621	2,621	2,621	3,596	0	0	0	0	0	29	0	0	0	0	0	975	**975**
Lowry Crossing	Collin	Trinity		177	164	164	164	164	164	164	164	164	12,635	2,321	2,321	2,321	2,321	2,321	2,321	2,321	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Lucas	Collin	Trinity		99	84	135	84	135	135	135	135	135	30,000	2,823	2,823	4,537	4,537	4,537	4,537	4,537	0	51	0	0	0	0	0	1,714	0	0	0	0	**1,714**
McKinney	Collin	Trinity		190	182	242	212	215	242	242	242	242	400,000	81,546	94,988	96,332	108,430	108,430	108,430	108,430	30	3	27	0	0	0	13,442	1,344	12,098	0	0	0	**26,884**
Melissa	Collin	Trinity		57	49	192	49	59	59	192	192	192	50,000	2,744	2,744	3,304	3,304	10,753	10,753	10,753	0	10	0	133	0	0	0	560	0	7,449	0	0	**8,009**
Milligan WSC	Collin	Trinity		112	98	101	98	98	98	98	98	101	1,621	178	178	178	178	178	178	183	0	0	0	0	0	3	0	0	0	0	0	5	**5**
Murphy	Collin	Trinity		157	147	180	147	180	180	180	180	180	28,500	4,693	4,693	5,746	5,746	5,746	5,746	5,746	0	33	0	0	0	0	0	1,053	0	0	0	0	**1,053**
Nevada	Collin	Sabine	P	325	311	311	311	311	311	311	311	311	10,000	3,484	3,484	3,484	3,484	3,484	3,484	3,484	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Nevada	Collin	Trinity	P	325	311	311	311	311	311	311	311	311	5,000	1,742	1,742	1,742	1,742	1,742	1,742	1,742	0	0	0	0	0	0	0	0	0	0	0	0	**0**
New Hope	Collin	Trinity		294	281	281	281	281	281	281	281	281	10,000	3,148	3,148	3,148	3,148	3,148	3,148	3,148	0	0	0	0	0	0	0	0	0	0	0	0	**0**
North Collin WSC	Collin	Trinity		160	149	149	149	149	149	149	149	149	12,012	2,005	2,005	2,005	2,005	2,005	2,005	2,005	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Parker	Collin	Trinity		217	202	332	311	332	332	332	332	332	52,000	11,766	18,115	19,338	19,338	19,338	19,338	19,338	109	21	0	0	0	0	6,349	1,223	0	0	0	0	**7,572**
Plano	Collin	Trinity	P	256	245	249	245	249	249	249	249	249	297,150	81,548	81,548	82,880	82,880	82,880	82,880	82,880	0	4	0	0	0	0	0	1,332	0	0	0	0	**1,332**
Princeton	Collin	Trinity		94	81	137	81	87	87	137	137	137	75,000	6,805	6,805	7,309	7,309	11,509	11,509	11,509	0	6	0	50	0	0	0	504	0	4,200	0	0	**4,704**
Prosper	Collin	Trinity	P	196	187	241	187	187	241	241	241	241	50,000	10,473	10,473	10,473	13,498	13,498	13,498	13,498	0	0	54	0	0	0	0	0	3,025	0	0	0	**3,025**
Richardson	Collin	Trinity	P	282	269	272	269	272	272	272	272	272	34,000	10,245	10,245	10,359	10,359	10,359	10,359	10,359	0	3	0	0	0	0	0	114	0	0	0	0	**114**
Royse City	Collin	Sabine	P	182	169	187	169	174	187	187	187	187	18,000	3,407	3,407	3,508	3,770	3,770	3,770	3,770	0	5	13	0	0	0	0	101	262	0	0	0	**363**
Sachse	Collin	Trinity	P	185	175	190	175	175	190	190	190	190	6,900	1,353	1,353	1,353	1,469	1,469	1,469	1,469	0	0	15	0	0	0	0	0	116	0	0	0	**116**
Saint Paul	Collin	Trinity		177	165	165	165	165	165	165	165	165	10,000	1,848	1,848	1,848	1,848	1,848	1,848	1,848	0	0	0	0	0	0	0	0	0	0	0	0	**0**
South Grayson WSC	Collin	Trinity	P	131	120	120	120	120	120	120	120	120	1,675	225	225	225	225	225	225	225	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Weston	Collin	Trinity		72	61	189	61	61	61	189	189	189	60,000	4,100	4,100	4,100	4,100	12,702	12,702	12,702	0	0	0	128	0	0	0	0	0	8,602	0	0	**8,602**
Wylie	Collin	Trinity	P	148	138	190	138	138	190	190	190	190	96,166	14,865	14,865	14,865	20,467	20,467	20,467	20,467	0	0	52	0	0	0	0	0	5,602	0	0	0	**5,602**
Bolivar WSC	Cooke	Trinity	P	102	89	137	89	89	89	137	137	137	1,858	185	185	185	185	285	285	285	0	0	0	48	0	0	0	0	0	100	0	0	**100**
County-Other	Cooke	Red	P	88	76	103	76	76	76	76	76	103	2,336	199	199	199	199	199	199	270	0	0	0	0	0	27	0	0	0	0	0	71	**71**
County-Other	Cooke	Trinity	P	88	76	103	76	76	76	76	76	103	8,250	702	702	702	702	702	702	952	0	0	0	0	0	27	0	0	0	0	0	250	**250**
Gainesville	Cooke	Red	P	143	130	170	130	170	170	170	170	170	12	2	2	2	2	2	2	2	0	40	0	0	0	0	0	0	0	0	0	0	**0**
Gainesville	Cooke	Trinity	P	143	130	170	130	170	170	170	170	170	28,988	4,221	4,221	5,520	5,520	5,520	5,520	5,520	0	40	0	0	0	0	0	1,299	0	0	0	0	**1,299**
Kiowa Homeowners WSC	Cooke	Trinity		138	128	128	128	128	128	128	128	128	3,709	532	532	532	532	532	532	532	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Lindsay	Cooke	Trinity		155	142	146	142	146	146	146	146	146	981	156	156	160	160	160	160	160	0	4	0	0	0	0	0	4	0	0	0	0	**4**
Muenster	Cooke	Trinity		151	138	168	138	168	168	168	168	168	3,300	510	510	621	621	621	621	621	0	30	0	0	0	0	0	111	0	0	0	0	**111**
Two Way SUD	Cooke	Red	P	90	79	104	79	79	79	79	79	104	93	8	8	8	8	8	8	11	0	0	0	0	0	25	0	0	0	0	0	3	**3**
Valley View	Cooke	Trinity		102	89	102	89	89	102	102	102	102	15,000	1,495	1,495	1,495	1,714	1,714	1,714	1,714	0	0	13	0	0	0	0	0	219	0	0	0	**219**
Woodbine WSC	Cooke	Red	P	104	91	102	91	91	91	91	91	102	117	12	12	12	12	12	12	13	0	0	0	0	0	11	0	0	0	0	0	1	**1**
Woodbine WSC	Cooke	Trinity	P	104	91	102	91	91	91	91	91	102	7,784	793	793	793	793	793	793	889	0	0	0	0	0	11	0	0	0	0	0	96	**96**
Addison	Dallas	Trinity		441	430	434	430	434	434	434	434	434	25,133	12,106	12,106	12,218	12,218	12,218	12,218	12,218	0	4	0	0	0	0	0	112	0	0	0	0	**112**
Balch Springs	Dallas	Trinity		110	96	101	96	96	96	96	96	101	26,768	2,878	2,878	2,878	2,878	2,878	2,878	3,028	0	0	0	0	0	5	0	0	0	0	0	150	**150**
Carrollton	Dallas	Trinity	P	189	176	183	176	183	183	183	183	183	53,400	10,528	10,528	10,946	10,946	10,946	10,946	10,946	0	7	0	0	0	0	0	418	0	0	0	0	**418**
Cedar Hill	Dallas	Trinity	P	159	148	148	148	148	148	148	148	148	92,949	15,409	15,409	15,409	15,409	15,409	15,409	15,409	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Cockrell Hill	Dallas	Trinity		117	104	117	104	106	117	117	117	117	5,095	594	594	605	668	668	668	668	0	2	11	0	0	0	0	11	63	0	0	0	**74**
Combine	Dallas	Trinity	P	89	76	102	76	90	90	90	90	102	1,649	140	140	166	166	166	166	188	0	14	0	0	0	12	0	26	0	0	0	22	**48**
Combine WSC	Dallas	Trinity	P	87	77	105	77	77	77	77	77	105	3,173	274	274	274	274	274	274	373	0	0	0	0	0	28	0	0	0	0	0	99	**99**
Coppell	Dallas	Trinity	P	203	194	218	194	218	218	218	218	218	40,000	8,692	8,692	9,768	9,768	9,768	9,768	9,768	0	24	0	0	0	0	0	1,076	0	0	0	0	**1,076**
County-Other	Dallas	Trinity		109	95	101	95	95	95	95	95	101	412	44	44	44	44	44	44	47	0	0	0	0	0	6	0	0	0	0	0	3	**3**
Dallas	Dallas	Trinity	P	198	185	256	249	256	256	256	256	256	1,956,134	405,363	545,597	560,935	560,935	560,935	560,935	560,935	64	7	0	0	0	0	140,234	15,338	0	0	0	0	**155,572**
Dallas County WCID #6	Dallas	Trinity		100	90	105	90	90	90	90	90	105	11,513	1,161	1,161	1,161	1,161	1,161	1,161	1,354	0	0	0	0	0	15	0	0	0	0	0	193	**193**
De Soto	Dallas	Trinity		190	177	197	177	183	197	197	197	197	85,400	16,932	16,932	17,506	18,845	18,845	18,845	18,845	0	6	14	0	0	0	0	574	1,339	0	0	0	**1,913**
Duncanville	Dallas	Trinity		172	157	185	157	170	185	185	185	185	41,480	7,295	7,295	7,899	8,596	8,596	8,596	8,596	0	13	15	0	0	0	0	604	697	0	0	0	**1,301**
East Fork SUD	Dallas	Trinity	P	131	119	119	119	119	119	119	119	119	991	132	132	132	132	132	132	132	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Farmers Branch	Dallas	Trinity		333	320	320	320	320	320	320	320	320	41,693	14,945	14,945	14,945	14,945	14,945	14,945	14,945	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Garland	Dallas	Trinity		159	146	155	146	155	155	155	155	155	300,000	49,062	49,062	52,087	52,087	52,087	52,087	52,087	0	9	0	0	0	0	0	3,025	0	0	0	0	**3,025**

Table F.3
Supporting Documentation for Per Capita Water Use Adjustments

Water User Group	County Name	Basin Name	Partial	TWDB Base GPCD	2060 Projections with Plumbing		2060 per Capita Projections after Accounting for Each Change						TWDB 2060 Population Projection	2060 Water Need Projections after Accounting for Each Change							Change in 2060 per Capita Projections due to Each Change						Change in 2060 Demand Projections due to Each Change						
				2000	TWDB	Draft Region C	Data Correction	Other Peak Years	Increasing Trend	Rapid Growth	Commercialization	115 gpcd Minimum		Initial TWDB	Data Correction	Other Peak Years	Increasing Trend	Rapid Growth	Commercialization	115 gpcd Minimum	Data Correction	Other Peak Years	Increasing Trend	Rapid Growth	Commercialization	115 gpcd Minimum	Data Correction	Other Peak Years	Increasing Trend	Rapid Growth	Commercialization	115 gpcd Minimum	Overall Change
Glenn Heights	Dallas	Trinity	P	115	104	104	104	104	104	104	104	104	14,182	1,652	1,652	1,652	1,652	1,652	1,652	1,652	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Grand Prairie	Dallas	Trinity	P	91	79	141	141	141	141	141	141	141	317,251	28,074	50,107	50,107	50,107	50,107	50,107	50,107	62	0	0	0	0	0	22,033	0	0	0	0	0	**22,033**
Grapevine	Dallas	Trinity	P	223	210	237	210	216	237	237	237	237	0	0	0	0	0	0	0	0	0	6	21	0	0	0	0	0	0	0	0	0	**0**
Highland Park	Dallas	Trinity		416	402	414	402	414	414	414	414	414	9,313	4,194	4,194	4,319	4,319	4,319	4,319	4,319	0	12	0	0	0	0	0	125	0	0	0	0	**125**
Hutchins	Dallas	Trinity		123	109	210	203	210	210	210	210	210	34,000	4,151	7,731	7,998	7,998	7,998	7,998	7,998	94	7	0	0	0	0	3,580	267	0	0	0	0	**3,847**
Irving	Dallas	Trinity		220	207	217	207	207	217	217	217	217	283,521	65,740	65,740	65,740	68,916	68,916	68,916	68,916	0	0	10	0	0	0	0	0	3,176	0	0	0	**3,176**
Lancaster	Dallas	Trinity		142	128	128	128	128	128	128	128	128	146,000	20,933	20,933	20,933	20,933	20,933	20,933	20,933	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Lewisville	Dallas	Trinity	P	167	157	170	157	170	170	170	170	170	2	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	**0**
Mesquite	Dallas	Trinity	P	160	147	152	147	152	152	152	152	152	250,600	41,264	41,264	42,668	42,668	42,668	42,668	42,668	0	5	0	0	0	0	0	1,404	0	0	0	0	**1,404**
Ovilla	Dallas	Trinity	P	188	177	177	177	177	177	177	177	177	2,500	496	496	496	496	496	496	496	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Richardson	Dallas	Trinity	P	282	269	272	269	272	272	272	272	272	82,000	24,708	24,708	24,984	24,984	24,984	24,984	24,984	0	3	0	0	0	0	0	276	0	0	0	0	**276**
Rockett SUD	Dallas	Trinity	P	123	111	111	111	111	111	111	111	111	4,954	616	616	616	616	616	616	616	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Rowlett	Dallas	Trinity	P	166	155	189	155	166	189	189	189	189	91,047	15,808	15,808	16,930	19,275	19,275	19,275	19,275	0	11	23	0	0	0	0	1,122	2,345	0	0	0	**3,467**
Sachse	Dallas	Trinity	P	185	175	190	175	175	190	190	190	190	20,845	4,086	4,086	4,086	4,436	4,436	4,436	4,436	0	0	15	0	0	0	0	0	350	0	0	0	**350**
Sardis-Lone Elm WSC	Dallas	Trinity	P	191	179	179	179	179	179	179	179	179	36	7	7	7	7	7	7	7	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Seagoville	Dallas	Trinity	P	132	119	125	119	125	125	125	125	125	27,438	3,657	3,657	3,842	3,842	3,842	3,842	3,842	0	6	0	0	0	0	0	185	0	0	0	0	**185**
Sunnyvale	Dallas	Trinity		198	184	310	310	310	310	310	310	310	13,300	2,741	4,618	4,618	4,618	4,618	4,618	4,618	126	0	0	0	0	0	1,877	0	0	0	0	0	**1,877**
University Park	Dallas	Trinity		257	243	260	243	260	260	260	260	260	25,693	6,994	6,994	7,483	7,483	7,483	7,483	7,483	0	17	0	0	0	0	0	489	0	0	0	0	**489**
Wilmer	Dallas	Trinity		97	86	104	86	86	86	86	86	104	22,000	2,119	2,119	2,119	2,119	2,119	2,119	2,563	0	0	0	0	0	18	0	0	0	0	0	444	**444**
Wylie	Dallas	Trinity	P	148	138	190	138	138	190	190	190	190	1,584	245	245	245	337	337	337	337	0	0	52	0	0	0	0	0	92	0	0	0	**92**
Argyle	Denton	Trinity		269	258	289	258	258	289	289	289	289	20,000	5,780	5,780	5,780	6,474	6,474	6,474	6,474	0	0	31	0	0	0	0	0	694	0	0	0	**694**
Argyle WSC	Denton	Trinity		192	180	180	180	180	180	180	180	180	4,012	809	809	809	809	809	809	809	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Aubrey	Denton	Trinity		103	91	138	91	91	138	138	138	138	21,252	2,166	2,166	2,166	3,285	3,285	3,285	3,285	0	0	47	0	0	0	0	0	1,119	0	0	0	**1,119**
Bartonville	Denton	Trinity		144	130	186	130	144	186	186	186	186	18,000	2,621	2,621	2,903	3,750	3,750	3,750	3,750	0	14	42	0	0	0	0	282	847	0	0	0	**1,129**
Bartonville WSC	Denton	Trinity		202	187	187	187	187	187	187	187	187	2,224	466	466	466	466	466	466	466	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Bolivar WSC	Denton	Trinity	P	102	89	137	89	89	89	137	137	137	87,999	8,773	8,773	8,773	8,773	13,504	13,504	13,504	0	0	0	48	0	0	0	0	0	4,731	0	0	**4,731**
Carrollton	Denton	Trinity	P	189	176	183	176	183	183	183	183	183	81,400	16,048	16,048	16,686	16,686	16,686	16,686	16,686	0	7	0	0	0	0	0	638	0	0	0	0	**638**
Coppell	Denton	Trinity	P	203	194	218	194	218	218	218	218	218	1,016	221	221	248	248	248	248	248	0	24	0	0	0	0	0	27	0	0	0	0	**27**
Copper Canyon	Denton	Trinity		223	209	236	209	228	236	236	236	236	5,600	1,311	1,311	1,430	1,480	1,480	1,480	1,480	0	19	8	0	0	0	0	119	50	0	0	0	**169**
Corinth	Denton	Trinity		201	194	194	194	194	194	194	194	194	31,500	6,845	6,845	6,845	6,845	6,845	6,845	6,845	0	0	0	0	0	0	0	0	0	0	0	0	**0**
County-Other	Denton	Trinity		191	180	180	180	180	180	180	180	180	77,612	15,649	15,649	15,649	15,649	15,649	15,649	15,649	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Cross Roads	Denton	Trinity		405	394	289	394	394	289	289	289	289	20,600	9,092	9,092	9,092	6,669	6,669	6,669	6,669	0	0	-105	0	0	0	0	0	-2,423	0	0	0	**-2,423**
Dallas	Denton	Trinity	P	198	185	256	249	256	256	256	256	256	30,012	6,219	8,371	8,606	8,606	8,606	8,606	8,606	64	7	0	0	0	0	2,152	235	0	0	0	0	**2,387**
Denton	Denton	Trinity		260	247	176	176	176	176	176	176	176	498,488	137,919	98,275	98,275	98,275	98,275	98,275	98,275	-71	0	0	0	0	0	-39,644	0	0	0	0	0	**-39,644**
Denton County FWSD #1A	Denton	Trinity		291	284	284	284	284	284	284	284	284	12,240	3,894	3,894	3,894	3,894	3,894	3,894	3,894	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Double Oak	Denton	Trinity		200	186	206	186	186	206	206	206	206	3,900	813	813	813	900	900	900	900	0	0	20	0	0	0	0	0	87	0	0	0	**87**
Flower Mound	Denton	Trinity		66	57	231	191	210	231	231	231	231	130,089	8,306	27,832	30,601	33,661	33,661	33,661	33,661	134	19	21	0	0	0	19,526	2,769	3,060	0	0	0	**25,355**
Fort Worth	Denton	Trinity	P	218	205	202	202	202	202	202	202	202	125,000	28,704	28,284	28,284	28,284	28,284	28,284	28,284	-3	0	0	0	0	0	-420	0	0	0	0	0	**-420**
Frisco	Denton	Trinity	P	291	286	295	286	286	295	295	295	295	115,500	37,002	37,002	37,002	38,166	38,166	38,166	38,166	0	0	9	0	0	0	0	0	1,164	0	0	0	**1,164**
Hackberry	Denton	Trinity		121	115	115	115	115	115	115	115	115	2,533	326	326	326	326	326	326	326	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Hebron	Denton	Trinity		114	100	194	100	194	194	194	194	194	8,100	907	907	1,760	1,760	1,760	1,760	1,760	0	94	0	0	0	0	0	853	0	0	0	0	**853**
Hickory Creek	Denton	Trinity		108	94	136	94	120	120	136	136	136	13,500	1,421	1,421	1,815	1,815	2,057	2,057	2,057	0	26	0	16	0	0	0	394	0	242	0	0	**636**
Highland Village	Denton	Trinity		205	192	192	192	192	192	192	192	192	19,000	4,086	4,086	4,086	4,086	4,086	4,086	4,086	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Justin	Denton	Trinity		149	138	169	138	138	163	169	169	169	16,000	2,473	2,473	2,473	2,921	3,029	3,029	3,029	0	0	25	6	0	0	0	0	448	108	0	0	**556**
Krugerville	Denton	Trinity		84	70	101	70	92	92	92	92	101	4,300	337	337	443	443	443	443	486	0	22	0	0	0	9	0	106	0	0	0	43	**149**
Krum	Denton	Trinity		117	103	136	103	103	136	136	136	136	11,500	1,327	1,327	1,327	1,752	1,752	1,752	1,752	0	0	33	0	0	0	0	0	425	0	0	0	**425**
Lake Dallas	Denton	Trinity		132	123	141	123	123	141	141	141	141	11,179	1,540	1,540	1,540	1,766	1,766	1,766	1,766	0	0	18	0	0	0	0	0	226	0	0	0	**226**
Lewisville	Denton	Trinity	P	167	157	170	157	170	170	170	170	170	185,000	32,535	32,535	35,229	35,229	35,229	35,229	35,229	0	13	0	0	0	0	0	2,694	0	0	0	0	**2,694**
Lincoln Park	Denton	Trinity		123	112	139	112	112	112	139	139	139	2,632	330	330	330	330	410	410	410	0	0	0	27	0	0	0	0	0	80	0	0	**80**
Little Elm	Denton	Trinity		162	156	184	156	156	184	184	184	184	47,477	8,296	8,296	8,296	9,785	9,785	9,785	9,785	0	0	28	0	0	0	0	0	1,489	0	0	0	**1,489**
Mustang WSC	Denton	Trinity		123	115	132	115	115	115	132	132	132	22,894	2,949	2,949	2,949	2,949	3,385	3,385	3,385	0	0	0	17	0	0	0	0	0	436	0	0	**436**
Northlake	Denton	Trinity		122	117	145	117	117	117	145	145	145	21,195	2,778	2,778	2,778	2,778	3,443	3,443	3,443	0	0	0	28	0	0	0	0	0	665	0	0	**665**
Oak Point	Denton	Trinity		111	104	143	104	104	126	143	143	143	11,886	1,385	1,385	1,385	1,678	1,904	1,904	1,904	0	0	22	17	0	0	0	0	293	226	0	0	**519**
Pilot Point	Denton	Trinity		122	111	139	111	119	119	139	139	139	15,000	1,865	1,865	1,999	1,999	2,335	2,335	2,335	0	8	0	20	0	0	0	134	0	336	0	0	**470**
Plano	Denton	Trinity	P	256	245	249	245	249	249	249	249	249	7,850	2,154	2,154	2,189	2,189	2,189	2,189	2,189	0	4	0	0	0	0	0	35	0	0	0	0	**35**
Ponder	Denton	Trinity		319	305	305	305	305	305	305	305	305	19,000	6,491	6,491	6,491	6,491	6,491	6,491	6,491	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Prosper	Denton	Trinity	P	196	187	241	187	187	241	241	241	241	25,000	5,237	5,237	5,237	6,749	6,749	6,749	6,749	0	0	54	0	0	0	0	0	1,512	0	0	0	**1,512**
Roanoke	Denton	Trinity		194	183	239	183	183	239	239	239	239	24,094	4,939	4,939	4,939	6,450	6,450	6,450	6,450	0	0	56	0	0	0	0	0	1,511	0	0	0	**1,511**
Sanger	Denton	Trinity		146	133	162	133	133	162	162	162	162	25,000	3,724	3,724	3,724	4,537	4,537	4,537	4,537	0	0	29	0	0	0	0	0	813	0	0	0	**813**
Shady Shores	Denton	Trinity		113	100	137	100	100	137	137	137	137	5,288	592	592	592	811	811	811	811	0	0	37	0	0	0	0	0	219	0	0	0	**219**
Southlake	Denton	Trinity	P	279	273	294	273	273	294	294	294	294	6,000	1,835	1,835	1,835	1,976	1,976	1,976	1,976	0	0	21	0	0	0	0	0	141	0	0	0	**141**
The Colony	Denton	Trinity		98	84	101	84	96	96	96	96	101	67,600	6,361	6,361	7,269	7,269	7,269	7,269	7,648	0	12	0	0	0	5	0	908	0	0	0	379	**1,287**
Trophy Club	Denton	Trinity		314	304	303	303	303	303	303	303	303	12,000	4,086	4,073	4,073	4,073	4,073	4,073	4,073	-1	0	0	0	0	0	-13	0	0	0	0	0	**-13**
Bardwell	Ellis	Trinity		95	85	105	85	85	85	85	85	105	2,107	201	201	201	201	201	201	248	0	0	0	0	0	20	0	0	0	0	0	47	**47**
Brandon-Irene WSC [(2)]	Ellis	Trinity	P	113	99	99	99	99	99	99	99	99	132	15	15	15	15	15	15	15	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Buena Vista - Bethel SUD	Ellis	Trinity		173	161	161	161	161	161	161	161	161	5,981	1,079	1,079	1,079	1,079	1,079	1,079	1,079	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Cedar Hill	Ellis	Trinity	P	159	148	148	148	148	148	148	148	148	49	8	8	8	8	8	8	8	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Community Water Company	Ellis	Trinity	P	76	64	103	64	64	64	64	64	103	2,636	189	189	189	189	189	189	304	0	0	0	0	0	39	0	0	0	0	0	115	**115**
County-Other	Ellis	Trinity		170	163	163	163	163	163	163	163	163	10,707	1,955	1,955	1,955	1,955	1,955	1,955	1,955	0	0	0	0	0	0	0	0	0	0	0	0	**0**

Table F.3
Supporting Documentation for Per Capita Water Use Adjustments

Water User Group	County Name	Basin Name	Partial	TWDB Base GPCD	2060 Projections with Plumbing		2060 per Capita Projections after Accounting for Each Change						TWDB 2060 Population Projection	2060 Water Need Projections after Accounting for Each Change							Change in 2060 per Capita Projections due to Each Change						Change in 2060 Demand Projections due to Each Change						
				2000	TWDB	Draft Region C	Data Correction	Other Peak Years	Increasing Trend	Rapid Growth	Commercialization	115 gpcd Minimum		Initial TWDB	Data Correction	Other Peak Years	Increasing Trend	Rapid Growth	Commercialization	115 gpcd Minimum	Data Correction	Other Peak Years	Increasing Trend	Rapid Growth	Commercialization	115 gpcd Minimum	Data Correction	Other Peak Years	Increasing Trend	Rapid Growth	Commercialization	115 gpcd Minimum	Overall Change
Ennis	Ellis	Trinity		156	143	143	143	143	143	143	143	143	70,596	11,308	11,308	11,308	11,308	11,308	11,308	11,308	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Ferris	Ellis	Trinity		137	122	125	122	125	125	125	125	125	2,175	297	297	305	305	305	305	305	0	3	0	0	0	0	0	8	0	0	0	0	**8**
Files Valley WSC	Ellis	Trinity		188	175	175	175	175	175	175	175	175	1,025	201	201	201	201	201	201	201	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Glenn Heights	Ellis	Trinity	P	115	104	104	104	104	104	104	104	104	7,905	921	921	921	921	921	921	921	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Grand Prairie	Ellis	Trinity	P	91	79	141	141	141	141	141	141	141	18,461	1,634	2,916	2,916	2,916	2,916	2,916	2,916	62	0	0	0	0	0	1,282	0	0	0	0	0	**1,282**
Italy	Ellis	Trinity		92	79	102	79	84	84	84	84	102	4,279	379	379	403	403	403	403	489	0	5	0	0	0	18	0	24	0	0	0	86	**110**
Johnson County SUD[1]	Ellis	Trinity	P	171	160	190	160	160	190	190	190	190	573	103	103	103	122	122	122	122	0	0	30	0	0	0	0	0	19	0	0	0	**19**
Mansfield	Ellis	Trinity	P	147	138	241	203	203	241	241	241	241	5,675	877	1,290	1,290	1,532	1,532	1,532	1,532	65	0	38	0	0	0	413	0	242	0	0	0	**655**
Maypearl	Ellis	Trinity		134	120	162	120	162	162	162	162	162	746	100	100	135	135	135	135	135	0	42	0	0	0	0	0	35	0	0	0	0	**35**
Midlothian	Ellis	Trinity		252	241	181	181	181	181	181	181	181	50,163	13,542	10,170	10,170	10,170	10,170	10,170	10,170	-60	0	0	0	0	0	-3,372	0	0	0	0	0	**-3,372**
Milford	Ellis	Trinity		103	89	101	89	89	89	89	89	101	685	68	68	68	68	68	68	77	0	0	0	0	0	12	0	0	0	0	0	9	**9**
Mountain Peak WSC	Ellis	Trinity		166	156	156	156	156	156	156	156	156	14,031	2,452	2,452	2,452	2,452	2,452	2,452	2,452	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Oak Leaf	Ellis	Trinity		147	134	193	134	193	193	193	193	193	2,960	444	444	640	640	640	640	640	0	59	0	0	0	0	0	196	0	0	0	0	**196**
Ovilla	Ellis	Trinity	P	188	177	177	177	177	177	177	177	177	9,346	1,853	1,853	1,853	1,853	1,853	1,853	1,853	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Palmer	Ellis	Trinity		103	89	101	89	100	100	100	100	101	2,670	266	266	299	299	299	299	302	0	11	0	0	0	1	0	33	0	0	0	3	**36**
Pecan Hill	Ellis	Trinity		147	135	168	135	168	168	168	168	168	1,512	229	229	285	285	285	285	285	0	33	0	0	0	0	0	56	0	0	0	0	**56**
Red Oak	Ellis	Trinity		156	143	167	143	143	167	167	167	167	13,455	2,155	2,155	2,155	2,517	2,517	2,517	2,517	0	0	24	0	0	0	0	0	362	0	0	0	**362**
Rice WSC	Ellis	Trinity	P	102	91	104	91	91	91	91	91	104	2,905	296	296	296	296	296	296	338	0	0	0	0	0	13	0	0	0	0	0	42	**42**
Rockett SUD	Ellis	Trinity	P	123	111	111	111	111	111	111	111	111	61,185	7,607	7,607	7,607	7,607	7,607	7,607	7,607	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Sardis-Lone Elm WSC	Ellis	Trinity	P	191	179	179	179	179	179	179	179	179	13,408	2,688	2,688	2,688	2,688	2,688	2,688	2,688	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Waxahachie	Ellis	Trinity		265	253	196	178	196	196	196	196	196	97,206	27,548	19,381	21,341	21,341	21,341	21,341	21,341	-75	18	0	0	0	0	-8,167	1,960	0	0	0	0	**-6,207**
Bonham	Fannin	Red		130	120	205	205	205	205	205	205	205	37,000	4,973	8,496	8,496	8,496	8,496	8,496	8,496	85	0	0	0	0	0	3,523	0	0	0	0	0	**3,523**
County-Other	Fannin	Red	P	118	104	104	104	104	104	104	104	104	7,839	913	913	913	913	913	913	913	0	0	0	0	0	0	0	0	0	0	0	0	**0**
County-Other	Fannin	Sulphur	P	118	104	104	104	104	104	104	104	104	1,262	147	147	147	147	147	147	147	0	0	0	0	0	0	0	0	0	0	0	0	**0**
County-Other	Fannin	Trinity	P	118	104	104	104	104	104	104	104	104	1,221	142	142	142	142	142	142	142	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Ector	Fannin	Red		134	122	122	122	122	122	122	122	122	786	107	107	107	107	107	107	107	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Hickory Creek SUD[1]	Fannin	Sulphur	P	155	90	144	144	144	144	144	144	144	130	13	21	21	21	21	21	21	54	0	0	0	0	0	8	0	0	0	0	0	**8**
Hickory Creek SUD[1]	Fannin	Trinity	P	155	90	144	144	144	144	144	144	144	103	10	17	17	17	17	17	17	54	0	0	0	0	0	7	0	0	0	0	0	**7**
Honey Grove	Fannin	Red	P	168	153	191	153	191	191	191	191	191	615	105	105	132	132	132	132	132	0	38	0	0	0	0	0	27	0	0	0	0	**27**
Honey Grove	Fannin	Sulphur	P	168	153	191	153	191	191	191	191	191	1,924	330	330	412	412	412	412	412	0	38	0	0	0	0	0	82	0	0	0	0	**82**
Ladonia	Fannin	Sulphur		328	314	314	314	314	314	314	314	314	3,000	1,055	1,055	1,055	1,055	1,055	1,055	1,055	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Leonard	Fannin	Sulphur	P	106	92	116	92	116	116	116	116	116	200	21	21	26	26	26	26	26	0	24	0	0	0	0	0	5	0	0	0	0	**5**
Leonard	Fannin	Trinity	P	106	92	116	92	116	116	116	116	116	9,800	1,010	1,010	1,273	1,273	1,273	1,273	1,273	0	24	0	0	0	0	0	263	0	0	0	0	**263**
North Hunt WSC[1]	Fannin	Sulphur		115	64	115	64	64	64	64	64	115	542	39	39	39	39	39	39	70	0	0	0	0	0	51	0	0	0	0	0	31	**31**
Savoy	Fannin	Red		101	86	100	86	86	86	86	86	100	974	94	94	94	94	94	94	109	0	0	0	0	0	14	0	0	0	0	0	15	**15**
Southwest Fannin County SUD	Fannin	Red	P	72	62	105	62	62	62	62	62	105	10,000	694	694	694	694	694	694	1,176	0	0	0	0	0	43	0	0	0	0	0	482	**482**
Southwest Fannin County SUD	Fannin	Trinity	P	72	62	105	62	62	62	62	62	105	85	6	6	6	6	6	6	10	0	0	0	0	0	43	0	0	0	0	0	4	**4**
Trenton	Fannin	Trinity		187	173	173	173	173	173	173	173	173	8,000	1,550	1,550	1,550	1,550	1,550	1,550	1,550	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Whitewright	Fannin	Red	P	180	166	186	166	166	186	186	186	186	41	8	8	8	9	9	9	9	0	0	20	0	0	0	0	0	1	0	0	0	**1**
County-Other	Freestone	Brazos	P	124	110	110	110	110	110	110	110	110	1,548	191	191	191	191	191	191	191	0	0	0	0	0	0	0	0	0	0	0	0	**0**
County-Other	Freestone	Trinity	P	124	110	110	110	110	110	110	110	110	8,150	1,004	1,004	1,004	1,004	1,026	1,004	1,004	0	0	0	0	0	0	0	0	0	22	-22	0	**0**
Fairfield	Freestone	Trinity		204	189	189	189	189	189	189	189	189	7,500	1,588	1,588	1,588	1,588	1,588	1,588	1,588	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Flo Community WSC[2]	Freestone	Trinity		75	64	64	64	64	64	64	64	64	271	19	19	19	19	19	19	19	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Teague	Freestone	Brazos		74	63	104	63	72	72	72	72	104	3,285	232	232	265	265	265	265	383	0	9	0	0	0	32	0	33	0	0	0	118	**151**
Teague	Freestone	Trinity		74	63	104	63	72	72	72	72	104	5,139	363	363	414	414	414	414	599	0	9	0	0	0	32	0	51	0	0	0	185	**236**
Turlington WSC[3]	Freestone	Trinity			66	102	66	66	66	66	66	102	300	22	22	22	22	22	22	34	0	0	0	0	0	36	0	0	0	0	0	12	**12**
Wortham	Freestone	Trinity		119	105	184	105	184	184	184	184	184	1,217	143	143	251	251	251	251	251	0	79	0	0	0	0	0	108	0	0	0	0	**108**
Bells	Grayson	Red		122	110	110	110	110	110	110	110	110	4,000	493	493	493	493	493	493	493	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Collinsville	Grayson	Trinity		124	110	133	110	133	133	133	133	133	6,035	744	744	899	899	899	899	899	0	23	0	0	0	0	0	155	0	0	0	0	**155**
County-Other	Grayson	Red	P	118	106	106	106	106	106	106	106	106	18,102	2,149	2,149	2,149	2,149	2,149	2,149	2,149	0	0	0	0	0	0	0	0	0	0	0	0	**0**
County-Other	Grayson	Trinity	P	118	106	106	106	106	106	106	106	106	2,625	312	312	312	312	312	312	312	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Denison	Grayson	Red		200	186	186	186	186	186	186	186	186	33,000	6,875	6,875	6,875	6,875	6,875	6,875	6,875	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Gunter	Grayson	Trinity		120	110	114	110	114	114	114	114	114	9,000	1,109	1,109	1,149	1,149	1,149	1,149	1,149	0	4	0	0	0	0	0	40	0	0	0	0	**40**
Gunter Rural WSC	Grayson	Trinity	P	101	91	105	91	91	91	91	91	105	5,000	510	510	510	510	510	510	588	0	0	0	0	0	14	0	0	0	0	0	78	**78**
Howe	Grayson	Red	P	118	105	137	105	105	105	137	137	137	781	92	92	92	92	120	120	120	0	0	0	32	0	0	0	0	0	28	0	0	**28**
Howe	Grayson	Trinity	P	118	105	137	105	105	105	137	137	137	10,000	1,176	1,176	1,176	1,176	1,535	1,535	1,535	0	0	0	32	0	0	0	0	0	359	0	0	**359**
Luella WSC	Grayson	Trinity		103	92	104	92	92	92	92	92	104	5,770	595	595	595	595	595	595	672	0	0	0	0	0	12	0	0	0	0	0	77	**77**
Pottsboro	Grayson	Red		143	130	147	130	130	147	147	147	147	12,000	1,747	1,747	1,747	1,976	1,976	1,976	1,976	0	0	17	0	0	0	0	0	229	0	0	0	**229**
Sherman	Grayson	Red		222	209	237	209	219	237	237	237	237	80,000	18,729	18,729	19,625	21,238	21,238	21,238	21,238	0	10	18	0	0	0	0	896	1,613	0	0	0	**2,509**
South Grayson WSC	Grayson	Trinity	P	131	120	120	120	120	120	120	120	120	5,000	672	672	672	672	672	672	672	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Southmayd	Grayson	Red		115	104	104	104	104	104	104	104	104	5,600	652	652	652	652	652	652	652	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Southwest Fannin County SUD	Grayson	Red	P	72	62	105	62	62	62	62	62	105	391	27	27	27	27	27	27	46	0	0	0	0	0	43	0	0	0	0	0	19	**19**
Tioga	Grayson	Trinity		122	110	147	110	147	147	147	147	147	4,600	567	567	757	757	757	757	757	0	37	0	0	0	0	0	190	0	0	0	0	**190**
Tom Bean	Grayson	Red	P	213	200	200	200	200	200	200	200	200	300	67	67	67	67	67	67	67	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Tom Bean	Grayson	Trinity	P	213	200	200	200	200	200	200	200	200	1,700	381	381	381	381	381	381	381	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Two Way SUD	Grayson	Red	P	90	79	104	79	79	79	79	79	104	8,354	739	739	739	739	739	739	973	0	0	0	0	0	25	0	0	0	0	0	234	**234**

Table F.3
Supporting Documentation for Per Capita Water Use Adjustments

Water User Group	County Name	Basin Name	Partial	TWDB Base GPCD 2000	2060 Projections with Plumbing: TWDB	2060 Projections with Plumbing: Draft Region C	2060 per Capita Projections after Accounting for Each Change: Data Correction	Other Peak Years	Increasing Trend	Rapid Growth	Commercialization	115 gpcd Minimum	TWDB 2060 Population Projection	2060 Water Need Projections after Accounting for Each Change: Initial TWDB	Data Correction	Other Peak Years	Increasing Trend	Rapid Growth	Commercialization	115 gpcd Minimum	Change in 2060 per Capita Projections due to Each Change: Data Correction	Other Peak Years	Increasing Trend	Rapid Growth	Commercialization	115 gpcd Minimum	Change in 2060 Demand Projections due to Each Change: Data Correction	Other Peak Years	Increasing Trend	Rapid Growth	Commercialization	115 gpcd Minimum	Overall Change
Two Way SUD	Grayson	Trinity	P	90	79	104	79	79	79	79	79	104	4,498	398	398	398	398	398	398	524	0	0	0	0	0	25	0	0	0	0	0	126	**126**
Van Alstyne	Grayson	Trinity		135	122	187	122	134	164	187	187	187	19,200	2,624	2,624	2,882	3,527	4,022	4,022	4,022	0	12	30	23	0	0	0	258	645	495	0	0	**1,398**
Whitesboro	Grayson	Red	P	143	130	146	130	146	146	146	146	146	7,074	1,030	1,030	1,157	1,157	1,157	1,157	1,157	0	16	0	0	0	0	0	127	0	0	0	0	**127**
Whitesboro	Grayson	Trinity	P	143	130	146	130	146	146	146	146	146	2,926	426	426	479	479	479	479	479	0	16	0	0	0	0	0	53	0	0	0	0	**53**
Whitewright	Grayson	Red	P	180	166	186	166	166	186	186	186	186	7,500	1,395	1,395	1,395	1,563	1,563	1,563	1,563	0	0	20	0	0	0	0	0	168	0	0	0	**168**
Woodbine WSC	Grayson	Trinity	P	104	91	102	91	91	91	91	91	102	112	11	11	11	11	11	11	13	0	0	0	0	0	11	0	0	0	0	0	2	**2**
Athens	Henderson	Trinity		167	153	171	153	171	171	171	171	171	32,921	5,642	5,642	6,306	6,306	6,306	6,306	6,306	0	18	0	0	0	0	0	664	0	0	0	0	**664**
Bethel-Ash WSC [1]	Henderson	Trinity		77	66	66	66	66	66	66	66	66	4,625	342	342	342	342	342	342	342	0	0	0	0	0	0	0	0	0	0	0	0	**0**
County-Other	Henderson	Trinity		180	166	166	166	166	166	166	166	166	1,324	246	246	246	246	246	246	246	0	0	0	0	0	0	0	0	0	0	0	0	**0**
East Cedar Creek FWSD	Henderson	Trinity		156	146	146	146	146	146	146	146	146	33,730	5,516	5,516	5,516	5,516	5,516	5,516	5,516	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Eustace	Henderson	Trinity		132	118	141	118	141	141	141	141	141	1,402	185	185	221	221	221	221	221	0	23	0	0	0	0	0	36	0	0	0	0	**36**
Gun Barrel City	Henderson	Trinity		128	116	175	116	175	175	175	175	175	12,324	1,601	1,601	2,416	2,416	2,416	2,416	2,416	0	59	0	0	0	0	0	815	0	0	0	0	**815**
Log Cabin	Henderson	Trinity		86	76	105	76	76	76	76	76	105	1,200	102	102	102	102	102	102	141	0	0	0	0	0	29	0	0	0	0	0	39	**39**
Mabank	Henderson	Trinity	P	168	155	187	155	187	187	187	187	187	482	84	84	101	101	101	101	101	0	32	0	0	0	0	0	17	0	0	0	0	**17**
Malakoff	Henderson	Trinity		125	111	147	111	147	147	147	147	147	3,228	401	401	532	532	532	532	532	0	36	0	0	0	0	0	131	0	0	0	0	**131**
Payne Springs	Henderson	Trinity		195	180	192	180	192	192	192	192	192	1,024	206	206	220	220	220	220	220	0	12	0	0	0	0	0	14	0	0	0	0	**14**
Seven Points	Henderson	Trinity		109	99	105	99	99	99	99	99	105	3,016	334	334	334	334	334	334	355	0	0	0	0	0	6	0	0	0	0	0	21	**21**
Tool	Henderson	Trinity		130	117	130	117	130	130	130	130	130	4,771	625	625	695	695	695	695	695	0	13	0	0	0	0	0	70	0	0	0	0	**70**
Trinidad	Henderson	Trinity		128	113	136	113	136	136	136	136	136	1,246	158	158	190	190	190	190	190	0	23	0	0	0	0	0	32	0	0	0	0	**32**
Virginia Hill WSC	Henderson	Trinity		101	87	101	87	87	87	87	87	101	3,219	314	314	314	314	314	314	364	0	0	0	0	0	14	0	0	0	0	0	50	**50**
West Cedar Creek MUD	Henderson	Trinity	P	80	70	100	70	70	70	70	70	105	29,664	2,326	2,326	2,326	2,326	2,326	2,326	3,489	0	0	0	0	0	35	0	0	0	0	0	1,163	**1,163**
Bryson	Jack	Brazos		130	116	147	116	147	147	147	147	147	570	74	74	94	94	94	94	94	0	31	0	0	0	0	0	20	0	0	0	0	**20**
County-Other	Jack	Brazos	P	102	89	102	89	89	89	89	89	102	1,448	144	144	144	144	144	144	165	0	0	0	0	0	13	0	0	0	0	0	21	**21**
County-Other	Jack	Trinity	P	102	89	102	89	89	89	89	89	102	5,500	548	548	548	548	548	548	628	0	0	0	0	0	13	0	0	0	0	0	80	**80**
Jacksboro	Jack	Trinity		126	115	124	115	124	124	124	124	124	4,897	631	631	680	680	680	680	680	0	9	0	0	0	0	0	49	0	0	0	0	**49**
Able Springs WSC	Kaufman	Trinity		81	70	104	70	70	70	70	70	104	15,693	1,230	1,230	1,230	1,230	1,230	1,230	1,828	0	0	0	0	0	34	0	0	0	0	0	598	**598**
College Mound WSC	Kaufman	Trinity		64	51	102	51	51	51	51	51	102	26,421	1,509	1,509	1,509	1,509	1,509	1,509	3,019	0	0	0	0	0	51	0	0	0	0	0	1,510	**1,510**
Combine	Kaufman	Trinity	P	89	76	102	76	90	90	90	90	102	3,914	333	333	395	395	395	395	447	0	14	0	0	0	12	0	62	0	0	0	52	**114**
Combine WSC	Kaufman	Trinity	P	87	77	105	77	77	77	77	77	105	10,112	872	872	872	872	872	872	1,189	0	0	0	0	0	28	0	0	0	0	0	317	**317**
County-Other	Kaufman	Sabine	P	139	131	131	131	131	131	131	131	131	2,629	386	386	386	386	386	386	386	0	0	0	0	0	0	0	0	0	0	0	0	**0**
County-Other	Kaufman	Trinity	P	139	131	131	131	131	131	131	131	131	11,797	1,731	1,731	1,731	1,731	1,731	1,731	1,731	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Crandall	Kaufman	Trinity		140	128	148	128	128	128	148	148	148	14,245	2,042	2,042	2,042	2,042	2,362	2,362	2,362	0	0	0	20	0	0	0	0	0	320	0	0	**320**
Dallas	Kaufman	Trinity	P	198	185	256	249	256	256	256	256	256	0	0	0	0	0	0	0	0	64	7	0	0	0	0	0	0	0	0	0	0	**0**
Forney	Kaufman	Trinity		130	117	147	117	117	117	147	147	147	42,803	5,610	5,610	5,610	5,610	7,048	7,048	7,048	0	0	0	30	0	0	0	0	0	1,438	0	0	**1,438**
Forney Lake WSC	Kaufman	Trinity	P	147	134	187	134	134	134	187	187	187	13,000	1,951	1,951	1,951	1,951	2,723	2,723	2,723	0	0	0	53	0	0	0	0	0	772	0	0	**772**
Gastonia-Scurry WSC	Kaufman	Trinity		86	74	103	74	74	74	74	74	103	20,986	1,740	1,740	1,740	1,740	1,740	1,740	2,421	0	0	0	0	0	29	0	0	0	0	0	681	**681**
High Point WSC	Kaufman	Trinity	P	83	71	103	71	71	71	71	71	103	12,486	993	993	993	993	993	993	1,441	0	0	0	0	0	32	0	0	0	0	0	448	**448**
Kaufman	Kaufman	Trinity		113	99	136	99	99	136	136	136	136	19,883	2,205	2,205	2,205	3,029	3,029	3,029	3,029	0	0	37	0	0	0	0	0	824	0	0	0	**824**
Kemp	Kaufman	Trinity		134	120	132	120	132	132	132	132	132	1,133	152	152	168	168	168	168	168	0	12	0	0	0	0	0	16	0	0	0	0	**16**
Mabank	Kaufman	Trinity	P	168	155	187	155	187	187	187	187	187	5,667	984	984	1,187	1,187	1,187	1,187	1,187	0	32	0	0	0	0	0	203	0	0	0	0	**203**
Mac Bee WSC [1]	Kaufman	Sabine		115	70	115	70	70	70	70	70	115	726	57	57	57	57	57	57	94	0	0	0	0	0	45	0	0	0	0	0	37	**37**
Mesquite	Kaufman	Trinity	P	160	147	152	147	152	152	152	152	152	10	2	2	2	2	2	2	2	0	5	0	0	0	0	0	0	0	0	0	0	**0**
Oak Grove	Kaufman	Trinity		83	69	111	69	111	111	111	111	111	2,274	176	176	283	283	283	283	283	0	42	0	0	0	0	0	107	0	0	0	0	**107**
Seagoville	Kaufman	Trinity	P	132	119	125	119	125	125	125	125	125	79	11	11	11	11	11	11	11	0	6	0	0	0	0	0	0	0	0	0	0	**0**
Talty	Kaufman	Trinity		316	314	314	314	314	314	314	314	314	11,211	3,943	3,943	3,943	3,943	3,943	3,943	3,943	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Terrell	Kaufman	Trinity		209	195	200	195	200	200	200	200	200	28,445	6,213	6,213	6,372	6,372	6,372	6,372	6,372	0	5	0	0	0	0	0	159	0	0	0	0	**159**
West Cedar Creek MUD	Kaufman	Trinity	P	80	70	100	70	70	70	70	70	105	34,269	2,687	2,687	2,687	2,687	2,687	2,687	4,031	0	0	0	0	0	35	0	0	0	0	0	1,344	**1,344**
Blooming Grove	Navarro	Trinity		163	149	149	149	149	149	149	149	149	833	139	139	139	139	139	139	139	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Brandon-Irene WSC [2]	Navarro	Trinity	P	113	99	99	99	99	99	99	99	99	328	36	36	36	36	36	36	36	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Chatfield WSC	Navarro	Trinity		77	67	105	67	67	67	67	67	105	14,075	1,056	1,056	1,056	1,056	1,056	1,056	1,655	0	0	0	0	0	38	0	0	0	0	0	599	**599**
Community Water Company	Navarro	Trinity	P	76	64	103	64	64	64	64	64	103	3,176	228	228	228	228	228	228	366	0	0	0	0	0	39	0	0	0	0	0	138	**138**
Corsicana	Navarro	Trinity		208	194	194	194	194	194	194	194	194	32,563	7,076	7,076	7,076	7,076	7,076	7,076	7,076	0	0	0	0	0	0	0	0	0	0	0	0	**0**
County-Other	Navarro	Trinity		130	116	116	116	116	116	116	116	116	1,760	229	229	229	229	229	229	229	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Dawson	Navarro	Trinity		154	141	164	141	164	164	164	164	164	1,293	204	204	238	238	238	238	238	0	23	0	0	0	0	0	34	0	0	0	0	**34**
Frost	Navarro	Trinity		110	97	102	97	101	101	101	101	102	1,002	109	109	113	113	113	113	114	0	4	0	0	0	1	0	4	0	0	0	1	**5**
Kerens	Navarro	Trinity		185	171	201	201	201	201	201	201	201	1,681	322	378	378	378	378	378	378	30	0	0	0	0	0	56	0	0	0	0	0	**56**
M E N WSC	Navarro	Trinity		119	107	107	107	107	107	107	107	107	5,180	621	621	621	621	621	621	621	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Navarro Mills WSC	Navarro	Trinity		86	73	102	73	73	73	73	73	102	9,804	802	802	802	802	802	802	1,120	0	0	0	0	0	29	0	0	0	0	0	318	**318**
Rice	Navarro	Trinity		218	207	207	207	207	207	207	207	207	1,998	463	463	463	463	463	463	463	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Rice WSC	Navarro	Trinity	P	102	91	104	91	91	91	91	91	104	17,247	1,758	1,758	1,758	1,758	1,758	1,758	2,009	0	0	0	0	0	13	0	0	0	0	0	251	**251**
Aledo	Parker	Trinity		141	130	149	130	130	149	149	149	149	7,162	1,043	1,043	1,043	1,195	1,195	1,195	1,195	0	0	19	0	0	0	0	0	152	0	0	0	**152**
Annetta	Parker	Trinity		105	94	104	94	101	101	101	101	104	3,176	334	334	359	359	359	359	370	0	7	0	0	0	3	0	25	0	0	0	11	**36**
Annetta South	Parker	Trinity		114	101	102	101	101	101	101	101	102	1,227	139	139	139	139	139	139	140	0	0	0	0	0	1	0	0	0	0	0	1	**1**
Azle	Parker	Trinity	P	130	116	135	116	135	135	135	135	135	5,362	697	697	811	811	811	811	811	0	19	0	0	0	0	0	114	0	0	0	0	**114**
County-Other	Parker	Brazos	P	106	95	104	95	95	95	95	95	104	25,396	2,702	2,702	2,702	2,702	2,702	2,702	2,959	0	0	0	0	0	9	0	0	0	0	0	257	**257**
County-Other	Parker	Trinity	P	106	95	104	95	95	95	95	95	104	10,000	1,064	1,064	1,064	1,064	1,064	1,064	1,165	0	0	0	0	0	9	0	0	0	0	0	101	**101**
Fort Worth	Parker	Trinity	P	218	205	202	202	202	202	202	202	202	115,000	26,407	26,021	26,021	26,021	26,021	26,021	26,021	-3	0	0	0	0	0	-386	0	0	0	0	0	**-386**
Hudson Oaks	Parker	Trinity		105	95	105	95	95	95	95	95	105	9,884	1,052	1,052	1,052	1,052	1,052	1,052	1,163	0	0	0	0	0	10	0	0	0	0	0	111	**111**
Mineral Wells [1]	Parker	Brazos		175	162	162	162	162	162	162	162	162	4,000	726	726	726	726	726	726	726	0	0	0	0	0	0	0	0	0	0	0	0	**0**

Table F.3
Supporting Documentation for Per Capita Water Use Adjustments

Water User Group	County Name	Basin Name	Partial	TWDB Base GPCD	2060 Projections with Plumbing		2060 per Capita Projections after Accounting for Each Change						TWDB 2060 Population Projection	2060 Water Need Projections after Accounting for Each Change							Change in 2060 per Capita Projections due to Each Change						Change in 2060 Demand Projections due to Each Change						
				2000	TWDB	Draft Region C	Data Correction	Other Peak Years	Increasing Trend	Rapid Growth	Commercialization	115 gpcd Minimum		Initial TWDB	Data Correction	Other Peak Years	Increasing Trend	Rapid Growth	Commercialization	115 gpcd Minimum	Data Correction	Other Peak Years	Increasing Trend	Rapid Growth	Commercialization	115 gpcd Minimum	Data Correction	Other Peak Years	Increasing Trend	Rapid Growth	Commercialization	115 gpcd Minimum	Overall Change
Reno	Parker	Trinity		99	84	100	84	84	84	84	84	100	3,005	283	283	283	283	283	283	337	0	0	0	0	0	16	0	0	0	0	0	54	**54**
Springtown	Parker	Trinity		136	123	142	123	142	142	142	142	142	8,000	1,102	1,102	1,272	1,272	1,272	1,272	1,272	0	19	0	0	0	0	0	170	0	0	0	0	**170**
Walnut Creek SUD	Parker	Trinity		106	95	104	95	95	95	95	95	104	36,245	3,857	3,857	3,857	3,857	3,857	3,857	4,222	0	0	0	0	0	9	0	0	0	0	0	365	**365**
Weatherford	Parker	Brazos	P	143	130	175	170	175	175	175	175	175	2,793	407	532	547	547	547	547	547	40	5	0	0	0	0	125	15	0	0	0	0	**140**
Weatherford	Parker	Trinity	P	143	130	175	170	175	175	175	175	175	52,006	7,573	9,903	10,194	10,194	10,194	10,194	10,194	40	5	0	0	0	0	2,330	291	0	0	0	0	**2,621**
Willow Park	Parker	Trinity		151	138	138	138	138	138	138	138	138	8,722	1,348	1,348	1,348	1,348	1,348	1,348	1,348	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Blackland WSC	Rockwall	Sabine	P	88	77	104	77	77	77	77	77	104	8,483	732	732	732	732	732	732	988	0	0	0	0	0	27	0	0	0	0	0	256	**256**
Blackland WSC	Rockwall	Trinity	P	88	77	104	77	77	77	77	77	104	3,623	312	312	312	312	312	312	422	0	0	0	0	0	27	0	0	0	0	0	110	**110**
Cash SUD[1]	Rockwall	Sabine		115	90	115	90	90	90	90	90	115	1,792	181	181	181	181	181	181	231	0	0	0	0	0	25	0	0	0	0	0	50	**50**
County-Other	Rockwall	Sabine	P	192	188	188	188	188	188	188	188	188	1,166	246	246	246	246	246	246	246	0	0	0	0	0	0	0	0	0	0	0	0	**0**
County-Other	Rockwall	Trinity	P	192	188	188	188	188	188	188	188	188	650	137	137	137	137	137	137	137	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Dallas	Rockwall	Trinity	P	198	185	256	249	256	256	256	256	256	21	4	6	6	6	6	6	6	64	7	0	0	0	0	2	0	0	0	0	0	**2**
East Fork SUD	Rockwall	Trinity	P	131	119	119	119	119	119	119	119	119	58	8	8	8	8	8	8	8	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Forney Lake WSC	Rockwall	Trinity	P	147	134	187	134	134	134	187	187	187	13,000	1,951	1,951	1,951	1,951	2,723	2,723	2,723	0	0	0	53	0	0	0	0	0	772	0	0	**772**
Heath	Rockwall	Trinity		214	204	230	204	204	230	230	230	230	21,968	5,020	5,020	5,020	5,660	5,660	5,660	5,660	0	0	26	0	0	0	0	0	640	0	0	0	**640**
High Point WSC	Rockwall	Trinity	P	83	71	103	71	71	71	71	71	103	1,391	111	111	111	111	111	111	160	0	0	0	0	0	32	0	0	0	0	0	49	**49**
Lavon WSC	Rockwall	Trinity	P	86	78	107	78	78	78	78	78	107	11,841	1,035	1,035	1,035	1,035	1,035	1,035	1,419	0	0	0	0	0	29	0	0	0	0	0	384	**384**
McLendon-Chisholm WSC	Rockwall	Trinity		142	128	128	128	128	128	128	128	128	3,255	467	467	467	467	467	467	467	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Mt Zion WSC	Rockwall	Trinity		235	221	221	221	221	221	221	221	221	3,500	866	866	866	866	866	866	866	0	0	0	0	0	0	0	0	0	0	0	0	**0**
R-C-H WSC	Rockwall	Trinity		162	148	148	148	148	148	148	148	148	3,515	583	583	583	583	583	583	583	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Rockwall	Rockwall	Trinity		221	211	240	211	215	240	240	240	240	82,113	19,407	19,407	19,775	22,075	22,075	22,075	22,075	0	4	25	0	0	0	0	368	2,300	0	0	0	**2,668**
Rowlett	Rockwall	Trinity	P	166	155	189	155	166	189	189	189	189	7,700	1,337	1,337	1,432	1,630	1,630	1,630	1,630	0	11	23	0	0	0	0	95	198	0	0	0	**293**
Royse City	Rockwall	Sabine	P	182	169	187	169	174	187	187	187	187	30,146	5,707	5,707	5,876	6,315	6,315	6,315	6,315	0	5	13	0	0	0	0	169	439	0	0	0	**608**
Wylie	Rockwall	Trinity	P	148	138	190	138	138	190	190	190	190	2,250	348	348	348	479	479	479	479	0	0	52	0	0	0	0	0	131	0	0	0	**131**
Arlington	Tarrant	Trinity		165	152	174	152	174	174	174	174	174	515,000	87,685	87,685	100,376	100,376	100,376	100,376	100,376	0	22	0	0	0	0	0	12,691	0	0	0	0	**12,691**
Azle	Tarrant	Trinity	P	130	116	135	116	135	135	135	135	135	40,000	5,197	5,197	6,049	6,049	6,049	6,049	6,049	0	19	0	0	0	0	0	852	0	0	0	0	**852**
Bedford	Tarrant	Trinity		186	171	171	171	171	171	171	171	171	58,713	11,246	11,246	11,246	11,246	11,246	11,246	11,246	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Benbrook	Tarrant	Trinity		211	197	197	197	197	197	197	197	197	51,000	11,254	11,254	11,254	11,254	11,254	11,254	11,254	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Bethesda WSC	Tarrant	Trinity		134	122	122	122	122	122	122	122	122	25,620	3,501	3,501	3,501	3,501	3,501	3,501	3,501	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Blue Mound	Tarrant	Trinity		97	83	101	83	88	88	88	88	101	2,500	232	232	246	246	246	246	283	0	5	0	0	0	13	0	14	0	0	0	37	**51**
Burleson[1]	Tarrant	Trinity		150	137	137	137	137	137	137	137	137	12,820	1,967	1,967	1,967	1,967	1,967	1,967	1,967	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Colleyville	Tarrant	Trinity		267	256	289	256	274	289	289	289	289	30,649	8,789	8,789	9,407	9,922	9,922	9,922	9,922	0	18	15	0	0	0	0	618	515	0	0	0	**1,133**
Community WSC	Tarrant	Trinity	P	107	93	101	93	93	93	93	93	101	3,702	386	386	386	386	386	386	419	0	0	0	0	0	8	0	0	0	0	0	33	**33**
County-Other	Tarrant	Trinity		132	121	121	121	121	121	121	121	121	23,911	3,241	3,241	3,241	3,241	3,241	3,241	3,241	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Crowley	Tarrant	Trinity		141	126	126	126	126	126	126	126	126	25,000	3,528	3,528	3,528	3,528	3,528	3,528	3,528	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Dalworthington Gardens	Tarrant	Trinity		283	269	269	269	269	269	269	269	269	2,935	884	884	884	884	884	884	884	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Edgecliff	Tarrant	Trinity		158	143	150	143	150	150	150	150	150	2,550	408	408	428	428	428	428	428	0	7	0	0	0	0	0	20	0	0	0	0	**20**
Euless	Tarrant	Trinity		159	145	153	145	153	153	153	153	153	66,798	10,849	10,849	11,448	11,448	11,448	11,448	11,448	0	8	0	0	0	0	0	599	0	0	0	0	**599**
Everman	Tarrant	Trinity		107	93	101	93	98	98	98	98	101	9,000	938	938	988	988	988	988	1,018	0	5	0	0	0	3	0	50	0	0	0	30	**80**
Forest Hill	Tarrant	Trinity		104	91	102	91	93	93	93	93	102	21,000	2,141	2,141	2,188	2,188	2,188	2,188	2,399	0	2	0	0	0	9	0	47	0	0	0	211	**258**
Fort Worth	Tarrant	Trinity	P	218	205	202	202	202	202	202	202	202	1,578,759	362,530	357,224	357,224	357,224	357,224	357,224	357,224	-3	0	0	0	0	0	-5,306	0	0	0	0	0	**-5,306**
Grand Prairie	Tarrant	Trinity	P	91	79	141	141	141	141	141	141	141	58,031	5,135	9,165	9,165	9,165	9,165	9,165	9,165	62	0	0	0	0	0	4,030	0	0	0	0	0	**4,030**
Grapevine	Tarrant	Trinity	P	223	210	237	210	216	237	237	237	237	70,490	16,581	16,581	17,055	18,713	18,713	18,713	18,713	0	6	21	0	0	0	0	474	1,658	0	0	0	**2,132**
Haltom City	Tarrant	Trinity		146	134	134	134	134	134	134	134	134	55,456	8,324	8,324	8,324	8,324	8,324	8,324	8,324	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Haslet	Tarrant	Trinity		118	106	179	145	179	179	179	179	179	7,000	831	1,137	1,404	1,404	1,404	1,404	1,404	39	34	0	0	0	0	306	267	0	0	0	0	**573**
Hurst	Tarrant	Trinity		176	161	163	161	163	163	163	163	163	45,167	8,146	8,146	8,247	8,247	8,247	8,247	8,247	0	2	0	0	0	0	0	101	0	0	0	0	**101**
Johnson County SUD[1]	Tarrant	Trinity	P	171	160	190	160	160	190	190	190	190	5,421	972	972	972	1,154	1,154	1,154	1,154	0	0	30	0	0	0	0	0	182	0	0	0	**182**
Keller	Tarrant	Trinity		207	198	198	198	198	198	198	198	198	48,097	10,667	10,667	10,667	10,667	10,667	10,667	10,667	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Kennedale	Tarrant	Trinity		165	153	153	153	153	153	153	153	153	11,626	1,992	1,992	1,992	1,992	1,992	1,992	1,992	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Lake Worth	Tarrant	Trinity		166	151	160	151	160	160	160	160	160	7,500	1,269	1,269	1,344	1,344	1,344	1,344	1,344	0	9	0	0	0	0	0	75	0	0	0	0	**75**
Lakeside	Tarrant	Trinity		324	310	310	310	310	310	310	310	310	2,436	846	846	846	846	846	846	846	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Mansfield	Tarrant	Trinity	P	147	138	241	203	203	241	241	241	241	122,000	18,859	27,741	27,741	32,934	32,934	32,934	32,934	65	0	38	0	0	0	8,882	0	5,193	0	0	0	**14,075**
North Richland Hills	Tarrant	Trinity		201	188	163	150	163	163	163	163	163	87,751	18,479	14,744	16,022	16,022	16,022	16,022	16,022	-38	13	0	0	0	0	-3,735	1,278	0	0	0	0	**-2,457**
Pantego	Tarrant	Trinity		253	239	239	239	239	239	239	239	239	2,318	621	621	621	621	621	621	621	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pelican Bay	Tarrant	Trinity		67	54	102	54	54	54	54	54	102	2,963	179	179	179	179	179	179	339	0	0	0	0	0	48	0	0	0	0	0	160	**160**
Richland Hills	Tarrant	Trinity		123	109	130	109	130	130	130	130	130	10,850	1,325	1,325	1,580	1,580	1,580	1,580	1,580	0	21	0	0	0	0	0	255	0	0	0	0	**255**
River Oaks	Tarrant	Trinity		138	123	116	116	116	116	116	116	116	7,100	978	923	923	923	923	923	923	-7	0	0	0	0	0	-55	0	0	0	0	0	**-55**
Saginaw	Tarrant	Trinity		152	141	159	141	141	159	159	159	159	25,930	4,095	4,095	4,095	4,618	4,618	4,618	4,618	0	0	18	0	0	0	0	0	523	0	0	0	**523**
Sansom Park Village	Tarrant	Trinity		123	109	113	109	113	113	113	113	113	4,857	593	593	615	615	615	615	615	0	4	0	0	0	0	0	22	0	0	0	0	**22**
Southlake	Tarrant	Trinity	P	279	273	294	273	273	294	294	294	294	48,445	14,814	14,814	14,814	15,954	15,954	15,954	15,954	0	0	21	0	0	0	0	0	1,140	0	0	0	**1,140**
Watauga	Tarrant	Trinity		119	105	121	105	121	121	121	121	121	27,468	3,231	3,231	3,723	3,723	3,723	3,723	3,723	0	16	0	0	0	0	0	492	0	0	0	0	**492**
Westover Hills	Tarrant	Trinity		379	364	364	364	364	364	364	364	364	658	268	268	268	268	268	268	268	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Westworth Village	Tarrant	Trinity		77	63	101	63	70	70	70	70	101	3,200	226	226	251	251	251	251	362	0	7	0	0	0	31	0	25	0	0	0	111	**136**
White Settlement	Tarrant	Trinity		146	132	132	132	132	132	132	132	132	22,000	3,253	3,253	3,253	3,253	3,253	3,253	3,253	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Alvord	Wise	Trinity		108	94	123	94	123	123	123	123	123	1,806	190	190	249	249	249	249	249	0	29	0	0	0	0	0	59	0	0	0	0	**59**
Aurora	Wise	Trinity		111	99	104	99	104	104	104	104	104	2,147	238	238	250	250	250	250	250	0	5	0	0	0	0	0	12	0	0	0	0	**12**
Bolivar WSC	Wise	Trinity	P	102	89	137	89	89	89	137	137	137	5,979	596	596	596	596	918	918	918	0	0	0	48	0	0	0	0	0	322	0	0	**322**
Boyd	Wise	Trinity		132	117	117	117	117	117	117	117	117	2,200	288	288	288	288	288	288	288	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Bridgeport	Wise	Trinity		173	160	199	160	199	199	199	199	199	19,936	3,573	3,573	4,444	4,444	4,444	4,444	4,444	0	39	0	0	0	0	0	871	0	0	0	0	**871**

Table F.3
Supporting Documentation for Per Capita Water Use Adjustments

Water User Group	County Name	Basin Name	Partial	TWDB Base GPCD	2060 Projections with Plumbing		2060 per Capita Projections after Accounting for Each Change						TWDB 2060 Population Projection	2060 Water Need Projections after Accounting for Each Change							Change in 2060 per Capita Projections due to Each Change						Change in 2060 Demand Projections due to Each Change						
				2000	TWDB	Draft Region C	Data Correction	Other Peak Years	Increasing Trend	Rapid Growth	Commercialization	115 gpcd Minimum		Initial TWDB	Data Correction	Other Peak Years	Increasing Trend	Rapid Growth	Commercialization	115 gpcd Minimum	Data Correction	Other Peak Years	Increasing Trend	Rapid Growth	Commercialization	115 gpcd Minimum	Data Correction	Other Peak Years	Increasing Trend	Rapid Growth	Commercialization	115 gpcd Minimum	Overall Change
Chico	Wise	Trinity		123	109	134	109	134	134	134	134	134	3,300	403	403	495	495	495	495	495	0	25	0	0	0	0	0	92	0	0	0	0	**92**
Community WSC	Wise	Trinity	P	107	93	101	93	93	93	93	93	101	145	15	15	15	15	15	15	16	0	0	0	0	0	8	0	0	0	0	0	1	**1**
County-Other	Wise	Trinity		94	83	104	83	83	83	83	83	104	35,909	3,339	3,339	3,339	3,339	3,339	3,339	4,183	0	0	0	0	0	21	0	0	0	0	0	844	**844**
Decatur	Wise	Trinity		199	187	207	187	207	207	207	207	207	23,225	4,865	4,865	5,385	5,385	5,385	5,385	5,385	0	20	0	0	0	0	0	520	0	0	0	0	**520**
Fort Worth	Wise	Trinity	P	218	205	202	202	202	202	202	202	202	30,000	6,889	6,788	6,788	6,788	6,788	6,788	6,788	-3	0	0	0	0	0	-101	0	0	0	0	0	**-101**
New Fairview	Wise	Trinity		114	110	111	110	110	110	110	110	111	4,654	573	573	573	573	573	573	579	0	0	0	0	0	1	0	0	0	0	0	6	**6**
Newark	Wise	Trinity		101	88	113	88	113	113	113	113	113	6,216	613	613	787	787	787	787	787	0	25	0	0	0	0	0	174	0	0	0	0	**174**
Rhome	Wise	Trinity		220	206	220	206	220	220	220	220	220	11,825	2,729	2,729	2,914	2,914	2,914	2,914	2,914	0	14	0	0	0	0	0	185	0	0	0	0	**185**
Runaway Bay	Wise	Trinity		192	181	181	181	181	181	181	181	181	3,378	685	685	685	685	685	685	685	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Walnut Creek SUD	Wise	Trinity	P	106	95	104	95	95	95	95	95	104	5,066	539	539	539	539	539	539	590	0	0	0	0	0	9	0	0	0	0	0	51	**51**
West Wise SUD	Wise	Trinity		129	115	115	115	115	115	115	115	115	5,568	717	717	717	717	717	717	717	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total for Region C													**13,087,849**	**2,543,515**	**2,717,688**	**2,790,359**	**2,855,663**	**2,899,149**	**2,899,127**	**2,915,772**							**174,173**	**72,671**	**65,304**	**43,486**	**-22**	**16,645**	**372,257**
Change in Projections															**174,173**	**72,671**	**65,304**	**43,486**	**-22**	**16,645**							**6.8%**	**2.9%**	**2.6%**	**1.7%**	**0.0%**	**0.7%**	**14.6%**

Notes:
(1) Majority of WUG's population resides in neighboring region. Region C demand was adjusted to match assumptions used in neighboring regions.
(2) TWDB adjusted demand
(3) Turlington WSC has been removed from the TWDB Approved population and demand tables and has been included in Freestone County Other.

APPENDIX G

DEMAND PROJECTIONS

Table G-1
Region C Adopted Municipal Water Demand Projections (in Acre-Feet[1])

REGION	WUG NAME	COUNTY NAME[2]	2000 Census	Demand Projections for 2010	2020	2030	2040	2050	2060
C	ALLEN	COLLIN	10,928	23,657	28,806	33,773	35,318	36,029	36,330
C	ANNA	COLLIN	174	1,234	2,527	3,770	5,027	6,703	10,473
C	BLUE RIDGE	COLLIN	86	305	627	1,090	1,700	2,473	2,782
C	CADDO BASIN SUD	COLLIN	367	607	756	942	1,132	1,329	1,541
C	CELINA	COLLIN	325	952	4,750	10,001	17,709	27,085	31,252
C	COUNTY-OTHER	COLLIN	805	818	743	677	613	554	504
C	CULLEOKA WSC	COLLIN	568	908	1,350	1,625	1,883	2,185	2,506
C	DALLAS	COLLIN	13,252	16,717	18,471	19,399	19,921	20,240	20,819
C	DANVILLE WSC	COLLIN	584	845	1,153	1,417	1,693	1,990	2,306
C	EAST FORK SUD	COLLIN	428	555	705	835	972	1,114	1,273
C	FAIRVIEW	COLLIN	1,004	1,721	2,290	2,948	4,395	7,326	12,820
C	FARMERSVILLE	COLLIN	496	565	1,035	1,445	2,151	3,154	4,301
C	FRISCO	COLLIN	9,881	29,941	47,914	51,549	55,184	58,819	60,967
C	GARLAND	COLLIN	0	0	0	0	0	0	0
C	GUNTER RURAL WSC	COLLIN	310	554	726	837	997	1,173	1,360
C	HICKORY CREEK SUD	COLLIN	9	12	16	19	22	25	29
C	JOSEPHINE	COLLIN	87	100	282	276	271	271	271
C	LAVON WSC	COLLIN	217	368	584	847	1,678	2,637	3,596
C	LOWRY CROSSING	COLLIN	244	313	392	463	537	614	2,321
C	LUCAS	COLLIN	320	1,032	1,533	1,828	2,344	3,327	4,537
C	MCKINNEY	COLLIN	13,398	24,715	40,242	58,554	79,216	94,472	108,430
C	MELISSA	COLLIN	86	2,323	4,324	5,592	6,882	8,603	10,753
C	MILLIGAN WSC	COLLIN	203	202	196	191	185	183	183
C	MURPHY	COLLIN	545	1,554	5,810	5,778	5,746	5,746	5,746
C	NEVADA	COLLIN	205	247	528	631	1,254	2,090	5,226
C	NEW HOPE	COLLIN	218	267	383	632	944	1,416	3,148
C	NORTH COLLIN WSC	COLLIN	678	876	1,116	1,321	1,525	1,757	2,005
C	PARKER	COLLIN	504	1,915	4,078	5,950	9,669	14,132	19,338
C	PLANO	COLLIN	63,055	70,892	72,920	75,153	77,640	80,105	82,880
C	PRINCETON	COLLIN	366	666	1,568	2,782	4,604	7,673	11,509
C	PROSPER	COLLIN	460	1,998	7,289	10,528	11,878	12,688	13,498
C	RICHARDSON	COLLIN	6,625	6,925	10,588	10,550	10,435	10,359	10,359
C	ROYSE CITY	COLLIN	38	313	1,053	1,676	2,514	3,351	3,770
C	SACHSE	COLLIN	344	726	1,169	1,348	1,411	1,444	1,469
C	SAINT PAUL	COLLIN	125	192	468	930	1,479	1,756	1,848
C	SOUTH GRAYSON WSC	COLLIN	211	212	215	219	220	222	225
C	WESTON	COLLIN	51	251	672	1,482	4,234	7,410	12,702
C	WYLIE	COLLIN	2,406	6,615	10,351	12,837	17,877	18,729	20,467
		COLLIN TOTAL	**129,603**	**202,093**	**277,630**	**329,895**	**391,260**	**449,184**	**513,544**
C	BOLIVAR WSC	COOKE	171	205	244	286	285	285	285
C	COUNTY-OTHER	COOKE	838	1,074	1,232	1,251	1,234	1,221	1,222
C	GAINESVILLE	COOKE	2,489	3,750	3,992	4,385	4,693	5,046	5,522
C	KIOWA HOMEOWNERS WSC	COOKE	461	503	531	542	536	532	532
C	LINDSAY	COOKE	137	154	161	164	162	160	160
C	MUENSTER	COOKE	263	379	429	468	511	565	621
C	TWO WAY SUD	COOKE	8	10	11	11	11	11	11
C	VALLEY VIEW	COOKE	84	187	363	594	808	1,371	1,714
C	WOODBINE WSC	COOKE	547	656	699	749	789	842	902
		COOKE TOTAL	**4,998**	**6,918**	**7,662**	**8,450**	**9,029**	**10,033**	**10,969**
C	ADDISON	DALLAS	6,998	8,852	10,074	10,919	11,514	11,918	12,218
C	BALCH SPRINGS	DALLAS	2,387	2,621	2,730	2,805	2,852	2,934	3,028
C	CARROLLTON	DALLAS	10,548	10,804	10,740	10,792	10,783	10,834	10,946
C	CEDAR HILL	DALLAS	5,707	7,971	9,992	11,741	13,088	14,350	15,409
C	COCKRELL HILL	DALLAS	582	653	687	681	670	667	668
C	COMBINE	DALLAS	62	100	126	136	148	165	188
C	COMBINE WSC	DALLAS	88	156	221	250	279	319	373
C	COPPELL	DALLAS	8,126	10,036	9,947	9,857	9,812	9,768	9,768
C	COUNTY-OTHER	DALLAS	231	189	145	109	80	59	46
C	DALLAS	DALLAS	329,027	365,042	399,346	414,694	431,629	477,217	560,935
C	DALLAS COUNTY WCID #6	DALLAS	319	577	771	884	994	1,149	1,354
C	DE SOTO	DALLAS	8,012	10,675	12,888	14,678	16,386	18,298	18,845
C	DUNCANVILLE	DALLAS	6,952	7,937	8,230	8,254	8,305	8,432	8,596
C	EAST FORK SUD	DALLAS	113	115	118	120	123	126	132

Table G-1
Region C Adopted Municipal Water Demand Projections (in Acre-Feet[1])

REGION	WUG NAME	COUNTY NAME[2]	2000 Census	Demand Projections for 2010	2020	2030	2040	2050	2060
C	FARMERS BRANCH	DALLAS	10,261	11,229	12,109	12,883	13,603	14,286	14,945
C	GARLAND	DALLAS	38,429	42,911	45,702	48,139	50,151	52,087	52,087
C	GLENN HEIGHTS	DALLAS	724	903	1,079	1,234	1,382	1,516	1,652
C	GRAND PRAIRIE	DALLAS	17,097	23,024	26,915	31,149	36,757	43,204	50,107
C	GRAPEVINE	DALLAS	0	0	0	0	0	0	0
C	HIGHLAND PARK	DALLAS	4,120	4,255	4,266	4,274	4,278	4,289	4,319
C	HUTCHINS	DALLAS	682	1,210	2,375	3,782	5,646	7,527	7,998
C	IRVING	DALLAS	47,220	55,501	59,975	63,050	65,382	67,267	68,916
C	LANCASTER	DALLAS	4,119	7,505	11,739	14,450	17,205	19,499	20,933
C	LEWISVILLE	DALLAS	1	1	1	1	1	1	1
C	MESQUITE	DALLAS	22,317	28,676	34,293	38,813	41,474	42,395	42,668
C	OVILLA	DALLAS	53	75	109	158	230	338	496
C	RICHARDSON	DALLAS	22,366	25,458	25,535	25,443	25,167	24,984	24,984
C	ROCKETT SUD	DALLAS	245	326	399	439	481	536	616
C	ROWLETT	DALLAS	6,966	10,708	13,657	15,507	17,029	18,230	19,275
C	SACHSE	DALLAS	1,677	2,302	2,850	3,309	3,699	4,086	4,436
C	SARDIS-LONE ELM WSC	DALLAS	8	8	7	7	7	7	7
C	SEAGOVILLE	DALLAS	1,599	2,462	2,747	3,032	3,312	3,567	3,842
C	SUNNYVALE	DALLAS	977	1,770	2,454	3,135	3,820	4,514	4,618
C	UNIVERSITY PARK	DALLAS	6,714	7,286	7,371	7,407	7,407	7,439	7,483
C	WILMER	DALLAS	369	641	899	1,035	1,223	1,631	2,563
C	WYLIE	DALLAS	51	114	178	224	265	303	337
		DALLAS TOTAL	**565,147**	**652,093**	**720,675**	**763,391**	**805,182**	**873,942**	**974,789**
C	ARGYLE	DENTON	713	2,316	3,877	4,867	5,358	5,918	6,474
C	ARGYLE WSC	DENTON	847	848	840	827	813	809	809
C	AUBREY	DENTON	173	462	855	1,373	1,819	2,445	3,285
C	BARTONVILLE	DENTON	176	941	2,095	2,917	3,438	3,646	3,750
C	BARTONVILLE WSC	DENTON	265	307	347	380	410	439	466
C	BOLIVAR WSC	DENTON	621	887	1,221	2,782	6,138	9,975	13,504
C	CARROLLTON	DENTON	12,650	15,083	15,373	15,980	16,282	16,522	16,686
C	COPPELL	DENTON	51	104	143	176	204	228	248
C	COPPER CANYON	DENTON	304	396	540	800	1,176	1,375	1,480
C	CORINTH	DENTON	2,550	3,767	4,681	5,383	6,085	6,519	6,845
C	COUNTY-OTHER	DENTON	4,564	7,218	9,008	10,727	12,341	13,971	15,649
C	CROSS ROADS	DENTON	273	575	1,267	2,056	3,430	5,341	6,669
C	DALLAS	DENTON	6,537	7,783	8,271	8,460	8,535	8,571	8,606
C	DENTON	DENTON	17,050	29,561	39,901	49,566	58,158	71,679	98,275
C	DENTON COUNTY FWSD #1A	DENTON	391	991	1,581	2,132	2,704	3,286	3,894
C	DOUBLE OAK	DENTON	488	668	729	769	812	854	900
C	FLOWER MOUND	DENTON	11,245	16,919	22,280	25,987	29,757	32,085	33,661
C	FORT WORTH	DENTON	11	1,182	6,956	10,333	14,780	21,496	28,284
C	FRISCO	DENTON	1,109	15,674	18,174	29,079	33,705	37,010	38,166
C	HACKBERRY	DENTON	74	142	210	275	304	319	326
C	HEBRON	DENTON	204	220	334	549	1,087	1,630	1,760
C	HICKORY CREEK	DENTON	251	529	825	1,005	1,219	1,600	2,057
C	HIGHLAND VILLAGE	DENTON	2,795	3,394	3,722	3,902	3,986	4,037	4,086
C	JUSTIN	DENTON	316	501	863	1,376	2,249	2,745	3,029
C	KRUGERVILLE	DENTON	85	162	181	204	263	339	486
C	KRUM	DENTON	259	469	661	807	1,066	1,371	1,752
C	LAKE DALLAS	DENTON	912	1,230	1,478	1,591	1,671	1,722	1,766
C	LEWISVILLE	DENTON	14,541	20,836	25,659	29,285	31,665	33,324	35,229
C	LINCOLN PARK	DENTON	71	132	195	246	298	353	410
C	LITTLE ELM	DENTON	662	5,441	8,289	9,785	9,785	9,785	9,785
C	MUSTANG WSC	DENTON	442	921	1,474	1,939	2,399	2,881	3,385
C	NORTHLAKE	DENTON	126	786	934	1,796	2,658	3,197	3,443
C	OAK POINT	DENTON	217	511	838	1,097	1,354	1,623	1,904
C	PILOT POINT	DENTON	483	1,210	1,670	1,895	2,069	2,195	2,335
C	PLANO	DENTON	614	1,547	2,160	2,165	2,170	2,176	2,189
C	PONDER	DENTON	181	621	1,714	3,416	5,466	6,320	6,491
C	PROSPER	DENTON	0	500	2,160	3,779	5,669	6,209	6,749
C	ROANOKE	DENTON	611	1,177	1,897	2,957	4,016	5,354	6,450
C	SANGER	DENTON	741	2,206	2,765	3,277	3,883	4,355	4,537

Table G-1
Region C Adopted Municipal Water Demand Projections (in Acre-Feet[1])

REGION	WUG NAME	COUNTY NAME[2]	2000 Census	Demand Projections for 2010	2020	2030	2040	2050	2060
C	SHADY SHORES	DENTON	185	306	436	524	617	710	811
C	SOUTHLAKE	DENTON	136	333	663	991	1,317	1,910	1,976
C	THE COLONY	DENTON	2,912	5,178	6,586	7,269	7,427	7,580	7,648
C	TROPHY CLUB	DENTON	2,226	2,693	3,017	3,289	3,530	3,801	4,073
		DENTON TOTAL	**89,062**	**156,727**	**206,870**	**258,013**	**302,113**	**347,705**	**400,328**
C	BARDWELL	ELLIS	62	103	130	155	182	213	248
C	BRANDON-IRENE WSC	ELLIS	9	10	11	11	12	13	15
C	BUENA VISTA - BETHEL SUD	ELLIS	407	553	669	725	819	937	1,079
C	CEDAR HILL	ELLIS	9	8	8	8	8	8	8
C	COMMUNITY WATER COMPANY	ELLIS	71	116	171	201	230	264	304
C	COUNTY-OTHER	ELLIS	2,039	2,015	2,003	1,979	1,967	1,955	1,955
C	ENNIS	ELLIS	2,804	3,497	4,358	5,504	6,949	8,834	11,308
C	FERRIS	ELLIS	334	331	324	317	309	305	305
C	FILES VALLEY WSC	ELLIS	131	143	153	163	173	186	201
C	GLENN HEIGHTS	ELLIS	207	328	440	546	657	779	921
C	GRAND PRAIRIE	ELLIS	8	75	342	844	1,408	2,066	2,916
C	ITALY	ELLIS	205	282	330	362	397	439	489
C	JOHNSON COUNTY SUD	ELLIS	28	42	55	69	86	104	122
C	MANSFIELD	ELLIS	31	122	271	469	728	1,076	1,532
C	MAYPEARL	ELLIS	112	145	142	140	137	135	135
C	MIDLOTHIAN	ELLIS	1,609	2,834	4,448	6,544	7,933	9,207	10,170
C	MILFORD	ELLIS	79	86	84	81	79	77	77
C	MOUNTAIN PEAK WSC	ELLIS	802	1,207	1,337	1,409	1,607	1,975	2,452
C	OAK LEAF	ELLIS	199	338	393	448	503	567	640
C	OVILLA	ELLIS	664	1,016	1,347	1,666	1,853	1,853	1,853
C	PALMER	ELLIS	205	239	250	259	267	282	302
C	PECAN HILL	ELLIS	111	160	183	205	228	254	285
C	RED OAK	ELLIS	752	1,104	1,389	1,638	1,898	2,186	2,517
C	RICE WSC	ELLIS	74	127	165	204	242	288	338
C	ROCKETT SUD	ELLIS	2,986	3,992	4,786	5,151	5,800	6,609	7,607
C	SARDIS-LONE ELM WSC	ELLIS	1,322	1,673	1,705	1,698	1,868	2,218	2,688
C	VENUS	ELLIS	0	0	0	0	0	0	0
C	WAXAHACHIE	ELLIS	4,560	6,462	8,151	10,330	13,090	16,672	21,341
		ELLIS TOTAL	**19,820**	**27,008**	**33,645**	**41,126**	**49,430**	**59,502**	**71,808**
C	BONHAM	FANNIN	2,406	2,735	2,950	3,710	5,076	6,889	8,496
C	COUNTY-OTHER	FANNIN	1,519	1,496	1,452	1,390	1,317	1,251	1,202
C	ECTOR	FANNIN	90	96	99	101	102	104	107
C	HICKORY CREEK SUD	FANNIN	26	30	32	34	34	36	38
C	HONEY GROVE	FANNIN	329	421	438	459	482	511	544
C	LADONIA	FANNIN	245	546	577	715	779	879	1,055
C	LEONARD	FANNIN	220	303	342	466	720	1,040	1,299
C	NORTH HUNT WSC	FANNIN	41	49	55	60	63	66	70
C	SAVOY	FANNIN	96	108	108	106	105	107	109
C	SOUTHWEST FANNIN COUNTY SUD	FANNIN	235	492	764	907	1,006	1,091	1,186
C	TRENTON	FANNIN	139	206	302	496	780	1,163	1,550
C	WHITEWRIGHT	FANNIN	3	5	6	7	7	8	9
		FANNIN TOTAL	**5,349**	**6,487**	**7,125**	**8,451**	**10,471**	**13,145**	**15,665**
C	COUNTY-OTHER	FREESTONE	**1,222**	**1,251**	**1,271**	**1,265**	**1,240**	**1,229**	**1,229**
C	FAIRFIELD	FREESTONE	707	1,120	1,208	1,297	1,383	1,482	1,588
C	FLO COMMUNITY WSC	FREESTONE	20	20	20	20	20	19	19
C	TEAGUE	FREESTONE	378	536	720	773	839	906	982
C	WORTHAM	FREESTONE	144	246	253	255	252	251	251
		FREESTONE TOTAL	**2,471**	**3,173**	**3,472**	**3,610**	**3,734**	**3,887**	**4,069**
C	BELLS	GRAYSON	163	238	296	348	404	456	493
C	COLLINSVILLE	GRAYSON	172	324	441	558	666	780	899
C	COUNTY-OTHER	GRAYSON	3,538	3,468	3,393	3,263	3,016	2,753	2,461
C	DENISON	GRAYSON	5,102	5,489	6,053	6,385	6,493	6,667	6,875
C	GUNTER	GRAYSON	165	407	666	786	902	1,022	1,149
C	GUNTER RURAL WSC	GRAYSON	28	99	145	190	259	412	588

Table G-1
Region C Adopted Municipal Water Demand Projections (in Acre-Feet[(1)])

REGION	WUG NAME	COUNTY NAME[(2)]	2000 Census	Demand Projections for 2010	2020	2030	2040	2050	2060
C	HOWE	GRAYSON	327	593	918	1,193	1,355	1,499	1,655
C	LUELLA WSC	GRAYSON	335	489	535	565	582	592	672
C	POTTSBORO	GRAYSON	253	504	851	1,176	1,492	1,811	1,976
C	SHERMAN	GRAYSON	8,724	10,081	12,135	13,660	15,382	17,787	21,238
C	SOUTH GRAYSON WSC	GRAYSON	71	169	264	342	434	538	672
C	SOUTHMAYD	GRAYSON	128	199	366	455	529	594	652
C	SOUTHWEST FANNIN COUNTY SUD	GRAYSON	32	38	46	47	46	46	46
C	TIOGA	GRAYSON	103	192	428	588	663	725	757
C	TOM BEAN	GRAYSON	224	311	348	388	405	426	448
C	TWO WAY SUD	GRAYSON	351	565	802	968	1,144	1,315	1,497
C	VAN ALSTYNE	GRAYSON	378	966	2,341	3,159	3,561	3,875	4,022
C	WHITESBORO	GRAYSON	603	1,042	1,277	1,429	1,524	1,594	1,636
C	WHITEWRIGHT	GRAYSON	348	549	757	958	1,152	1,354	1,563
C	WOODBINE WSC	GRAYSON	11	13	13	13	13	13	13
		GRAYSON TOTAL	**21,056**	**25,736**	**32,075**	**36,471**	**40,022**	**44,259**	**49,312**
C	ATHENS	HENDERSON	2,069	2,693	3,169	3,739	4,392	5,248	6,306
C	BETHEL-ASH WSC	HENDERSON	139	163	194	222	253	290	342
C	COUNTY-OTHER	HENDERSON	268	262	257	253	248	246	246
C	EAST CEDAR CREEK FWSD	HENDERSON	1,821	2,319	2,853	3,402	3,931	4,631	5,516
C	EUSTACE	HENDERSON	118	149	161	172	183	199	221
C	GUN BARREL CITY	HENDERSON	738	1,257	1,452	1,637	1,841	2,089	2,416
C	LOG CABIN	HENDERSON	71	96	128	144	142	141	141
C	MABANK	HENDERSON	60	74	78	82	87	93	101
C	MALAKOFF	HENDERSON	316	420	437	453	468	494	532
C	PAYNE SPRINGS	HENDERSON	149	165	174	182	191	203	220
C	SEVEN POINTS	HENDERSON	140	174	205	234	266	304	355
C	TOOL	HENDERSON	331	405	452	500	548	610	695
C	TRINIDAD	HENDERSON	156	183	183	183	181	184	190
C	VIRGINIA HILL WSC	HENDERSON	353	393	384	375	366	361	364
C	WEST CEDAR CREEK MUD	HENDERSON	896	1,280	1,803	2,199	2,527	2,952	3,489
		HENDERSON TOTAL (P)	**7,625**	**10,033**	**11,930**	**13,777**	**15,624**	**18,045**	**21,134**
C	BRYSON	JACK	77	96	97	96	94	94	94
C	COUNTY-OTHER	JACK	423	549	600	647	686	736	793
C	JACKSBORO	JACK	640	688	699	697	686	680	680
		JACK TOTAL	**1,140**	**1,333**	**1,396**	**1,440**	**1,466**	**1,510**	**1,567**
C	ABLE SPRINGS WSC	KAUFMAN	276	512	783	976	1,195	1,478	1,828
C	COLLEGE MOUND WSC	KAUFMAN	570	873	1,329	1,820	2,133	2,517	3,019
C	COMBINE	KAUFMAN	116	182	230	269	315	372	447
C	COMBINE WSC	KAUFMAN	149	306	467	605	756	949	1,189
C	COUNTY-OTHER	KAUFMAN	1,594	2,182	2,166	2,150	2,133	2,117	2,117
C	CRANDALL	KAUFMAN	435	730	1,004	1,258	1,544	1,909	2,362
C	DALLAS	KAUFMAN	0	0	0	0	0	0	0
C	FORNEY	KAUFMAN	814	1,936	4,033	4,973	5,763	6,422	7,048
C	FORNEY LAKE WSC	KAUFMAN	98	2,228	2,366	2,448	2,527	2,618	2,723
C	GASTONIA-SCURRY	KAUFMAN	483	842	1,199	1,370	1,629	1,983	2,421
C	HIGH POINT WSC	KAUFMAN	326	507	717	851	1,005	1,194	1,441
C	KAUFMAN	KAUFMAN	821	1,156	1,716	2,013	2,264	2,511	3,029
C	KEMP	KAUFMAN	170	181	178	174	170	168	168
C	MABANK	KAUFMAN	345	517	621	725	846	996	1,187
C	MAC BEE WSC	KAUFMAN	26	36	45	54	65	78	94
C	MESQUITE	KAUFMAN	0	0	1	1	1	1	2
C	OAK GROVE	KAUFMAN	66	124	148	172	201	236	283
C	SEAGOVILLE	KAUFMAN	1	3	4	5	7	9	11
C	TALTY	KAUFMAN	364	863	1,348	1,849	2,404	3,091	3,943
C	TERRELL	KAUFMAN	3,185	3,575	4,302	4,926	5,325	5,735	6,372
C	WEST CEDAR CREEK MUD	KAUFMAN	437	904	1,497	2,028	2,545	3,208	4,031
		KAUFMAN TOTAL	**10,276**	**17,657**	**24,154**	**28,667**	**32,828**	**37,592**	**43,715**
C	BLOOMING GROVE	NAVARRO	152	149	146	144	141	139	139
C	BRANDON-IRENE WSC	NAVARRO	26	27	28	30	31	33	36
C	CHATFIELD WSC	NAVARRO	285	539	812	982	1,153	1,378	1,655

Table G-1
Region C Adopted Municipal Water Demand Projections (in Acre-Feet[1])

REGION	WUG NAME	COUNTY NAME[2]	2000 Census	Demand Projections for 2010	2020	2030	2040	2050	2060
C	COMMUNITY WATER COMPANY	NAVARRO	71	106	157	193	237	293	366
C	CORSICANA	NAVARRO	5,705	5,835	6,006	6,179	6,366	6,667	7,076
C	COUNTY-OTHER	NAVARRO	256	250	244	239	233	229	229
C	DAWSON	NAVARRO	147	177	185	195	204	219	238
C	FROST	NAVARRO	80	87	91	95	98	105	114
C	KERENS	NAVARRO	405	399	394	388	382	378	378
C	M E N WSC	NAVARRO	280	441	471	510	542	571	621
C	NAVARRO MILLS WSC	NAVARRO	247	342	481	585	724	896	1,120
C	RICE	NAVARRO	195	229	265	304	347	398	463
C	RICE WSC	NAVARRO	577	818	1,002	1,205	1,408	1,678	2,009
		NAVARRO TOTAL	**8,426**	**9,399**	**10,282**	**11,049**	**11,866**	**12,984**	**14,444**
C	ALEDO	PARKER	273	439	591	744	879	1,029	1,195
C	ANNETTA	PARKER	130	195	236	272	302	333	370
C	ANNETTA SOUTH	PARKER	71	87	100	110	119	128	140
C	AZLE	PARKER	228	353	438	533	614	708	811
C	COUNTY-OTHER	PARKER	5,066	4,785	4,618	4,663	4,634	4,357	4,124
C	FORT WORTH	PARKER	0	2,836	12,057	18,370	20,920	23,758	26,021
C	HUDSON OAKS	PARKER	193	361	511	674	817	980	1,163
C	MINERAL WELLS	PARKER	427	766	753	744	730	726	726
C	RENO	PARKER	271	319	321	322	321	327	337
C	SPRINGTOWN	PARKER	314	504	659	807	961	1,113	1,272
C	WALNUT CREEK SUD	PARKER	1,271	2,017	2,562	2,975	3,342	3,762	4,222
C	WEATHERFORD	PARKER	3,895	5,209	6,448	7,607	8,554	9,561	10,741
C	WILLOW PARK	PARKER	482	627	758	914	1,049	1,188	1,348
		PARKER TOTAL	**12,621**	**18,498**	**30,052**	**38,735**	**43,242**	**47,970**	**52,470**
C	BLACKLAND WSC	ROCKWALL	277	479	694	835	990	1,183	1,410
C	CASH SUD	ROCKWALL	54	82	111	136	162	194	231
C	COUNTY-OTHER	ROCKWALL	207	385	385	385	383	383	383
C	DALLAS	ROCKWALL	6	6	6	6	6	6	6
C	EAST FORK SUD	ROCKWALL	9	8	8	8	8	8	8
C	FORNEY LAKE WSC	ROCKWALL	80	1,747	2,366	2,448	2,527	2,618	2,723
C	HEATH	ROCKWALL	995	1,757	2,562	3,199	3,879	4,699	5,660
C	HIGH POINT WSC	ROCKWALL	26	49	76	93	112	134	160
C	LAVON WSC	ROCKWALL	141	334	584	755	937	1,159	1,419
C	MCLENDON-CHISHOLM	ROCKWALL	145	194	246	290	339	396	467
C	MT ZION WSC	ROCKWALL	350	442	641	709	774	842	866
C	R-C-H WSC	ROCKWALL	380	410	440	468	495	533	583
C	ROCKWALL	ROCKWALL	4,450	8,423	14,971	19,167	21,507	22,075	22,075
C	ROWLETT	ROCKWALL	1,309	1,575	1,661	1,647	1,639	1,630	1,630
C	ROYSE CITY	ROCKWALL	565	2,422	4,373	4,283	5,275	6,210	6,315
C	WYLIE	ROCKWALL	52	133	225	292	364	451	479
		ROCKWALL TOTAL	**9,046**	**18,446**	**29,349**	**34,721**	**39,397**	**42,521**	**44,415**
C	ARLINGTON	TARRANT	61,541	79,508	90,961	96,159	98,013	99,402	100,376
C	AZLE	TARRANT	1,170	1,600	2,195	3,069	4,083	5,141	6,049
C	BEDFORD	TARRANT	9,824	10,138	10,447	10,665	10,808	11,017	11,246
C	BENBROOK	TARRANT	4,776	4,893	5,685	6,721	7,984	9,489	11,254
C	BETHESDA WSC	TARRANT	1,184	1,530	1,850	2,182	2,542	2,970	3,501
C	BLUE MOUND	TARRANT	259	297	300	294	286	283	283
C	BURLESON	TARRANT	582	799	989	1,190	1,397	1,653	1,967
C	COLLEYVILLE	TARRANT	5,873	8,681	9,471	9,762	9,873	9,898	9,922
C	COMMUNITY WSC	TARRANT	400	426	421	416	406	410	419
C	COUNTY-OTHER	TARRANT	3,535	3,482	3,402	3,348	3,268	3,241	3,241
C	CROWLEY	TARRANT	1,179	1,361	1,614	2,023	2,703	3,246	3,528
C	DALWORTHINGTON GARDENS	TARRANT	693	771	816	847	862	874	884
C	EDGECLIFF	TARRANT	451	460	451	443	434	428	428
C	EULESS	TARRANT	8,194	9,698	10,760	11,158	11,308	11,377	11,448
C	EVERMAN	TARRANT	699	808	859	906	948	1,007	1,018
C	FOREST HILL	TARRANT	1,508	1,783	1,892	1,997	2,122	2,285	2,399
C	FORT WORTH	TARRANT	128,760	145,105	160,989	186,973	226,002	283,575	357,224
C	GRAND PRAIRIE	TARRANT	4,734	6,077	7,328	8,108	8,620	8,927	9,165

Table G-1
Region C Adopted Municipal Water Demand Projections (in Acre-Feet[1])

REGION	WUG NAME	COUNTY NAME[2]	2000 Census	Demand Projections for 2010	2020	2030	2040	2050	2060
C	GRAPEVINE	TARRANT	10,506	13,518	15,729	16,886	17,662	18,243	18,713
C	HALTOM CITY	TARRANT	6,381	7,135	7,835	8,142	8,231	8,272	8,324
C	HASLET	TARRANT	199	412	811	1,411	1,404	1,404	1,404
C	HURST	TARRANT	7,151	7,524	7,850	8,014	8,070	8,156	8,247
C	JOHNSON COUNTY SUD	TARRANT	308	419	532	656	799	976	1,154
C	KELLER	TARRANT	6,340	9,160	10,829	10,775	10,667	10,667	10,667
C	KENNEDALE	TARRANT	1,081	1,346	1,594	1,756	1,867	1,937	1,992
C	LAKE WORTH	TARRANT	859	930	1,010	1,102	1,190	1,290	1,344
C	LAKESIDE	TARRANT	377	447	512	580	652	740	846
C	MANSFIELD	TARRANT	6,478	13,218	19,132	24,397	29,695	32,934	32,934
C	NORTH RICHLAND HILLS	TARRANT	10,158	12,496	13,832	14,753	15,300	15,693	16,022
C	PANTEGO	TARRANT	657	649	641	634	626	621	621
C	PELICAN BAY	TARRANT	113	157	202	253	274	302	339
C	RICHLAND HILLS	TARRANT	1,120	1,327	1,381	1,441	1,511	1,558	1,580
C	RIVER OAKS	TARRANT	1,025	1,010	986	954	931	923	923
C	SAGINAW	TARRANT	2,107	2,885	3,540	3,942	4,240	4,448	4,618
C	SANSOM PARK VILLAGE	TARRANT	576	603	609	609	605	608	615
C	SOUTHLAKE	TARRANT	6,589	11,504	13,774	14,916	15,476	15,791	15,954
C	WATAUGA	TARRANT	2,920	3,437	3,532	3,584	3,603	3,657	3,723
C	WESTOVER HILLS	TARRANT	279	276	274	272	270	268	268
C	WESTWORTH VILLAGE	TARRANT	183	244	287	297	308	328	362
C	WHITE SETTLEMENT	TARRANT	2,425	2,531	2,647	2,818	2,831	3,031	3,253
		TARRANT TOTAL	**303,194**	**368,645**	**417,969**	**464,453**	**517,871**	**587,070**	**668,255**
C	ALVORD	WISE	122	172	185	197	211	227	249
C	AURORA	WISE	106	136	157	177	198	221	250
C	BOLIVAR WSC	WISE	142	187	238	303	440	612	918
C	BOYD	WISE	162	215	278	298	291	288	288
C	BRIDGEPORT	WISE	835	1,570	1,899	2,702	3,187	3,713	4,444
C	CHICO	WISE	130	208	235	276	333	405	495
C	COMMUNITY WSC	WISE	17	18	17	17	16	16	16
C	COUNTY-OTHER	WISE	2,751	3,843	4,344	4,304	4,223	4,183	4,183
C	DECATUR	WISE	1,159	1,639	2,011	2,748	3,537	4,580	5,385
C	FORT WORTH	WISE	0	473	2,319	3,215	4,093	5,430	6,788
C	NEW FAIRVIEW	WISE	112	201	272	340	409	488	579
C	NEWARK	WISE	100	154	232	301	418	564	787
C	RHOME	WISE	136	575	1,119	1,592	2,036	2,431	2,914
C	RUNAWAY BAY	WISE	237	321	390	455	521	595	685
C	WALNUT CREEK SUD	WISE	157	247	312	372	433	506	590
C	WEST WISE SUD	WISE	451	497	536	571	609	656	717
		WISE TOTAL	**6,617**	**10,456**	**14,544**	**17,868**	**20,955**	**24,915**	**29,288**
		Region C TOTAL	**1,196,451**	**1,534,702**	**1,828,830**	**2,060,117**	**2,294,490**	**2,574,264**	**2,915,772**

[1] An acft is an amount of water to cover one acre with one foot of water and equals 325,851 gallons.
[2] If the "(P)" is present for a county entry, then the county has been split by Regional boundaries and the data listed in the row represent only the county's water demands within the particular region, not the county's total.

Projections last updated on 7/26/04

Table G-2
Region C Adopted Municipal Water Demand Projections (In Acre-Feet[1])

REGION	WUG NAME	COUNTY NAME[2]	2000 Census	Projected Demands for 2010	2020	2030	2040	2050	2060
C	AZLE	PARKER	228	353	438	533	614	708	811
C	AZLE	TARRANT	1,170	1,600	2,195	3,069	4,083	5,141	6,049
	AZLE TOTAL		**1,398**	**1,953**	**2,633**	**3,602**	**4,697**	**5,849**	**6,860**
C	BOLIVAR WSC	COOKE	171	205	244	286	285	285	285
C	BOLIVAR WSC	DENTON	621	887	1,221	2,782	6,138	9,975	13,504
C	BOLIVAR WSC	WISE	142	187	238	303	440	612	918
	BOLIVAR WSC TOTAL		**934**	**1,279**	**1,703**	**3,371**	**6,863**	**10,872**	**14,707**
C	BRANDON-IRENE WSC	ELLIS	9	10	11	11	12	13	15
C	BRANDON-IRENE WSC	NAVARRO	26	27	28	30	31	33	36
	BRANDON-IRENE WSC TOTAL		**35**	**37**	**39**	**41**	**43**	**46**	**51**
C	CARROLLTON	DALLAS	10,548	10,804	10,740	10,792	10,783	10,834	10,946
C	CARROLLTON	DENTON	12,650	15,083	15,373	15,980	16,282	16,522	16,686
	CARROLLTON TOTAL		**23,198**	**25,887**	**26,113**	**26,772**	**27,065**	**27,356**	**27,632**
C	CEDAR HILL	DALLAS	5,707	7,971	9,992	11,741	13,088	14,350	15,409
C	CEDAR HILL	ELLIS	9	8	8	8	8	8	8
	CEDAR HILL TOTAL		**5,716**	**7,979**	**10,000**	**11,749**	**13,096**	**14,358**	**15,417**
C	COMBINE	DALLAS	62	100	126	136	148	165	188
C	COMBINE	KAUFMAN	116	182	230	269	315	372	447
	COMBINE TOTAL		**178**	**282**	**356**	**405**	**463**	**537**	**635**
C	COMBINE WSC	DALLAS	88	156	221	250	279	319	373
C	COMBINE WSC	KAUFMAN	149	306	467	605	756	949	1,189
	COMBINE WSC TOTAL		**237**	**462**	**688**	**855**	**1,035**	**1,268**	**1,562**
C	COMMUNITY WATER COMPANY	ELLIS	71	116	171	201	230	264	304
C	COMMUNITY WATER COMPANY	NAVARRO	71	106	157	193	237	293	366
	COMMUNITY WATER COMPANY TOTAL		**142**	**222**	**328**	**394**	**467**	**557**	**670**
C	COMMUNITY WSC	TARRANT	400	426	421	416	406	410	419
C	COMMUNITY WSC	WISE	17	18	17	17	16	16	16
	COMMUNITY WSC TOTAL		**417**	**444**	**438**	**433**	**422**	**426**	**435**
C	COPPELL	DALLAS	8,126	10,036	9,947	9,857	9,812	9,768	9,768
C	COPPELL	DENTON	51	104	143	176	204	228	248
	COPPELL TOTAL		**8,177**	**10,140**	**10,090**	**10,033**	**10,016**	**9,996**	**10,016**
C	DALLAS	COLLIN	13,252	16,717	18,471	19,399	19,921	20,240	20,819
C	DALLAS	DALLAS	329,027	365,042	399,346	414,694	431,629	477,217	560,935
C	DALLAS	DENTON	6,537	7,783	8,271	8,460	8,535	8,571	8,606
C	DALLAS	KAUFMAN	0	0	0	0	0	0	0
C	DALLAS	ROCKWALL	6	6	6	6	6	6	6
	DALLAS TOTAL		**348,822**	**389,548**	**426,094**	**442,559**	**460,091**	**506,034**	**590,366**
C	EAST FORK SUD	COLLIN	428	555	705	835	972	1,114	1,273
C	EAST FORK SUD	DALLAS	113	115	118	120	123	126	132
C	EAST FORK SUD	ROCKWALL	9	8	8	8	8	8	8
	EAST FORK SUD TOTAL		**550**	**678**	**831**	**963**	**1,103**	**1,248**	**1,413**
C	FORNEY LAKE WSC	KAUFMAN	98	2,228	2,366	2,448	2,527	2,618	2,723
C	FORNEY LAKE WSC	ROCKWALL	80	1,747	2,366	2,448	2,527	2,618	2,723
	FORNEY LAKE WSC TOTAL		**178**	**3,975**	**4,732**	**4,896**	**5,054**	**5,236**	**5,446**

Table G-2
Region C Adopted Municipal Water Demand Projections (In Acre-Feet[1])

REGION	WUG NAME	COUNTY NAME[2]	2000 Census	Projected Demands for 2010	2020	2030	2040	2050	2060
C	FORT WORTH	DENTON	11	1,182	6,956	10,333	14,780	21,496	28,284
C	FORT WORTH	PARKER	0	2,836	12,057	18,370	20,920	23,758	26,021
C	FORT WORTH	TARRANT	128,760	145,105	160,989	186,973	226,002	283,575	357,224
C	FORT WORTH	WISE	0	473	2,319	3,215	4,093	5,430	6,788
	FORT WORTH TOTAL		**128,771**	**149,596**	**182,321**	**218,891**	**265,795**	**334,259**	**418,317**
C	FRISCO	COLLIN	9,881	29,941	47,914	51,549	55,184	58,819	60,967
C	FRISCO	DENTON	1,109	15,674	18,174	29,079	33,705	37,010	38,166
	FRISCO TOTAL		**10,990**	**45,615**	**66,088**	**80,628**	**88,889**	**95,829**	**99,133**
C	GARLAND	COLLIN	0	0	0	0	0	0	0
C	GARLAND	DALLAS	38,429	42,911	45,702	48,139	50,151	52,087	52,087
	GARLAND TOTAL		**38,429**	**42,911**	**45,702**	**48,139**	**50,151**	**52,087**	**52,087**
C	GLENN HEIGHTS	DALLAS	724	903	1,079	1,234	1,382	1,516	1,652
C	GLENN HEIGHTS	ELLIS	207	328	440	546	657	779	921
	GLENN HEIGHTS TOTAL		**931**	**1,231**	**1,519**	**1,780**	**2,039**	**2,295**	**2,573**
C	GRAND PRAIRIE	DALLAS	17,097	23,024	26,915	31,149	36,757	43,204	50,107
C	GRAND PRAIRIE	ELLIS	8	75	342	844	1,408	2,066	2,916
C	GRAND PRAIRIE	TARRANT	4,734	6,077	7,328	8,108	8,620	8,927	9,165
	GRAND PRAIRIE TOTAL		**21,839**	**29,176**	**34,585**	**40,101**	**46,785**	**54,197**	**62,188**
C	GRAPEVINE	DALLAS	0	0	0	0	0	0	0
C	GRAPEVINE	TARRANT	10,506	13,518	15,729	16,886	17,662	18,243	18,713
	GRAPEVINE TOTAL		**10,506**	**13,518**	**15,729**	**16,886**	**17,662**	**18,243**	**18,713**
C	GUNTER RURAL WSC	COLLIN	310	554	726	837	997	1,173	1,360
C	GUNTER RURAL WSC	GRAYSON	28	99	145	190	259	412	588
	GUNTER RURAL WSC TOTAL		**338**	**653**	**871**	**1,027**	**1,256**	**1,585**	**1,948**
C	HICKORY CREEK SUD	COLLIN	9	12	16	19	22	25	29
C	HICKORY CREEK SUD	FANNIN	26	30	32	34	34	36	38
	HICKORY CREEK SUD TOTAL		**35**	**42**	**48**	**53**	**56**	**61**	**67**
C	HIGH POINT WSC	KAUFMAN	326	507	717	851	1,005	1,194	1,441
C	HIGH POINT WSC	ROCKWALL	26	49	76	93	112	134	160
	HIGH POINT WSC TOTAL		**352**	**556**	**793**	**944**	**1,117**	**1,328**	**1,601**
C	JOHNSON COUNTY SUD	ELLIS	28	42	55	69	86	104	122
C	JOHNSON COUNTY SUD	TARRANT	308	419	532	656	799	976	1,154
	JOHNSON COUNTY SUD		**336**	**461**	**587**	**725**	**885**	**1,080**	**1,276**
C	LAVON WSC	COLLIN	217	368	584	847	1,678	2,637	3,596
C	LAVON WSC	ROCKWALL	141	334	584	755	937	1,159	1,419
	LAVON WSC TOTAL		**358**	**702**	**1,168**	**1,602**	**2,615**	**3,796**	**5,015**
C	LEWISVILLE	DALLAS	1	1	1	1	1	1	1
C	LEWISVILLE	DENTON	14,541	20,836	25,659	29,285	31,665	33,324	35,229
	LEWISVILLE TOTAL		**14,542**	**20,837**	**25,660**	**29,286**	**31,666**	**33,325**	**35,230**
C	MABANK	HENDERSON	60	74	78	82	87	93	101
C	MABANK	KAUFMAN	345	517	621	725	846	996	1,187
	MABANK TOTAL		**405**	**591**	**699**	**807**	**933**	**1,089**	**1,288**
C	MANSFIELD	ELLIS	31	122	271	469	728	1,076	1,532
C	MANSFIELD	TARRANT	6,478	13,218	19,132	24,397	29,695	32,934	32,934
	MANSFIELD TOTAL		**6,509**	**13,340**	**19,403**	**24,866**	**30,423**	**34,010**	**34,466**
C	MESQUITE	DALLAS	22,317	28,676	34,293	38,813	41,474	42,395	42,668
C	MESQUITE	KAUFMAN	0	0	1	1	1	1	2
	MESQUITE TOTAL		**22,317**	**28,676**	**34,294**	**38,814**	**41,475**	**42,396**	**42,670**

Table G-2
Region C Adopted Municipal Water Demand Projections (In Acre-Feet[1])

REGION	WUG NAME	COUNTY NAME[2]	2000 Census	Projected Demands for 2010	2020	2030	2040	2050	2060
C	OVILLA	DALLAS	53	75	109	158	230	338	496
C	OVILLA	ELLIS	664	1,016	1,347	1,666	1,853	1,853	1,853
	OVILLA TOTAL		**717**	**1,091**	**1,456**	**1,824**	**2,083**	**2,191**	**2,349**
C	PLANO	COLLIN	63,055	70,892	72,920	75,153	77,640	80,105	82,880
C	PLANO	DENTON	614	1,547	2,160	2,165	2,170	2,176	2,189
	PLANO TOTAL		**63,669**	**72,439**	**75,080**	**77,318**	**79,810**	**82,281**	**85,069**
C	PROSPER	COLLIN	460	1,998	7,289	10,528	11,878	12,688	13,498
C	PROSPER	DENTON	0	500	2,160	3,779	5,669	6,209	6,749
	PROSPER TOTAL		**460**	**2,498**	**9,449**	**14,307**	**17,547**	**18,897**	**20,247**
C	RICE WSC	ELLIS	74	127	165	204	242	288	338
C	RICE WSC	NAVARRO	577	818	1,002	1,205	1,408	1,678	2,009
	RICE WSC TOTAL		**651**	**945**	**1,167**	**1,409**	**1,650**	**1,966**	**2,347**
C	RICHARDSON	COLLIN	6,625	6,925	10,588	10,550	10,435	10,359	10,359
C	RICHARDSON	DALLAS	22,366	25,458	25,535	25,443	25,167	24,984	24,984
	RICHARDSON TOTAL		**28,991**	**32,383**	**36,123**	**35,993**	**35,602**	**35,343**	**35,343**
C	ROCKETT SUD	DALLAS	245	326	399	439	481	536	616
C	ROCKETT SUD	ELLIS	2,986	3,992	4,786	5,151	5,800	6,609	7,607
	ROCKETT SUD TOTAL		**3,231**	**4,318**	**5,185**	**5,590**	**6,281**	**7,145**	**8,223**
C	ROWLETT	DALLAS	6,966	10,708	13,657	15,507	17,029	18,230	19,275
C	ROWLETT	ROCKWALL	1,309	1,575	1,661	1,647	1,639	1,630	1,630
	ROWLETT TOTAL		**8,275**	**12,283**	**15,318**	**17,154**	**18,668**	**19,860**	**20,905**
C	ROYSE CITY	COLLIN	38	313	1,053	1,676	2,514	3,351	3,770
C	ROYSE CITY	ROCKWALL	565	2,422	4,373	4,283	5,275	6,210	6,315
	ROYSE CITY TOTAL		**603**	**2,735**	**5,426**	**5,959**	**7,789**	**9,561**	**10,085**
C	SACHSE	COLLIN	344	726	1,169	1,348	1,411	1,444	1,469
C	SACHSE	DALLAS	1,677	2,302	2,850	3,309	3,699	4,086	4,436
	SACHSE TOTAL		**2,021**	**3,028**	**4,019**	**4,657**	**5,110**	**5,530**	
C	SARDIS-LONE ELM WSC	DALLAS	8	8	7	7	7	7	7
C	SARDIS-LONE ELM WSC	ELLIS	1,322	1,673	1,705	1,698	1,868	2,218	2,688
	SARDIS-LONE ELM WSC TOTAL		**1,330**	**1,681**	**1,712**	**1,705**	**1,875**	**2,225**	**2,695**
C	SEAGOVILLE	DALLAS	1,599	2,462	2,747	3,032	3,312	3,567	3,842
C	SEAGOVILLE	KAUFMAN	1	3	4	5	7	9	11
	SEAGOVILLE TOTAL		**1,600**	**2,465**	**2,751**	**3,037**	**3,319**	**3,576**	**3,853**
C	SOUTH GRAYSON WSC	COLLIN	211	212	215	219	220	222	225
C	SOUTH GRAYSON WSC	GRAYSON	71	169	264	342	434	538	672
	SOUTH GRAYSON WSC TOTAL		**282**	**381**	**479**	**561**	**654**	**760**	**897**
C	SOUTHLAKE	DENTON	136	333	663	991	1,317	1,910	1,976
C	SOUTHLAKE	TARRANT	6,589	11,504	13,774	14,916	15,476	15,791	15,954
	SOUTHLAKE TOTAL		**6,725**	**11,837**	**14,437**	**15,907**	**16,793**	**17,701**	**17,930**
C	SOUTHWEST FANNIN COUNTY SUD	FANNIN	235	492	764	907	1,006	1,091	1,186
C	SOUTHWEST FANNIN COUNTY SUD	GRAYSON	32	38	46	47	46	46	46
	SOUTHWEST FANNIN COUNTY SUD TOTAL		**267**	**530**	**810**	**954**	**1,052**	**1,137**	**1,232**

Table G-2
Region C Adopted Municipal Water Demand Projections (In Acre-Feet[1])

REGION	WUG NAME	COUNTY NAME[2]	2000 Census	Projected Demands for 2010	2020	2030	2040	2050	2060
C	TWO WAY SUD	COOKE	8	10	11	11	11	11	11
C	TWO WAY SUD	GRAYSON	351	565	802	968	1,144	1,315	1,497
	TWO WAY SUD TOTAL		**359**	**575**	**813**	**979**	**1,155**	**1,326**	**1,508**
C	WALNUT CREEK SUD	PARKER	1,271	2,017	2,562	2,975	3,342	3,762	4,222
C	WALNUT CREEK SUD	WISE	157	247	312	372	433	506	590
	WALNUT CREEK SUD TOTAL		**1,428**	**2,264**	**2,874**	**3,347**	**3,775**	**4,268**	**4,812**
C	WEST CEDAR CREEK MUD	HENDERSON	896	1,280	1,803	2,199	2,527	2,952	3,489
C	WEST CEDAR CREEK MUD	KAUFMAN	437	904	1,497	2,028	2,545	3,208	4,031
	WEST CEDAR CREEK MUD TOTAL		**1,333**	**2,184**	**3,300**	**4,227**	**5,072**	**6,160**	**7,520**
C	WHITEWRIGHT	FANNIN	3	5	6	7	7	8	9
C	WHITEWRIGHT	GRAYSON	348	549	757	958	1,152	1,354	1,563
	WHITEWRIGHT TOTAL		**351**	**554**	**763**	**965**	**1,159**	**1,362**	**1,572**
C	WOODBINE WSC	COOKE	547	656	699	749	789	842	902
C	WOODBINE WSC	GRAYSON	11	13	13	13	13	13	13
	WOODBINE WSC TOTAL		**558**	**669**	**712**	**762**	**802**	**855**	**915**
C	WYLIE	COLLIN	2,406	6,615	10,351	12,837	17,877	18,729	20,467
C	WYLIE	DALLAS	51	114	178	224	265	303	337
C	WYLIE	ROCKWALL	52	133	225	292	364	451	479
	WYLIE TOTAL		**2,509**	**6,862**	**10,754**	**13,353**	**18,506**	**19,483**	**21,283**

[1] An acft is an amount of water to cover one acre with one foot of water and equals 325,851 gallons.
[2] If the "(P)" is present for a county entry, then the county has been split by Regional boundaries and the data listed in the row represent only the county's water demands within the particular region, not the county's total.

Projections last updated on 7/26/04

APPENDIX H

DEMAND PROJECTIONS FOR WHOLESALE WATER PROVIDERS

APPENDIX H
DEMAND PROJECTIONS FOR WHOLESALE WATER PROVIDERS

TABLE OF CONTENTS

Athens MWA

-Values in Acre-Feet per Year-

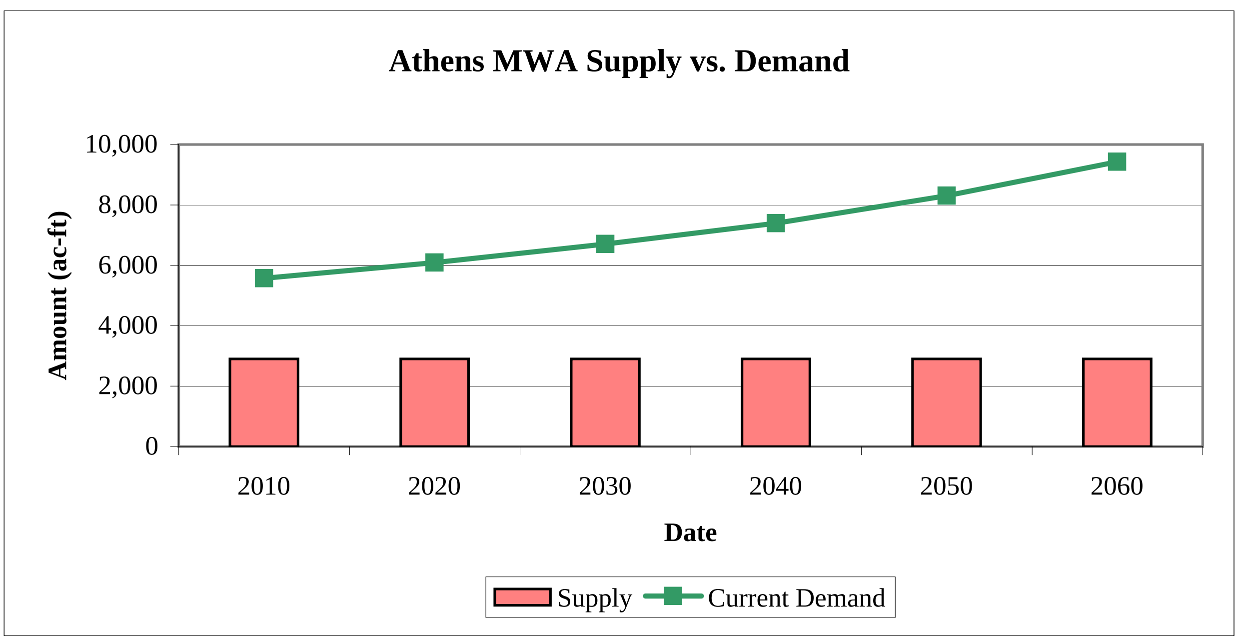
WUG Demands on Athens MWA and Lake Athens						
WUG	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
City of Athens[a]	2,326	2,832	3,431	4,111	5,003	6,108
Lawn Irrigation (Henderson Co. Irrigation - Region I)	159	164	169	174	179	185
Henderson County Livestock (TPWD Fish Hatchery)	3,023	3,023	3,023	3,023	3,023	3,023
Henderson County Manufacturing (60% - Reg C)	66	71	80	91	103	117
Total	**5,574**	**6,090**	**6,703**	**7,399**	**8,308**	**9,433**

Potential Future Customers	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Henderson County Manufacturing	33	35	40	45	52	59
Total	**33**	**35**	**40**	**45**	**52**	**59**

Current Supply	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Lake Athens (firm yield)	6,064	5,983	5,903	5,822	5,741	5,660
Lake Athens (operational yield)	2,900	2,900	2,900	2,900	2,900	2,900
Reuse (lmt- 2,677)	0	0	0	0	0	0
Total	**2,900**	**2,900**	**2,900**	**2,900**	**2,900**	**2,900**

Supplies Less Current Demands	**-2,674**	**-3,190**	**-3,803**	**-4,499**	**-5,408**	**-6,533**
Supplies Less Current & Potential Demands	**-2,707**	**-3,225**	**-3,843**	**-4,544**	**-5,460**	**-6,592**

[a] Supplies from other sources



Cedar Hill

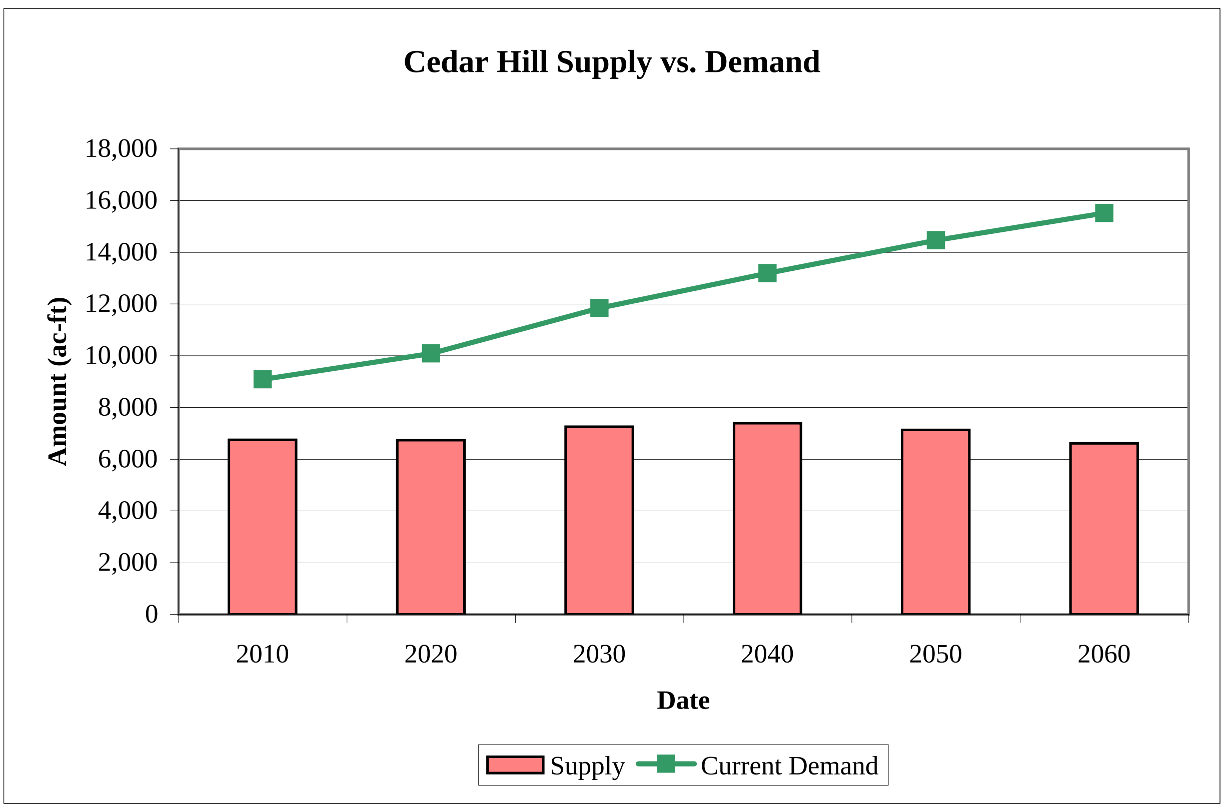
-Values in Acre-Feet per Year-

WUG Demands on Cedar Hill						
WUG	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Cedar Hill	7,979	10,000	11,749	13,096	14,358	15,417
Ovilla[a]	1,035	0	0	0	0	0
Dallas County- Manufacturing	68	76	82	88	93	94
Ellis County-Manufacturing	7	7	8	8	8	8
Total	**9,089**	**10,083**	**11,839**	**13,192**	**14,460**	**15,519**

Current Supply	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Trinity Aquifer	275	275	275	275	275	275
DWU	6,430	6,411	6,939	7,074	6,815	6,308
DWU (for Dallas Co. Manufacturing)	47	46	46	46	42	37
Total	**6,752**	**6,733**	**7,261**	**7,394**	**7,132**	**6,620**

Supplies Less Current Demands	**-2,338**	**-3,350**	**-4,578**	**-5,798**	**-7,327**	**-8,899**

[a] Supplies from other sources



City of Corsicana
-Values in Acre-Feet per Year-

WUG Demands on Corsicana						
WUGs	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Corsicana	5,835	6,006	6,179	6,366	6,667	7,076
Blooming Grove	149	146	144	141	139	139
Dawson	177	185	195	204	219	238
Frost	87	91	95	98	105	114
Hill County-Other (50%)	187	197	212	227	243	263
Hubbard	179	174	169	163	160	160
Kerens	399	394	388	382	378	378
Chatfield WSC	539	812	982	1,153	1,378	1,655
Community Water	106	157	193	237	293	366
M.E.N. WSC	441	471	510	542	571	621
Navarro Mills WSC	342	481	585	724	896	1,120
Navarro County - Manufacturing (51%)	598	677	749	820	882	955
Navarro County-Other (50%)	125	122	120	117	115	115
Rice WSC[a]	869	1,068	1,308	1,549	1,865	2,246
Rice	229	265	304	347	398	463
Total	**10,261**	**11,246**	**12,132**	**13,069**	**14,309**	**15,908**

Potential Future Customers	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Freestone County-Other (Winkler WSC and City of Streetman)	183	185	185	181	179	179
Wortham	246	253	255	252	251	251
Total	**429**	**438**	**440**	**433**	**430**	**430**

Current Supplies	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Navarro Mills Reservoir	19,400	18,800	17,850	16,900	15,950	15,000
Total	**19,400**	**18,800**	**17,850**	**16,900**	**15,950**	**15,000**
WTP Capacity	**11,210**	**11,210**	**11,210**	**11,210**	**11,210**	**11,210**

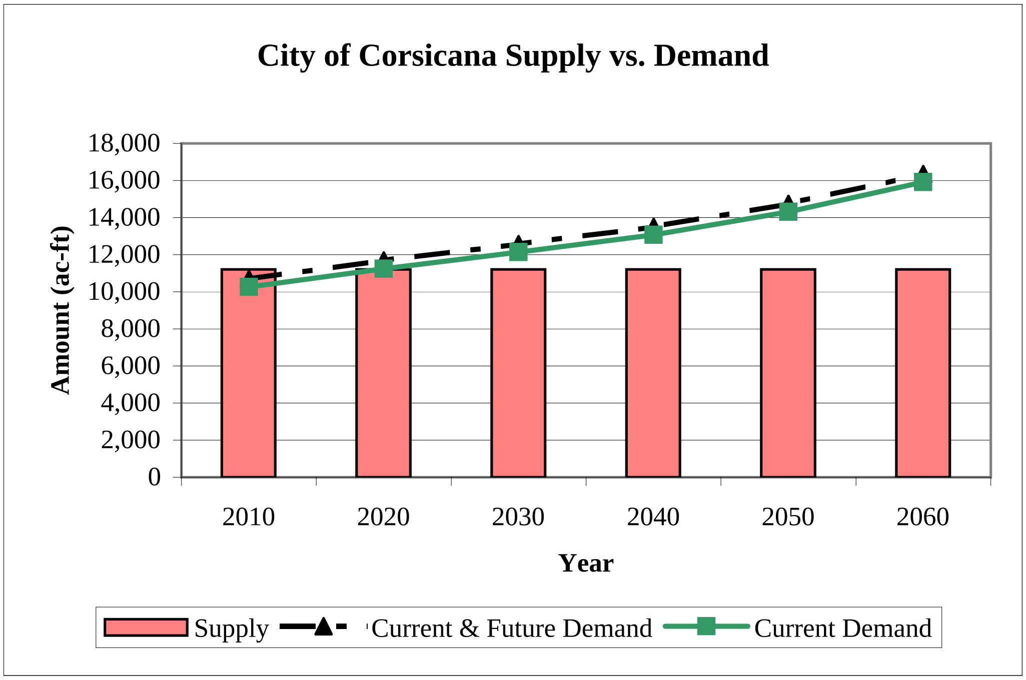
Supplies Less Current Demand	**949**	**-36**	**-922**	**-1,859**	**-3,099**	**-4,698**
Supplies Less Current & Future Demand	**520**	**-475**	**-1,361**	**-2,291**	**-3,529**	**-5,128**

[a] Supplies from other sources

[b] Water right to divert 13,650 acre-feet but infrastructure not in place

City of Corsicana

-Values in Acre-Feet per Year-

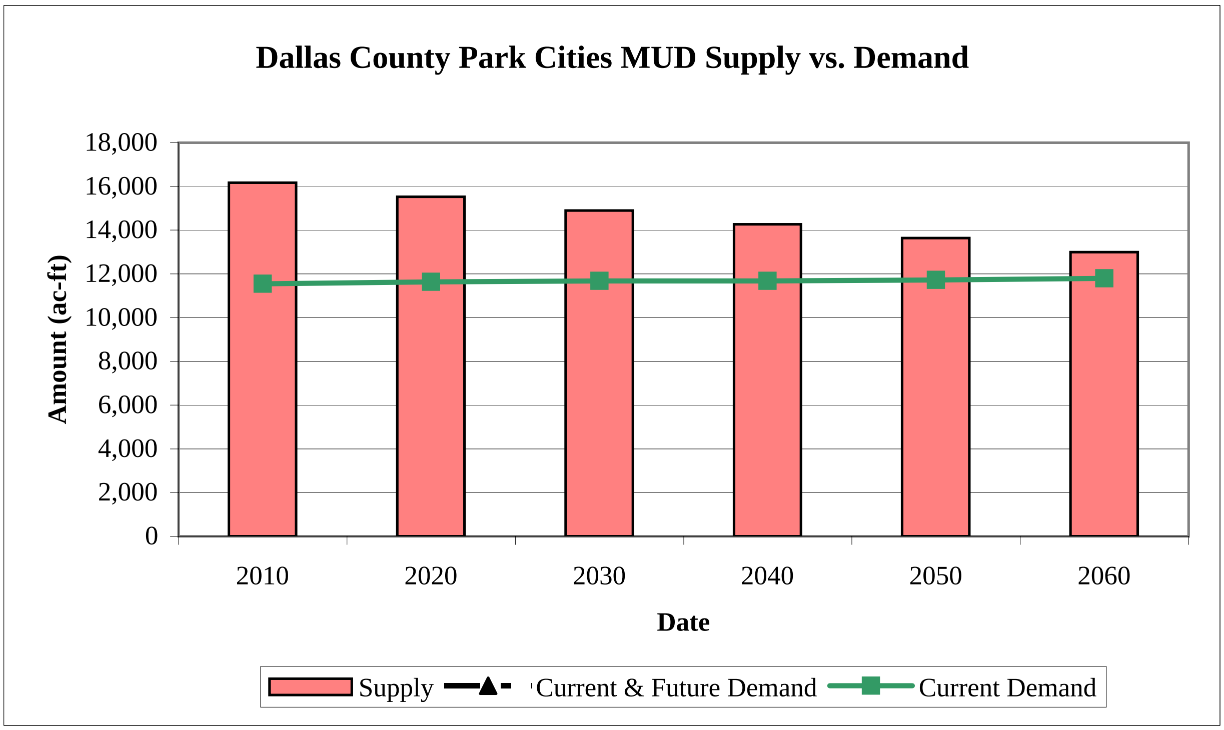


Dallas County Park Cities MUD
-Values in Acre-Feet per Year-

WUG Demands on Dallas County Park Cities MUD						
WUG	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Highland Park	4,255	4,266	4,274	4,278	4,289	4,319
University Park	7,286	7,371	7,407	7,407	7,439	7,483
Total	**11,541**	**11,637**	**11,681**	**11,685**	**11,728**	**11,802**

Current Supply	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Lake Grapevine	16,167	15,533	14,900	14,267	13,633	13,000
Total	**16,167**	**15,533**	**14,900**	**14,267**	**13,633**	**13,000**

Supplies Less Current Demands	**4,626**	**3,896**	**3,219**	**2,582**	**1,905**	**1,198**



Dallas Water Utilities
-Values in Acre-Feet per Year-

WUG Demand on Dallas Water Utilities						
WUG	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Addison	8,852	10,074	10,919	11,514	11,918	12,218
Carrollton[a]	25,877	26,103	26,762	27,055	27,346	27,622
Hebron (80%)	176	267	439	870	1,304	1,408
Cedar Hill[a]	7,711	9,732	11,482	12,829	14,091	15,150
Ovilla[a]	1,035	1,400	1,768	2,027	2,135	2,293
Cockrell Hill	653	687	681	670	667	668
Coppell	10,140	10,090	10,033	10,016	9,996	10,016
Dallas	389,548	426,094	442,559	460,091	506,034	590,366
Dallas County WCID #6	577	771	884	994	1,149	1,354
Balch Springs	2,621	2,730	2,805	2,852	2,934	3,028
Dallas County-Other[a]	20	20	20	20	20	20
Dallas County Manufacturing[a]	25,075	27,776	30,244	32,497	34,327	34,533
Dallas County Mining[a]	0	0	0	0	0	0
Dallas County Steam Electric (TXU)[a]	5,390	5,390	5,390	5,390	5,390	7,390
Denton[a]	2,597	12,352	20,676	28,150	40,467	64,974
Denton County-Manufacturing	393	601	776	935	1,098	1,277
DeSoto[a]	10,650	12,863	14,653	16,361	18,273	18,820
Duncanville	7,937	8,230	8,254	8,305	8,432	8,596
Farmers Branch	11,229	12,109	12,883	13,603	14,286	14,945
Flower Mound[a]	12,331	12,331	12,331	12,331	12,331	12,331
Glenn Heights[a]	1,002	1,290	1,551	1,810	2,066	2,344
Oak Leaf	338	393	448	503	567	640
Grand Prairie[a]	25,299	29,587	35,103	41,787	49,199	57,190
Grapevine[a]	2,000	2,000	2,000	2,000	2,000	2,000
Hutchins[a]	1,210	2,375	3,782	5,646	7,527	7,998
Irving[a]	14,696	2,242	2,242	2,242	2,710	4,425
Lancaster[a]	7,143	11,377	14,088	16,843	19,137	20,571
Lewisville	20,836	25,659	29,285	31,665	33,324	35,229
Red Oak[a]	309	305	422	544	828	1,159
Rockett SUD[a]	1,852	5,114	4,472	5,025	5,716	6,578
Ferris[a]	0	79	42	34	30	30
Pecan Hill[a]	31	100	88	118	134	155

Dallas Water Utilities
-Values in Acre-Feet per Year-

WUG	2010	2020	2030	2040	2050	2060
Seagoville	2,465	2,751	3,037	3,319	3,576	3,853
Combine WSC	462	688	855	1,035	1,268	1,562
Combine	282	356	405	463	537	635
The Colony[a]	4,660	5,927	6,542	6,684	6,822	6,883
USACE	33	33	33	33	33	33
UTRWD[a]	14,038	16,803	24,042	36,141	58,339	66,027
Waxahachie (by 2010)	1,121	1,611	3,838	6,639	6,726	6,726
Carrollton Indian Creek Golf Course	300	300	300	300	300	300
Garland Firewheel Golf Course	700	700	700	700	700	700
Cedar Crest Golf Course	561	561	561	561	561	561
Total	**622,150**	**689,872**	**747,394**	**810,601**	**914,296**	**1,052,607**

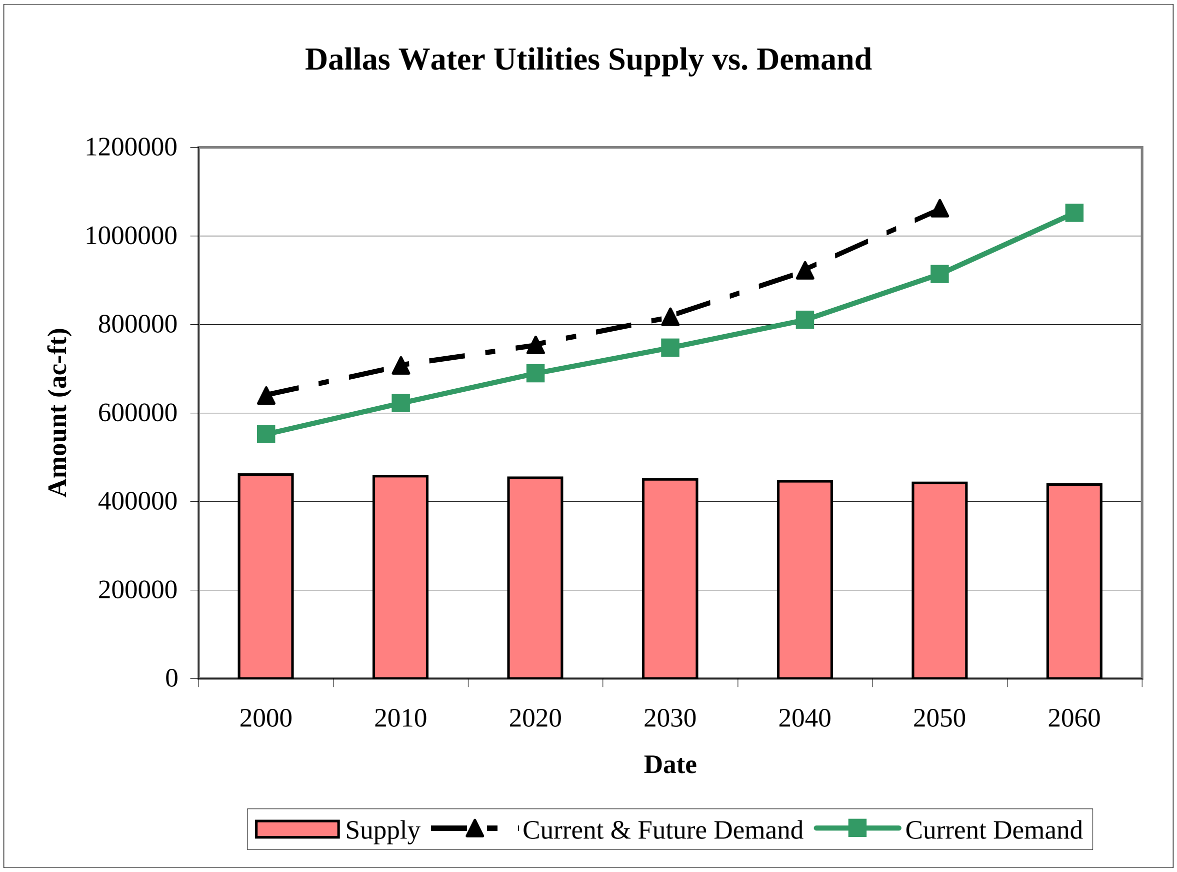
Potential Future Customers						
Ennis[a]	0	0	0	0	0	0
NTMWD	11,210	11,210	0	0	0	0
Rusk County Steam Electric (TXU)	1,500	1,500	1,500	1,500	6,328	12,228
Johnson County SUD	1,794	1,794	1,794	1,794	1,794	1,794
Palmer[a]	30	30	30	30	30	30
Mountain Peak WSC[a]	471	596	674	960	1,435	2,041
Sardis-Lone Elm[a]	585	695	706	1,004	1,354	1,809
Wilmer[a]	455	786	961	1,189	1,660	2,736
Buena Vista Bethel SUD[a]	337	408	442	500	572	658
Dallas County Irrigation	2,282	1,956	1,614	1,459	1,332	1,205
Dallas County Mining	250	250	250	250	250	250
Total	**18,915**	**19,225**	**7,972**	**8,686**	**14,756**	**22,751**
Total Current and Potential Customer Demand	**641,065**	**709,097**	**755,366**	**819,287**	**929,052**	**1,075,359**

Supply	2010	2020	2030	2040	2050	2060
Lake Ray Hubbard	60,367	60,033	59,700	59,367	59,033	58,700
Lake Tawakoni	183,619	182,251	180,882	179,515	178,146	176,777
Lake Ray Roberts/Lewisville/Elm Fork System	191,729	189,705	187,681	185,657	183,633	181,609
Lake Grapevine	7,250	6,800	6,350	5,900	5,450	5,000
Direct Reuse	561	561	561	561	561	561
Total	**443,525**	**439,350**	**435,174**	**430,999**	**426,823**	**422,647**

Dallas Water Utilities
-Values in Acre-Feet per Year-

Supplies Less Current Demands	**-178,625**	**-250,522**	**-312,220**	**-379,602**	**-487,474**	**-629,961**
Supplies Less Current & Future Demands	**-197,540**	**-269,747**	**-320,192**	**-388,288**	**-502,229**	**-652,712**

[a] Supplies from other sources

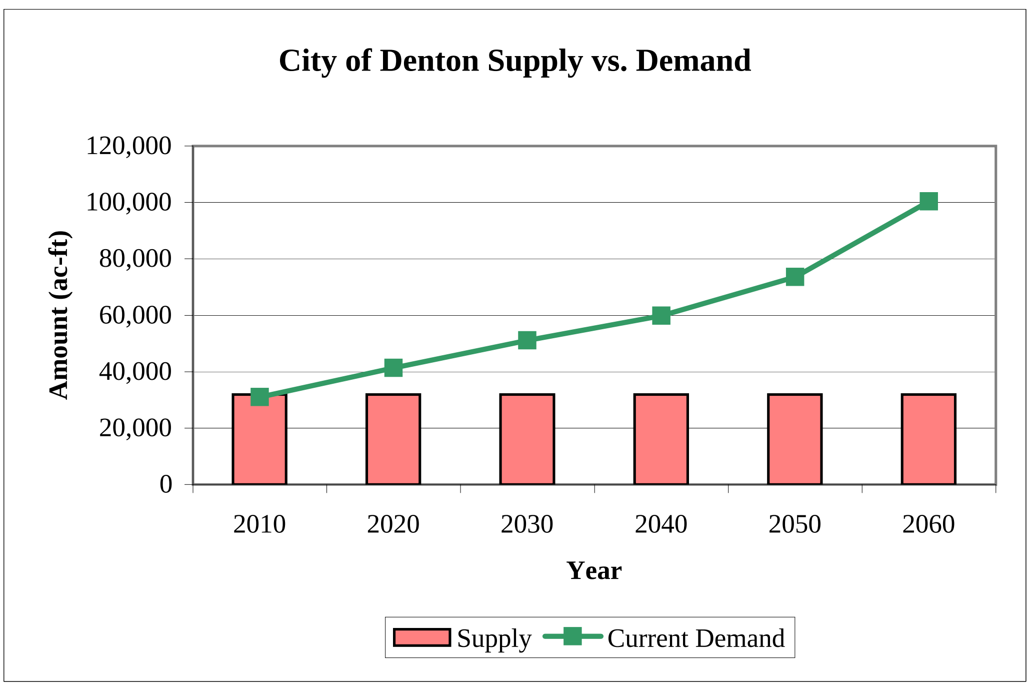


City of Denton
-Values in Acre-Feet per Year-

WUG Demands on Denton						
WUG	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Denton	29,561	39,901	49,566	58,158	71,679	98,275
Denton County Manufacturing (45%)	481	558	634	711	779	846
Denton County SEP	524	418	489	575	680	808
Denton County Irrigation	402	402	402	402	402	402
Total	**30,968**	**41,279**	**51,091**	**59,846**	**73,540**	**100,331**

Current Supplies	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Lake Lewisville	7,702	7,507	7,313	7,119	6,924	6,730
Lake Ray Roberts	20,445	19,882	19,319	18,756	18,193	17,630
Indirect Reuse	1,682	2,130	2,915	3,475	4,372	5,381
DWU	1,931	8,256	12,676	15,741	19,818	27,321
Direct Reuse (SEP and IRR)	1,233	2,242	2,690	3,251	3,924	4,708
Total	**32,993**	**40,017**	**44,913**	**48,342**	**53,231**	**61,770**
WTP capacity	**31,949**	**31,949**	**31,949**	**31,949**	**31,949**	**31,949**

Supplies Less Current Demand	**981**	**-9,330**	**-19,142**	**-27,897**	**-41,591**	**-68,383**

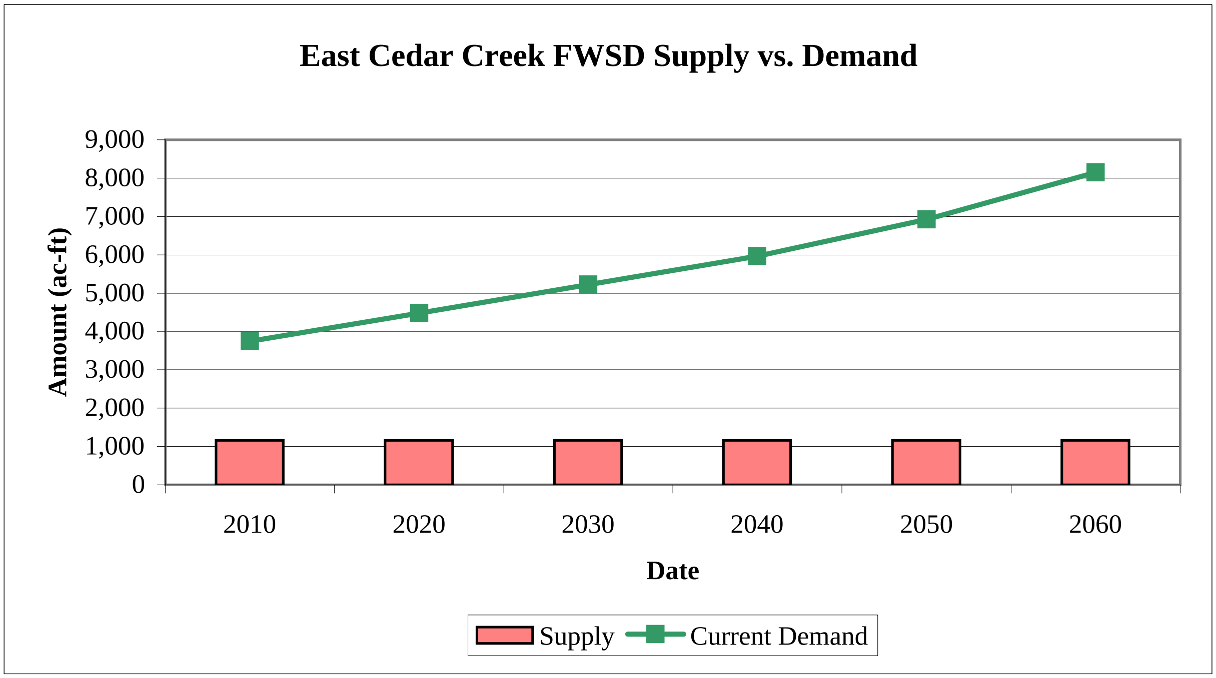


East Cedar Creek FWSD
-Values in Acre-Feet per Year-

WUG Demands on East Cedar Creek FWSD						
WUG	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
East Cedar Creek FWSD	2,319	2,853	3,402	3,931	4,631	5,516
Payne Springs	165	174	182	191	203	220
Gun Barrel City	1,257	1,452	1,637	1,841	2,089	2,416
Total	**3,741**	**4,479**	**5,221**	**5,963**	**6,923**	**8,152**

Current Supply	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
TRWD Sources	1,157	1,157	1,157	1,157	1,157	1,157
Total	**1,157**	**1,157**	**1,157**	**1,157**	**1,157**	**1,157**

Supplies Less Current Demands	**-2,584**	**-3,322**	**-4,064**	**-4,806**	**-5,766**	**-6,995**



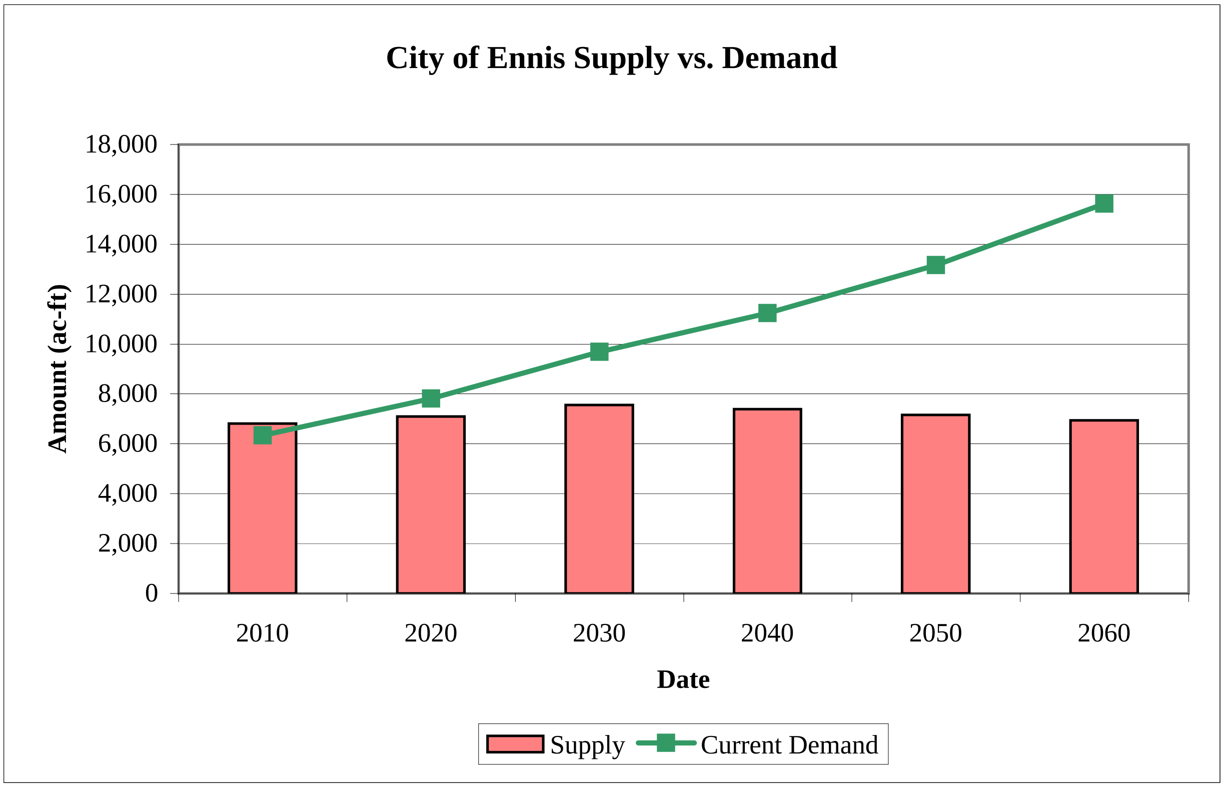
City of Ennis
-Values in Acre-Feet per Year-

WUG Demands on Ennis						
WUG	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
City of Ennis	3,497	4,358	5,504	6,949	8,834	11,308
Community Water Company (Ellis County)	116	171	201	230	264	266
East Garrett WSC (assume 10% Ellis County-Other)	202	200	198	197	196	196
Rice WSC	76	99	101	101	101	101
Ellis County Manufacturing (10%)	347	367	384	399	409	391
Ellis County Steam Electric Power (10%)	2,098	2,615	3,302	3,363	3,363	3,363
Total	**6,336**	**7,810**	**9,690**	**11,239**	**13,167**	**15,625**

Current Supply	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Lake Bardwell (TRA)	4,712	4,484	4,257	4,030	3,802	3,575
Direct reuse	2,098	2,615	3,302	3,363	3,363	3,363
TRWD Sources*	0	0	0	0	0	0
Total	**6,810**	**7,099**	**7,559**	**7,393**	**7,165**	**6,938**

Supplies Less Current Demands	**474**	**-711**	**-2,131**	**-3,846**	**-6,001**	**-8,687**

*On line by October 2005



City of Forney

-Values in Acre-Feet per Year-

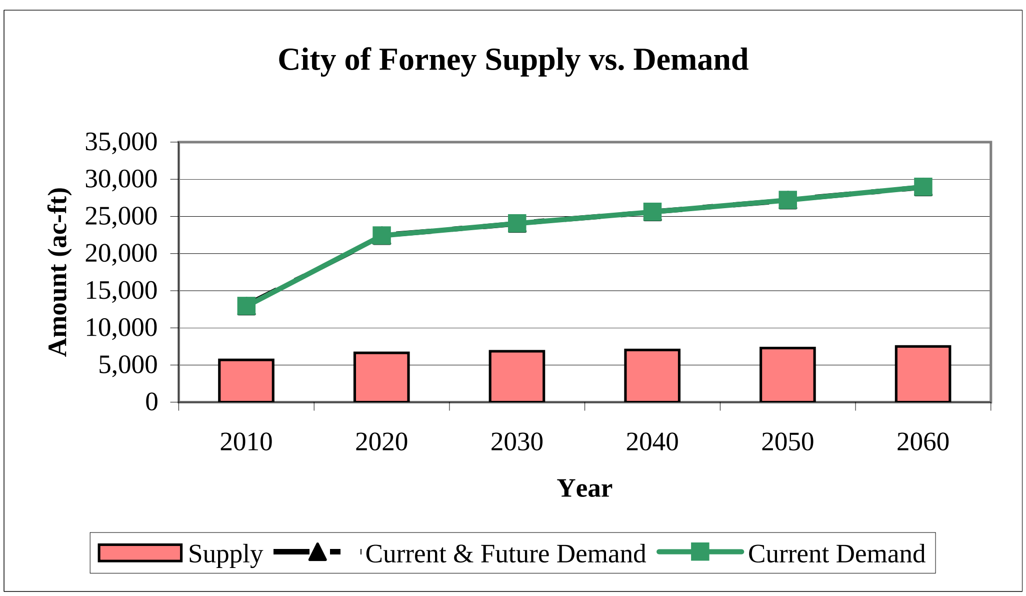
WUG Demands on Forney						
WUGs	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Forney	1,936	4,033	4,973	5,763	6,422	7,048
High Point WSC	436	673	824	997	1,208	1,481
Talty WSC	863	1,348	1,849	2,404	3,091	3,943
Kaufman County-Other (10%)	218	217	215	213	212	212
Markout WSC	0	0	0	0	0	0
Kaufman County Manufacturing (66%)	502	537	574	612	655	700
Kaufman Steam Electric Power*	8,979	15,600	15,600	15,600	15,600	15,600
Total	**12,934**	**22,407**	**24,035**	**25,590**	**27,188**	**28,984**

Potential Future Customers	2010	2020	2030	2040	2050	2060
None	0	0	0	0	0	0

Current Supplies	2010	2020	2030	2040	2050	2060
NTMWD	2,691	3,630	3,861	4,043	4,268	4,491
Reuse from Garland (SEP only)	3,000	3,000	3,000	3,000	3,000	3,000
Total	**5,691**	**6,630**	**6,861**	**7,043**	**7,268**	**7,491**

Supplies Less Current Demands	**-7,243**	**-15,778**	**-17,173**	**-18,547**	**-19,920**	**-21,493**
Supplies Less Current & Future Demands	**-7,243**	**-15,778**	**-17,173**	**-18,547**	**-19,920**	**-21,493**

*contract limited to 14 mgd



City of Fort Worth

-Values in Acre-Feet per Year-

WUG Demands on Fort Worth						
WUG Demands	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Bethesda WSC (Tarrant County)[a]	1,495	1,815	2,147	2,507	2,935	3,466
Burleson	4,119	4,741	5,430	6,159	7,099	8,293
Crowley[a]	1,208	1,461	1,870	2,550	3,093	3,375
Dalworthington Gardens[a]	582	627	658	673	685	695
Denton County-Other (10%)	722	901	1,073	1,234	1,397	1,565
Edgecliff	460	451	443	434	428	428
Everman[a]	396	447	494	536	595	606
Forest Hill	1,783	1,892	1,997	2,122	2,285	2,399
Fort Worth	149,596	182,321	218,891	265,795	334,259	418,317
Grand Prairie (part)	1,120	1,120	1,120	1,120	1,120	1,120
Haltom City	7,135	7,835	8,142	8,231	8,272	8,324
Haslet[a]	259	658	1,258	1,251	1,251	1,251
Hurst[a]	6,443	6,769	6,933	6,989	7,075	7,166
Keller[a]	9,160	10,829	10,775	10,667	10,667	10,667
Lake Worth[a]	585	665	757	845	945	999
North Richland Hills (30%)[a]	3,749	4,150	4,426	4,590	4,708	4,807
Watauga (100%)	3,437	3,532	3,584	3,603	3,657	3,723
Northlake[a]	524	623	1,197	1,772	2,131	2,295
Richland Hills[a]	1,174	1,228	1,288	1,358	1,405	1,427
Roanoke[a]	1,114	1,834	2,894	3,953	5,291	6,387
Saginaw	2,885	3,540	3,942	4,240	4,448	4,618
Sansom Park Village[a]	181	187	187	183	186	193
Southlake	11,837	14,437	15,907	16,793	17,701	17,930
Tarrant County-Other (100%)	3,482	3,402	3,348	3,268	3,241	3,241
Tarrant County Irrigation)a	897	897	897	897	897	897
Trophy Club[a]	2,147	2,471	2,743	2,984	3,255	3,527
Westover Hills	276	274	272	270	268	268
Westworth Village	244	287	297	308	328	362
Wise County Manufacturing (7%)[a]	162	186	209	229	248	270
White Settlement[a]	1,702	1,818	1,989	2,002	2,202	2,424
Tarrant County Manufacturing (75%)[a]	12,944	15,333	17,723	20,193	22,439	24,343
Total	**231,817**	**276,731**	**322,890**	**377,756**	**454,511**	**545,382**

Potential Future Customers	2010	2020	2030	2040	2050	2060
Aledo[a]	148	300	453	588	738	904
Bethesda WSC (Johnson County)[a]	2,357	3,021	3,721	4,504	5,469	6,702
Kennedale (starting by 2010)[a]	271	395	476	531	566	594
Pantego (starting by 2010)[a]	90	86	82.5	78.5	76	76
Tarrant County Steam Electric Power	500	500	1100	2000	2600	2600
Total	**3,366**	**4,302**	**5,832**	**7,702**	**9,449**	**10,876**

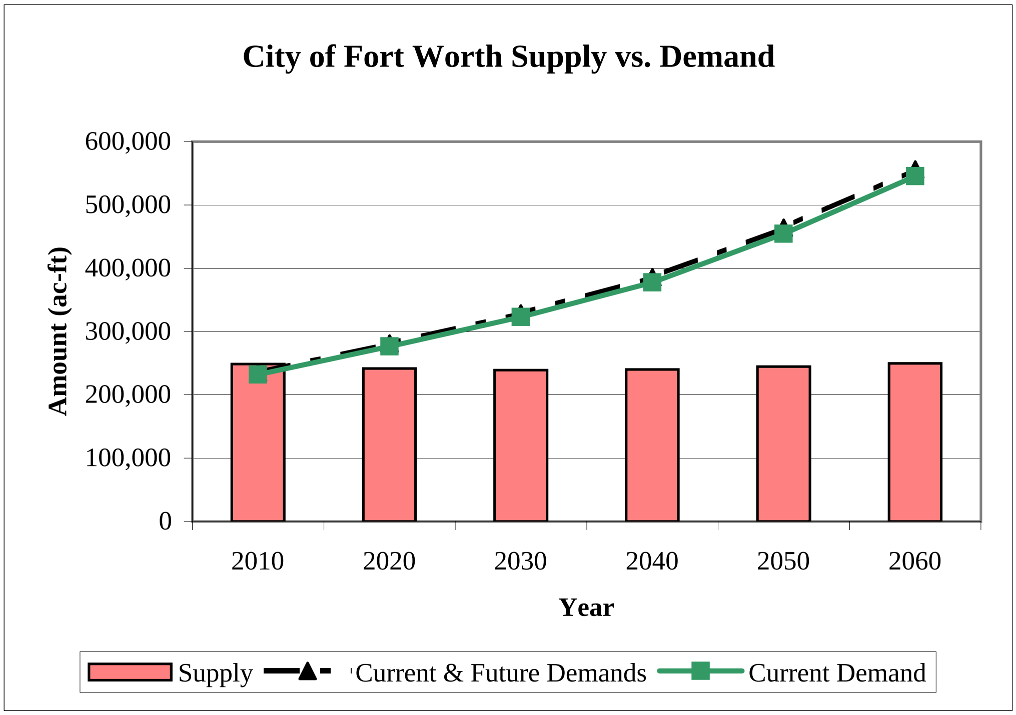
City of Fort Worth

-Values in Acre-Feet per Year-

Current Supplies	2010	2020	2030	2040	2050	2060
Tarrant Regional Water District	248,015	240,472	237,978	239,241	243,894	248,586
Direct Reuse	897	897	897	897	897	897
Total Supply	**248,912**	**241,369**	**238,875**	**240,138**	**244,791**	**249,483**

Supplies Less Current Demands	**17,095**	**-35,362**	**-84,015**	**-137,618**	**-209,720**	**-295,899**
Supplies Less Current & Future Demands	**13,729**	**-39,663**	**-89,847**	**-145,320**	**-219,169**	**-306,775**

[a] Supplies from other sources



City of Gainesville

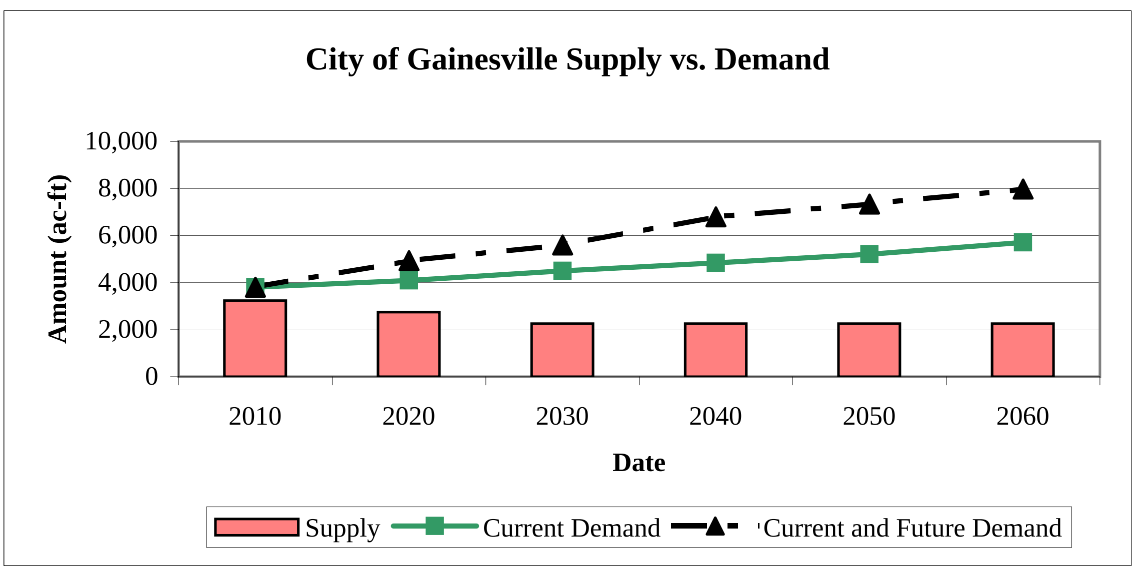
-Values in Acre-Feet per Year-

WUG Demands on Gainesville						
WUG	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Gainesville	3,750	3,992	4,385	4,693	5,046	5,522
Cooke County-Manufacturing	49	90	110	132	152	177
Cooke County-Irrigation	9	9	9	9	9	9
Total	**3,808**	**4,091**	**4,504**	**4,834**	**5,207**	**5,708**

Potential Future Customers	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Bolivar WSC (Cooke County)	0	68	128	228	228	228
Bolivar WSC (Wise County)	0	50	100	800	800	800
Cooke County-Other	0	132	144	137	131	131
Cooke County-Irrigation	0	51	51	51	51	51
Kiowa Homeowners WSC	0	182	205	194	184	185
Lindsay	0	52	57	53	50	50
Valley View	0	71	129	182	323	400
Woodbine WSC	0	240	283	316	368	427
Total Potential Customers	**0**	**847**	**1,097**	**1,963**	**2,135**	**2,272**

Current Supply	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Trinity Aquifer	2,108	1,615	1,121	1,121	1,121	1,121
Moss Lake (limited by WTP)	1,121	1,121	1,121	1,121	1,121	1,121
Direct Reuse	9	9	9	9	9	9
Total	**3,238**	**2,745**	**2,251**	**2,251**	**2,251**	**2,251**

Supplies Less Current Demands	**-570**	**-1,346**	**-2,253**	**-2,583**	**-2,956**	**-3,457**
Supplies Less Current and Future Demands	**-570**	**-2,194**	**-3,350**	**-4,546**	**-5,091**	**-5,729**



City of Garland

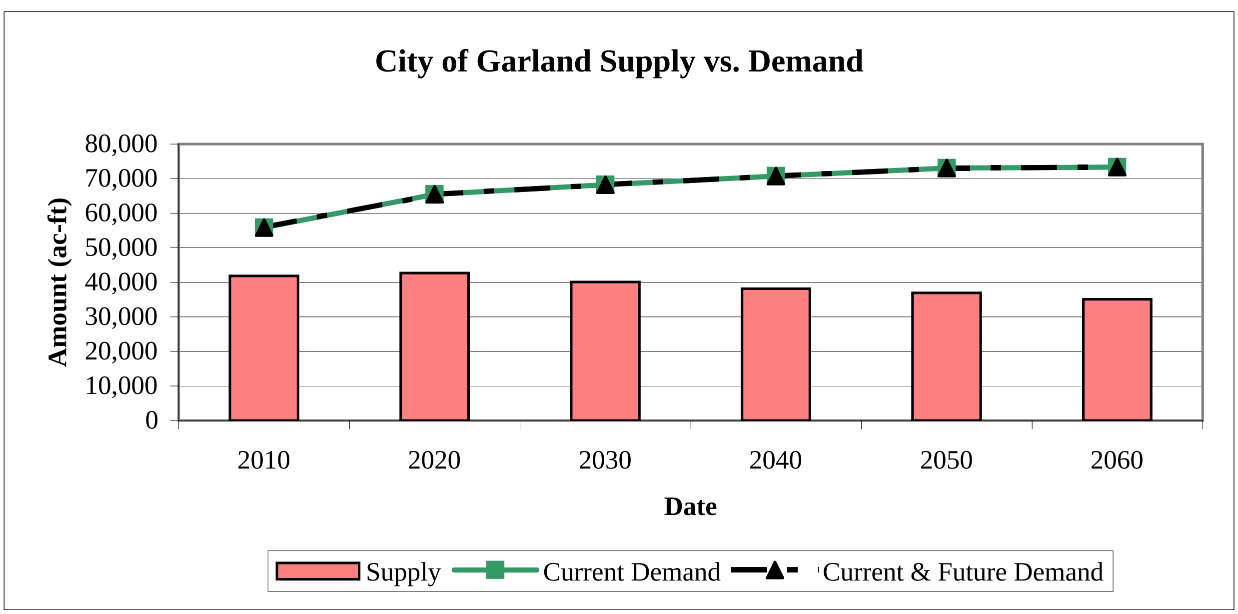
-Values in Acre-Feet per Year-

WUG Demands on Garland						
WUG	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
City of Garland	42,911	45,702	48,139	50,151	52,087	52,087
Dallas County Manufacturing (9%)	3,070	3,401	3,703	3,979	4,203	4,228
Dallas County SEP (CE Newman Plant)	106	84	98	116	137	163
Collin County SEP (Ray Olinger Plant)	793	632	739	869	1,028	1,222
Reuse water to Forney (Kaufman Co. SEP)	8,979	15,600	15,600	15,600	15,600	15,600
Total	**55,859**	**65,419**	**68,279**	**70,715**	**73,055**	**73,300**

Potential Future Customers						
None	0	0	0	0	0	0

Current Supply	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
NTMWD	32,889	27,041	24,465	22,575	21,386	19,538
Reuse (from Garland)	8,979	15,600	15,600	15,600	15,600	15,600
Total	**41,868**	**42,641**	**40,065**	**38,175**	**36,986**	**35,138**

Supplies Less Current Demands	**-13,991**	**-22,778**	**-28,214**	**-32,540**	**-36,069**	**-38,162**
Supplies Less Current & Future Customers	**-13,991**	**-22,778**	**-28,214**	**-32,540**	**-36,069**	**-38,162**



Greater Texoma Utility Authority
-Values in Acre-Feet per Year-

WUG Demands on GTUA						
WUG	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Sherman	2,508	5,146	6,775	8,617	11,009	14,320
Grayson County Manufacturing	6,442	6,775	7,010	7,353	7,720	8,378
Total	**8,949**	**11,921**	**13,785**	**15,970**	**18,729**	**22,699**

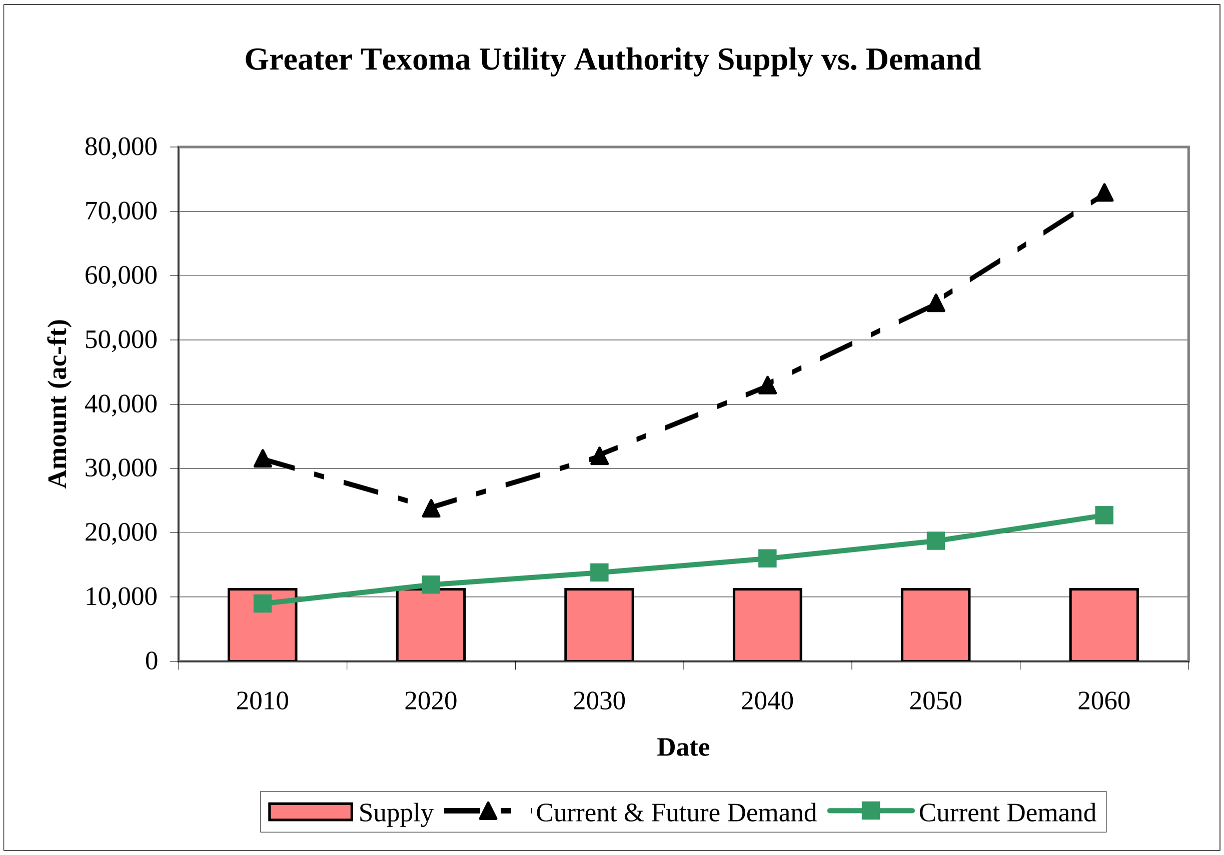
Potential Future Customers	2010	2020	2030	2040	2050	2060
Bells	0	147	205	258	312	359
Celina	0	21	487	2,086	4,079	4,800
Collinsville	0	245	353	451	559	676
Grayson County-Other	0	1,348	1,476	1,520	1,536	1,528
Gunter	0	372	498	612	733	865
Gunter Rural WSC	0	205	370	608	936	1,302
Luella WSC	0	126	213	275	329	428
South Grayson WSC	0	50	50	50	50	50
Southmayd	0	162	246	319	390	461
Tioga	0	222	345	415	484	535
Tom Bean	0	100	160	200	241	284
Two Way SUD	0	444	609	773	938	1,120
Whitesboro	0	682	861	974	1,070	1,156
Whitewright	0	176	354	532	731	962
Howe	184	590	947	1,191	1,335	1,491
Van Alstyne	498	1,966	2,878	3,374	3,688	3,835
Anna	1,022	2,357	3,643	4,942	6,618	10,388
Melissa	654	1,922	2,935	4,002	5,333	7,041
Weston	187	621	1,444	4,208	7,384	12,676
South Grayson WSC	50	100	120	196	281	299
NTMWD (Raw water)	20,000	0	0	0	0	0
Total	**22,594**	**11,859**	**18,192**	**26,987**	**37,027**	**50,257**

Current Supply	2010	2020	2030	2040	2050	2060
Lake Texoma Raw Water	25,000	25,000	25,000	25,000	25,000	25,000
Delivery Limited by WTP Capacity	11,210	11,210	11,210	11,210	11,210	11,210
Total	**11,210**	**11,210**	**11,210**	**11,210**	**11,210**	**11,210**

Supplies Less Current Demands	**2,261**	**-711**	**-2,575**	**-4,760**	**-7,519**	**-11,489**
Supplies Less Current & Future Demands	**-6,544**	**-12,570**	**-20,767**	**-31,747**	**-44,547**	**-61,746**

Greater Texoma Utility Authority

-Values in Acre-Feet per Year-

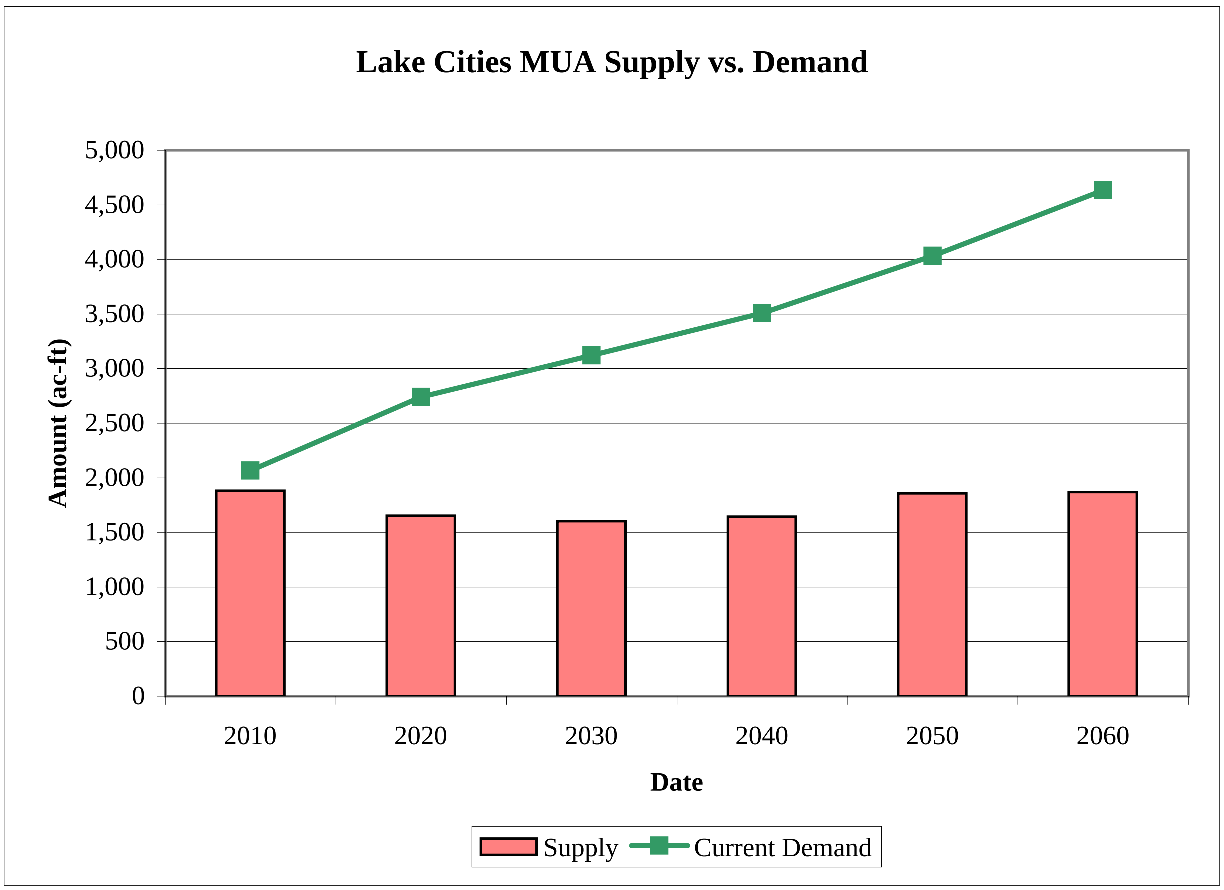


Lake Cities MUA
-Values in Acre-Feet per Year-

WUG Demands on Lake Cities MUA						
WUG	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Lake Dallas	1,230	1,478	1,591	1,671	1,722	1,766
Hickory Creek	529	825	1,005	1,219	1,600	2,057
Shady Shores	306	436	524	617	710	811
Total	**2,065**	**2,739**	**3,120**	**3,507**	**4,032**	**4,634**

Current Supply	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
UTRWD	1,473	1,245	1,196	1,237	1,449	1,461
Trinity Aquifer	129	129	129	129	129	129
Woodbine Aquifer	279	279	279	279	279	279
Total	**1,881**	**1,653**	**1,604**	**1,645**	**1,857**	**1,869**

Supplies Less Current Demands	**-184**	**-1,086**	**-1,516**	**-1,862**	**-2,175**	**-2,765**



City of Mansfield
-Values in Acre-Feet per Year-

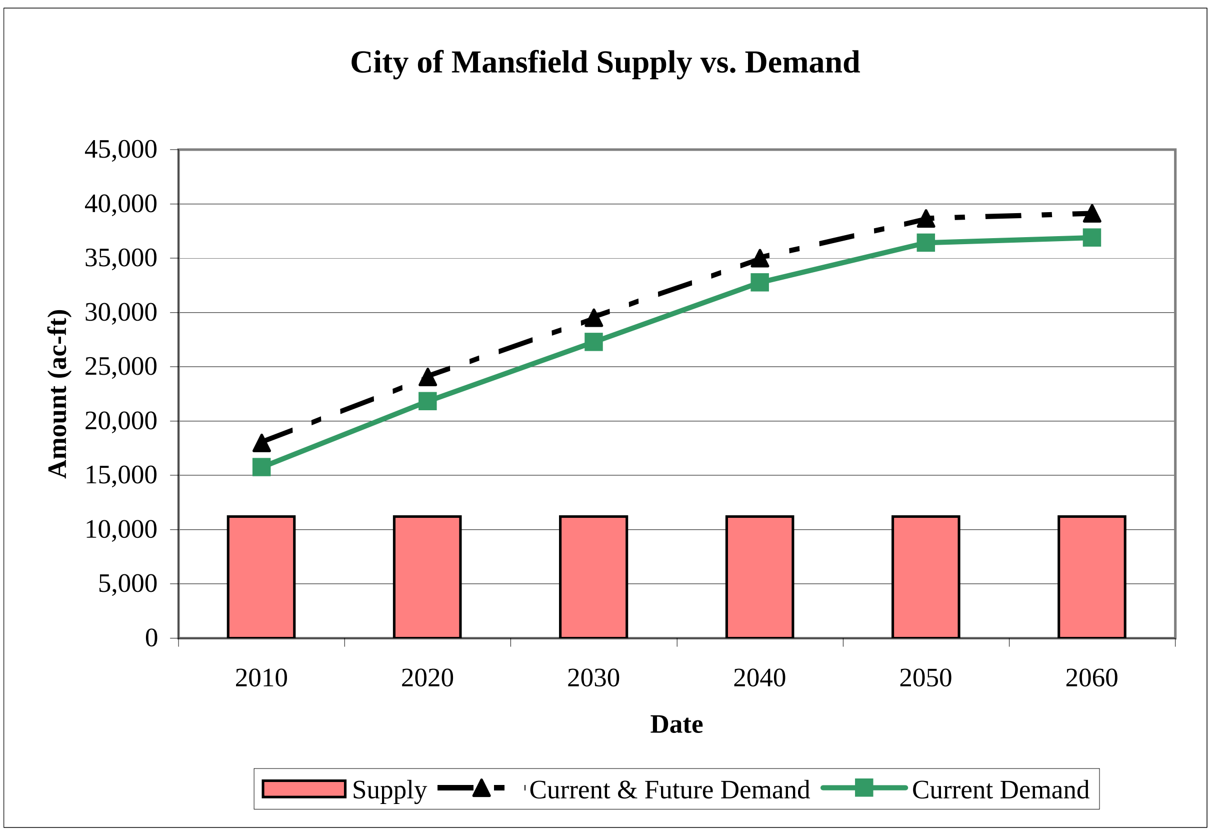
WUG Demands on Mansfield						
WUG	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
City of Mansfield	13,505	19,575	25,037	30,522	34,185	34,644
Johnson County SUD	2,242	2,242	2,242	2,242	2,242	2,242
Total	**15,747**	**21,817**	**27,279**	**32,764**	**36,427**	**36,886**

Potential Future Customers	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Grand Prairie	2,242	2,242	2,242	2,242	2,242	2,242
Total	**2,242**	**2,242**	**2,242**	**2,242**	**2,242**	**2,242**

Current Supply	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
TRWD *	11,210	11,210	11,210	11,210	11,210	11,210
Total	**11,210**	**11,210**	**11,210**	**11,210**	**11,210**	**11,210**

*** Limited by WTP Capacity**

Supplies Less Current Demands	**-4,537**	**-10,607**	**-16,069**	**-21,554**	**-25,217**	**-25,676**
Supplies Less Current & Future Demands	**-6,779**	**-12,849**	**-18,311**	**-23,796**	**-27,459**	**-27,918**



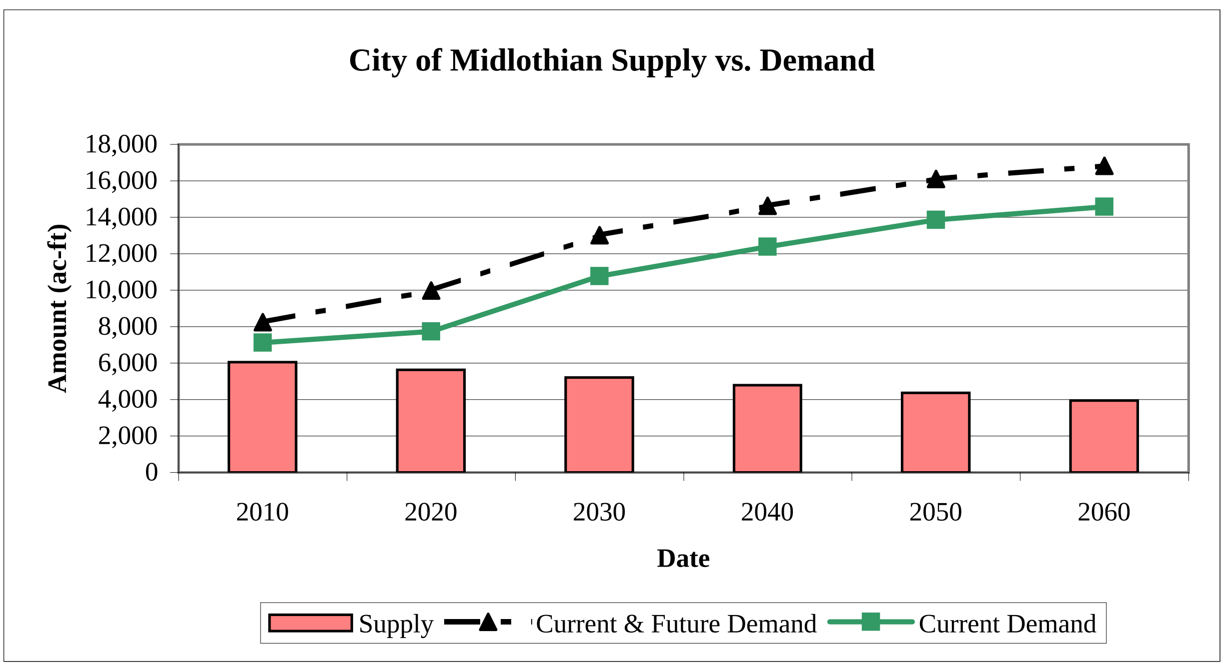
City of Midlothian
-Values in Acre-Feet per Year-

WUG Demands on Midlothian						
WUG	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Midlothian	2,834	4,448	6,544	7,933	9,207	10,170
Mountain Peak WSC	448	560	560	560	560	560
Ellis County-Manufacturing	1,109	1,714	2,610	2,814	2,957	2,709
Ellis County Steam Electric Power	224	224	224	224	224	224
Rocket SUD	1,747	0	0	0	0	0
City of Venus	282	278	271	267	265	265
Alvarado (through Venus)	487	519	559	596	650	650
Total	**7,131**	**7,743**	**10,768**	**12,394**	**13,863**	**14,578**

Potential Future Customers	2010	2020	2030	2040	2050	2060
Grand Prairie	1,120	2,241	2,241	2,241	2,241	2,241
Total	**1,120**	**2,241**	**2,241**	**2,241**	**2,241**	**2,241**

Current Supply	2010	2020	2030	2040	2050	2060
Trinity Aquifer	36	36	36	36	36	36
Joe Pool Lake (TRA)	6,011	5,593	5,174	4,756	4,338	3,920
Total	**6,047**	**5,629**	**5,210**	**4,792**	**4,374**	**3,956**

Supplies Less Current Demands	**-1,084**	**-2,114**	**-5,558**	**-7,602**	**-9,489**	**-10,622**
Supplies Less Current & Future Demands	**-2,204**	**-4,355**	**-7,799**	**-9,843**	**-11,730**	**-12,863**



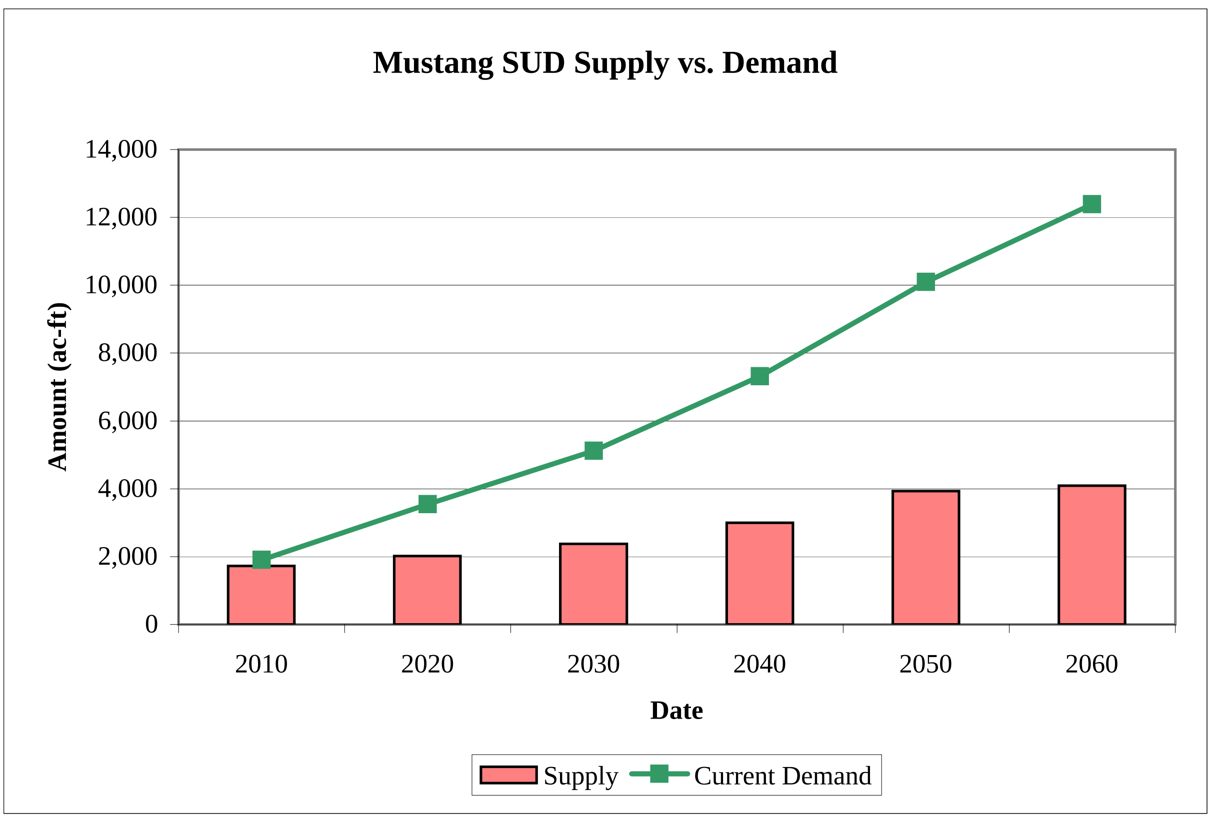
Mustang SUD

-Values in Acre-Feet per Year-

WUG Demands on Mustang SUD						
WUG	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Mustang SUD	921	1,474	1,939	2,399	2,881	3,385
Cross Roads	497	1,202	2,004	3,391	5,315	6,652
Oak Point	381	729	1,010	1,289	1,580	1,875
Krugerville	111	138	170	237	322	475
Total	**1,909**	**3,543**	**5,123**	**7,316**	**10,097**	**12,387**

Current Supply	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Trinity Aquifer	331	331	331	331	331	331
UTRWD Sources	1,398	1,687	2,048	2,665	3,596	3,765
Total	**1,729**	**2,018**	**2,379**	**2,996**	**3,927**	**4,096**

Supplies Less Current Demands	**-180**	**-1,525**	**-2,744**	**-4,320**	**-6,170**	**-8,291**

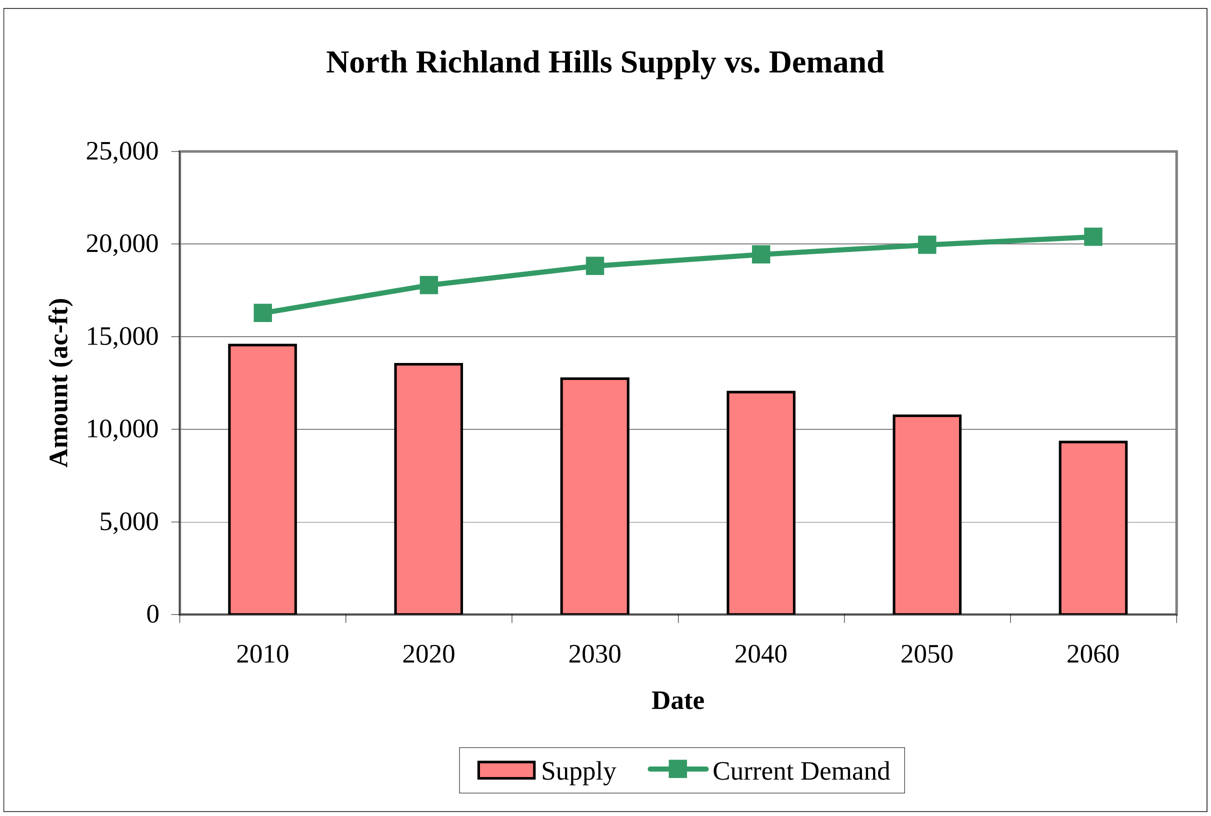


North Richland Hills
-Values in Acre-Feet per Year-

WUG Demands on North Richland Hills						
WUG	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
North Richland Hills	12,496	13,832	14,753	15,300	15,693	16,022
Watauga	3,437	3,532	3,584	3,603	3,657	3,723
Tarrant County Manufacturing (2%)	345	409	473	538	598	649
Total	**16,278**	**17,773**	**18,810**	**19,441**	**19,948**	**20,394**

Current Supply	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Trinity Aquifer	14	14	14	14	14	14
TRWD (through Fort Worth and TRA)	14,534	13,499	12,715	11,989	10,719	9,305
Total	**14,548**	**13,513**	**12,729**	**12,003**	**10,733**	**9,319**

Supplies Less Current Demands	**-1,730**	**-4,260**	**-6,081**	**-7,438**	**-9,216**	**-11,075**



North Texas Municipal Water District
-Values in Acre-Feet per Year-

WUG Demands on North Texas Municipal Water District						
WUG	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Allen	23,657	28,806	33,773	35,318	36,029	36,330
Bonham (limited by WTP capacity)	2,735	2,950	3,710	3,800	3,800	3,800
Caddo Basin SUD	1,210	1,501	1,893	2,423	3,382	4,787
Cash SUD[a]	1,792	1,792	1,792	1,792	1,792	1,792
College Mound WSC[a]	488	944	1,435	1,748	2,132	2,634
East Fork SUD	678	831	963	1,103	1,248	1,413
Fairview	1,721	2,290	2,948	4,395	7,326	12,820
Farmersville	565	1,035	1,445	2,151	3,154	4,301
Forney	1,936	4,033	4,973	5,763	6,422	7,048
High Point WSC[a]	436	673	824	997	1,208	1,481
Talty WSC	863	1,348	1,849	2,404	3,091	3,943
Forney Lake WSC	3,975	4,732	4,896	5,054	5,236	5,446
Frisco	45,615	66,088	80,628	88,889	95,829	99,133
Little Elm[a]	4,745	7,593	9,089	9,089	9,089	9,089
Prosper[a]	1,393	6,954	10,841	13,433	14,513	15,593
Garland	42,911	45,702	48,139	50,151	52,087	52,087
Gastonia-Scurry WSC	842	1,199	1,370	1,629	1,983	2,421
Josephine	103	285	280	275	277	279
Kaufman	1,156	1,716	2,013	2,264	2,511	3,029
Oak Grove	124	148	172	201	236	283
Crandall	730	1,004	1,258	1,544	1,909	2,362
Lavon WSC	702	1,168	1,602	2,615	3,796	5,015
Lucas	1,032	1,533	1,828	2,344	3,327	4,537
McKinney	24,715	40,242	58,554	79,216	94,472	108,430
Danville WSC	845	1,153	1,417	1,693	1,990	2,306
Melissa[a]	2,215	4,216	5,484	6,774	8,495	10,645
Mesquite	28,676	34,294	38,814	41,475	42,396	42,670
Milligan WSC	202	196	191	185	183	183
Lowry Crossing	313	392	463	537	614	2,321
Murphy	1,554	5,810	5,778	5,746	5,746	5,746
N. Collin WSC	876	1,116	1,321	1,525	1,757	2,005
New Hope	267	383	632	944	1,416	3,148
Heath	1,757	2,562	3,199	3,879	4,699	5,660
Nevada	247	528	631	1,254	2,090	5,226
Parker	1,915	4,078	5,950	9,669	14,132	19,338
Plano	72,439	75,080	77,318	79,810	82,281	85,069
The Colony (part) - 10%	518	659	727	743	758	765

North Texas Municipal Water District
-Values in Acre-Feet per Year-

WUG	2010	2020	2030	2040	2050	2060
Princeton	666	1,568	2,782	4,604	7,673	11,509
Culleoka WSC	908	1,350	1,625	1,883	2,185	2,506
Richardson	32,383	36,123	35,993	35,602	35,343	35,343
Rockwall	8,423	14,971	19,167	21,507	22,075	22,075
Blackland WSC	483	699	842	999	1,197	1,433
Mt. Zion WSC	442	641	709	774	842	866
McLendon-Chisholm	194	246	290	339	396	467
RCH WSC	410	440	468	495	533	583
Rowlett	12,283	15,318	17,154	18,668	19,860	20,905
Royse City	2,735	5,426	5,959	7,789	9,561	10,085
Sachse	3,028	4,019	4,657	5,110	5,530	5,905
Sunnyvale	1,770	2,454	3,135	3,820	4,514	4,618
Terrell and customers (assume 100% by 2010)	5,279	6,030	6,685	7,126	7,620	8,388
Wylie	6,862	10,754	13,353	18,506	19,483	21,283
Collin County Other (50%)[a]	409	372	339	307	277	252
Collin County Manufacturing (100%)[a]	3,393	3,923	4,440	4,956	5,419	5,901
Dallas County Manufacturing (19%)	6,482	7,180	7,818	8,401	8,874	8,927
Dallas County Steam Electric Power	106	84	98	116	137	163
Collin County Steam Electric Power	793	632	739	869	1,028	1,222
Kaufman County Manufacturing (66%)	502	537	574	612	655	700
Kaufman County Other (50%)[a]	1,091	1,083	1,075	1,067	1,059	1,059
Rockwall County Manufacturing (100%)[a]	20	23	26	29	32	35
Rockwall County Other (100%)[a]	385	385	385	383	383	383
Hackberry	142	210	275	304	319	326
Saint Paul	192	468	930	1,479	1,756	1,848
Total	**365,328**	**469,969**	**547,716**	**618,575**	**678,156**	**739,916**

Potential Future Customers	2010	2020	2030	2040	2050	2060
Anna[a]	1,022	2,357	3,643	4,942	6,618	10,388
Blue Ridge[a]	186	532	1,019	1,652	2,425	2,734
Bonham[a]	0	0	66	1,436	3,253	5,020
Caddo Mills[a]	100	100	100	100	100	100

North Texas Municipal Water District
-Values in Acre-Feet per Year-

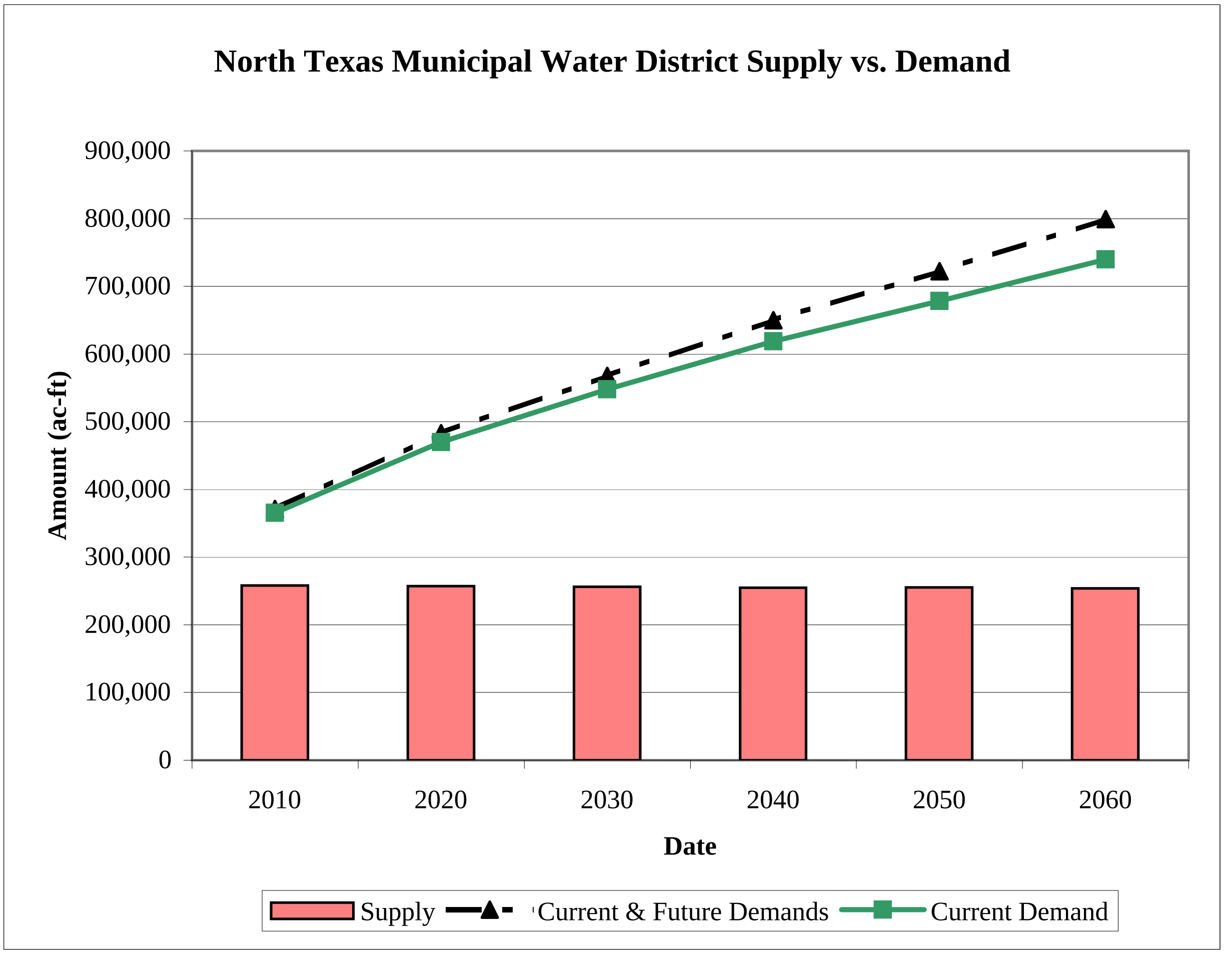
Potential Future Customers	2010	2020	2030	2040	2050	2060
Celina[a]	238	1,187	2,500	4,427	7,313	9,600
Ector[a]	0	9	33	57	59	62
Fannin County-Other[a]	110	331	534	726	664	617
Grayson County Other[a]	50	100	100	100	100	100
Honey Grove[a]	0	85	194	306	335	368
Howe[a]	184	590	947	1,191	1,335	1,491
Leonard[a]	0	121	300	610	930	1,189
South Grayson County WSC[a]	50	100	100	100	100	100
Savoy[a]	0	10	32	56	58	60
Southwest Fannin County SUD[a]	0	402	635	825	910	1,005
Trenton[a]	0	151	383	704	1,087	1,474
Van Alstyne[a]	498	1,966	2,878	3,374	3,688	3,835
Weston[a]	187	621	1,444	4,208	7,384	12,676
Collin County Irrigation[a]	360	360	360	360	360	360
Collin County Mining[a]	146	146	146	146	146	146
Additional Collin County Steam Electric Power	100	100	100	500	500	500
Grayson County Manufacturing (through Howe)[a]	70	78	85	91	96	104
Kaufman County Irrigation	2,200	2,200	2,200	2,200	2,200	2,200
Kaufman County Steam Electric Power[a]	0	1,000	2,000	3,000	4,000	5,000
Rockwall County Irrigation	341	341	341	341	341	341
Total	**5,841**	**12,887**	**20,139**	**31,452**	**44,002**	**59,470**
Total Current and Future Demands	**371,170**	**482,856**	**567,856**	**650,027**	**722,158**	**799,386**

Current Supply	2010	2020	2030	2040	2050	2060
Lake Lavon	104,000	104,000	104,000	104,000	104,000	104,000
Lake Texoma	77,300	77,300	77,300	77,300	77,300	77,300
Lake Chapman	49,976	49,150	48,324	47,498	46,672	45,843
Wilson Creek Reuse	35,941	35,941	35,941	35,941	35,941	35,941
Lake Bonham	3,800	3,800	3,800	3,800	3,800	3,650
Treatment and Distribution Losses	(13,163)	(13,122)	(13,120)	(13,770)	(12,553)	(12,714)
Total Supply	**257,854**	**257,069**	**256,245**	**254,769**	**255,160**	**254,020**

North Texas Municipal Water District
-Values in Acre-Feet per Year-

Supplies Less Current Demands	**-107,474**	**-212,900**	**-291,471**	**-363,806**	**-422,996**	**-485,896**
Supplies Less Current & Future Demands	**-113,316**	**-225,787**	**-311,611**	**-395,258**	**-466,998**	**-545,366**

[a] Supplies from other sources



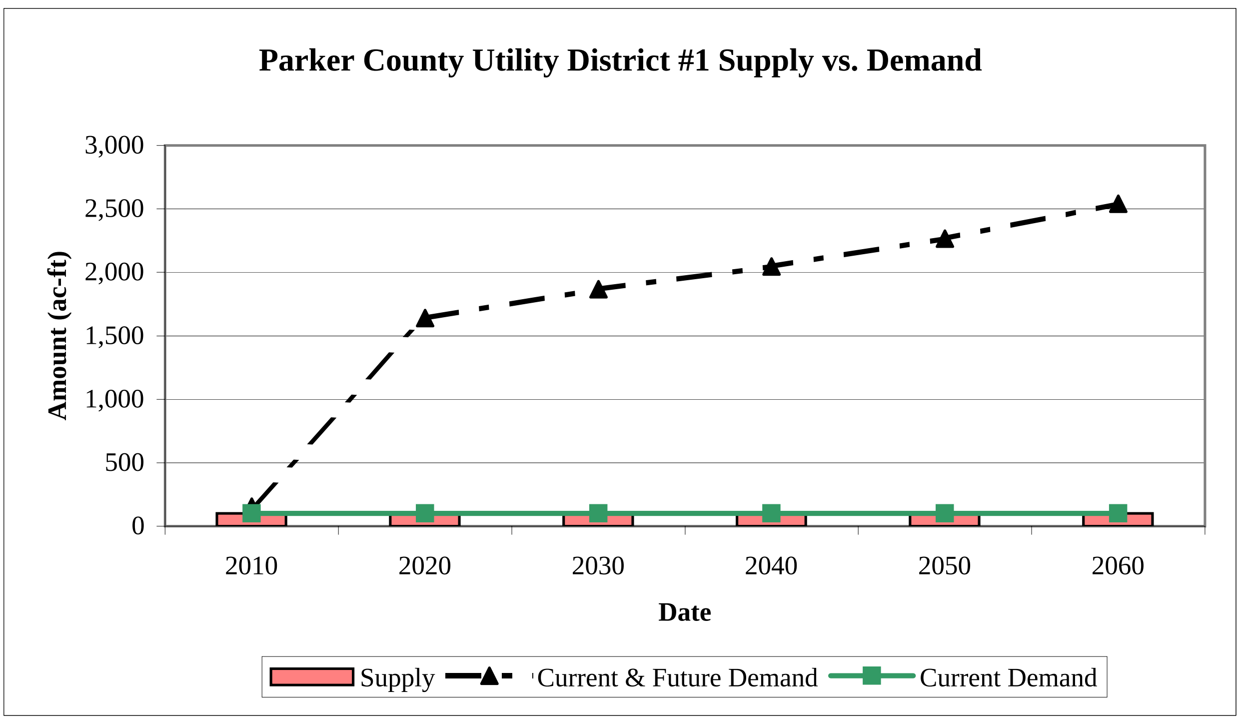
Parker County Utility District #1
-Values in Acre-Feet per Year-

WUG Demands on Parker County Utility District #1						
WUG	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Hudson Oaks	102	102	102	102	102	102
Total	**102**	**102**	**102**	**102**	**102**	**102**

Potential Future Customers	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Hudson Oaks (additional contract)	53	203	366	509	672	855
Willow Park	0	116	272	407	546	706
Annetta	0	97	133	163	194	231
Annetta South	0	24	34	43	52	64
Parker County-Other	0	1,099	959	824	699	583
Total	**53**	**1,539**	**1,764**	**1,946**	**2,163**	**2,439**

Current Supply	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
TRWD Sources (through Weatherford)	102	102	102	102	102	102
Total	**102**	**102**	**102**	**102**	**102**	**102**

Supplies Less Current Demands	**0**	**0**	**0**	**0**	**0**	**0**
Supplies Less Current & Future Demands	**-53**	**-1,539**	**-1,764**	**-1,946**	**-2,163**	**-2,439**



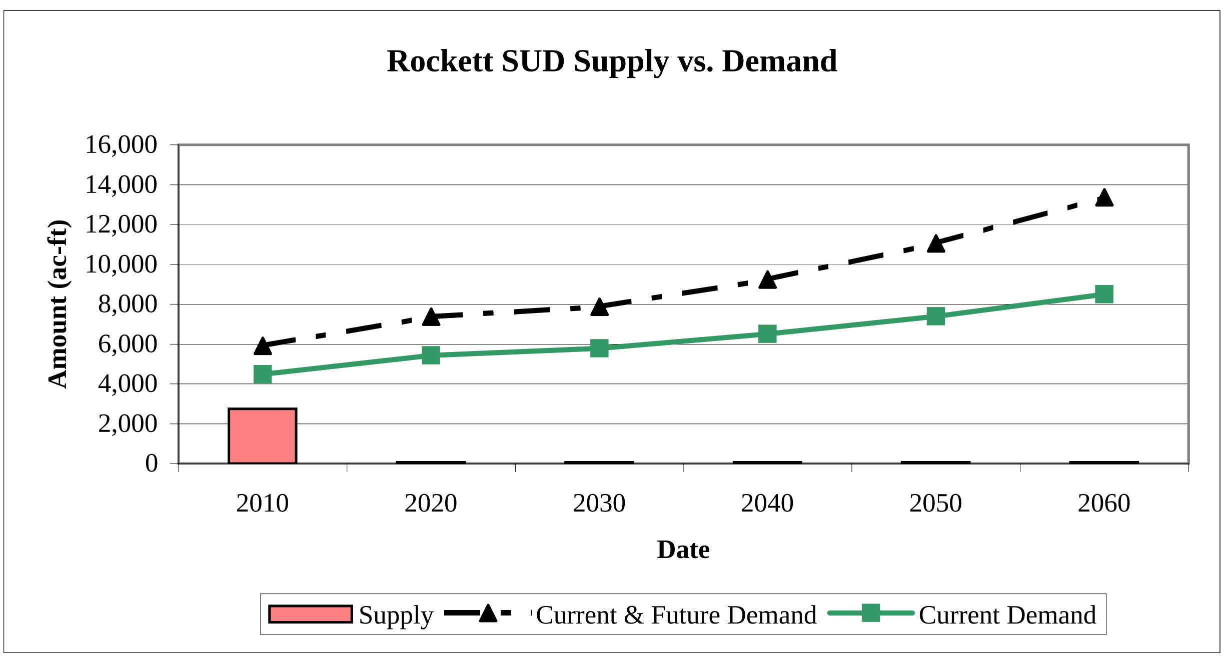
Rockett SUD
-Values in Acre-Feet per Year-

WUG Demands on Rockett SUD						
WUG	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Rockett SUD	4,318	5,185	5,590	6,281	7,145	8,223
Pecan Hill	31	136	129	164	185	212
Red Oak	100	0	0	0	0	0
Ferris	40	109	72	64	60	60
Total	**4,489**	**5,430**	**5,791**	**6,508**	**7,390**	**8,495**

Potential Future Customers	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Buena Vista-Bethel SUD	337	408	442	500	572	658
Mountain Peak WSC	471	596	674	960	1,435	2,041
Palmer	30	80	82	83	86	90
Sardis-Lone Elm WSC	585	865	876	1,191	1,576	2,078
Total	**1,424**	**1,949**	**2,074**	**2,734**	**3,669**	**4,868**

Current Supply	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Midlothian	1,590	0	0	0	0	0
Waxahachie	1,085	0	0	0	0	0
Trinity Aquifer	71	71	71	71	71	71
Total	**2,746**	**71**	**71**	**71**	**71**	**71**

Supplies Less Current Demands	**-1,743**	**-5,359**	**-5,720**	**-6,437**	**-7,319**	**-8,424**
Supplies Less Current & Future Demands	**-3,167**	**-7,308**	**-7,794**	**-9,172**	**-10,988**	**-13,292**

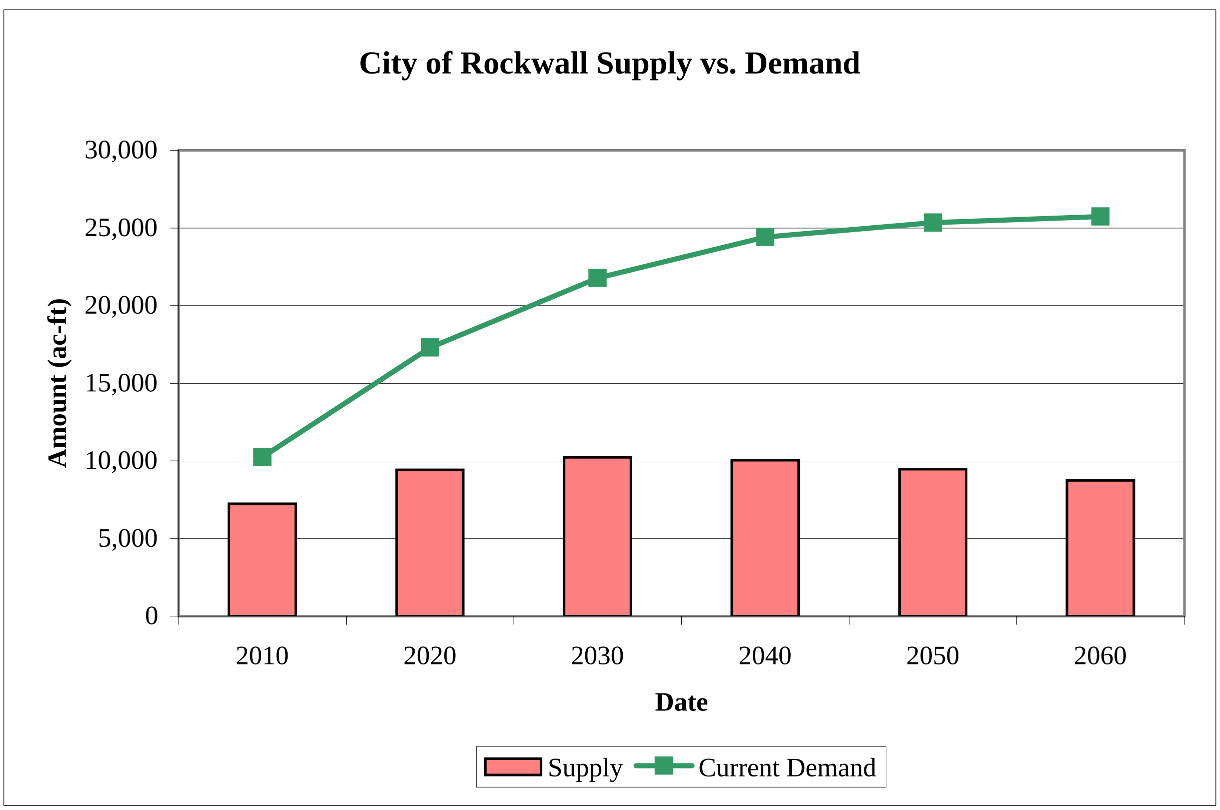


City of Rockwall
-Values in Acre-Feet per Year-

WUG Demands on Rockwall						
WUG	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Rockwall	8,423	14,971	19,167	21,507	22,075	22,075
Blackland WSC	483	699	842	999	1,197	1,433
McLendon-Chisholm	194	246	290	339	396	467
Rockwall County-Other (75%)	289	289	289	287	287	287
RCH WSC	410	440	468	495	533	583
Mt. Zion WSC	442	641	709	774	842	866
Rockwall County Manufacturing (60%)	12	14	16	17	19	21
Total	**10,253**	**17,300**	**21,780**	**24,419**	**25,349**	**25,732**

Current Supply	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
NTMWD	7,236	9,426	10,227	10,032	9,466	8,750
Total	**7,236**	**9,426**	**10,227**	**10,032**	**9,466**	**8,750**

Supplies Less Current Demands	**-3,017**	**-7,874**	**-11,553**	**-14,387**	**-15,883**	**-16,982**



Sabine River Authority Upper Basin
-Values in Acre-Feet per Year-

WUG Demands on Sabine River Authority Upper Basin						
WUG	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Dallas - Tawakoni	183,619	182,251	180,882	179,515	178,146	176,777
Greenville	21,282	21,282	21,282	21,282	21,282	21,282
Quitman	1,120	1,120	1,120	1,120	1,120	1,120
Emory	2,016	2,016	2,016	2,016	2,016	2,016
Able Springs	1,120	1,120	1,120	1,120	1,120	1,120
West Tawakoni	1,120	1,120	1,120	1,120	1,120	1,120
Edgewood	841	841	841	841	841	841
Terrell	10,081	10,081	10,081	10,081	10,081	10,081
Combined WSC	1,680	1,680	1,680	1,680	1,680	1,680
Point	448	448	448	448	448	448
Community WC	92	92	92	92	92	92
Commerce	8,396	8,396	8,396	8,396	8,396	8,396
Cash SUD	3,564	3,564	3,564	3,564	3,564	3,564
McBee	2,240	2,240	2,240	2,240	2,240	2,240
Tawakoni Plant farm	184	184	184	184	184	184
Willis Point	2,240	2,240	2,240	2,240	2,240	2,240
Dallas - Fork	131,860	131,860	131,860	131,860	131,860	131,860
South Tawakoni	1,120	1,120	1,120	1,120	1,120	1,120
Longview	20,000	20,000	20,000	20,000	20,000	20,000
Kilgore	6,721	6,721	6,721	6,721	6,721	6,721
Henderson	5,041	5,041	5,041	5,041	5,041	5,041
Mining - Harrison Co. (TXU)*	12,000	12,000	12,000	12,000	12,000	12,000
Manufacturing - Harrison Co (Eastman Chemicals)	3,500	3,500	3,500	3,500	3,500	3,500
Total	**420,285**	**418,917**	**417,548**	**416,181**	**414,812**	**413,443**

Potential Future Customers	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Bright Star- Salem WSC	841	841	841	841	841	841
Elmo Water Supply Corp	4,484	4,484	4,484	4,484	4,484	4,484
City of East Tawakoni	1,233	1,233	1,233	1,233	1,233	1,233
Poetry WSC	2,242	2,242	2,242	2,242	2,242	2,242
College Mound WSC	5,605	5,605	5,605	5,605	5,605	5,605
North Kaufman WSC	1,233	1,233	1,233	1,233	1,233	1,233
Golden WSC	1,121	1,121	1,121	1,121	1,121	1,121
City of Quinlan	561	561	561	561	561	561
City of Lindale	5,045	5,045	5,045	5,045	5,045	5,045
Total	**22,365**	**22,365**	**22,365**	**22,365**	**22,365**	**22,365**

* This contract is currently being re-negotiated and sold as municipal supply.

Sabine River Authority Upper Basin

-Values in Acre-Feet per Year-

Additional Requests from Existing Customers	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
So. Tawakoni WSC	561	561	561	561	561	561
Cash SUD	2,242	2,242	2,242	2,242	2,242	2,242
Combined Consumers WSC	5,941	5,941	5,941	5,941	5,941	5,941
City of Henderson	5,605	5,605	5,605	5,605	5,605	5,605
City of Kilgore	5,045	5,045	5,045	5,045	5,045	5,045
Able Springs WSC	3,363	3,363	3,363	3,363	3,363	3,363
MacBee WSC	2,242	2,242	2,242	2,242	2,242	2,242
City of Quitman	1,121	1,121	1,121	1,121	1,121	1,121
City of Emory	4,484	4,484	4,484	4,484	4,484	4,484
Greenville	9,865	9,865	9,865	9,865	9,865	9,865
Willis Point	1,121	1,121	1,121	1,121	1,121	1,121
Point	1,233	1,233	1,233	1,233	1,233	1,233
West Tawakoni	1,121	1,121	1,121	1,121	1,121	1,121
Total	**43,944**	**43,944**	**43,944**	**43,944**	**43,944**	**43,944**

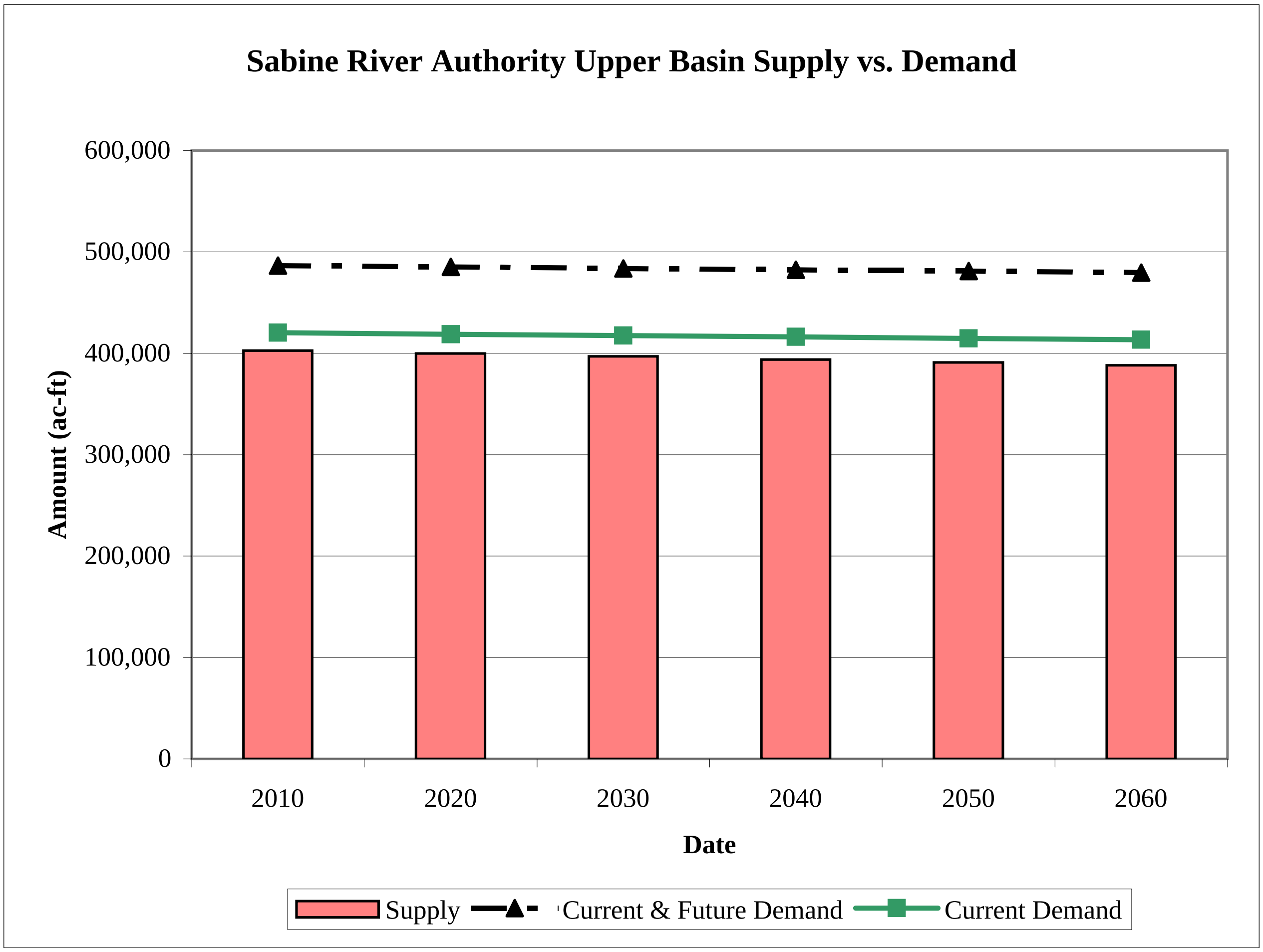
Current Supply (Permitted)	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Lake Tawakoni	229,807	228,093	226,380	224,667	222,953	221,240
Lake Fork	173,035	171,820	170,605	169,390	168,175	166,960
Toledo Bend	750,000	750,000	750,000	750,000	750,000	750,000
Sabine River, Run-of-the-River Supplies	147,100	147,100	147,100	147,100	147,100	147,100
Total	**1,299,942**	**1,297,013**	**1,294,085**	**1,291,157**	**1,288,228**	**1,285,300**

Current Supplies Available to SRA Upper Basin Customers	**2,010**	**2,020**	**2,030**	**2,040**	**2,050**	**2,060**
Lake Tawakoni (Dallas)	183,619	182,251	180,882	179,515	178,146	176,777
Lake Tawakoni (Terrell)	9,718	9,646	9,573	9,501	9,428	9,356
Lake Tawakoni (Others)	36,469	36,197	35,925	35,651	35,379	35,107
Lake Fork (Dallas- Trinity)	120,000	119,943	119,095	118,248	117,400	116,551
Lake Fork (Dallas- Sabine)	791					
Lake Fork (Others)	52,244	51,877	51,510	51,142	50,775	50,409
Total	**402,842**	**399,913**	**396,985**	**394,057**	**391,128**	**388,200**

Supplies Less Current Demands	**-17,444**	**-19,004**	**-20,563**	**-22,124**	**-23,684**	**-25,243**
Supplies Less Current & Future Demands	**-83,753**	**-85,313**	**-86,872**	**-88,433**	**-89,993**	**-91,552**

Sabine River Authority Upper Basin

-Values in Acre-Feet per Year-

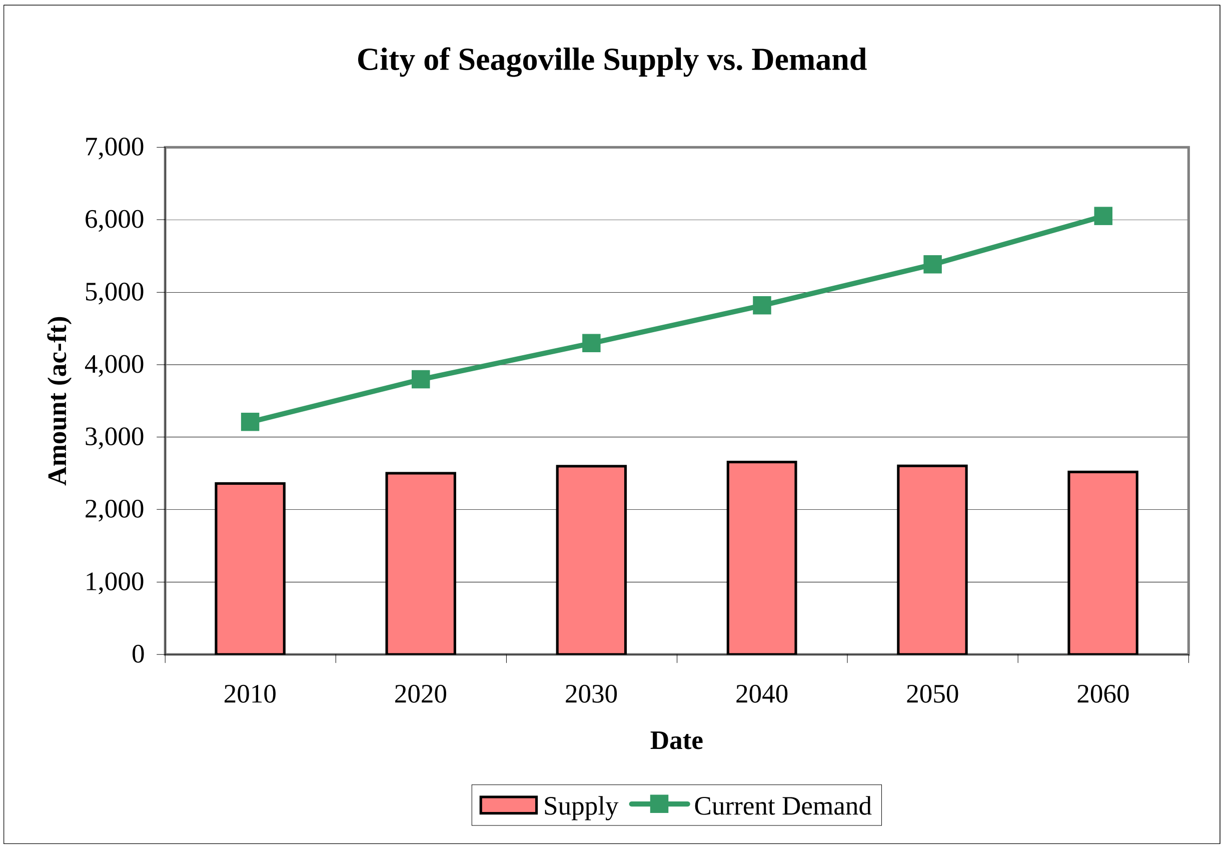


City of Seagoville
-Values in Acre-Feet per Year-

WUG Demands on Seagoville						
WUG	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Seagoville	2,465	2,751	3,037	3,319	3,576	3,853
Combine WSC	462	688	855	1,035	1,268	1,562
Combine	282	356	405	463	537	635
Total	**3,209**	**3,795**	**4,297**	**4,817**	**5,381**	**6,050**

Current Supply	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
DWU Sources	2,360	2,501	2,598	2,657	2,602	2,518
Total	**2,360**	**2,501**	**2,598**	**2,657**	**2,602**	**2,518**

Supplies Less Current Demands	**-849**	**-1,294**	**-1,699**	**-2,160**	**-2,779**	**-3,532**



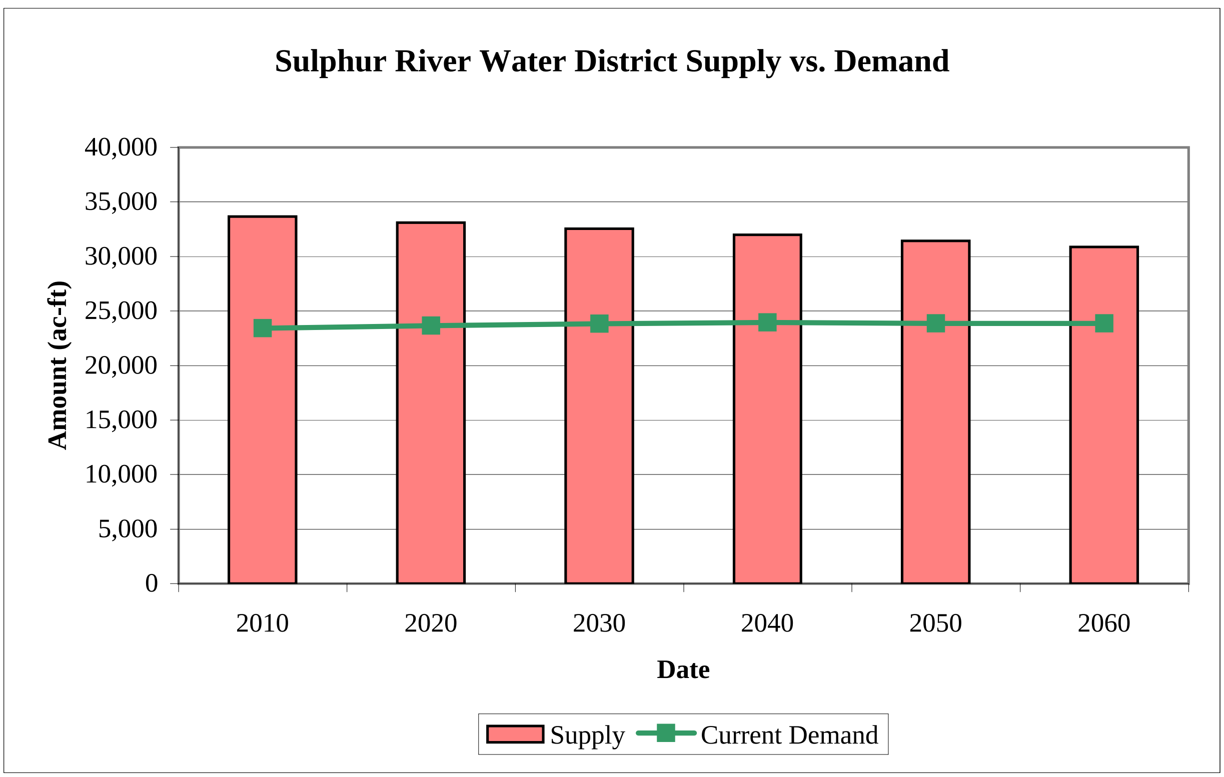
Sulphur River Water District
-Values in Acre-Feet per Year-

WUG Demands on Sulphur River Water District						
WUG	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Sulphur Springs (includes Sulphur Springs manufacturing sales, Martin WSC, North Hopkins WSC and 40% Hopkins County-Other)	6,139	6,642	7,078	7,447	7,639	7,906
Cooper	391	418	442	465	462	462
North Texas Municipal Water District (sales from Cooper to NTMWD)*	2,808	2,762	2,716	2,670	2,624	2,575
Upper Trinity Regional Water District (sales from Commerce)*	14,068	13,835	13,602	13,369	13,136	12,905
Total	**23,406**	**23,657**	**23,838**	**23,951**	**23,861**	**23,848**

Current Supply	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Lake Chapman	33,647	33,090	32,533	31,976	31,419	30,864
Total	**33,647**	**33,090**	**32,533**	**31,976**	**31,419**	**30,864**

Supplies Less Current Demands	**10,241**	**9,433**	**8,695**	**8,025**	**7,558**	**7,016**

* Contract amounts for NTMWD and UTRWD are reduced based upon the yield of Lake Chapman.



Tarrant Regional WaterDistrict
-Values in Acre-Feet per Year-

WUG Demands on Tarrant Regional Water District						
WUG	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Arlington[a]	71,175	82,694	87,959	89,880	91,335	92,376
Azle	1,953	2,633	3,602	4,697	5,849	6,860
Benbrook[a]	3,943	4,735	5,771	7,034	8,539	10,304
Bethesda WSC[a]	1,495	1,815	2,147	2,507	2,935	3,466
Burleson	4,119	4,741	5,430	6,159	7,099	8,293
Crowley[a]	1,208	1,461	1,870	2,550	3,093	3,375
Blue Mound[a]	114	117	111	103	100	100
Bridgeport	1,570	1,899	2,702	3,187	3,713	4,444
Community WSC	444	438	433	422	426	435
Dalworthington Gardens[a]	582	627	658	673	685	695
Decatur (Wise County WSD)	1,639	2,011	2,748	3,537	4,580	5,385
Denton County-Other[a]	722	901	1,073	1,234	1,397	1,565
East Cedar Creek FWSD	2,319	2,853	3,402	3,931	4,631	5,516
Payne Springs	165	174	182	191	203	220
Gun Barrel City	1,257	1,452	1,637	1,841	2,089	2,416
Edgecliff	460	451	443	434	428	428
Everman[a]	396	447	494	536	595	606
Fairfield (starting by 2030)[a]	0	0	405	491	590	696
Forest Hill	1,783	1,892	1,997	2,122	2,285	2,399
Grand Prairie	1,120	1,120	1,120	1,120	1,120	1,120
Haltom City	7,135	7,835	8,142	8,231	8,272	8,324
Fort Worth	149,596	182,321	218,891	265,795	334,259	418,317
Haslet[a]	259	658	1,258	1,251	1,251	1,251
Henderson County SEP	0	0	0	0	0	0
Hurst[a]	6,443	6,769	6,933	6,989	7,075	7,166
Keller[a]	9,160	10,829	10,775	10,667	10,667	10,667
Lake Worth[a]	585	665	757	845	945	999
North Richland Hills[a]	3,749	4,150	4,426	4,590	4,708	4,807
Jacksboro[a]	0	0	0	0	0	0
Kemp	181	178	174	170	168	168
Mabank	591	699	807	933	1,089	1,288
Malakoff[a]	215	232	248	263	289	327
Mansfield	13,505	19,575	25,037	30,522	34,185	34,644
Johnson County SUD	2,242	2,242	2,242	2,242	2,242	2,242
Northlake[a]	524	623	1,197	1,772	2,131	2,295

Tarrant Regional WaterDistrict
-Values in Acre-Feet per Year-

WUG	2010	2020	2030	2040	2050	2060
Richland Hills[a]	1,174	1,228	1,288	1,358	1,405	1,427
River Oaks	1,010	986	954	931	923	923
Roanoke[a]	1,114	1,834	2,894	3,953	5,291	6,387
Saginaw	2,885	3,540	3,942	4,240	4,448	4,618
Runaway Bay	321	390	455	521	595	685
Sansom Park Village[a]	181	187	187	183	186	193
Southlake (Denton & Tarrant Counties)	11,837	14,437	15,907	16,793	17,701	17,930
Springtown[a]	268	423	571	725	877	1,036
Reno[a]	89	91	92	91	97	107
Trinity River Authority	0	0	0	0	0	0
Bedford[a]	9,713	10,022	10,240	10,383	10,592	10,821
Buena Vista Bethel SUD (by 2020)[a]	0	261	283	319	365	421
Ennis and customers (by 2005)[a]	341	711	2,131	3,846	4,138	4,446
Ellis County-Other (by 2020)[a]	0	1,045	1,024	1,013	1,002	1,002
Ellis County Manufacturing (through Midlothian, Ennis and Waxahachie)[a]	0	0	0	0	0	0
Ferris (by 2020)[a]	0	30	30	30	30	30
Palmer (by 2020)[a]	0	50	52	53	56	60
Italy (by 2020)[a]	0	140	172	207	249	299
Euless[a]	8,767	9,829	10,227	10,377	10,446	10,517
North Richland Hills[a]	8,733	9,668	10,313	10,696	10,971	11,201
Maypearl (by 2020)[a]	0	73	71	68	66	66
Midlothian Water District[a]	597	1,595	4,999	7,006	8,839	9,972
Red Oak (by 2020)[a]	0	387	519	657	660	660
Rocket SUD (by 2020)[a]	0	957	1,030	1,160	1,322	1,521
Pecan Hill[a]	0	37	41	46	51	57
Waxahachie (by 2020)[a]	0	511	511	511	2,392	5,212
Colleyville[a]	8,107	8,897	9,188	9,299	9,324	9,348
Grapevine[a]	8,155	10,138	11,153	11,848	12,398	12,861
Trophy Club[a]	2,147	2,471	2,743	2,984	3,255	3,527

Tarrant Regional WaterDistrict
-Values in Acre-Feet per Year-

WUG	2010	2020	2030	2040	2050	2060
Walnut Creek SUD	2,264	2,874	3,347	3,775	4,268	4,812
Boyd[a]	65	128	148	141	138	138
Rhome[a]	450	994	1,467	1,911	2,306	2,789
Aurora[a]	38	59	79	100	123	152
West Wise SUD	88	98	109	123	141	164
Wise County-Other	56	63	65	65	65	65
Parker County Other	200	200	200	200	200	200
Reno	80	80	80	80	80	80
Watauga	3,437	3,532	3,584	3,603	3,657	3,723
Weatherford[a]	2,459	3,848	5,157	6,254	7,411	8,741
Parker County Manufacturing[a]	575	645	712	778	836	905
Hudson Oaks (starting by 2010)[a]	102	102	102	102	102	102
West Cedar Creek MUD	2,184	3,300	4,227	5,072	6,160	7,520
Seven Points	174	205	234	266	304	355
Tool	405	452	500	548	610	695
West Wise WSC[a]	409	438	462	486	515	553
Chico[a]	89	116	157	214	286	376
Westover Hills	276	274	272	270	268	268
Westworth Village	244	287	297	308	328	362
White Settlement[a]	1,702	1,818	1,989	2,002	2,202	2,424
Freestone County Other[a]	367	371	369	362	359	359
Freestone County Steam Electric	6,726	6,726	6,726	6,726	6,726	6,726
Henderson County-Other[a]	131	129	127	124	123	123
Henderson County Mining[a]	154	154	154	154	154	154
Jack County-SEP[a]	0	3,674	4,257	4,257	4,257	4,257
Kaufman County-Other[a]	218	217	215	213	212	212
Kaufman County Irrigation	125	125	125	125	125	125
Navarro County-Other[a]	125	122	120	117	115	115
Navarro County Manufacturing (assume 49%)	574	651	719	787	848	917
Tarrant County-Other[a]	3,482	3,402	3,348	3,268	3,241	3,241
Tarrant County Manufacturing[a]	17,258	20,444	23,630	26,924	29,919	32,457
Tarrant County Irrigation[a]	3,058	3,058	3,058	3,058	3,058	3,058
Tarrant County Steam Electric Power[a]	3,923	3,232	3,949	4,824	5,890	7,188
Wise County-Other[a]	905	1,730	1,585	1,700	1,480	1,520
Wise County Irrigation	124	124	124	124	124	124
Wise County Manufacturing[a]	2,299	2,646	2,965	3,263	3,525	3,844
Wise County Steam Electric Power	4,600	4,600	4,600	4,600	4,600	4,600
Wise County Mining[a]	2,896	2,896	2,896	2,896	2,896	2,896
Total	**418,350**	**502,987**	**578,240**	**656,036**	**754,302**	**864,860**

Tarrant Regional WaterDistrict
-Values in Acre-Feet per Year-

Potential Future Customers	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Alvord[a]	58	71	83	97	113	135
Grand Prairie (part, through Midlothian)	1,120	2,241	2,241	2,241	2,241	2,241
Grand Prairie (part, through Mansfield)	2,242	2,242	2,242	2,242	2,242	2,242
Newark (Walnut Creek SUD through Rhome)[a]	62	140	209	326	472	695
New Fairview (Walnut Creek SUD through Rhome)[a]	98	169	237	306	385	476
Aledo (Fort Worth)[a]	148	300	453	588	738	904
Hudson Oaks (Parker Co. UD)	53	203	366	509	672	855
Lakeside[a]	180	245	313	385	473	579
Mountain Peak WSC (Rockett SUD)	0	165	183	214	263	326
Sardis Lone Elm (Rockett SUD)	0	170	170	187	222	269
Henderson Steam Electric (assumed conversion of Forest Grove to other use)	0	0	0	0	0	0
Jack County Steam Electric (Above Contract with Duke)	0	0	39	796	1,720	2,845
Kennedale (starting by 2010)	541	789	951	1,062	1,132	1,187
Pantego (starting by 2010)	180	172	165	157	152	152
Parker County-Other (50% of Trinity Basin, starting by 2020)	0	1,099	959	824	699	583
Pelican Bay (through Azle)[a]	77	122	173	194	222	259
Bethesda WSC (Johnson County)[a]	2,357	3,021	3,721	4,504	5,469	6,702
Freestone County Steam Electric Power[a]	0	0	0	1,000	1,000	1,000
Annetta (through Parker UD)[a]	0	97	133	163	194	231
Annetta South (through Parker UD)[a]	0	24	34	43	52	64
Willow Park (through Parker UD)[a]	0	116	272	407	546	706
Tarrant County Irrigation	100	100	100	100	100	100
Tarrant County Mining	100	150	200	250	300	300
Wise County Mining[a]	3,300	3,300	3,300	3,300	3,300	3,300
Wise County Steam Electric (additional)[a]	0	1,053	1,209	2,374	2,500	2,500
Total	**10,616**	**15,989**	**17,753**	**22,268**	**25,207**	**28,650**
Total Current and Potential Customer Demand	**428,966**	**518,976**	**595,992**	**678,304**	**779,509**	**893,510**

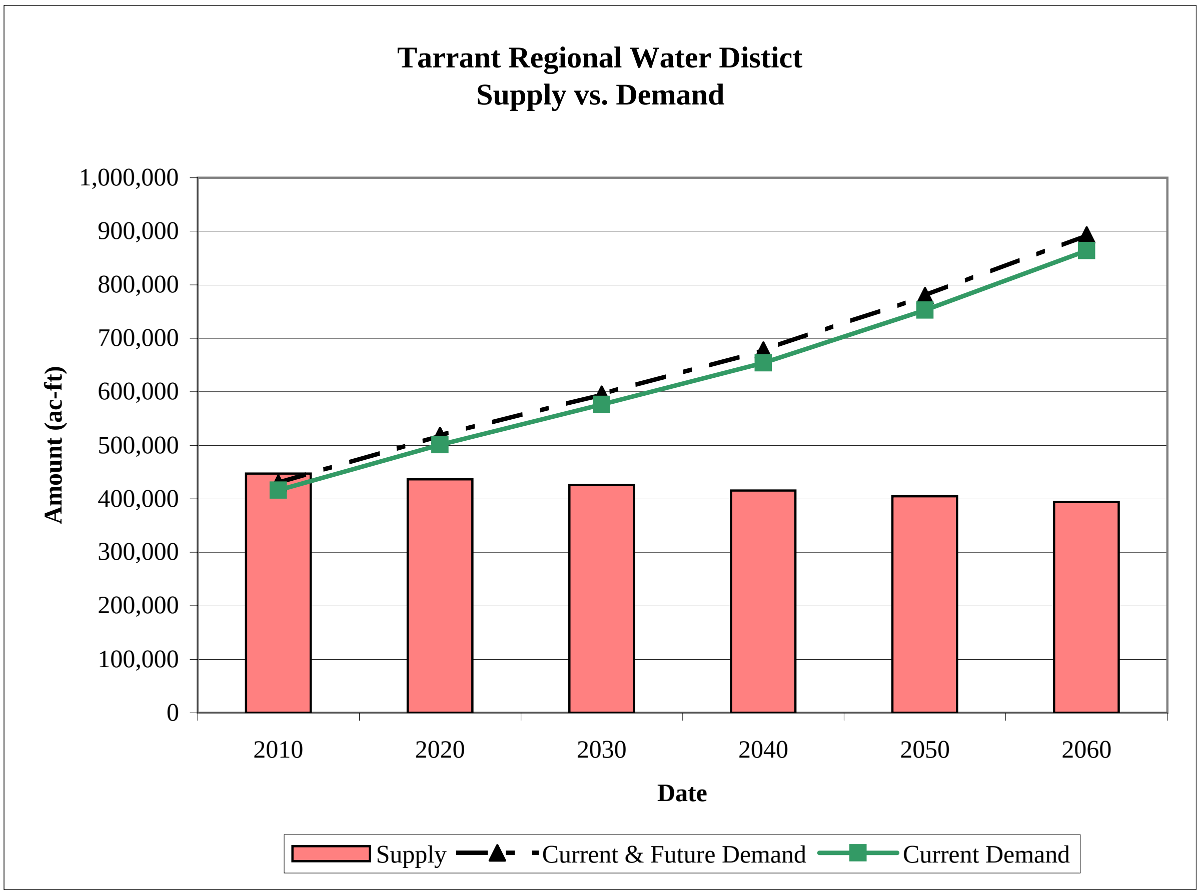
Tarrant Regional WaterDistrict

-Values in Acre-Feet per Year-

Current Supply	2010	2020	2030	2040	2050	2060
Cedar Creek	152,783	150,066	147,349	144,632	141,915	139,200
Richland Chambers	188,444	181,388	174,332	167,276	160,220	153,165
West Fork System (includes Bridgeport local)	98,975	98,150	97,325	96,500	95,675	94,850
Lake Benbrook	6,834	6,834	6,834	6,834	6,834	6,834
Total	**447,036**	**436,438**	**425,840**	**415,242**	**404,644**	**394,049**

Supplies Less Current Demands	**28,686**	**-66,549**	**-152,400**	**-240,794**	**-349,658**	**-470,811**
Supplies Less Current & Future Demands	**18,070**	**-82,538**	**-170,152**	**-263,062**	**-374,865**	**-499,461**

[a] Supplies from other sources



City of Terrell

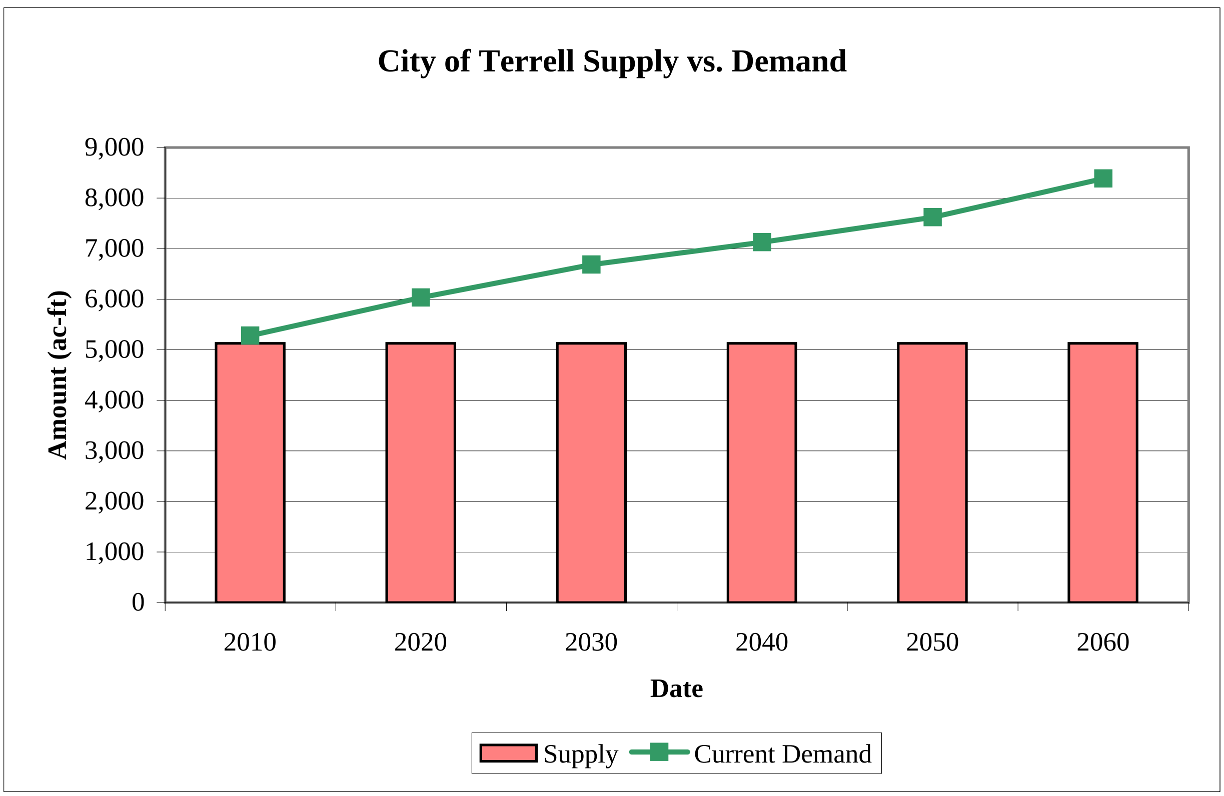
-Values in Acre-Feet per Year-

WUG Demands on Terrell						
WUG	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Terrell	3,575	4,302	4,926	5,325	5,735	6,372
College Mound	385	385	385	385	385	385
High Point WSC	120	120	120	120	120	120
Hunt County-Other (5%)	68	80	98	127	196	303
Kaufman County-Other (40%)	873	866	860	853	847	847
Kaufman County Manufacturing (34%)	258	276	295	316	338	361
Total	**5,279**	**6,030**	**6,685**	**7,126**	**7,620**	**8,388**

Current Supply	2010	2020	2030	2040	2050	2060
Lake Tawakoni	9,718	9,646	9,573	9,501	9,428	9,356
Lake Terrell	2,200	2,200	2,200	2,200	2,200	2,200
NTMWD*	0	0	0	0	0	0
Total	**11,918**	**11,846**	**11,773**	**11,701**	**11,628**	**11,556**
Pipeline Capacity	**5,125**	**5,125**	**5,125**	**5,125**	**5,125**	**5,125**

Supplies Less Current Demands	**-154**	**-905**	**-1,560**	**-2,001**	**-2,495**	**-3,263**

* Contract signed , but there is no infrastructure in place



Trinity River Authority
(Units: Acre-Feet per Year)

WUGs Demands on Trinity River Authority						
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
TRWD Sources						
Ellis County Project						
Buena Vista Bethel SUD [a]	0	261	283	319	365	421
Ennis (by 2010)[a]	341	711	2,131	3,846	4,138	4,446
Community WC						
Rice WSC						
Ellis County-Other[a]	0	1,045	1,024	1,013	1,002	1,002
Ferris (by 2020)[a]	0	30	30	30	30	30
Italy (by 2020)[a]	0	140	172	207	249	299
Maypearl (by 2020)[a]	0	73	71	68	66	66
Midlothian[a]	597	1,595	4,999	7,006	8,839	9,972
Palmer (by 2020)[a]	0	50	52	53	56	60
Red Oak (by 2020)[a]	0	387	519	657	660	660
Rocket SUD (by 2020)[a]	0	957	1,030	1,160	1,322	1,521
Pecan Hill[a]	0	37	41	46	51	57
Waxahachie (by 2020)[a]	0	511	511	511	2,392	5,212
Subtotal	**938**	**5,797**	**10,861**	**14,915**	**19,170**	**23,746**
Potential Future Customers						
Grand Prairie (Midlothian)	1,120	2,241	2,241	2,241	2,241	2,241
Mountain Peak WSC (Rockett)	0	165	183	214	263	326
Sardis Lone Elm (Rockett)	0	170	170	187	222	269
Tarrant County Project (TCWSP)[b]						
Bedford[a]	9,713	10,022	10,240	10,383	10,592	10,821
Euless[a]	8,767	9,829	10,227	10,377	10,446	10,517
North Richland Hills[a]	8,733	9,668	10,313	10,696	10,971	11,201
Colleyville[a]	8,107	8,897	9,188	9,299	9,324	9,348
Grapevine[a]	8,155	10,138	11,153	11,848	12,398	12,861
Subtotal	**43,475**	**48,554**	**51,121**	**52,603**	**53,731**	**54,749**
Freestone SEP[a]	6,726	6,726	6,726	6,726	6,726	6,726
Subtotal	**6,726**	**6,726**	**6,726**	**6,726**	**6,726**	**6,726**
Freestone SEP (additional)				1,000	1,000	1,000
Joe Pool Lake[c]						
Midlothian	6,011	5,593	5,174	4,756	4,338	3,920
Dallas Irrigation (through Grand Prairie)	100	100	100	100	100	100
Subtotal	**6,111**	**5,693**	**5,274**	**4,856**	**4,438**	**4,020**
Potential Customers						
Additional Midlothian	362	217	138	108	88	75
Subtotal	**362**	**217**	**138**	**108**	**88**	**75**

Trinity River Authority
(Units: Acre-Feet per Year)

Bardwell Lake	2010	2020	2030	2040	2050	2060
Ennis	3,888	3,762	3,668	3,556	3,426	3,297
Community Water Company	129	148	134	118	102	78
East Garrett WSC (assume 10% county-other)	224	173	132	101	76	57
Rice WSC[a]	85	85	67	52	39	29
Ellis County Manufacturing	386	317	256	204	159	114
Waxahachie (Ellis County WCID)	3,855	3,669	3,483	3,297	3,111	2,925
Subtotal	**8,567**	**8,153**	**7,740**	**7,327**	**6,913**	**6,500**
Navarro Mills						
Corsicana & customers	10,337	11,345	12,233	13,170	14,410	15,000
Subtotal	**10,337**	**11,345**	**12,233**	**13,170**	**14,410**	**15,000**
Lake Livingston						
SE Power (Livingston to TXU Fairfield)	16,643	19,091	20,000	20,000	20,000	20,000
Subtotal	**16,643**	**19,091**	**20,000**	**20,000**	**20,000**	**20,000**
Reuse						
Ellis County - SEP (from Ennis)	3,363	3,363	3,363	3,363	3,363	3,363
Dallas County - Other	8,000	8,000	8,000	8,000	8,000	8,000
Waxahachie	4,998	5,129	5,129	5,129	5,129	5,129
Subtotal	**16,361**	**16,492**	**16,492**	**16,492**	**16,492**	**16,492**
Potential Future Customers						
Las Colinas Reuse	0	7,000	7,000	7,000	7,000	7,000
Ellis County Steam Electric Reuse	20,000	20,000	30,000	30,000	40,000	40,000
Freestone County Steam Electric Reuse	0	0	10,000	10,000	20,000	20,000
Kaufman County Steam Electric Reuse	0	7,500	15,000	15,000	15,000	15,000
Tarrant and Denton County Irrigation	7,500	7,500	7,500	7,500	7,500	7,500
Tarrant County Municipal Reuse	0	7,500	7,500	7,500	7,500	7,500
Mountain Creek Lake Reuse	0	3,000	3,000	3,000	3,000	3,000
Joe Pool Lake Reuse from Central WWTP for Johnson County SUD	0	20,000	20,000	20,000	20,000	20,000
Joe Pool Lake Reuse from New WWTP	0	3,500	3,500	3,500	3,500	3,500
TRA - Irving reuse	28,000	28,000	28,000	28,000	28,000	28,000
Subtotal	**55,500**	**104,000**	**131,500**	**131,500**	**151,500**	**151,500**

Trinity River Authority
(Units: Acre-Feet per Year)

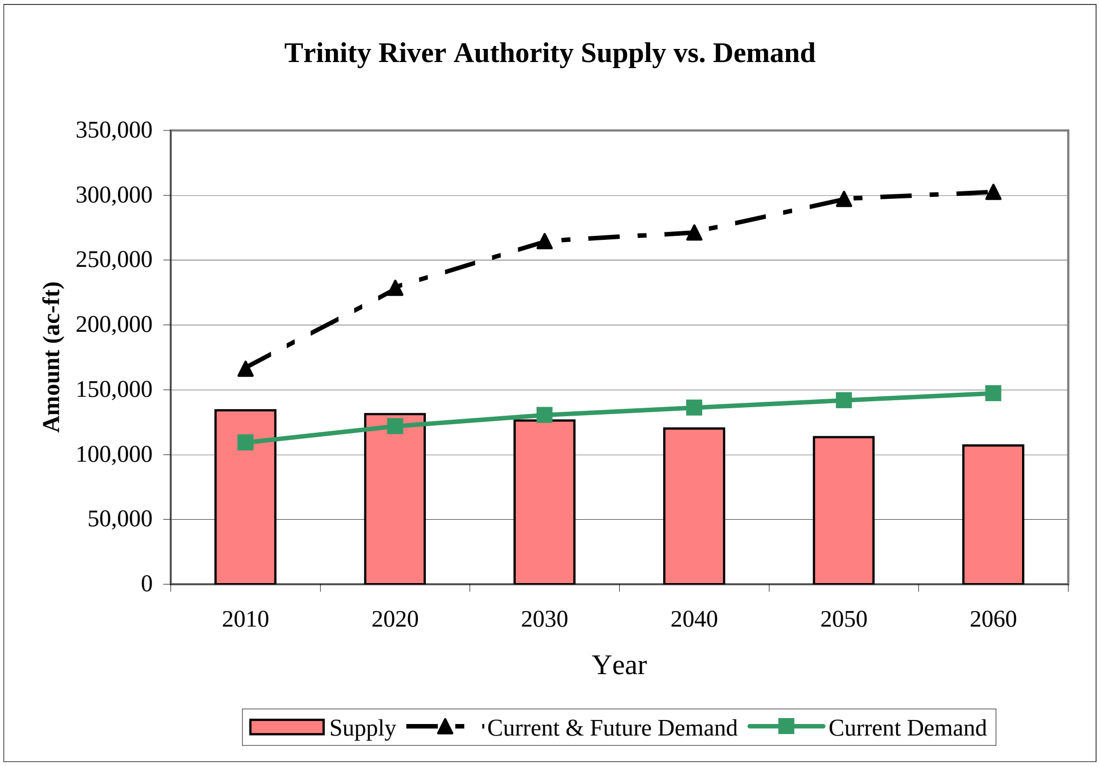
Current Supplies	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Joe Pool Lake	15,333	14,267	13,200	12,133	11,067	10,000
Navarro Mills Lake	19,400	18,800	17,850	16,900	15,950	15,000
Bardwell Lake	8,567	8,153	7,740	7,327	6,913	6,500
Lake Livingston	20,000	20,000	20,000	20,000	20,000	20,000
Reuse	16,361	16,492	16,492	16,492	16,492	16,492
TRWD	54,428	53,514	51,013	47,356	42,960	38,936
Total	**134,089**	**131,226**	**126,295**	**120,208**	**113,382**	**106,928**

Supplies Less Current Demands	**24,931**	**9,375**	**-4,153**	**-15,881**	**-28,498**	**-40,305**
Supplies Less Current & Future Demands	**-32,051**	**-97,418**	**-138,384**	**-151,131**	**-183,812**	**-195,716**

[a] Supplies from other sources

[b] The Master Plan for the TCWSP show demands at 43,577 ac-ft/yr in 2010 and 46,489 ac-ft/yr in 2020.

[c] Demand on Joe Pool Lake is based on percentage of contract to firm yield of reservoir.

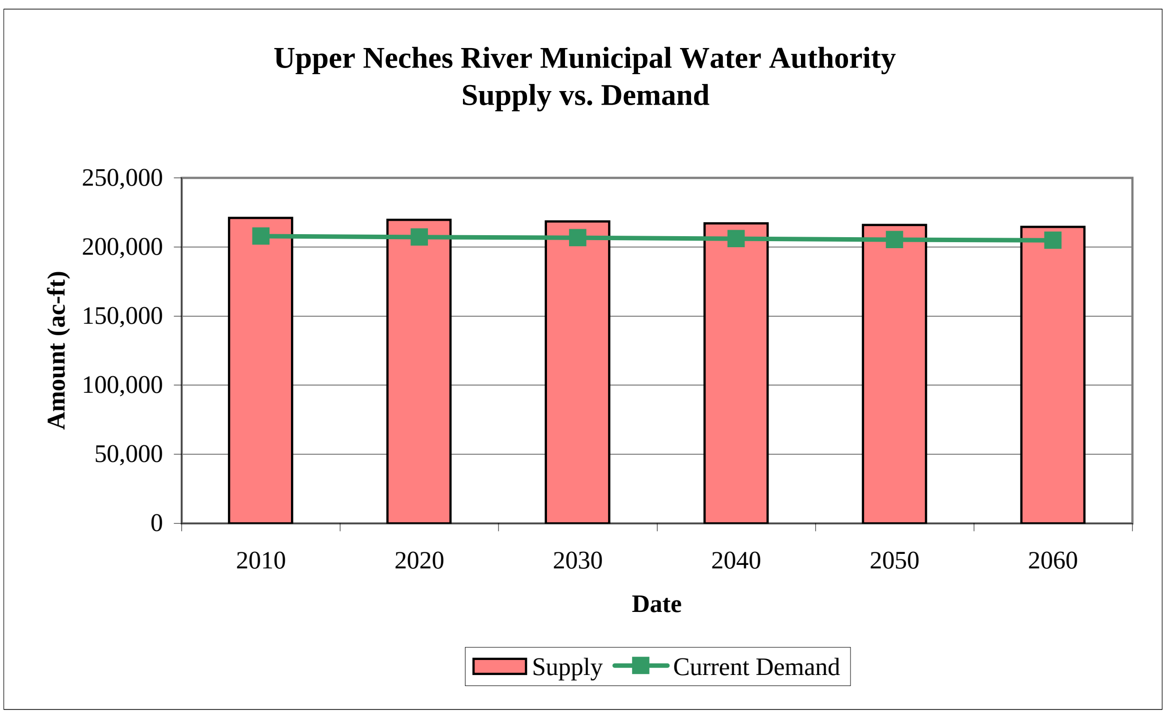


Upper Neches River Municipal Water Authority
-Values in Acre-Feet per Year-

WUG Demands on Upper Neches River Municipal Water Authority						
WUG	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
City of Dallas (not connected)	112,080	111,460	110,840	110,220	109,600	108,980
City of Tyler	67,200	67,200	67,200	67,200	67,200	67,200
Smith County Manufacturing						
Whitehouse						
City of Palestine	28,000	28,000	28,000	28,000	28,000	28,000
Smith County-Other (1%)	93	82	73	64	57	51
Super Tree Farm for International Paper (Cherokee County irrigation)	300	300	300	300	300	300
TCON (Henderson County-Other)	100	100	100	100	100	100
Emerald Bay Golf Course (Smith County irrigation)	105	105	105	105	105	105
Total	**207,878**	**207,247**	**206,618**	**205,989**	**205,362**	**204,736**

Current Supply	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Lake Palestine	220,933	219,667	218,400	217,133	215,867	214,600
Total	**220,933**	**219,667**	**218,400**	**217,133**	**215,867**	**214,600**

Supplies Less Current Demands	**13,055**	**12,419**	**11,782**	**11,144**	**10,504**	**9,864**



Upper Trinity Regional Water District
-Values in Acre-Feet per Year-

WUG Demands on Upper Trinity Regional Water District						
WUG	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Argyle WSC[a]	490	542	588	634	690	729
Argyle[a]	1,958	3,579	4,628	5,179	5,799	6,394
City of Aubrey[a]	287	709	1,256	1,731	2,387	3,246
Bartonville WSC[a]	53	136	211	283	354	410
Bartonville[a]	765	1,948	2,799	3,350	3,587	3,711
Copper Canyon[a]	341	494	763	1,149	1,357	1,468
Double Oak[a]	573	650	705	764	822	879
City of Corinth[a]	3,757	4,675	5,380	6,085	6,519	6,845
Denton County-Irrigation (direct reuse)	897	897	897	897	897	897
Denton County-Other (80%)	5,774	7,206	8,582	9,873	11,177	12,519
Denton County Manufacturing (19%)	203	235	268	300	329	357
Denton County FWSD 1A	991	1,581	2,132	2,704	3,286	3,894
Hebron (20%)	44	67	110	217	326	352
Highland Village[a]	2,124	2,664	3,055	3,351	3,614	3,804
Krum[a]	201	438	628	932	1,282	1,692
Lake Cities MUA[a]	0	0	0	0	0	0
Hickory Creek[a]	435	733	926	1,155	1,551	2,021
Lake Dallas[a]	1,011	1,313	1,466	1,584	1,670	1,735
Shady Shores[a]	252	387	483	585	688	797
Flower Mound[a]	4,588	9,949	13,656	17,426	19,754	21,330
Town of Lincoln Park[a]	88	158	217	276	338	400
Mustang SUD[a]	623	1,226	1,740	2,250	2,782	3,319
Cross Roads[a]	497	1,202	2,004	3,391	5,315	6,652
Oak Point[a]	381	729	1,010	1,289	1,580	1,875
Krugerville[a]	111	138	170	237	322	475
City of Sanger[a]	1,717	2,358	2,951	3,639	4,192	4,428
City of Celina[a]	661	4,925	10,751	19,037	29,116	33,600
City of Justin[a]	183	598	1,164	2,090	2,639	2,958
Total	**29,003**	**49,535**	**68,541**	**90,407**	**112,372**	**126,787**

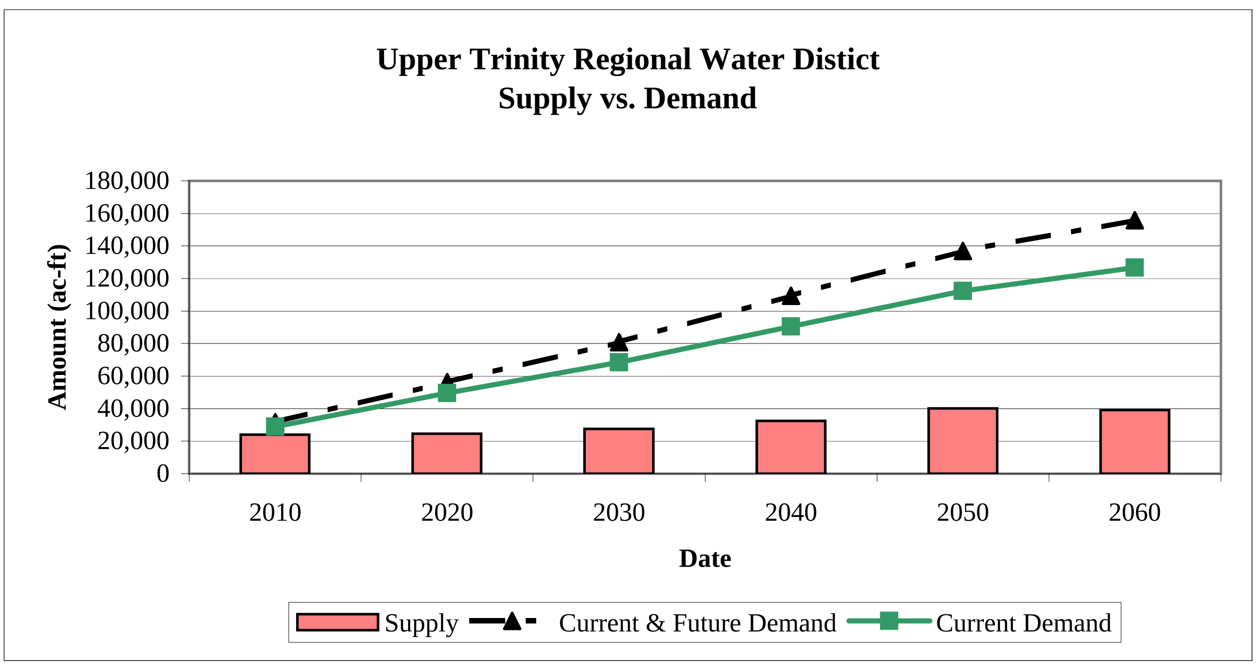
Upper Trinity Regional Water District
-Values in Acre-Feet per Year-

Potential Future Customers	2010	2020	2030	2040	2050	2060
Pilot Point[a]	682	1,230	1,543	1,805	2,019	2,218
Prosper[a]	500	1,890	2,861	3,509	3,779	4,049
Gunter Rural WSC[a]	271	553	773	1,065	1,458	1,863
Bolivar WSC (by 2010)[a]	205	629	2,297	5,147	8,154	11,030
Valley View (by 2010)[a]	108	272	446	606	1,028	1,286
Ladonia[a]	298	370	550	655	796	1,000
Northlake (33%)[a]	262	311	599	886	1,066	1,148
Ponder[a]	440	1,563	3,295	5,376	6,260	6,451
Total	**2,766**	**6,818**	**12,363**	**19,049**	**24,560**	**29,045**

Current Supply	2010	2020	2030	2040	2050	2060
DWU	10,302	11,026	14,476	19,883	28,137	27,450
Lake Chapman	14,068	13,835	13,602	13,369	13,136	12,905
Reuse	897	897	897	897	897	897
Treatment and Transmission Losses	(1,219)	(1,243)	(1,404)	(1,663)	(2,064)	(2,018)
Total	**24,048**	**24,515**	**27,571**	**32,486**	**40,106**	**39,234**

Supplies Less Current Demands	**-4,955**	**-25,020**	**-40,970**	**-57,921**	**-72,266**	**-87,553**
Supplies Less Current & Future Demands	**-7,721**	**-31,838**	**-53,333**	**-76,970**	**-96,826**	**-116,597**

[a] Supplies from other sources



Walnut Creek SUD

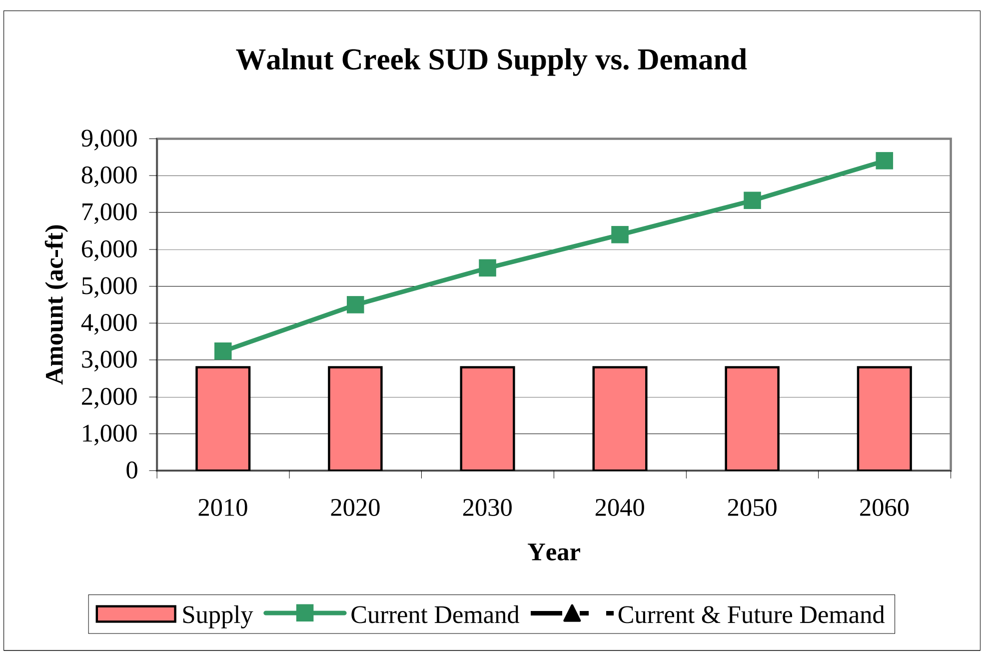
-Values in Acre-Feet per Year-

WUG Demand on Walnut Creek SUD						
WUG Demands	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Walnut Creek SUD	2264	2874	3347	3775	4268	4812
Boyd	65	128	148	141	138	138
Rhome	450	994	1467	1911	2306	2789
Aurora	38	59	79	100	123	152
West Wise SUD	88	98	109	123	141	164
Wise County-Other	56	63.28	65	65	65	65
Parker County Other	200	200	200	200	200	200
Reno	80	80	80	80	80	80
Total	**3,241**	**4,496**	**5,495**	**6,395**	**7,321**	**8,400**

Potential Future Customers	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
New Fairview	98	169	237	306	385	476
Newark	62	140	209	326	472	695
Total	**160**	**309**	**446**	**632**	**857**	**1,171**

Current Supplies	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
TRWD Sources	3,481	3,920	4,061	4,060	3,936	3,835
Total	**3,481**	**3,920**	**4,061**	**4,060**	**3,936**	**3,835**
WTP Capacity	**2,800**	**2,800**	**2,800**	**2,800**	**2,800**	**2,800**

Supplies Less Current Demands	**-441**	**-1,696**	**-2,695**	**-3,595**	**-4,521**	**-5,600**
Supplies Less Current & Future Demand	**-601**	**-2,005**	**-3,141**	**-4,227**	**-5,378**	**-6,771**

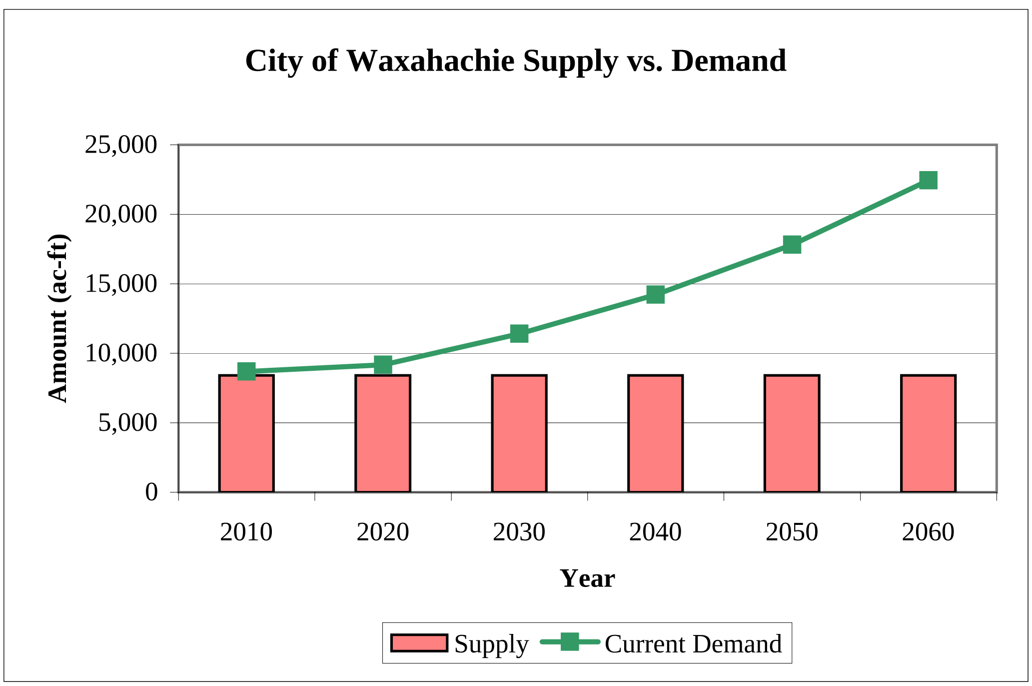


City of Waxahachie
-Values in Acre-Feet per Year-

WUG Demands on Waxahachie						
WUGs	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Waxahachie	6,462	8,151	10,330	13,090	16,672	21,341
Rockett SUD	951	0	0	0	0	0
Ferris	40	0	0	0	0	0
Pecan Hill	30	0	0	0	0	0
Red Oak	100	0	0	0	0	0
Ellis County-Other	135	0	0	0	0	0
Ellis County Manufacturing (28%)	970	1,028	1,075	1,116	1,145	1,095
Total	**8,688**	**9,179**	**11,405**	**14,206**	**17,817**	**22,436**

Current Supplies	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Lake Waxahachie	2,667	2,573	2,480	2,387	2,293	2,200
TRA (Bardwell)	3,855	3,669	3,483	3,297	3,111	2,925
TRA (Reuse)	4,998	5,129	5,129	5,129	5,129	5,129
Total	**11,520**	**11,371**	**11,092**	**10,813**	**10,533**	**10,254**
WTP Capacity	**8,408**	**8,408**	**8,408**	**8,408**	**8,408**	**8,408**

Supplies Less Current Demands	**-280**	**-771**	**-2,997**	**-5,798**	**-9,409**	**-14,028**



City of Weatherford
-Values in Acre-Feet per Year-

WUG Demands on Weatherford						
WUGs Demands	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Weatherford	5,209	6,448	7,607	8,554	9,561	10,741
Parker Co.Utility District						
Hudson Oaks[a]	102	102	102	102	102	102
Parker County-Other	20	20	20	20	20	20
Parker County Manufacturing[a]	575	645	712	778	836	905
Brazos Electric Co-op	30	24	28	32	38	46
Total	**5,936**	**7,239**	**8,469**	**9,486**	**10,557**	**11,814**

Potential Future Customers	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Parker Co.Utility District						
Hudson Oaks (additional contract)	53	203	366	509	672	855
Willow Park	0	116	272	407	546	706
Annetta	0	97	133	163	194	231
Annetta South	0	24	34	43	52	64
Parker County-Other	0	1099	959	823.5	699	582.5
Parker County Other (Brazos Basin)	50	100	100	100	100	100
Parker County Steam Electric		5000	5000	5000	5000	5000
Total	**103**	**6,639**	**6,864**	**7,046**	**7,263**	**7,539**

Current Supplies	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Lake Weatherford	2,750	2,600	2,450	2,300	2,150	2,000
Lake Benbrook (TRWD)[b]	1,802	1,937	2,082	2,228	2,377	2,531
Trinity Aquifer	50	50	50	50	50	50
Total	**4,602**	**4,587**	**4,582**	**4,578**	**4,577**	**4,581**
WTP Capacity	**4,484**	**4,484**	**4,484**	**4,484**	**4,484**	**4,484**

Supplies Less Current Demands	**-1,452**	**-2,755**	**-3,985**	**-5,002**	**-6,073**	**-7,330**
Supplies Less Current & Future Demands	**-1,555**	**-9,394**	**-10,849**	**-12,048**	**-13,336**	**-14,869**

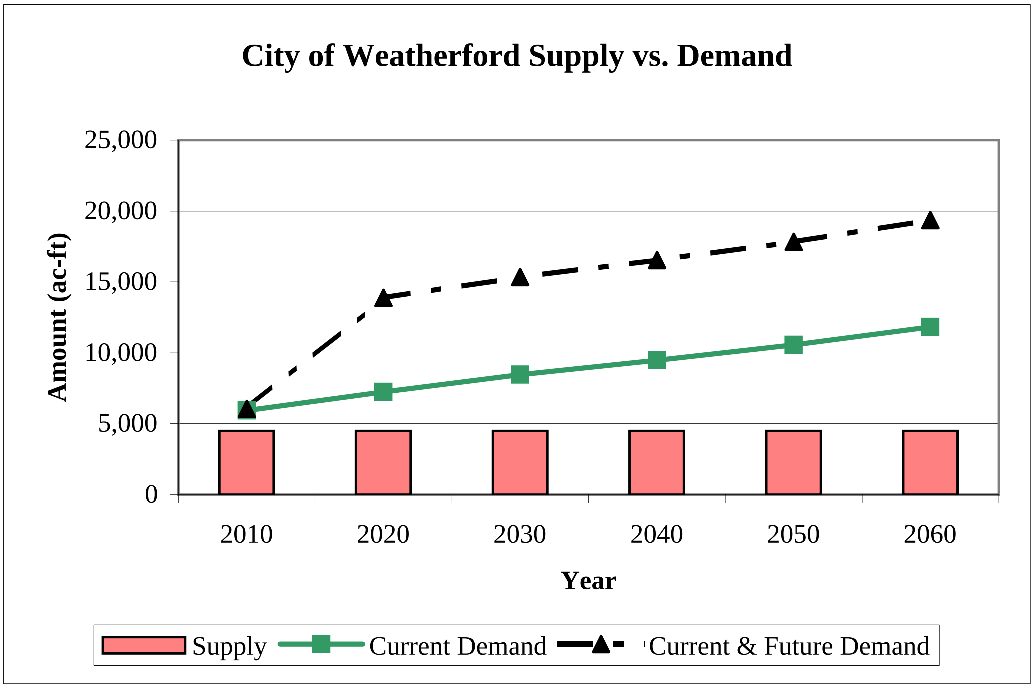
[a] Supplies from other sources

[b] Lake Benbrook infrastructure recently completed (peak capacity = 17.5 MGD)
Supply from TRWD is limited by Weatherford's WTP capacity.

Lake Weatherford to WTP is 24 in pipeline. Assume capacity is 13 mgd.

City of Weatherford

-Values in Acre-Feet per Year-

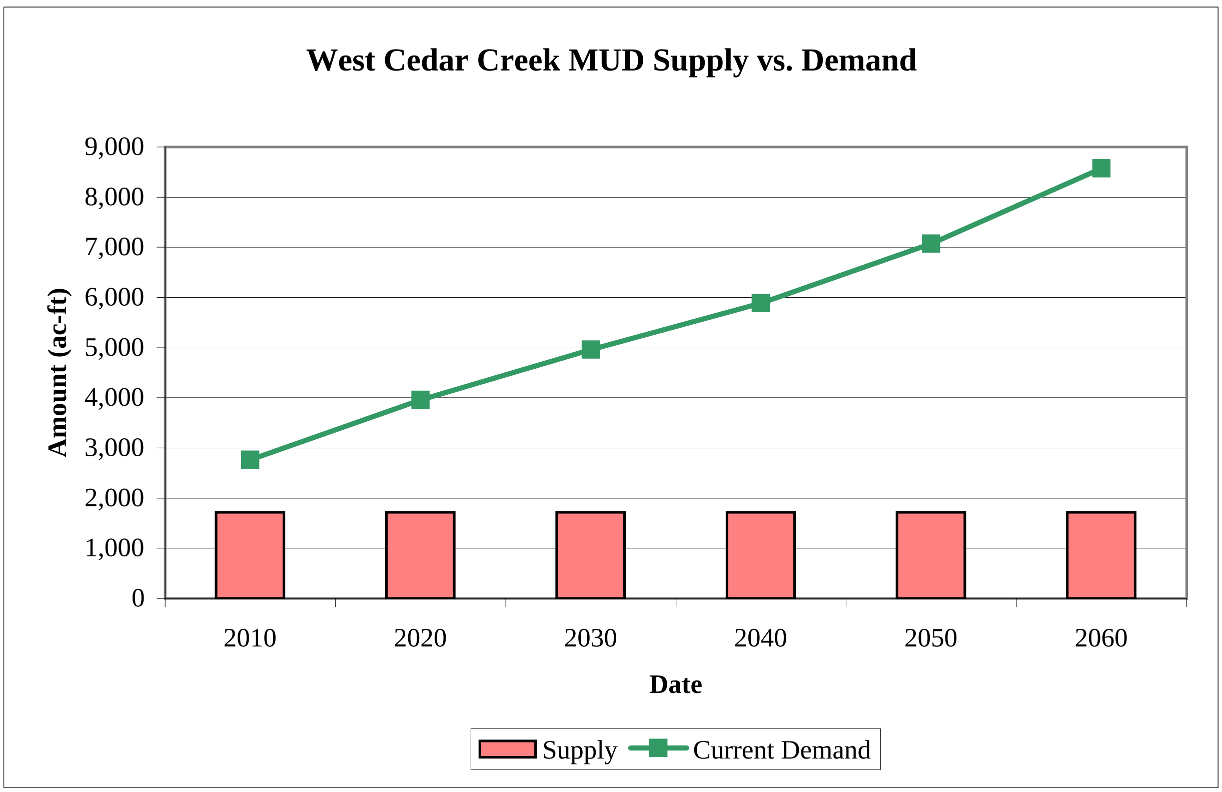


West Cedar Creek MUD
-Values in Acre-Feet per Year-

WUG Demands on West Cedar Creek MUD						
WUG	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
West Cedar Creek MUD	2184	3300	4227	5072	6160	7,520
Seven Points	174	205	234	266	304	355
Tool	405	452	500	548	610	695
Total	**2,763**	**3,957**	**4,961**	**5,886**	**7,074**	**8,570**

Current Supply	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
TRWD Sources (contract limit)	1,714	1,714	1,714	1,714	1,714	1,714
Total	**1,714**	**1,714**	**1,714**	**1,714**	**1,714**	**1,714**

Supplies Less Current Demands	**-1,049**	**-2,243**	**-3,247**	**-4,172**	**-5,360**	**-6,856**



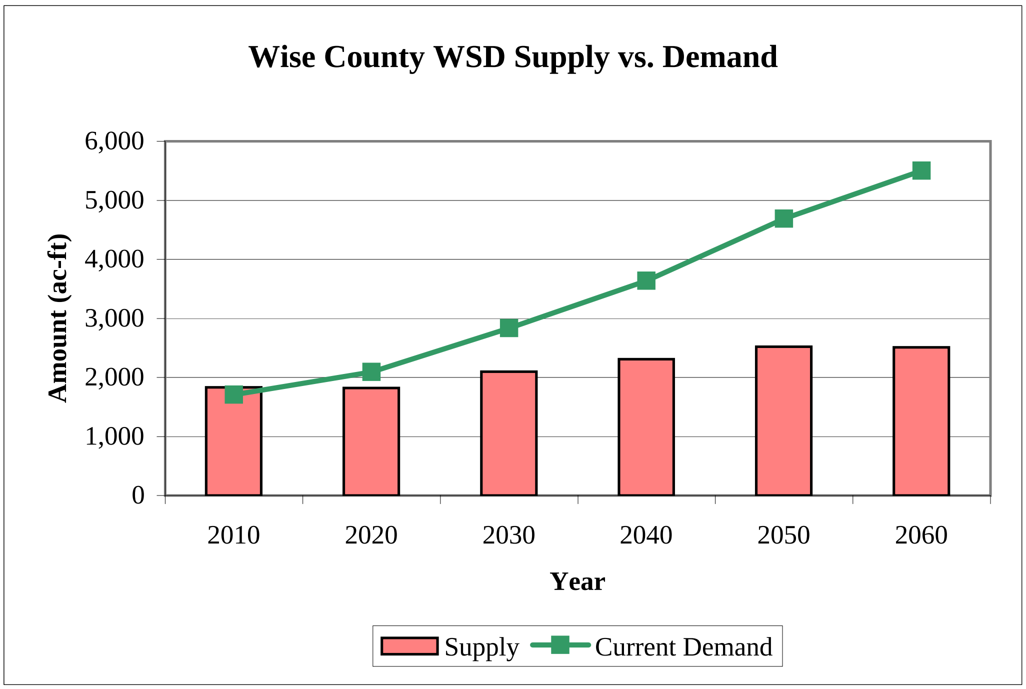
Wise County WSD

-Values in Acre-Feet per Year-

WUG Demands on Wise County WSD						
WUGs	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Decatur	1,639	2,011	2,748	3,537	4,580	5,385
Wise County Manufacturing (3%)	69	80	89	98	106	116
Total	**1,708**	**2,091**	**2,837**	**3,635**	**4,686**	**5,501**

Current Supplies	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Tarrant Regional Water District	1,834	1,822	2,097	2,308	2,520	2,511
Total	**1,834**	**1,822**	**2,097**	**2,308**	**2,520**	**2,511**

Supplies Less Current Demands	**126**	**-268**	**-741**	**-1,328**	**-2,167**	**-2,989**



APPENDIX I

WATER SUPPLY AVAILABLE TO REGION C

APPENDIX I
WATER SUPPLY AVAILABLE TO REGION C

Table I-1 shows the overall water supply available to Region C. The rest of the appendix explains the sources of the data in the table. The table represents the water supply that might be available to the region, whether it is currently connected to a water user group or not. The table is based on:

- Existing water rights
- Available supply for reservoirs
- Reliable supplies from run-of-the-river diversions
- Available supply from groundwater
- Estimated reliable local supplies for mining and livestock
- Existing and permitted reuse supplies

Limits to water supply due to current water transmission facilities and wells are not considered in the development of Table I-1. They are considered in Appendix J, Current Supplies by Water User Groups.

Table I-1
Overall Water Supply Availability in Region C
(acre-feet per year)

SUMMARY	2000	2010	2020	2030	2040	2050	2060
Reservoirs in Region C	1,173,789	1,165,080	1,155,771	1,146,113	1,135,964	1,125,705	1,111,096
Local Irrigation	20,205	20,205	20,205	20,205	20,205	20,205	20,205
Other Local Supply	23,701	23,701	23,701	23,701	23,701	23,701	23,701
Surface Water Imports	567,772	564,302	560,292	555,492	550,689	545,898	541,117
Groundwater	106,460	106,460	106,460	106,460	106,460	106,460	106,460
Reuse	77,363	99,979	105,810	104,800	104,175	103,697	103,429
REGION C TOTAL	**1,969,290**	**1,979,727**	**1,972,240**	**1,956,770**	**1,941,194**	**1,925,666**	**1,906,007**

Water Supply Systems and Reservoirs

Table I-2 presents the water availability for water supply systems and reservoirs in Region C that are used in the 2006 regional water plan. In accordance with the Texas Water Development

Board's (TWDB) established procedures, these surface water supplies are determined using the TCEQ-approved Water Availability Models (WAM). WAMs have been completed for each of the major river basins in Texas. The WAM models were developed for the purpose of reviewing and granting new surface water rights permits. The assumptions in the WAM models are based on the legal interpretation of water rights, and in some cases do not accurately reflect current operations. Availabilities for each water right are analyzed in priority date order, with water rights with the earliest permit date diverting first. WAM Run 3, which is the version required for planning, assumes full permitted diversions by all water rights and no return flows unless return flows are specifically included in the water right. Run 3 also does not include agreements or operations that are not reflected in the water rights permits and does not account for reductions in reservoir storage capacities due to sediment accumulation. For planning purposes, adjustments were made to the WAMs to better reflect current and future surface water conditions in the region. Generally, changes to the WAMs included:

- Assessment of reservoir sedimentation rates and calculation of area-capacity conditions for current (2000) and future (2060) conditions.
- Inclusion of subordination agreements
- Inclusion of system operations where appropriate
- Other corrections

Specific adjustments to the WAMs to more accurately reflect the water rights and agreements for water supply sources in Region C are:

Trinity River Basin WAM

- Modeling of Lake Jacksboro and Lost Creek as a system.
- Modeling of Tarrant Regional Water District's West Fork reservoirs (Bridgeport, Eagle Mountain, and Worth) as a system.
- Subordination special condition in Lake Ray Hubbard water right. (Lake Ray Hubbard is not allowed to make priority calls on flows originating upstream of Lake Lavon unless Lake Lavon is spilling. This change was accepted by TCEQ and incorporated into the TCEQ-approved model.)
- Correction of flow distribution errors at the control point between Lake Lavon and Lake Ray Hubbard. (This change is being submitted to the TCEQ.)
- An upstream diversion of Lake Livingston water from the Trinity River to Fairfield Lake.
- Inclusion of a minimum elevation for Lake Fairfield (305.0 ft. msl).

- Modeling of Dallas' water rights in the Elm Fork of the Trinity River as a system with Lake Lewisville and Ray Roberts.

Sabine River Basin WAM

- Adjusted the sedimentation rate for Lake Fork to equal the rate determined for Lake Tawakoni. (Based on soil types and watershed characteristics of the two lakes, sedimentation for Lake Fork should be less than Lake Tawakoni. This rate will be re-assessed after a new volumetric survey is completed for Lake Fork.)

Other adjustments to the WAMs in the Sabine and Neches River Basins had no impacts to the currently available water supplies in Region C. The Red River WAM was not used to assess surface water supplies from this basin. Previous yield studies were used to establish supplies for surface water reservoirs. The reliable supply from run-of-the-river diversions was assumed equal to the permitted diversion for water rights located on the main stem of the river and 75 percent of the permitted diversion for water rights located on tributaries. Supplies from Lake Chapman were determined from the *Operations Plan for Lake Chapman* (Brandes, June 2003). The Sulphur River Basin WAM was used in the Brandes study. Region C has very few water supplies in the Brazos River Basin. Thus, the water availability information as determined by the Brazos G Regional Water Planning Group was adopted.

Table I-2
Currently Available Surface Water Supplies from Reservoirs in Region C
(Not Considering Transmission Constraints)
(Acre-Feet per Year)

	Basin	2000	2010	2020	2030	2040	2050	2060
WATER SUPPLY SYSTEMS								
Lost Creek/ Jacksboro System	Trinity	1,440	1,440	1,440	1,440	1,440	1,440	1,440
West Fork (includes Bridgeport Local)	Trinity	110,000	108,500	107,000	105,500	104,000	102,500	101,000
Elm Fork/ Lewisville/ Ray Roberts	Trinity	193,753	191,729	189,705	187,681	185,657	183,633	181,609
Grapevine - Dallas	Trinity	7,700	7,250	6,800	6,350	5,900	5,450	5,000
Subtotal		**312,893**	**308,919**	**304,945**	**300,971**	**296,997**	**293,023**	**289,049**

Table I-2, Continued

RESERVOIRS IN REGION C								
	Basin	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Cedar Creek	Trinity	175,000	175,000	175,000	175,000	175,000	175,000	175,000
Richland-Chambers (TRWD)	Trinity	210,000	210,000	210,000	210,000	210,000	210,000	205,650
Richland-Chambers (Corsicana)	Trinity	12,750	12,625	12,500	12,375	12,250	12,125	12,000
Moss	Red	4,500	4,500	4,500	4,500	4,500	4,500	4,500
Lake Texoma (Texas' Share – NTMWD)	Red	77,300	77,300	77,300	77,300	77,300	77,300	77,300
Lake Texoma (Texas' Share – GTUA)	Red	25,000	25,000	25,000	25,000	25,000	25,000	25,000
Lake Texoma (Texas' Share – Denison)	Red	24,400	24,400	24,400	24,400	24,400	24,400	24,400
LakeTexoma (Texas' Share – TXU)	Red	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Lake Texoma (Texas' Share – RRA)	Red	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Randell	Red	5,280	5,280	5,280	5,280	5,280	5,280	5,280
Valley	Red	0	0	0	0	0	0	0
Bonham	Red	5,340	5,340	5,340	5,340	4,850	4,250	3,650
Ray Roberts (Denton)	Trinity	21,008	20,445	19,882	19,319	18,756	18,193	17,630
Lewisville (Denton)	Trinity	7,896	7,702	7,507	7,313	7,119	6,924	6,730
Benbrook	Trinity	6,834	6,834	6,834	6,834	6,834	6,834	6,834
Weatherford	Trinity	2,900	2,750	2,600	2,450	2,300	2,150	2,000
Grapevine (PCMUD)	Trinity	16,800	16,167	15,533	14,900	14,267	13,633	13,000
Grapevine (Grapevine)	Trinity	1,900	1,833	1,767	1,700	1,633	1,567	1,500
Arlington	Trinity	8,400	8,333	8,267	8,200	8,133	8,067	8,000
Joe Pool	Trinity	16,400	15,333	14,267	13,200	12,133	11,067	10,000
Mountain Creek	Trinity	6,400	6,400	6,400	6,400	6,400	6,400	6,400
North	*Trinity*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Lake Ray Hubbard (Dallas)	Trinity	60,700	60,367	60,033	59,700	59,367	59,033	58,700
White Rock	Trinity	5,900	5,083	4,267	3,450	2,633	1,817	1,000
Terrell	Trinity	2,300	2,283	2,267	2,250	2,233	2,217	2,200
Clark	Trinity	139	139	139	139	139	139	139
Bardwell	Trinity	8,980	8,567	8,153	7,740	7,327	6,913	6,500
Waxahachie	Trinity	2,760	2,667	2,573	2,480	2,387	2,293	2,200
Forest Grove	Trinity	8,600	8,583	8,567	8,550	8,533	8,517	8,500
Trinidad City Lake	Trinity	500	500	500	500	500	500	500
Trinidad	Trinity	3,100	3,067	3,033	3,000	2,967	2,933	2,900
Navarro Mills	Trinity	19,400	19,400	18,800	17,850	16,900	15,950	15,000
Halbert	Trinity	0	0	0	0	0	0	0
Fairfield[1]	Trinity	1,700	1,567	1,433	1,300	1,167	1,033	900
Bryson	Brazos	0	0	0	0	0	0	0

Table I-2, Continued

RESERVOIRS IN REGION C (Continued)								
	Basin	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Mineral Wells	Brazos	2,520	2,508	2,495	2,483	2,470	2,458	2,445
Teague City Lake	Brazos	189	189	189	189	189	189	189
Lake Lavon	Trinity	104,000	104,000	104,000	104,000	104,000	104,000	104,000
Muenster		0	0	0	0	0	0	0
Subtotal		**874,396**	**869,995**	**864,993**	**859,642**	**853,800**	**847,849**	**837,547**
TOTAL		**1,187,289**	**1,178,914**	**1,169,938**	**1,160,613**	**1,150,797**	**1,140,872**	**1,126,596**

WATER SUPPLY SYSTEMS

The water supply systems listed are operated as physical systems – the water they provide cannot easily be separated by individual source. The supply available is based on the calculation of the Water Availability Models (WAMs), as described above. More detailed discussions on water supply available for each system are given below.

Lost Creek/Jacksboro System (Jacksboro). Lake Jacksboro is a 2,129 acre-foot reservoir located just outside of the City of Jacksboro in the Trinity River Basin in Jack County, and Lost Creek Reservoir is an 11,961 acre-foot reservoir located 1.5 miles downstream of the Lake Jacksboro dam. The City of Jacksboro holds a water right for the combined use of both reservoirs for municipal water supply and the right to divert 1,440 acre-feet per year. The water right authorizes the reservoirs to be operated as a system, so the WAM was modified to include system operation. According to the WAM, the available supply from this system as of 2060 is 1,440 acre-feet per year.

West Fork including Bridgeport Local System (Tarrant Regional Water District). Tarrant Regional Water District's West Fork Reservoir system is comprised of Lake Bridgeport, Lake Worth, and Eagle Mountain Lake. The WAM was modified to include the system operation of these three reservoirs. The resulting combined system yield was 108,500 acre-feet per year in 2010 and 101,000 acre-feet per year in 2060.

Under current conditions, this system provides somewhat less supply than shown. With existing facilities, it is not possible to divert water from Lake Worth when the lake is drawn down more than four feet, which makes some of the water stored in Lake Worth unavailable. In addition, the Tarrant Regional Water District operates its water supplies on a safe yield basis, which provides a smaller supply than the firm yield numbers shown. (In safe yield operation, the user takes less than the firm yield in order to leave a reserve supply in the reservoir in case a drought worse than any historical drought occurs.)

Elm Fork/Lake Lewisville/Ray Roberts System (Dallas). This system, owned by Dallas, is comprised of Lake Lewisville, Lake Ray Roberts, and run-of-the-river rights from Elm Fork. The WAM was modified to include the system operation of these supplies. The resulting combined system yield was 191,729 acre-feet per year in 2010 and 181,609 acre-feet per year in 2060.

Lake Grapevine (Dallas). Dallas includes its portion of supply from Lake Grapevine in its system operation with Elm Fork/Lewisville/Ray Roberts. The WAM was modified to include this system operation. The resulting yield for Dallas' portion of Lake Grapevine was 7,250 acre-feet per year in 2010 and 5,000 acre-feet per year in 2060.

RESERVOIRS IN REGION C

All major reservoirs in Region C as well as some smaller reservoirs used for municipal supply are listed in Table I-2. The supply available is based on the calculation of the Water Availability Models (WAMs), which limits the supply to the lesser of the firm yield or the permit amount.

Cedar Creek. Cedar Creek Reservoir is located on Cedar Creek in the Trinity River Basin in Henderson and Kaufman Counties. The reservoir has conservation storage of 678,900 acre-feet. Tarrant Regional Water District holds a water right for diversion of 175,000 acre-feet per year. According to the WAM, the available supply from Cedar Creek as of 2060 is 175,000 acre-feet per year.

Richland-Chambers. Richland-Chambers Reservoir is located on Richland Creek in the Trinity River Basin in Freestone and Navarro Counties. The reservoir has conservation storage of 1,135,000 acre-feet. Tarrant Regional Water District and City of Corsicana hold water rights in the reservoir (210,000 acre-feet per year for TRWD and 13,650 acre-feet per year for Corsicana). According to the WAM, the available supply from Richland-Chambers as of 2060 is 217,650 acre-feet per year.

Moss. Moss Lake is located on Fish Creek in the Red River Basin in Cooke County. The reservoir has conservation storage of 23,210 acre-feet. The City of Gainesville holds a water right in the reservoir for 4,500 acre-feet per year. The available supply from Moss Lake in 2060 is 4,500 acre-feet per year.

Texoma (Texas' share). Lake Texoma is located along the Texas and Oklahoma border in the Red River Basin in Grayson and Cooke Counties. The reservoir has conservation storage of 2,722,000 acre-feet. Red River Authority, Greater Texoma Utility Authority, Denison, North Texas Municipal Water District, and TXU all hold water rights in the reservoir. The total available supply from Texoma as of 2060 is 138,700 acre-feet per year (2,000 acre-feet per year for Red River Authority; 25,000 acre-feet per year for Greater Texoma Utility Authority; 24,400 acre-feet per year for Denison; 77,300 acre-feet per year for NTMWD; and 10,000 acre-feet per year for TXU). In the case of Texoma, the available supply is limited to the water right amount.

Randell. Randell Reservoir is located on an unnamed tributary of Shawnee Creek in the Red River Basin in Grayson County. The reservoir has conservation storage of 5,400 acre-feet. The City of Denison holds a water right in the reservoir for 5,280 acre-feet per year. The available supply from Randell Reservoir as of 2060 is 5,280 acre-feet per year.

Valley. Valley Lake is located on Sand Creek in the Red River Basin in Fannin and Grayson Counties. The reservoir has conservation storage of 15,000 acre-feet. This reservoir is operated by TXU Electric for steam electric power cooling in conjunction with their water right in Lake Texoma. The total amount of water that can be diverted from either Texoma or Valley Lake is 10,000 acre-feet per year. During drought, it is assumed that the full permitted diversion would be taken from Lake Texoma (see Lake Texoma discussion). Therefore the available supply from Valley Lake is 0 acre-feet per year.

Bonham. Lake Bonham is located on Timber Creek in the Red River Basin in Fannin County. The reservoir has conservation storage of 13,000 acre-feet. The City of Bonham holds a water right in the reservoir for 5,340 acre-feet per year. The NTMWD has recently entered an agreement with the City of Bonham to operate the lake and water treatment plant. The available supply from Lake Bonham as of 2060 is 3,650 acre-feet per year.

Lake Ray Roberts (Denton). Lake Ray Roberts is located on the Elm Fork of the Trinity River in Denton, Cooke, and Grayson Counties. The reservoir has conservation storage of 799,600 acre-feet. The City of Dallas and the City of Denton both hold water rights in the reservoir totaling 799,600 acre-feet per year, which is much greater than the actual yield of the reservoir. Dallas' share of Lake Ray Roberts was discussed above under *Water Supply Systems*.

According to the WAM, Denton's available supply from Ray Roberts as of 2060 is 17,630 acre-feet per year.

Lake Lewisville (Denton). Lake Lewisville is located on the Elm Fork of the Trinity River in Denton County. The reservoir has conservation storage of 618,400 acre-feet. The City of Dallas and the City of Denton both hold water rights in the reservoir totaling 598,900 acre-feet per year, which is much greater than the actual yield of the reservoir. Dallas' share of Lake Ray Roberts was discussed above under *Water Supply Systems*. According to the WAM, Denton's available supply from Lewisville as of 2060 is 6,730 acre-feet per year.

Benbrook. Lake Benbrook is located on the Clear Fork of the Trinity River in Tarrant County. The reservoir has conservation storage of 72,500 acre-feet. Authorized use from Lake Benbrook is 6,834 acre-feet per year. Tarrant Regional Water District holds the water right which specifies use amounts for Benbrook Water and Sewer Authority, City of Fort Worth, and City of Weatherford. According to the WAM, available supply from Lake Benbrook as of 2060 is 6,834 acre-feet per year.

Weatherford. Lake Weatherford is located on the Clear Fork of the Trinity River in Parker County. The reservoir has conservation storage of 19,470 acre-feet. The City of Weatherford holds a water right for consumptive use 5,220 acre-feet per year (the permit also authorizes 59,400 acre-feet per year of non-consumptive industrial use). According to the WAM, available supply from Lake Weatherford as of 2060 is 2,000 acre-feet per year.

Grapevine. Lake Grapevine is located on Denton Creek in the Trinity River Basin in Tarrant and Denton Counties. The reservoir has conservation storage of 161,250 acre-feet. City of Dallas, City of Grapevine, and Dallas County Park Cities MUD all hold water rights in the reservoir totaling 161,250 acre-feet per year, which is much greater than the actual yield of the reservoir. Dallas' share of Lake Grapevine was discussed above under *Water Supply Systems*. According to the WAM, Dallas County PCMUD's available supply from Lake Grapevine as of 2060 is 13,000 acre-feet per year, and the City of Grapevine's available supply from Lake Grapevine as of 2060 is 1,500 acre-feet per year.

Arlington. Lake Arlington is located on Village Creek in the Trinity River Basin in Tarrant County. The reservoir has conservation storage of 45,710 acre-feet. The City of Arlington and TXU Electric jointly hold a water right for 23,120 acre-feet per year (13,000 acre-feet per year for Arlington and 10,120 acre-feet per year for TXU). According to the WAM, available supply from Lake Arlington as of 2060 is 8,000 acre-feet per year.

Joe Pool. Joe Pool Lake is located on Mountain Creek in the Trinity River Basin in Dallas and Tarrant Counties. The reservoir has conservation storage of 176,900 acre-feet. The Trinity River Authority holds a water right for 17,000 acre-feet per year. According to the WAM, available supply from Joe Pool Lake as of 2060 is 10,000 acre-feet per year.

Mountain Creek. Mountain Creek Lake is located on Mountain Creek in the Trinity River Basin in Dallas County. The reservoir has conservation storage of 22,840 acre-feet. TXU Electric holds a water right for 6,400 acre-feet per year. According to the WAM, available supply from Mountain Creek Lake as of 2060 is 6,400 acre-feet per year.

North. North Lake is located on the South Fork of Grapevine Creek in the Trinity River Basin in Dallas County. The reservoir has conservation storage of 17,100 acre-feet. TXU Electric holds a water right for 1,000 acre-feet per year. According to the WAM, available supply from North Lake as of 2060 is 0 acre-feet per year.

Ray Hubbard. Lake Ray Hubbard is located on the Elm Fork of the Trinity River in Dallas, Kaufman, and Rockwall Counties. The reservoir has conservation storage of 490,000 acre-feet. The City of Dallas holds a water right for 89,700 acre-feet per year. According to the WAM, available supply from Ray Hubbard as of 2060 is 60,700 acre-feet per year in 2000, decreasing to 58,700 acre-feet per year by 2060.

White Rock. White Rock Lake is located on White Rock Creek in the Trinity River Basin in Dallas County. The reservoir has conservation storage of 21,345 acre-feet. The City of Dallas holds a water right for 8,703 acre-feet per year. According to the WAM, available supply from White Rock Lake as of 2060 is 1,000 acre-feet per year. White Rock Lake is no longer used for water supply.

Terrell. Lake Terrell is located on Muddy Cedar Creek in the Trinity River Basin in Kaufman County. The reservoir has conservation storage of 8,712 acre-feet. The City of Terrell holds a water right for 6,000 acre-feet per year. According to the WAM, available supply from Terrell as of 2060 is 2,200 acre-feet per year.

Clark. Lake Clark is located on Little Mustang Creek in the Trinity River Basin in Ellis County. The reservoir has conservation storage of 1,549 acre-feet. The City of Ennis holds a water right for 450 acre-feet per year. According to the WAM, available supply from Lake Clark as of 2060 is 139 acre-feet per year. The city of Ennis no longer uses water from Lake Clark.

Bardwell. Lake Bardwell is located on Waxahachie Creek in the Trinity River Basin in Ellis County. The reservoir has conservation storage of 54,900 acre-feet. The Trinity River Authority holds a water right for 14,729 acre-feet per year (which includes reuse of up to 5,129 acre-feet per year of return flows). According to the WAM, available supply from Lake Bardwell as of 2060 is 6,500 acre-feet per year.

Waxahachie. Lake Waxahachie is located on Waxahachie Creek in the Trinity River Basin in Ellis County. The reservoir has conservation storage of 13,500 acre-feet. Ellis County Water Control and Improvement District #1 holds a water right for 3,570 acre-feet per year. According to the WAM, available supply from Lake Waxahachie as of 2060 is 2,200 acre-feet per year.

Forest Grove. Forest Grove Reservoir is located on Caney Creek in the Trinity River Basin in Henderson County. The reservoir has conservation storage of 20,038 acre-feet. TXU Electric holds a water right for 9,500 acre-feet per year (not including non-consumptive use). Presently, the dam for Forest Grove Reservoir is built, but the lake has not begun to store water. According to the WAM, available supply from Forest Grove as of 2060 is 8,500 acre-feet per year.

Trinidad City Lake. Trinidad City Lake is located on Cedar Creek in the Trinity River Basin in Henderson County. The reservoir has conservation storage of 498 acre-feet. The City of Trinidad holds a water right for 1,000 acre-feet per year. According to the WAM, available supply from Trinidad City Lake as of 2060 is 500 acre-feet per year.

Trinidad. Lake Trinidad is located just off the Trinity River in Henderson County. The reservoir has conservation storage of 6,200 acre-feet. TXU Electric holds a water right for 4,000 acre-feet per year. According to the WAM, available supply from Lake Trinidad as of 2060 is 2,900 acre-feet per year.

Navarro Mills. Lake Navarro Mills is located on Richland Creek in the Trinity River Basin in Navarro County. The reservoir has conservation storage of 63,300 acre-feet. The Trinity River Authority holds a water right for 19,400 acre-feet per year. According to the WAM, available supply from Navarro Mills as of 2060 is 15,000 acre-feet per year.

Halbert. Lake Halbert is located on Elm Creek in the Trinity River Basin in Navarro County. The reservoir has conservation storage of 7,357 acre-feet. The City of Corsicana holds a water right for 4,003 acre-feet per year. According to the WAM, available supply from Halbert as of 2060 is 0 acre-feet per year.

Fairfield. Lake Fairfield is located on Big Brown Creek in the Trinity River Basin in Freestone County. The reservoir has conservation storage of 50,600 acre-feet. TXU Electric holds a water right for 14,150 acre-feet per year. According to the WAM, available supply from Lake Fairfield as of 2060 is 900 acre-feet per year.

Bryson. Lake Bryson is located on East Rock Creek in the Brazos River Basin in Jack County. The reservoir has conservation storage of 950 acre-feet. The City of Bryson holds a water right for 90 acre-feet per year. According to the WAM, available supply from Bryson as of 2060 is 0 acre-feet per year.

Mineral Wells. Lake Mineral Wells is located on Rock Creek in the Brazos River Basin in Parker County. The reservoir has conservation storage of 7,065 acre-feet. The City of Mineral Wells holds a water right for 2,520 acre-feet per year. According to the WAM, available supply from Mineral Wells as of 2060 is 2,445 acre-feet per year. The City of Mineral Wells no longer uses water from Lake Mineral Wells.

Teague City Lake. Teague City Lake is located on Holman Creek in the Brazos River Basin in Freestone County. The reservoir has permitted conservation storage of 1,160 acre-feet. The City of Teague holds a water right for 605 acre-feet per year. According to the WAM, available supply from Teague City Lake as of 2060 is 189 acre-feet per year.

Lavon. Lake Lavon is located on the East Fork of the Trinity River in Collin County. The reservoir has conservation storage of 380,000 acre-feet. North Texas Municipal Water District holds a water right for 104,000 acre-feet per year. According to the WAM, available supply from Lake Lavon as of 2060 is 104,000 acre-feet per year.

Groundwater

Groundwater in Region C is obtained from two major aquifers, three minor aquifers and locally undifferentiated sediments referred to as "other aquifer". The TWDB developed the Groundwater Availability Models (GAMs) to assist regional water planning groups in determining available groundwater supplies. Several GAMs are still being developed and are not currently available to the planning groups. The completed GAMs for Region C aquifers at this time are the Carrizo-Wilcox GAM and the Trinity-Woodbine GAM.

The GAMs include numerical representations of the groundwater flow through the respective aquifer. Rainfall, evaporation, evapotranspiration, and surface runoff are included in the models. The models also include recharge and historical groundwater pumpage information. The available supply from groundwater using the GAMs is based on assumptions and constraints defined by the user. For Region C, consideration of historical use and groundwater conservation district guidelines were considered, as well as limiting water level impacts.

The available supply from the Carrizo-Wilcox Aquifer is based on minimal lowering of the water table from current levels over the planning period. Using the recommended sustainable pumping for 50 years, there were additional drawdowns between 0 and 8 feet.

For the Trinity and Woodbine Aquifers, the sustainable groundwater supply was evaluated under current pumpage and with limiting drawdowns. Under continued current pumping, it was found that the Woodbine Aquifer would rebound in most areas in Region C. Only the eastern portion of Fannin County showed additional drawdowns greater than 50 feet. Pumpage was then increased in all areas except eastern Fannin County, limiting additional drawdown to between 0 and 50 feet.

The analysis for the Trinity Aquifer found that under current pumpage, the changes in water levels after 50 years ranged from rebounds of 400 feet to additional drawdowns of over 400 feet. The greater regional drawdowns were observed in the Paluxy layer. The drawdowns in the Hensel and Hosston layers were typically more localized or influenced from pumping in neighboring regions. To reduce the drawdowns in the Paluxy layer, pumpage was reduced in Tarrant, Dallas, Ellis and Johnson Counties. This resulted in overall drawdowns of -70 to 240 feet, with most of the region having increased drawdowns of less than 150 feet.

Projected drawdowns in the Hensel layer was generally less than 100 feet and the greatest drawdown appeared to be associated with pumpage outside the region. No changes were made to the current pumpage amounts in the Hensel layer.

The Hosston layer is the deepest layer of the Trinity Group and has a considerable amount of pumpage in localized areas. As a result much of the projected changes in water levels were observed in isolated areas, particularly in Tarrant County. These changes included both water level rebounds and drawdowns. Most of the region was projected to have additional drawdowns of less than 100 feet. It was concluded that the Hosston layer could support the current pumpage amounts.

The total water available from the Trinity Aquifer in Region C was estimated from the summation of the adjusted pumpage in each layer, which is considerably less than current use in some counties.

The groundwater availability for the other minor aquifers and "other aquifer" were determined from historical use and data provided by the TWDB for the 2001 *Region C Water Plan.* Table I-3 details the groundwater availability for Region C.

Table I-3
Groundwater Availability for Region C
(Acre-Feet per Year)

Aquifer	County	Basin	2,000	2,010	2,020	2,030	2,040	2,050	2,060
Other	Collin	Sabine	5	5	5	5	5	5	5
Other	Collin	Trinity	134	134	134	134	134	134	134
Trinity	Collin	Sabine	0	0	0	0	0	0	0
Trinity	Collin	Trinity	2,100	2,100	2,100	2,100	2,100	2,100	2,100
Woodbine	Collin	Sabine	130	130	130	130	130	130	130
Woodbine	Collin	Trinity	2,370	2,370	2,370	2,370	2,370	2,370	2,370
	Collin		**4,739**	**4,739**	**4,739**	**4,739**	**4,739**	**4,739**	**4,739**
Other	Cooke	Red	237	237	237	237	237	237	237
Other	Cooke	Trinity	0	0	0	0	0	0	0
Trinity	Cooke	Red	950	950	950	950	950	950	950
Trinity	Cooke	Trinity	5,450	5,450	5,450	5,450	5,450	5,450	5,450
Woodbine	Cooke	Red	0	0	0	0	0	0	0
Woodbine	Cooke	Trinity	0	0	0	0	0	0	0
	Cooke		**6,637**	**6,637**	**6,637**	**6,637**	**6,637**	**6,637**	**6,637**
Other	Dallas	Trinity	593	593	593	593	593	593	593
Trinity	Dallas	Trinity	4,400	4,400	4,400	4,400	4,400	4,400	4,400
Woodbine	Dallas	Trinity	1,100	1,100	1,100	1,100	1,100	1,100	1,100
	Dallas		**6,093**	**6,093**	**6,093**	**6,093**	**6,093**	**6,093**	**6,093**
Other	Denton	Trinity	5	5	5	5	5	5	5
Trinity	Denton	Trinity	10,400	10,400	10,400	10,400	10,400	10,400	10,400
Woodbine	Denton	Trinity	4,700	4,700	4,700	4,700	4,700	4,700	4,700
	Denton		**15,105**	**15,105**	**15,105**	**15,105**	**15,105**	**15,105**	**15,105**
Other	Ellis	Trinity	139	139	139	139	139	139	139
Trinity	Ellis	Trinity	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Woodbine	Ellis	Trinity	4,400	4,400	4,400	4,400	4,400	4,400	4,400
	Ellis		**8,539**	**8,539**	**8,539**	**8,539**	**8,539**	**8,539**	**8,539**
Trinity	Fannin	Red	0	0	0	0	0	0	0
Trinity	Fannin	Sulphur	601	601	601	601	601	601	601

Table I-3, Continued

Aquifer	County	Basin	2,000	2,010	2,020	2,030	2,040	2,050	2,060
Trinity	Fannin	Trinity	99	99	99	99	99	99	99
Woodbine	Fannin	Red	2202	2202	2199	2199	2198	2198	2197
Woodbine	Fannin	Sulphur	568	568	571	571	572	572	573
Woodbine	Fannin	Trinity	530	530	530	530	530	530	530
Other	Fannin	Red	2,919	2,919	2,919	2,919	2,919	2,919	2,919
	Fannin		**6,919**	**6,919**	**6,919**	**6,919**	**6,919**	**6,919**	**6,919**
Carrizo-Wilcox	Freestone	Trinity	5,578	5,578	5,578	5,578	5,578	5,578	5,578
Carrizo-Wilcox	Freestone	Brazos	1,075	1,075	1,075	1,075	1,075	1,075	1,075
Other	Freestone	Trinity	51	51	51	51	51	51	51
Other	Freestone	Brazos	21	21	21	21	21	21	21
Queen City	Freestone	Trinity	345	345	345	345	345	345	345
Queen City	Freestone	Brazos	48	48	48	48	48	48	48
	Freestone		**7,118**	**7,118**	**7,118**	**7,118**	**7,118**	**7,118**	**7,118**
Other	Grayson	Red	35	35	35	35	35	35	35
Other	Grayson	Trinity	0	0	0	0	0	0	0
Trinity	Grayson	Red	6,700	6,797	6,849	6,875	6,890	6,900	6,901
Trinity	Grayson	Trinity	2,700	2,603	2,552	2,525	2,510	2,500	2,499
Woodbine	Grayson	Red	6,380	6,310	6,288	6,277	6,272	6,267	6,265
Woodbine	Grayson	Trinity	5,720	5,790	5,812	5,823	5,828	5,833	5,835
	Grayson		**21,535**	**21,535**	**21,535**	**21,535**	**21,535**	**21,535**	**21,535**
Carrizo-Wilcox	Henderson	Trinity	5,370	5,370	5,370	5,370	5,370	5,370	5,370
Nacatoch	Henderson	Trinity	10	10	10	10	10	10	10
Other	Henderson	Trinity	167	167	167	167	167	167	167
Queen City	Henderson	Trinity	480	480	480	480	480	480	480
	Henderson		**6,027**	**6,027**	**6,027**	**6,027**	**6,027**	**6,027**	**6,027**
Other	Jack	Brazos	284	284	284	284	284	284	284
Other	Jack	Trinity	650	650	650	650	650	650	650
Trinity	Jack	Trinity	50	50	50	50	50	50	50
Trinity	Jack	Brazos	50	50	50	50	50	50	50
	Jack		**1,034**	**1,034**	**1,034**	**1,034**	**1,034**	**1,034**	**1,034**
Nacatoch	Kaufman	Sabine	10	10	10	10	10	10	10
Nacatoch	Kaufman	Trinity	308	308	308	308	308	308	308
Other	Kaufman	Sabine	124	124	124	124	124	124	124
Other	Kaufman	Trinity	87	87	87	87	87	87	87
Trinity	Kaufman	Trinity	0	0	0	0	0	0	0
Woodbine	Kaufman	Trinity	200	200	200	200	200	200	200
	Kaufman		**729**	**729**	**729**	**729**	**729**	**729**	**729**

Table I-3, Continued

Aquifer	County	Basin	2,000	2,010	2,020	2,030	2,040	2,050	2,060
Carrizo-Wilcox	Navarro	Trinity	180	180	180	180	180	180	180
Nacatoch	Navarro	Trinity	229	229	229	229	229	229	229
Other	Navarro	Trinity	104	104	104	104	104	104	104
Trinity	Navarro	Trinity	0	0	0	0	0	0	0
Woodbine	Navarro	Trinity	300	300	300	300	300	300	300
	Navarro		**813**	**813**	**813**	**813**	**813**	**813**	**813**
Other	Parker	Trinity	0	0	0	0	0	0	0
Other	Parker	Brazos	50	50	50	50	50	50	50
Trinity	Parker	Trinity	2,100	2,100	2,255	2,300	2,300	2,300	2,300
Trinity	Parker	Brazos	4,900	4,900	4,745	4,700	4,700	4,700	4,700
	Parker		**7,050**	**7,050**	**7,050**	**7,050**	**7,050**	**7,050**	**7,050**
Nacatoch	Rockwall	Trinity	1	1	1	1	1	1	1
Trinity	Rockwall	Trinity	0	0	0	0	0	0	0
Other	Rockwall	Sabine	187	187	187	187	187	187	187
Other	Rockwall	Trinity	21	21	21	21	21	21	21
	Rockwall		**209**	**209**	**209**	**209**	**209**	**209**	**209**
Other	Tarrant	Trinity	207	207	207	207	207	207	207
Trinity	Tarrant	Trinity	9,200	9,200	9,200	9,200	9,200	9,200	9,200
Woodbine	Tarrant	Trinity	0	0	0	0	0	0	0
	Tarrant		**9,407**	**9,407**	**9,407**	**9,407**	**9,407**	**9,407**	**9,407**
Other	Wise	Trinity	106	106	106	106	106	106	106
Trinity	Wise	Trinity	4,400	4,400	4,400	4,400	4,400	4,400	4,400
	Wise		**4,506**	**4,506**	**4,506**	**4,506**	**4,506**	**4,506**	**4,506**

Irrigation Local Supply and Other Local Supply

The local irrigation availability is based on existing run-of-the-river surface water rights for irrigation not associated with major reservoirs as modeled in the Water Availability Models. Other local supply includes non-irrigation run-of-the-river supplies and mining and livestock local supplies that do not have a water right. Most surface water used for livestock is taken from unpermitted stock ponds or directly from streams. For livestock and mining local supply, the current and maximum historical uses over the past ten years were considered in determining the available supplies. Table I-4 shows the available supply for irrigation and other local supply.

Table I-4
Summary of Local Surface Water Supplies for Region C
(Acre-Feet per Year)

Use	County	Basin	2000	2010	2020	2030	2040	2050	2060
IRRIGATION RUN-OF-THE-RIVER SUPPLIES									
Irrigation	Cooke	Red	23	23	23	23	23	23	23
Irrigation	Fannin	Red	14,758	14,758	14,758	14,758	14,758	14,758	14,758
Irrigation	Grayson	Red	2,394	2,394	2,394	2,394	2,394	2,394	2,394
Irrigation	Fannin	Sulphur	0	0	0	0	0	0	0
Irrigation	Collin	Trinity	408	408	408	408	408	408	408
Irrigation	Cooke	Trinity	0	0	0	0	0	0	0
Irrigation	Dallas	Trinity	791	791	791	791	791	791	791
Irrigation	Denton	Trinity	0	0	0	0	0	0	0
Irrigation	Ellis	Trinity	3	3	3	3	3	3	3
Irrigation	Fannin	Trinity	0	0	0	0	0	0	0
Irrigation	Grayson	Trinity	0	0	0	0	0	0	0
Irrigation	Henderson	Trinity	415	415	415	415	415	415	415
Irrigation	Jack	Trinity	110	110	110	110	110	110	110
Irrigation	Kaufman	Trinity	64	64	64	64	64	64	64
Irrigation	Navarro	Trinity	226	226	226	226	226	226	226
Irrigation	Parker	Trinity	122	122	122	122	122	122	122
Irrigation	Rockwall	Trinity	0	0	0	0	0	0	0
Irrigation	Tarrant	Trinity	549	549	549	549	549	549	549
Irrigation	Wise	Trinity	139	139	139	139	139	139	139
Irrigation	Freestone	Trinity	87	87	87	87	87	87	87
Irrigation	Jack	Brazos	0	0	0	0	0	0	0
Irrigation	Parker	Brazos	117	117	117	117	117	117	117
Irrigation	Freestone	Brazos	0	0	0	0	0	0	0
SUBTOTAL			**20,205**	**20,205**	**20,205**	**20,205**	**20,205**	**20,205**	**20,205**

Table I-4, Continued

Use	County	Basin	2000	2010	2020	2030	2040	2050	2060
NON-IRRIGATION RUN-OF-THE-RIVER SUPPLIES									
Mining	Fannin	Red	72	72	72	72	72	72	72
Mining	Wise	Trinity	133	133	133	133	133	133	133
Municipal	Fannin	Red	20	20	20	20	20	20	20
Municipal	Fannin	Sulphur	49	49	49	49	49	49	49
Municipal	Freestone	Trinity	41	41	41	41	41	41	41
Municipal	Navarro	Trinity	252	252	252	252	252	252	252
Municipal	Parker	Trinity	33	33	33	33	33	33	33
Industrial	Dallas	Trinity	368	368	368	368	368	368	368
Industrial	Grayson	Red	30	30	30	30	30	30	30
Industrial	Tarrant	Trinity	959	959	959	959	959	959	959
LIVESTOCK AND MINING LOCAL SUPPLIES									
Livestock	Collin	Sabine	31	31	31	31	31	31	31
Livestock	Collin	Trinity	971	971	971	971	971	971	971
Livestock	Cooke	Red	380	380	380	380	380	380	380
Livestock	Cooke	Trinity	807	807	807	807	807	807	807
Livestock	Dallas	Trinity	712	712	712	712	712	712	712
Livestock	Denton	Trinity	935	935	935	935	935	935	935
Livestock	Ellis	Trinity	1,688	1,688	1,688	1,688	1,688	1,688	1,688
Livestock	Fannin	Red	1,139	1,139	1,139	1,139	1,139	1,139	1,139
Livestock	Fannin	Sulphur	364	364	364	364	364	364	364
Livestock	Fannin	Trinity	80	80	80	80	80	80	80
Livestock	Freestone	Brazos	83	83	83	83	83	83	83
Livestock	Freestone	Trinity	960	960	960	960	960	960	960
Livestock	Grayson	Red	1,077	1,077	1,077	1,077	1,077	1,077	1,077
Livestock	Grayson	Trinity	606	606	606	606	606	606	606
Livestock	Henderson	Trinity	341	341	341	341	341	341	341
Livestock	Jack	Brazos	450	450	450	450	450	450	450

Table I-4, Continued

Use	County	Basin	2000	2010	2020	2030	2040	2050	2060
LIVESTOCK AND MINING LOCAL SUPPLIES (Continued)									
Livestock	Jack	Trinity	1,215	1,215	1,215	1,215	1,215	1,215	1,215
Livestock	Kaufman	Sabine	98	98	98	98	98	98	98
Livestock	Kaufman	Trinity	1,524	1,524	1,524	1,524	1,524	1,524	1,524
Livestock	Navarro	Trinity	1,603	1,603	1,603	1,603	1,603	1,603	1,603
Livestock	Parker	Brazos	903	903	903	903	903	903	903
Livestock	Parker	Trinity	1,019	1,019	1,019	1,019	1,019	1,019	1,019
Livestock	Rockwall	Sabine	32	32	32	32	32	32	32
Livestock	Rockwall	Trinity	136	136	136	136	136	136	136
Livestock	Tarrant	Trinity	442	442	442	442	442	442	442
Livestock	Wise	Trinity	1,117	1,117	1,117	1,117	1,117	1,117	1,117
Mining	Collin	Trinity	195	195	195	195	195	195	195
Mining	Cooke	Red	77	77	77	77	77	77	77
Mining	Cooke	Trinity	160	160	160	160	160	160	160
Mining	Dallas	Trinity	1,525	1,525	1,525	1,525	1,525	1,525	1,525
Mining	Denton	Trinity	103	103	103	103	103	103	103
Mining	Freestone	Trinity	66	66	66	66	66	66	66
Mining	Jack	Trinity	370	370	370	370	370	370	370
Mining	Kaufman	Trinity	75	75	75	75	75	75	75
Mining	Parker	Brazos	17	17	17	17	17	17	17
Mining	Parker	Trinity	3	3	3	3	3	3	3
Mining	Rockwall	Sabine	33	33	33	33	33	33	33
Mining	Tarrant	Trinity	342	342	342	342	342	342	342
SUBTOTAL NON-IRRIGATION SUPPLIES			**23,701**	**23,701**	**23,701**	**23,701**	**23,701**	**23,701**	**23,701**
TOTAL RUN-OF-THE-RIVER AND LOCAL SUPPLIES			**43,906**	**43,906**	**43,906**	**43,906**	**43,906**	**43,906**	**43,906**

Reuse

The reuse listed in Table I-1 is limited to currently permitted and operating reuse projects and existing direct reuse for irrigation or industrial purposes. Table I-5 shows the individual reuse projects that make up the total reuse amount in Table I-1. These amounts are the results of a detailed study of existing and potential reuse projects in Region C that was conducted for the region. The topics addressed in the additional study included:

- Water reuse projects being performed under a Chapter 210 notification,
- Water reuse plans for large dischargers,
- Consolidation of water reuse plans into a regional plan,
- Recent water right amendments involving reuse, and
- Pending water right permit applications involving reuse.

The findings of this study are presented below.

Water Reuse Projects Being Performed Under a Chapter 210 Reuse Authorization

Title 30, Chapter 210 of the Texas Administrative Code establishes general requirements, quality criteria, design, and operational requirements for direct reuse of reclaimed water. Before implementing a direct reuse project, the reclaimed water provider must notify the Executive Director of the Texas Commission on Environmental Quality (TCEQ) and obtain written approval to provide the reclaimed water. Table I-6 shows Region C entities that have notified the TCEQ of their intent to provide reclaimed water (as of August 2005) and received a reuse authorization. Authorization does not necessarily mean that an entity has followed through and developed a reuse project.

Table I-5
Summary of Supplies Available from Reuse
(Acre-Feet per Year)

Reuse Description	User	County	2000	2010	2020	2030	2040	2050	2060
North Texas MWD Stewart Creek Direct Reuse	Frisco	Collin	0	307	307	307	307	307	307
North Texas MWD Rowlett Creek Direct Reuse	Golf Courses	Collin	1,540	1,540	1,540	1,540	1,540	1,540	1,540
Gainesville Direct Reuse	Park irrigation	Cooke	9	9	9	9	9	9	9
Alcatel Network Systems Direct Reuse	Manufacturing	Dallas	20	20	20	20	20	20	20
Trinity River Authority/Las Colinas Indirect Reuse (Dallas County irrigation)	TRA	Dallas	8,000	8,000	8,000	8,000	8,000	8,000	8,000
Cedar Crest Golf Course (Dallas)	Dallas	Dallas	0	561	561	561	561	561	561
Denton (Power Plant - direct reuse)	Denton	Denton	3,363	3,363	3,363	3,363	3,363	3,363	3,363
Denton County Direct Reuse	Denton	Denton	0	6,165	5,717	4,932	4,372	3,475	2,466
Denton County Indirect Reuse	Denton	Denton	0	1,682	2,130	2,915	3,475	4,372	5,381
UTRWD Direct Reuse	Denton Co. FWSD #1	Denton	897	897	897	897	897	897	897
Collin County Direct Reuse (golf irrigation)	The Colony	Collin	380	380	380	380	380	380	380
Denton County Direct Reuse (golf irrigation)	Trophy Club	Denton	661	800	896	977	1,049	1,129	1,210
Ennis Direct Reuse	SEP	Ellis	3,363	3,363	3,363	3,363	3,363	3,363	3,363
Trinity River Authority/Waxahachie Indirect Reuse	Waxahachie	Ellis	4,213	4,998	5,129	5,129	5,129	5,129	5,129
Denison (golf - direct reuse)	Denison	Grayson	0	0	0	0	0	0	0
Pinnacle Club Direct Reuse	Golf Course	Henderson	32	32	32	32	32	32	32
Jack County Direct Reuse (irrigation)	Bryson	Jack	28	27	27	26	26	25	25
Jacksboro Direct Reuse	Golf Course	Jack	385	385	385	385	385	385	385
Country Club WSC Direct Reuse (golf irrigation)	Country Club	Kaufman	65	92	92	92	92	92	92

Table I-5, Continued

Reuse Description	User	County	2000	2010	2020	2030	2040	2050	2060
Crandall Direct Reuse (golf irrigation)	Crandall	Kaufman	320	484	666	835	1,024	1,267	1,567
Garland Direct Reuse (sales through Forney)	SEP	Kaufman	0	8,979	15,600	15,600	15,600	15,600	15,600
Weatherford Direct Reuse	Golf Course	Parker	202	202	202	202	202	202	202
Deer Creek Waterworks WWTP Direct Reuse	Golf Course	Parker	11	11	11	11	11	11	11
Millsap ISD WWTP Direct Reuse	Athletic Fields	Parker	2	2	2	2	2	2	2
North Texas MWD Buffalo Creek Direct Reuse	Golf Course	Rockwall	672	672	672	672	672	672	672
Royce City Direct Reuse	Golf Course	Rockwall	112	112	112	112	112	112	112
Azle Direct Reuse (golf irrigation)	Azle	Tarrant	741	811	1,089	1,484	1,930	2,403	2,818
Grapevine reuse (Lake Grapevine)	Grapevine	Tarrant	2,781	3,317	3,696	3,964	4,142	4,276	4,386
Fort Worth Direct Reuse (golf irrigation)	Golf Course	Tarrant	897	897	897	897	897	897	897
North Texas MWD Lake Lavon Reuse	NTMWD	NA	32,739	35,941	35,941	35,941	35,941	35,941	35,941
Wise County Mining Reuse	Mining	Wise	15,930	15,930	14,074	12,152	10,643	9,236	8,061
Total			**77,363**	**99,979**	**105,810**	**104,800**	**104,175**	**103,697**	**103,429**

Table I-6
Region C Entities That Have Received a Chapter 210 Reuse Authorization

Permittee	County	Permit Number	Source
Bridgeport	Wise	R10389-002	Wastewater Treatment Plant (WWTP)
City of Teague and City of Fairfield	Freestone	R13579-001	WWTP
Crandall	Kaufman	R10834-001	WWTP
Dallas	Dallas	R10060-001	Central WWTP
Deer Creek Waterworks	Parker	R13759-001	WWTP
Denton	Denton	R10027-003	Pecan Creek Water Reclamation Plant
Denton	Denton	R10027-004	Robson Ranch Water Reclamation Plant
Denison	Grayson	R10079-003	Paw Paw WWTP
Ennis	Ellis	R10443-002	Oak Grove WWTP
Flower Mound	Denton	R11321-001	WWTP
Fort Worth	Tarrant	R10494-013	Village Creek WWTP
Gainesville	Cooke	R10726-001	WWTP
Garland	Kaufman	R10090-001	Duck Creek WWTP
Grapevine	Tarrant	R10486-002	Peach Street WWTP
Lewisville	Denton	R10662-001	WWTP
Millsap ISD	Parker	R13537-001	WWTP
North Texas Municipal Water District	Collin	R10172-003	Frisco Cottonwood Branch WWTP
North Texas Municipal Water District	Rockwall	R11894-001	Shepards Glen WWTP
North Texas Municipal Water District	Denton	R14008-001	Stewart Creek West WWTP
Runaway Bay	Wise	R10862-001	WWTP
Sanger	Denton	R10271-001	WWTP
The Colony	Denton	R11570-001	Stewart Creek WWTP
Trinity River Authority	Dallas	R10303-001	Central Regional Wastewater System
Trinity River Authority	Dallas	R10984-001	Ten Mile Creek Regional Wastewater System
Weatherford	Parker	R10380-002	WWTP
Weatherford	Parker	R14198-001	Water Treatment Plant

Bridgeport. The City of Bridgeport reuse authorization would allow the use of reclaimed water for irrigation at the Bridgeport Country Club in Bridgeport.

City of Teague and City of Fairfield. The Cities of Teague and Fairfield have received reuse authorizations, but currently do not operate a reuse project.

Crandall. The City of Crandall provides reclaimed water from the Crandall Wastewater Treatment Plant (WWTP) for irrigation at the Creekview Golf Club in Crandall.

Dallas. The City of Dallas provides reclaimed water from the Central WWTP for irrigation at Cedar Crest Golf Course in Dallas. The authorization also allows the use of reclaimed water for turf and landscape irrigation, maintenance of impoundments, soil compaction, and cooling tower makeup water.

Deer Creek Waterworks. The Deer Creek Waterworks provides reclaimed water from its WWTP for irrigation at the Split Rail Golf Links in Aledo. The authorization also allows the use of reclaimed water for athletic field irrigation and horticultural use.

Denton. The City of Denton operates a non-potable reclaimed water system that supplies reclaimed water directly from its Pecan Creek Water Reclamation Plant (WRP) to several customers, including the City landfill, the Denton Regional Medical Center, Oakmont Country Club, the Denton State School, and the City of Garland's Spencer Generating Station. Primary uses include irrigation, dust control, and cooling water for steam electric power generation.

Denison. The City of Denison previously provided reclaimed water from its Grayson County Airport WWTP for irrigation at the Grayson County College Golf Course; however, this project has been discontinued.

Ennis. The City of Ennis provides reclaimed water from its Oak Grove WWTP for cooling water for steam electric power generation at the Suez-Tractebel power plant in Ennis.

Flower Mound. The Town of Flower Mound reuse authorization would allow the use of reclaimed water for residential irrigation; urban uses, including irrigation of public parks, golf courses with unrestricted public access, schoolyards, or athletic fields; fire protection; maintenance of impoundments or natural water bodies; toilet or urinal flush water; other similar activities where the potential for unintentional human exposure may occur; irrigation of sod farms, silviculture, limited access highway rights of way, and other areas where human access is restricted or unlikely to occur; soil compaction or dust control in construction areas; cooling tower makeup water; and irrigation or other non-potable uses of reclaimed water at a wastewater treatment facility. This project has not been implemented.

Fort Worth. The City of Fort Worth provides reclaimed water from its Village Creek WWTP for irrigation at the Links at Waterchase Golf Course in Fort Worth.

Gainesville. The City of Gainesville irrigates athletic fields at Keneteso Park, a municipal park, with reclaimed water from its WWTP.

Garland. The City of Garland produces reclaimed water at its Duck Creek WWTP. The City sells reclaimed water to the City of Forney, which in turn provides the reclaimed water to the FPL Energy power plant near Forney. The authorization also allows the use of reclaimed water for irrigation of golf courses, sod farms, silviculture, and food crops.

Grapevine. Although the City of Grapevine does use reclaimed water, it does so indirectly by discharging reclaimed water from its Peach Street WWTP to Lake Grapevine and using raw water from Lake Grapevine for municipal and irrigation purposes. This reuse project is permitted under a water right and is not operated under the authority of the Chapter 210 reuse authorization.

Lewisville. The City of Lewisville produces reclaimed water at its WWTP. The City sells reclaimed water to the Upper Trinity Regional Water District, which in turn provides the reclaimed water to the Denton County Fresh Water Supply District No. 1 for irrigation at the Castle Hills Golf Club. The City has also occasionally provided reclaimed water for maintenance of wetlands at the Lewisville Lake Environmental Learning Area. The authorization would also allow the use of reclaimed water for irrigation of a tree nursery and of landscaped areas within the city.

Millsap ISD. The Millsap Independent School District uses reclaimed water from its WWTP to irrigate its football field and land around the athletic fields. The District irrigates the football field with reclaimed water during the off-season when the field is not in use. The remainder of the reclaimed water is disposed of by irrigating land around the athletic fields.

North Texas Municipal Water District. The North Texas Municipal Water District has Chapter 210 authorizations for reclaimed water from the Frisco Cottonwood Branch WWTP, the Shepards Glen WWTP, and the Stewart Creek West WWTP. The District does not operate reuse projects from the Frisco Cottonwood Branch or Shepards Glen WWTPs, but it does provide reclaimed water from the Stewart Creek West WWTP to the City of Frisco, which in turn sells the reclaimed water for irrigation at the Trails of Frisco Golf Club in Frisco.

Runaway Bay. The City of Runaway Bay reuse authorization would allow the use of reclaimed water for golf course irrigation. This project has not been implemented.

Sanger. The City of Sanger reuse authorization would allow the use of reclaimed water for agricultural and golf course irrigation. The City intends to provide reclaimed water for irrigation at a golf course that has not yet been designed or constructed.

The Colony. The City of The Colony provides reclaimed water from its Stewart Creek WWTP for irrigation at Stonebriar Country Club in Frisco.

Trinity River Authority. The Trinity River Authority provides reclaimed water from its Central Regional Wastewater System plant to the Dallas County Utility and Reclamation District for golf course irrigation and aesthetic purposes in Las Colinas. The Authority has also received an authorization that would allow it to supply reclaimed water from the Ten Mile Creek Regional Wastewater System plant for steam-electric power generation process water, irrigation of a pecan grove, and maintenance of impoundments. Under this authorization, the Authority currently provides reclaimed water to South Creek Ranch for irrigation and maintenance of impoundments.

Weatherford. The City of Weatherford provides backwash water from its water treatment plant for irrigation at Crown Valley Country Club in Weatherford. The City does not operate a reuse project from its WWTP, but the associated authorization would allow the use of reclaimed water for cooling tower makeup water, soil compaction and dust control in construction areas, irrigation of animal feed crops (other than pastures for milking animals), fire protection, golf course irrigation, and maintenance of water features.

Water Reuse Plans for Large Dischargers

Table I-7 lists wastewater treatment plants that currently discharge an annual average flowrate of two millions gallons per day (mgd) or more. In addition to the dischargers listed in Table I-7, several other dischargers are permitted to discharge more than 2 mgd but currently have annual average discharges of less than 2 mgd. Of the dischargers in Table I-7, the following have written reuse plans (some in draft form): Dallas, Flower Mound, Lewisville, North Texas Municipal Water District, and Weatherford. These reuse plans are summarized below.

Dallas. The City is developing a *Recycled Water Implementation Plan*[11,12]. The draft plan recommends two direct reuse projects and two water supply augmentation projects (indirect reuse) for near-term implementation. Currently, the City irrigates Cedar Crest Golf Course with reclaimed water from the Central Wastewater Treatment Plant. One direct reuse project involves extending the pipeline from Cedar Crest Golf Course to the Dallas Zoo and an industrial customer. The projected average supply from this project would be 1.75 mgd. The projected capital cost is $6.5 million, operation and maintenance costs are estimated to be $162,500 per year, and energy costs are expected to be $60,200 per year.

The second direct reuse project, the White Rock Pipeline, would involve a pipeline from the Central Wastewater Treatment Plant northward to serve customers in the White Rock Creek Basin. The projected average supply from this project would be 16.5 mgd. The projected capital cost is $55.2 million, operation and maintenance costs are estimated to be $1,380,000 per year, and energy costs are expected to be $825,200 per year.

Water supply augmentation projects are recommended for Lake Lewisville and Lake Ray Hubbard. The Lake Lewisville augmentation project would involve pumping an annual average of 60 mgd of reclaimed water from the Central Wastewater Treatment Plant to Lake Lewisville for storage, blending, and future use. The projected capital cost for the Lake Lewisville project is $185.7 million, and operation and maintenance costs are estimated to be $5.0 million per year.

The Lake Ray Hubbard augmentation project would involve pumping an annual average of 60 mgd of reclaimed water from the Southside Wastewater Treatment Plant to Lake Ray Hubbard for storage, blending, and future use. The projected capital cost for the Lake Ray Hubbard project is $201.3 million, and operation and maintenance costs are estimated to be $5.0 million per year.

Flower Mound. The Town received a Chapter 210 reuse authorization from the Texas Natural Resource Conservation Commission (TNRCC, now the TCEQ) in April 2002. The Town identified a potential service area[13] that includes the corporate Town limits and the Grapevine Municipal Golf Course complex adjacent to the Town's southern limits. Potential uses include residential irrigation; urban uses, including irrigation of public parks, golf courses with unrestricted public access, schoolyards, or athletic fields; fire protection; maintenance of

Table I-7
Region C Wastewater Dischargers That Currently Discharge 2 MGD or More

Discharger	Plant	Permit Number	County	2005 Annual Average Flow (mgd)
The Colony	Stewart Creek	WQ0011570-001	Denton	2.26
Corsicana	STP No. 2	WQ0010402-003	Navarro	2.78
Dallas	Central	WQ0010060-001	Dallas	141.50
	Southside	WQ0010060-006	Dallas	68.50
Denison	Paw Paw	WQ0010079-003	Grayson	2.79
Denton	Pecan Creek	WQ0010027-003	Denton	14.17
Flower Mound		WQ0011321-001	Denton	4.81
Fort Worth	Village Creek	WQ0010494-013	Tarrant	120.90
Garland	Duck Creek	WQ0010090-001	Dallas	13.92
	Rowlett Creek	WQ0010090-002	Dallas	17.77
Grapevine	Peach Street	WQ0010486-002	Tarrant	3.50
Lewisville		WQ0010662-001	Denton	9.32
NTMWD	Buffalo Creek	WQ0012047-001	Rockwall	2.07
	Floyd Branch	WQ0010257-001	Dallas	2.49
	Mesquite	WQ0010221-001	Dallas	14.59
	Rowlett Creek	WQ0010363-001	Collin	17.79
	Stewart Creek West	WQ0014008-001	Denton	4.45
	Wilson Creek	WQ0012446-001	Collin	36.68
	Wylie	WQ0010384-001	Collin	4.88
Sherman	Post Oak	WQ0010329-001	Grayson	7.00
TRA	Central	WQ0010303-001	Dallas	144.62
	Denton Creek	WQ0013457-001	Tarrant	2.65
	Red Oak	WQ0013415-001	Ellis	2.87
	Ten Mile Creek	WQ0010984-001	Ellis	17.67
UTRWD		WQ0010698-001	Denton	2.42
Waxahachie		WQ0010379-001	Ellis	4.82
Weatherford		WQ0010380-002	Parker	2.39
Total				**670**

* Several other dischargers are permitted to discharge more than 2 mgd but currently have annual average discharges of less than 2 mgd.

impoundments or natural water bodies; toilet or urinal flush water; other similar activities where the potential for unintentional human exposure may occur; irrigation of sod farms, silviculture, limited access highway rights of way, and other areas where human access is restricted or unlikely to occur; soil compaction or dust control in construction areas; cooling tower makeup water; and irrigation or other non-potable uses of reclaimed water at a wastewater treatment facility. Initially, it is anticipated that reclaimed water would be delivered to users in Lakeside Business District, for irrigation of vegetated medians along FM 2499, and for irrigation of Gerault Park.

Lewisville. The City received a Chapter 210 reuse authorization from the TCEQ in February 2004. The City identified a potential service area(14) that includes the City's Extraterritorial Jurisdiction (ETJ) and selected locations outside the ETJ. According to the authorization, the City will continue to produce reclaimed water for existing users (Denton County Fresh Water Supply District No. 1 and the City) and may provide reclaimed water to users including, but not limited to: the Lake Park Golf Complex; the Lake Park athletic fields; a tree farm near Jones Street and Kealy Avenue; the City's Fire Training Center; a Heavy Industry Zone roughly bounded by State Highway 121 to the south, the Elm Fork Trinity River to the east, Prairie Creek and Sewage Treatment Plant Road to the north, and the Atchison, Topeka & Santa Fe Railroad to the west; Coyote Ridge Golf Club; Indian Creek Golf Course; and Riverchase Golf Club.

North Texas Municipal Water District. The District is developing a reclaimed water plan(15). The draft plan recommends near-term implementation of the East Fork Reuse Project, which includes a water diversion structure and pump station, a constructed wetland, a transfer pump station, a water conveyance pipeline from the wetland to Lake Lavon, and an outlet structure in Lake Lavon. The draft plan recommends that the system should be sized to deliver at least 91 mgd to Lake Lavon. No cost information was presented in the draft reclaimed water plan prepared by Alan Plummer Associates, Inc. in 2004. (Section 4D.17 shows an estimated cost of $288,879,000.) The draft plan also recommends that the District continue to seek direct reclaimed water customers.

Weatherford. The City received a Chapter 210 reuse authorization from the TCEQ in June 2002. The authorization defines the potential service area as the City's ETJ. Potential uses include irrigation of sod farms, silviculture, limited access highway rights of way, and other areas where human access is restricted or unlikely to occur; irrigation of animal feed crops, other than pasture for milking animals; soil compaction or dust control in construction areas; cooling tower makeup water; and irrigation or other non-potable uses of reclaimed water at a wastewater treatment facility; irrigation at golf courses with restricted public access; and other acceptable uses where human contact with effluent is unlikely to occur[16].

Consolidation of Reuse Plans into a Regional Reuse Plan

All of the projects discussed in the 210 authorizations and the reuse plans are included in the Region C Initially Prepared Water Plan. Additional reuse projects were identified where possible to meet water needs. The recommended regional reuse plan is outlined in Table 4B.6 in Section 4B of the Region C plan.

Recent Water Right Amendments Involving Reuse

The Texas Commission on Environmental Quality (TCEQ) recently granted reuse-based amendments to water right certificates of adjudication held by the Tarrant Regional Water District and the Trinity River Authority. These recent amendments are discussed below and summarized in Table I-8.

Tarrant Regional Water District. On February 8, 2005, the District received amendments to its water rights in Cedar Creek Reservoir (Certificate of Adjudication 08-4976C) and Richland-Chambers Reservoir (Certificate of Adjudication 08-5035C). The amended certificates allow the District to divert from the Trinity River a portion of the historic and future return flows that originate from water stored in District reservoirs. The return flows will be diverted into off-channel, wetland impoundments to be constructed and used for water quality treatment purposes and then delivered into Cedar Creek Reservoir and/or Richland-Chambers Reservoir for storage and future diversion. The maximum annual diversion from the Trinity River shall not exceed any one of the following:

90,799 acre-feet per year (Certificate of Adjudication 08-4976C),
105,019 acre-feet per year (Certificate of Adjudication 08-5035C),
195,818 acre-feet per year for both certificates, or
70 percent of District return flows, less carriage losses.

The maximum annual delivery from the Cedar Creek wetland impoundment to Cedar Creek Reservoir is 88,059 acre-feet per year. This water will augment existing storage in Cedar Creek Reservoir for diversion under the reservoir's original permit of 175,000 acre-feet per year, plus

Table I-8
Recent Water Right Amendments and Permit Applications Involving Reuse

Entity	Flow Description	Certificate of Adjudication/ Permit Number	Status	Amendment/ Administrative Completion Date	Additional Annual Diversion for Water Supply (ac-ft/yr)
Tarrant Regional Water District	Multiple WWTPs to Wetland/Cedar Creek Reservoir	08-4976C	Amended	2/8/2005	52,500
Tarrant Regional Water District	Multiple WWTPs to Wetland/Richland-Chambers Reservoir	08-5035C	Amended	2/8/2005	63,000
Trinity River Authority	Mountain Creek WWTP to Joe Pool Lake	08-3404D	Amended	6/27/2005	4,368
Trinity River Authority	Multiple WWTPs to Lake Livingston	08-4248	Administratively complete	9/7/2000	Unspecified
City of Dallas	Multiple WWTPs to Lewisville Lake	08-2456E	Administratively complete	12/5/2001	0
City of Dallas	Multiple WWTPs to Lake Ray Hubbard	08-2462G	Administratively complete	12/5/2001	150,000
Upper Trinity Regional Water District	Multiple WWTPs to Lewisville Lake	5778	Administratively complete	5/28/2002	9,664
City of Irving	Unspecified	03-4799C	Administratively complete	7/31/2002	Up to 54,000
North Texas Municipal Water District	Wilson Creek WWTP to Lake Lavon	08-2410E	Administratively complete	11/10/2002	35,941
North Texas Municipal Water District	Multiple WWTPs to Wetland/Lake Lavon	08-2410F	Application received	N/A	Up to 206,600
North Texas Municipal Water District	Multiple WWTPs to Wetland	5871	Administratively complete	2/24/2005	750*

* Temporary permit for irrigation.

additional authorized diversion from Cedar Creek Reservoir up to 52,500 acre-feet per year for municipal, mining, industrial, and agricultural purposes.

The maximum annual delivery from the Richland-Chambers wetland impoundment to Richland-Chambers Reservoir is 100,465 acre-feet per year. Similar to the operation of the Cedar Creek wetland project, the water from the Richland-Chambers wetland impoundment will augment existing storage in Richland-Chambers Reservoir for diversion under the reservoir's original permit of 210,000 acre-feet per year, with additional authorized diversion from Richland-Chambers Reservoir up to 63,000 acre-feet per year for municipal, mining, industrial, and agricultural purposes.

Trinity River Authority. On June 27, 2005, the Authority received an amendment to its water right in Joe Pool Lake (Certificate of Adjudication 08-3404D). The amended certificate allows the Authority to impound in and use from Joe Pool Lake an amount not to exceed 4,368 acre-feet per year of treated wastewater effluent discharged from the Authority's Mountain Creek Regional Wastewater Treatment Plant. The amendment also allows a bed and banks authorization to use an unnamed tributary of Newton Branch, tributary of Soap Creek, tributary of Mountain Creek, and Joe Pool Lake to convey the discharged water to Joe Pool Lake for storage and subsequent diversion.

Pending Water Right Permit Applications Involving Reuse

The Trinity River Authority, the City of Dallas, the Upper Trinity Regional Water District, the City of Irving, and the North Texas Municipal Water District have submitted water right permit applications involving reuse to the Texas Commission on Environmental Quality (TCEQ). To date, the TCEQ has not taken action on these permit applications. This section describes the pending water right permit applications in the order in which they were declared administratively complete, which determines the eventual water right priority date. All have been declared administratively complete with the exception of North Texas Municipal Water District's application for Certificate of Adjudication 08-2410F.

Trinity River Authority. On September 7, 2000, the TCEQ declared the Authority's application to amend Certificate of Adjudication 08-4248 administratively complete. The proposed amendment would allow the Authority to impound, in its share of the storage in Lake Livingston, historical and future return flow discharges from its Central, Denton Creek, Red Oak

Creek, and Ten Mile Creek wastewater treatment plants. According to the application, these treatment plants have a cumulative permitted discharge of 161 million gallons per day (MGD). (Since the application was filed, the cumulative permitted discharge has been increased to 190.5 MGD.) The Authority seeks a bed and banks authorization to convey the return flows to the diversion point in Lake Livingston (Polk County). The proposed amendment would allow the Authority to impound return flows in Lake Livingston and to divert and use the return flows as authorized in the amended certificate.

City of Dallas. On December 5, 2001, the TCEQ declared the City's applications administratively complete for Certificate of Adjudication 08-2456E, an amendment to its water right in Lake Lewisville, and Certificate of Adjudication 08-2462G, an amendment to its water right in Lake Ray Hubbard.

The proposed amendments would allow the diversion of historical and future return flow discharges from the City of Lewisville and Town of Flower Mound Wastewater Treatment Plants from the Elm Fork Trinity River to the City's Elm Fork and Bachman Water Treatment Plants. The applications also request the right to discharge, store, divert, and use historical and future return flows from the City's Central and Southside Wastewater Treatment Plants. The City would convey by pipeline a portion of the return flows from the Central and Southside Wastewater Treatment Plants to Lake Lewisville and Lake Ray Hubbard. According to the applications, the five-year average discharges from these plants are 157,030 acre-feet per year from the Central plant and 85,800 acre-feet per year from the Southside plant. The proposed amendments would leave at least 114,000 acre-feet per year of water discharged from the Central and Southside Wastewater Treatment Plants in the Trinity River for instream flows.

The proposed amendments would also include a bed and banks authorization to convey the return flows from the pipeline discharge point to previously authorized diversion points. The applications request diversion authorization of up to an additional 150,000 acre-feet per year from Lake Ray Hubbard but do not request a new appropriation of water in Lake Lewisville. Return flows covered by this request include the following:

- Dallas Trinity Basin origin water historically discharged into the Trinity River,
- Sabine River water (Lake Tawakoni) historically discharged into the Trinity River,
- Future increases in wastewater effluent originating from the Trinity River and Sabine River Basins, and

- Developed water to be transferred form the Sabine River (Lake Fork) and Neches River Basins.

Upper Trinity Regional Water District. On May 28, 2002, the TCEQ declared the District's application to amend water right Permit Number 5778 administratively complete. The proposed amendment would allow the District to divert from Lake Lewisville up to 9,664 acre-feet per year of return flows originating from the District's Lake Chapman water for municipal and industrial purposes. The proposed amendment would authorize use of bed and banks to convey return flows from their points of discharge to the diversion point in Lake Lewisville.

City of Irving. On July 31, 2002, the TCEQ declared the City's application for Certificate of Adjudication 03-4799C, an amendment to its water right in Lake Chapman, administratively complete. The current certificate allows the City to divert water from Lake Chapman up to 44,820 acre-feet per year for municipal use and up to 9,180 acre-feet per year of water for municipal and industrial use within the City's service area. The current certificate requires that water diverted but not consumed in the Trinity River Basin must be returned to the Trinity River Basin at the City's disposal plants and disposal plants of industrial users. The application seeks to remove the requirement to return unconsumed water to the Trinity River Basin and to add an authorization to reuse, in the Trinity River Basin, an amount not to exceed 54,000 acre-feet per year (less carriage losses) of its Sulphur River Basin water as "developed" water. The reuse authorization would be subject to obtaining future authorizations after identifying specific points of discharge and diversion and satisfying bed and banks requirements.

North Texas Municipal Water District (Lake Lavon). The District has three water right applications that involve reuse pending before the TCEQ. If granted, these water rights would be called Certificate of Adjudication 08-2410E, Certificate of Adjudication 08-2410F, and Permit Number 5871. Each of these is discussed below.

On November 10, 2002, the TCEQ declared the District's application for Certificate of Adjudication 08-2410E, an amendment to its water right in Lake Lavon, administratively complete. The proposed amendment would allow the District to divert from Lake Lavon up to an additional 35,941 acre-feet per year (for a total of 71,882 acre-feet per year) of water discharged from the District's Wilson Creek Wastewater Treatment Plant. This diversion would be for municipal purposes and would be limited to the amount actually discharged from the treatment plant, less conveyance losses. The proposed amendment would also alter several other provisions that are not related to reuse.

On April 20, 2004, the TCEQ received the District's application for Certificate of Adjudication 08-2410F, another amendment to its water right in Lake Lavon. To date, the TCEQ has not declared this application administratively complete. The proposed amendment would allow the diversion of up to 206,600 acre-feet per year of return flows originating from District water supplies from the East Fork Trinity River for municipal, industrial, agricultural, and recreational purposes. This amount includes all future District return flows with the following exceptions:

- 64 MGD of discharges from the District's Wilson Creek Wastewater Treatment Plant, which the District has or will appropriate through separate authorization and
- 30 percent of all Trinity Basin-based resources authorized pursuant to Certificate of Adjudication No. 08-2410, as amended, which the District proposes to leave in the East Fork Trinity River to address downstream water rights and the needs of the environment.

The application also requests a bed and banks authorization to use streams within the Trinity River Basin to convey District return flows to the diversion point.

On February 24, 2005, the TCEQ declared the District's application for temporary water right Permit Number 5871 administratively complete. The proposed permit would allow the District to divert up to 750 acre-feet per year for a period of three years from the East Fork Trinity River for agricultural purposes (irrigation) to facilitate the development of a constructed wetland in Kaufman County. The constructed wetland will eventually be part of the District's East Fork Reuse Project.

Imports

The supply available from imports is based upon the Water Availability Models (WAMs) from the TCEQ and the current contracts with the owners of the water sources. Table I-9 shows those imports. Below is a discussion of each of the imported water sources.

Table I-9
Currently Available Surface Water Supplies – Imports
(Acre-Feet per Year)

Source	Basin of Origin	2000	2010	2020	2030	2040	2050	2060
Chapman (NTMWD)[a]	Sulphur	50,802	49,976	49,150	48,324	47,498	46,672	45,843
Chapman (Irving)	Sulphur	47,948	47,168	46,388	45,608	44,828	44,048	43,268
Chapman (Upper Trinity MWD)	Sulphur	14,301	14,068	13,835	13,602	13,369	13,136	12,905
Tawakoni (Terrell)	Sabine	9,790	9,718	9,646	9,573	9,501	9,428	9,356
Tawakoni (Dallas)	Sabine	184,991	183,619	182,251	180,882	179,515	178,146	176,777
Fork (Dallas) [b]	Sabine	120,000	120,000	119,943	119,095	118,248	117,400	116,551
Palestine (Dallas) [c]	Neches	112,700	112,080	111,460	110,840	110,220	109,600	108,980
Livingston [d]	Trinity	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Lake Athens [e]	Neches	3,960	3,908	3,856	3,804	3,751	3,699	3,647
Possum Kingdom [f]	Brazos	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Lake Aquilla	Brazos	245	264	276	285	295	309	329
Lake Granbury	Brazos	185	231	231	231	231	231	231
Lake Palo Pinto	Brazos	850	1,270	1,257	1,248	1,234	1,230	1,230
TOTAL		**567,772**	**564,302**	**560,292**	**555,492**	**550,689**	**545,898**	**541,117**

a. The supplies from Lake Chapman for NTMWD include NTMWD's share of Lake Chapman and sales from the City of Cooper.

b. The import of water from Lake Fork to the Trinity Basin is limited to 120,000 acre-feet per year. The infrastructure to transport this water to DWU is under construction.

c. There is no current infrastructure to transport the water from Lake Palestine to DWU.

d. Water supply contract from Lake Livingston is for 20,000 acre-feet per year in any one year with no more than 48,000 acre-feet per year over a three year period.

e. The amount of water from Lake Athens is the amount that is imported to Region C. The firm yield of the lake is 6,145 acre-feet per year in 2000, reducing to 5,660 acre-feet per year by 2060.

f. The supply from Possum Kingdom Lake is for Vulcan Materials (Parker County Mining).

Chapman. North Texas Municipal Water District, the City of Irving, and the Sulphur River Water District hold water rights in Lake Chapman totaling 146,520 acre-feet per year. Of this total, 127,320 acre-feet per year can be exported for use in Region C – 57,214 acre-feet per year for North Texas Municipal Water District, 54,000 acre-feet per year for Irving, and 16,106 acre-feet per year for the Upper Trinity Regional Water District (purchased from the Sulphur River Water District). The recently completed Water Availability Model for the Sulphur Basin indicated that the firm yield of Lake Chapman is less than 146,520 acre-feet per year. According to the Operations Plan for Jim Chapman, prepared by R.J. Brandes Company in June 2003, the year 2000 firm yield of Lake Chapman is about 130,100 acre-feet per year. Due to sedimentation, the firm yield in 2060 is estimated at 117,400 acre-feet per year.

The values in Table I-9 show Lake Chapman's computed firm yield divided proportionally among the Region C water suppliers with a share of the water. The water supply for Upper Trinity Regional Water District could reduce by 25 percent in 2050 because the City of Commerce has the option to reclaim a portion of the water it has sold to UTRWD after 2040. However, based on future water projections for the City of Commerce, it is expected that Commerce may not need to exercise the option, thereby letting the water remain available to UTRWD.

Tawakoni. Lake Tawakoni is located in the Sabine River Basin. The Sabine River Authority holds water rights for 238,100 acre-feet per year. The City of Dallas has a contract for 190,480 acre-feet per year. The City of Terrell has a contract for 10,081 acre-feet per year. Using the Sabine River WAM, the firm yield of Lake Tawakoni is 231,520 in year 2000, reducing to 221,240 acre-feet per year by 2060. The supply available to the cities of Dallas and Terrell are based on the proportion of the contracted amount to the firm yield. Adjustments were made to ensure that supplies to each customer of the Sabine River Authority were reduced proportionally.

Lake Fork (Dallas). Lake Fork is located in the Sabine River Basin. The Sabine River Authority holds water rights for 188,660 acre-feet per year. The City of Dallas has a contract for 131,860 acre-feet per year. Of this amount, 120,000 acre-feet per year can be exported to the Trinity Basin in Region C. The remainder can only be used in the Sabine River Basin. The Sabine River WAM reports the firm yield of Lake Fork as 174,250 acre-feet per year in year 2000, reducing due to sedimentation to 166,960 acre-feet per year. The supply to Dallas was reduced in proportion to the reduced yield. The total amount exported to Region C was limited to the 120,000 acre-feet per year specified in the trans-basin diversion permit.

Palestine (Dallas). Lake Palestine is located on the Neches River in the Neches River Basin. The lake is owned and operated by the Upper Neches River Municipal Water Authority (UNRMWA) in conjunction with a downstream diversion point (Rocky Point). The UNRMWA holds water rights totaling 238,110 acre-feet per year from the Lake Palestine system. The firm yield of the Palestine system using the Neches WAM is estimated at 222,200 acre-feet per year in year 2000, reducing to 214,600 acre-feet per year by 2060. The City of Dallas has a contract with the UNRMWA for 114,337 acre-feet per year. The supply to Dallas was reduced due to the reduced yield. Presently there is no infrastructure to transport this water from Lake Palestine to Dallas. This will be considered as a water management strategy.

Athens (Athens). Lake Athens is located in Henderson County in the Neches River Basin. The Athens Municipal Water Authority holds water rights in Lake Athens totaling 8,500 acre-feet per year. Of this amount 3,023 acre-feet per year is designated for industrial use for the Athens Fish Hatchery, which is located at the lake. The yield of Lake Athens using the Neches Basin Water Availability Model is currently 6,145 acre-feet per year. The amount that is exported to Region C for use by the City of Athens is 3,960 acre-feet per year, reducing to 3,647 acre-feet per year in 2060.

Possum Kingdom Lake (Vulcan Materials). Vulcan Materials has a contract to purchase 2,000 acre-feet per year of water originating in Possum Kingdom Lake from the Brazos River Authority for mining use. Possum Kingdom Lake is in the Brazos River Basin in Region G. This supply is assumed to be available through the planning period.

Lake Aquilla. Lake Aquilla is located in the Brazos River Basin in Region G. The Aquilla Water Supply Corporation provides water to entities in Ellis and Navarro Counties in Region C. The total estimated supply provided to Region C from Lake Aquilla is 245 acre-feet per year in 2000, increasing to 329 acre-feet per year by 2060.

Lake Granbury. Lake Granbury is located in the Brazos River Basin in Region G. The Brazos River Authority owns and operates the lake as part of the Authority's water system. Currently, the Authority sells water from Lake Granbury to Johnson County Special Utility District (SUD). Johnson County SUD provides water to customers in both Region C and Region G. The amount of water imported to Region C is estimated at 231 acre-feet per year.

Lake Palo Pinto. Lake Palo Pinto is located in Palo Pinto County in the Brazos River Basin in Region G. A portion of Mineral Wells is in Parker County in Region C, and Mineral Wells also sells water to Millsap Water Supply Corporation (WSC), Parker County WSC, and the portions of North Rural and Santo WSCs in Parker County. All of Mineral Wells' water supply currently comes from Lake Palo Pinto. (Mineral Wells has a water right in Lake Mineral Wells in Parker County but has no plans to use that source for water supply.) The supply from Lake Palo Pinto to Region C consists of:

- All projected City of Mineral Wells demand in Parker County
- 25 acre-feet per year of demand for Parker County Manufacturing, provided through the City of Mineral Wells
- 479 acre-feet per year for Parker County Other.

APPENDIX I

LIST OF REFERENCES

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(15) Alan Plummer Associates, Inc.: *Reclaimed Water Augmentation and Implementation Plan, Draft Report*, prepared for the North Texas Municipal Water District, July 2004.

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APPENDIX J

CURRENT SUPPLIES BY WATER USER GROUP

Table J.1
Current Supplies by Water User Group

WUG	County Water Used	Basin Water Used	Source	Purchased From	2010	2020	2030	2040	2050	2060
Able Springs WSC	KAUFMAN	Trinity	Lake Fork	SRA	965	965	959	946	918	887
Able Springs WSC	KAUFMAN	Trinity	Lake Tawakoni	SRA	0	0	0	0	0	0
Addison	DALLAS	Trinity	Lake Ray Roberts	DWU	2,835	2,880	2,851	2,731	2,469	2,170
Addison	DALLAS	Trinity	Lake Ray Hubbard	DWU	1,057	1,087	1,090	1,058	969	863
Addison	DALLAS	Trinity	Lake Tawakoni	DWU	2,616	2,670	2,658	2,560	2,326	2,055
Aledo	PARKER	Trinity	Trinity Aquifer	TRA	291	291	291	291	291	291
Allen	COLLIN	Trinity	Lake Texoma	NTMWD	4,802	4,537	4,566	4,224	3,928	3,615
Allen	COLLIN	Trinity	Lake Lavon/Reuse	NTMWD	6,460	6,104	6,142	5,683	5,284	4,862
Allen	COLLIN	Trinity	Lake Chapman	NTMWD	3,104	2,885	2,854	2,596	2,372	2,144
Allen	COLLIN	Trinity	Indirect Reuse (Lavon)	NTMWD	2,232	2,109	2,122	1,963	1,826	1,680
Alvord	WISE	Trinity	Trinity Aquifer	TRA	114	114	114	114	114	114
Anna	COLLIN	Trinity	Trinity Aquifer	TRA	88	88	88	88	88	88
Anna	COLLIN	Trinity	Woodbine Aquifer	TRA	124	124	124	124	124	124
Annetta	PARKER	Trinity	Trinity Aquifer	TRA	139	139	139	139	139	139
Annetta	PARKER	Trinity	Other Aquifer	TRA	0	0	0	0	0	0
Annetta South	PARKER	Trinity	Trinity Aquifer	TRA	76	76	76	76	76	76
Argyle	DENTON	Trinity	Lake Ray Roberts	UTRWD	569	648	769	895	1,025	1,027
Argyle	DENTON	Trinity	Lake Chapman	UTRWD	776	813	723	604	478	483
Argyle	DENTON	Trinity	Trinity Aquifer		398	398	398	398	398	398
Argyle WSC	DENTON	Trinity	Lake Ray Roberts	UTRWD	143	98	97	109	122	117
Argyle WSC	DENTON	Trinity	Lake Chapman	UTRWD	195	123	93	74	57	55
Argyle WSC	DENTON	Trinity	Trinity Aquifer		398	398	398	398	398	398
Arlington	TARRANT	Trinity	TRWD Sources	TRWD	76,445	72,096	65,012	57,061	49,111	42,177
Arlington	TARRANT	Trinity	Lake Arlington		8,333	8,267	8,200	8,133	8,067	8,000
Athens	HENDERSON	Trinity	Carrizo-Wilcox Aquifer		432	429	428	428	428	428
Athens	HENDERSON	Trinity	Lake Athens	Athens MWA	1,537	1,663	1,783	1,892	2,003	2,105
Aubrey	DENTON	Trinity	Lake Ray Roberts	UTRWD	48	50	58	67	77	76
Aubrey	DENTON	Trinity	Lake Chapman	UTRWD	64	62	54	45	35	36
Aubrey	DENTON	Trinity	Trinity Aquifer		195	195	195	195	195	195
Aurora	WISE	Trinity	TRWD Sources		33	37	40	44	47	51
Aurora	WISE	Trinity	Trinity Aquifer		98	98	98	98	98	98
Azle	PARKER	Trinity	TRWD Sources	TRWD	304	279	249	220	203	199
Azle	TARRANT	Trinity	TRWD Sources	TRWD	1,376	1,401	1,431	1,460	1,477	1,481
Balch Springs	DALLAS	Trinity	Lake Ray Roberts	DWU	765	682	624	566	494	423
Balch Springs	DALLAS	Trinity	Lake Ray Hubbard	DWU	285	258	238	219	194	169
Balch Springs	DALLAS	Trinity	Lake Tawakoni	DWU	705	633	581	531	466	402
Bardwell	ELLIS	Trinity	Woodbine Aquifer		78	78	78	78	78	78
Bartonville	DENTON	Trinity	Lake Ray Roberts	UTRWD	281	442	598	742	907	809
Bartonville	DENTON	Trinity	Lake Chapman	UTRWD	382	555	564	502	423	381
Bartonville	DENTON	Trinity	Trinity Aquifer		196	196	196	196	196	196
Bartonville WSC	DENTON	Trinity	Lake Ray Roberts	UTRWD	19	30	44	62	89	89
Bartonville WSC	DENTON	Trinity	Lake Chapman	UTRWD	27	39	43	43	42	42
Bartonville WSC	DENTON	Trinity	Trinity Aquifer		282	282	282	282	282	282
Bedford	TARRANT	Trinity	TRWD Sources	TRA	10,200	8,738	7,569	6,592	5,695	4,941
Bedford	TARRANT	Trinity	Trinity Aquifer		425	425	425	425	425	425
Bells	GRAYSON	Red	Trinity Aquifer		161	161	161	161	161	161
Bells	GRAYSON	Red	Woodbine Aquifer		31	31	31	31	31	31
Benbrook	TARRANT	Trinity	TRWD Sources		4,235	4,128	4,265	4,466	4,591	4,705

Table J.1
Current Supplies by Water User Group

WUG	County Water Used	Basin Water Used	Source	Purchased From	2010	2020	2030	2040	2050	2060
Benbrook	TARRANT	Trinity	Trinity Aquifer		950	950	950	950	950	950
Bethel-Ash WSC	HENDERSON	Trinity	Carrizo-Wilcox Aquifer		173	172	172	172	171	172
Bethesda WSC	TARRANT	Trinity	TRWD Sources	Fort Worth	1,606	1,582	1,587	1,592	1,578	1,583
Bethesda WSC	TARRANT	Trinity	Trinity Aquifer		35	35	35	35	35	35
Blackland WSC	ROCKWALL	Sabine	Lake Texoma	NTMWD	68	77	79	83	90	98
Blackland WSC	ROCKWALL	Sabine	Lake Lavon	NTMWD	88	97	100	102	108	110
Blackland WSC	ROCKWALL	Sabine	Lake Chapman	NTMWD	44	49	49	51	55	58
Blackland WSC	ROCKWALL	Sabine	Indirect Reuse (Lavon)	NTMWD	32	36	37	39	42	46
Blackland WSC	ROCKWALL	Trinity	Lake Texoma	NTMWD	29	33	34	35	39	42
Blackland WSC	ROCKWALL	Trinity	Lake Lavon	NTMWD	39	44	45	48	52	56
Blackland WSC	ROCKWALL	Trinity	Lake Chapman	NTMWD	19	21	21	22	23	25
Blackland WSC	ROCKWALL	Trinity	Indirect Reuse (Lavon)	NTMWD	13	15	16	16	18	20
Blooming Grove	NAVARRO	Trinity	Navarro Mills Reservoir	TRA	163	146	133	121	109	98
Blue Mound	TARRANT	Trinity	TRWD Sources		122	102	82	65	54	46
Blue Mound	TARRANT	Trinity	Trinity Aquifer		183	183	183	183	183	183
Blue Ridge	COLLIN	Trinity	Woodbine Aquifer		119	119	119	119	119	119
Bolivar WSC	COOKE	Trinity	Trinity Aquifer		173	173	173	173	173	173
Bolivar WSC	DENTON	Trinity	Trinity Aquifer		760	760	760	760	760	760
Bolivar WSC	WISE	Trinity	Trinity Aquifer		141	141	141	141	141	141
Bonham	FANNIN	Red	Lake Bonham		3,656	3,649	3,645	3,640	3,636	3,476
Boyd	WISE	Trinity	TRWD Sources		56	80	75	62	53	46
Boyd	WISE	Trinity	Trinity Aquifer		150	150	150	150	150	150
Brandon-Irene WSC	ELLIS	Trinity	Lake Aquilla	Aquilla WSC	10	11	11	12	13	15
Brandon-Irene WSC	NAVARRO	Trinity	Lake Aquilla	Aquilla WSC	27	28	30	31	33	36
Bridgeport	WISE	Trinity	TRWD Sources	TRWD	1,686	1,656	1,700	1,700	1,700	1,700
Bryson	JACK	Brazos	Lake Bryson		0	0	0	0	0	0
Buena Vista - Bethel SUD	ELLIS	Trinity	Trinity Aquifer		305	305	305	305	305	305
Buena Vista - Bethel SUD	ELLIS	Trinity	TRWD Sources	TRA	0	0	0	0	0	0
Burleson	TARRANT	Trinity	TRWD Sources	Fort Worth	858	862	880	887	889	898
Caddo Basin SUD	COLLIN	Sabine	Lake Texoma	NTMWD	84	81	87	93	99	105
Caddo Basin SUD	COLLIN	Sabine	Lake Lavon	NTMWD	114	110	118	124	133	141
Caddo Basin SUD	COLLIN	Sabine	Lake Chapman	NTMWD	54	52	54	57	60	62
Caddo Basin SUD	COLLIN	Sabine	Indirect Reuse (Lavon)	NTMWD	39	38	40	43	46	49
Caddo Basin SUD	COLLIN	Trinity	Lake Texoma	NTMWD	39	38	40	43	46	48
Caddo Basin SUD	COLLIN	Trinity	Lake Lavon	NTMWD	53	51	54	58	61	65
Caddo Basin SUD	COLLIN	Trinity	Lake Chapman	NTMWD	25	24	25	26	28	29
Caddo Basin SUD	COLLIN	Trinity	Indirect Reuse (Lavon)	NTMWD	18	17	19	20	21	23
Carrollton	DALLAS	Trinity	Lake Ray Roberts	DWU	3,458	3,068	2,817	2,557	2,244	1,942
Carrollton	DALLAS	Trinity	Lake Ray Hubbard	DWU	1,290	1,159	1,077	990	880	773
Carrollton	DALLAS	Trinity	Lake Tawakoni	DWU	3,192	2,846	2,626	2,396	2,114	1,841
Carrollton	DALLAS	Trinity	Trinity Aquifer		10	10	10	10	10	10
Carrollton	DENTON	Trinity	Lake Ray Roberts	DWU	4,829	4,393	4,171	3,861	3,421	2,962
Carrollton	DENTON	Trinity	Lake Ray Hubbard	DWU	1,800	1,658	1,595	1,495	1,343	1,178
Carrollton	DENTON	Trinity	Lake Tawakoni	DWU	4,455	4,073	3,889	3,618	3,224	2,806
Carrollton	DENTON	Trinity	Trinity Aquifer		0	0	0	0	0	0

Table J.1
Current Supplies by Water User Group

WUG	County Water Used	Basin Water Used	Source	Purchased From	2010	2020	2030	2040	2050	2060
Cash WSC	ROCKWALL	Sabine	Lake Texoma	NTMWD	10	8	7	19	21	23
Cash WSC	ROCKWALL	Sabine	Lake Lavon	NTMWD	13	11	9	26	28	30
Cash WSC	ROCKWALL	Sabine	Lake Chapman	NTMWD	6	5	4	12	13	14
Cash WSC	ROCKWALL	Sabine	Lake Tawakoni	SRA	42	58	62	40	33	26
Cash WSC	ROCKWALL	Sabine	Indirect Reuse (Lavon)	NTMWD	4	4	3	9	10	11
Cedar Hill	DALLAS	Trinity	Lake Ray Roberts	DWU	2,466	2,778	2,994	3,040	2,916	2,687
Cedar Hill	DALLAS	Trinity	Lake Joe Pool	TRA	0	0	0	0	0	0
Cedar Hill	DALLAS	Trinity	Lake Ray Hubbard	DWU	920	1,049	1,145	1,177	1,144	1,068
Cedar Hill	DALLAS	Trinity	Lake Tawakoni	DWU	2,275	2,576	2,792	2,849	2,747	2,545
Cedar Hill	DALLAS	Trinity	Trinity Aquifer		275	275	275	275	275	275
Cedar Hill	DALLAS	Trinity	Woodbine Aquifer		0	0	0	0	0	0
Cedar Hill	ELLIS	Trinity	Lake Ray Roberts	DWU	4	4	4	4	4	4
Cedar Hill	ELLIS	Trinity	Lake Joe Pool		0	0	0	0	0	0
Cedar Hill	ELLIS	Trinity	Lake Ray Hubbard	DWU	1	1	1	1	1	1
Cedar Hill	ELLIS	Trinity	Lake Tawakoni	DWU	3	3	3	3	3	3
Cedar Hill	ELLIS	Trinity	Trinity Aquifer		0	0	0	0	0	0
Cedar Hill	ELLIS	Trinity	Woodbine Aquifer		0	0	0	0	0	0
Celina	COLLIN	Trinity	Lake Ray Roberts	UTRWD	242	1,117	1,445	1,675	2,012	1,906
Celina	COLLIN	Trinity	Lake Chapman	UTRWD	331	1,403	1,358	1,128	891	897
Celina	COLLIN	Trinity	Trinity Aquifer		317	317	317	317	317	317
Celina	COLLIN	Trinity	Woodbine Aquifer		408	408	408	408	408	408
Chatfield WSC	NAVARRO	Trinity	Navarro Mills Reservoir	Corsicana	589	809	907	989	1,080	1,166
Chico	WISE	Trinity	TRWD Sources	West Wise Rural WSC	96	101	111	111	111	111
Chico	WISE	Trinity	Trinity Aquifer		119	119	119	119	119	119
Cockrell Hill	DALLAS	Trinity	Lake Ray Roberts	DWU	209	197	178	158	139	119
Cockrell Hill	DALLAS	Trinity	Lake Ray Hubbard	DWU	78	74	68	62	54	47
Cockrell Hill	DALLAS	Trinity	Lake Tawakoni	DWU	193	182	166	149	130	112
College Mound WSC	KAUFMAN	Trinity	Lake Texoma	NTMWD	99	149	194	209	232	262
College Mound WSC	KAUFMAN	Trinity	Lake Lavon	NTMWD	133	199	261	282	314	353
College Mound WSC	KAUFMAN	Trinity	Lake Terrell	Terrell	161	140	127	119	111	101
College Mound WSC	KAUFMAN	Trinity	Lake Chapman	NTMWD	64	95	121	128	140	155
College Mound WSC	KAUFMAN	Trinity	Lake Tawakoni	Terrell	213	187	168	158	148	134
College Mound WSC	KAUFMAN	Trinity	Indirect Reuse (Lavon)	NTMWD	46	69	90	97	108	122
Colleyville	TARRANT	Trinity	TRWD Sources	TRA	8,015	7,757	6,791	5,904	5,013	4,268
Colleyville	TARRANT	Trinity	Trinity Aquifer		574	574	574	574	574	574
Collin County-Irrigation	COLLIN	Trinity	Run-of-River - Trinity		408	408	408	408	408	408
Collin County-Irrigation	COLLIN	Trinity	Direct reuse	NTMWD	2,227	2,227	2,227	2,227	2,227	2,227
Collin County-Livestock	COLLIN	Sabine	Livestock Local Supply		31	31	31	31	31	31
Collin County-Livestock	COLLIN	Sabine	Other Aquifer		4	4	4	4	4	4
Collin County-Livestock	COLLIN	Trinity	Livestock Local Supply		971	971	971	971	971	971
Collin County-Livestock	COLLIN	Trinity	Other Aquifer		114	114	114	114	114	114
Collin County-Manufacturing	COLLIN	Trinity	Lake Texoma	NTMWD	689	618	600	593	591	587
Collin County-Manufacturing	COLLIN	Trinity	Lake Chapman	NTMWD	445	393	375	364	357	348
Collin County-Manufacturing	COLLIN	Trinity	Woodbine Aquifer		214	214	214	214	214	214
Collin County-Manufacturing	COLLIN	Trinity	Indirect Reuse (Lavon)	NTMWD	1,247	1,119	1,087	1,073	1,069	1,063
Collin County-Mining	COLLIN	Trinity	Other Local Supply		195	195	195	195	195	195

Table J.1
Current Supplies by Water User Group

WUG	County Water Used	Basin Water Used	Source	Purchased From	2010	2020	2030	2040	2050	2060
Collin County-Other	COLLIN	Sabine	Lake Texoma	NTMWD	3	3	3	3	2	2
Collin County-Other	COLLIN	Sabine	Lake Lavon	NTMWD	5	5	4	3	4	3
Collin County-Other	COLLIN	Sabine	Lake Chapman	NTMWD	2	2	2	2	1	1
Collin County-Other	COLLIN	Sabine	Woodbine Aquifer		0	0	0	0	0	0
Collin County-Other	COLLIN	Sabine	Trinity Aquifer		0	0	0	0	0	0
Collin County-Other	COLLIN	Sabine	Indirect Reuse (Lavon)	NTMWD	2	1	1	1	1	1
Collin County-Other	COLLIN	Trinity	Lake Texoma	NTMWD	80	55	43	34	28	23
Collin County-Other	COLLIN	Trinity	Lake Lavon	NTMWD	107	75	57	46	37	30
Collin County-Other	COLLIN	Trinity	Lake Chapman	NTMWD	51	35	27	21	17	14
Collin County-Other	COLLIN	Trinity	Trinity Aquifer		655	655	655	655	655	655
Collin County-Other	COLLIN	Trinity	Woodbine Aquifer		505	505	505	505	505	505
Collin County-Other	COLLIN	Trinity	Indirect Reuse (Lavon)	NTMWD	37	26	20	16	13	11
Collin County-Steam Electric Power	COLLIN	Trinity	Lake Texoma	NTMWD	161	100	100	104	112	122
Collin County-Steam Electric Power	COLLIN	Trinity	Lake Lavon	NTMWD	216	134	135	140	151	163
Collin County-Steam Electric Power	COLLIN	Trinity	Lake Chapman	NTMWD	104	63	62	64	68	72
Collin County-Steam Electric Power	COLLIN	Trinity	Trinity Aquifer		555	555	555	555	555	555
Collin County-Steam Electric Power	COLLIN	Trinity	Indirect Reuse (Lavon)	NTMWD	75	46	46	48	52	57
Collinsville	GRAYSON	Trinity	Trinity Aquifer		283	283	283	283	283	283
Combine	DALLAS	Trinity	Lake Ray Roberts	DWU	32	36	35	35	35	33
Combine	DALLAS	Trinity	Lake Ray Hubbard	DWU	12	14	14	14	13	13
Combine	DALLAS	Trinity	Lake Tawakoni	DWU	30	33	33	33	32	32
Combine	KAUFMAN	Trinity	Lake Ray Roberts	DWU	58	66	70	75	77	79
Combine	KAUFMAN	Trinity	Lake Ray Hubbard	DWU	22	25	27	29	30	32
Combine	KAUFMAN	Trinity	Lake Tawakoni	DWU	54	61	66	70	73	75
Combine WSC	DALLAS	Trinity	Lake Ray Roberts	DWU	50	63	65	66	66	66
Combine WSC	DALLAS	Trinity	Lake Ray Hubbard	DWU	19	24	25	26	26	26
Combine WSC	DALLAS	Trinity	Lake Tawakoni	DWU	46	59	61	62	62	63
Combine WSC	KAUFMAN	Trinity	Lake Ray Roberts	DWU	98	134	159	180	197	211
Combine WSC	KAUFMAN	Trinity	Lake Ray Hubbard	DWU	37	50	60	69	77	84
Combine WSC	KAUFMAN	Trinity	Lake Tawakoni	DWU	90	124	147	168	185	200
Community Water Company	ELLIS	Trinity	Lake Bardwell	TRA	129	148	134	118	102	78
Community Water Company	NAVARRO	Trinity	Navarro Mills Reservoir	TRA	116	156	178	203	230	258
Community WSC	TARRANT	Trinity	TRWD Sources		458	367	307	258	220	191
Community WSC	WISE	Trinity	TRWD Sources		19	15	13	10	9	7
Cooke County-Irrigation	COOKE	Red	Run-of-River - Irrigation		23	23	23	23	23	23
Cooke County-Irrigation	COOKE	Red	Trinity Aquifer		176	176	176	176	176	176
Cooke County-Irrigation	COOKE	Trinity	Run-of-River - Trinity		0	0	0	0	0	0
Cooke County-Irrigation	COOKE	Trinity	Trinity Aquifer		96	96	96	96	96	96
Cooke County-Irrigation	COOKE	Trinity	Direct reuse		9	9	9	9	9	9

Table J.1
Current Supplies by Water User Group

WUG	County Water Used	Basin Water Used	Source	Purchased From	2010	2020	2030	2040	2050	2060
Cooke County-Livestock	COOKE	Red	Livestock Local Supply		380	380	380	380	380	380
Cooke County-Livestock	COOKE	Red	Trinity Aquifer		287	287	287	287	287	287
Cooke County-Livestock	COOKE	Trinity	Livestock Local Supply		807	807	807	807	807	807
Cooke County-Livestock	COOKE	Trinity	Trinity Aquifer		611	611	611	611	611	611
Cooke County-Manufacturing	COOKE	Trinity	Trinity Aquifer		209	209	209	209	209	209
Cooke County-Mining	COOKE	Red	Trinity Aquifer		42	42	42	42	42	42
Cooke County-Mining	COOKE	Red	Other Local Supply		77	77	77	77	77	77
Cooke County-Mining	COOKE	Trinity	Other Local Supply		160	160	160	160	160	160
Cooke County-Mining	COOKE	Trinity	Trinity Aquifer		7	7	7	7	7	7
Cooke County-Other	COOKE	Red	Trinity Aquifer		171	171	171	171	171	171
Cooke County-Other	COOKE	Trinity	Trinity Aquifer		604	604	604	604	604	604
Coppell	DALLAS	Trinity	Lake Ray Roberts	DWU	3,214	2,843	2,574	2,327	2,024	1,734
Coppell	DALLAS	Trinity	Lake Ray Hubbard	DWU	1,198	1,073	984	902	794	690
Coppell	DALLAS	Trinity	Lake Tawakoni	DWU	2,966	2,637	2,400	2,181	1,906	1,643
Coppell	DENTON	Trinity	Lake Ray Roberts	DWU	33	41	45	48	48	44
Coppell	DENTON	Trinity	Lake Ray Hubbard	DWU	12	15	18	19	18	17
Coppell	DENTON	Trinity	Lake Tawakoni	DWU	31	38	43	45	44	42
Copper Canyon	DENTON	Trinity	Lake Ray Roberts		125	112	164	256	343	320
Copper Canyon	DENTON	Trinity	Lake Chapman		171	141	153	171	160	151
Copper Canyon	DENTON	Trinity	Trinity Aquifer		61	61	61	61	61	61
Corinth	DENTON	Trinity	Lake Ray Roberts	UTRWD	1,379	1,060	1,147	1,350	1,648	1,493
Corinth	DENTON	Trinity	Lake Chapman	UTRWD	1,881	1,331	1,085	910	769	703
Corinth	DENTON	Trinity	Trinity Aquifer		13	13	13	13	13	13
Corsicana	NAVARRO	Trinity	Lake Halbert		0	0	0	0	0	0
Corsicana	NAVARRO	Trinity	Navarro Mills Reservoir	TRA	6,373	5,986	5,709	5,463	5,222	4,986
Crandall	KAUFMAN	Trinity	Lake Texoma		148	158	170	185	208	235
Crandall	KAUFMAN	Trinity	Lake Lavon		199	213	229	248	280	317
Crandall	KAUFMAN	Trinity	Lake Chapman		96	101	106	113	126	139
Crandall	KAUFMAN	Trinity	Indirect Reuse (Lavon)		69	73	79	86	97	109
Cross Roads	DENTON	Trinity	Lake Ray Roberts		182	273	427	752	1,219	1,235
Cross Roads	DENTON	Trinity	Lake Chapman		249	342	404	507	569	581
Cross Roads	DENTON	Trinity	Trinity Aquifer		87	87	87	87	87	87
Crowley	TARRANT	Trinity	TRWD Sources	Fort Worth	1,297	1,274	1,382	1,619	1,663	1,541
Crowley	TARRANT	Trinity	Trinity Aquifer		153	153	153	153	153	153
Culleoka WSC	COLLIN	Trinity	Lake Texoma		184	213	220	225	238	249
Culleoka WSC	COLLIN	Trinity	Lake Lavon		248	286	296	303	320	336
Culleoka WSC	COLLIN	Trinity	Lake Chapman		119	135	137	138	144	148
Culleoka WSC	COLLIN	Trinity	Indirect Reuse (Lavon)		86	99	102	105	111	116

Table J.1
Current Supplies by Water User Group

WUG	County Water Used	Basin Water Used	Source	Purchased From	2010	2020	2030	2040	2050	2060
Dallas	COLLIN	Trinity	Lake Ray Roberts	DWU	5,354	5,279	5,066	4,726	4,194	3,697
Dallas	COLLIN	Trinity	Lake Ray Hubbard	DWU	1,996	1,993	1,937	1,830	1,645	1,470
Dallas	COLLIN	Trinity	Lake Tawakoni	DWU	4,940	4,896	4,722	4,428	3,950	3,502
Dallas	DALLAS	Trinity	Lake Ray Roberts	DWU	109,163	102,505	92,312	81,613	71,046	67,890
Dallas	DALLAS	Trinity	Lake Ray Hubbard	DWU	32,382	33,078	32,477	32,076	32,946	34,563
Dallas	DALLAS	Trinity	Lake Tawakoni	DWU	113,383	114,140	112,270	110,655	112,776	116,705
Dallas	DENTON	Trinity	Lake Ray Roberts	DWU	2,493	2,364	2,209	2,025	1,775	1,528
Dallas	DENTON	Trinity	Lake Ray Hubbard	DWU	929	893	845	784	697	608
Dallas	DENTON	Trinity	Lake Tawakoni	DWU	2,300	2,192	2,059	1,897	1,673	1,448
Dallas	ROCKWALL	Trinity	Lake Ray Roberts	DWU	1	1	1	1	1	1
Dallas	ROCKWALL	Trinity	Lake Ray Hubbard	DWU	4	4	4	4	4	4
Dallas	ROCKWALL	Trinity	Lake Tawakoni	DWU	1	1	1	1	1	1
Dallas County WCID #6	DALLAS	Trinity	Lake Ray Roberts	DWU	184	221	231	236	239	240
Dallas County WCID #6	DALLAS	Trinity	Lake Ray Hubbard	DWU	69	83	88	91	93	96
Dallas County WCID #6	DALLAS	Trinity	Lake Tawakoni	DWU	171	204	215	221	224	228
Dallas County-Irrigation	DALLAS	Trinity	Run-of-River - Trinity		791	791	791	791	791	791
Dallas County-Irrigation	DALLAS	Trinity	Lake Ray Roberts	DWU	320	286	261	237	208	177
Dallas County-Irrigation	DALLAS	Trinity	Lake Joe Pool		100	100	100	100	100	100
Dallas County-Irrigation	DALLAS	Trinity	Lake Ray Hubbard	DWU	119	108	100	92	81	71
Dallas County-Irrigation	DALLAS	Trinity	Lake Tawakoni	DWU	296	265	243	222	195	168
Dallas County-Irrigation	DALLAS	Trinity	Other Aquifer		593	593	593	593	593	593
Dallas County-Irrigation	DALLAS	Trinity	Indirect Reuse	TRA	8,000	8,000	8,000	8,000	8,000	8,000
Dallas County-Irrigation	DALLAS	Trinity	Direct Reuse	DWU	561	561	561	561	561	561
Dallas County-Livestock	DALLAS	Trinity	Livestock Local Supply		712	712	712	712	712	712
Dallas County-Livestock	DALLAS	Trinity	Woodbine Aquifer		69	69	69	69	69	69
Dallas County-Manufacturing	DALLAS	Trinity	Lake Texoma	NTMWD	1,316	1,131	1,057	1,005	967	888
Dallas County-Manufacturing	DALLAS	Trinity	Lake Lavon	NTMWD	1,770	1,521	1,422	1,352	1,302	1,195
Dallas County-Manufacturing	DALLAS	Trinity	Lake Ray Roberts	DWU	8,030	7,938	7,897	7,709	7,111	6,132
Dallas County-Manufacturing	DALLAS	Trinity	Lake Ray Hubbard	DWU	2,994	2,998	3,020	2,986	2,791	2,438
Dallas County-Manufacturing	DALLAS	Trinity	Lake Chapman		2,353	2,480	2,589	2,672	2,700	2,590
Dallas County-Manufacturing	DALLAS	Trinity	Lake Chapman		851	719	661	617	584	527
Dallas County-Manufacturing	DALLAS	Trinity	Lake Tawakoni	DWU	7,410	7,363	7,362	7,224	6,700	5,809
Dallas County-Manufacturing	DALLAS	Trinity	Trinity Aquifer		250	250	250	250	250	250
Dallas County-Manufacturing	DALLAS	Trinity	Woodbine Aquifer		521	521	521	521	521	521
Dallas County-Manufacturing	DALLAS	Trinity	Direct Reuse		20	20	20	20	20	20
Dallas County-Manufacturing	DALLAS	Trinity	Indirect Reuse (Lavon)	NTMWD	611	526	491	467	450	413
Dallas County-Mining	DALLAS	Trinity	Other Local Supply		1,525	1,525	1,525	1,525	1,525	1,525
Dallas County-Mining	DALLAS	Trinity	Trinity Aquifer		1,138	1,138	1,138	1,138	1,138	1,138
Dallas County-Other	DALLAS	Trinity	Lake Texoma		0	0	0	0	0	0
Dallas County-Other	DALLAS	Trinity	Lake Ray Roberts	Dallas	6	6	5	5	4	3
Dallas County-Other	DALLAS	Trinity	Lake Ray Hubbard	Dallas	2	2	2	2	2	1
Dallas County-Other	DALLAS	Trinity	Lake Chapman		0	0	0	0	0	0
Dallas County-Other	DALLAS	Trinity	Lake Tawakoni	Dallas	6	5	5	4	4	3
Dallas County-Other	DALLAS	Trinity	Other Aquifer		0	0	0	0	0	0
Dallas County-Other	DALLAS	Trinity	Trinity Aquifer		150	150	150	150	150	150
Dallas County-Other	DALLAS	Trinity	Woodbine Aquifer		89	89	89	89	89	89
Dallas County-Other	DALLAS	Trinity	Indirect Reuse		0	0	0	0	0	0

Table J.1
Current Supplies by Water User Group

WUG	County Water Used	Basin Water Used	Source	Purchased From	2010	2020	2030	2040	2050	2060
Dallas County-Steam Electric Power	DALLAS	Trinity	Lake Texoma	NTMWD	22	13	13	14	15	16
Dallas County-Steam Electric Power	DALLAS	Trinity	Lake Lavon	NTMWD	28	19	19	19	20	21
Dallas County-Steam Electric Power	DALLAS	Trinity	Lake Ray Roberts	DWU	1,726	1,140	535	794	1,020	1,216
Dallas County-Steam Electric Power	DALLAS	Trinity	Lake Mountain Creek		6,400	6,400	6,400	6,400	6,400	6,400
Dallas County-Steam Electric Power	DALLAS	Trinity	Lake Ray Hubbard	DWU	644	431	205	307	400	483
Dallas County-Steam Electric Power	DALLAS	Trinity	Lake Chapman	NTMWD	14	8	8	9	9	10
Dallas County-Steam Electric Power	DALLAS	Trinity	Lake Tawakoni	DWU	1,593	1,058	500	744	961	1,152
Dallas County-Steam Electric Power	DALLAS	Trinity	Trinity Aquifer		0	0	0	0	0	0
Dallas County-Steam Electric Power	DALLAS	Trinity	Run-of-River - Industrial		368	368	368	368	368	368
Dallas County-Steam Electric Power	DALLAS	Trinity	Indirect Reuse (Lavon)	NTMWD	10	6	6	6	7	8
Dalworthington Gardens	TARRANT	Trinity	TRWD Sources	Fort Worth	625	547	486	427	368	317
Dalworthington Gardens	TARRANT	Trinity	Trinity Aquifer		189	189	189	189	189	189
Danville WSC	COLLIN	Trinity	Lake Texoma	McKinney	172	182	192	202	217	229
Danville WSC	COLLIN	Trinity	Lake Lavon	McKinney	230	245	257	273	292	309
Danville WSC	COLLIN	Trinity	Lake Chapman	McKinney	111	115	120	124	131	136
Danville WSC	COLLIN	Trinity	Indirect Reuse (Lavon)	McKinney	80	84	89	94	101	107
Dawson	NAVARRO	Trinity	Navarro Mills Reservoir	TRA	193	184	180	175	172	168
Decatur	WISE	Trinity	TRWD Sources	Wise Co WSD	1,754	1,753	1,754	1,754	1,754	1,754
Denison	GRAYSON	Red	Lake Randell		4,720	4,720	4,720	4,720	4,720	4,720
Denison	GRAYSON	Red	Lake Texoma		1,100	1,100	1,100	1,100	1,100	1,100
Denison	GRAYSON	Red	Trinity Aquifer		157	157	157	157	157	157
Denison	GRAYSON	Red	Woodbine Aquifer		155	155	155	155	155	155
Denton	DENTON	Trinity	Lake Ray Roberts	DWU	20076	19562	19026	18476	17944	17433
Denton	DENTON	Trinity	Lake Ray Roberts Non-System		841	1054	1038	1118	1054	941
Denton	DENTON	Trinity	Lake Lewisville		7,563	7,387	7,202	7,013	6,830	6,655
Denton	DENTON	Trinity	Indirect Reuse		1,682	2,130	2,915	3,475	4,372	5,382
Denton County FWSD	DENTON	Trinity	Lake Ray Roberts	UTRWD	363	360	457	601	832	851
Denton County FWSD	DENTON	Trinity	Lake Chapman	UTRWD	497	450	430	405	387	399
Denton County-Irrigation	DENTON	Trinity	Woodbine Aquifer		590	590	590	590	590	590
Denton County-Irrigation	DENTON	Trinity	Direct Reuse	UTRWD	2,099	2,195	2,276	2,348	2,428	2,509
Denton County-Livestock	DENTON	Trinity	Livestock Local Supply		935	935	935	935	935	935
Denton County-Livestock	DENTON	Trinity	Trinity Aquifer		246	246	246	246	246	246
Denton County-Livestock	DENTON	Trinity	Woodbine Aquifer		531	531	531	531	531	531

Table J.1
Current Supplies by Water User Group

WUG	County Water Used	Basin Water Used	Source	Purchased From	2010	2020	2030	2040	2050	2060
Denton County-Manufacturing	DENTON	Trinity	Lake Ray Roberts	Denton	369	320	293	280	249	197
Denton County-Manufacturing	DENTON	Trinity	Lake Ray Roberts	DWU	197	202	217	234	244	227
Denton County-Manufacturing	DENTON	Trinity	Lake Ray Hubbard	DWU	46	55	61	64	63	60
Denton County-Manufacturing	DENTON	Trinity	Lake Lewisville	Denton	139	120	111	106	94	75
Denton County-Manufacturing	DENTON	Trinity	Lake Chapman	UTRWD	102	67	54	45	39	37
Denton County-Manufacturing	DENTON	Trinity	Lake Tawakoni	DWU	113	136	149	155	151	142
Denton County-Manufacturing	DENTON	Trinity	Trinity Aquifer		59	59	59	59	59	59
Denton County-Mining	DENTON	Trinity	Other Local Supply		103	103	103	103	103	103
Denton County-Mining	DENTON	Trinity	Trinity Aquifer		36	36	36	36	36	36
Denton County-Other	DENTON	Trinity	Lake Ray Roberts	UTRWD	2,119	1,638	1,839	2,196	2,827	2,732
Denton County-Other	DENTON	Trinity	TRWD Sources	Fort Worth	775	785	793	783	751	715
Denton County-Other	DENTON	Trinity	Lake Chapman	UTRWD	2,892	2,052	1,730	1,477	1,319	1,285
Denton County-Other	DENTON	Trinity	Other Aquifer		0	0	0	0	0	0
Denton County-Other	DENTON	Trinity	Trinity Aquifer		1,806	1,806	1,806	1,806	1,806	1,806
Denton County-Other	DENTON	Trinity	Woodbine Aquifer		200	200	200	200	200	200
Denton County-Other	DENTON	Trinity	Direct Reuse		0	0	0	0	0	0
Denton County-Steam Electric Power	DENTON	Trinity	Direct Reuse	Denton	831	1,840	2,288	2,849	3,363	3,363
DeSoto	DALLAS	Trinity	DWU Sources	DWU	3,410	3,676	3,826	3,881	3,785	3,342
DeSoto	DALLAS	Trinity	Lake Ray Roberts	DWU	1,272	1,388	1,463	1,503	1,485	1,329
DeSoto	DALLAS	Trinity	Lake Ray Hubbard	DWU	3,147	3,410	3,567	3,637	3,567	3,166
DeSoto	DALLAS	Trinity	Lake Tawakoni		25	25	25	25	25	25
Double Oak	DENTON	Trinity	Lake Ray Roberts		211	146	151	169	208	193
Double Oak	DENTON	Trinity	Lake Chapman		286	186	142	115	97	89
Double Oak	DENTON	Trinity	Trinity Aquifer		106	106	106	106	106	106
Duncanville	DALLAS	Trinity	Lake Ray Roberts	DWU	2,542	2,353	2,156	1,970	1,747	1,526
Duncanville	DALLAS	Trinity	Lake Joe Pool	Trinity Aquifer	0	0	0	0	0	0
Duncanville	DALLAS	Trinity	Lake Ray Hubbard	DWU	948	888	824	763	685	607
Duncanville	DALLAS	Trinity	Lake Tawakoni	DWU	2,345	2,181	2,009	1,846	1,646	1,446
East Cedar Creek FWSD	HENDERSON	Trinity	TRWD Sources		717	737	754	763	774	783
East Fork SUD	COLLIN	Trinity	Lake Texoma	NTMWD	113	111	113	116	121	127
East Fork SUD	COLLIN	Trinity	Lake Lavon	NTMWD	151	149	152	157	165	170
East Fork SUD	COLLIN	Trinity	Lake Chapman	NTMWD	73	71	71	71	73	75
East Fork SUD	COLLIN	Trinity	Indirect Reuse (Lavon)	NTMWD	52	52	52	54	56	59
East Fork SUD	DALLAS	Trinity	Lake Texoma	NTMWD	23	19	16	15	14	13
East Fork SUD	DALLAS	Trinity	Lake Lavon	NTMWD	32	24	22	19	19	18
East Fork SUD	DALLAS	Trinity	Lake Chapman	NTMWD	15	12	10	9	8	8
East Fork SUD	DALLAS	Trinity	Indirect Reuse (Lavon)	NTMWD	11	9	8	7	6	6
East Fork SUD	ROCKWALL	Trinity	Lake Texoma	NTMWD	2	1	1	1	1	1
East Fork SUD	ROCKWALL	Trinity	Lake Lavon	NTMWD	2	1	1	1	1	2
East Fork SUD	ROCKWALL	Trinity	Lake Chapman	NTMWD	1	1	1	1	1	0
East Fork SUD	ROCKWALL	Trinity	Indirect Reuse (Lavon)	NTMWD	1	1	1	0	0	0
Ector	FANNIN	Red	Woodbine Aquifer		113	113	113	113	113	113
Edgecliff	TARRANT	Trinity	TRWD Sources	Fort Worth	494	393	327	276	230	195
Ellis County-Irrigation	ELLIS	Trinity	Run-of-River - Trinity		3	3	3	3	3	3
Ellis County-Irrigation	ELLIS	Trinity	Trinity Aquifer		17	17	17	17	17	17

Table J.1
Current Supplies by Water User Group

WUG	County Water Used	Basin Water Used	Source	Purchased From	2010	2020	2030	2040	2050	2060
Ellis County-Livestock	ELLIS	Trinity	Livestock Local Supply		1,688	1,688	1,688	1,688	1,688	1,688
Ellis County-Livestock	ELLIS	Trinity	Woodbine Aquifer		154	154	154	154	154	154
Ellis County-Manufacturing	ELLIS	Trinity	Lake Joe Pool	Midlothian	1,009	1,335	1,332	1,143	979	769
Ellis County-Manufacturing	ELLIS	Trinity	Lake Bardwell	TRA	386	317	256	204	159	114
Ellis County-Manufacturing	ELLIS	Trinity	Lake Waxahachie		939	941	793	661	540	410
Ellis County-Manufacturing	ELLIS	Trinity	Trinity Aquifer		1,007	1,007	1,007	1,007	1,007	1,007
Ellis County-Manufacturing	ELLIS	Trinity	Woodbine Aquifer		364	364	364	364	364	364
Ellis County-Mining	ELLIS	Trinity	Woodbine Aquifer		113	113	113	113	113	113
Ellis County-Other	ELLIS	Trinity	Lake Joe Pool		0	0	0	0	0	0
Ellis County-Other	ELLIS	Trinity	Lake Bardwell		224	173	132	101	76	57
Ellis County-Other	ELLIS	Trinity	Lake Waxahachie		131	0	0	0	0	0
Ellis County-Other	ELLIS	Trinity	Trinity Aquifer		497	497	497	497	497	497
Ellis County-Other	ELLIS	Trinity	Other Aquifer		0	0	0	0	0	0
Ellis County-Other	ELLIS	Trinity	Woodbine Aquifer		260	260	260	260	260	260
Ellis County-Steam Electric Power	ELLIS	Trinity	Lake Joe Pool	Midlothian	204	175	114	91	74	64
Ellis County-Steam Electric Power	ELLIS	Trinity	Direct Reuse		2,098	2,615	3,302	3,363	3,363	3,363
Ennis	ELLIS	Trinity	TRWD Sources	TRA	0	0	0	0	0	0
Ennis	ELLIS	Trinity	Lake Bardwell	TRA	3,888	3,762	3,668	3,556	3,426	3,297
Ennis	ELLIS	Trinity	Lake Clark		0	0	0	0	0	0
Euless	TARRANT	Trinity	TRWD Sources	TRA	8,743	8,569	7,559	6,588	5,617	4,802
Euless	TARRANT	Trinity	Trinity Aquifer		931	931	931	931	931	931
Eustace	HENDERSON	Trinity	Carrizo-Wilcox Aquifer		153	153	153	153	153	153
Everman	TARRANT	Trinity	TRWD Sources	Fort Worth	425	390	365	340	320	277
Everman	TARRANT	Trinity	Trinity Aquifer		412	412	412	412	412	412
Fairfield	FREESTONE	Trinity	Carrizo-Wilcox Aquifer		893	893	893	893	893	893
Fairfield	FREESTONE	Trinity	TRWD Sources		0	0	0	0	0	0
Fairview	COLLIN	Trinity	Lake Texoma	NTMWD	349	361	399	526	799	1,276
Fairview	COLLIN	Trinity	Lake Lavon	NTMWD	470	485	536	707	1,075	1,716
Fairview	COLLIN	Trinity	Lake Chapman	NTMWD	226	229	249	323	482	756
Fairview	COLLIN	Trinity	Indirect Reuse (Lavon)	NTMWD	162	168	185	244	371	593
Fannin County-Irrigation	FANNIN	Red	Run-of-River - Irrigation		14,758	14,758	14,758	14,758	14,758	14,758
Fannin County-Irrigation	FANNIN	Red	Other Aquifer		2,620	2,620	2,620	2,620	2,620	2,620
Fannin County-Livestock	FANNIN	Red	Livestock Local Supply		1,139	1,139	1,139	1,139	1,139	1,139
Fannin County-Livestock	FANNIN	Red	Woodbine Aquifer		94	94	94	94	94	94
Fannin County-Livestock	FANNIN	Red	Trinity Aquifer		0	0	0	0	0	0
Fannin County-Livestock	FANNIN	Sulphur	Livestock Local Supply		364	364	364	364	364	364
Fannin County-Livestock	FANNIN	Sulphur	Woodbine Aquifer		30	30	30	30	30	30
Fannin County-Livestock	FANNIN	Sulphur	Trinity Aquifer		24	24	24	24	24	24
Fannin County-Livestock	FANNIN	Trinity	Livestock Local Supply		80	80	80	80	80	80
Fannin County-Livestock	FANNIN	Trinity	Woodbine Aquifer		7	7	7	6	7	6
Fannin County-Livestock	FANNIN	Trinity	Trinity Aquifer		0	0	0	0	0	0
Fannin County-Manufacturing	FANNIN	Red	Lake Bonham		73	82	90	98	105	114
Fannin County-Manufacturing	FANNIN	Red	Woodbine Aquifer		0	0	0	0	0	0
Fannin County-Mining	FANNIN	Red	Run-of-River - Mining		72	72	72	72	72	72

Table J.1
Current Supplies by Water User Group

WUG	County Water Used	Basin Water Used	Source	Purchased From	2010	2020	2030	2040	2050	2060
Fannin County-Other	FANNIN	Red	Lake Bonham		75	73	70	66	63	60
Fannin County-Other	FANNIN	Red	Woodbine Aquifer		742	741	742	742	742	742
Fannin County-Other	FANNIN	Red	Run-of-River - Red River		20	20	20	20	20	20
Fannin County-Other	FANNIN	Sulphur	Lake Bonham		0	0	0	0	0	0
Fannin County-Other	FANNIN	Sulphur	Woodbine Aquifer		53	54	53	53	53	53
Fannin County-Other	FANNIN	Sulphur	Trinity Aquifer		265	265	265	265	265	265
Fannin County-Other	FANNIN	Sulphur	Run-of-river - Sulphur River		49	49	49	49	49	49
Fannin County-Other	FANNIN	Trinity	Woodbine Aquifer		50	50	50	50	50	50
Fannin County-Other	FANNIN	Trinity	Trinity Aquifer		88	88	88	88	88	88
Fannin County-Steam Electric Power	FANNIN	Red	Lake Texoma		10,000	10,000	10,000	10,000	10,000	10,000
Fannin County-Steam Electric Power	FANNIN	Red	Woodbine Aquifer		629	629	629	629	629	629
Farmers Branch	DALLAS	Trinity	Lake Ray Roberts	DWU	3,596	3,460	3,364	3,227	2,960	2,654
Farmers Branch	DALLAS	Trinity	Lake Ray Hubbard	DWU	1,341	1,307	1,286	1,250	1,161	1,055
Farmers Branch	DALLAS	Trinity	Lake Tawakoni	DWU	3,318	3,210	3,136	3,024	2,788	2,514
Farmersville	COLLIN	Trinity	Lake Texoma	NTMWD	115	163	195	257	344	428
Farmersville	COLLIN	Trinity	Lake Lavon	NTMWD	154	219	263	346	462	575
Farmersville	COLLIN	Trinity	Lake Chapman	NTMWD	74	104	122	158	208	254
Farmersville	COLLIN	Trinity	Indirect Reuse (Lavon)	NTMWD	53	76	91	120	160	199
Ferris	ELLIS	Trinity	Lake Joe Pool		15	0	0	0	0	0
Ferris	ELLIS	Trinity	Lake Waxahachie		39	0	0	0	0	0
Ferris	ELLIS	Trinity	Woodbine Aquifer		327	327	327	327	327	327
Files Valley WSC	ELLIS	Trinity	Brazos River Authority	Aquilla WSC	143	153	163	173	186	201
Flo Community WSC	FREESTONE	Trinity	Carrizo-Wilcox Aquifer		25	25	25	25	25	25
Flower Mound	DENTON	Trinity	Lake Ray Roberts	DWU	5,633	5,784	6,145	6,800	7,553	6,847
Flower Mound	DENTON	Trinity	Lake Ray Hubbard	DWU	1,473	1,331	1,231	1,133	1,002	871
Flower Mound	DENTON	Trinity	Lake Chapman	UTRWD	2,296	2,833	2,754	2,607	2,330	2,188
Flower Mound	DENTON	Trinity	Lake Tawakoni	DWU	3,644	3,269	3,002	2,741	2,407	2,074
Forest Hill	TARRANT	Trinity	TRWD Sources	Fort Worth	1,915	1,650	1,476	1,347	1,229	1,095
Forney	KAUFMAN	Trinity	Lake Texoma	NTMWD	393	635	672	689	700	701
Forney	KAUFMAN	Trinity	Lake Lavon	NTMWD	528	855	905	928	942	943
Forney	KAUFMAN	Trinity	Lake Chapman	NTMWD	254	404	420	424	423	416
Forney	KAUFMAN	Trinity	Indirect Reuse (Lavon)	NTMWD	183	295	312	320	325	326
Forney Lake WSC	KAUFMAN	Trinity	Lake Texoma	NTMWD	452	373	331	302	285	271
Forney Lake WSC	KAUFMAN	Trinity	Lake Lavon	NTMWD	609	501	445	407	384	364
Forney Lake WSC	KAUFMAN	Trinity	Lake Chapman	NTMWD	292	237	207	186	172	161
Forney Lake WSC	KAUFMAN	Trinity	Indirect Reuse (Lavon)	NTMWD	210	173	154	140	133	126
Forney Lake WSC	ROCKWALL	Trinity	Lake Texoma	NTMWD	355	373	331	302	285	271
Forney Lake WSC	ROCKWALL	Trinity	Lake Lavon	NTMWD	477	501	445	407	384	364
Forney Lake WSC	ROCKWALL	Trinity	Lake Chapman	NTMWD	229	237	207	186	172	161
Forney Lake WSC	ROCKWALL	Trinity	Indirect Reuse (Lavon)	NTMWD	165	173	154	140	133	126
Fort Worth	DENTON	Trinity	TRWD Sources		1,270	6,065	7,637	9,383	11,558	12,914
Fort Worth	PARKER	Trinity	TRWD Sources		3,046	10,512	13,577	13,281	12,775	11,881
Fort Worth	TARRANT	Trinity	TRWD Sources	TRWD	155,849	140,347	138,184	143,469	152,464	163,088
Fort Worth	WISE	Trinity	TRWD Sources		508	2,022	2,376	2,599	2,920	3,099

Table J.1
Current Supplies by Water User Group

WUG	County Water Used	Basin Water Used	Source	Purchased From	2010	2020	2030	2040	2050	2060
Freestone County-Irrigation	FREESTONE	Trinity	Run-of-River - Trinity		87	87	87	87	87	87
Freestone County-Irrigation	FREESTONE	Trinity	Carrizo-Wilcox Aquifer		19	19	19	19	19	19
Freestone County-Irrigation	FREESTONE	Brazos	Carrizo-Wilcox Aquifer		2	2	2	2	2	2
Freestone County-Livestock	FREESTONE	Brazos	Livestock Local Supply		960	960	960	960	960	960
Freestone County-Livestock	FREESTONE	Trinity	Other Aquifer		50	50	50	50	50	50
Freestone County-Livestock	FREESTONE	Brazos	Carrizo-Wilcox Aquifer		619	619	619	619	619	619
Freestone County-Livestock	FREESTONE	Trinity	Queen City Aquifer		40	40	40	40	40	40
Freestone County-Livestock	FREESTONE	Trinity	Livestock Local Supply		83	83	83	83	83	83
Freestone County-Livestock	FREESTONE	Trinity	Queen City Aquifer		0	0	0	0	0	0
Freestone County-Livestock	FREESTONE	Trinity	Carrizo-Wilcox Aquifer		50	50	50	50	50	50
Freestone County-Livestock	FREESTONE	Trinity	Other Aquifer		0	0	0	0	0	0
Freestone County-Mining	FREESTONE	Trinity	Other Local Supply		120	120	120	120	120	120
Freestone County-Mining	FREESTONE	Trinity	Carrizo-Wilcox Aquifer		19	19	19	19	19	19
Freestone County-Mining	FREESTONE	Brazos	Carrizo-Wilcox Aquifer		19	19	19	19	19	19
Freestone County-Other	FREESTONE	Trinity	TRWD Sources		394	323	273	230	193	164
Freestone County-Other	FREESTONE	Trinity	Lake Waxahachie		0	0	0	0	0	0
Freestone County-Other	FREESTONE	Trinity	Carrizo-Wilcox Aquifer		1,454	1,452	1,453	1,457	1,458	1,458
Freestone County-Other	FREESTONE	Trinity	Run-of-River - Trinity		41	41	41	41	41	41
Freestone County-Other	FREESTONE	Brazos	Lake Wortham		0	0	0	0	0	0
Freestone County-Other	FREESTONE	Brazos	Carrizo-Wilcox Aquifer		195	197	196	192	191	191
Freestone County-Steam Electric Power	FREESTONE	Trinity	TRWD Sources	TRA	5,602	5,602	4,971	4,270	3,617	3,071
Freestone County-Steam Electric Power	FREESTONE	Trinity	Lake Fairfield		1,567	1,433	1,300	1,167	1,033	900
Freestone County-Steam Electric Power	FREESTONE	Trinity	Lake Livingston-Wallisville		20,000	20,000	20,000	20,000	20,000	20,000
Freestone County-Steam Electric Power	FREESTONE	Trinity	Carrizo-Wilcox Aquifer		115	115	115	115	115	115
Freestone County-Steam Electric Power	FREESTONE	Trinity	Run-of-River - Municipal		0	0	0	0	0	0
Frisco	COLLIN	Trinity	Lake Texoma	NTMWD	6,077	7,547	6,969	6,600	6,413	6,066
Frisco	COLLIN	Trinity	Lake Lavon	NTMWD	8,177	10,153	9,376	8,880	8,628	8,161
Frisco	COLLIN	Trinity	Lake Chapman	NTMWD	3,929	4,799	4,356	4,056	3,872	3,597
Frisco	COLLIN	Trinity	Trinity Aquifer		61	61	61	61	61	61
Frisco	COLLIN	Trinity	Indirect Reuse (Lavon)	NTMWD	2,824	3,507	3,239	3,067	2,980	2,819
Frisco	DENTON	Trinity	Lake Texoma	NTMWD	3,181	2,863	3,931	4,031	4,035	3,797
Frisco	DENTON	Trinity	Lake Lavon	NTMWD	4,280	3,851	5,288	5,424	5,429	5,109
Frisco	DENTON	Trinity	Lake Chapman	NTMWD	2,057	1,820	2,458	2,477	2,436	2,252
Frisco	DENTON	Trinity	Trinity Aquifer		0	0	0	0	0	0
Frisco	DENTON	Trinity	Indirect Reuse (Lavon)	NTMWD	1,479	1,330	1,827	1,874	1,875	1,765
Frost	NAVARRO	Trinity	Navarro Mills Reservoir	TRA	95	91	88	84	82	80
Frost	NAVARRO	Trinity	Woodbine Aquifer		0	0	0	0	0	0
Gainesville	COOKE	Red	Lake Hubert H. Moss		2	2	2	2	2	2
Gainesville	COOKE	Trinity	Trinity Aquifer		233	207	185	185	185	185
Gainesville	COOKE	Trinity	Trinity Aquifer		1,833	1,348	881	874	870	866
Gainesville	COOKE	Trinity	Lake Hubert H. Moss		1,119	1,119	1,119	1,119	1,119	1,119

Table J.1
Current Supplies by Water User Group

WUG	County Water Used	Basin Water Used	Source	Purchased From	2010	2020	2030	2040	2050	2060
Garland	DALLAS	Trinity	Lake Texoma	NTMWD	8,710	7,198	6,508	5,998	5,679	5,182
Garland	DALLAS	Trinity	Lake Lavon	NTMWD	11,717	9,686	8,756	8,070	7,640	6,973
Garland	DALLAS	Trinity	Lake Chapman	NTMWD	5,631	4,577	4,068	3,686	3,429	3,073
Garland	DALLAS	Trinity	Indirect Reuse (Lavon)	NTMWD	4,048	3,345	3,024	2,788	2,639	2,408
Gastonia-Scurry	KAUFMAN	Trinity	Lake Texoma	NTMWD	171	189	185	195	216	241
Gastonia-Scurry	KAUFMAN	Trinity	Lake Lavon	NTMWD	231	254	249	261	291	324
Gastonia-Scurry	KAUFMAN	Trinity	Lake Chapman	NTMWD	110	120	116	120	131	143
Gastonia-Scurry	KAUFMAN	Trinity	Indirect Reuse (Lavon)	NTMWD	79	88	86	91	100	112
Glenn Heights	DALLAS	Trinity	Lake Ray Roberts	DWU	235	262	281	290	283	268
Glenn Heights	DALLAS	Trinity	Lake Ray Hubbard	DWU	88	99	107	113	111	106
Glenn Heights	DALLAS	Trinity	Lake Tawakoni	DWU	217	243	262	273	266	253
Glenn Heights	DALLAS	Trinity	Trinity Aquifer		178	178	178	178	178	178
Glenn Heights	DALLAS	Trinity	Woodbine Aquifer		0	0	0	0	0	0
Glenn Heights	ELLIS	Trinity	Lake Ray Roberts	DWU	85	107	124	138	145	149
Glenn Heights	ELLIS	Trinity	Lake Ray Hubbard	DWU	32	40	48	54	57	59
Glenn Heights	ELLIS	Trinity	Lake Tawakoni	DWU	79	99	116	130	137	141
Glenn Heights	ELLIS	Trinity	Trinity Aquifer		51	51	51	51	51	51
Glenn Heights	ELLIS	Trinity	Woodbine Aquifer		0	0	0	0	0	0
Grand Prairie	DALLAS	Trinity	Lake Ray Roberts	DWU	6,813	6,919	7,406	8,033	8,332	8,357
Grand Prairie	DALLAS	Trinity	Lake Joe Pool		0	0	0	0	0	0
Grand Prairie	DALLAS	Trinity	Lake Ray Hubbard	DWU	2,540	2,613	2,832	3,111	3,269	3,323
Grand Prairie	DALLAS	Trinity	Lake Tawakoni	DWU	6,287	6,418	6,904	7,527	7,849	7,917
Grand Prairie	DALLAS	Trinity	Trinity Aquifer		1,292	1,274	1,272	1,286	1,305	1,319
Grand Prairie	ELLIS	Trinity	Lake Ray Roberts	DWU	21	83	193	297	389	477
Grand Prairie	ELLIS	Trinity	Lake Ray Hubbard	DWU	8	32	74	116	152	189
Grand Prairie	ELLIS	Trinity	Lake Tawakoni	DWU	19	78	180	280	366	451
Grand Prairie	ELLIS	Trinity	Trinity Aquifer		4	16	34	49	62	77
Grand Prairie	ELLIS	Trinity	Trinity Aquifer		0	0	0	0	0	0
Grand Prairie	TARRANT	Trinity	Lake Ray Roberts	DWU	1,269	1,453	1,567	1,581	1,472	1,322
Grand Prairie	TARRANT	Trinity	TRWD Sources	Fort Worth	1,203	976	828	711	602	511
Grand Prairie	TARRANT	Trinity	Lake Ray Hubbard	DWU	473	549	599	613	578	526
Grand Prairie	TARRANT	Trinity	Lake Tawakoni	DWU	1,170	1,347	1,461	1,482	1,387	1,253
Grand Prairie	TARRANT	Trinity	Trinity Aquifer		341	347	331	302	270	241
Grand Prairie	TARRANT	Trinity	Trinity Aquifer		0	0	0	0	0	0
Grapevine	TARRANT	Trinity	Lake Ray Roberts	DWU	1,470	1,315	1,203	1,100	967	832
Grapevine	TARRANT	Trinity	TRWD Sources	TRA	6,894	6,894	6,894	6,894	6,667	5,872
Grapevine	TARRANT	Trinity	Lake Grapevine		1,833	1,767	1,700	1,633	1,567	1,500
Grapevine	TARRANT	Trinity	Indirect Reuse	DWU	1,824	2,033	2,180	2,278	2,352	2,412
Grayson County-Irrigation	GRAYSON	Red	Run-of-River - Irrigation		2,394	2,394	2,394	2,394	2,394	2,394
Grayson County-Irrigation	GRAYSON	Red	Lake Texoma		150	150	150	150	150	150
Grayson County-Irrigation	GRAYSON	Red	Trinity Aquifer		0	0	0	0	0	0
Grayson County-Irrigation	GRAYSON	Red	Woodbine Aquifer		100	100	100	100	100	100
Grayson County-Irrigation	GRAYSON	Trinity	Woodbine Aquifer		3,839	3,839	3,839	3,839	3,839	3,839
Grayson County-Irrigation	GRAYSON	Trinity	Trinity Aquifer		0	0	0	0	0	0

Table J.1
Current Supplies by Water User Group

WUG	County Water Used	Basin Water Used	Source	Purchased From	2010	2020	2030	2040	2050	2060
Grayson County-Livestock	GRAYSON	Red	Livestock Local Supply		1,077	1,077	1,077	1,077	1,077	1,077
Grayson County-Livestock	GRAYSON	Red	Woodbine Aquifer		107	107	107	107	107	107
Grayson County-Livestock	GRAYSON	Trinity	Livestock Local Supply		606	606	606	606	606	606
Grayson County-Livestock	GRAYSON	Trinity	Woodbine Aquifer		60	60	60	60	60	60
Grayson County-Manufacturing	GRAYSON	Red	Lake Randell		500	500	500	500	500	500
Grayson County-Manufacturing	GRAYSON	Red	Lake Texoma		8,567	5,253	4,995	4,734	4,361	3,984
Grayson County-Manufacturing	GRAYSON	Red	Woodbine Aquifer		0	0	0	0	0	0
Grayson County-Manufacturing	GRAYSON	Red	Run-of-River - Industrial		30	30	30	30	30	30
Grayson County-Manufacturing	GRAYSON	Trinity	Lake Texoma		2	2	2	2	2	2
Grayson County-Manufacturing	GRAYSON	Trinity	Woodbine Aquifer		0	0	0	0	0	0
Grayson County-Mining	GRAYSON	Red	Lake Texoma		100	100	100	100	100	100
Grayson County-Mining	GRAYSON	Red	Trinity Aquifer		0	0	0	0	0	0
Grayson County-Mining	GRAYSON	Red	Woodbine Aquifer		285	285	285	285	285	285
Grayson County-Mining	GRAYSON	Trinity	Woodbine Aquifer		274	274	274	274	274	274
Grayson County-Mining	GRAYSON	Trinity	Trinity Aquifer		431	431	431	431	431	431
Grayson County-Other	GRAYSON	Red	Lake Randell		60	60	60	60	60	60
Grayson County-Other	GRAYSON	Red	Lake Texoma		891	891	891	891	891	891
Grayson County-Other	GRAYSON	Red	Trinity Aquifer		986	986	986	986	986	986
Grayson County-Other	GRAYSON	Red	Other Aquifer		35	35	35	35	35	35
Grayson County-Other	GRAYSON	Trinity	Woodbine Aquifer		1,389	1,388	1,389	1,388	1,387	1,388
Grayson County-Other	GRAYSON	Red	Direct Reuse		0	0	0	0	0	0
Grayson County-Other	GRAYSON	Red	Woodbine Aquifer		270	270	270	270	270	270
Grayson County-Other	GRAYSON	Red	Other Aquifer		0	0	0	0	0	0
Grayson County-Other	GRAYSON	Red	Trinity Aquifer		183	183	183	183	183	183
Gun Barrel City	HENDERSON	Trinity	TRWD Sources		389	375	363	357	349	343
Gunter	GRAYSON	Trinity	Trinity Aquifer		214	214	214	214	214	214
Gunter Rural WSC	COLLIN	Trinity	Trinity Aquifer		424	424	424	424	424	424
Gunter Rural WSC	GRAYSON	Trinity	Trinity Aquifer		48	48	48	48	48	48
Hackberry	DENTON	Trinity	Lake Texoma	NTMWD	29	33	37	36	35	32
Hackberry	DENTON	Trinity	Lake Lavon	NTMWD	39	45	51	50	47	44
Hackberry	DENTON	Trinity	Lake Chapman	NTMWD	19	21	23	22	21	19
Hackberry	DENTON	Trinity	Trinity Aquifer		73	73	73	73	73	73
Hackberry	DENTON	Trinity	Indirect Reuse (Lavon)	NTMWD	13	15	17	17	16	15
Haltom City	TARRANT	Trinity	TRWD Sources	Fort Worth	7,663	6,831	6,018	5,226	4,448	3,801
Haslet	TARRANT	Trinity	Trinity Aquifer		153	153	153	153	153	153
Haslet	TARRANT	Trinity	TRWD Sources	Fort Worth	278	574	930	794	673	571
Heath	ROCKWALL	Trinity	Lake Texoma	NTMWD	357	404	432	464	512	563
Heath	ROCKWALL	Trinity	Lake Lavon	NTMWD	479	542	583	624	690	757
Heath	ROCKWALL	Trinity	Lake Chapman	NTMWD	231	257	270	285	309	334
Heath	ROCKWALL	Trinity	Indirect Reuse (Lavon)	NTMWD	166	188	201	216	238	262
Hebron	DENTON	Trinity	Lake Ray Roberts	DWU	72	91	138	255	352	327
Hebron	DENTON	Trinity	Lake Ray Hubbard	DWU	21	29	44	80	106	99
Hebron	DENTON	Trinity	Lake Chapman	UTRWD	22	19	22	32	39	36
Hebron	DENTON	Trinity	Lake Tawakoni	DWU	52	71	107	193	255	237
Hebron	DENTON	Trinity	Woodbine Aquifer		0	0	0	0	0	0

Table J.1
Current Supplies by Water User Group

WUG	County Water Used	Basin Water Used	Source	Purchased From	2010	2020	2030	2040	2050	2060
Henderson County-Livestock	HENDERSON	Trinity	Livestock Local Supply		341	341	341	341	341	341
Henderson County-Livestock	HENDERSON	Trinity	Queen City Aquifer		43	43	43	43	43	43
Henderson County-Livestock	HENDERSON	Trinity	Carrizo-Wilcox Aquifer		518	518	518	518	518	518
Henderson County-Livestock	HENDERSON	Trinity	Other Aquifer		126	126	126	126	126	126
Henderson County-Manufacturing	HENDERSON	Trinity	Lake Athens		44	43	43	43	43	42
Henderson County-Manufacturing	HENDERSON	Trinity	Carrizo-Wilcox Aquifer		11	12	13	15	17	20
Henderson County-Mining	HENDERSON	Trinity	TRWD Sources	TRWD	165	134	114	98	83	70
Henderson County-Mining	HENDERSON	Trinity	Carrizo-Wilcox Aquifer		583	583	583	583	583	583
Henderson County-Other	HENDERSON	Trinity	TRWD Sources	TRWD	141	112	93	79	66	56
Henderson County-Other	HENDERSON	Trinity	Carrizo-Wilcox Aquifer		846	846	846	846	846	846
Henderson County-Other	HENDERSON	Trinity	Other Aquifer		41	41	41	41	41	41
Henderson County-Other	HENDERSON	Trinity	Run-of-River - Trinity		0	0	0	0	0	0
Henderson County-Steam Electric Power	HENDERSON	Trinity	TRWD Sources	TRWD	0	0	0	0	0	0
Henderson County-Steam Electric Power	HENDERSON	Trinity	Lake Forest Grove		0	0	0	0	0	0
Henderson County-Steam Electric Power	HENDERSON	Trinity	Lake Trinidad		3,067	3,033	3,000	2,967	2,933	2,900
Henderson County-Steam Electric Power	HENDERSON	Trinity	Carrizo-Wilcox Aquifer		0	0	0	0	0	0
Hickory Creek	DENTON	Trinity	Lake Ray Roberts	Lake Cities MUA	159	166	198	257	392	441
Hickory Creek	DENTON	Trinity	Lake Chapman	Lake Cities MUA	218	209	186	172	183	207
Hickory Creek	DENTON	Trinity	Trinity Aquifer	Lake Cities MUA	33	39	42	45	51	57
Hickory Creek	DENTON	Trinity	Woodbine Aquifer	Lake Cities MUA	71	84	90	97	111	124
Hickory Creek SUD	COLLIN	Trinity	Woodbine Aquifer		13	15	16	17	18	19
Hickory Creek SUD	FANNIN	Sulphur	Woodbine Aquifer		18	17	16	15	14	0
Hickory Creek SUD	FANNIN	Trinity	Woodbine Aquifer		14	13	12	12	12	11
High Point WSC	KAUFMAN	Trinity	Lake Texoma	Forney	78	94	99	106	117	131
High Point WSC	KAUFMAN	Trinity	Lake Lavon	Forney	106	127	133	143	158	177
High Point WSC	KAUFMAN	Trinity	Lake Terrell		45	40	36	33	31	28
High Point WSC	KAUFMAN	Trinity	Lake Chapman	Forney	51	60	62	65	71	78
High Point WSC	KAUFMAN	Trinity	Lake Tawakoni		60	53	47	44	42	37
High Point WSC	KAUFMAN	Trinity	Indirect Reuse (Lavon)	Forney	36	44	46	49	54	61
High Point WSC	ROCKWALL	Trinity	Lake Texoma	Forney	8	10	11	12	13	15
High Point WSC	ROCKWALL	Trinity	Lake Lavon	Terrell	10	13	14	16	18	19
High Point WSC	ROCKWALL	Trinity	Lake Terrell	Forney	5	4	3	4	4	3
High Point WSC	ROCKWALL	Trinity	Lake Chapman	Terrell	5	6	7	7	8	9
High Point WSC	ROCKWALL	Trinity	Lake Tawakoni	Forney	6	5	6	5	4	5
High Point WSC	ROCKWALL	Trinity	Indirect Reuse (Lavon)		3	5	5	5	6	7
Highland Park	DALLAS	Trinity	Lake Grapevine	Dallas County Park Cities MUD	5,960	5,694	5,452	5,223	4,986	4,757
Highland Village	DENTON	Trinity	Lake Ray Roberts	UTRWD	780	606	655	746	915	831
Highland Village	DENTON	Trinity	Lake Chapman	UTRWD	1,063	758	616	501	425	390
Highland Village	DENTON	Trinity	Trinity Aquifer		1,411	1,411	1,411	1,411	1,411	1,411
Honey Grove	FANNIN	Red	Woodbine Aquifer		107	107	107	107	107	107
Honey Grove	FANNIN	Sulphur	Woodbine Aquifer		334	334	334	334	334	334
Howe	GRAYSON	Red	Woodbine Aquifer		73	52	41	36	32	30
Howe	GRAYSON	Trinity	Woodbine Aquifer		336	357	369	374	377	380

Table J.1
Current Supplies by Water User Group

WUG	County Water Used	Basin Water Used	Source	Purchased From	2010	2020	2030	2040	2050	2060
Hudson Oaks	PARKER	Trinity	Trinity Aquifer		206	206	206	206	206	206
Hudson Oaks	PARKER	Trinity	TRWD Sources	Parker Co. UD	102	102	102	102	102	102
Hurst	TARRANT	Trinity	TRWD Sources	Fort Worth	6,920	5,901	5,124	4,437	3,804	3,272
Hurst	TARRANT	Trinity	Trinity Aquifer		1,081	1,081	1,081	1,081	1,081	1,081
Hutchins	DALLAS	Trinity	Lake Ray Roberts	DWU	388	679	987	1,339	1,559	1,420
Hutchins	DALLAS	Trinity	Lake Ray Hubbard	DWU	144	256	378	519	612	565
Hutchins	DALLAS	Trinity	Lake Tawakoni	DWU	358	630	921	1,255	1,469	1,345
Hutchins	DALLAS	Trinity	Woodbine Aquifer		0	0	0	0	0	0
Irving	DALLAS	Trinity	Lake Ray Roberts	DWU	4,706	641	585	532	562	787
Irving	DALLAS	Trinity	Lake Ray Hubbard	DWU	1,755	242	224	206	220	312
Irving	DALLAS	Trinity	Lake Chapman		44,815	43,908	43,019	42,156	41,348	40,678
Irving	DALLAS	Trinity	Lake Tawakoni	DWU	4,343	594	546	498	529	744
Irving	DALLAS	Trinity	Trinity Aquifer		0	0	0	0	0	0
Italy	ELLIS	Trinity	Trinity Aquifer		111	111	111	111	111	111
Italy	ELLIS	Trinity	Woodbine Aquifer		79	79	79	79	79	79
Jack County-Livestock	JACK	Trinity	Livestock Local Supply		1,215	1,215	1,215	1,215	1,215	1,215
Jack County-Livestock	JACK	Trinity	Other Aquifer		98	98	98	98	98	98
Jack County-Livestock	JACK	Brazos	Livestock Local Supply		450	450	450	450	450	450
Jack County-Livestock	JACK	Brazos	Other Aquifer		36	36	36	36	36	36
Jack County-Manufacturing	JACK	Brazos	Lost Creek/Jacksboro System		2	2	2	2	2	2
Jack County-Mining	JACK	Trinity	Other Local Supply		370	370	370	370	370	370
Jack County-Mining	JACK	Trinity	Other Aquifer		76	76	76	76	76	76
Jack County-Mining	JACK	Brazos	Other Aquifer		3	3	3	3	3	3
Jack County-Other	JACK	Trinity	Lost Creek/Jacksboro System		5	5	5	5	5	5
Jack County-Other	JACK	Trinity	Other Aquifer		355	369	381	393	403	411
Jack County-Other	JACK	Trinity	Trinity Aquifer		0	0	0	0	0	0
Jack County-Other	JACK	Brazos	Lake Bryson		0	0	0	0	0	0
Jack County-Other	JACK	Brazos	Trinity Aquifer		0	0	0	0	0	0
Jack County-Other	JACK	Brazos	Other Aquifer		164	150	138	126	116	108
Jack County-Steam Electric Power	JACK	Trinity	TRWD Sources	TRWD	0	0	0	0	0	0
Jacksboro	JACK	Trinity	Lost Creek/Jacksboro System		993	993	993	993	993	993
Jacksboro	JACK	Trinity	TRWD Sources		0	0	0	0	0	0
Johnson County Rural WSC	ELLIS	Trinity	Trinity Aquifer		0	0	0	0	0	0
Johnson County Rural WSC	ELLIS	Trinity	Brazos River Authority		21	21	21	21	21	21
Johnson County Rural WSC	TARRANT	Trinity	Trinity Aquifer		1	0	0	0	1	1
Johnson County Rural WSC	TARRANT	Trinity	Brazos River Authority	BRA	210	210	210	210	210	210
Josephine	COLLIN	Trinity	Lake Texoma	NTMWD	21	45	38	33	30	28
Josephine	COLLIN	Trinity	Lake Lavon	NTMWD	27	60	50	45	41	37
Josephine	COLLIN	Trinity	Lake Chapman	NTMWD	14	29	24	20	18	16
Josephine	COLLIN	Trinity	Indirect Reuse (Lavon)	NTMWD	10	21	18	15	14	13
Justin	DENTON	Trinity	Lake Ray Roberts	UTRWD	67	136	249	464	574	572
Justin	DENTON	Trinity	Lake Chapman	UTRWD	92	170	235	314	267	269
Justin	DENTON	Trinity	Trinity Aquifer		353	353	353	353	353	353
Kaufman	KAUFMAN	Trinity	Lake Texoma	NTMWD	235	270	272	271	274	301
Kaufman	KAUFMAN	Trinity	Lake Lavon	NTMWD	315	363	367	364	369	406
Kaufman	KAUFMAN	Trinity	Lake Chapman	NTMWD	152	172	170	166	165	179
Kaufman	KAUFMAN	Trinity	Indirect Reuse (Lavon)	NTMWD	109	126	126	126	127	140

Table J.1
Current Supplies by Water User Group

WUG	County Water Used	Basin Water Used	Source	Purchased From	2010	2020	2030	2040	2050	2060
Kaufman County-Irrigation	KAUFMAN	Trinity	Run-of-River - Trinity		64	64	64	64	64	64
Kaufman County-Irrigation	KAUFMAN	Trinity	TRWD Sources		125	109	92	79	67	57
Kaufman County-Irrigation	KAUFMAN	Trinity	Nacatoch Aquifer		4	4	4	4	4	4
Kaufman County-Irrigation	KAUFMAN	Trinity	Direct Reuse		576	758	927	1,116	1,359	1,659
Kaufman County-Livestock	KAUFMAN	Sabine	Livestock Local Supply		98	98	98	98	98	98
Kaufman County-Livestock	KAUFMAN	Sabine	Nacatoch Aquifer		10	10	10	10	10	10
Kaufman County-Livestock	KAUFMAN	Trinity	Livestock Local Supply		1,524	1,524	1,524	1,524	1,524	1,524
Kaufman County-Livestock	KAUFMAN	Trinity	Nacatoch Aquifer		63	63	63	63	63	63
Kaufman County-Livestock	KAUFMAN	Trinity	Woodbine Aquifer		121	121	121	121	121	121
Kaufman County-Manufacturing	KAUFMAN	Trinity	Lake Texoma	NTMWD	102	85	78	73	71	70
Kaufman County-Manufacturing	KAUFMAN	Trinity	Lake Lavon	NTMWD	137	113	104	99	97	94
Kaufman County-Manufacturing	KAUFMAN	Trinity	Lake Terrell	Terrell	108	101	97	97	97	94
Kaufman County-Manufacturing	KAUFMAN	Trinity	Lake Chapman	NTMWD	66	54	48	45	43	41
Kaufman County-Manufacturing	KAUFMAN	Trinity	Lake Tawakoni	Terrell	143	134	130	130	130	126
Kaufman County-Manufacturing	KAUFMAN	Trinity	Indirect Reuse (Lavon)	NTMWD	47	39	36	34	33	32
Kaufman County-Mining	KAUFMAN	Trinity	Other Local Supply		86	86	86	86	86	86
Kaufman County-Other	KAUFMAN	Sabine	Lake Texoma	NTMWD	68	52	44	39	35	32
Kaufman County-Other	KAUFMAN	Sabine	Lake Lavon	NTMWD	90	70	59	52	48	43
Kaufman County-Other	KAUFMAN	Sabine	Lake Chapman	NTMWD	44	33	28	24	21	19
Kaufman County-Other	KAUFMAN	Sabine	Lake Tawakoni	Terrell	188	177	169	164	159	154
Kaufman County-Other	KAUFMAN	Sabine	Other Aquifer		0	0	0	0	0	0
Kaufman County-Other	KAUFMAN	Sabine	Indirect Reuse (Lavon)	NTMWD	31	24	21	18	16	15
Kaufman County-Other	KAUFMAN	Trinity	Lake Texoma	NTMWD	154	119	101	89	80	73
Kaufman County-Other	KAUFMAN	Trinity	Lake Lavon	NTMWD	207	160	136	120	109	99
Kaufman County-Other	KAUFMAN	Trinity	TRWD sources		234	189	159	135	114	97
Kaufman County-Other	KAUFMAN	Trinity	Lake Terrell	Terrell	364	316	283	264	244	222
Kaufman County-Other	KAUFMAN	Trinity	Lake Chapman	NTMWD	99	75	63	54	48	43
Kaufman County-Other	KAUFMAN	Trinity	Lake Tawakoni	Terrell	295	243	208	187	166	141
Kaufman County-Other	KAUFMAN	Trinity	Nacatoch Aquifer		241	241	241	241	241	241
Kaufman County-Other	KAUFMAN	Trinity	Indirect Reuse (Lavon)	NTMWD	72	55	47	41	37	34
Kaufman County-Steam Electric Power	KAUFMAN	Trinity	Direct Reuse	Forney	3,000	3,000	3,000	3,000	3,000	3,000
Keller	TARRANT	Trinity	TRWD Sources	Fort Worth	9,838	9,441	7,964	6,772	5,736	4,870
Keller	TARRANT	Trinity	Trinity Aquifer		0	0	0	0	0	0
Kemp	KAUFMAN	Trinity	TRWD Sources	TRWD	194	155	129	108	90	77
Kennedale	TARRANT	Trinity	Trinity Aquifer		805	805	805	805	805	805
Kerens	NAVARRO	Trinity	Navarro Mills Reservoir	TRA	436	393	359	328	296	266
Kerens	NAVARRO	Trinity	Trinity Run-of-River		252	252	252	252	252	252
Kiowa Homeowners WSC	COOKE	Trinity	Trinity Aquifer		630	630	630	630	630	630
Krugerville	DENTON	Trinity	Lake Ray Roberts		41	32	36	53	74	89
Krugerville	DENTON	Trinity	Lake Chapman		55	39	34	35	34	41
Krugerville	DENTON	Trinity	Trinity Aquifer		57	57	57	57	57	57
Krum	DENTON	Trinity	Lake Ray Roberts	UTRWD	74	99	134	208	305	305
Krum	DENTON	Trinity	Lake Chapman	UTRWD	100	125	127	139	143	143
Krum	DENTON	Trinity	Trinity Aquifer		298	298	298	298	298	298
Ladonia	FANNIN	Sulphur	Trinity Aquifer		276	276	276	276	276	276

Table J.1
Current Supplies by Water User Group

WUG	County Water Used	Basin Water Used	Source	Purchased From	2010	2020	2030	2040	2050	2060
Lake Dallas	DENTON	Trinity	Lake Ray Roberts	Lake Cities MUA	371	298	303	351	422	379
Lake Dallas	DENTON	Trinity	Lake Chapman	Lake Cities MUA	507	374	295	237	197	178
Lake Dallas	DENTON	Trinity	Trinity Aquifer	Lake Cities MUA	77	70	66	61	55	49
Lake Dallas	DENTON	Trinity	Woodbine Aquifer	Lake Cities MUA	166	150	142	133	119	106
Lake Worth	TARRANT	Trinity	Trinity Aquifer		345	345	345	345	345	345
Lake Worth	TARRANT	Trinity	TRWD Sources	Fort Worth	628	580	560	536	508	456
Lakeside	TARRANT	Trinity	Trinity Aquifer		267	267	267	267	267	267
Lancaster	DALLAS	Trinity	Lake Ray Roberts	DWU	2,287	3,251	3,679	3,995	3,964	3,654
Lancaster	DALLAS	Trinity	Lake Ray Hubbard	DWU	853	1,228	1,407	1,548	1,556	1,452
Lancaster	DALLAS	Trinity	Lake Tawakoni	DWU	2,111	3,016	3,429	3,744	3,735	3,460
Lancaster	DALLAS	Trinity	Trinity Aquifer		362	362	362	362	362	362
Lavon WSC	COLLIN	Trinity	Lake Texoma	NTMWD	75	92	114	201	288	358
Lavon WSC	COLLIN	Trinity	Lake Lavon	NTMWD	101	124	154	270	386	482
Lavon WSC	COLLIN	Trinity	Lake Chapman	NTMWD	48	58	72	123	174	212
Lavon WSC	COLLIN	Trinity	Indirect Reuse (Lavon)	NTMWD	35	43	53	93	134	166
Lavon WSC	ROCKWALL	Trinity	Lake Texoma	NTMWD	68	92	102	112	126	141
Lavon WSC	ROCKWALL	Trinity	Lake Lavon	NTMWD	91	124	138	151	170	189
Lavon WSC	ROCKWALL	Trinity	Lake Chapman	NTMWD	44	58	64	69	76	84
Lavon WSC	ROCKWALL	Trinity	Indirect Reuse (Lavon)	NTMWD	31	43	47	52	59	66
Leonard	FANNIN	Sulphur	Woodbine Aquifer		5	5	5	5	6	6
Leonard	FANNIN	Trinity	Woodbine Aquifer		271	271	271	271	270	270
Lewisville	DALLAS	Trinity	Lake Ray Roberts	DWU	1	1	1	1	1	1
Lewisville	DENTON	Trinity	Lake Ray Roberts	DWU	6,672	7,333	7,647	7,511	6,903	6,255
Lewisville	DENTON	Trinity	Lake Ray Hubbard	DWU	2,488	2,769	2,924	2,909	2,709	2,487
Lewisville	DENTON	Trinity	Lake Tawakoni	DWU	6,157	6,801	7,128	7,039	6,504	5,926
Lincoln Park	DENTON	Trinity	Lake Ray Roberts	UTRWD	32	36	47	61	77	76
Lincoln Park	DENTON	Trinity	Lake Chapman	UTRWD	44	45	43	42	35	36
Lincoln Park	DENTON	Trinity	Trinity Aquifer		49	49	49	49	49	49
Lindsay	COOKE	Trinity	Trinity Aquifer		130	130	130	130	130	130
Little Elm	DENTON	Trinity	Lake Texoma	NTMWD	963	1,196	1,229	1,087	991	904
Little Elm	DENTON	Trinity	Lake Lavon	NTMWD	1,295	1,609	1,653	1,463	1,333	1,217
Little Elm	DENTON	Trinity	Lake Chapman	NTMWD	623	760	768	668	598	536
Little Elm	DENTON	Trinity	Woodbine Aquifer		696	696	696	696	696	696
Little Elm	DENTON	Trinity	Indirect Reuse (Lavon)	NTMWD	448	556	571	505	461	420
Log Cabin	HENDERSON	Trinity	Carrizo-Wilcox Aquifer		89	89	89	89	89	89
Lowry Crossing	COLLIN	Trinity	Lake Texoma		64	62	63	64	67	231
Lowry Crossing	COLLIN	Trinity	Lake Lavon		85	83	84	87	91	311
Lowry Crossing	COLLIN	Trinity	Lake Chapman		41	39	39	39	40	137
Lowry Crossing	COLLIN	Trinity	Indirect Reuse (Lavon)		30	29	29	30	31	107
Lucas	COLLIN	Trinity	Lake Texoma	NTMWD	209	241	247	280	363	451
Lucas	COLLIN	Trinity	Lake Lavon	NTMWD	283	325	333	378	487	607
Lucas	COLLIN	Trinity	Lake Chapman	NTMWD	135	154	154	172	219	268
Lucas	COLLIN	Trinity	Indirect Reuse (Lavon)	NTMWD	97	112	115	130	169	210
Luella WSC	GRAYSON	Trinity	Woodbine Aquifer		408	408	408	408	408	408
M E N WSC	NAVARRO	Trinity	Navarro Mills Reservoir	Corsicana	482	469	471	465	447	438
Mabank	HENDERSON	Trinity	TRWD Sources	TRWD	80	68	60	55	50	46
Mabank	KAUFMAN	Trinity	TRWD Sources	TRWD	555	541	536	537	536	542
Mac Bee WSC	KAUFMAN	Sabine	Lake Fork	SRA	71	75	80	86	91	95

Table J.1
Current Supplies by Water User Group

WUG	County Water Used	Basin Water Used	Source	Purchased From	2010	2020	2030	2040	2050	2060
Malakoff	HENDERSON	Trinity	TRWD Sources		231	202	183	167	155	149
Malakoff	HENDERSON	Trinity	Carrizo-Wilcox Aquifer		410	410	410	410	410	410
Mansfield	ELLIS	Trinity	TRWD Sources		101	155	209	266	352	495
Mansfield	TARRANT	Trinity	TRWD Sources		10,860	10,856	10,829	10,788	10,710	10,566
Maypearl	ELLIS	Trinity	Trinity Aquifer		55	55	55	55	55	55
Maypearl	ELLIS	Trinity	Woodbine Aquifer		49	49	49	49	49	49
McKinney	COLLIN	Trinity	Lake Texoma	NTMWD	5,016	6,338	7,916	9,475	10,300	10,788
McKinney	COLLIN	Trinity	Lake Lavon	NTMWD	6,750	8,528	10,650	12,747	13,857	14,514
McKinney	COLLIN	Trinity	Lake Chapman	NTMWD	3,243	4,030	4,948	5,822	6,219	6,398
McKinney	COLLIN	Trinity	Indirect Reuse (Lavon)	NTMWD	2,331	2,946	3,679	4,403	4,787	5,014
McLendon-Chisholm	ROCKWALL	Trinity	Lake Texoma		39	39	39	41	43	46
McLendon-Chisholm	ROCKWALL	Trinity	Lake Lavon		54	52	53	54	58	62
McLendon-Chisholm	ROCKWALL	Trinity	Lake Chapman		25	25	25	25	26	28
McLendon-Chisholm	ROCKWALL	Trinity	Indirect Reuse (Lavon)		18	18	18	19	20	22
Melissa	COLLIN	Trinity	Lake Texoma	McKinney	450	664	741	810	926	1,059
Melissa	COLLIN	Trinity	Lake Lavon	McKinney	604	893	998	1,090	1,247	1,425
Melissa	COLLIN	Trinity	Lake Chapman	McKinney	291	422	463	498	559	628
Melissa	COLLIN	Trinity	Woodbine Aquifer		108	108	108	108	108	108
Melissa	COLLIN	Trinity	Indirect Reuse (Lavon)	McKinney	209	309	345	377	430	492
Mesquite	DALLAS	Trinity	Lake Texoma	NTMWD	5,820	5,401	5,247	4,960	4,622	4,245
Mesquite	DALLAS	Trinity	Lake Lavon	NTMWD	7,830	7,268	7,058	6,674	6,218	5,710
Mesquite	DALLAS	Trinity	Lake Chapman	NTMWD	3,763	3,434	3,280	3,048	2,791	2,518
Mesquite	DALLAS	Trinity	Indirect Reuse (Lavon)	NTMWD	2,705	2,510	2,439	2,305	2,148	1,973
Mesquite	KAUFMAN	Trinity	Lake Lavon	NTMWD	0	1	1	1	1	2
Midlothian	ELLIS	Trinity	TRWD Sources	TRWD	0	0	0	0	0	0
Midlothian	ELLIS	Trinity	Joe Pool Lake	TRA	2,543	3,430	3,304	3,186	3,012	2,853
Midlothian	ELLIS	Trinity	Trinity Aquifer		36	36	36	36	36	36
Milford	ELLIS	Trinity	Other Aquifer		0	0	0	0	0	0
Milford	ELLIS	Trinity	Woodbine Aquifer		53	53	53	53	53	53
Milford	ELLIS	Trinity	Brazos River Authority		84	84	81	79	77	77
Milligan WSC	COLLIN	Trinity	Lake Texoma	NTMWD	41	31	26	22	20	18
Milligan WSC	COLLIN	Trinity	Lake Lavon	NTMWD	55	41	35	30	27	25
Milligan WSC	COLLIN	Trinity	Lake Chapman	NTMWD	27	20	16	14	12	11
Milligan WSC	COLLIN	Trinity	Indirect Reuse (Lavon)	NTMWD	19	14	12	10	9	8
Mineral Wells	PARKER	Brazos	Lake Palo Pinto		766	753	744	730	726	726
Mineral Wells	PARKER	Brazos	Lake Mineral Wells		0	0	0	0	0	0
Mountain Peak WSC	ELLIS	Trinity	Lake Joe Pool	Midlothian	408	436	286	227	185	159
Mountain Peak WSC	ELLIS	Trinity	Trinity Aquifer		751	751	751	751	751	751
Mt Zion WSC	ROCKWALL	Trinity	Lake Texoma	Rockwall	90	101	96	93	92	86
Mt Zion WSC	ROCKWALL	Trinity	Lake Lavon	Rockwall	120	136	128	124	124	116
Mt Zion WSC	ROCKWALL	Trinity	Lake Chapman	Rockwall	58	64	60	57	55	51
Mt Zion WSC	ROCKWALL	Trinity	Indirect Reuse (Lavon)	Rockwall	42	47	45	43	43	40
Muenster	COOKE	Trinity	Trinity Aquifer		301	301	301	301	301	301
Murphy	COLLIN	Trinity	Lake Texoma	NTMWD	315	915	781	687	626	572
Murphy	COLLIN	Trinity	Lake Lavon	NTMWD	424	1,232	1,051	926	844	769
Murphy	COLLIN	Trinity	Lake Chapman	NTMWD	204	582	488	422	378	339
Murphy	COLLIN	Trinity	Indirect Reuse (Lavon)	NTMWD	147	425	363	319	291	266

Table J.1
Current Supplies by Water User Group

WUG	County Water Used	Basin Water Used	Source	Purchased From	2010	2020	2030	2040	2050	2060
Mustang SUD	DENTON	Trinity	Lake Ray Roberts	UTRWD	229	279	377	502	871	1,018
Mustang SUD	DENTON	Trinity	Lake Chapman	UTRWD	312	349	351	337	298	289
Mustang SUD	DENTON	Trinity	Trinity Aquifer		331	331	331	331	331	331
Navarro County-Livestock	NAVARRO	Trinity	Livestock Local Supply		1,603	1,603	1,603	1,603	1,603	1,603
Navarro County-Livestock	NAVARRO	Trinity	Other Aquifer		104	104	104	104	104	104
Navarro County-Livestock	NAVARRO	Trinity	Carrizo-Wilcox Aquifer		15	15	15	15	15	15
Navarro County-Livestock	NAVARRO	Trinity	Nacatoch Aquifer		10	10	10	10	10	10
Navarro County-Manufacturing	NAVARRO	Trinity	TRWD Sources		617	567	532	500	456	419
Navarro County-Manufacturing	NAVARRO	Trinity	Lake Navarro Mills	TRA	653	675	692	703	691	673
Navarro County-Manufacturing	NAVARRO	Trinity	Lake Halbert	Corsicana	0	0	0	0	0	0
Navarro County-Manufacturing	NAVARRO	Trinity	Other Aquifer		0	0	0	0	0	0
Navarro County-Mining	NAVARRO	Trinity	Carrizo-Wilcox Aquifer		73	73	73	73	73	73
Navarro County-Mining	NAVARRO	Trinity	Nacatoch Aquifer		38	38	38	38	38	38
Navarro County-Other	NAVARRO	Trinity	TRWD Sources		134	106	88	74	62	52
Navarro County-Other	NAVARRO	Trinity	Lake Navarro Mills		137	122	110	100	90	81
Navarro County-Other	NAVARRO	Trinity	Lake Halbert	Corsicana	0	0	0	0	0	0
Navarro County-Other	NAVARRO	Trinity	Trinity Aquifer		0	0	0	0	0	0
Navarro County-Other	NAVARRO	Trinity	Woodbine Aquifer		0	0	0	0	0	0
Navarro Mills WSC	NAVARRO	Trinity	Navarro Mills Reservoir	Corsicana	374	479	541	621	702	789
Nevada	COLLIN	Sabine	Lake Texoma	NTMWD	36	55	57	100	152	347
Nevada	COLLIN	Sabine	Lake Lavon	NTMWD	48	75	77	135	203	466
Nevada	COLLIN	Sabine	Lake Chapman	NTMWD	23	35	36	61	92	206
Nevada	COLLIN	Sabine	Indirect Reuse (Lavon)	NTMWD	17	26	26	46	71	161
Nevada	COLLIN	Trinity	Lake Texoma	NTMWD	14	28	28	50	76	173
Nevada	COLLIN	Trinity	Lake Lavon	NTMWD	19	37	39	67	102	233
Nevada	COLLIN	Trinity	Lake Chapman	NTMWD	9	18	18	31	46	103
Nevada	COLLIN	Trinity	Indirect Reuse (Lavon)	NTMWD	7	13	13	23	35	81
New Fairview	WISE	Trinity	TRWD Sources		0	0	0	0	0	0
New Fairview	WISE	Trinity	Trinity Aquifer		103	103	103	103	103	103
New Hope	COLLIN	Trinity	Lake Texoma		54	60	85	113	154	313
New Hope	COLLIN	Trinity	Lake Lavon		73	82	116	153	208	421
New Hope	COLLIN	Trinity	Lake Chapman		35	38	53	69	93	186
New Hope	COLLIN	Trinity	Indirect Reuse (Lavon)		25	28	40	52	72	146
Newark	WISE	Trinity	Trinity Aquifer		92	92	92	92	92	92
Newark	WISE	Trinity	TRWD Sources		0	0	0	0	0	0
North Collin WSC	COLLIN	Trinity	Lake Texoma	NTMWD	178	176	179	182	192	199
North Collin WSC	COLLIN	Trinity	Lake Lavon	NTMWD	239	236	239	246	257	269
North Collin WSC	COLLIN	Trinity	Lake Chapman	NTMWD	115	112	112	112	116	118
North Collin WSC	COLLIN	Trinity	Indirect Reuse (Lavon)	NTMWD	83	82	83	85	89	93
North Hunt WSC	FANNIN	Sulphur	Woodbine Aquifer		60	65	71	71	71	71
North Richland Hills	TARRANT	Trinity	TRWD Sources		10,472	10,064	9,717	9,360	8,430	7,309
North Richland Hills	TARRANT	Trinity	Trinity Aquifer		14	14	14	14	14	14
Northlake	DENTON	Trinity	TRWD Sources	Fort Worth	563	543	885	1,125	1,146	1,048
Northlake	DENTON	Trinity	Woodbine Aquifer		9	9	9	9	9	9
Oak Grove	KAUFMAN	Trinity	Lake Texoma	Kaufman	25	23	23	24	26	28
Oak Grove	KAUFMAN	Trinity	Lake Lavon		34	31	31	32	34	38
Oak Grove	KAUFMAN	Trinity	Lake Chapman		16	15	15	15	16	17
Oak Grove	KAUFMAN	Trinity	Indirect Reuse (Lavon)		12	11	11	11	12	13

Table J.1
Current Supplies by Water User Group

WUG	County Water Used	Basin Water Used	Source	Purchased From	2010	2020	2030	2040	2050	2060
Oak Leaf	ELLIS	Trinity	Lake Ray Roberts	DWU	108	113	117	119	117	113
Oak Leaf	ELLIS	Trinity	Lake Ray Hubbard	DWU	40	42	45	46	46	45
Oak Leaf	ELLIS	Trinity	Lake Tawakoni	DWU	100	104	109	112	111	108
Oak Point	DENTON	Trinity	Lake Ray Roberts		140	166	215	286	362	349
Oak Point	DENTON	Trinity	Lake Chapman		190	207	204	193	169	163
Oak Point	DENTON	Trinity	Trinity Aquifer		145	145	145	145	145	145
Ovilla	DALLAS	Trinity	Lake Ray Roberts	DWU	25	32	42	56	72	91
Ovilla	DALLAS	Trinity	Lake Ray Hubbard	DWU	9	12	16	22	28	36
Ovilla	DALLAS	Trinity	Lake Tawakoni	DWU	23	29	39	52	68	86
Ovilla	ELLIS	Trinity	Lake Ray Roberts	DWU	310	368	420	425	371	316
Ovilla	ELLIS	Trinity	Lake Ray Hubbard	DWU	115	139	161	165	145	126
Ovilla	ELLIS	Trinity	Lake Tawakoni	DWU	286	342	391	398	349	300
Ovilla	ELLIS	Trinity	Woodbine Aquifer		56	56	56	56	56	56
Palmer	ELLIS	Trinity	Woodbine Aquifer		280	280	280	280	280	280
Pantego	TARRANT	Trinity	Trinity Aquifer		469	469	469	469	469	469
Parker	COLLIN	Trinity	Lake Texoma	NTMWD	389	642	804	1,156	1,541	1,924
Parker	COLLIN	Trinity	Lake Lavon	NTMWD	523	864	1,082	1,556	2,073	2,589
Parker	COLLIN	Trinity	Lake Chapman	NTMWD	251	408	503	711	930	1,141
Parker	COLLIN	Trinity	Indirect Reuse (Lavon)	NTMWD	181	299	374	537	716	894
Parker County-Irrigation	PARKER	Trinity	Run-of-River - Trinity		122	122	122	122	122	122
Parker County-Irrigation	PARKER	Trinity	Direct Reuse		11	11	11	11	11	11
Parker County-Irrigation	PARKER	Brazos	Run-of-River - Brazos		117	117	117	117	117	117
Parker County-Irrigation	PARKER	Brazos	Trinity Aquifer		88	88	88	88	88	88
Parker County-Irrigation	PARKER	Brazos	Direct Reuse	Weatherford	202	202	202	202	202	202
Parker County-Livestock	PARKER	Trinity	Livestock Local Supply		1,019	1,019	1,019	1,019	1,019	1,019
Parker County-Livestock	PARKER	Trinity	Trinity Aquifer		213	213	213	213	213	213
Parker County-Livestock	PARKER	Brazos	Livestock Local Supply		903	903	903	903	903	903
Parker County-Livestock	PARKER	Brazos	Trinity Aquifer		0	0	0	0	0	0
Parker County-Manufacturing	PARKER	Brazos	TRWD Sources	Weatherford	169	168	171	180	185	191
Parker County-Manufacturing	PARKER	Brazos	Lake Weatherford	Weatherford	223	188	162	144	126	109
Parker County-Manufacturing	PARKER	Brazos	Trinity Aquifer		18	18	18	18	18	18
Parker County-Manufacturing	PARKER	Trinity	Lake Weatherford	Weatherford	45	45	45	45	45	45
Parker County-Manufacturing	PARKER	Trinity	Other Local Supply		0	0	0	0	0	0
Parker County-Manufacturing	PARKER	Trinity	Lake Palo Pinto	Mineral Wells	25	25	25	24	25	25
Parker County-Manufacturing	PARKER	Trinity	Trinity Aquifer		0	0	0	0	0	0
Parker County-Mining	PARKER	Trinity	Trinity Aquifer		59	59	59	59	59	59
Parker County-Mining	PARKER	Trinity	Other Local Supply		4	4	5	5	6	6
Parker County-Mining	PARKER	Brazos	Other Local Supply		16	16	15	15	14	14
Parker County-Mining	PARKER	Brazos	Brazos River Authority	BRA	2,000	2,000	2,000	2,000	2,000	2,000
Parker County-Other	PARKER	Trinity	TRWD Sources		173	125	102	88	76	67
Parker County-Other	PARKER	Trinity	Lake Weatherford	Weatherford	15	12	11	9	8	8
Parker County-Other	PARKER	Trinity	Trinity Aquifer		2,848	2,722	2,722	2,722	2,722	2,722
Parker County-Other	PARKER	Brazos	Lake Palo Pinto	Mineral Wells	479	479	479	479	479	479
Parker County-Other	PARKER	Brazos	Trinity Aquifer		1,967	2,093	2,093	2,093	2,093	2,093
Parker County-Other	PARKER	Brazos	Other Aquifer		33	33	33	33	33	33
Parker County-Steam Electric Power	PARKER	Trinity	Lake Weatherford	Weatherford	30	24	28	32	38	46
Payne Springs	HENDERSON	Trinity	TRWD Sources		51	45	40	37	34	31

Table J.1
Current Supplies by Water User Group

WUG	County Water Used	Basin Water Used	Source	Purchased From	2010	2020	2030	2040	2050	2060
Pecan Hill	ELLIS	Trinity	Lake Waxahachie	Rockett SUD	29	0	0	0	0	0
Pecan Hill	ELLIS	Trinity	Other Aquifer		111	111	111	111	111	111
Pelican Bay	TARRANT	Trinity	Trinity Aquifer		80	80	80	80	80	80
Pilot Point	DENTON	Trinity	Lake Ray Roberts	UTRWD	0	0	0	0	0	0
Pilot Point	DENTON	Trinity	Lake Ray Hubbard	UTRWD	0	0	0	0	0	0
Pilot Point	DENTON	Trinity	Lake Chapman	UTRWD	0	0	0	0	0	0
Pilot Point	DENTON	Trinity	Lake Tawakoni	UTRWD	0	0	0	0	0	0
Pilot Point	DENTON	Trinity	Trinity Aquifer		587	587	587	587	587	587
Plano	COLLIN	Trinity	Lake Texoma	NTMWD	14,389	11,486	10,160	9,286	8,733	8,246
Plano	COLLIN	Trinity	Lake Lavon	NTMWD	19,359	15,452	13,669	12,493	11,750	11,095
Plano	COLLIN	Trinity	Lake Chapman	NTMWD	9,303	7,303	6,351	5,706	5,273	4,890
Plano	COLLIN	Trinity	Indirect Reuse (Lavon)	NTMWD	6,687	5,338	4,722	4,316	4,059	3,832
Plano	DENTON	Trinity	Lake Texoma	NTMWD	314	340	293	260	237	218
Plano	DENTON	Trinity	Lake Lavon	NTMWD	422	458	393	348	320	293
Plano	DENTON	Trinity	Lake Chapman	NTMWD	203	216	183	160	143	129
Plano	DENTON	Trinity	Indirect Reuse (Lavon)	NTMWD	146	158	136	121	110	101
Ponder	DENTON	Trinity	Trinity Aquifer		201	201	201	201	201	201
Pottsboro	GRAYSON	Red	Lake Randell		0	0	0	0	0	0
Pottsboro	GRAYSON	Red	Lake Texoma		561	561	561	561	561	561
Pottsboro	GRAYSON	Red	Woodbine Aquifer		123	123	123	123	123	123
Princeton	COLLIN	Trinity	Lake Texoma	NTMWD	135	247	376	551	837	1,145
Princeton	COLLIN	Trinity	Lake Lavon	NTMWD	182	332	506	741	1,125	1,541
Princeton	COLLIN	Trinity	Lake Chapman	NTMWD	87	157	235	338	505	679
Princeton	COLLIN	Trinity	Indirect Reuse (Lavon)	NTMWD	63	115	175	256	389	532
Prosper	COLLIN	Trinity	Lake Texoma		226	845	1,079	1,087	1,062	1,034
Prosper	COLLIN	Trinity	Lake Lavon		305	1,137	1,451	1,464	1,430	1,392
Prosper	COLLIN	Trinity	Lake Chapman		146	537	674	668	641	613
Prosper	COLLIN	Trinity	Woodbine Aquifer		605	605	605	605	605	605
Prosper	COLLIN	Trinity	Indirect Reuse (Lavon)		105	393	501	505	494	481
Prosper	DENTON	Trinity	Lake Texoma		57	250	387	519	520	517
Prosper	DENTON	Trinity	Lake Lavon		76	338	520	699	699	696
Prosper	DENTON	Trinity	Lake Chapman		37	159	242	319	314	307
Prosper	DENTON	Trinity	Indirect Reuse (Lavon)		26	116	180	241	242	240
R-C-H WSC	ROCKWALL	Trinity	Lake Texoma		83	69	63	59	58	58
R-C-H WSC	ROCKWALL	Trinity	Lake Lavon		112	94	85	80	78	79
R-C-H WSC	ROCKWALL	Trinity	Lake Chapman		54	44	40	36	35	34
R-C-H WSC	ROCKWALL	Trinity	Indirect Reuse (Lavon)		39	32	29	28	27	27
Red Oak	ELLIS	Trinity	Lake Joe Pool		100	0	0	0	0	0
Red Oak	ELLIS	Trinity	Woodbine Aquifer		698	698	698	698	698	698
Reno	PARKER	Trinity	TRWD Sources		164	129	109	93	83	75
Reno	PARKER	Trinity	Trinity Aquifer		167	167	167	167	167	167
Rhome	WISE	Trinity	Trinity Aquifer		125	125	125	125	125	125
Rhome	WISE	Trinity	TRWD Sources		389	619	748	837	882	930
Rice	NAVARRO	Trinity	Lake Bardwell	TRA	0	0	0	0	0	0
Rice	NAVARRO	Trinity	Navarro Mills Reservoir	Corsicana	250	264	281	298	312	326
Rice WSC	ELLIS	Trinity	Navarro Mills Reservoir		43	65	108	143	175	199
Rice WSC	ELLIS	Trinity	Lake Bardwell	TRA	85	85	67	52	39	29
Rice WSC	NAVARRO	Trinity	Navarro Mills Reservoir	TRA	906	1,000	1,101	1,186	1,286	1,384

Table J.1
Current Supplies by Water User Group

WUG	County Water Used	Basin Water Used	Source	Purchased From	2010	2020	2030	2040	2050	2060
Richardson	COLLIN	Trinity	Lake Texoma	NTMWD	1,406	1,668	1,426	1,248	1,129	1,031
Richardson	COLLIN	Trinity	Lake Lavon	NTMWD	1,891	2,244	1,918	1,680	1,520	1,387
Richardson	COLLIN	Trinity	Lake Chapman	NTMWD	909	1,060	892	767	682	611
Richardson	COLLIN	Trinity	Indirect Reuse (Lavon)	NTMWD	653	775	663	580	525	479
Richardson	DALLAS	Trinity	Lake Texoma	NTMWD	5,167	4,022	3,440	3,010	2,724	2,486
Richardson	DALLAS	Trinity	Lake Lavon	NTMWD	6,952	5,412	4,627	4,049	3,664	3,344
Richardson	DALLAS	Trinity	Lake Chapman	NTMWD	3,341	2,557	2,150	1,850	1,645	1,474
Richardson	DALLAS	Trinity	Indirect Reuse (Lavon)	NTMWD	2,401	1,869	1,599	1,399	1,266	1,155
Richland Hills	TARRANT	Trinity	TRWD Sources	Fort Worth	1,261	1,071	952	862	755	652
Richland Hills	TARRANT	Trinity	Trinity Aquifer		153	153	153	153	153	153
River Oaks	TARRANT	Trinity	TRWD Sources	TRWD	1,085	860	705	591	496	421
Roanoke	DENTON	Trinity	TRWD Sources	Fort Worth	1,196	1,599	2,139	2,510	2,845	2,916
Roanoke	DENTON	Trinity	Trinity Aquifer		63	63	63	63	63	63
Rockett SUD	DALLAS	Trinity	Lake Joe Pool	Midlothian	105	0	0	0	0	0
Rockett SUD	DALLAS	Trinity	Lake Waxahachie	Waxahachie	69	0	0	0	0	0
Rockett SUD	ELLIS	Trinity	Lake Joe Pool	Midlothian	1,370	0	0	0	0	0
Rockett SUD	ELLIS	Trinity	Lake Waxahachie	Waxahachie	948	0	0	0	0	0
Rockett SUD	ELLIS	Trinity	Trinity Aquifer		71	71	71	71	71	71
Rockwall	ROCKWALL	Trinity	Lake Texoma	NTMWD	1,710	2,358	2,591	2,572	2,407	2,196
Rockwall	ROCKWALL	Trinity	Lake Lavon	NTMWD	2,300	3,173	3,486	3,461	3,237	2,955
Rockwall	ROCKWALL	Trinity	Lake Chapman	NTMWD	1,105	1,499	1,620	1,581	1,453	1,303
Rockwall	ROCKWALL	Trinity	Indirect Reuse (Lavon)	NTMWD	795	1,096	1,204	1,195	1,119	1,021
Rockwall County-Irrigation	ROCKWALL	Trinity	Direct Reuse	NTMWD	784	784	784	784	784	784
Rockwall County-Livestock	ROCKWALL	Sabine	Livestock Local Supply		32	32	32	32	32	32
Rockwall County-Livestock	ROCKWALL	Sabine	Other Aquifer		0	0	0	0	0	0
Rockwall County-Livestock	ROCKWALL	Trinity	Livestock Local Supply		136	136	136	136	136	136
Rockwall County-Livestock	ROCKWALL	Trinity	Other Aquifer		21	21	21	21	21	21
Rockwall County-Manufacturing	ROCKWALL	Trinity	Lake Lavon	NTMWD	3	4	3	3	3	3
Rockwall County-Manufacturing	ROCKWALL	Trinity	Lake Chapman	NTMWD	2	1	1	1	1	1
Rockwall County-Manufacturing	ROCKWALL	Trinity	Indirect Reuse (Lavon)	NTMWD	1	1	1	1	1	1
Rockwall County-Manufacturing	ROCKWALL	Sabine	Lake Texoma	NTMWD	4	3	3	3	3	3
Rockwall County-Manufacturing	ROCKWALL	Sabine	Lake Lavon	NTMWD	2	2	2	2	2	2
Rockwall County-Manufacturing	ROCKWALL	Sabine	Lake Chapman	NTMWD	1	1	1	1	1	1
Rockwall County-Manufacturing	ROCKWALL	Sabine	Indirect Reuse (Lavon)	NTMWD	1	1	1	1	1	1
Rockwall County-Mining	ROCKWALL	Sabine	Other Local Supply		33	33	33	33	33	33
Rockwall County-Other	ROCKWALL	Sabine	Lake Texoma	Rockwall	38	29	25	22	20	18
Rockwall County-Other	ROCKWALL	Sabine	Lake Lavon	Rockwall	51	39	33	30	28	25
Rockwall County-Other	ROCKWALL	Sabine	Lake Chapman	Rockwall	24	19	16	14	12	11
Rockwall County-Other	ROCKWALL	Sabine	Other Aquifer		187	187	187	187	187	187
Rockwall County-Other	ROCKWALL	Sabine	Indirect Reuse (Lavon)	Rockwall	17	14	12	10	9	9
Rockwall County-Other	ROCKWALL	Trinity	Lake Texoma	Rockwall	21	16	14	12	11	10
Rockwall County-Other	ROCKWALL	Trinity	Lake Lavon	Rockwall	28	22	18	16	15	14
Rockwall County-Other	ROCKWALL	Trinity	Lake Chapman	Rockwall	14	10	9	8	7	6
Rockwall County-Other	ROCKWALL	Trinity	Direct Reuse		0	0	0	0	0	0
Rockwall County-Other	ROCKWALL	Trinity	Indirect Reuse (Lavon)	Rockwall	10	8	7	6	5	5

Table J.1
Current Supplies by Water User Group

WUG	County Water Used	Basin Water Used	Source	Purchased From	2010	2020	2030	2040	2050	2060
Rowlett	DALLAS	Trinity	Lake Texoma	NTMWD	2,173	2,151	2,096	2,037	1,987	1,918
Rowlett	DALLAS	Trinity	Lake Lavon	NTMWD	2,925	2,894	2,821	2,740	2,674	2,580
Rowlett	DALLAS	Trinity	Lake Chapman	NTMWD	1,405	1,368	1,311	1,251	1,200	1,137
Rowlett	DALLAS	Trinity	Indirect Reuse (Lavon)	NTMWD	1,010	1,000	974	947	924	891
Rowlett	ROCKWALL	Trinity	Lake Texoma	NTMWD	320	262	223	196	178	162
Rowlett	ROCKWALL	Trinity	Lake Lavon	NTMWD	429	351	299	264	239	219
Rowlett	ROCKWALL	Trinity	Lake Chapman	NTMWD	207	166	139	120	107	96
Rowlett	ROCKWALL	Trinity	Indirect Reuse (Lavon)	NTMWD	149	122	103	91	83	75
Royse City	COLLIN	Sabine	Lake Texoma	NTMWD	64	166	226	301	365	375
Royse City	COLLIN	Sabine	Lake Lavon	NTMWD	85	223	305	404	491	505
Royse City	COLLIN	Sabine	Lake Chapman	NTMWD	41	106	142	185	221	223
Royse City	COLLIN	Sabine	Indirect Reuse (Lavon)	NTMWD	30	77	105	140	170	174
Royse City	ROCKWALL	Sabine	Lake Texoma	NTMWD	491	689	579	631	677	628
Royse City	ROCKWALL	Sabine	Lake Lavon	NTMWD	662	926	779	848	911	845
Royse City	ROCKWALL	Sabine	Lake Chapman	NTMWD	318	438	362	388	409	373
Royse City	ROCKWALL	Sabine	Indirect Reuse (Lavon)	NTMWD	228	320	269	293	315	292
Runaway Bay	WISE	Trinity	TRWD Sources		345	340	336	331	320	313
Sachse	COLLIN	Trinity	Lake Texoma	NTMWD	147	184	182	169	157	146
Sachse	COLLIN	Trinity	Lake Lavon	NTMWD	199	248	245	227	212	196
Sachse	COLLIN	Trinity	Lake Chapman	NTMWD	95	117	114	104	95	87
Sachse	COLLIN	Trinity	Indirect Reuse (Lavon)	NTMWD	68	86	85	78	73	68
Sachse	DALLAS	Trinity	Lake Texoma	NTMWD	467	449	447	442	446	441
Sachse	DALLAS	Trinity	Lake Lavon	NTMWD	629	603	602	595	599	594
Sachse	DALLAS	Trinity	Lake Chapman	NTMWD	302	285	280	272	269	262
Sachse	DALLAS	Trinity	Indirect Reuse (Lavon)	NTMWD	217	209	208	206	207	205
Saginaw	TARRANT	Trinity	TRWD Sources	Fort Worth	3,099	3,086	2,914	2,692	2,392	2,109
Saint Paul	COLLIN	Trinity	Lake Texoma	NTMWD	39	74	126	177	191	184
Saint Paul	COLLIN	Trinity	Lake Lavon	NTMWD	53	99	169	238	258	248
Saint Paul	COLLIN	Trinity	Lake Chapman	NTMWD	25	47	79	109	116	109
Saint Paul	COLLIN	Trinity	Indirect Reuse (Lavon)	NTMWD	18	34	58	82	89	85
Sanger	DENTON	Trinity	Lake Ray Roberts	UTRWD	237	249	289	335	382	382
Sanger	DENTON	Trinity	Lake Chapman	UTRWD	324	312	272	226	179	179
Sanger	DENTON	Trinity	Trinity Aquifer		543	543	543	543	543	543
Sansom Park Village	TARRANT	Trinity	Trinity Aquifer		422	422	422	422	422	422
Sansom Park Village	TARRANT	Trinity	TRWD Sources	Fort Worth	194	163	138	116	100	88
Sardis-Lone Elm WSC	DALLAS	Trinity	Trinity Aquifer		8	7	7	7	7	7
Sardis-Lone Elm WSC	ELLIS	Trinity	Lake Joe Pool	Midlothian	0	0	0	0	0	0
Sardis-Lone Elm WSC	ELLIS	Trinity	Trinity Aquifer		1,142	1,143	1,143	1,143	1,143	1,143
Savoy	FANNIN	Red	Woodbine Aquifer		123	123	123	123	123	123
Seagoville	DALLAS	Trinity	Lake Ray Roberts	DWU	788	784	792	784	737	679
Seagoville	DALLAS	Trinity	Lake Ray Hubbard	DWU	294	296	302	304	289	270
Seagoville	DALLAS	Trinity	Lake Tawakoni	DWU	727	728	737	735	694	644
Seagoville	KAUFMAN	Trinity	Lake Ray Roberts	DWU	2	1	2	3	3	5
Seagoville	KAUFMAN	Trinity	Lake Chapman	DWU	0	1	1	1	2	2
Seagoville	KAUFMAN	Trinity	Trinity Aquifer	DWU	1	2	2	3	4	4
Seven Points	HENDERSON	Trinity	TRWD Sources		108	89	81	77	74	71

Table J.1
Current Supplies by Water User Group

WUG	County Water Used	Basin Water Used	Source	Purchased From	2010	2020	2030	2040	2050	2060
Shady Shores	DENTON	Trinity	Lake Ray Roberts	Lake Cities MUA	92	87	103	130	174	174
Shady Shores	DENTON	Trinity	Lake Chapman	Lake Cities MUA	126	111	97	87	81	82
Shady Shores	DENTON	Trinity	Trinity Aquifer	Lake Cities MUA	19	21	22	23	23	23
Shady Shores	DENTON	Trinity	Woodbine Aquifer	Lake Cities MUA	41	44	47	49	49	49
Sherman	GRAYSON	Red	Lake Texoma	GTUA	2,641	5,955	6,213	6,474	6,847	7,224
Sherman	GRAYSON	Red	Trinity Aquifer		4,674	4,674	4,674	4,674	4,674	4,674
Sherman	GRAYSON	Red	Woodbine Aquifer		3,463	3,463	3,463	3,463	3,463	3,463
South Grayson WSC	COLLIN	Trinity	Woodbine Aquifer		199	161	140	120	105	90
South Grayson WSC	COLLIN	Trinity	Trinity Aquifer		202	163	141	122	106	91
South Grayson WSC	GRAYSON	Trinity	Woodbine Aquifer		159	197	218	238	254	268
South Grayson WSC	GRAYSON	Trinity	Trinity Aquifer		161	200	221	240	256	271
Southlake	DENTON	Trinity	TRWD Sources	Fort Worth	357	578	732	836	1,027	903
Southlake	TARRANT	Trinity	TRWD Sources	Fort Worth	12,356	12,009	11,025	9,825	8,491	7,284
Southmayd	GRAYSON	Red	Woodbine Aquifer		49	49	49	49	49	49
Southmayd	GRAYSON	Red	Trinity Aquifer		99	99	99	99	99	99
Southwest Fannin County SUD	FANNIN	Red	Woodbine Aquifer		394	392	391	390	390	389
Southwest Fannin County SUD	FANNIN	Trinity	Woodbine Aquifer		5	7	8	9	9	10
Southwest Fannin County SUD	GRAYSON	Red	Woodbine Aquifer		54	54	54	54	54	54
Springtown	PARKER	Trinity	Trinity Aquifer		236	236	236	236	236	236
Springtown	PARKER	Trinity	TRWD Sources	TRWD	288	369	422	460	472	473
Sunnyvale	DALLAS	Trinity	Lake Texoma	NTMWD	359	387	424	457	492	459
Sunnyvale	DALLAS	Trinity	Lake Lavon	NTMWD	484	519	570	615	662	619
Sunnyvale	DALLAS	Trinity	Lake Chapman	NTMWD	232	246	265	281	297	272
Sunnyvale	DALLAS	Trinity	Indirect Reuse (Lavon)	NTMWD	167	180	197	212	229	214
Talty	KAUFMAN	Trinity	Lake Texoma	Forney	170	209	246	284	334	389
Talty	KAUFMAN	Trinity	Lake Lavon	Forney	228	280	332	382	449	522
Talty	KAUFMAN	Trinity	Lake Chapman	Forney	110	133	154	175	201	231
Talty	KAUFMAN	Trinity	Indirect Reuse (Lavon)	Forney	79	97	114	132	155	181
Tarrant County-Irrigation	TARRANT	Trinity	Run-of-river - Trinity		549	549	549	549	549	549
Tarrant County-Irrigation	TARRANT	Trinity	TRWD Sources		2,187	2,187	2,187	1,941	1,644	1,396
Tarrant County-Irrigation	TARRANT	Trinity	Trinity Aquifer		15	15	15	15	15	15
Tarrant County-Irrigation	TARRANT	Trinity	Direct Reuse	Fort Worth	1,708	1,986	2,381	2,827	3,300	3,715
Tarrant County-Irrigation	TARRANT	Trinity	Indirect Reuse	Dallas County Park Cities MUD	1,493	1,663	1,784	1,864	1,924	1,974
Tarrant County-Livestock	TARRANT	Trinity	Livestock Local Supply		442	442	442	442	442	442
Tarrant County-Livestock	TARRANT	Trinity	Trinity Aquifer		361	361	361	361	361	361
Tarrant County-Manufacturing	TARRANT	Trinity	Lake Arlington		0	0	0	0	0	0
Tarrant County-Manufacturing	TARRANT	Trinity	TRWD Sources		18,536	17,824	17,465	17,093	16,087	14,819
Tarrant County-Manufacturing	TARRANT	Trinity	Trinity Aquifer		0	0	0	0	0	0
Tarrant County-Manufacturing	TARRANT	Trinity	Indirect Reuse		0	0	0	0	0	0
Tarrant County-Mining	TARRANT	Trinity	Other Local Supply		342	342	342	342	342	342
Tarrant County-Mining	TARRANT	Trinity	TRWD Sources		0	0	0	0	0	0
Tarrant County-Other	TARRANT	Trinity	TRWD Sources		3,740	2,966	2,475	2,075	1,743	1,480
Tarrant County-Other	TARRANT	Trinity	Other Aquifer		0	0	0	0	0	0
Tarrant County-Other	TARRANT	Trinity	Trinity Aquifer		354	354	354	354	354	354
Tarrant County-Other	TARRANT	Trinity	Woodbine Aquifer		0	0	0	0	0	0
Tarrant County-Other	TARRANT	Trinity	Direct Reuse		0	0	0	0	0	0

Table J.1
Current Supplies by Water User Group

WUG	County Water Used	Basin Water Used	Source	Purchased From	2010	2020	2030	2040	2050	2060
Tarrant County-Steam Electric Power	TARRANT	Trinity	Lake Arlington		0	0	0	0	0	0
Tarrant County-Steam Electric Power	TARRANT	Trinity	TRWD Sources		4,213	2,818	2,919	3,063	3,167	3,282
Tarrant County-Steam Electric Power	TARRANT	Trinity	Trinity Aquifer		0	0	0	0	0	0
Tarrant County-Steam Electric Power	TARRANT	Trinity	Run-of-river - Trinity		235	187	219	257	304	362
Teague	FREESTONE	Trinity	Teague City Lake		0	0	0	0	0	0
Teague	FREESTONE	Trinity	Carrizo-Wilcox Aquifer		319	319	319	319	319	319
Teague	FREESTONE	Brazos	Teague City Lake		0	0	0	0	0	0
Teague	FREESTONE	Brazos	Carrizo-Wilcox Aquifer		204	204	203	204	204	204
Terrell	KAUFMAN	Trinity	Lake Texoma	NTMWD	0	0	0	0	0	0
Terrell	KAUFMAN	Trinity	Lake Lavon	NTMWD	0	0	0	0	0	0
Terrell	KAUFMAN	Trinity	Lake Terrell		1,490	1,570	1,621	1,644	1,656	1,671
Terrell	KAUFMAN	Trinity	Lake Chapman	NTMWD	0	0	0	0	0	0
Terrell	KAUFMAN	Trinity	Lake Tawakoni	SRA	1,981	2,086	2,155	2,186	2,201	2,222
Terrell	KAUFMAN	Trinity	Indirect Reuse (Lavon)	NTMWD	0	0	0	0	0	0
The Colony	DENTON	Trinity	Lake Texoma		105	104	98	89	83	76
The Colony	DENTON	Trinity	Lake Lavon		141	139	133	119	111	103
The Colony	DENTON	Trinity	Lake Ray Roberts	DWU	1,492	1,694	1,709	1,586	1,412	1,222
The Colony	DENTON	Trinity	Lake Ray Hubbard	DWU	557	640	653	614	555	486
The Colony	DENTON	Trinity	Lake Chapman		68	66	61	55	50	45
The Colony	DENTON	Trinity	Lake Tawakoni	DWU	1,377	1,571	1,592	1,486	1,332	1,158
The Colony	DENTON	Trinity	Trinity Aquifer		934	934	934	934	934	934
The Colony	DENTON	Trinity	Indirect Reuse (Lavon)		49	48	46	41	38	35
Tioga	GRAYSON	Trinity	Trinity Aquifer		130	130	130	130	130	130
Tom Bean	GRAYSON	Red	Woodbine Aquifer		44	43	43	43	43	43
Tom Bean	GRAYSON	Trinity	Woodbine Aquifer		245	245	245	245	245	245
Tool	HENDERSON	Trinity	TRWD Sources		251	196	173	160	148	139
Trenton	FANNIN	Trinity	Woodbine Aquifer		189	189	189	189	189	189
Trinidad	HENDERSON	Trinity	Trinidad City Lake		484	484	484	484	484	484
Trophy Club	DENTON	Trinity	TRWD Sources		2,306	2,154	2,027	1,894	1,750	1,610
Trophy Club	DENTON	Trinity	Trinity Aquifer		546	546	546	546	546	546
Two Way WSC	COOKE	Red	Trinity Aquifer		10	11	11	11	11	11
Two Way WSC	GRAYSON	Red	Trinity Aquifer		276	275	276	276	276	276
Two Way WSC	GRAYSON	Trinity	Trinity Aquifer		155	156	155	154	154	154
University Park	DALLAS	Trinity	Lake Grapevine	Dallas County Park Cities MUD	8,968	8,968	8,968	8,968	8,647	8,243
Valley View	COOKE	Trinity	Trinity Aquifer		78	78	78	78	78	78
Van Alstyne	GRAYSON	Trinity	Woodbine Aquifer		0	0	0	0	0	0
Van Alstyne	GRAYSON	Trinity	Trinity Aquifer		468	468	468	468	468	468
Virginia Hill WSC	HENDERSON	Trinity	Carrizo-Wilcox Aquifer		443	443	443	443	443	443
Walnut Creek SUD	PARKER	Trinity	TRWD Sources	TRWD/walnut	1,743	1,595	1,516	1,463	1,439	1,407
Walnut Creek SUD	WISE	Trinity	TRWD Sources	TRWD/walnut	213	194	190	190	194	197
Watauga	TARRANT	Trinity	TRWD Sources	North Richland Hills	3,691	3,079	2,649	2,287	1,966	1,700
Waxahachie	ELLIS	Trinity	Lake Bardwell	TRA	3,855	3,668	3,483	3,296	3,111	2,925
Waxahachie	ELLIS	Trinity	Lake Waxahachie		512	1,632	1,687	1,726	1,753	1,790
Waxahachie	ELLIS	Trinity	Indirect Reuse	TRA	1,886	2,166	2,445	2,724	3,004	3,283

Table J.1
Current Supplies by Water User Group

WUG	County Water Used	Basin Water Used	Source	Purchased From	2010	2020	2030	2040	2050	2060
Weatherford	PARKER	Trinity	TRWD sources	TRWD	1,486	1,629	1,769	1,903	2,042	2,184
Weatherford	PARKER	Trinity	Lake Weatherford		2,289	2,196	2,080	1,955	1,830	1,700
Weatherford	PARKER	Trinity	Trinity Aquifer		50	50	50	50	50	50
Weatherford	PARKER	Brazos	TRWD sources		70	77	88	97	107	117
Weatherford	PARKER	Brazos	Lake Weatherford		110	105	104	101	97	92
West Cedar Creek MUD	HENDERSON	Trinity	TRWD Sources	TRWD	794	781	760	736	715	698
West Cedar Creek MUD	KAUFMAN	Trinity	TRWD Sources	TRWD	561	648	701	741	777	806
West Wise Rural WSC	WISE	Trinity	TRWD Sources	TRWD	521	435	383	343	306	277
Weston	COLLIN	Trinity	Woodbine Aquifer		64	64	64	64	64	64
Westover Hills	TARRANT	Trinity	TRWD Sources	Fort Worth	296	239	201	171	144	122
Westworth Village	TARRANT	Trinity	TRWD Sources	Fort Worth	262	250	220	196	176	165
White Settlement	TARRANT	Trinity	TRWD Sources	Fort Worth	1,828	1,585	1,470	1,271	1,184	1,107
White Settlement	TARRANT	Trinity	Trinity Aquifer		829	829	829	829	829	829
Whitesboro	GRAYSON	Red	Trinity Aquifer		434	486	510	526	536	537
Whitesboro	GRAYSON	Trinity	Trinity Aquifer		327	275	251	235	225	223
Whitewright	GRAYSON	Red	Woodbine Aquifer		432	432	430	431	430	429
Whitewright	FANNIN	Red	Woodbine Aquifer		5	6	7	7	8	8
Willow Park	PARKER	Trinity	Trinity Aquifer		642	642	642	642	642	642
Wilmer	DALLAS	Trinity	Trinity Aquifer		322	322	322	322	322	322
Wise County-Irrigation	WISE	Trinity	Run-of-river - Trinity		139	139	139	139	139	139
Wise County-Irrigation	WISE	Trinity	TRWD Sources	TRWD	124	108	92	79	67	57
Wise County-Irrigation	WISE	Trinity	Trinity Aquifer		251	251	251	251	251	251
Wise County-Livestock	WISE	Trinity	Livestock Local Supply		1,117	1,117	1,117	1,117	1,117	1,117
Wise County-Livestock	WISE	Trinity	Trinity Aquifer		807	807	807	807	807	807
Wise County-Manufacturing	WISE	Trinity	Other Local Supply		0	0	0	0	0	0
Wise County-Manufacturing	WISE	Trinity	TRWD Sources	TRWD	2,469	2,307	2,191	2,072	1,895	1,755
Wise County-Manufacturing	WISE	Trinity	Other Aquifer		14	14	14	14	14	14
Wise County-Mining	WISE	Trinity	Other Local Supply		0	0	0	0	0	0
Wise County-Mining	WISE	Trinity	TRWD Sources	TRWD	2,896	2,525	2,140	1,839	1,557	1,322
Wise County-Mining	WISE	Trinity	Trinity Aquifer		239	239	239	239	239	239
Wise County-Mining	WISE	Trinity	Run-of-river - Trinity		51	51	51	51	51	51
Wise County-Mining	WISE	Trinity	Direct Reuse		15,930	14,074	12,152	10,643	9,236	8,061
Wise County-Other	WISE	Trinity	TRWD Sources	TRWD	1,024	926	772	647	541	458
Wise County-Other	WISE	Trinity	Trinity Aquifer		2,161	2,161	2,161	2,161	2,161	2,161
Wise County-Steam Electric Power	WISE	Trinity	TRWD sources	TRWD	4,600	4,010	3,400	2,920	2,473	2,100
Woodbine WSC	COOKE	Red	Trinity Aquifer		13	13	13	13	13	13
Woodbine WSC	COOKE	Trinity	Trinity Aquifer		503	503	503	503	503	503
Woodbine WSC	GRAYSON	Trinity	Trinity Aquifer		13	13	13	13	13	13
Wortham	FREESTONE	Trinity	Wortham Lake		0	0	0	0	0	0
Wortham	FREESTONE	Trinity	Lake Mexia	Mexia	0	1	0	0	0	0

Table J.1
Current Supplies by Water User Group

WUG	County Water Used	Basin Water Used	Source	Purchased From	2010	2020	2030	2040	2050	2060
Wylie	COLLIN	Trinity	Lake Texoma	NTMWD	1,343	1,630	1,736	2,138	2,042	2,036
Wylie	COLLIN	Trinity	Lake Lavon	NTMWD	1,806	2,193	2,334	2,876	2,747	2,740
Wylie	COLLIN	Trinity	Lake Chapman	NTMWD	868	1,037	1,085	1,314	1,233	1,208
Wylie	COLLIN	Trinity	Indirect Reuse (Lavon)	NTMWD	624	758	807	994	949	946
Wylie	ROCKWALL	Trinity	Lake Texoma	NTMWD	27	35	40	44	49	48
Wylie	ROCKWALL	Trinity	Lake Lavon	NTMWD	36	48	53	58	66	64
Wylie	ROCKWALL	Trinity	Lake Chapman	NTMWD	17	23	25	27	30	28
Wylie	ROCKWALL	Trinity	Indirect Reuse (Lavon)	NTMWD	13	16	18	20	23	22
Wylie	DALLAS	Trinity	Lake Texoma	NTMWD	23	28	30	32	33	33
Wylie	DALLAS	Trinity	Lake Lavon	NTMWD	31	38	41	42	45	45
Wylie	DALLAS	Trinity	Lake Chapman	NTMWD	15	18	19	20	20	20
Wylie	DALLAS	Trinity	Indirect Reuse (Lavon)	NTMWD	11	13	14	15	15	16
Total					**1,513,837**	**1,482,370**	**1,453,760**	**1,428,239**	**1,403,433**	**1,379,108**

APPENDIX K

QUESTIONNAIRES ON WATER CONSERVATION PRACTICES

APPENDIX K
QUESTIONNAIRES ON WATER CONSERVATION PRACTICES

Consultants to the Region C Water Planning Group conducted a survey of Region C water user groups and wholesale water providers to identify current water conservation practices in the region and to gather information about the costs of and potential water savings from water conservation strategies in Region C. Similar questionnaires were prepared for water user groups and wholesale water providers. Questionnaires were mailed by July 14, 2004, to 243 water user groups and 27 wholesale water providers.

In this appendix, the following information is presented regarding the Water Conservation Practices Survey:

- List of water user groups and wholesale water providers to whom questionnaires were mailed.
- Water user group questionnaire.
- Wholesale water provider questionnaire.
- Technical memorandum entitled "Summary of Region C Water Conservation Survey Responses."

Water User Groups Receiving Questionnaire on Water Conservation Practices

Questionnaires on water conservation practices were mailed to the following water user groups:

Able Springs WSC
Addison
Aledo
Allen
Alvord
Anna
Annetta
Annetta South
Argyle
Argyle WSC
Arlington
Athens
Aubrey
Aurora
Azle
Balch Springs
Bardwell
Bartonville
Bartonville WSC
Bedford
Bells
Benbrook
Bethel-Ash WSC
Bethesda WSC
Blackland WSC
Blooming Grove
Blue Mound
Blue Ridge
Bolivar WSC
Bonham
Boyd
Brandon-Irene WSC
Bridgeport
Bryson
Buena Vista - Bethel SUD
Burleson
Caddo Basin SUD
Carrollton
Cash SUD
Celina
Chatfield WSC
Chico
Cockrell Hill
College Mound WSC
Colleyville
Collinsville
Combine
Combine WSC
Community Water Company
Community WSC
Coppell
Copper Canyon
Corinth
Crandall
Cross Roads
Crowley
Culleoka WSC
Dallas County WCID #6
Dalworthington Gardens
Danville WSC
Dawson
Decatur
Denison
Denton County FWSD
DeSoto
Double Oak
Duncanville
East Cedar Creek FWSD
East Fork SUD
Ector
Edgecliff Village
Ennis
Euless
Eustace
Everman
Fairfield
Fairview
Farmers Branch
Farmersville
Ferris
Files Valley WSC
Flo Community WSC
Flower Mound
Forest Hill
Forney Lake WSC
Frisco
Frost
Gainesville
Gastonia-Scurry WSC
Glenn Heights
Grand Prairie
Grapevine
Gun Barrel City
Gunter
Gunter Rural WSC
Hackberry
Haltom City
Haslet
Heath
Hebron
Hickory Creek
Hickory Creek SUD
High Point WSC
Highland Park
Highland Village
Honey Grove
Howe
Hudson Oaks
Hurst
Hutchins
Irving
Italy
Jacksboro
Johnson County SUD
Josephine
Justin
Kaufman
Keller
Kemp
Kennedale
Kerens
Kiowa Homeowners WSC
Krugerville
Krum
Ladonia

Lake Dallas
Lake Worth
Lakeside
Lancaster
Lavon WSC
Leonard
Lewisville
Lincoln Park
Lindsay
Little Elm
Log Cabin
Lowry Crossing
Lucas
Luella WSC
M E N WSC
Mabank
Mac Bee WSC
Malakoff
Mansfield
Maypearl
McKinney
McLendon-Chisholm
Melissa
Mesquite
Milford
Milligan WSC
Mineral Wells
Mountain Peak WSC
Mt Zion WSC
Muenster
Murphy
Mustang SUD
Navarro Mills WSC
Nevada
New Fairview
New Hope
Newark
North Collin WSC
North Hunt WSC
Northlake
Oak Grove
Oak Leaf
Oak Point
Ovilla
Palmer
Pantego
Parker
Payne Springs
Pecan Hill
Pelican Bay
Pilot Point
Plano
Ponder
Pottsboro
Princeton
Prosper
R C H WSC
Red Oak
Reno
Rhome
Rice
Rice WSC
Richardson
Richland Hills
River Oaks
Roanoke
Rockett SUD
Rowlett
Royse City
Runaway Bay
Sachse
Saginaw
Saint Paul
Sanger
Sansom Park
Sardis-Lone Elm WSC
Savoy
Seagoville
Seven Points
Shady Shores
Sherman
South Grayson WSC
Southlake
Southmayd
Southwest Fannin County SUD
Springtown
Sunnyvale
Talty
Teague
The Colony
Tioga
Tom Bean
Tool
Trenton
Trinidad
Trophy Club
Turlington WSC
Two Way SUD
University Park
Valley View
Van Alstyne
Virginia Hill WSC
Walnut Creek SUD
Watauga
West Cedar Creek MUD
West Wise SUD
Weston
Westover Hills
Westworth Village
White Settlement
Whitesboro
Whitewright
Willow Park
Wilmer
Woodbine WSC
Wortham
Wylie

Wholesale Water Providers Receiving Questionnaire on Water Conservation Practices

Questionnaires on water conservation practices were mailed to the following water user groups:

Athens Municipal Water Authority
Cedar Hill
Corsicana
Dallas
Dallas County Park Cities MUD
Denton
Forney
Fort Worth
Garland
Greater Texoma Utility Authority
Lake Cities Municipal Utility Authority
Midlothian
Midlothian Water District
North Richland Hills
North Texas Municipal Water District
Parker County Utility District #1
Rockwall
Sabine River Authority
Sulphur River Water District
Tarrant Regional Water District
Terrell
Trinity River Authority
Upper Neches Municipal Water Authority
Upper Trinity Regional Water District
Waxahachie
Weatherford
Wise County Water Supply District

REGION C WATER PLANNING GROUP

Senate Bill One Second Round of Regional Water Planning - Texas Water Development Board

WUG Survey

July 12, 2004

«Title» «First_Name» «Last_Name»
«Job_Title»
«WUGName2»
«Address1»
«City», «State» «Postal_Code»

Subject: Water Conservation Strategies for Regional Water Planning

Dear «Title» «Last_Name»:

The Region C Water Planning Group is actively working on updating the 2001 *Region C Water Plan*. The updated *Region C Water Plan* will be completed by January 5, 2006. Water conservation is an important issue for regional water planning, and the Texas Water Development Board rules require the Planning Group to consider recommending water conservation strategies for each water user group that has a projected water need during the 50-year planning period. We are seeking your input regarding potentially feasible water conservation strategies.

The attached pages list potentially feasible water conservation strategies that the Planning Group is evaluating. Detailed information about these strategies is available from the Texas Water Development Board at the following online locations:
http://www.twdb.state.tx.us/assistance/conservation/TaskForceDocs/Feb/DraftBMPs2-27-04.pdf
http://www.twdb.state.tx.us/assistance/conservation/Documents/DraftBMPs4-28-04Vol2.pdf

For each water conservation strategy that you have already implemented, please report the types of targeted water users, the degree of public participation, the amount of water that has been saved, and your cost in implementing and operating the program (including overhead). If you have implemented conservation strategies that are not on the list, please add them and report the above information.

For each water conservation strategy that you have not implemented, please indicate whether you would consider pursuing the strategy. If you are interested in pursuing conservation strategies that are not on the list, please add them.

Please call «Contact» of «Contact_Company» at «PHONE_» with any questions, comments, or corrections you may have regarding this survey. Please return your completed survey to the address shown on the third page of the attached survey by July 31, 2004. We greatly appreciate your attention and cooperation in responding to this survey, which will help the Planning Group evaluate water conservation strategies for Region C.

Sincerely,

James M Parks

Jim Parks
Chairman

Cc: Roy Eaton, Secretary

c/o NTMWD
505 E. Brown Street
P. O. Box 2408
Wylie, Texas 75098-2408
972/442-5405
972/442-5405/Fax
jparks@ntmwd.com
www.regioncwater.org

Region C Water Planning Group
Potentially Feasible Water Management Strategies for Water User Groups (WUGs)
Please Return by July 31, 2004

Name of Water User Group: _«WUGName_of_Political_Subdivision» _
Contact Person:____
Telephone Number:__________________________FAX:__________________________
Email Address:____
Mailing Address:____

1. Based on your most recent system water audit, how much "unaccounted-for" water do you have? Please list quantity (million gallons and percent of total use) and specify if adjustments were made for line flushing, fire flows and other unmetered uses. How much do you estimate that you lost to leakage? How much raw water did you pump (million gallons)? How much treated water did you purchase (million gallons)?

2. If applicable, what is your current cost for raw water?

3. Do you offer rebates, incentives, or retrofit kits for customers to conserve water? Please describe your rebate/incentive/retrofit program. What is the value of the rebate/incentive/retrofit kit? How many rebates/incentives/retrofits have you paid out or distributed? How long has your program been in place?

4. Do you have a program to educate the public and/or schoolchildren about water conservation? Please describe your program. Please attach any information on water conservation that is distributed to the public.

5. Do you have an ordinance that prohibits water waste? If so, please attach a copy of the ordinance.

6. Do you reuse treated wastewater effluent? If so, please describe your reuse program (source, customers, uses, contracted water amounts, infrastructure capacity, etc.)

7. Please provide a summary of your water rates. Please include quantity and cost information for each rate tier.

8. Please report information about the conservation strategies that you have already implemented. For strategies that you have not implemented, please indicate whether you would consider pursuing these strategies.

Strategy Name	Have You Implemented This Strategy? (please circle)		Target Water Users * (please circle)	Degree of Public Participation/ Interest ** (please circle)	Amount of Water Saved Per Year		Startup Cost ($)	Annual Operating Cost ($/year)	Would You Consider Implementing This Strategy? (please circle)		If No, Why Not?
	Yes	No			Quantity	Units			Yes	No	
Public Information/School Education	Y	N	R Ind C Inst	H M L NA					Y	N	
Water Conservation Pricing	Y	N	R Ind C Inst	H M L NA					Y	N	
System Water Audit and Water Loss	Y	N	R Ind C Inst	H M L NA					Y	N	
Pressure Control and Leak Detection	Y	N	R Ind C Inst	H M L NA					Y	N	
Water Waste Prohibition (Ordinance/ Enforcement)***	Y	N	R Ind C Inst	H M L NA					Y	N	
Customer Indoor Water Audit	Y	N	R Ind C Inst	H M L NA					Y	N	
Showerhead/Faucet Aerator Retrofit Program	Y	N	R Ind C Inst	H M L NA					Y	N	
Toilet Replacement Program	Y	N	R Ind C Inst	H M L NA					Y	N	
Clothes Washer Rebate	Y	N	R Ind C Inst	H M L NA					Y	N	
Customer Irrigation Audit	Y	N	R Ind C Inst	H M L NA					Y	N	
Landscape Irrigation Systems Rebate	Y	N	R Ind C Inst	H M L NA					Y	N	
Landscape Design and Conversion Program (including Xeriscaping)	Y	N	R Ind C Inst	H M L NA					Y	N	
General Industrial, Commercial, and Institutional (ICI) Conservation Rebate	Y	N	R Ind C Inst	H M L NA					Y	N	
ICI Water Audit, Water Waste Reduction, and Site-Specific Conservation Programs	Y	N	R Ind C Inst	H M L NA					Y	N	
Reuse of Treated Wastewater Effluent	Y	N	R Ind C Inst	H M L NA					Y	N	

* R=Residential, Ind=Industrial, C=Commercial, Inst=Institutional,
** H=High, M=Medium, L=Low, NA=Not applicable
*** Note that the “Water Waste Prohibition” is different from a Drought Contingency or Emergency Water Management Plan. See http://www.twdb.state.tx.us/assistance/conservation/TaskForceDocs/Feb/DraftBMPs2-27-04.pdf for examples of Water Waste Prohibition.

9. Please report information about other conservation strategies that you have already implemented. Also, please indicate other conservation strategies that you are interested in pursuing.

Strategy Name	**Have You Implemented This Strategy? (please circle) Yes No**	**Target Water Users * (please circle)**	**Degree of Public Participation/ Interest ** (please circle)**	**Amount of Water Saved Per Year**		**Startup Cost ($)**	**Annual Operating Cost ($/year)**	**Would You Consider Implementing This Strategy? (please circle) Yes No**
				Quantity	**Units**			
	Y N	R Ind C Inst	H M L NA					Y N
	Y N	R Ind C Inst	H M L NA					Y N
	Y N	R Ind C Inst	H M L NA					Y N
	Y N	R Ind C Inst	H M L NA					Y N

* R=Residential, Ind=Industrial, C=Commercial, Inst=Institutional

** H=High, M=Medium, L=Low, NA=Not applicable

10. What percentage of your retail residential, commercial, industrial, and institutional customers use automatic irrigation systems? If possible, please report the number of automatic irrigation systems (from permits or other sources) and your total number of connections.

11. Please use this space to provide any other information or comments on your water conservation efforts. Use additional sheets if needed.

Please return by July 31, 2004, to:

«Contact»
«Contact_Company»
«Address»
«StateZip»

«FAX_» (fax)

REGION C WATER PLANNING GROUP

Senate Bill One Second Round of Regional Water Planning - Texas Water Development Board

July 12, 2004

WWP Survey

«Title» «First_Name» «Last_Name»
«Job_Title»
«WWPName2»
«Address1»
«Address2»
«City», «State» «Postal_Code»

Subject: Water Conservation Strategies for Regional Water Planning

Dear «Title» «Last_Name»:

The Region C Water Planning Group is actively working on updating the 2001 *Region C Water Plan*. The updated *Region C Water Plan* will be completed by January 5, 2006. Water conservation is an important issue for regional water planning, and Texas Water Development Board rules require the Planning Group to consider recommending water conservation strategies for each water user group that has a projected water need during the 50-year planning period. We are seeking your input regarding potentially feasible water conservation strategies.

The attached pages list potentially feasible water conservation strategies that the Planning Group is evaluating. Detailed information about these strategies is available from the Texas Water Development Board at the following online locations:
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For each water conservation strategy that you have already implemented, please report the types of targeted water users, the degree of public participation, the amount of water that has been saved, and your cost in implementing and operating the program (including overhead). If you have implemented conservation strategies that are not on the list, please add them and report the above information.

For each water conservation strategy that you have not implemented, please indicate whether you would consider pursuing the strategy. If you are interested in pursuing conservation strategies that are not on the list, please add them.

Please call «Contact» of «Contact_Company» at «PHONE_» with any questions, comments, or corrections you may have regarding this survey. Please return your completed survey to the address shown on the third page of the attached survey by July 31, 2004. We greatly appreciate your attention and cooperation in responding to this survey, which will help the Planning Group evaluate water conservation strategies for Region C.

Sincerely,

Jim Parks
Chairman

Cc: Roy Eaton, Secretary

c/o NTMWD
505 E. Brown Street
P. O. Box 2408
Wylie, Texas 75098-2408
972/442-5405
972/442-5405/Fax
jparks@ntmwd.com
www.regioncwater.org

Region C Water Planning Group
Potentially Feasible Water Management Strategies for Wholesale Water Providers
Please Return by July 31, 2004

Name of Water User Group: _«WWPName_of_Political_Subdivision» _
Contact Person:____
Telephone Number:____________________FAX:___________________
Email Address:____
Mailing Address:____

1. Based on your most recent system water audit, how much "unaccounted-for" water do you have? Please list quantity (million gallons and percent of total use) and specify if adjustments were made for line flushing, fire flows and other unmetered uses. How much do you estimate that you lost to leakage? How much raw water did you pump (million gallons)? How much treated water did you purchase (million gallons)?

2. Do your contracts require your wholesale customers to prepare a water conservation plan? Do your contracts require that these conservation plans be consistent with your conservation plan?

3. If applicable, what is your current cost for raw water?

4. Do you offer rebates, incentives, or retrofit kits for customers to conserve water? Please describe your rebate/incentive/retrofit program. What is the value of the rebate/incentive/retrofit kit? How many rebates/incentives/retrofits have you paid out or distributed? How long has your program been in place?

5. Do you have a program to educate the public and/or schoolchildren about water conservation? Please describe your program. Please attach any information on water conservation that is distributed to the public.

6. Do you have an ordinance that prohibits water waste? If so, please attach a copy of the ordinance.

7. Do you reuse treated wastewater effluent? If so, please describe your reuse program (source, customers, uses, contracted water amounts, infrastructure capacity, etc.)

8. Please provide a summary of your water rates. Please include quantity and cost information for each rate tier.

9. Please report information about the conservation strategies that you have already implemented. For strategies that you have not implemented, please indicate whether you would consider pursuing these strategies.

Strategy Name	Have You Implemented This Strategy? (please circle) Yes No	Target Water Users * (please circle)	Degree of Public Participation/ Interest ** (please circle)	Amount of Water Saved Per Year		Startup Cost ($)	Annual Operating Cost ($/year)	Would You Consider Implementing This Strategy? (please circle) Yes No	If No, Why Not?
				Quantity	Units				
Public Information/School Education	Y N	R Ind C Inst	H M L NA					Y N	
Water Conservation Pricing	Y N	R Ind C Inst	H M L NA					Y N	
System Water Audit and Water Loss	Y N	R Ind C Inst	H M L NA					Y N	
Pressure Control and Leak Detection	Y N	R Ind C Inst	H M L NA					Y N	
Water Waste Prohibition (Ordinance/ Enforcement)***	Y N	R Ind C Inst	H M L NA					Y N	
Customer Indoor Water Audit	Y N	R Ind C Inst	H M L NA					Y N	
Showerhead/Faucet Aerator Retrofit Program	Y N	R Ind C Inst	H M L NA					Y N	
Toilet Replacement Program	Y N	R Ind C Inst	H M L NA					Y N	
Clothes Washer Rebate	Y N	R Ind C Inst	H M L NA					Y N	
Customer Irrigation Audit	Y N	R Ind C Inst	H M L NA					Y N	
Landscape Irrigation Systems Rebate	Y N	R Ind C Inst	H M L NA					Y N	
Landscape Design and Conversion Program (including Xeriscaping)	Y N	R Ind C Inst	H M L NA					Y N	
General Industrial, Commercial, and Institutional (ICI) Conservation Rebate	Y N	R Ind C Inst	H M L NA					Y N	
ICI Water Audit, Water Waste Reduction, and Site-Specific Conservation Programs	Y N	R Ind C Inst	H M L NA					Y N	
Reuse of Treated Wastewater Effluent	Y N	R Ind C Inst	H M L NA					Y N	

* R=Residential, Ind=Industrial, C=Commercial, Inst=Institutional
****** H=High, M=Medium, L=Low, NA=Not applicable
*** Note that the "Water Waste Prohibition" is different from a Drought Contingency or Emergency Water Management Plan. See http://www.twdb.state.tx.us/assistance/conservation/TaskForceDocs/Feb/DraftBMPs2-27-04.pdf for examples of Water Waste Prohibition.

10. Please report information about other conservation strategies that you have already implemented. Also, please indicate other conservation strategies that you are interested in pursuing.

Strategy Name	Have You Implemented This Strategy? (please circle) Yes No	Target Water Users * (please circle)	Degree of Public Participation/ Interest ** (please circle)	Amount of Water Saved Per Year		Startup Cost ($)	Annual Operating Cost ($/year)	Would You Consider Implementing This Strategy? (please circle) Yes No
				Quantity	Units			
	Y N	R Ind C Inst	H M L NA					Y N
	Y N	R Ind C Inst	H M L NA					Y N
	Y N	R Ind C Inst	H M L NA					Y N
	Y N	R Ind C Inst	H M L NA					Y N

* R=Residential, Ind=Industrial, C=Commercial, Inst=Institutional

** H=High, M=Medium, L=Low, NA=Not applicable

11. What percentage of your <u>retail</u> residential, commercial, industrial, and institutional customers use automatic irrigation systems? If possible, please report the number of automatic irrigation systems (from permits or other sources) and your total number of connections.

12. Please use this space to provide any other information or comments on your water conservation efforts. Use additional sheets if needed.

Please return by July 31, 2004, to:

«Contact»
«Contact_Company»
«Address»
«StateZip»

«FAX_» (fax)

Summary of Region C Water Conservation Survey Responses

PROJECT: 312-1704

DATE: December 3, 2004

PREPARED FOR: Region C Water Planning Group

PREPARED BY: Brian K. McDonald, Texas P.E. 83332 Alan Plummer Associates, Inc. (APAI)

1.0 INTRODUCTION

At the July 12, 2004, Region C Water Planning Group (RCWPG) meeting, the planning group authorized a survey of Region C water user groups (WUGs) and wholesale water providers (WWP) to identify current water conservation practices in the region and to gather information about the costs of and potential water savings from water conservation strategies in Region C. Surveys were mailed by July 14, 2004, to 242 WUGs and 27 WWPs.

As of the date of this memorandum, 129 WUGs (53 percent) and 17 WWPs (63 percent) have responded to the water conservation survey. WUGs that have not responded to the survey are listed below:

Anna
Annetta
Aubrey
Balch Springs
Bedford
Bells
Blooming Grove
Blue Ridge
Bonham
Boyd
Brandon-Irene WSC
Bridgeport
Bryson
Cash SUD
Chatfield WSC
Cockrell Hill
College Mound WSC
Colleyville
Community Water Company
Copper Canyon
Corinth
Cross Roads
Crowley
Dallas County WCID #6
Dalworthington Gardens
Danville WSC
Denison
Denton County FWSD
DeSoto
Double Oak
East Cedar Creek FWSD
East Fork SUD
Ector
Edgecliff Village
Everman
Farmersville
Files Valley WSC
Flower Mound
Gainesville
Glenn Heights
Gun Barrel City
Hackberry
Heath
Hebron
Hickory Creek
Hurst
Hutchins
Italy
Johnson County SUD
Josephine
Keller
Kennedale
Kerens
Kiowa Homeowners WSC
Krugerville
Krum
Ladonia
Lake Dallas
Lake Worth
Lancaster
Leonard
Lincoln Park
Log Cabin
Lowry Crossing
Lucas
Malakoff
Maypearl
Milford
Mountain Peak WSC
Muenster
Murphy
Mustang SUD
Navarro Mills WSC
Nevada
New Fairview
New Hope
Newark
North Collin WSC
Northlake
Palmer
Parker
Pilot Point
Ponder
Princeton
Prosper
Red Oak
Reno
Rhome
Rice WSC
Roanoke
Rockett SUD
Rowlett
Royse City
Sachse
Saginaw
Saint Paul
Sanger
Sansom Park
Seagoville
Seven Points
Southlake
Southmayd
Sunnyvale
Trenton
Trinidad
Trophy Club
Valley View
Van Alstyne
Virginia Hill WSC
West Cedar Creek MUD
Whitewright

Willow Park	Wortham	

WWPs that have not responded to the water conservation survey are listed below:

Cedar Hill	Midlothian Water District	Terrell
Denton	Rockwall	Wise County WSD
Forney	Sabine River Authority	
Lake Cities MUA	Sulphur River Water District	

Fifteen WUGs (Argyle, Aurora, Bartonville, Blue Mound, Combine, McLendon-Chisholm, Oak Grove, Oak Leaf, Oak Point, Payne Springs, Pecan Hill, Shady Shores, Talty, Tool, and Weston) indicated that they do not operate a water supply system and that the survey does not apply to them. Ten WUGs (Annetta South, Dawson, Forney Lake WSC, Lindsay, Mesquite, Mt Zion WSC, Ovilla, R C H WSC, Rice, and Watauga) declined to participate in the survey. One WWP (Parker County Utility District #1) indicated that it purchases raw water from the Tarrant Regional Water District and purchases water treatment from the City of Weatherford but did not provide further information. These responses have not been analyzed further.

2.0 UNACCOUNTED-FOR WATER

Based on your most recent system water audit, how much "unaccounted-for" water do you have? Please list quantity (million gallons and percent of total use) and specify if adjustments were made for line flushing, fire flows and other unmetered uses. How much do you estimate that you lost to leakage? How much raw water did you pump (million gallons)? How much treated water did you purchase (million gallons)?

WUGs and WWPs reported a wide range of unaccounted-for water using a number of different calculation methods. Some WUGs reported unaccounted-for water as the difference between total raw water pumped and total water sold. Some subtracted line flushing, fire fighting, and other unmetered uses from this difference. Others reported estimates for line flushing, fire fighting, and other unmetered uses but did not specify whether or not these quantities were included in the unaccounted-for water.

Given that these problems obscure some of the information, 19 of 96 WUGs that responded to the question reported unaccounted-for water (with adjustments for unmetered uses) of more than 15 percent of total water usage, and 9 out of 96 reported unaccounted-for water (with adjustments for unmetered uses) of more than 20 percent of total water usage. No WWP reported unaccounted-for water greater than 15 percent.

No patterns were noted in reports of adjustments for unmetered usage and leakage.

Haltom City reported that they are in the process of replacing mains to reduce water loss. Kemp attributed its unaccounted-for water to aging water mains that need replacing. River Oaks reported elevated unaccounted-for water (35 percent) for fiscal year 2003 due to major construction; in fiscal year 2002, the River Oaks unaccounted-for water was 17 percent. Westover Hills reported that they have initiated a comprehensive meter testing program, and they are also removing meters that are more than 10 years old.

3.0 COST FOR RAW WATER

If applicable, what is your current cost for raw water?

Although the question asks about raw water, some WUGs reported their cost for purchasing treated water. For the reporting WUGs known to use raw water, the reported cost of raw water ranged from approximately \$0.064 (Athens) to \$1.01 (Bethel Ash WSC) per thousand gallons. For WWPs, the reported cost of raw water ranged from $0.037 (Greater Texoma Utility Authority) to $0.68 (Midlothian) per thousand gallons.

4.0 WHOLESALE CUSTOMER WATER CONSERVATION PLANS

Do your contracts require your wholesale customers to prepare a water conservation plan? Do your contracts require that these conservation plans be consistent with your conservation plan?

This question was asked only of WWPs. Of the 14 WWPs that responded, 11 have contract provisions that require their wholesale customers to prepare a water conservation plan. Of these, 7 require that the wholesale customer water conservation plans be consistent with their own water conservation plan.

The current North Texas Municipal Water District (NTMWD) water supply contracts do not have provisions for water conservation plans. NTMWD will soon adopt a new policy that requires all water contracts to include and implement water conservation and drought contingency plans to be consistent with the District plans.

5.0 REBATES, INCENTIVES, RETROFIT KITS

Do you offer rebates, incentives, or retrofit kits for customers to conserve water? Please describe your rebate/incentive/retrofit program. What is the value of the rebate/incentive/retrofit kit? How many rebates/incentives/retrofits have you paid out or distributed? How long has your program been in place?

Of the 101 WUGs that responded to this question, 3 (Grand Prairie, Grapevine, and Plano) offer rebates, incentives, or retrofit kits.

Representatives from Grand Prairie regularly visit schools, clubs, civic groups, and community events and promote water conservation via give-aways that include: leak detection tablets, low-flow showerheads, shower timers, etc.

Grapevine offers a “rain stopper” valve to residential or commercial customers. This valve turns off automatic sprinkler systems after a rainfall event. The valves cost the city $20 each and are offered at no charge to the customer. Grapevine has distributed 200 rain stopper valves over the past 2 years.

Plano offers numerous retrofit items, including: low-flow showerheads, faucet aerators, toilet leak detection tablets, toilet banks and dams, and outdoor water kits that include hose repair supplies and an end of hose nozzle. In addition, they offer a free rain sensor for automatic irrigation systems or a $25 rebate on a rain sensor. The cost to the City for these items has been $12,000 for retrofit items (since October 2002), $20,000 for rain sensors (since December 2001), and $8,750 for rain sensor rebates.

Several other WUGs reported that tiered water rates serve as an incentive to conserve water; however, water rates are addressed in a later survey question and were not the focus of this question.

Allen reported that it is setting up new conservation programs along with a new water conservation ordinance that will be implemented in January 2005.

Of the 14 WWPs that responded to this question, 3 (Dallas, Garland, and Tarrant Regional Water District) offer rebates, incentives, or retrofit kits.

Dallas has a rain and freeze sensor rebate program that is in effect from July 1, 2004, through December 31, 2004. All automatic irrigation systems in Dallas must have a rain and freeze sensor by January 1, 2005. The City is offering either a $50 rebate or a free rain and freeze sensor (value $95). 1,396 rebate checks have been issued as of October 21, 2004. To receive a free rain and freeze sensor, residents must attend a 20-minute workshop. 864 residents have attended the workshop as of October 21, 2004, and an additional 214 residents are registered for an upcoming workshop. Applications for rebates and sensors are still being received. This program is available to residents who installed an automatic irrigation system prior to 2002 and do not have a rain and freeze sensor.

Garland supplies indoor and outdoor retrofit kits to their customers at no charge. They distribute these kits upon request and after water main replacement projects. The cost to the City for these kits is $9.99 for the indoor kit and $7.97 for the outdoor kit.

Tarrant Regional Water District has participated with the City of Fort Worth and the City of Arlington in offering area schools the opportunity to participate in the WaterWise program, which is a 5th grade curriculum that teaches kids about water with an emphasis on water conservation. Kits distributed to the students contain retrofit showerheads and faucet aerators. As part of the activities involving "water in the home," children are encouraged to have their parents install the water saving devices at their residence. The District has spent $25,000 over the last 2 years to distribute 2,221 retrofit kits. The showerhead installation rate ranges from 52 to 66 percent, and the faucet aerator installation rate ranges from 51 to 71 percent.

6.0 PUBLIC INFORMATION/ SCHOOL EDUCATION

Do you have a program to educate the public and/or schoolchildren about water conservation? Please describe your program. Please attach any information on water conservation that is distributed to the public.

Of the 99 WUGs that responded to this question, 33 report having a public information and/or school education program. Table 6.0.1 shows the methods used by Region C WUGs to inform the public and educate schoolchildren about water conservation in Region C.

Table 6.0.1: Reported Public Information/School Education in Region C

Method	Number of WUGs Reporting	Number of WWPs Reporting
Newsletters/mailouts	12	3
Literature available	12	2
Presentation/distribute literature to school/civic groups	11	8
Bill inserts	7	4
Web page	4	1
Newspaper ads/articles	3	2
Movie theater ads	2	0
Xeriscape demonstrations/seminars, SmartScape CDs	2	1
Water conservation classes	1	0
Television ads/shows	1	2
Poster contest	1	1
Signs	1	0
Mural art contest	0	1

Several WUGs that reported that they do not have a public information or school education program also reported that they display conservation brochures at utility offices.

Allen reported that they are developing a public information/school education program. Carrollton reported that their program is on hold due to funding limitations and reduced staff levels. Celina intends to start a program in conservation education to be included with their next Consumer Confidence Report on water quality. Sherman reported that their public education program is inactive at this time due to significant decreases in water demand (down about 20 percent since 2001).

Of the 15 WWPs that responded to this question, 12 report having a public information and/or school education program. Table 6.0.1 shows the methods used by Region C WWPs to inform the public and educate schoolchildren about water conservation.

7.0 PROHIBITION OF WATER WASTE

Do you have an ordinance that prohibits water waste? If so, please attach a copy of the ordinance.

Of the 100 WUGs that responded to this question, 23 report having an ordinance that prohibits water waste. Table 7.0.1 shows water waste prohibitions reported by Region C WUGs.

Table 7.0.1: Reported Prohibition of Water Waste in Region C

Method	Number of WUGs Reporting	Number of WWPs Reporting
Drought contingency/emergency water demand management plan	10	1
Prohibit spray of impervious surface/excessive runoff	5	2
May discontinue service due to unreasonable waste	2	1
Prohibit use of poorly maintained irrigation systems	2	1
Restrict hours of irrigation	2	1
Require freeze sensors for irrigation systems	2	1
Require leak repair within 5 working days	1	1
Require recycling of backwash from swimming pool filters	1	1
Require rain sensors for irrigation systems	1	1
Prohibit irrigation during any type of precipitation	1	1

Irving is preparing a water waste prohibition ordinance, but it is not yet ready for release. Water supply corporations reported that they do not have ordinance-making authority.

Of the 13 WWPs that responded to this question, 4 report having an ordinance that prohibits water waste. Table 7.0.1 shows water waste prohibitions reported by Region C WWPs.

The North Texas Municipal Water District, the Tarrant Regional Water District, the Trinity River Authority, and the Greater Texoma Utility Authority are regional water providers that do not have ordinance-making authority.

8.0 REUSE OF TREATED WASTEWATER EFFLUENT

Do you reuse treated wastewater effluent? If so, please describe your reuse program (source, customers, uses, contracted water amounts, infrastructure capacity, etc.).

Of the 104 WUGs that responded to this question, 14 report reuse of treated wastewater effluent. The following types of reuse were reported:

- Golf course irrigation (8)
- General reuse at the wastewater treatment plant (5)
- Cooling at steam electric power plant (1)

Of the 15 WWPs that responded to this question, 9 report reuse of treated wastewater effluent. The following types of reuse were reported:

- Golf course irrigation (5)
- Water supply augmentation (3)
- General reuse at the wastewater treatment plant (2)
- Cooling, including at steam electric power plant (2)
- Agricultural irrigation (1)
- Aesthetic purposes (1)

9.0 SUMMARY OF TREATED WATER RATES

Please provide a summary of your water rates. Please include quantity and cost information for each rate tier.

9.1 WUGs

97 WUGs responded to this question. The following water rate structures were reported:

- Increasing block rates (64, including 6 with seasonal rates)
- Flat rate (32)
- Declining block rates (1, Jacksboro)

WUGs that reported increasing block rates had from 2 to 9 tiers, with median of 3. The water quantity at which the top rate tier begins ranged from 2,000 to 300,000 gallons per month, with a median of 20,000 gallons per month. The top tier residential water rates ranged from $1.85 to $76.96 per thousand gallons, with a median of $4.10 per thousand gallons.

Reported WUG flat rates ranged from $1.42 to $5.00 per thousand gallons, with a median flat rate of $2.71 per thousand gallons.

70 WUGs reported that they include an amount of water in the base residential water service fee. These amounts ranged from 100 to 4,000 gallons per month, with a median of 2,000 gallons per month.

9.2 WWPs Providing Retail Treated Water Service

9 of the responding WWPs provide retail treated water service. Of these, 4 reported increasing block rates, and 5 reported flat rates. No seasonal or declining block rates were reported. WWPs that reported increasing block rates had either 3 or 4 tiers. The water quantity at which the top rate tier begins ranged from 15,000 to 60,000 gallons per month, with a median of about 30,000 gallons per month. The top tier residential water rates ranged from $3.21 to $6.02 per thousand gallons, with a median of $3.45 per thousand gallons.

Reported WWP flat rates ranged from $1.00 to $3.56 per thousand gallons, with a median flat rate of $1.82 per thousand gallons.

4 WWPs reported that they include an amount of water in the base residential water service fee. These amounts ranged from 1,000 to 2,000 gallons per month, with a median of about 1,750 gallons per month.

9.3 WWPs Providing Wholesale Treated Water Service

3 WWPs that provide wholesale treated water service responded to this question. Of these, the North Texas Municipal Water District charges a flat rate of $0.92 per thousand gallons to Member Cities and $0.97 to Customer Cities. The Trinity River Authority charges a flat rate of $1.67 to its customer cities. The Upper Trinity Regional Water District has two rate structure alternatives for their customers:

- Flat rate of $2.50 per thousand gallons, or
- Demand charge of $190,000 per year per million gallons per day, plus:
    - $0.08 per thousand gallons (Members)
    - $0.085 per thousand gallons (Customers)

10.0 WATER CONSERVATION STRATEGIES

Region C WUGs and WWPs provided information on currently implemented conservation initiatives as well as whether or not they would consider specific strategies and why. As shown in Table 10.0.1, the water conservation strategies considered in the survey are grouped into five categories (system/utility, indoor, outdoor, ICI*, and reuse).

Table 10.0.1 Water Conservation Strategy Groups

Strategy	Group
Public information/school education	System/utility
Water conservation pricing	
System water audit and loss prevention	
Pressure control and leak detection	
Water waste prohibition	
Customer indoor water audit	Indoor
Showerhead/faucet aerator retrofit program	
Toilet replacement program	
Clothes washer rebate	
Customer irrigation audit	Outdoor
Landscape irrigation systems rebate	
Landscape design and conversion program (including xeriscaping)	
General ICI rebate	ICI*
ICI water audit, water waste reduction, and site-specific conservation programs	
Reuse of treated effluent	Reuse

Table 10.0.2 shows reported public information/school education program startup costs. WUG startup costs range from $0.00 to $0.56 per person, and WUG annual operating costs also range from $0.00 to $0.56 per person. WWP startup costs range from $0.11 to $0.21 per person, and WWP annual operating costs range from $0.12 to $0.99 per person. This table is presented separately from the remaining survey responses because it contains the most detailed reported costs for any of the water conservation strategies.

Tables 10.0.3 through 10.0.5 summarize the WUG and WWP survey responses to questions about system/utility, indoor, outdoor, and ICI water conservation strategies.

Buena Vista-Bethel SUD has an automatic meter reading system that notifies the District of leaks. The billing system for Chico is set up to flag water use that is much higher or much lower than previous water use. Highland Park staff have discussed placing conservation information in schools and are considering a proposal to require that irrigation systems be retrofit with rain-sensing shutoff valves. Whitesboro has a small system, allowing them to respond to leaks rapidly. River Oaks plans to adopt a landscaping ordinance that will promote xeriscaping. Melissa is investigating a program to require and/or retrofit rain sensors on all irrigation systems.

* ICI stands for “industrial, commercial, and institutional.”

Table 10.0.2: Reported Public Information/School Education Program Annual Operating Costs

Entity	Reported Startup Cost	Reported Annual Operating Cost	Estimated 2004 Population Served	Per Capita Startup Cost	Per Capita Annual Operating Cost
WUGs					
MacBee SUD	$0	$0	5,946	$0.00	$0.00
Kaufman		$200	7,146		$0.03
Addison	$500	$500	15,562	$0.03	$0.03
Honey Grove	$1,000	$1,000	1,790	$0.56	$0.56
Duncanville		$1,500	36,485		$0.04
Highland Village		$5,000	13,286		$0.38
Lewisville	$10,000	$7,000	87,900	$0.11	$0.08
McKinney	$10,000	$10,000	67,534	$0.15	$0.15
Richardson		$10,000	96,066		$0.10
Grand Prairie		$30,000	144,994		$0.21
Plano	$104,000	$72,000	234,160	$0.44	$0.31
WWPs					
Corsicana	$5,000	$3,000	24,900	$0.20	$0.12
Dallas		$1,200,000	1,214,800		$0.99
Greater Texoma Utility Authority	$640		5,724*	$0.11	
North Texas Municipal Water District	$250,000	$250,000	1,210,000**	$0.21	$0.21

*Estimated population for Cities of Anna and Van Alstyne. Program aimed at schoolchildren in these cities.

**Service area includes Kaufman, McKinney, Richardson, and Plano. These cities also spend money on public information/school education programs as shown in Table 10.0.1.

Table 10.0.3: Summary of Survey Responses Regarding System/Utility Water Conservation Strategies

Item		Public Information/ School Education	Water Conservation Pricing	System Water Audit and Water Loss	Pressure Control and Leak Detection	Water Waste Prohibition
WUGs Reporting Current Implementation		34 of 95	45 of 97	63 of 92	46 of 93	16 of 90
WWPs Reporting Current Implementation		9 of 14	5 of 12	8 of 12	6 of 12	3 of 12
Degree of Public Participation/Interest Reported	High (WUGs/WWPs)	2/1	9/1	5/0	4/0	2/1
	Medium (WUGs/WWPs)	12/3	9/0	4/2	9/2	4/0
	Low (WUGs/WWPs)	11/4	3/0	8/0	3/1	4/1
Reported Water Savings		River Oaks: 2,962 cu. ft., or 0.022 MG compared to 359 MG purchased. Lewisville: 1 MGD compared to 13.4 MGD average annual usage. MacBee SUD: 1% McKinney: 67 gpcd*	Hudson Oaks: 15 MG compared to 112 MG/yr raw water pumpage MacBee SUD: 10%	Hudson Oaks: 2 MG compared to 112 MG/yr raw water pumpage Kaufman: 5 MG compared to 380 MG/yr raw water pumpage Gunter SUD: 34 MG MacBee SUD: 5%	Hudson Oaks: 0.1 MG compared to 112 MG/yr raw water pumpage MacBee SUD: 5%	River Oaks: 47,046 cu. ft., or 0.352 MG compared to 359 MG purchased.
Startup Cost	WUG Range	\$0.00 - \$0.56**	\$0 (several entities) - \$10,000 (Addison)	\$0 (Culleoka WSC) - \$5,000 (Addison)	\$100 (Hudson Oaks) - \$50,000 (Addison)	\$1,000 (Addison)
	WWP Range	\$0.11 - \$0.21**	Not reported	Not reported	\$500,000 (Dallas)	\$0 (Dallas)
Annual Operating Cost	WUG Range	\$0.00 - \$0.56**	\$0 (several entities)	\$0 (several entities) – \$10,000 (Highland Village)	\$500 (Hudson Oaks) - \$25,000 (Addison)	\$1,000 (Addison)
	WWP Range	\$0.12 - \$0.99**	Not reported	Not reported	\$500,000 (Dallas)	\$114,000 (Dallas)
If Not Implemented, Consider Strategy?	Yes (WUGs/WWPs)	38/4	30/3	33/3	33/3	42/4
	No (WUGs/WWPs)	8/1	8/2	1/1	6/1	10/1
Reasons for Not Considering Strategy	Reasons Cited by WUGs (No. of WUGs)	- No schools in service area (3) - Lack of funding (1)	- Cost (2) - Low prospects for council approval (1) - Ineffectiveness (1)	- No reasons stated	- Small system (1)	- No authority to make ordinances (3) - Cost (1) - Time (1) - Prefer to handling matters on individual basis (1)
	Reasons Cited by WWPs (No. of WWPs)	- Wholesale provider (1)	- Wholesale provider (1) - Budget/personnel constraints (1)	- Wholesale provider (1)	- Wholesale provider (1)	- Wholesale provider (1)

* McKinney reported 67 gpcd total savings from implementation of four conservation strategies (public information/school education, water conservation pricing, system water audit and water loss, and pressure control and leak detection)

** per person

Table 10.0.4: Summary of Survey Responses Regarding Indoor Water Conservation Strategies

Item		Customer Indoor Water Audit	Showerhead/Faucet Aerator Retrofit Program*	Toilet Replacement Program*	Clothes Washer Rebate Program
WUGs Reporting Current Implementation		3 of 92 (Ferris, Jacksboro, Justin)	6 of 94 (Grand Prairie, Jacksboro, Plano, River Oaks*, Springtown, Tom Bean)	4 of 94 (Forest Hill, Jacksboro, River Oaks, Springtown)	0 of 92
WWPs Reporting Current Implementation		0 of 12	1 of 11 (Garland)	0 of 12	0 of 12
Degree of Public Participation/Interest Reported	High (WUGs/WWPs)	0/0	2/0	0/0	0/0
	Medium (WUGs/WWPs)	1/0	0/0	2/0	1/0
	Low (WUGs/WWPs)	1/0	2/0	2/0	0/0
Reported Water Savings		Not reported	Not reported	River Oaks: 47,046 cu. ft., or 0.352 MG compared to 359 MG purchased.*	Not reported
Startup Cost	WUG Range	Not reported	$20,000 (Plano)	Not reported	Not reported
	WWP Range	Not reported	Not reported	Not reported	Not reported
Annual Operating Cost	WUG Range	Not reported	$10,000 (Plano)	Not reported	Not reported
	WWP Range	Not reported	Not reported	Not reported	Not reported
If Not Implemented, Consider Strategy?	Yes (WUGs/WWPs)	26/3	28/5	26/4	25/3
	No (WUGs/WWPs)	30/5	26/2	30/3	30/4
Reasons for Not Considering Strategy	Reasons Cited by WUGs (No. of WUGs)	- Personnel availability (7) - Cost (4) - Lack of council support (1) - Time (1) - Lack of customer interest (1)	- Cost (7) - Personnel availability (2) - Lack of council support (1) - Time (1) - Lack of customer interest (1) - Replacement already implemented by attrition/new construction (1)	- Cost (10) - Personnel availability (3) - Lack of older plumbing (2) - Lack of customer interest (2) - Time (1) - Lack of council support (1) - Replacement already implemented by attrition/new construction (1)	- Cost (8) - Personnel availability (3) - Lack of customer interest (1) - Lack of council support (1) - Time (1) - Prefer not to give rebates (1) - People will purchase efficient washers without a rebate (1)
	Reasons Cited by WWPs (No. of WWPs)	- Wholesale provider (1)	- Wholesale provider (1)	- Wholesale provider (1) - Replacement already implemented by attrition/new construction (1)	- Wholesale provider (1) - Not necessary (1)

* These strategies refer to active programs rather than passive implementation of plumbing codes. At least one (River Oaks) of the entities that report having such programs is referring to passive implementation of the plumbing code.

Table 10.0.5: Summary of Survey Responses Regarding Outdoor and ICI Water Conservation Strategies

Item		Customer Irrigation Audit	Landscape Irrigation Systems Rebate	Landscape Design and Conversion Program (Including Xeriscaping)	General Industrial, Commercial, and Institutional (ICI) Conservation Rebate	ICI Water Audit, Water Waste Reduction, and Site-Specific Conservation Programs
WUGs Reporting Current Implementation		6 of 92 (Allen, Bartonville WSC, Forest Hill, Honey Grove, Jacksboro, River Oaks)	1 of 94 (Plano)	10 of 94	0 of 94	0 of 91
WWPs Reporting Current Implementation		1 of 12 (Waxahachie)	1 of 12 (Dallas)	2 of 12 (Fort Worth, Waxahachie)	0 of 13	1 of 10 (Ft. Worth)
Degree of Public Participation/Interest Reported	High (WUGs/WWPs)	0/0	1/0	1/0	0/0	0/0
	Medium (WUGs/WWPs)	2/1	0/0	4/1	0/0	0/0
	Low (WUGs/WWPs)	1/0	1/1	3/0	1/0	1/0
Reported Water Savings		Not reported	Not reported	Not reported	Not reported	Not reported
Startup Cost	WUG Range	Not reported	$20,000 (Plano)	$200 (Richardson) - $10,000 (Plano)	Not reported	Not reported
	WWP Range	Not reported	$25,000 (Dallas)	Not reported	Not reported	Not reported
Annual Operating Cost	WUG Range	Not reported	$5,000 (Plano)	$200 (Richardson) – $5,000 (Plano)	Not reported	Not reported
	WWP Range	Not reported	$25,000 (Dallas)	Not reported	Not reported	Not reported
If Not Implemented, Consider Strategy?	Yes (WUGs/WWPs)	32/3	27/3	28/3	25/4	34/4
	No (WUGs/WWPs)	22/3	25/3	20/3	32/4	20/3
Reasons for Not Considering Strategy	Reasons Cited by WUGs (No. of WUGs)	- Personnel availability (5) - Cost (4) - Lack of council support (1) - Time (1) - Lack of customer interest (1)	- Cost (6) - Personnel availability (3) - Prefer landscape conversion program (1) - Lack of council support (1) - Time (1) - Lack of customer interest (1) - Prefer not to give rebates (1)	- Cost (4) - Personnel availability (2) - Does not apply to rural systems (2) - Lack of customer interest (1) - Lack of council support (1) - Time (1) - Prefer not to give rebates (1) - Need more information (1)	- Little commercial or industrial water use (9) - Cost (5) - Lack of council support (2) - Personnel availability (1) - Program not necessary due to higher commercial water rates (1) - Lack of customer interest (1)	- No commercial/industrial water use (3) - Cost (2) - Personnel availability (1) - Lack of council support (1)
	Reasons Cited by WWPs (No. of WWPs)	- Wholesale provider (1) - Personnel availability (1)	- Wholesale provider (1) - Not necessary (1)	- Wholesale provider (1) - Not necessary (1)	- Wholesale provider (1) - Not necessary (1) - Personnel/budget constraints (1)	- Wholesale provider (1) - Personnel/budget constraints (1)

10.1 Reuse of Treated Wastewater Effluent

14 of 90 WUGs reported having implemented a reuse program. 2 WUGs (Irving and Pelican Bay) that reported having implemented a reuse program under this item reported that they do not reuse treated wastewater effluent under Item 6 of the survey.

Pelican Bay reported a high level of public participation/interest and 2 WUGs reported a medium level of public participation/interest in a reuse program. Ennis reported a savings of 150 million gallons (compare to the current raw water pumpage of 1,242 million gallons per year), Grapevine reported a savings of 2,713 ac-ft (or 884 million gallons), and Jacksboro reported a savings of 200 ac-ft (or 65 million gallons, compare to the current raw water pumpage of 199.6 million gallons per year). No WUGs reported costs for a reuse program. Ennis, which provides water for cooling at a steam electric power facility, noted that the power company pays for the annual operating costs.

30 WUGs indicated that they would consider a reuse program. 20 WUGs indicated that they would not consider such a program. The reasons why they would not consider this program include lack of wastewater availability (7), cost (3), and a lack of industries (1).

10 of 14 WWPs reported having implemented a reuse program. Tarrant Regional Water District reported a high level, North Texas Municipal Water District reported a medium level, and 2 WUGs reported a low level of public participation/interest in a reuse program. North Texas Municipal Water District reported a water savings of 41,000 acre-ft, or 13,360 million gallons (included in raw water pumping of 84,083 million gallons per year). Trinity River Authority reported a water savings of about 7.2 million gallons per day (compare to annual average raw water pumping of 29.5 million gallons per day). Trinity River Authority reported a reuse startup cost of $4 million and an annual operating cost of $494,000.

Garland and Upper Trinity Regional Water District indicated that they would consider a reuse program. Upper Trinity Regional Water District has a reuse-based water right permit application pending at the Texas Commission on Environmental Quality (TCEQ).

11.0 OTHER CONSERVATION STRATEGIES

Several WUGs reported additional potential water conservation strategies. These are presented in Table 11.0.1.

12.0 AUTOMATIC IRRIGATION SYSTEMS

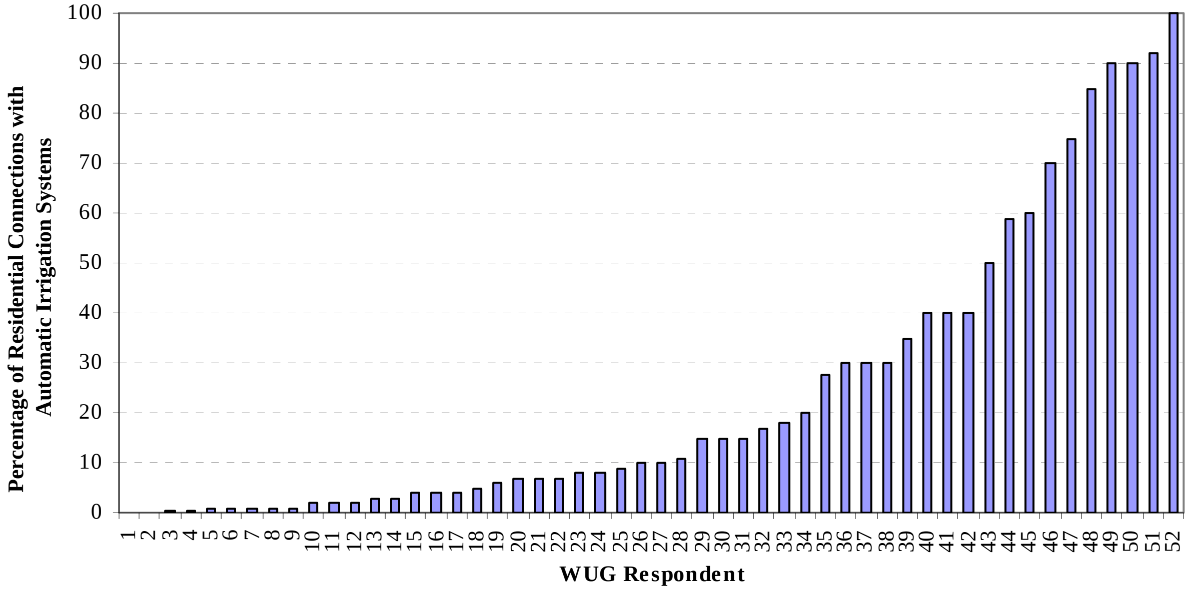
What percentage of your retail residential, commercial, industrial, and institutional customers use automatic irrigation systems? If possible, please report the number of automatic irrigation systems (from permits or other sources) and your total number of connections.

51 WUGs and 3 WWPs responded to this question; of these 49 WUGs and 3 WWPs either gave a percentage of their connections that have irrigation systems or gave sufficient information to estimate the percentage. Figure 12.0.1 shows the distribution of the responses:

Table 11.0.1: Other Water Conservation Strategies

WUG	Method	Implemented	Target Users	Degree of Public Participation/ Interest	Amount of Water Saved	Startup Cost	Annual Operating Cost	Would You Consider This Strategy?
Addison	Leak detection tablets	Y	All	H		$500	$500	Y
Addison	SmartScape CDs	Y	All	H		$500	$500	Y
Arlington	Gardens with Parks Department	N	R					
Carrollton	Ductile iron main replacement program	Y						
Chico	Sewer charges based on water usage	Y		NA				
Grapevine	Rain stopper valves	Y	R/C	M		$10,000	$4,000	
Hudson Oaks	Advertising at theater	N	R			Unknown		Y
Pelican Bay	Reuse of treated water	Y	R	H	36,000,000		$120,000	
River Oaks	Water Conservation and Drought Contingency Plan	Y	R/C/Inst	M	47,076 cu. ft.			In place
Runaway Bay	Drought Contingency Plan	Y	R/C	H	Unknown	$0	Minimal	

Figure 12.0.1
Percentage of Residential Connections with Automatic Irrigation Systems



- 29 WUGs and 3 WWPs reported that 0-20 percent of residential connections have automatic irrigation systems;
- 9 WUGs reported 21-40 percent;
- 3 WUGs reported 41-60 percent;
- 2 WUGs reported 61-80 percent; and
- 6 WUGs reported 81-100 percent.

WUGs reporting that more than 20 percent of their residential connections have automatic irrigation systems are primarily suburban. The WUGs/WWPs reporting 20 percent or less serve a mix of rural and urban or suburban populations.

Celina no longer allows separate meters for irrigation. Fairfield has also proposed an ordinance making separate irrigation meters unavailable. Frisco has implemented an ordinance mandating automated irrigation systems.

13.0 OTHER INFORMATION

Please use this space to provide any other information or comments on your water conservation efforts.

Buena Vista-Bethel SUD reported that they are a small, rural system with a lot of customers off the road and out of the line of sight. They have no way to know their customers' watering habits.

Celina will be interested in implementing some of these water conservation programs in the future. Currently they do not have the manpower or the funds.

Hudson Oaks said that most customers are not interested in conserving water, but they are interested in how much the water costs.

Lakeside said that it is trying to implement odd and even watering from July through September.

APPENDIX L

NEIGHBORHOOD STUDY

TECHNICAL MEMORANDUM ALAN PLUMMER ASSOCIATES, INC.

Neighborhood Water Conservation Study

PROJECT: 312-1704

DATE: July 26, 2004

PREPARED FOR: Region C Water Planning Group

PREPARED BY: Brian K. McDonald, Texas P.E. 83332
Alan Plummer Associates, Inc.

INTRODUCTION

Water conservation will be an important tool in meeting projected water needs in Region C. As part of the scope of work for developing the 2006 Region C Water Plan, the Region C Water Planning Group (RCWPG) must evaluate the effectiveness and potential water savings associated with different water conservation methods. Evaluations of various measures are available in the water conservation literature, but there has been little evaluation of water conservation impacts in Region C.

As part of the consultant team for the Region C Water Planning Group, Alan Plummer Associates, Inc. (APAI) has conducted a neighborhood-scale study of residential water conservation and residential water usage. The local impacts of two water conservation methods were studied: low-flow plumbing fixtures and customer water audits.

When compared on flowrate or "per-flush" bases, low-flow plumbing fixtures use significantly less water than older plumbing fixtures. In 1991, the Texas Legislature passed the Water Efficiency Plumbing Act. The Act, implemented in 1992, effectively required the use of low-flow plumbing fixtures in new construction. Region C has grown rapidly since 1992, and low-flow plumbing fixtures have been implemented to varying degrees in many Region C neighborhoods.

Customer water audits are practiced in the City of Denton but have not been widely implemented in Region C. A customer water audit involves implementing several conservation measures (including public education and leak detection) on a customer-by-customer basis.

In addition to evaluating the local impacts of these water conservation methods, this study quantifies indoor and outdoor water usage and identifies relationships between readily available weather and socioeconomic data and local water use.

The next sections describe the neighborhoods selected for the study, the water usage data and water usage predictor variables, correlations between predictor variables and water usage data, statistical models of indoor and outdoor water usage, the impact of customer water audits, and the study results.

SELECTED NEIGHBORHOODS

APAI selected eight neighborhoods in Arlington, Fort Worth, Dallas, and Plano for evaluation of water usage and the impact of low-flow plumbing fixtures. Neighborhoods were selected based on the availability of seasonal water use data, existing water conservation measures in each area, the age of the neighborhood, and socioeconomic conditions. Neighborhoods were selected to reflect a broad range of family income and housing age. Table 1 shows the characteristics of the selected neighborhoods. Appendix A shows a location map for each neighborhood.

The median family income for the selected neighborhoods ranges from $18,625 per year to $197,096 per year. The percentage of housing constructed since 1992 (and presumed to have low-flow plumbing fixtures) ranges from 0 percent to 80.1 percent.

Table 1: Selected Neighborhood Characteristics from 2000 U. S. Census

Neighborhood	Population	House-holds	Median Family Income	Area (Sq Mi)	Population Density (Cap/Sq Mi)	Percentage Housing Constructed Since 1992
Arlington	2,656	966	$67,039	1.144	2,321	80.1
Dallas North	1,100	412	$183,932	0.654	1,681	1.7
Dallas SW	674	225	$51,806	0.358	1,884	0.0
Denton	N/A	N/A	N/A	N/A	N/A	N/A
Fort Worth North	6,290	1,966	$90,790	1.277	4,924	71.2
Fort Worth South	1,920	591	$64,583	0.186	10,342	4.9
Fort Worth SW	1,261	595	$135,242	1.254	1,006	47.4
Fort Worth SE	826	357	$18,625	0.242	3,417	5.3
Plano	1,470	454	$197,096	0.696	2,113	78.0

WATER USAGE DATA AND PREDICTOR VARIABLES

APAI obtained water usage data, weather data, and socioeconomic data for each selected neighborhood. These data are discussed below.

Monthly Water Usage Data

Each city provided all readily available monthly water usage data for the selected neighborhoods. Table 2 summarizes the available data. The span of the available data ranged from 1½ years for Dallas to 7 ½ years for Fort Worth.

Table 2: Water Usage Data Received

City	Begin Date	End Date	Connections
Arlington	1/2001	8/2003	921
Dallas	2/2002	9/2003	636
Denton	8/1997	9/2003	102
Fort Worth	5/1995	12/2002	3,615
Plano	1/1998	10/2003	590

Predictor Variables

It is expected that the monthly water usage for each neighborhood will vary with weather and socioeconomic conditions; therefore, the weather and economic variables are called "predictor" variables. The predictor variables are shown in Table 3. Some of the predictor data were only available for neighborhoods in Tarrant County (as shown in Table 3); the remaining predictor data were available for each neighborhood. The weather data are monthly values, while the socioeconomic data are single values. The predictor variables are discussed below.

Table 3: Water Usage Predictor Variables

Variable	Neighborhoods	Scale	Frequency	Source
Average high temperature	All	Neighborhood	Monthly	NOAA
Average temperature	All	Neighborhood	Monthly	NOAA
Cooling degree days	All	Neighborhood	Monthly	NOAA
Heating degree days	All	Neighborhood	Monthly	NOAA
Precipitation	All	Neighborhood	Monthly	NOAA
2000 Median family income	All	Neighborhood	Single	2000 U. S. Census
2000 Percentage of units constructed before 1992 (surrogate variable representing the absence of low-flow plumbing fixtures)	All	Neighborhood	Single	2000 U. S. Census
Average lot size	All	Neighborhood	Single	Various
Housing age	Tarrant	Address	Single	Tarrant Appraisal District
Irrigated area	Tarrant	Address	Single	Tarrant Appraisal District
Presence of swimming pool	Tarrant	Address	Single	Tarrant Appraisal District

Weather Variables

For each neighborhood, APAI identified the nearest weather station and obtained monthly weather data from the National Oceanic and Atmospheric Administration (NOAA). Monthly data included average temperature, average high temperature, cooling degree days, heating degree days, and precipitation.

Cooling degree days is a measure of how hot the weather was for a particular year. For a given day, cooling degree days is difference between the mean daily temperature and 65 degrees Fahrenheit. For a given year, the cooling degree days is the sum of cooling degree days for all days of the year.

Heating degree days is similar but measures how cold the weather was for a particular year. It is based on the difference between 65 degrees Fahrenheit and the mean daily temperature.

Socioeconomic Variables

Median family income and approximate housing age were obtained from the 2000 U.S. Census for each selected neighborhood.

For neighborhoods in Collin and Dallas Counties, APAI obtained maps of each neighborhood from the Collin Central and Dallas Central Appraisal Districts and estimated the average lot size for the neighborhood using a small sample of actual lot areas. Information for individual lots was not readily available.

Information about individual addresses was readily available from the Tarrant Appraisal District for most addresses. For each address in the selected neighborhoods in Tarrant County, APAI obtained the housing age, whether the address has a swimming pool, the lot size, and the living area size. APAI estimated the irrigated area as the lot size minus the living area and calculated the average lot size for each neighborhood.

CORRELATIONS BETWEEN PREDICTOR VARIABLES AND WATER USAGE DATA

Many of the predictor variables are intercorrelated. Two sets of correlation coefficients were calculated: those for data available for all neighborhoods and those for data available only in Tarrant County neighborhoods. These correlation coefficients were used in selecting predictor variables for the statistical models that are discussed in later sections.

All Selected Neighborhoods

Table 4 shows the correlation coefficients for data that were available in all neighborhoods. A coefficient approaching 1.0 means a strong positive correlation, a coefficient approaching –1.0 means a strong negative correlation, and a coefficient near 0.0 means little correlation. If there is a strong correlation between two variables, it may not be necessary to include both variables in a statistical model.

Among the weather variables, there are strong positive correlations between average temperature, average high temperature, and cooling degree days, and strong negative correlations between those variables and heating degree days. There is a weaker negative correlation between precipitation and the temperature variables.

Among the socioeconomic variables, there is a strong positive correlation between median family income and lot size and a fairly strong negative correlation between median family income and housing age.

Table 4: Correlation Coefficients for Predictor Variables and Water Usage
Neighborhood Block Groups

		Weather Variables					Socioeconomic Variables			Water Usage				
		Average High Temperature	Cooling Degree Days	Heating Degree Days	Precipitation	Average Temperature	Median Family Income	Percentage of Units Older Than 1992	Average Lot Size	Overall Water Usage	Indoor Water Usage	Outdoor Water Usage	Outdoor Water Usage (Low Users)	Outdoor Water Usage (High Users)
Weather Variables	Average High Temperature	1.00	0.94	-0.92	-0.20	0.99	-0.05	0.05	-0.02	0.38	-0.02	0.47	0.66	0.74
	Cooling Degree Days	0.94	1.00	-0.75	-0.20	0.94	-0.04	0.04	-0.02	0.37	-0.04	0.47	0.71	0.73
	Heating Degree Days	-0.92	-0.75	1.00	0.06	-0.93	0.05	-0.04	0.02	-0.30	0.03	-0.38	-0.51	-0.62
	Precipitation	-0.20	-0.20	0.06	1.00	-0.15	0.04	-0.05	0.00	-0.11	-0.01	-0.14	-0.23	-0.21
	Average Temperature	0.99	0.94	-0.93	-0.15	1.00	-0.05	0.05	-0.02	0.36	-0.04	0.46	0.66	0.73
Socioeconomic Variables	Median Family Income	-0.05	-0.04	0.05	0.04	-0.05	1.00	-0.61	0.80	0.72	0.84	0.58	0.37	0.19
	Percentage of Units Older Than 1992	0.05	0.04	-0.04	-0.05	0.05	-0.61	1.00	-0.20	-0.33	-0.40	-0.33	-0.32	-0.07
	Average Lot Size	-0.02	-0.02	0.02	0.00	-0.02	0.80	-0.20	1.00	0.66	0.85	0.55	0.08	0.14
Water Usage	Overall Water Usage	0.38	0.37	-0.30	-0.11	0.36	0.72	-0.33	0.66	1.00	0.69	0.97	0.98	0.98
	Indoor Water Usage	-0.02	-0.04	0.03	-0.01	-0.04	0.84	-0.40	0.85	0.69	1.00	0.49	0.12	-0.06
	Outdoor Water Usage (All Users)	0.47	0.47	-0.38	-0.14	0.46	0.58	-0.33	0.55	0.97	0.49	1.00	1.00	1.00
	Outdoor Water Usage (Low Users)	0.66	0.71	-0.51	-0.23	0.66	0.37	-0.32	0.08	0.98	0.12	1.00	1.00	-0.44
	Outdoor Water Usage (High Users)	0.74	0.73	-0.62	-0.21	0.73	0.19	-0.07	0.14	0.98	-0.06	1.00	-0.44	1.00

As expected, there is little to no correlation between the weather variables and the socioeconomic variables.

For all selected neighborhoods, there is little to no correlation between the weather variables and indoor water usage. There are moderate correlations between the weather variables and outdoor water usage and stronger correlations between the socioeconomic variables and overall water usage.

Selected Tarrant County Neighborhoods

Table 5 shows the correlation coefficients for data that were available only in Tarrant County neighborhoods.

Among the weather variables, there are strong positive correlations between average temperature, average high temperature, and cooling degree days, and strong negative correlations between those variables and heating degree days. There is a weaker negative correlation between precipitation and the temperature variables.

Among the socioeconomic variables, there is a weak positive correlation between median family income and lot size and a weak negative correlation between median family income and housing age.

As expected, there is little to no correlation between the weather variables and the socioeconomic variables.

For the Tarrant County neighborhoods, there is no correlation between the weather variables and indoor water usage. There are weak correlations between the weather variables and outdoor water usage and weak correlations between the socioeconomic variables and overall water usage.

ESTIMATION OF INDOOR AND OUTDOOR WATER USAGE

For each neighborhood, residential indoor/winter and outdoor water usages were estimated. The annual indoor water usage for each year was estimated using the minimum monthly water usage for that year. Although this is really an estimate of winter water usage, it represents indoor water usage if it is assumed that there is no outdoor water usage in the minimum usage month. Outdoor water usage was estimated by subtracting the estimated indoor water usage from the monthly water usage.

STATISTICAL MODELS OF INDOOR WATER USAGE

Using the predictor variables, statistical models were constructed to predict monthly indoor water usage for all neighborhoods and for Tarrant County neighborhoods only. During selection of the appropriate predictor variables, the statistical significance of each variable and correlations between predictor variables were examined. The final statistical models were used to draw conclusions about water conservation and water usage in each neighborhood.

Indoor Water Usage, All Selected Neighborhoods

A statistical model was constructed to represent residential indoor water usage for all selected neighborhoods. Initially, the model included all of the predictor variables. As variables were found to be statistically insignificant[1], they were eliminated from the model. In addition, some of the weather

[1] Generally, greater than one percent probability that the associated coefficient is zero.

Table 5: Correlation Coefficients for Predictor Variables and Water Usage
Tarrant County Neighborhoods

		Weather Variables					Socioeconomic Variables			Water Usage		
		Average High Temperature	Cooling Degree Days	Heating Degree Days	Precipitation	Average Temperature	Median Family Income	Unit Built Before 1992	Irrigation Area	Overall Water Usage	Indoor Water Usage	Outdoor Water Usage
Weather Variables	Average High Temperature	1.00	0.94	-0.92	-0.20	1.00	0.00	0.04	0.01	0.19	0.00	0.17
	Cooling Degree Days	0.94	1.00	-0.74	-0.21	0.94	0.00	0.01	0.00	0.20	0.00	0.18
	Heating Degree Days	-0.92	-0.74	1.00	0.05	-0.93	0.00	-0.01	0.00	-0.15	0.00	-0.14
	Precipitation	-0.20	-0.21	0.05	1.00	-0.15	0.04	-0.03	-0.02	-0.07	0.00	-0.06
	Average Temperature	1.00	0.94	-0.93	-0.15	1.00	0.00	0.01	0.00	0.19	0.00	0.17
Socioeconomic Variables	Median Family Income	0.00	0.00	0.00	0.04	0.00	1.00	-0.28	0.24	0.17	0.07	0.12
	Unit Built Before 1992	0.04	0.01	-0.01	-0.03	0.01	-0.28	1.00	0.15	0.02	0.05	0.00
	Irrigation Area	0.01	0.00	0.00	-0.02	0.00	0.24	0.15	1.00	0.16	0.09	0.11
Water Usage	Overall Water Usage	0.19	0.20	-0.15	-0.07	0.19	0.17	0.02	0.16	1.00	0.06	0.87
	Indoor Water Usage	0.00	0.00	0.00	0.00	0.00	0.07	0.05	0.09	0.06	1.00	-0.44
	Outdoor Water Usage	0.17	0.18	-0.14	-0.06	0.17	0.12	0.00	0.11	0.87	-0.44	1.00

variables that are strongly correlated with each other were removed from the model for the sake of simplicity.

The final statistical model for indoor water usage in all selected neighborhoods is:

$$W = aI + bP + cL$$

where W is monthly average indoor water usage in gallons per connection per day (gal/conn/day), I is the 2000 median family income, P is the estimated percentage of units constructed before 1992, and L is the estimated average lot size in acres. The model coefficients are:

$$\begin{aligned} a &= 0.001385 \text{ gal/conn/day/\$} \\ b &= 66.8 \text{ gal/conn/day} \\ c &= 494.8 \text{ gal/conn/day/acre} \end{aligned}$$

The squared multiple correlation (R^2) of the model is approximately 0.78, and the standard error is 60.3 gal/conn/day. The R^2 value indicates that the model variables explain 78 percent of the variability in the indoor water usage data. The model indicates that indoor water usage increases with increasing family income and increasing lot size (which is strongly correlated to family income). The model also indicates that indoor water usage is greater in older neighborhoods (which presumably have older plumbing fixtures).

Figure 1 shows predicted versus measured indoor water usage for all neighborhoods. The measured indoor water usage ranged from 150 gal/conn/day to 571 gal/conn/day, with an average of 261 gal/conn/day. The predicted indoor water usage ranged from 160 gal/conn/day to 583 gal/conn/day.

The predicted water usage is a single value for each year, because none of the predictor variables in the statistical model is time-dependent. The indoor water usage for the Plano and Fort Worth SW neighborhoods varies considerably from year to year, while Arlington and the other Fort Worth neighborhoods do not show much variation in indoor water usage. The three neighborhoods with the greatest indoor water usage also have the greatest median family incomes.

Table 6 summarizes the model results for all selected neighborhoods on a per connection basis and on a per capita basis. The per connection usage numbers are connection-weighted averages, and the per capita values are based on the connection-weighted population density of 2.98 people per connection. The average indoor water usage was 87.5 gallons per capita per day (gpcd). The model indicates that installation of low-flow plumbing fixtures is responsible for a change in indoor water usage of 22.4 gpcd. However, approximately 51.3 percent[2] of homes in the selected neighborhoods have already installed low-flow plumbing fixtures. Without any low-flow plumbing fixtures, the average indoor water usage would be approximately 98.5 gpcd. Conversely, if low-flow plumbing fixtures were installed in each home, the average indoor water usage would be reduced to approximately 76.1 gpcd. Therefore, retrofitting all older (pre-1992) homes in the selected neighborhoods with low-flow plumbing fixtures would reduce indoor water usage from 87.5 gpcd to 76.1 gpcd, a reduction of 13 percent.

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[2]This is based on housing age and the average number of connections during the years for which data were available and assumes that no pre-1992 homes have been retrofitted with low-flow plumbing fixtures.

Figure 1
Predicted vs. Measured Indoor Water Usage
All Neighborhoods

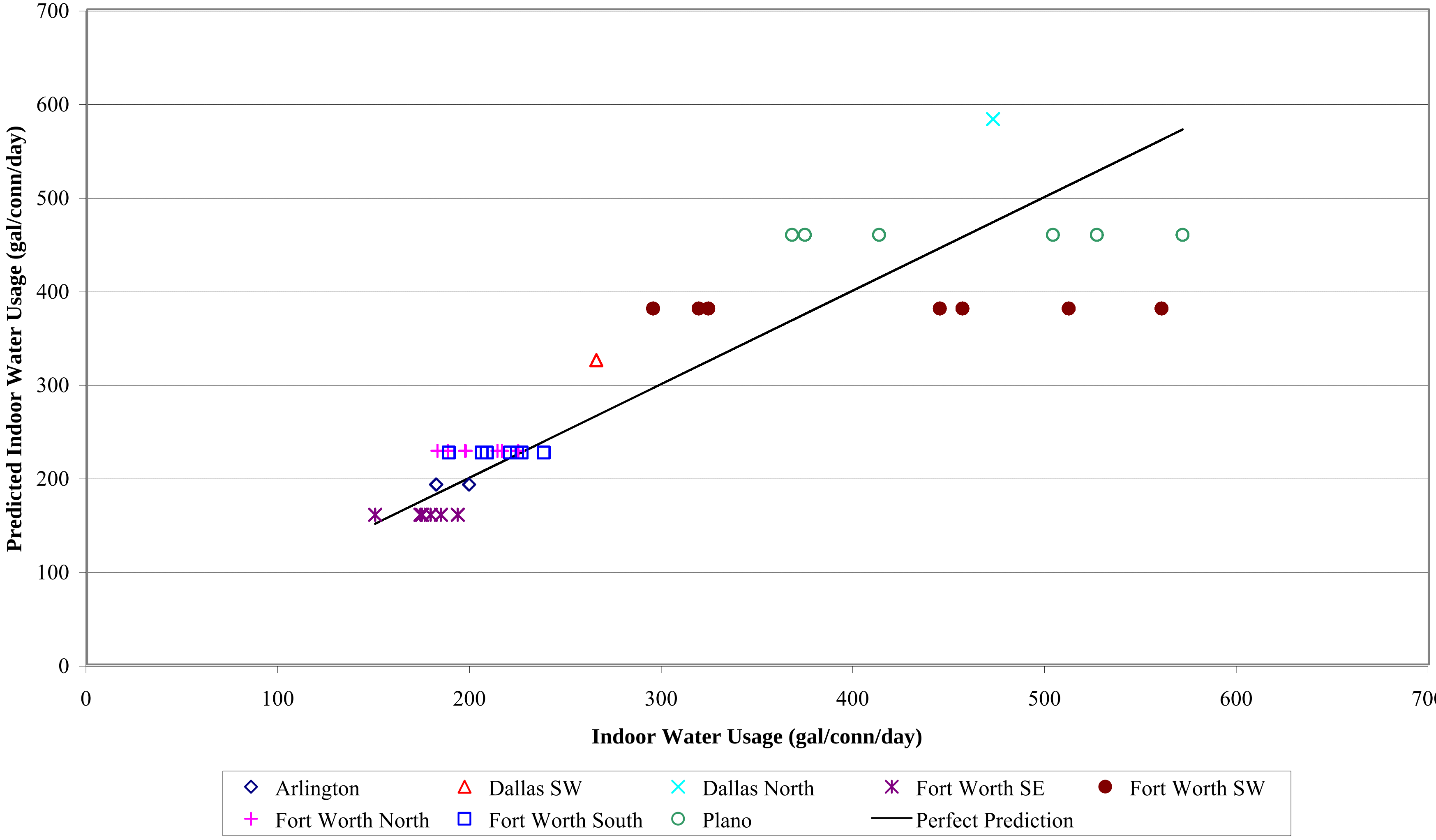


Table 6: Summary of Indoor Water Usage Model Results, All Selected Neighborhoods

Type	Actual Indoor Water Usage	Indoor Water Usage Without Low-Flow Plumbing Fixtures	Savings from Low-Flow Plumbing Fixtures	Indoor Water Usage With Low-Flow Plumbing Fixtures
Per Connection (gal/conn/day)	260.5	293.2	66.8	226.4
Per Capita (gpcd)	87.5	98.5	22.4	76.1

Literature values[3] for water savings from low-flow plumbing fixtures are shown in Table 7. Based on the older plumbing fixture water usage rates in Table 6, it is estimated that low-flow plumbing fixtures will save from 11.1 gpcd to 28.3 gpcd, depending on the ages and flowrates of the fixtures that are replaced. The projected savings from the statistical model, 22.4 gpcd, is within the range of the values reported by Vickers.

Table 7: Literature Values for Low-Flow Plumbing Fixtures Water Savings

Low-Flow Plumbing Fixture	Estimated Water Savings (gpcd)	High-Flow Fixture Water Usage Rate	Low-Flow Fixture Water Usage Rate	Texas Low-Flow Fixture Standards**
Toilets	9.7-19.9	3.5-5.5 gpf*	1.6 gpf	1.6 gpf
Showerheads	0.0-4.4	2.75-4.0 gpm*	2.75 gpm	2.75 gpm
Faucets	1.4-4.0	2.5-3.0 gpm	2.2 gpm	2.2 gpm
TOTAL	11.1-28.3			

* "Gpf" means "gallons per flush," and "gpm" means "gallons per minute."
** For new installations.

The Texas Water Development Board (TWDB) recommended adjustments to water demand projections based on the implementation of low-flow plumbing fixtures. The recommended adjustments ranged from 2 gpcd for communities that consist of mostly new development to 15 gpcd for communities that consist of mostly pre-1992 development. These recommendations are consistent with those in Table 7.

The statistical model of indoor water usage for all selected neighborhoods indicates that indoor water usage depends on median family income, housing age, and average lot size. It is not obvious why indoor water usage should depend on average lot size. Both median family income and average lot size are statistically significant, but there is a strong positive correlation between average lot size and median family income, so the inclusion of both variables in the model may be redundant. However, if average lot size is removed from the model, then the predicted impact of low-flow plumbing fixtures is increased by 74 percent. Since the model predictions in Table 6 are consistent with literature findings, it is probably not appropriate to remove average lot size from the model. It is possible that a variable that is significant to indoor water usage and is highly correlated with average lot size is missing from the model.

[3] Handbook of Water Use and Conservation, Amy Vickers, WaterPlow Press, Amherst, Massachusetts, 2001.

Indoor Water Usage, Selected Tarrant County Neighborhoods

The final statistical model for indoor water usage in selected Tarrant County neighborhoods is:

$$W = aI + bH + cL'$$

Where W is monthly average indoor water usage in gallons per connection per day (gal/conn/day), I is the 2000 median family income, H equals one if the unit was constructed before 1992 and zero if the unit was constructed in 1992 or later, and L' equals the land area minus the living area in acres. The model coefficients are:

a = 0.001068 gal/conn/day/\$
b = 50.8 gal/conn/day
c = 219.8 gal/conn/day/acre

The statistical model of indoor water usage in selected Tarrant County neighborhoods produces an R^2 of 0.19 and a standard error of 298.4 gal/conn/day. This means that the model explains 19 percent of the variability in the data. When compared to the indoor model for all selected neighborhoods, the R^2 and standard errors for the Tarrant County indoor model indicate a relatively poor fit to the data. This may result from the fact that the relevant data for all neighborhoods largely consisted of a single, average value for each neighborhood while the much of the relevant data for the Tarrant County analysis consists of individual values for each address. Much of the variability in the former analysis has been averaged out of the data, while this variability is maintained in the latter analysis.

Table 8 summarizes the indoor model results for all selected Tarrant County neighborhoods on a per connection basis and on a per capita basis. The per connection usage numbers are connection-weighted averages, and the per capita values are based on the connection-weighted population density of 2.97 people per connection. The average indoor water usage was 71.1 gallons per capita per day (gpcd). The model indicates that installation of low-flow plumbing fixtures is responsible for a change in indoor water usage of 17.1 gpcd. However, approximately 55.9 percent[4] of homes in the selected neighborhoods have already installed low-flow plumbing fixtures. Without any low-flow plumbing fixtures, the average indoor water usage would be approximately 81.0 gpcd. Conversely, if low-flow plumbing fixtures were installed in each home, the average indoor water usage would be reduced to approximately 63.9 gpcd. Therefore, retrofitting all older (pre-1992) homes in the selected Tarrant County neighborhoods with low-flow plumbing fixtures would reduce indoor water usage from 71.1 gpcd to 63.9 gpcd, a reduction of 10 percent.

The projected savings from the statistical model, 17.1 gpcd, is well within the range of the literature values shown in Table 7 and are similar to the TWDB-recommended water demand adjustment for low-flow plumbing fixtures (15 gpcd for retrofits).

[4]This is based on housing age and the average number of connections during the years for which data were available and assumes that no pre-1992 homes have been retrofitted with low-flow plumbing fixtures.

Table 8: Summary of Indoor Water Usage Model Results, Selected Tarrant County Neighborhoods

Type	Indoor Water Usage Without Low-Flow Plumbing Fixtures	Savings from Low-Flow Plumbing Fixtures	Indoor Water Usage With Low-Flow Plumbing Fixtures	Actual Indoor Water Usage
Per Connection (gal/conn/day)	240.7	50.8	189.9	211.3
Per Capita (gpcd)	81.0	17.1	63.9	71.1

As with the basic model for all neighborhoods, it is not clear why indoor water usage should depend on lot size or any other estimate of irrigated area. The same comments apply.

STATISTICAL MODELS OF OUTDOOR WATER USAGE

Using the predictor variables, statistical models were constructed to predict monthly outdoor water usage for all neighborhoods and for Tarrant County neighborhoods only. During selection of the appropriate predictor variables, the statistical significance of each variable and correlations between predictor variables were examined. The final statistical models were used to draw conclusions about water usage in each neighborhood.

Outdoor Water Usage, All Selected Neighborhoods

A statistical model was constructed to represent residential outdoor water usage in all selected neighborhoods. Initially, the model included all of the predictor variables. As variables were found to be statistically insignificant, they were eliminated from the model. In addition, some of the weather variables that are strongly positively correlated were removed from the model for the sake of simplicity.

The final statistical model for outdoor water usage in all selected neighborhoods is:

$$W = aD + bI + cP$$

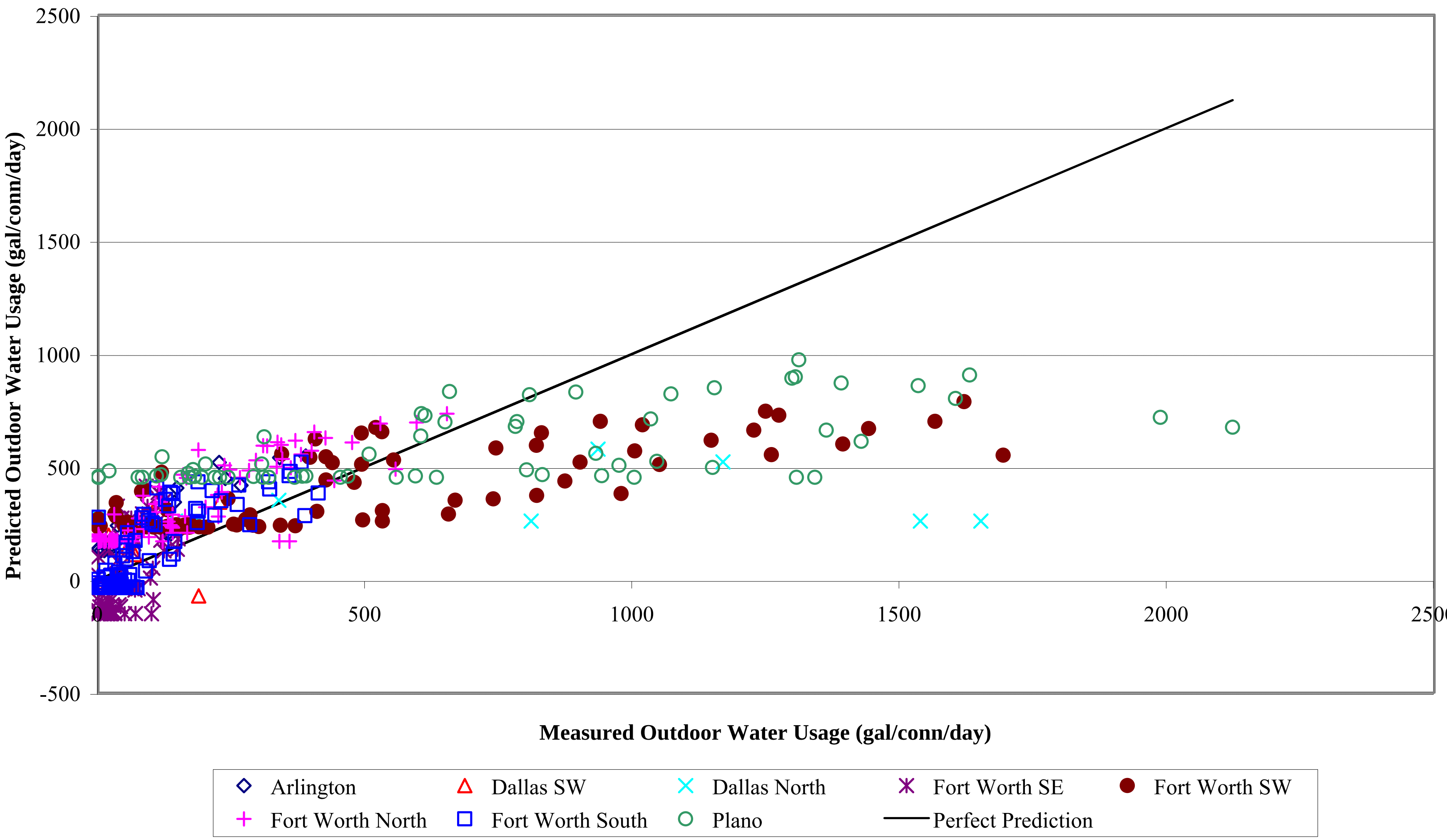
where W is monthly average outdoor water usage in gallons per connection per day (gal/conn/day), D is cooling degree days at the nearest weather station, I is the 2000 median family income, and P is the estimated percentage of housing units constructed before 1992. The model coefficients are:

$$\begin{aligned} a &= 0.692 \text{ gal/conn/day/degree-day} \\ b &= 0.002528 \text{ gal/conn/day/\$} \\ c &= -208.9 \text{ gal/conn/day} \end{aligned}$$

The squared multiple correlation (R^2) of the model is 0.67, and the standard error is 259.9 gal/conn/day. The R^2 value indicates that the model variables explain 67 percent of the variability in the outdoor water usage data.

Figure 2 shows predicted versus measured outdoor water usage for all neighborhoods. The measured outdoor water usage ranged from 0 gal/conn/day to 2,122 gal/conn/day, with an average of approximately 247 gal/conn/day. In addition, the average maximum monthly outdoor water usage is 798 gal/conn/day.

Figure 2
Predicted vs. Measured Outdoor Water Usage
All Neighborhoods



The predicted outdoor water usage ranged from -151 gal/conn/day to 973 gal/conn/day. The statistical model performs better at low water usage rates than at high water usage rates. This suggests that the water use characteristics for neighborhoods with higher outdoor water use are different than those with lower outdoor water use.

For this reason, the neighborhoods were separated into two groups. Dallas North, Plano, and Fort Worth SW were assigned to the higher outdoor use group, and the other neighborhoods were assigned to the lower outdoor use group. In addition to having higher outdoor water usage, Dallas North, Plano, and Fort Worth SW also have higher median family incomes than the other neighborhoods. The basic statistical model for each group is the same as shown above, but the coefficients are different (Table 9). Coefficient *a* for the higher outdoor use/higher income group is 4.4 times coefficient *a* for the lower outdoor use/lower income group. This means that the higher outdoor use/higher income group is predicted to use 4.4 times as much water outdoors in response to hot weather compared to the lower outdoor use/lower income group.

Table 9: Coefficients for Outdoor Water Use Statistical Models, All Selected Neighborhoods

Coefficient	Associated Variable	Higher Outdoor Use Group	Lower Outdoor Use Group	Units
a	Cooling Degree Days	1.526	0.347	gal/conn/day/degree-day
b	Median Family Income	0.001999	0.001068	gal/conn/day/$
c	Percentage of Housing Constructed Prior to 1992	-268.4	-58.6	gal/conn/day

Figures 3 and 4 show the predicted versus measured outdoor water usage for each group of neighborhoods. The model predictions are significantly closer to the measured values when the neighborhoods are divided into groups by water usage.

For the higher outdoor use group, the squared multiple correlation (R^2) of the model is 0.81, and the standard error is 320.9 gal/conn/day. For the lower outdoor use group, the squared multiple correlation (R^2) of the model is 0.79, and the standard error is 73.5 gal/conn/day. These statistics show that separate models for the two groups provide a better fit than a single model for all neighborhoods. The models indicate that outdoor water usage increases with increasing cooling degree days and with increasing family income. The models also indicate that newer (post-1992) homes have greater outdoor water usage than older (pre-1992) homes. Outdoor water use in the higher use group is significantly more dependent on the weather than outdoor use for the lower use group, as evidenced by the higher value for model coefficient *a* in Table 9.

Intuitively, average lot size would seem to be an important variable in a model of outdoor water usage, but it is not explicitly represented in the outdoor water usage models shown above. However, average lot size is highly correlated with median family income, which is a predictor variable in the models.

Outdoor Water Usage, Selected Tarrant County Neighborhoods

The final statistical model for outdoor water usage in selected Tarrant County neighborhoods is:

$$W = aD + bI + cL'$$

Figure 3
Predicted vs. Measured Outdoor Water Usage
Lower Outdoor Water Usage Neighborhoods

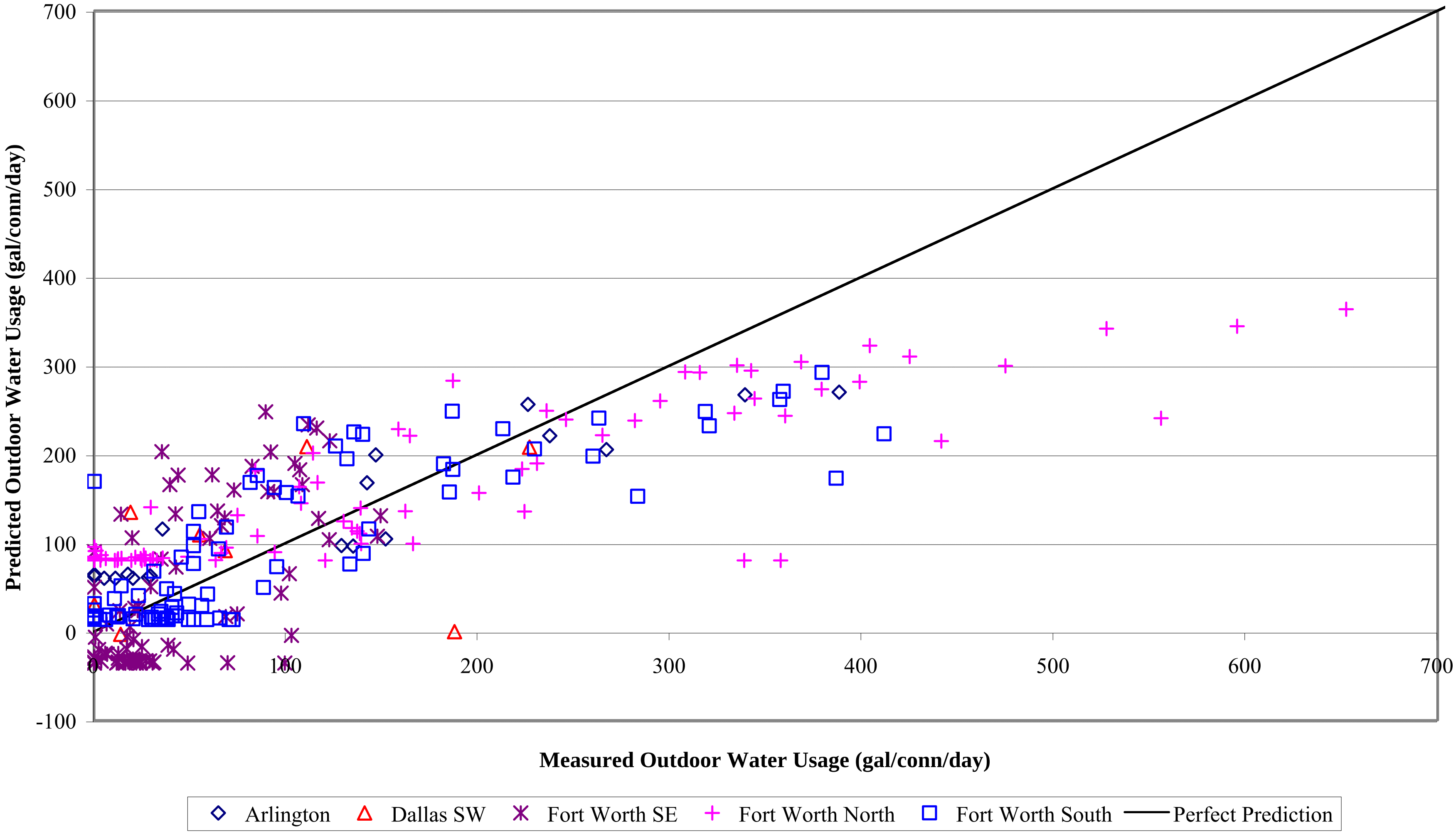
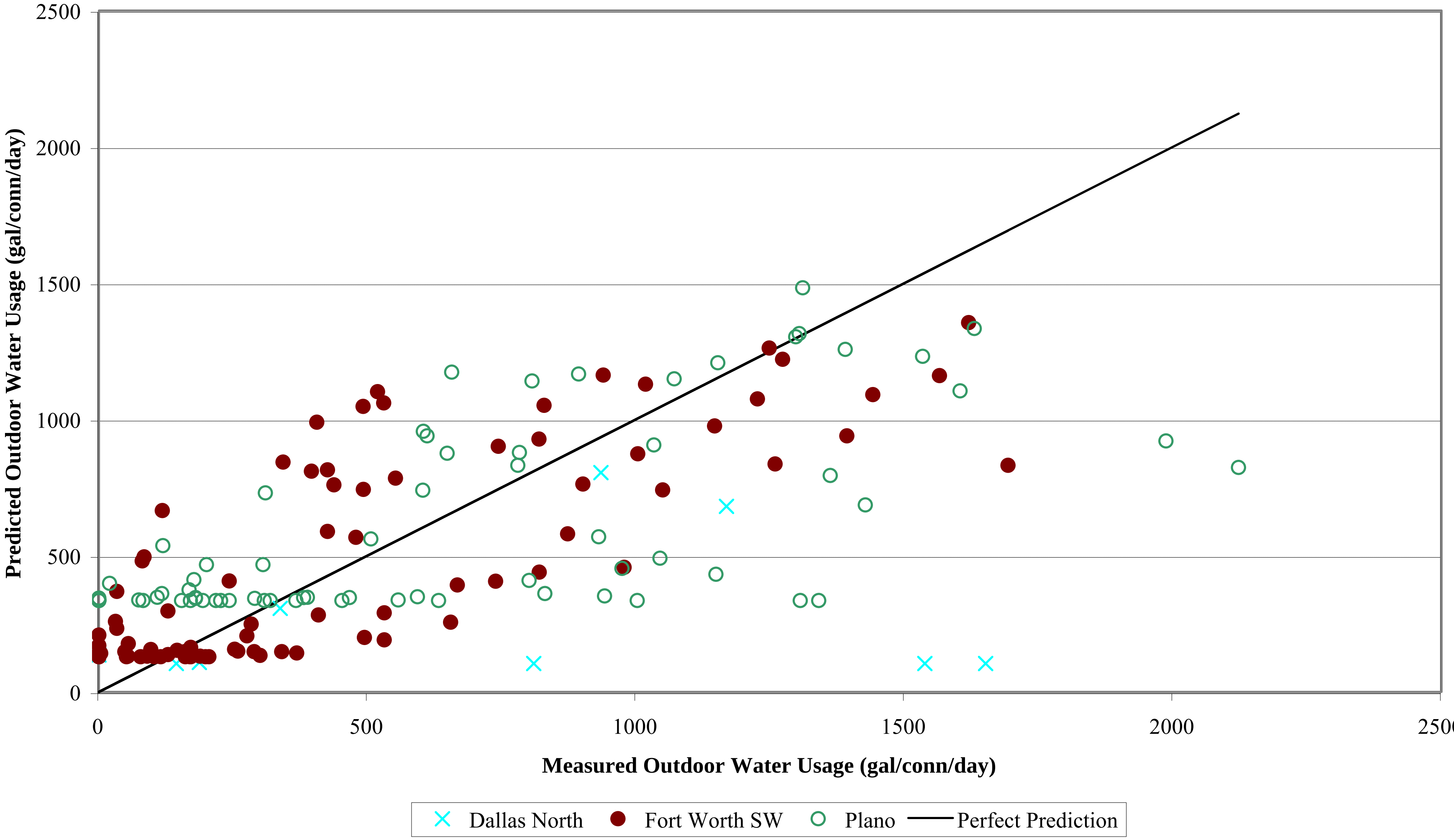


Figure 4
Predicted vs. Measured Outdoor Water Usage
Higher Outdoor Water Usage Neighborhoods



where W is monthly average outdoor water usage in gallons per connection per day (gal/conn/day), D is cooling degree days, I is the 2000 median family income, and L' equals the estimated irrigated area in acres. The model coefficients are:

$$a = 0.532 \text{ gal/conn/day/degree-day}$$
$$b = 0.000652 \text{ gal/conn/day/\$}$$
$$c = 709.5 \text{ gal/conn/day/acre}$$

The squared multiple correlation (R^2) of the Tarrant County outdoor model is 0.14, and the standard error is 743.7 gal/conn/day. When compared to the outdoor model for all selected neighborhoods, the R^2 and standard errors for the Tarrant County outdoor model indicate a relatively poor fit to the data. A potential reason for this difference was discussed in the section on indoor water usage models, and those comments also apply here.

In the analysis of all selected neighborhoods, the neighborhoods were divided into two groups: a higher outdoor water use group (including Fort Worth SW) and a lower outdoor water use group (including the other Tarrant neighborhoods). If the same divisions are made for the selected Tarrant County neighborhoods, it is not possible to get a meaningful model for the higher outdoor use group (Fort Worth SW only), but it is possible to get a meaningful model for the lower outdoor use group. The reason that a statistical model is not possible for the higher outdoor water use group is that several key variables (including median family income and cooling degree days) are the same for all connections in the group.

The final statistical model for outdoor water usage for the lower use group of selected Tarrant County neighborhoods is:

$$W = aD + bI + cL'$$

where W is monthly average water usage in gallons per connection per day (gal/conn/day), D is cooling degree days, I is 2000 median family income, and L' is the estimated irrigated area in acres. The model coefficients are:

$$a = 0.516 \text{ gal/conn/day/degree-day}$$
$$b = 0.000874 \text{ gal/conn/day/\$}$$
$$c = 310.4 \text{ gal/conn/day/acre}$$

The squared multiple correlation (R^2) of the Tarrant County outdoor model for the lower outdoor water use group is 0.11, and the standard error is 732.0 gal/conn/day. Based on these statistics, it does not appear that a separate model for the lower outdoor water use group is provides better results than a single model for outdoor water use for the selected Tarrant County neighborhoods.

A number of statistical models for neighborhood-scale indoor and outdoor water usage have been presented. These models are summarized in Table 10. The next section presents analysis of the impacts of customer water audits. A summary of all results is presented at the end of this technical memorandum.

IMPACT OF CUSTOMER WATER AUDITS

The City of Denton performs customer water audits that may have an impact on water usage. In this section, customer water audits are defined, a statistical model is presented, and the potential effectiveness and estimated cost of the customer water audit program is discussed.

Table 10: Summary of Statistical Models

Model Type	Neighbor-hoods	Category	Predictor Variable Coefficients (gal/conn/day/predictor variable units)										R^2	Standard Error (gal/conn/day)
			Weather Variables					Socioeconomic Variables						
			Average High Temperature	Cooling Degree Days	Heating Degree Days	Precipitation	Average Temperature	Median Family Income	Percentage of Units Older Than 1992	Unit Built Before 1992	Average Lot Size	Irrigated Area		
Indoor	All	NA						0.001385	66.8		494.8		0.78	60.3
Outdoor	All	NA		0.692				0.002528	-208.9				0.67	259.9
Outdoor	All	Lower Use		0.347				0.001068	-58.6				0.79	73.5
Outdoor	All	Higher Use		1.526				0.001999	-268.4				0.81	320.9
Indoor	Tarrant	NA						0.001068		50.8		219.8	0.19	298.4
Outdoor	Tarrant	NA		0.532				0.000652				709.5	0.14	743.7
Outdoor	Tarrant	Lower Use		0.516				0.000874				310.4	0.11	732.0

Customer Water Audits

The City of Denton performs free water audits for its customers upon their request. The customer requests usually originate from concerns over expensive water bills. When a customer requests a water audit, City personnel review the customer's bill to determine whether it is within normal seasonal parameters and review water usage habits with the customer, such as:

- How many times per week does the customer wash clothes? How full are the loads?
- How many times per week does the customer wash dishes? Are dishes washed by hand or by machine? How full are the loads?
- How many people live in the home?
- What are the customer's sprinkler settings? How many times per week does the customer water the lawn? For how long?
- Does the customer have a swimming pool, Jacuzzi, water filter or purifier, or other water using devices?
- Are outdoor faucets leaking?

After discussion with the customer, City personnel perform an on-site walk-through, if necessary, to teach the customer how to read the water meter, to evaluate the landscaping and irrigation system, to check for leaks, to review conservative water usage habits, and, if the customer wishes, to install water saving devices. The auditor then provides a report and water saving suggestions.

Statistical Model and Analysis

The City of Denton provided monthly water usage data for the 102 customers that had requested water audits as of October 2003. For many of these customers, there is insufficient water usage history (either before or after the water audit) to permit a determination of whether the audit has been effective in conserving water. There were 27 customers that had at least twelve months of water usage history both before and after the water audit was performed.

For each of these 27 customers, APAI constructed a statistical water usage model with the following form:

$$W = aT^6 + bF$$

where W is the monthly average water usage in gallons per day, T is the monthly average high temperature, F equals one for months before the water audit and equals zero for months after the water audit, and *a* and *b* are regression coefficients that are unique for each customer. Using this model, APAI performed a multiple linear regression on the monthly water usage data to calculate the regression coefficients *a* and *b*. In addition, the regression statistics contain information about the squared multiple correlation (R^2) and the standard error.

Table 11 summarizes the results for each customer. Additional information is presented in Appendix B. The R^2 ranged from 0.854, reflecting a very good fit, to approximately zero, reflecting a very poor fit. A low value of R^2 indicates that there are other factors that influence water usage that are not represented in the statistical water usage model.

Customer water audits were deemed to be statistically significant if there was less than a five percent probability that the regression coefficient *b* is zero.

The multiple regression analysis does not tell the complete story in every case. The regression analysis is based on the simplistic supposition that changes in water usage are caused only by the weather and by the customer water audit. However, factors affecting water usage are much more complex. As an example, consider commercial customer DE0000101. According to the analysis, the audit is statistically significant; however, the customer actually used much more water after the audit than before. In all likelihood, the customer's water usage was affected by some unknown factor that coincided with the water audit. There is no apparent reason why a water audit would cause a customer to use more water.

Table 11: Effectiveness of Customer Water Audits, City of Denton

Customer	Residential or Commercial	R^2	Audit Significant	Average Water Usage* (gal/day)	Estimated Water Savings (gal/day)	Estimated Percent Savings
DE0000043	Residential	0.642	No	873		
DE0000045	Residential	0.090	No	653		
DE0000050	Commercial	0.002	No	663		
DE0000052	Residential	0.710	Yes	344	86	25
DE0000053	Residential	0.047	No	78		
DE0000054	Residential	0.548	Yes	830	321	39
DE0000056	Residential	0.459	Yes	340	188	55
DE0000057	Residential	0.599	Yes	745	170	23
DE0000068	Residential	0.309	No	683		
DE0000069	Commercial	0.279	Yes	1,449	1,275	88
DE0000072	Residential	0.616	Yes	515	218	42
DE0000076	Residential	0.046	No	47		
DE0000078	Residential	0.436	No	336		
DE0000079	Commercial	0.342	Yes	150	93	62
DE0000080	Residential	0.495	No	1,546		
DE0000081	Residential	0.163	No	546		
DE0000082	Residential	0.640	Yes	741	164	22
DE0000085	Residential	0.726	No	360		
DE0000087	Residential	0.046	No	159		
DE0000092	Residential	0.121	Yes	131	15	11
DE0000093	Commercial	0.035	No	438		
DE0000094	Residential	0.206	No	450		
DE0000095	Residential	0.733	No	175		
DE0000096	Residential	0.761	Yes	512	113	22
DE0000097	Residential	0.858	Yes	399	119	30
DE0000099	Residential	0.752	Yes	317	217	68
DE0000101	Commercial	0.146	Yes	8,224	-4,564	-56

*Average over period of record if audit not significant. Average over period before audit if audit significant.

In addition, there are customers for whom the audit was statistically insignificant, yet the audit was apparently effective. Consider the graphs in Appendix B for customers DE0000043, DE0000053, DE0000078, and DE0000087. Each of these customers experienced abnormally high water usage immediately before the water audit took place, and this abnormally high water usage was not repeated after the water audit. This pattern is consistent with identification and repair of a water leak. Although the statistical analysis did not reveal a change in the water usage pattern for these customers, identification of leaks through customer water audits and subsequent repair of the leaks still leads to reduced water usage.

Although the statistical analysis does not perfectly capture the impact of customer water audits, it is useful in estimating the water savings for the customers who requested audits. Table 12 summarizes results for the customers as a group. Although there are data for only a limited number of customers, these data indicate that the City of Denton customer water audit program has reduced water usage for audited customers by an average of 15-16 percent. About half of the audited customers measurably changed their water usage behavior after the audit (*i.e.*, the audits were statistically significant), resulting in an average of 33-34 percent water savings for the customers who changed their behavior.

Table 12: Summary of Water Savings from Customer Water Audits, City of Denton

Customers	Number	Average Total Water Usage (gal/day)	Estimated Total Water Savings (gal/day)	Estimated Percent Savings
Residential	21	9,906	1,611	16
Residential and Commercial*	24	11,158	1,704	15
Residential with Statistically Significant Audits	10	4,874	1,611	33
Residential and Commercial* with Statistically Significant Audits	11	5,024	1,704	34

* Not including commercial customers DE0000069 and DE0000101. These commercial customers experienced very large changes (one increased, one decreased) in water usage after the water audit. Because these changes are large enough to significantly skew the results and because not all factors that affected water usage are known, these customers were not included in the summary.

U. S. Census and Texas Water Development Board (TWDB) data show the following year 2000 statistics for the City of Denton:

- Population of 80,537
- Water usage of 17,050 acre-feet, or 189 gallons per capita per day (gpcd).

Based on the above analysis, it is estimated that the average customer water audit saves 15 percent, or 28 gpcd, for each audited customer. Since the City does not recruit customers for water audits, and since the customers that request water audits are concerned about expensive water bills, it appears that the customers that participate in the water audit program are highly motivated to change their behavior. It is likely that the effectiveness (on a gpcd basis) of the program would decrease if the City recruited customers to increase the participation rate, because additional customers might not be as motivated to change their behavior. Therefore the 15 percent water savings for audited customers should be regarded as the maximum savings possible from this customer water audit programs.

Potential Effectiveness

The City of Denton does not extensively publicize the customer water audit program. Besides word of mouth, the only public notifications about the customer water audit program are mention in an annual customer mailing regarding water rates and a page on the City's Water Utilities web site. In the 2½ years that the City of Denton has been conducting customer water audits, 102 customers have requested audits. The City currently has 24,976 water connections, suggesting a participation rate of approximately 0.16 percent of customers per year.

The data are insufficient to determine how long the water savings resulting from water audits will last. A study performed for the TWDB suggested that water conservation savings from customer water audits might last approximately three years[5].

Assuming a participation rate of 0.16 percent per year, 15 percent water savings for each audited customer, and a conservation savings duration of three years, the projected savings for the entire city is approximately:

- 11,182 gallons per day
- 12.5 acre-feet per year
- 0.14 gpcd.

This projection assumes that the program will continue to operate in its current fashion.

Estimated Cost of Water Audit Program

Each water audit requires from ½ to 1½ hours, depending on whether a site visit is necessary. According to City personnel, the labor cost is probably less than $1,000 per year, and the overhead multiplier is probably between 2 and 3. Assuming that the program costs $3,000 per year to operate, then the unit cost is approximately $0.75 per thousand gallons of conserved water conserved (or $244 per acre-foot of conserved water).

To meet future water needs, the 2001 Region C Water Plan recommends that the City of Denton acquire additional water from the City of Dallas and make water treatment plant improvements. Currently, Dallas's wholesale water rate for an uninterruptible supply of raw water is $0.3868 per thousand gallons. Assuming that it costs approximately $0.50 to treat the raw water, the current cost of potable water (originating from Dallas) is approximately $0.89 plus distribution costs.

According to the 2001 Region C Water Plan, phased water treatment plant improvements will cost between $0.65 and $0.85 per thousand gallons. Based on this information, expected future water costs range between $1.54 and $1.74 plus distribution costs. As it is currently operated, the customer water audit program is cost-effective when compared with these estimated costs.

As discussed above, it is likely that the effectiveness (on a gpcd basis) of the program would decrease if the City recruited customers to increase the participation rate, because additional customers might not be as motivated to change their behavior. Therefore the 15 percent water savings for audited customers should be regarded as the maximum savings possible from this customer water audit programs. For a larger program, the expected water conservation from customer water audits is four to six percent[6].

If the conserved water volume were to be reduced by a factor of three, as suggested for a larger program, then the unit cost of water conserved by customer audits would be increased by a factor of three to approximately $2.25 per thousand gallons conserved. A larger customer audit program would probably not be cost-effective compared to the current cost of potable water, but it might be cost-effective compared to the future cost of potable water, depending on the distribution costs.

[5] Quantifying the Effectiveness of Various Water Conservation Techniques in Texas, performed for the Texas Water Development Board by GDS Associates, Inc., Austin, May 2002.

[6] Handbook of Water Use and Conservation, Amy Vickers, WaterPlow Press, Amherst, Massachusetts, 2001.

SUMMARY OF RESULTS

Results of the neighborhood water conservation and water study and of the study of customer water audits are summarized below.

Neighborhood Water Conservation and Water Usage Study

The statistical models indicate that indoor water usage increases with increasing family income and increasing lot size (which is strongly correlated to family income). The models also indicate that indoor water usage is greater in older neighborhoods (which presumably have older plumbing fixtures) than in newer neighborhoods.

For a given home in the selected neighborhoods, the conservation savings from low-flow plumbing fixtures is projected to range from 17.1 to 22.4 gpcd. This estimate is within the range of 11.1 to 28.3 gpcd reported by Vickers[7] and is somewhat greater than the TWDB-recommended adjustment to water demand projections to account for implementation of low-flow plumbing fixtures (15 gpcd). On a percentage basis, the models indicate that low-flow plumbing fixtures save about 21 to 23 percent on indoor water use compared to older fixtures. The selected neighborhoods contain a significant number of homes constructed since 1992, so some of this savings has already been realized. It is estimated that retrofits of low-flow plumbing fixtures in the selected neighborhoods could yield an additional 7.2 to 11.4 gpcd.

The statistical models of ourdoor water usage indicate that:

- Outdoor water usage increases with increasing cooling degree days and with increasing family income.
- Newer (post-1992) homes have greater outdoor water usage than older (pre-1992) homes.
- Outdoor water use in the higher use group is significantly more dependent on the weather than outdoor use for the lower use group, as evidenced by the higher value for model coefficient *a* in Table 9.

For all selected neighborhoods, Table 13 summarizes the indoor and outdoor water usage.

Table 13: Summary of Indoor and Outdoor Water Usage, All Selected Neighborhoods

Type	Minimum (gal/conn/day)	Average (gal/conn/day)	Maximum (gal/conn/day)
Indoor water usage	150	261	571
Monthly outdoor water usage	0	247	2,122
Peak month outdoor water usage	149	798	2,122
	Minimum (gpcd)	**Average (gpcd)**	**Maximum (gpcd)**
Indoor water usage	50	87	192
Monthly outdoor water usage	0	83	712
Peak month outdoor water usage	50	268	712

Residents of the selected neighborhoods use an annual average of approximately 87 gpcd indoors and 83 gpcd outdoors, for a total annual average water usage of 170 gpcd. Outdoor usage comprises approximately 49 percent of the total annual usage volume. During the maximum usage month, average outdoor water usage is 268 gpcd, or 3.2 times the annual average indoor usage.

[7] Handbook of Water Use and Conservation, Amy Vickers, WaterPlow Press, Amherst, Massachusetts, 2001.

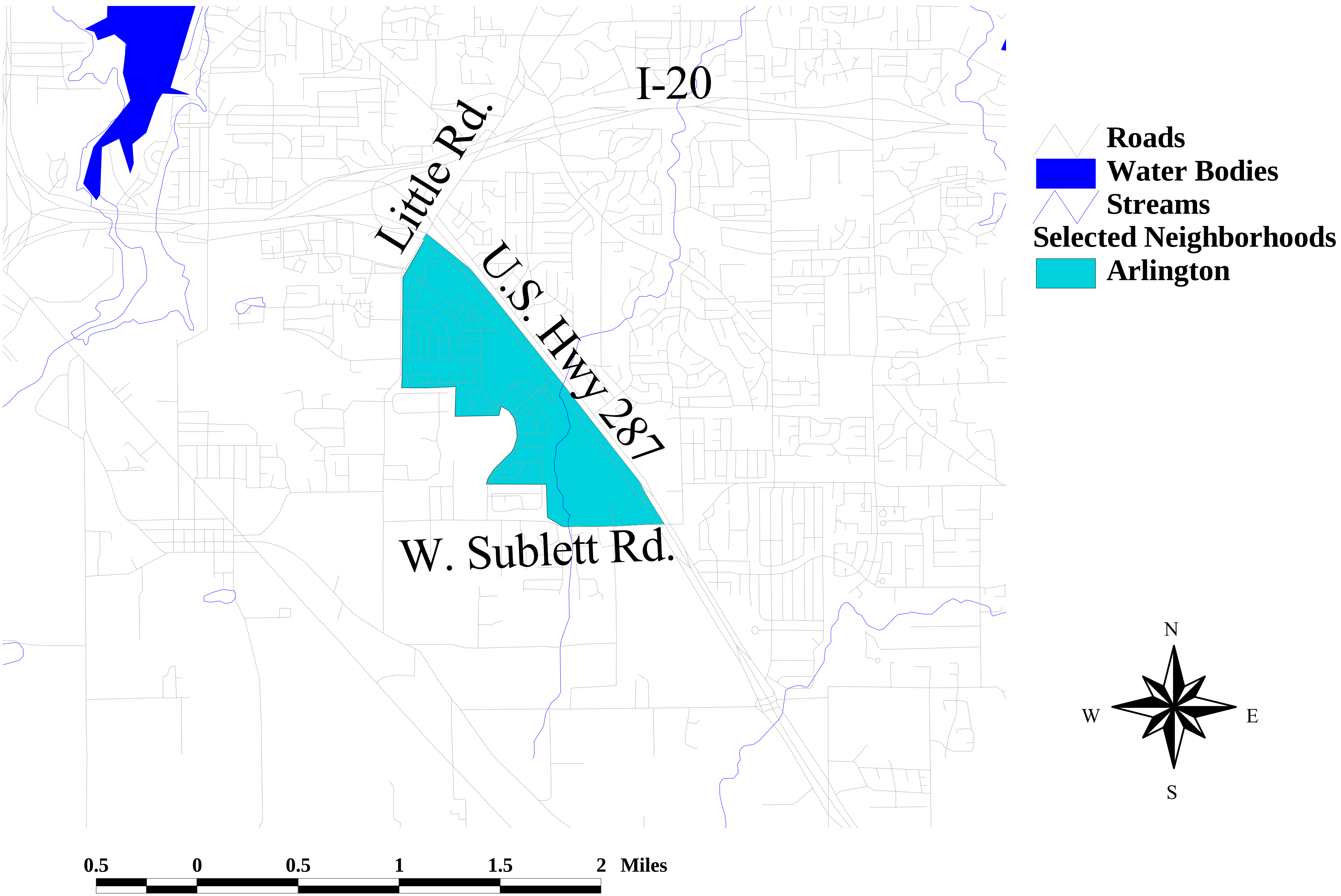
Impacts of Water Audits

Based on the statistical analysis, the customer water audits have been effective where they are performed, saving approximately 15 percent of pre-audit water usage for the customers that request water audits. The relatively low participation rate has limited the total water savings. As it is currently operated, the City of Denton's customer water audit program is cost-effective when compared to the current cost of producing potable water. If the City increased participation through advertising and public education, it is likely that the effectiveness (on a gpcd basis) of the program would decline, raising the unit cost. The unit cost of a larger program is probably not cost-effective compared to the current cost of potable water, but it might be cost-effective compared to the future cost of potable water, depending on the distribution costs.

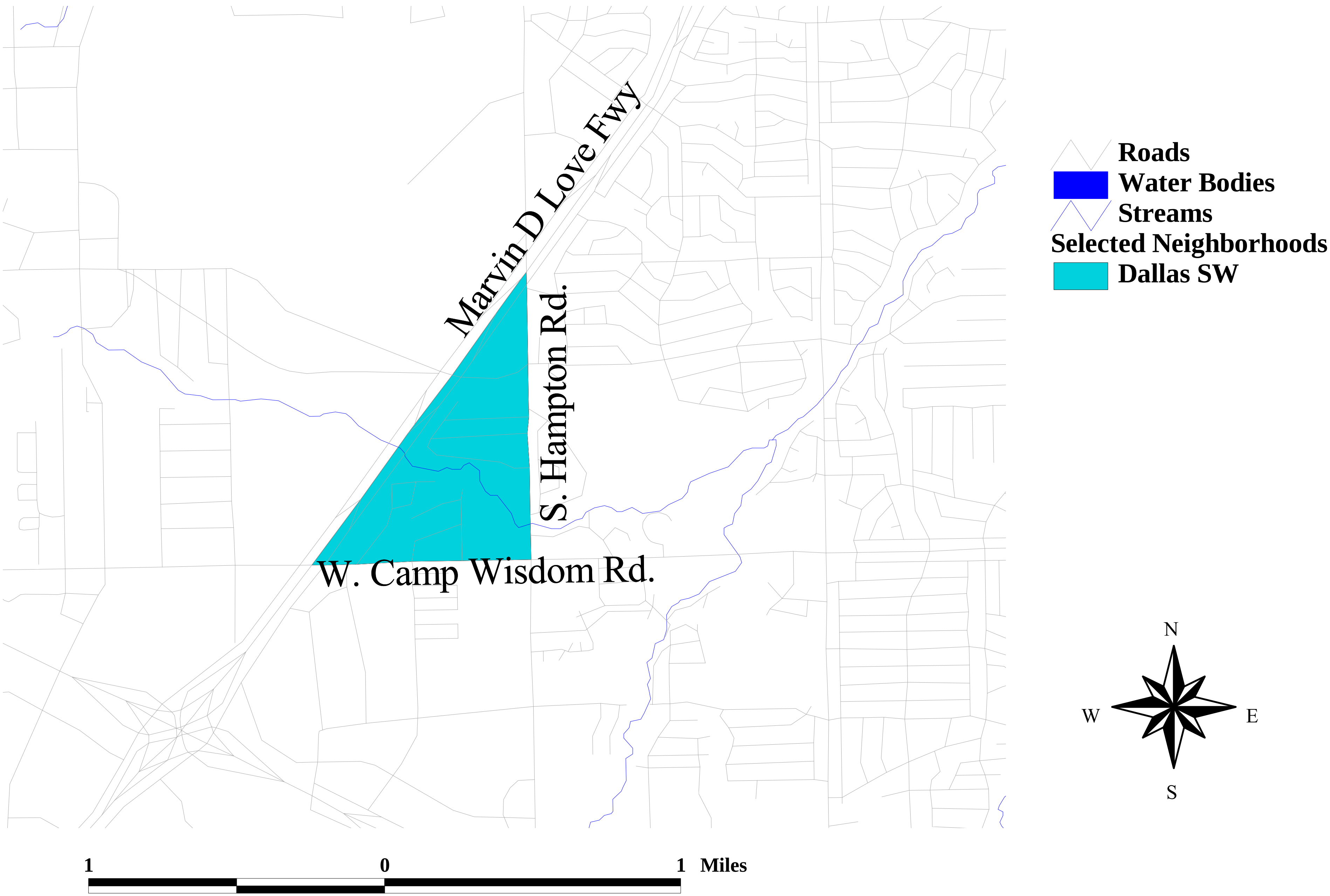
APPENDIX A

LOCATION MAPS FOR SELECTED NEIGHBORHOODS

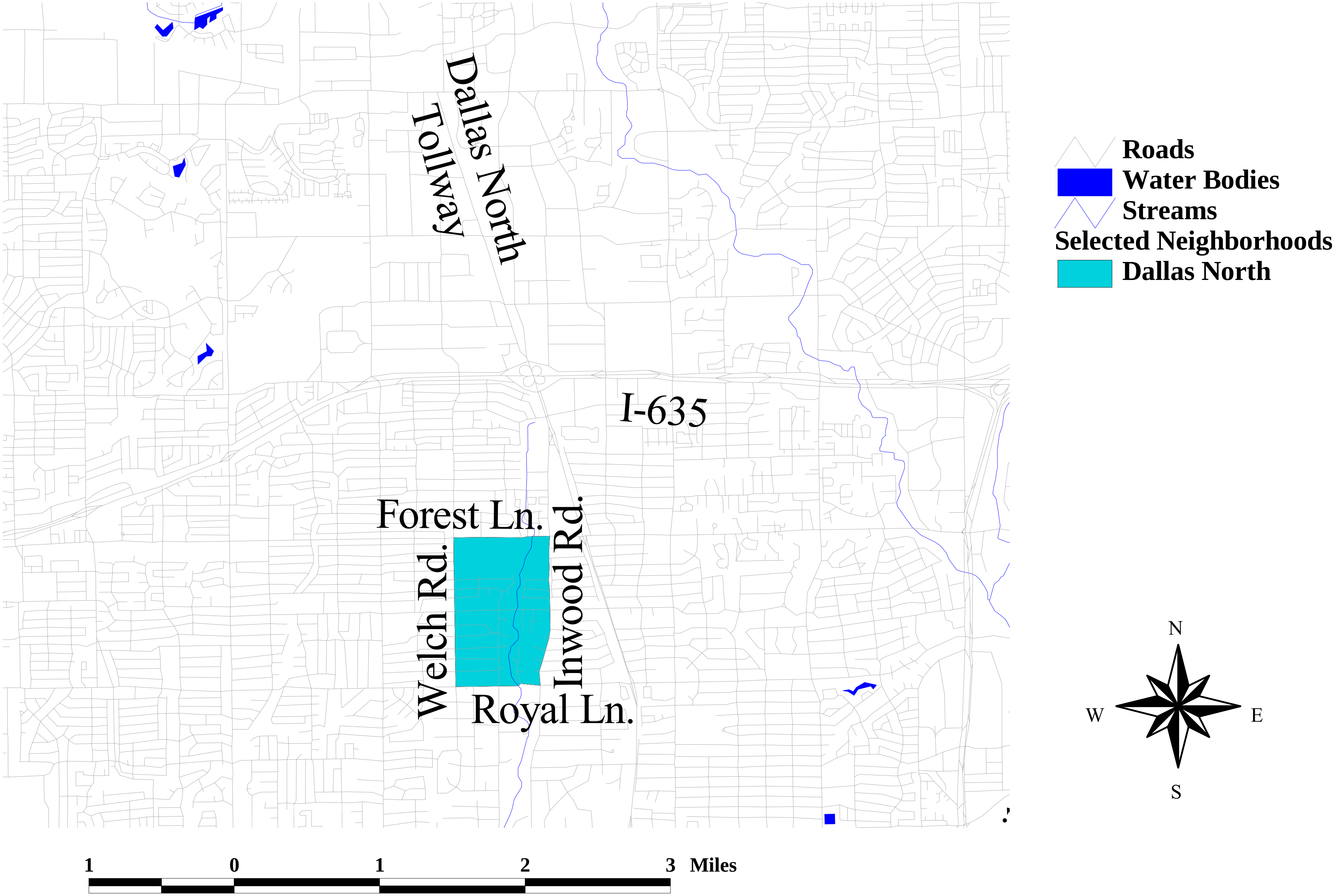
Medium Income, Newer Housing Neighborhood
City of Arlington



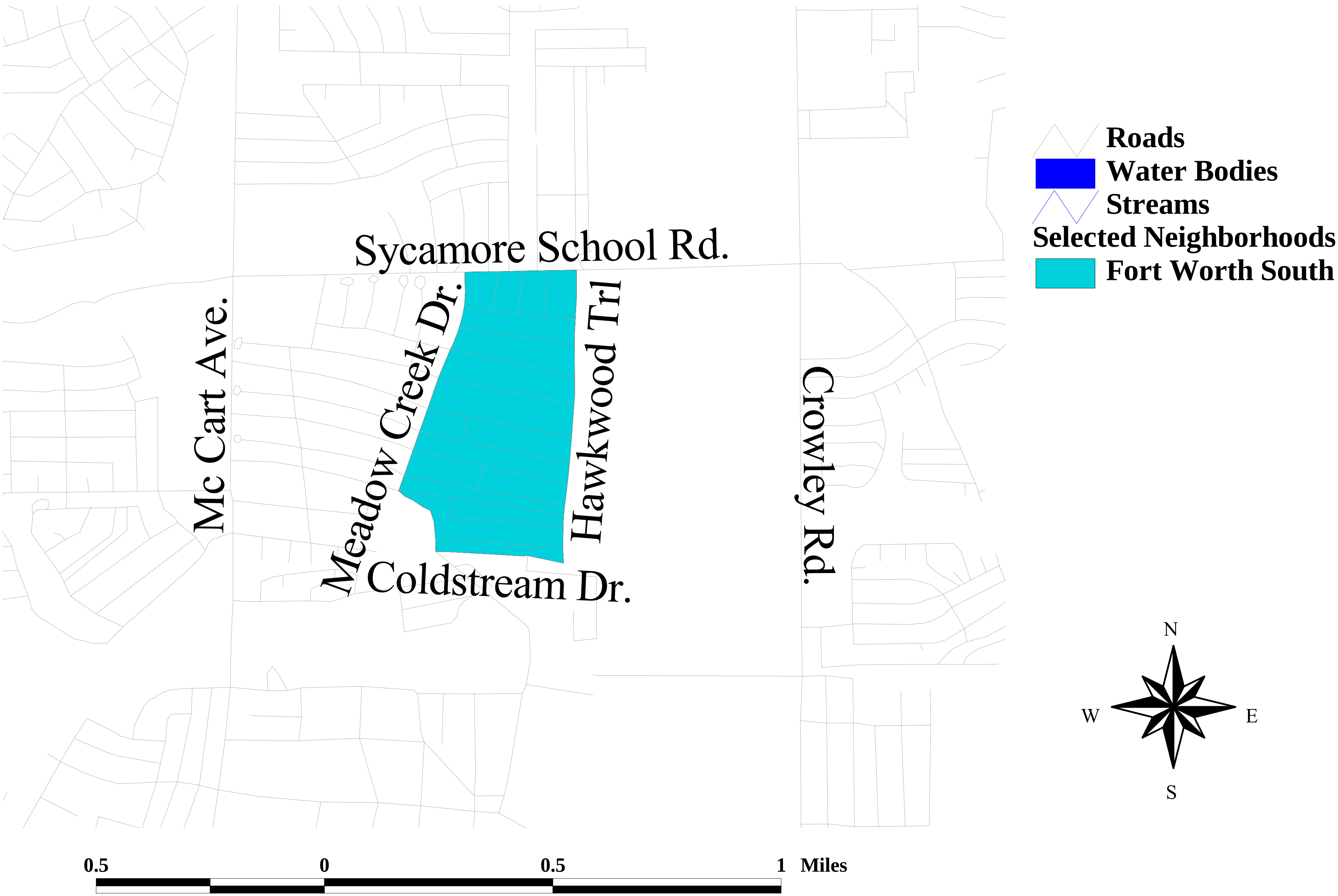
Medium Income, Older Housing Neighborhood (Dallas SW)
City of Dallas



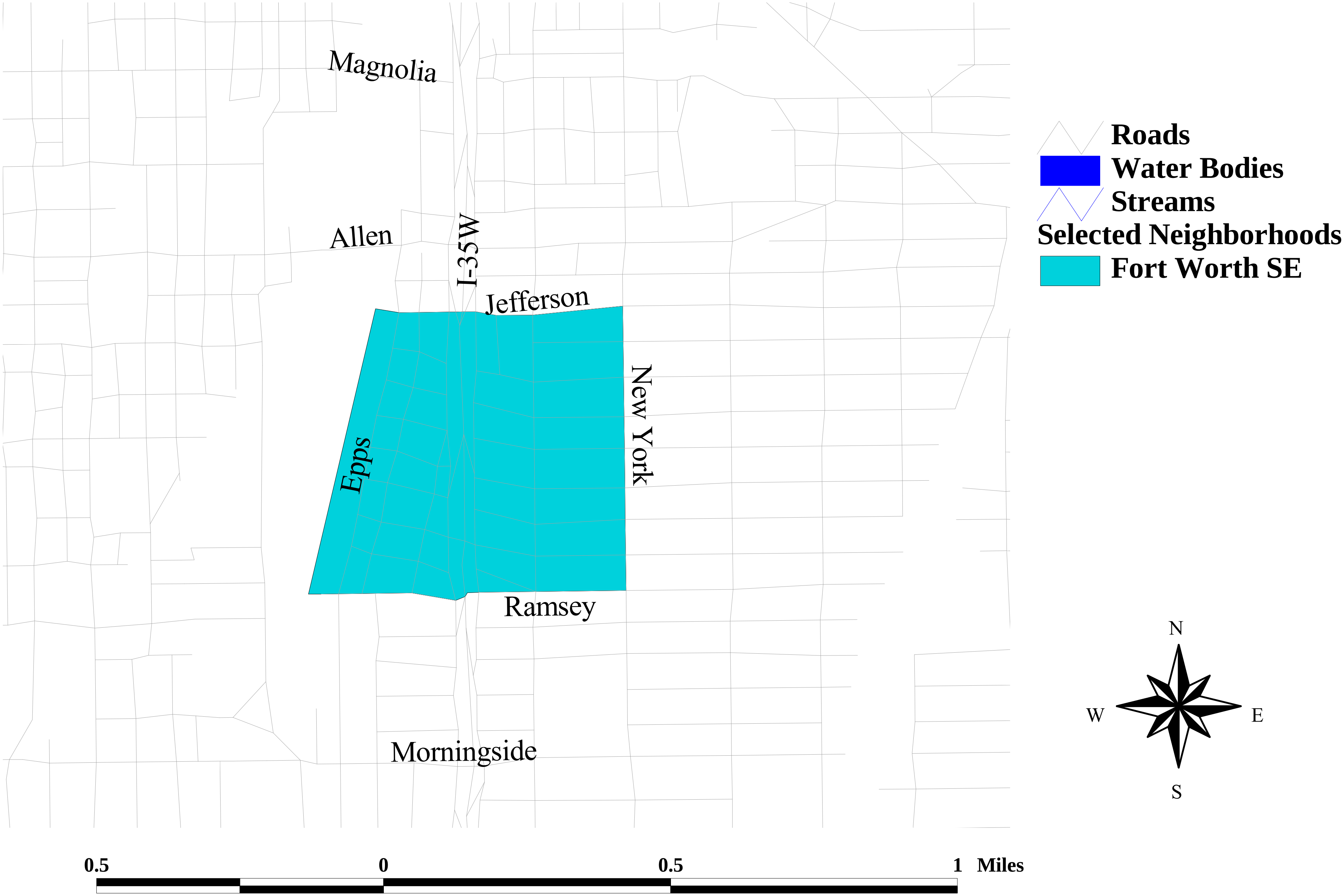
High Income, Older Housing Neighborhood (Dallas North)
City of Dallas



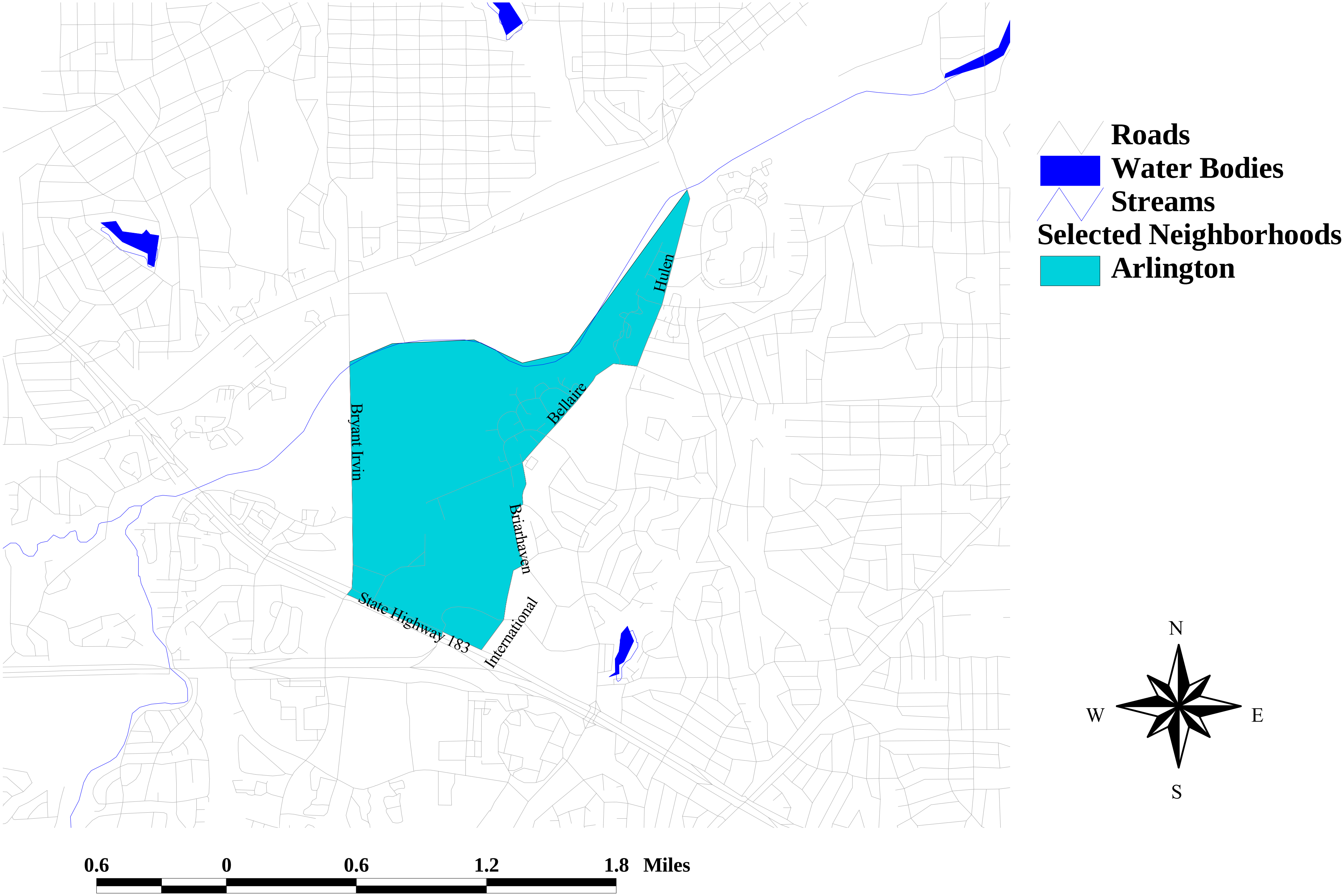
Medium Income, Older Housing Neighborhood (Fort Worth South)
City of Fort Worth



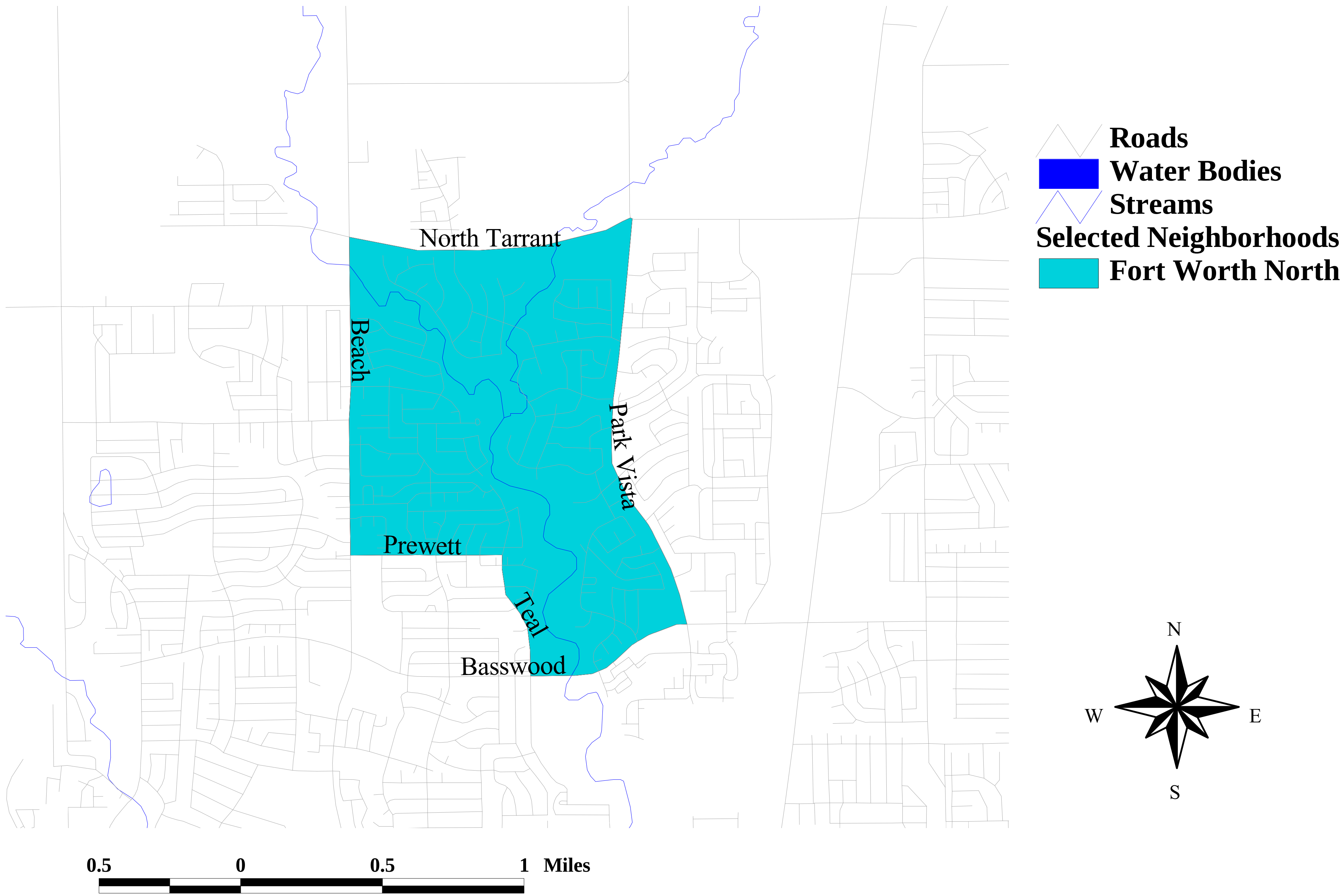
Low Income, Older Housing Neighborhood (Fort Worth SE)
City of Fort Worth



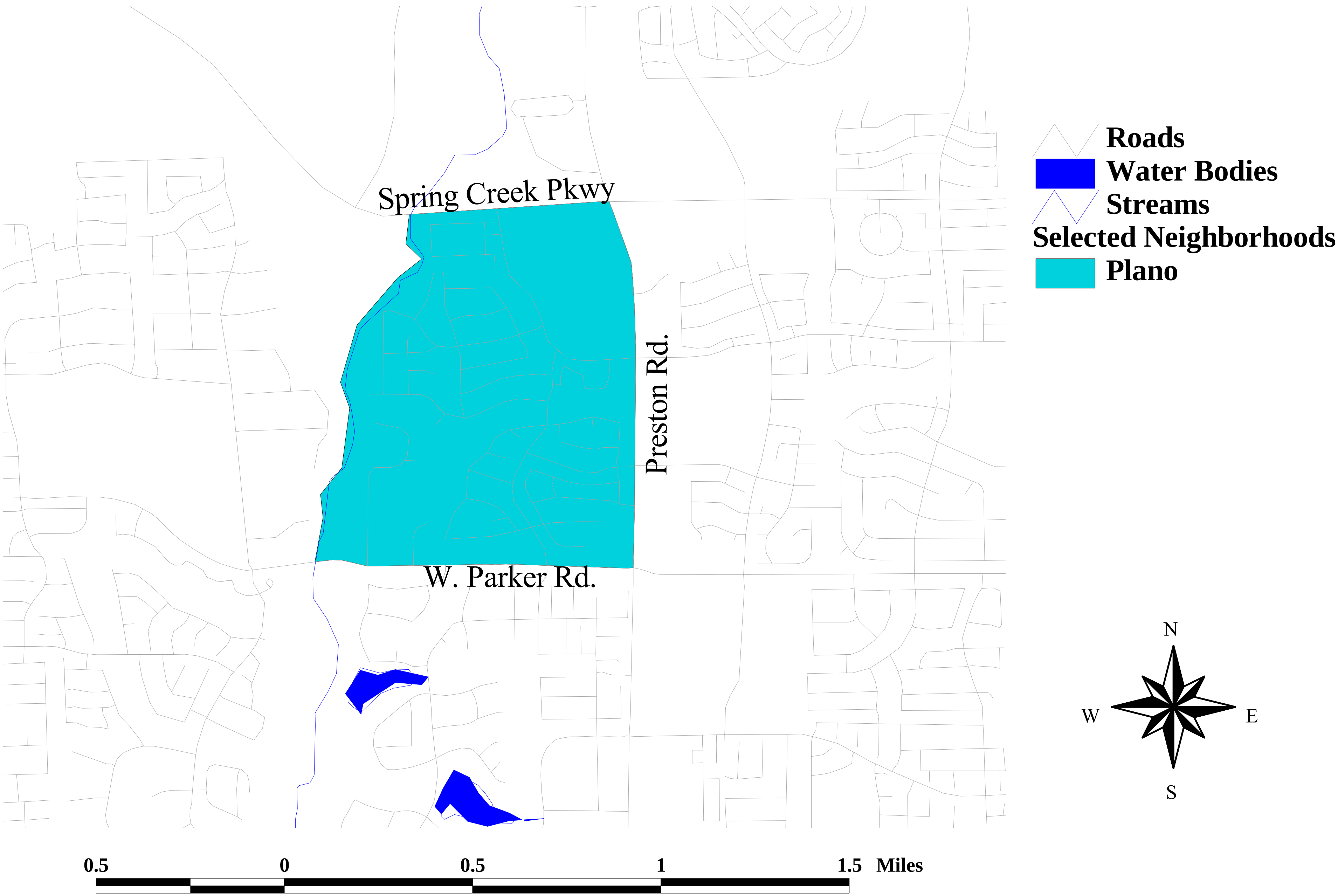
High Income, Older Housing Neighborhood (Fort Worth SW)
City of Fort Worth



Medium High Income, Newer Housing Neighborhood (Fort Worth North)
City of Fort Worth



High Income, Newer Housing Neighborhood
City of Plano



Appendix B

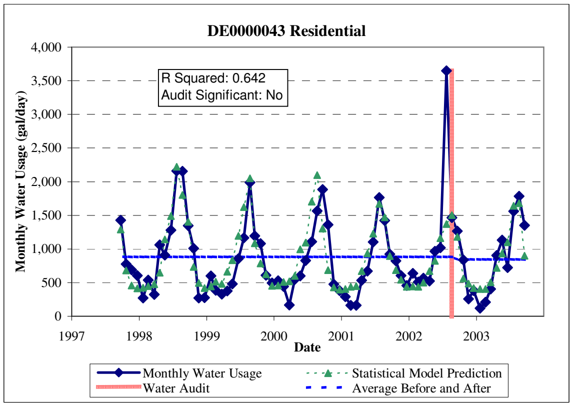
Statistical Analysis of City of Denton Water Audit Data

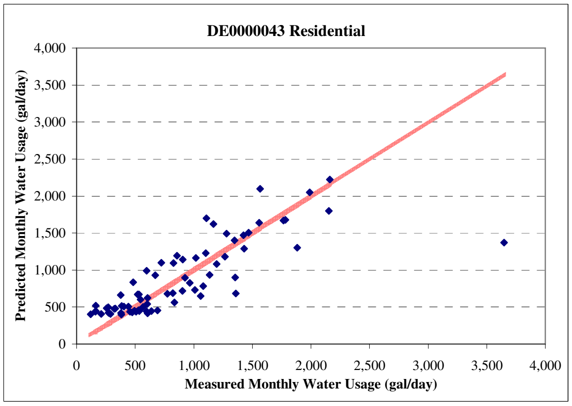
Table B-1: Effectiveness of Water Audits

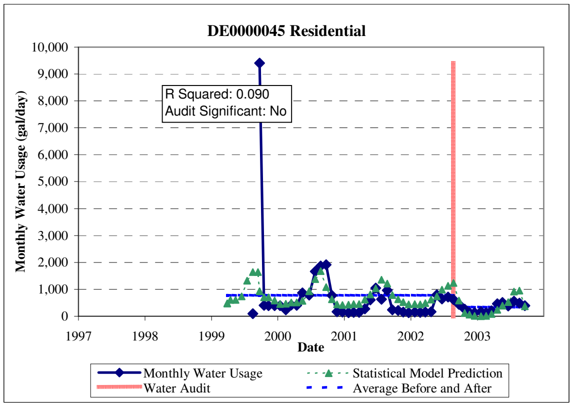
Customer	Residential or Commercial	Y Intercept	Model Coefficient A	Model Coefficient B	R^2	Audit Significant	Average Water Usage* (gal/day)	Estimated Water Savings (gal/day)	Estimated Percent Savings
DE0000043	Residential	366.28	1.48E-09	13.67	0.642	No	873		
DE0000045	Residential	-21.92	1.09E-09	425.56	0.090	No	653		
DE0000050	Commercial	629.82	1.11E-10	10.42	0.002	No	663		
DE0000052	Residential	38.15	6.70E-10	86.35	0.710	Yes	344	86	25
DE0000053	Residential	57.06	-5.65E-11	54.15	0.047	No	78		
DE0000054	Residential	208.54	9.00E-10	321.42	0.548	Yes	830	321	39
DE0000056	Residential	45.76	3.08E-10	187.96	0.459	Yes	340	188	55
DE0000057	Residential	303.48	7.85E-10	170.15	0.599	Yes	745	170	23
DE0000068	Residential	347.77	1.02E-09	-29.67	0.309	No	683		
DE0000069	Commercial	-253.29	1.07E-09	1,274.88	0.279	Yes	1,449	1,275	88
DE0000072	Residential	-55.37	1.01E-09	218.37	0.616	Yes	515	218	42
DE0000076	Residential	29.79	7.17E-12	40.82	0.046	No	47		
DE0000078	Residential	24.14	6.79E-10	170.90	0.436	No	336		
DE0000079	Commercial	-19.15	2.13E-10	92.80	0.342	Yes	150	93	62
DE0000080	Residential	409.30	3.14E-09	-35.29	0.495	No	1,546		
DE0000081	Residential	409.24	6.16E-10	-111.80	0.163	No	546		
DE0000082	Residential	135.83	1.25E-09	163.82	0.640	Yes	741	164	22
DE0000085	Residential	145.60	6.47E-10	0.84	0.726	No	360		
DE0000087	Residential	63.22	9.70E-11	96.10	0.046	No	159		
DE0000092	Residential	112.46	1.02E-11	14.78	0.121	Yes	131	15	11
DE0000093	Commercial	514.69	2.77E-14	-121.31	0.035	No	438		
DE0000094	Residential	342.04	3.00E-10	-12.91	0.206	No	450		
DE0000095	Residential	103.45	2.14E-10	-2.23	0.733	No	175		
DE0000096	Residential	170.02	6.60E-10	113.41	0.761	Yes	512	113	22
DE0000097	Residential	71.10	6.28E-10	118.60	0.858	Yes	399	119	30
DE0000099	Residential	57.33	1.27E-10	216.81	0.752	Yes	317	217	68
DE0000101	Commercial	11,142.02	5.22E-09	-4,563.77	0.146	Yes	8,224	-4,564	-56

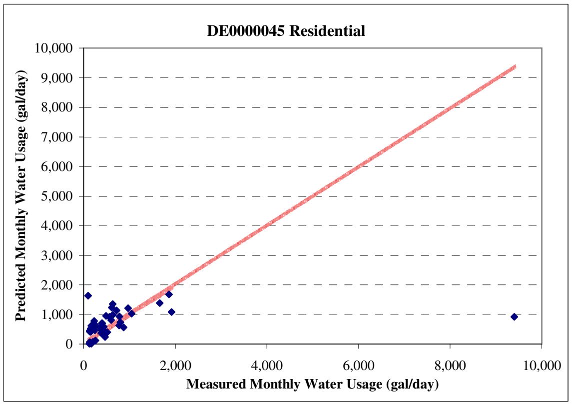
*Average over period of record if audit not significant. Average over period before audit if audit significant.

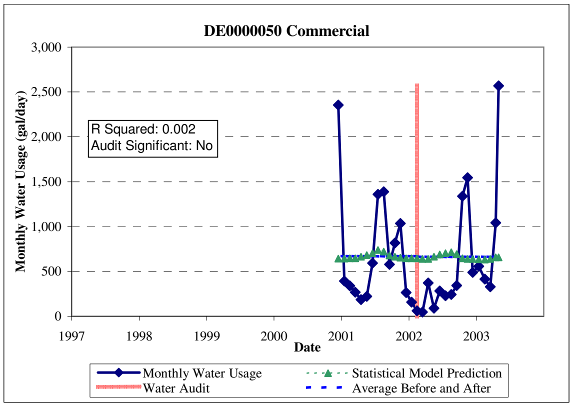
Impact of Water Audits
Comparison of Before and After Monthly Water Usage
Denton, Texas

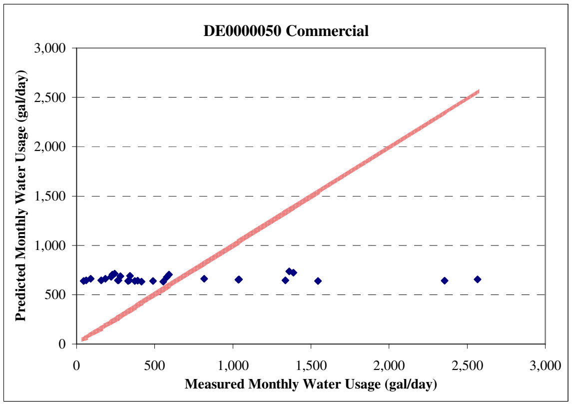


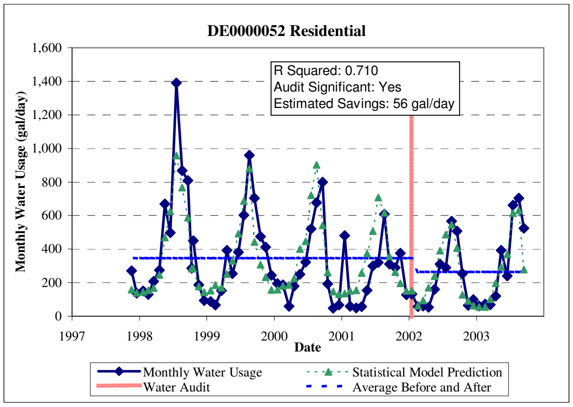


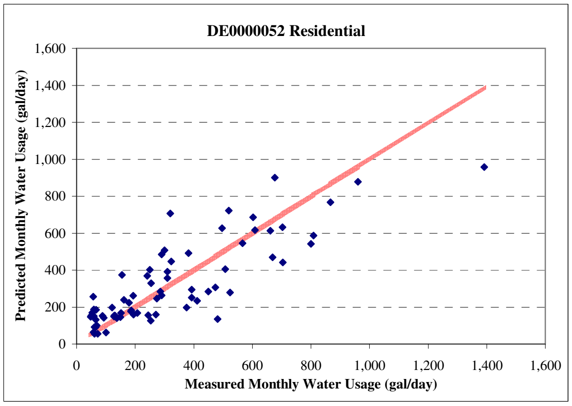












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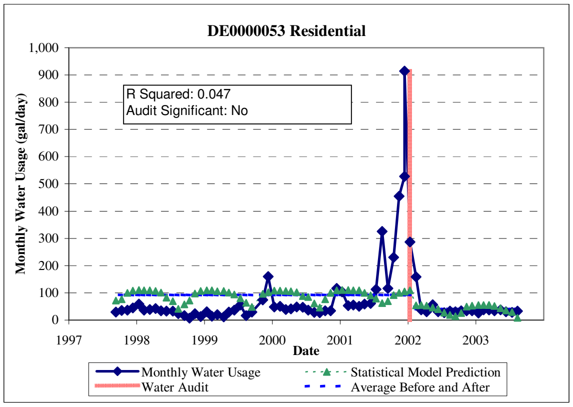

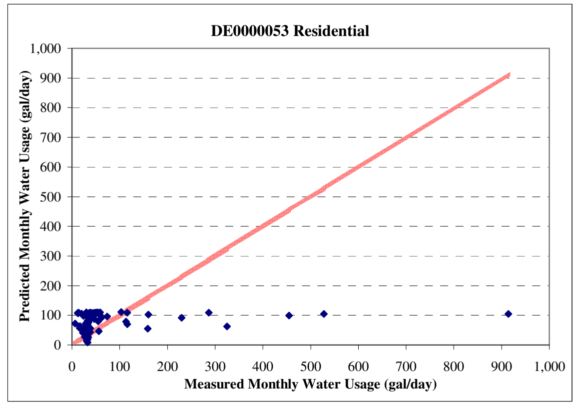

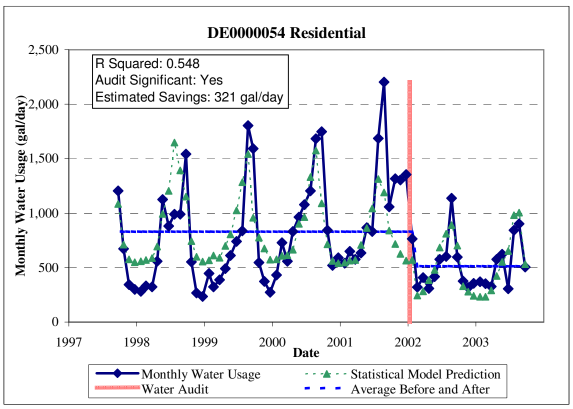

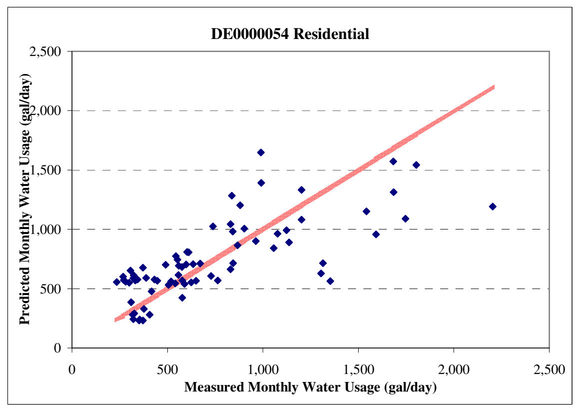

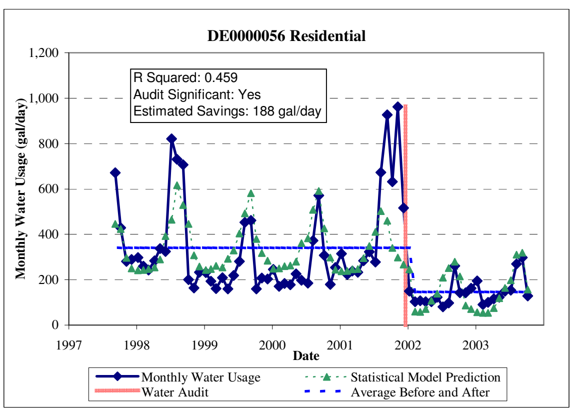

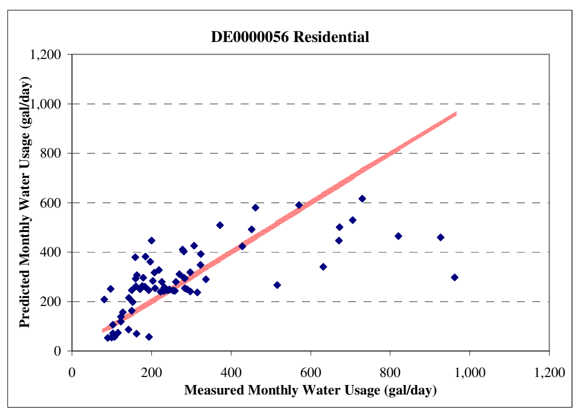

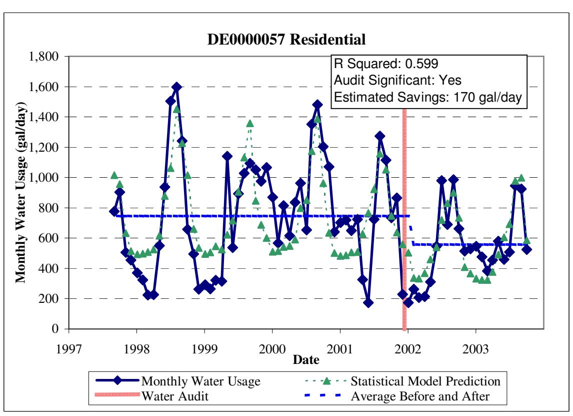

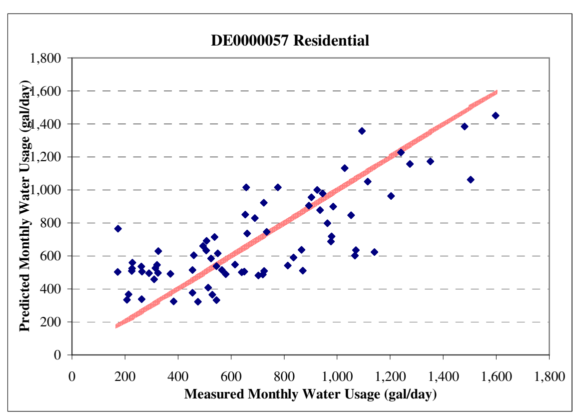

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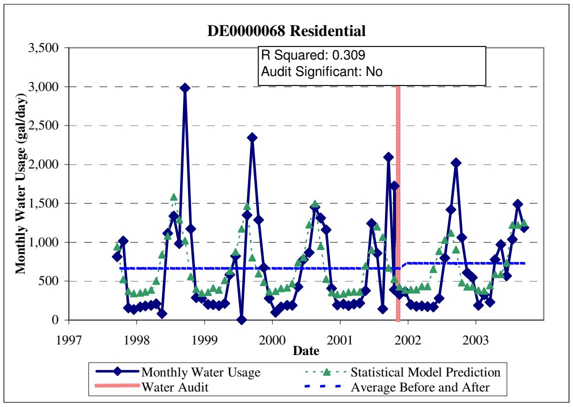
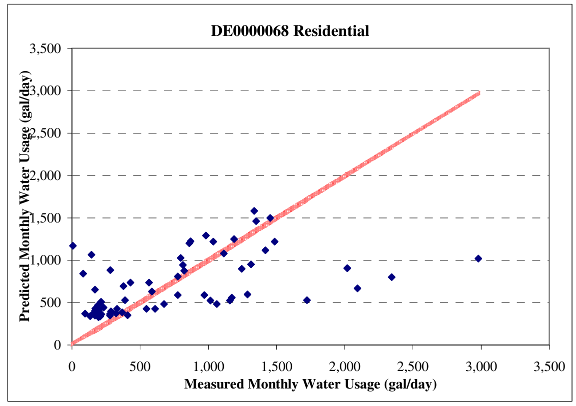
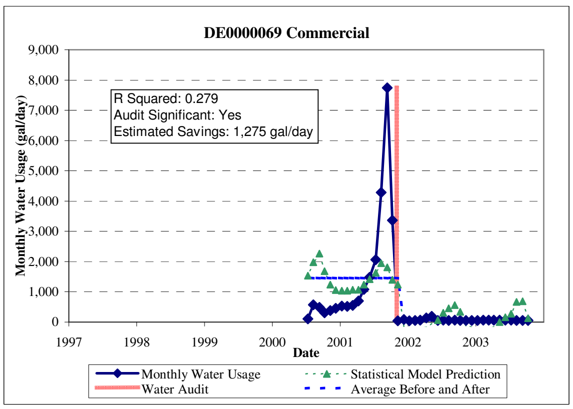
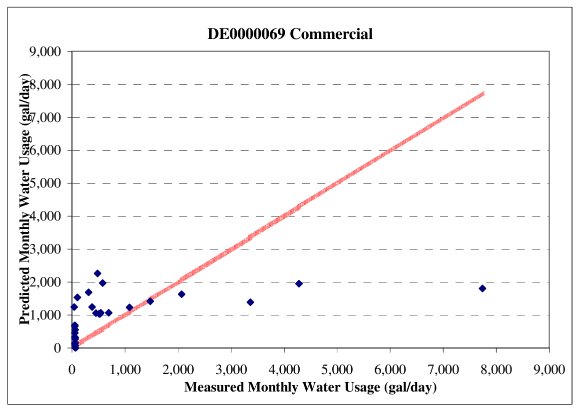
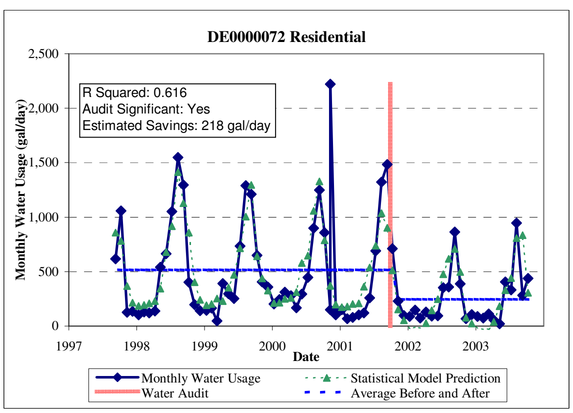
Denton, Texas

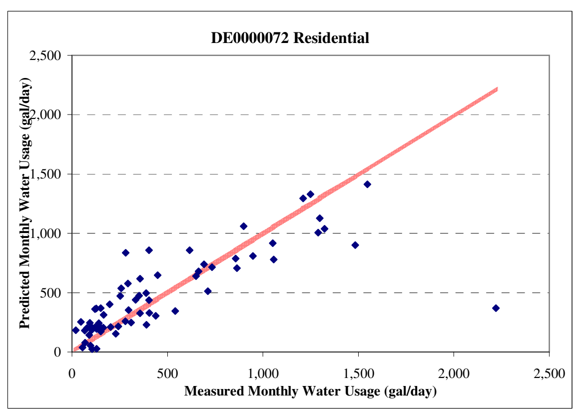


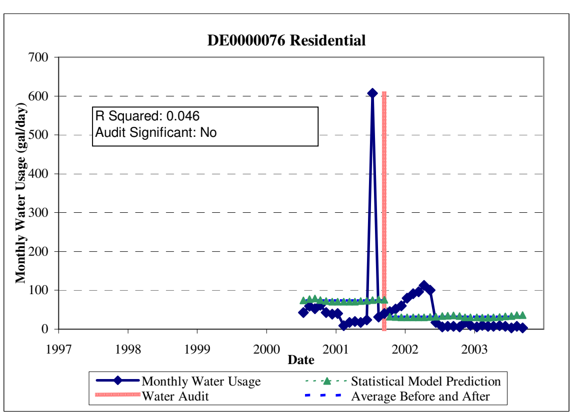


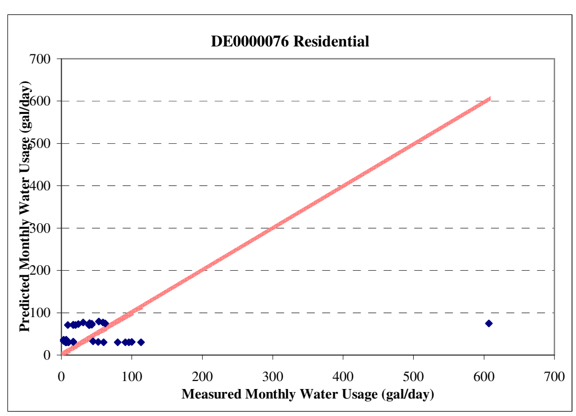












Impact of Water Audits
Comparison of Before and After Monthly Water Usage
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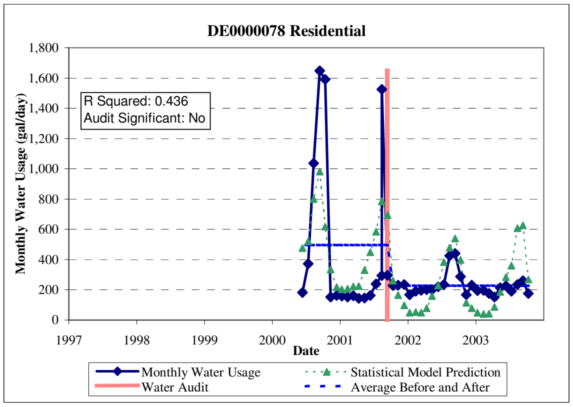

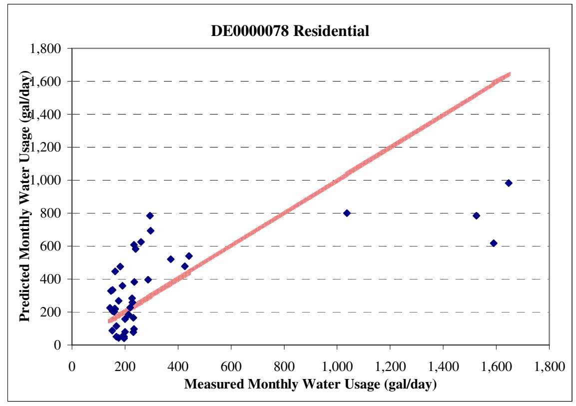

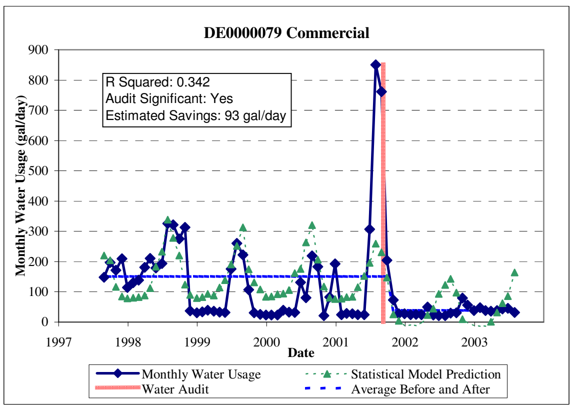

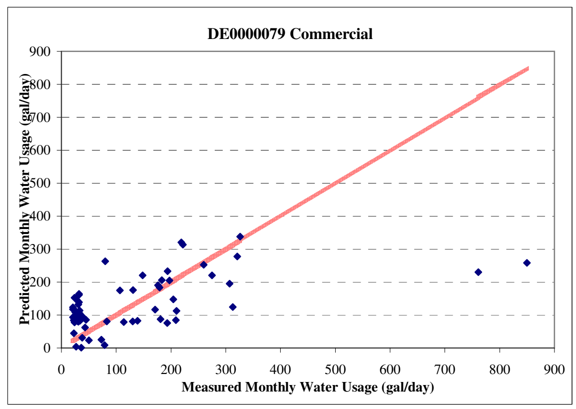

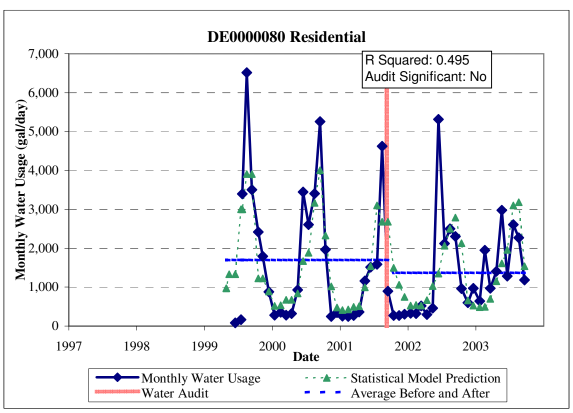

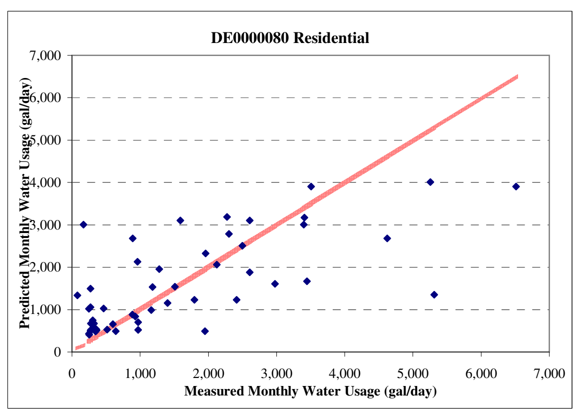

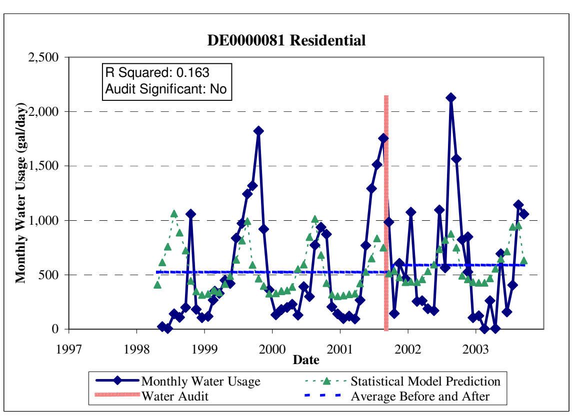

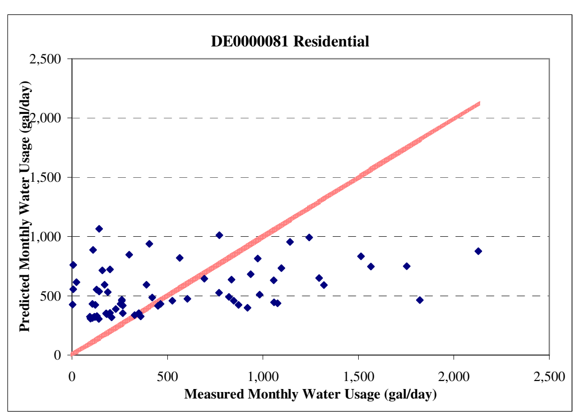

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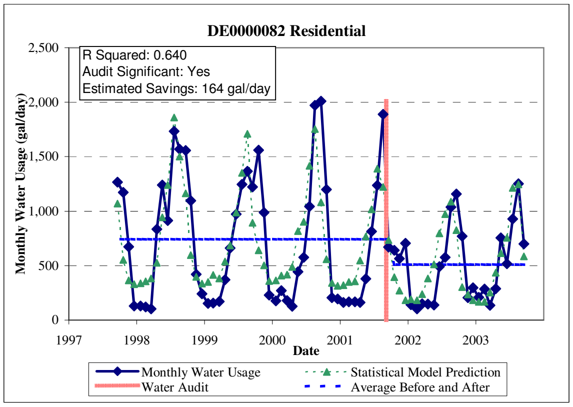

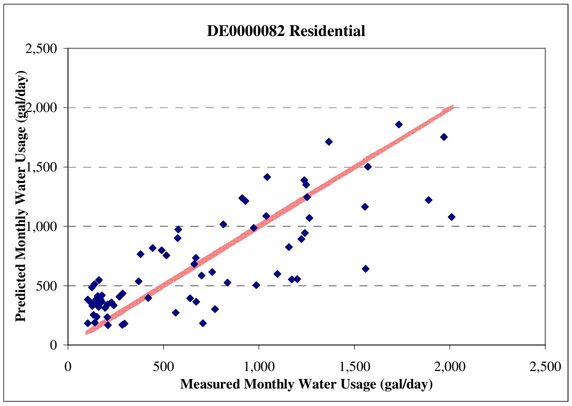

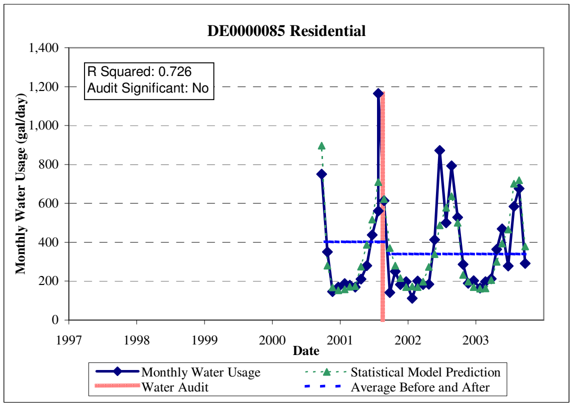

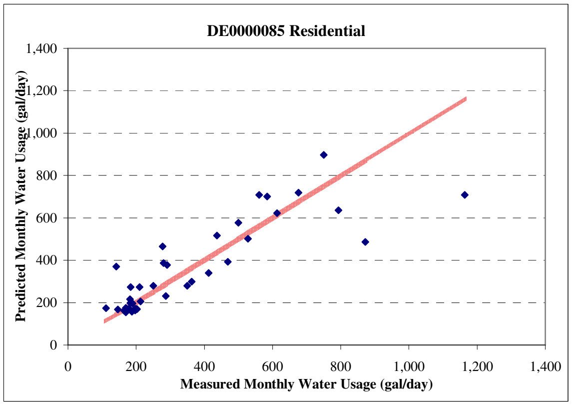

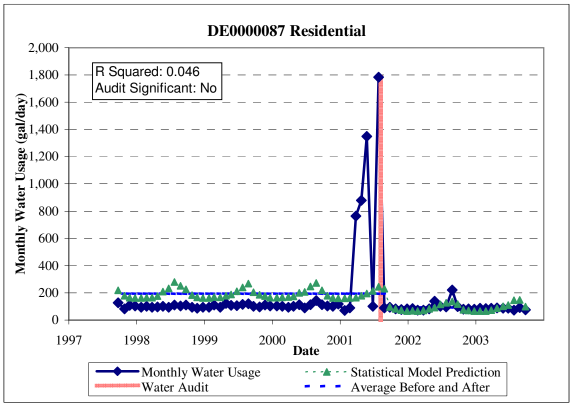

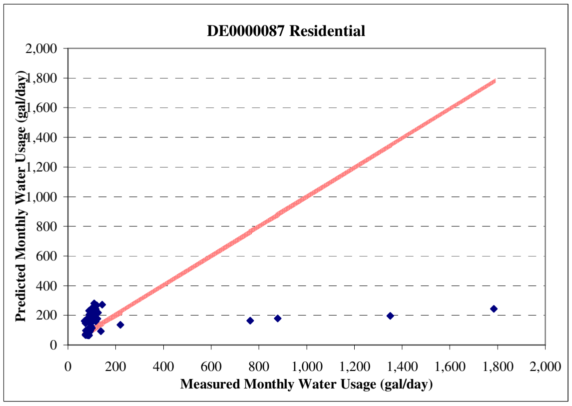

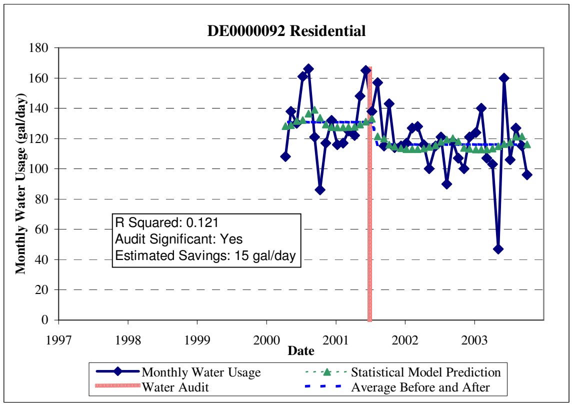

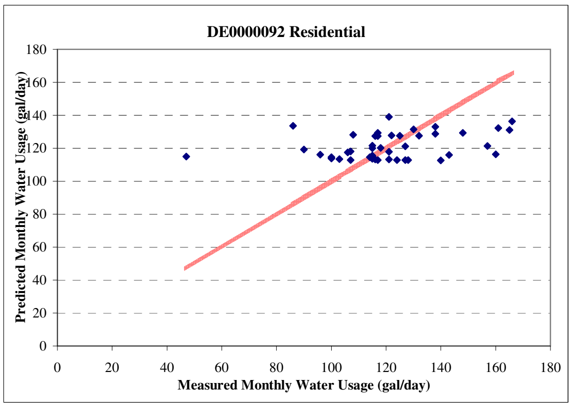

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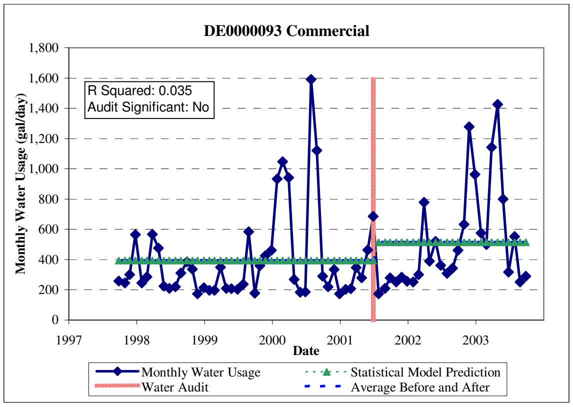

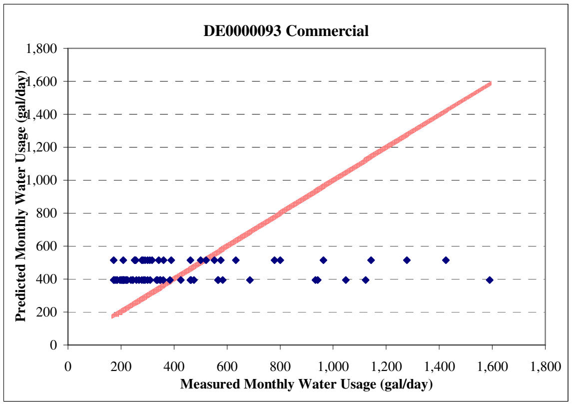

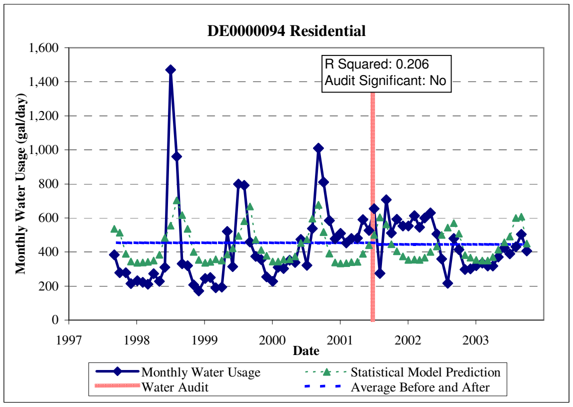

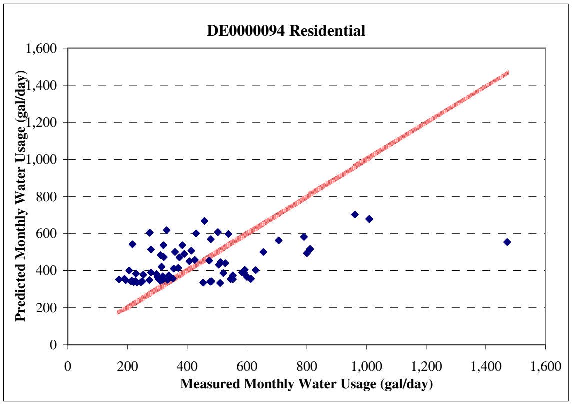

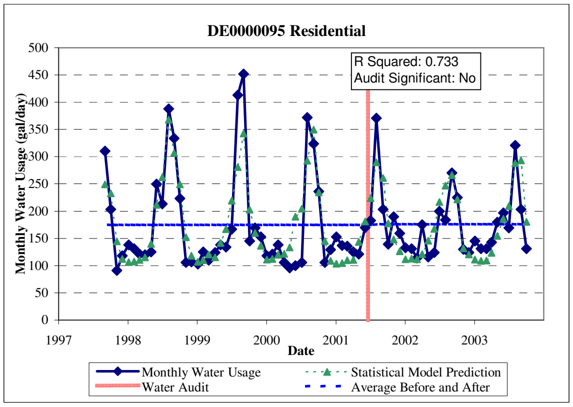

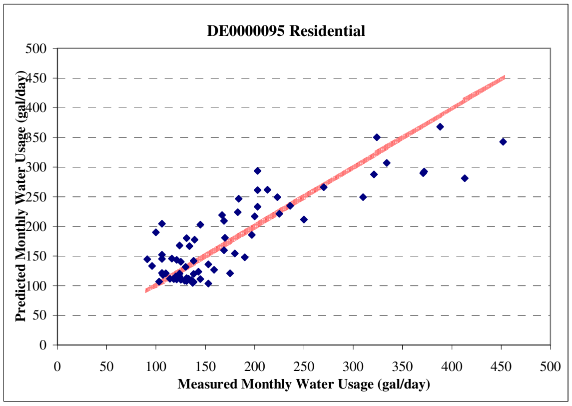

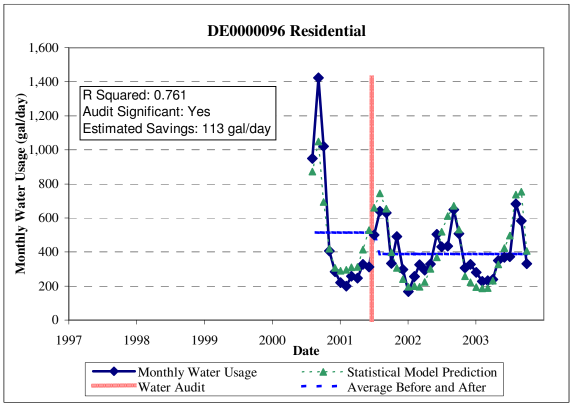

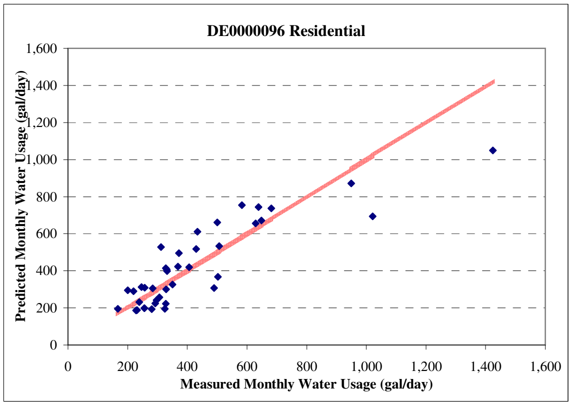

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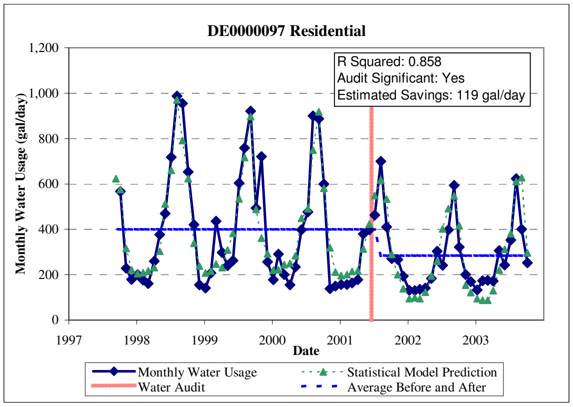
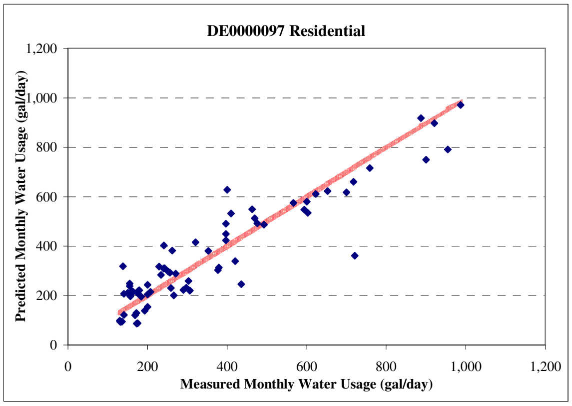
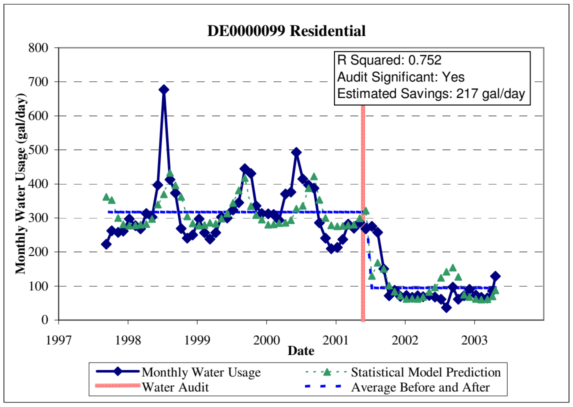
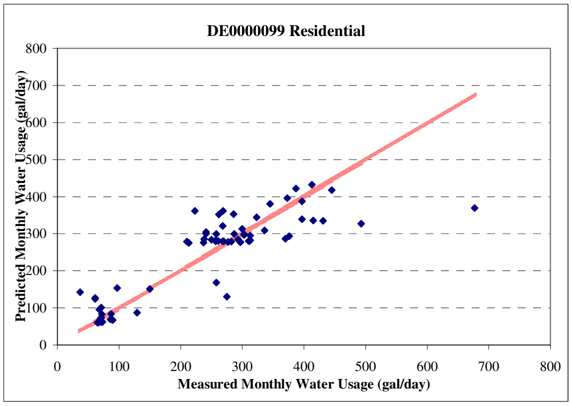
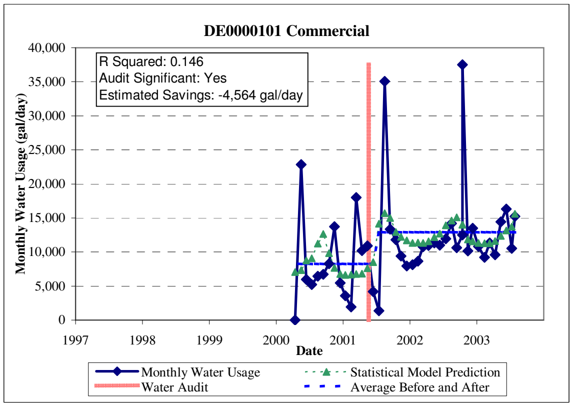
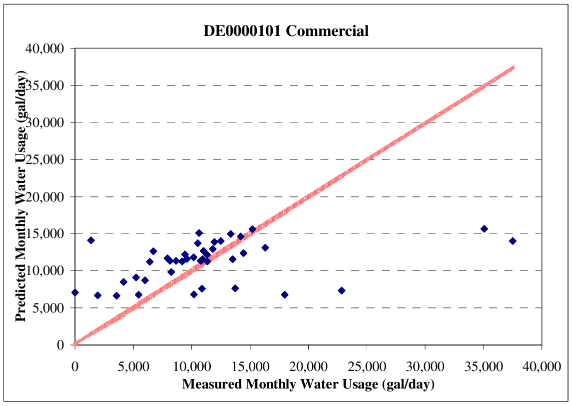












APPENDIX M

ESTIMATION OF SAVINGS AND COSTS FOR WATER CONSERVATION STRATEGIES

Estimation of Savings and Costs for Potentially Feasible Water Conservation Strategies in Region C

PROJECT: 312-1710

DATE: November 7, 2005

PREPARED FOR: File 312-1710

PREPARED BY: Brian K. McDonald, Texas P.E. 83332 Alan Plummer Associates, Inc. (APAI)

1.0 INTRODUCTION

The Region C Water Planning Group (RCWPG) selected potentially feasible water conservation strategies and divided them into categories as shown in Table 1.1.

Table 1.1: Potentially Feasible Water Conservation Strategies

Strategy	Category	User Group Type
Low-flow plumbing fixture rules	Basic	Municipal
Public and school education	Basic	Municipal
Water use reduction due to increasing water prices	Basic	Municipal
Water system audit, leak detection and repair, pressure control	Basic	Municipal
Federal residential clothes washer standards	Basic	Municipal
Water conservation pricing structure	Expanded	Municipal
Water waste prohibition	Expanded	Municipal
Coin-operated clothes washer rebate	Expanded	Municipal
Residential customer water audit	Expanded	Municipal
ICI (industrial, commercial, and institutional) general rebate	Expanded	Municipal
ICI water audit, water waste reduction, and site-specific conservation program	Expanded	Municipal
Showerhead and faucet aerator retrofit program	Less Cost-Effective	Municipal
Water-efficient toilet rebate	Less Cost-Effective	Municipal
Single-family water-efficient clothes washer rebate	Less Cost-Effective	Municipal
Landscape irrigation systems rebate	Less Cost-Effective	Municipal
Landscape design and conversion rebate	Less Cost-Effective	Municipal
Efficient new steam electric power plants	Less Cost-Effective	Municipal
Manufacturing general rebate	Manufacturing	Manufacturing
Golf course conservation	Irrigation	Irrigation
Recycling of water in operations	Mining	Mining
Reuse of treated wastewater effluent	N/A	Various

The screening and selection process is described in Section 4B of the Region C Water Plan, along with a description of each potentially feasible water conservation strategy. This memorandum has two purposes:

- To document the criteria for recommending appropriate packages of strategies for each Water User Group (WUG).
- To document assumptions made in projecting water savings and opinions of probable cost for these measures.

Of the strategies listed above, low-flow plumbing fixture rules and efficient new steam electric power plants are already accounted for in the water demand projections and will not be further discussed in this memorandum. In addition, reuse of treated wastewater effluent was considered on a case-by-case basis, and savings and costs are documented elsewhere in the plan. Summaries of the potential water savings and cost per 1,000 gallons of water saved for each municipal conservation strategy are presented in Tables 1.2 and 1.3. The water savings represent regional totals and the costs are regional average costs. Water savings and costs may differ for individual water user groups.

2.0 PUBLIC AND SCHOOL EDUCATION

2.1. *Applicability*

The public and school education program strategy was evaluated for municipal WUGs with the following characteristics:

- Existing or projected total water usage of more than 140 gpcd,
- Projected water need,
- Identified sponsor for the public and school education program

2.2 *Projected Water Savings*

Water savings from public and school education are difficult to measure. Public and school education results in indirect savings through enhancement of other water conservation measures and direct savings from changes in customer behavior. In this memorandum, the indirect savings from public education will be attributed to the other water conservation strategies with which they are associated. Therefore, the potential water savings from public and school education will be the direct savings from changes in customer behavior. The projected water savings in a given decade is estimated to be from 2 to 4.5 percent[1,2] of municipal water demand[3], with savings increasing by 0.5 percent per decade over the planning period according to Table 2.1. WUGs that implement this program by 2010 are projected to achieve 4.5 percent savings by 2060.

Table 2.1: Projected Percentage Savings by Decade for Public and School Education

2010	2020	2030	2040	2050	2060
2.0%	2.5%	3.0%	3.5%	4.0%	4.5%

It is assumed that the savings from public and school education last one year[4] and that the program must be renewed each year to maintain and increase the estimated savings.

2.3 *Additional Data Requirements*

No additional data are needed to project water savings from public and school education.

2.4 *Reliability*

Water savings from public and school education are difficult to measure and depend on customer behavior. For these reasons, the reliability of the estimated water savings is low. Public and school education reinforces and builds on previously delivered conservation messages; therefore, it is important that the public and school education program be continued from year to year in order to enhance the reliability of the savings.

Table 1.2: Summary of Municipal Water Savings by Conservation Strategy

Strategy	Implementation Date	Conservation Package	Water Savings (acre-feet per year)					
			2010	2020	2030	2040	2050	2060
Public and School Education	2010	Basic	27,958	41,473	55,961	72,609	93,094	118,633
Impact of Increasing Water Prices	2010		5,095	12,182	20,585	30,569	42,871	58,270
Water System Audit	2010		1,892	7,175	8,889	10,503	11,908	13,149
Implement New Federal Clothes Washer Standards	2010		7,793	33,543	38,595	43,800	49,540	55,985
Basic Package Subtotal			**42,737**	**94,374**	**124,030**	**157,481**	**197,413**	**246,038**
Water Conservation Pricing Structure	2010	Expanded	2,166	5,357	6,345	7,230	7,985	8,548
Water Waste Prohibition	2020		0	1,664	4,119	4,804	5,428	6,126
Coin-Op Water-Efficient Clothes Washer Rebate	2020		0	201	1,725	1,909	2,133	2,415
ICI General Rebate	2020		0	1,044	12,015	17,578	19,402	22,122
ICI Water Audit	2020		0	210	2,424	4,628	5,094	5,758
Residential Customer Audit	2010		855	4,962	5,710	6,385	7,112	7,929
Expanded Conservation Package Subtotal			**3,020**	**13,439**	**32,338**	**42,534**	**47,154**	**52,898**
Showerhead and Faucet Aerator Retrofit	NA	Less	0	0	0	0	0	0
Water-Efficient Toilet Rebate	2010	Cost-Effective	682	6,035	0	0	0	0
SF Water-Efficient Clothes Washer Rebate	2010		1,485	0	0	0	0	0
Landscape Irrigation Systems Rebate	2010		88	1,051	1,338	1,589	1,851	2,151
Landscape Design and Conversion	2010		29	324	377	423	472	529
Less Cost-Effective Conservation Package Subtotal			**2,285**	**7,410**	**1,716**	**2,011**	**2,322**	**2,680**

Table 1.3: Summary of Cost by Municipal Conservation Strategy

Strategy	Implementation Date	Conservation Package	Cost Per 1,000 Gallons of Water Saved					
			2010	2020	2030	2040	2050	2060
Public and School Education	2010	Basic	$0.91	$0.72	$0.60	$0.51	$0.44	$0.39
Impact of Increasing Water Prices	2010		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Water System Audit	2010		$2.26	$0.66	$0.63	$0.64	$0.63	$0.63
Implement New Federal Clothes Washer Standards	2010		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Basic Package Subtotal			**$0.70**	**$0.37**	**$0.32**	**$0.28**	**$0.25**	**$0.22**
Water Conservation Pricing Structure	2010	Expanded	$0.11	$0.04	$0.00	$0.00	$0.00	$0.00
Water Waste Prohibition	2020		-	$1.11	$0.52	$0.49	$0.47	$0.46
Coin-Op Water-Efficient Clothes Washer Rebate	2020		-	$0.49	$0.49	$0.49	$0.49	$0.49
ICI General Rebate	2020		-	$0.65	$0.65	$0.65	$0.65	$0.65
ICI Water Audit	2020		-	$1.17	$1.20	$1.23	$1.27	$1.29
Residential Customer Audit	2010		$1.93	$1.90	$1.91	$1.93	$1.95	$1.98
Expanded Conservation Package Subtotal			**$0.62**	**$0.93**	**$0.76**	**$0.77**	**$0.77**	**$0.78**
Showerhead and Faucet Aerator Retrofit	NA	Less	-	-	-	-	-	-
Water-Efficient Toilet Rebate	2010	Cost-Effective	$5.36	$3.87	-	-	-	-
SF Water-Efficient Clothes Washer Rebate	2010		$4.27	-	-	-	-	-
Landscape Irrigation Systems Rebate	2010		$11.78	$10.70	$9.77	$9.24	$8.92	$8.71
Landscape Design and Conversion	2010		$11.93	$11.72	$11.71	$11.74	$11.84	$11.97
Less Cost-Effective Conservation Package Subtotal			**$4.98**	**$5.19**	**$10.20**	**$9.76**	**$9.52**	**$9.35**

2.5 *Opinion of Probable Cost*

Previous planning efforts have budgeted between $0.50 and $0.75 per resident per year for public and school education[5,6,7]. The projected savings of 2.0 to 4.5 percent of municipal water use is relatively aggressive compared to other planning efforts, justifying a greater level of spending in Region C. The City of Dallas currently spends approximately $1.00 per resident per year on public and school education. On a per capita basis, it is anticipated that smaller cities would have to spend up to $3.00 per resident per year to deliver effective water conservation messages.

The opinion of probable annual cost for each WUG to which this measure applies was derived from Figure 2.1 using population projections. For a given WUG and given year, the probable unit cost was calculated as the probable annual cost divided by projected water savings.

3.0 IMPACT OF INCREASING WATER PRICES

3.1 *Applicability*

The impact of increasing water prices was evaluated for all municipal WUGs.

3.2 *Potential Water Savings*

The change in water demand from increases in water prices is called the price elasticity of water demand. A price elasticity of -0.20 indicates that a 1.00 percent increase in water rates will cause a -0.20 percent decrease in water usage. Estimation of potential water savings from the price elasticity of water demand requires projection of future treated water prices.

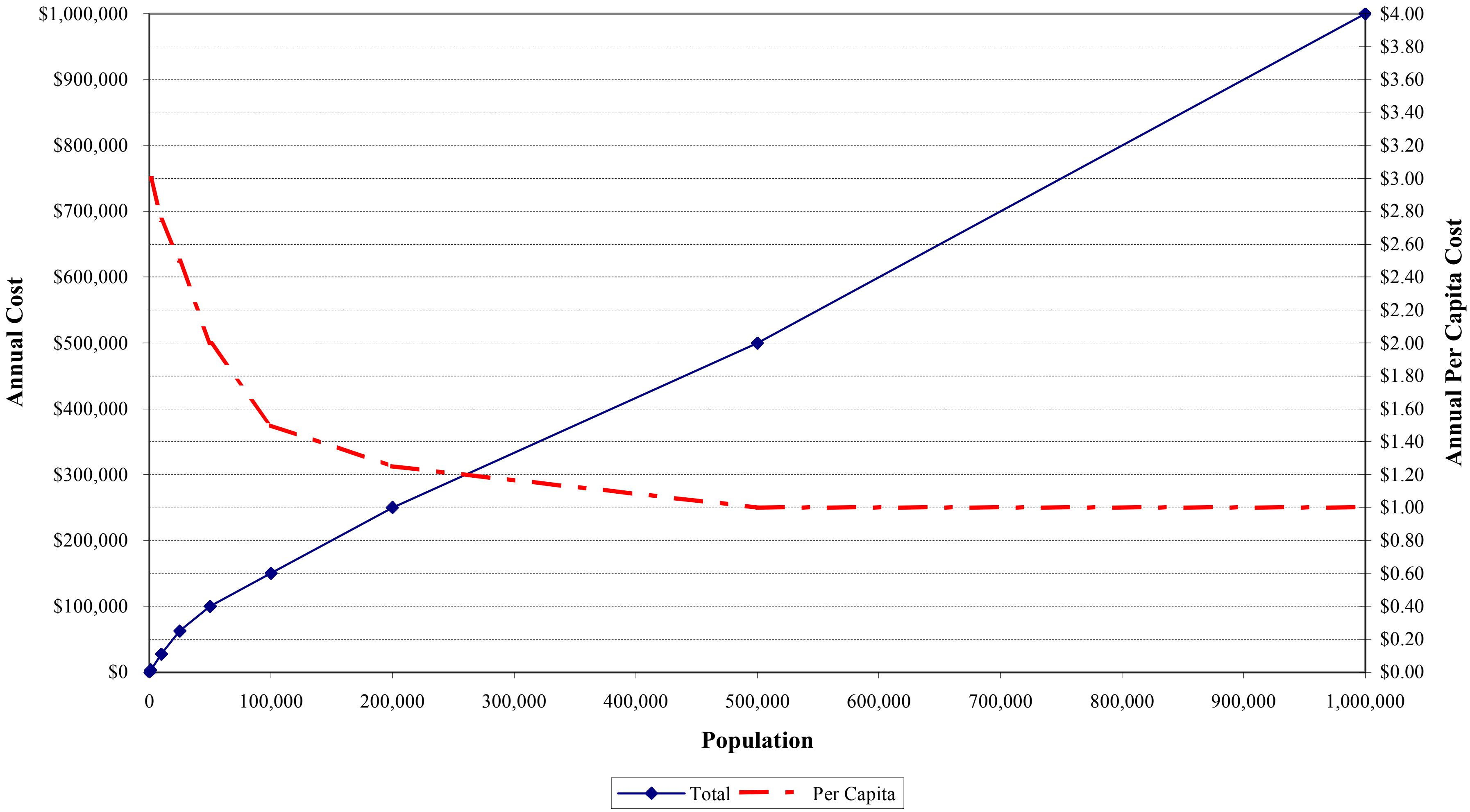
The Texas Water Development Board (TWDB) sponsored a 1991 study[8] of per capita water consumption in Texas. Price elasticities were estimated from regression analyses of 11 years of municipal water usage data, water pricing, income statistics, weather data, and conservation programs across 72 cities in 28 Metropolitan Statistical Areas (MSAs) in Texas. Estimated price elasticities in Region C are shown in Table 3.1. Price elasticity in the "urban" Metroplex group was relatively low compared to many other areas in the state and compared to the "suburban" Metroplex group. The Amarillo (-0.047), Brownsville-Harlingen (-0.025), El Paso (-0.042), and McAllen-Edinburg-Mission (-0.033) MSAs had smaller average price elasticities than the "urban" Metroplex.

The TWDB also sponsored a 1999 study[9] of water price elasticity in single-family homes in Austin, Corpus Christi, and San Antonio. The overall price elasticities for single-family water demand in Austin, Corpus Christi, and the San Antonio Water System are -0.17, -0.20, and -0.20, respectively (Table 3.1). Note that the price elasticities from the 1991 study are based on municipal water usage, which includes single- and multi-family residential, commercial, and other water uses, while the price elasticities from the 1999 study are for single-family residential water usage only.

No studies of price elasticity for rural cities and water systems were identified.

Unfortunately, historical price elasticities depend upon economic and other conditions that may not persist in the future, and no projections of future price elasticities were identified. Therefore, a long-term price elasticity of -0.20 is recommended for projecting the impact of increasing water prices in Region C. It has also been assumed that real water prices will increase by 20 percent over the planning period and that half of the potential impact of increasing water prices will be offset by increasing income.

Figure 2.1: Opinion of Probable Public and School Education Cost



The projected water savings for each WUG is one half of the long-term price elasticity multiplied by the change in real water price multiplied by the municipal water demand. It was assumed that real water prices will increase linearly during planning period, for a total 20 percent increase by 2060 (Table 3.2). By the end of the planning period, increasing water prices are projected to cause a 2 percent reduction in total water demand.

Table 3.1: Summary of Region C and Selected Other Price Elasticities

MSA Group*	1991 TWDB Study (Municipal Usage)		1999 TWDB Study (Single-Family Usage)
	Summer	Winter	
Metroplex**	-0.066	-0.065	Not studied
Metroplex Suburban***	-0.177	-0.187	Not studied
Sherman-Denison	-0.132	-0.130	Not studied
Austin	-0.293	-0.316	-0.17
Corpus Christi	-0.074	-0.078	-0.20
San Antonio	-0.224	-0.228	-0.20

* The 1999 study examined the City of Austin, the City of Corpus Christi, and the San Antonio Water System.

** Includes the Cities of Fort Worth, Arlington, Dallas, Plano, Carrollton, Irving, and Richardson

*** Includes the Cities of Cleburne, Bedford, Euless, Grapevine, Haltom City, Hurst, North Richland Hills, Garland, Grand Prairie, Mesquite, and Denton

Table 3.2: Projected Real Water Price Increases During Planning Period

2010	2020	2030	2040	2050	2060
1.8%	5.4%	9.1%	12.7%	16.4%	20.0%

3.3 *Additional Data Requirements and Reliability*

Customer participation is highly reliable for this strategy, since changes in water prices automatically affect all water customers. However, the projected water savings are based on broad, general assumptions, and the reliability of the above projections is low.

The reliability of the above projections could be increased if detailed projections of real treated water prices and real income were available. This would require projections of raw water costs, treatment costs, distribution costs, and administrative costs for each WUG.

3.4 *Opinion of Probable Cost*

The projected water savings should be realized at no cost to the WUGs.

4.0 WATER SYSTEM AUDIT, LEAK DETECTION AND REPAIR, AND PRESSURE CONTROL

4.1 *Applicability*

HB 3338, passed by the 78th Texas Legislature, requires water system audits for retail public utilities. In addition, the feasibility of the system water audit, pressure control, and leak detection strategy was evaluated for publicly-owned municipal WUGs with the following characteristics:

- Existing or projected total water usage of more than 140 gpcd,
- Total unaccounted-for water (UFW) in excess of the target level.
- Projected water need, and

- Identified sponsor for this strategy.

4.2 *Potential Water Savings*

For a given WUG, the projected water savings associated with the water system audit, leak detection and repair, and pressure control strategy is the difference between the WUG's actual UFW and the target UFW multiplied by the municipal water demand multiplied by an implementation schedule percentage. The target UFW is 12 percent for most WUGs and 18 percent for WUGs with widespread, rural systems. It has been assumed that "Implementation Schedule" is 33.3 percent in the first decade of implementation and 100 percent by the second decade of implementation. The program should be continued indefinitely to maintain the target UFW.

No water savings were projected for WUGs that have not reported their UFW.

4.3 *Additional Data Requirements*

Although the Texas Water Development Board's (TWDB's) annual survey of water utilities requests an estimate of UFW, many entities do not report this information. Estimates of UFW are unavailable for many Region C WUGs. In the absence of WUG-specific information, it is not possible to project potential water savings from this strategy. UFW is known for WUGs that comprise 68 percent of 2060 municipal water demand.

During the next round of regional water planning, water system audit information will be available from the audits mandated by HB 3338. Assuming that this information is reported in the IWA format, it should be possible to calculate actual infrastructure leakage index (ILI) and compare it to a target ILI. This should allow projection of potential water savings from leak detection and repair in the next round of planning. Unfortunately, WUG-specific ILI information is not yet available.

4.4 *Reliability*

The projected water savings are based on reported UFW data, which increases the reliability of the estimates. However, UFW as a percentage of total produced and/or purchased water can vary widely from year to year, even if the total system water loss does not change. Therefore, the reliability of the potential water savings is medium.

4.5 *Opinion of Probable Cost*

The cost for a system water audit is highly variable and depends on the size of the water system and the degree of uncertainty present in the estimated losses. The opinion of probable cost for a "desktop" audit, conducted by assembling readily available data and estimating losses for which data are not available, may range from \$5,000 to \$50,000. The opinion of probable cost for an "intensive" audit, where field investigations are conducted to generate additional data with which to refine the desktop audit, may range from \$50,000 to \$500,000 or more. It has been assumed that WUGs will implement the desktop audit and will incur costs as shown in Figure 4.1.

In addition, a typical cost for leak detection and repair is \$400 per mile of main per year. Using estimates of the number of miles per main for different populations (Figure 4.2), an opinion of the probable annual cost for leak detection and repair was generated (Figure 4.3).

For a given WUG and given year, the probable unit cost was calculated as the probable annual cost divided by projected water savings.

Figure 4.1: Opinion of Probable Cost for Water System Audit Cost

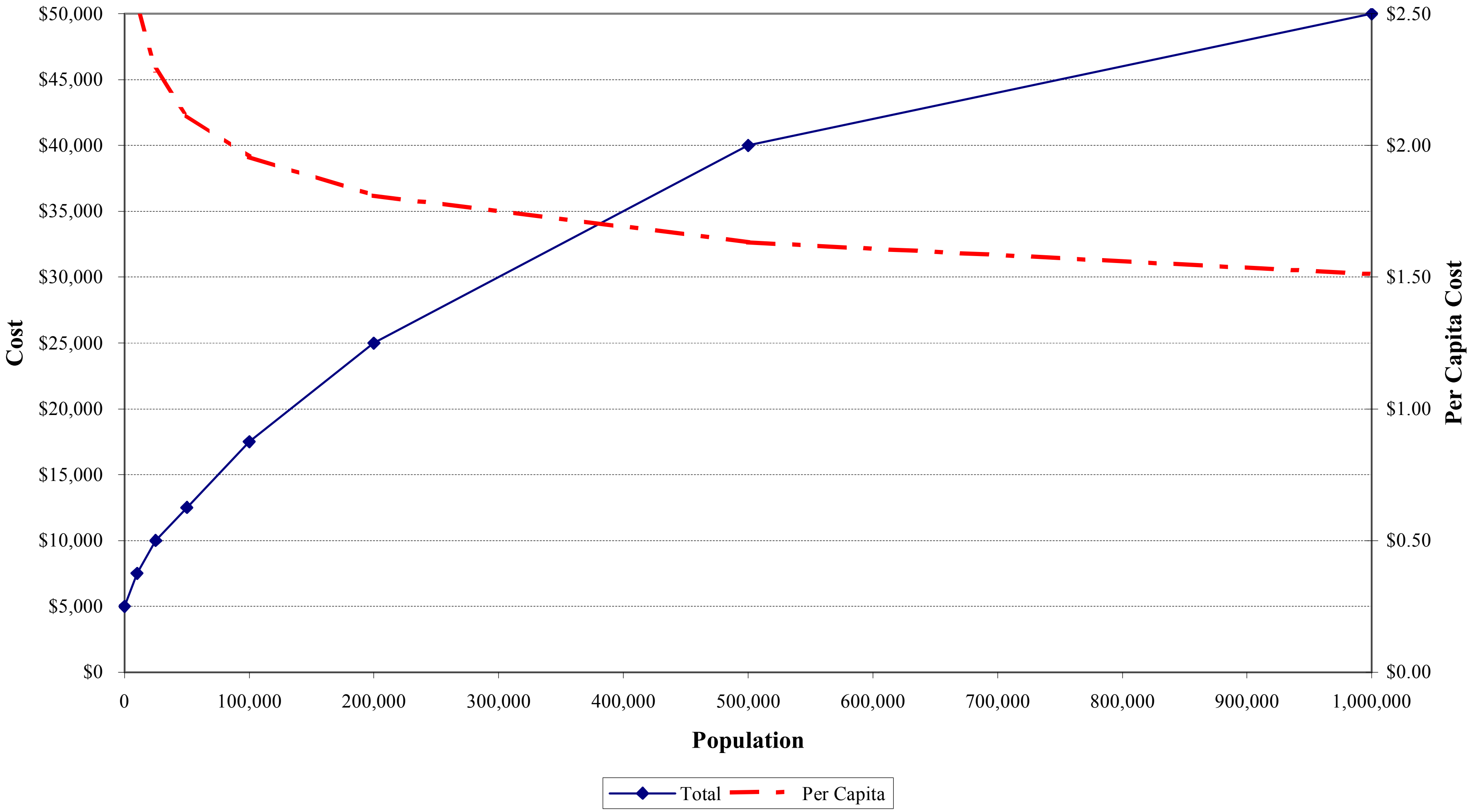


Figure 4.2: Municipal Population Vs. Miles of Water Main

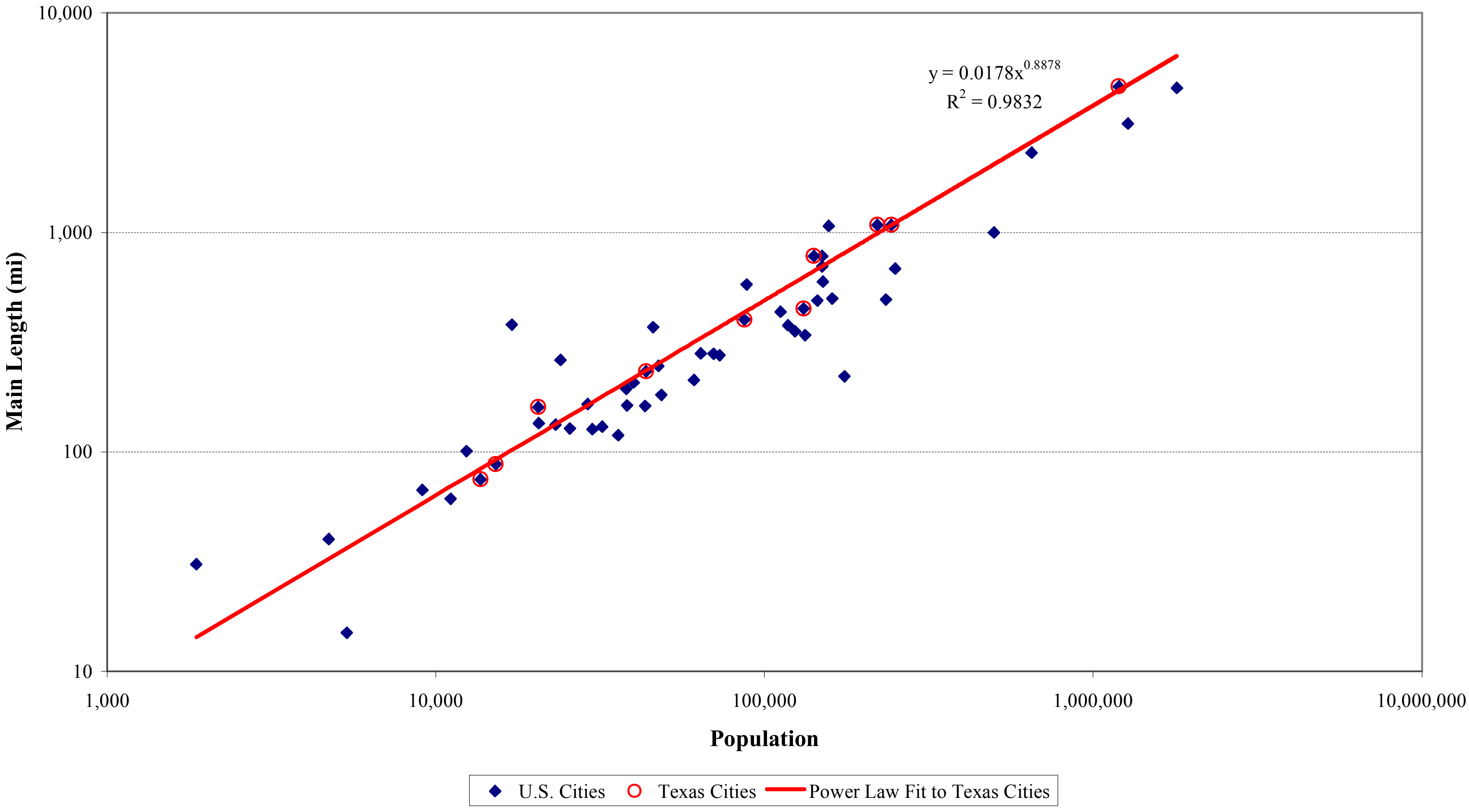
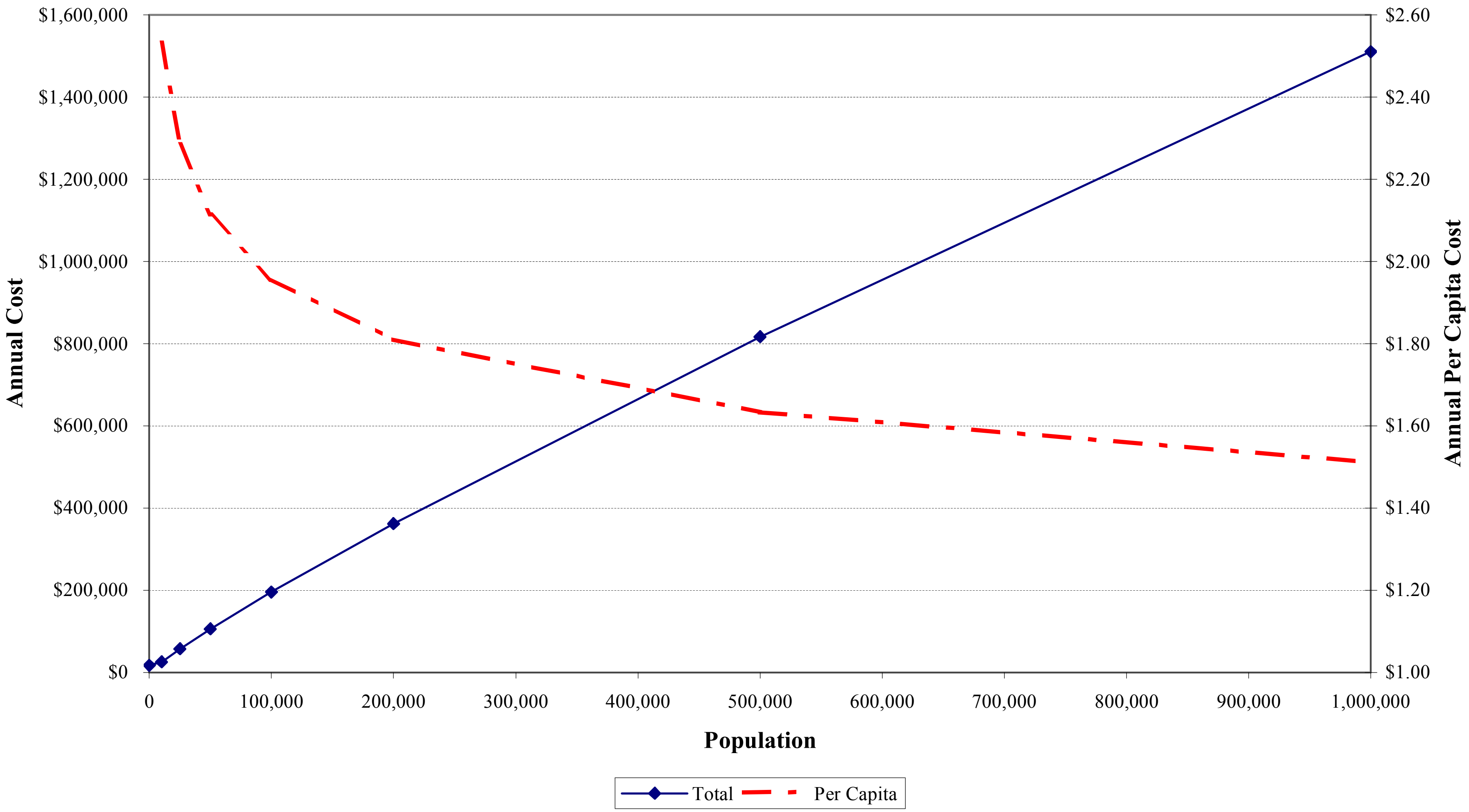


Figure 4.3: Opinion of Probable Cost for Leak Detection and Repair



5.0 FEDERAL RESIDENTIAL CLOTHES WASHER STANDARDS

5.1 *Applicability*

Potential savings from federal residential clothes washer standards were evaluated for all municipal WUGs.

5.2 *Potential Water Savings*

For a given WUG, the projected water savings associated with federal residential clothes washer standards is the projected difference in the number of efficient clothes washers with and without the federal standards multiplied by the number of people per single-family housing unit multiplied by the projected per capita savings. The number of people per single-family housing unit was obtained from 2000 Census data, and the projected per capita savings is 5.6 gpcd[10,11].

The projected number of efficient clothes washers in the absence of federal standards is the projected number of single-family homes multiplied by single-family washer density multiplied by the initial market penetration of efficient clothes washers. The projected number of single-family homes is based on the Region C population projections and Census density data. The projected single-family washer density is 0.9 washers per home[12]. The initial market penetration of efficient clothes washers is assumed to be 5 percent[11].

The projected number of efficient clothes washers in the presence of federal standards is the projected number of single-family homes multiplied by single-family washer density minus the number of inefficient clothes washers. The number of inefficient clothes washers decrease over time at the natural replacement rate. The life of a residential clothes washer is approximately 13 years[10], and the assumed natural replacement rate is 7.7 percent per year.

5.3 *Additional Data Requirements*

No additional data are necessary to project savings from federal residential clothes washer standards.

5.4 *Reliability*

The projected water savings should be realized without action by the WUG. Therefore, the reliability of the potential water savings is relatively high.

5.5 *Opinion of Probable Cost*

The projected water savings should be realized at no cost to the WUGs.

6.0 WATER CONSERVATION PRICING STRUCTURE

6.1 *Applicability*

The water conservation pricing structure strategy was evaluated for municipal WUGs with the following characteristics:

- Existing or projected total water usage of more than 140 gpcd,
- Projected water need,
- No water conservation pricing structure, and
- Identified sponsor for the water conservation pricing structure.

6.2 *Potential Water Savings*

The projected water savings for each WUG is a percentage of municipal water demand multiplied by an implementation schedule percentage. Selection of water conservation pricing structures is a highly WUG-specific task requiring a separate rate study. For purposes of projecting conservation savings, it was assumed that implementation of a water conservation pricing structure would save 1.5 percent of total water demand for each municipal WUG. No savings were projected if the current water pricing structure is unknown.

The assumed implementation schedule percentages are 50 percent in the first decade of implementation and 100 percent by the second decade of implementation.

6.3 *Additional Data Requirements*

The current water pricing structure is known for WUGs that comprise 86 percent of 2060 municipal water demand. For a complete estimate of potential water savings, it is necessary to identify the existing water pricing structure for the remaining WUGs.

6.4 *Reliability*

Customer participation is highly reliable for this strategy, since changes to the pricing structure automatically affect all water customers. However, it is not possible to predict the water conservation pricing structure that each WUG would adopt, so the reliability of the savings estimate is low.

6.5 *Opinion of Probable Cost*

It has been assumed that the probable cost to pass an ordinance in a city of up to 25,000 people is $5,000 and that the cost to pass an ordinance in a city of more than 50,000 people is $10,000. The opinion of probable cost for a water conservation pricing structure ordinance is shown in Figure 6.1. In addition, based on actual rate studies, an opinion of probable cost was developed for the rate study necessary to support a water conservation pricing structure (Figure 6.2).

To obtain an opinion of probable annual costs, probable capital costs were amortized at a 6 percent interest rate for a term of 20 years. For a given WUG and given year, the probable unit cost was calculated as the probable annual cost divided by projected water savings.

7.0 WATER WASTE PROHIBITION

7.1 *Applicability*

The water waste prohibition strategy was evaluated for municipal WUGs with the following characteristics:

- Existing or projected total water usage of more than 140 gpcd.
- Projected water need.
- No water waste prohibition.
- Identified sponsor to implement a water waste prohibition strategy.

Some WUGs are unable to implement this strategy, because they lack ordinance-making authority.

Figure 6.1: Opinion of Probable Cost for Water Conservation Pricing Structure Ordinance

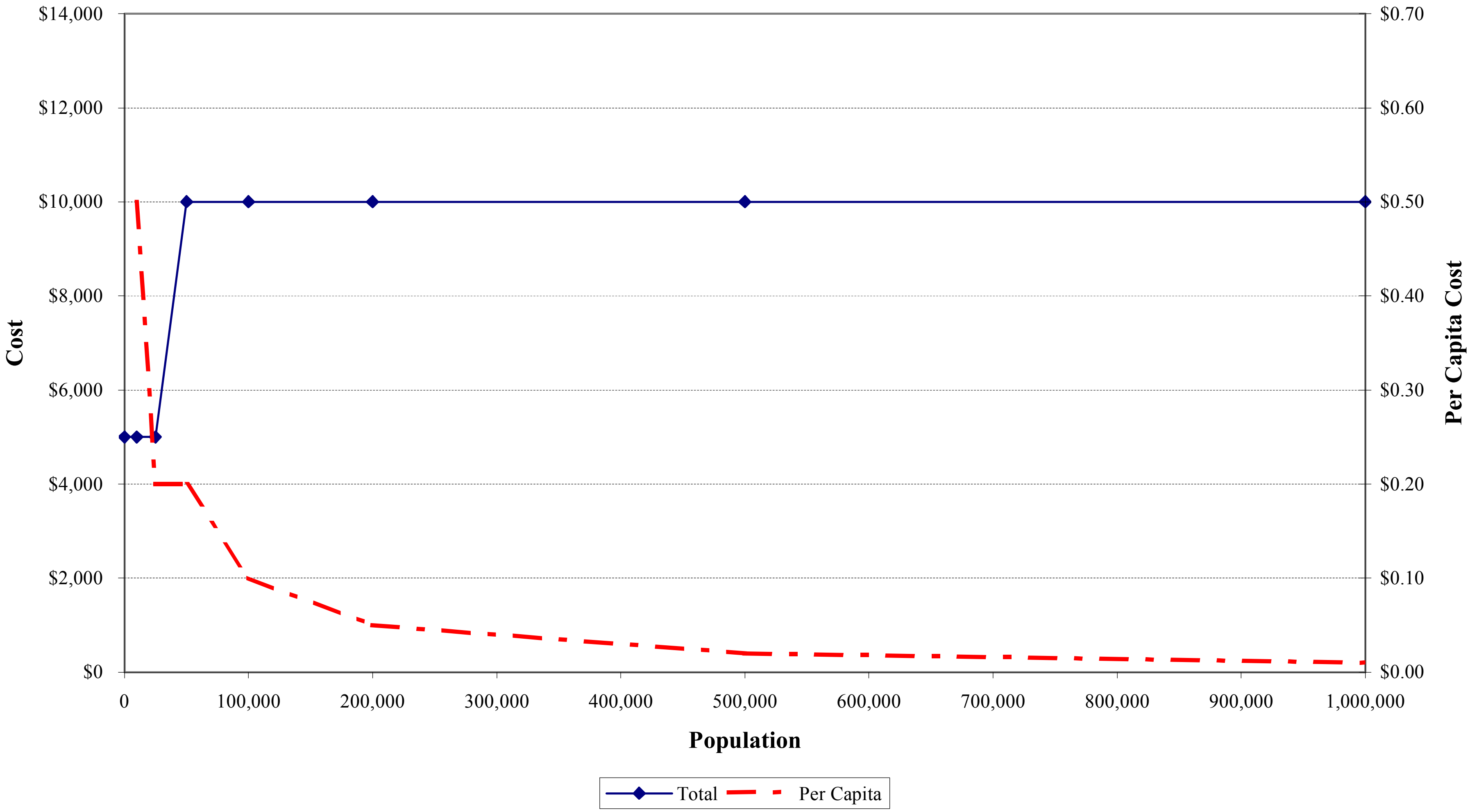
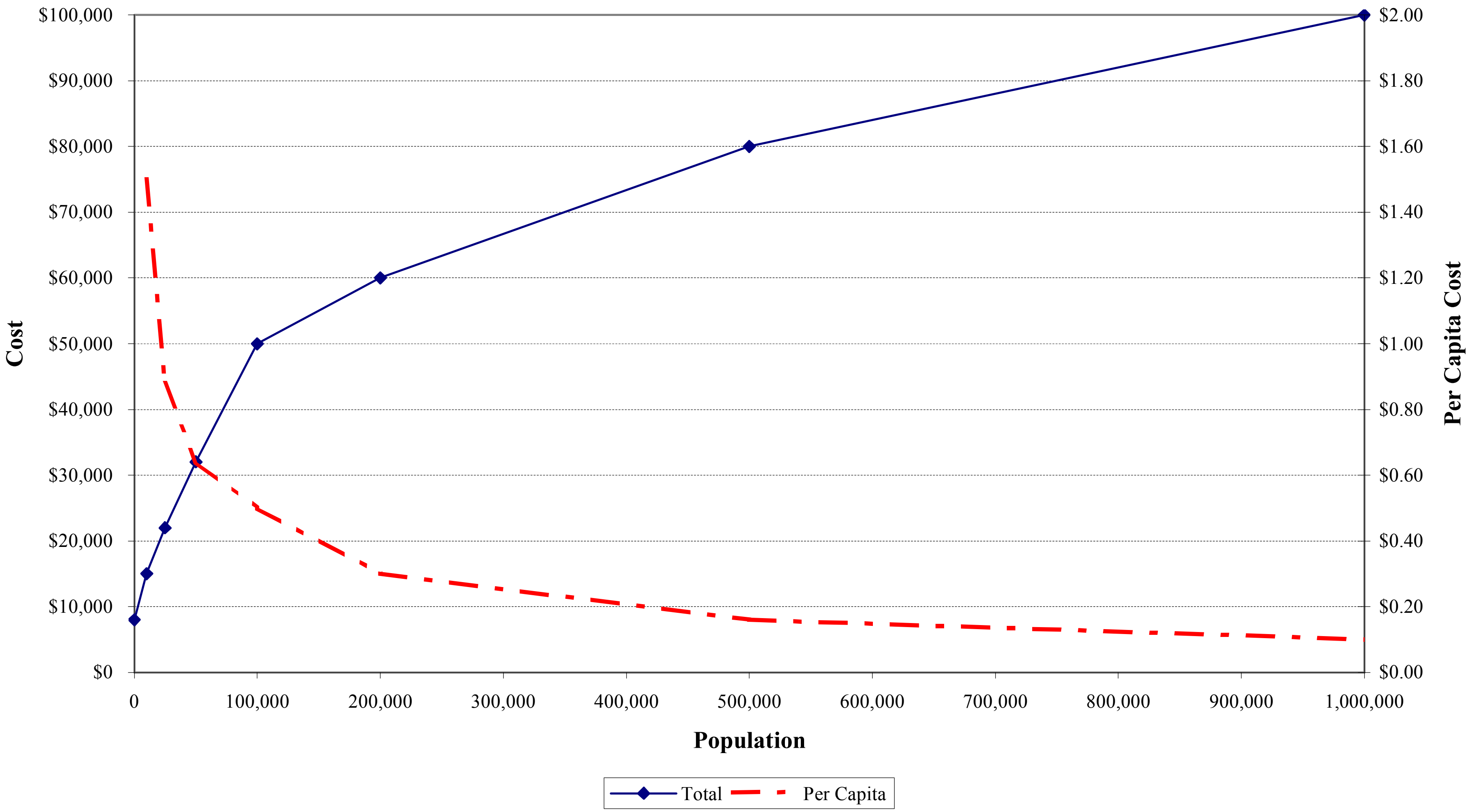


Figure 6.2: Opinion of Probable Cost for Water Conservation Pricing Structure Rate Study



7.2 *Potential Water Savings*

The projected water savings for each WUG is the product of the following parameters:

- Potential water savings
- Municipal water demand
- Percent seasonal water demand
- Percent automatic irrigation
- Compliance rate
- Implementation schedule percentage

Table 7.1 lists assumed values for these parameters. It has been assumed that the implementation schedule percentages are 50 percent in the first decade of implementation and 100 percent by the second decade of implementation.

Table 7.1: Water Waste Prohibition Savings Assumptions

Item	Value	Units	Reference
Potential Water Savings	3.3	percent	see text
Municipal Water Demand	Individual	ac-ft/yr	3
Percent Seasonal Water Demand	Individual	percent	estimated
Percent Automatic Irrigation	Individual	percent	estimated
Compliance Rate	90	percent	see text

The projected savings are based on use of rain sensors that shut off automatic irrigation systems when it is raining or when it has rained recently (depending on the type of sensor). It is estimated that the percentage of watering cycles missed during a drought year is approximately equal to the minimum annual percentage of days with ½-inch rainfall events. At the DFW Airport (and its predecessor weather stations), the minimum annual percentage of days with ½-inch rainfall events is approximately 3.3 percent[13]. Therefore, it is projected that the potential water savings from an irrigation water waste prohibition strategy is 3.3 percent of irrigation water use for accounts that have automatic irrigation systems.

The percentage of customers that have automatic irrigation systems varies considerably across the region and is unknown in most cases. In the July 2004 RCWPG survey, 52 out of 129 total responses provided an estimate of the percentage of customers that have automatic irrigation systems. Table 7.2 shows the assumed percentage of customers that have automatic irrigation systems for different types of WUGs.

Table 7.2: Assumed Percentage of Customers With Automatic Irrigation Systems

WUG Type	Percentage of Existing Customers	Percentage of New Customers
Established	Actual percentage or 20 percent	Maximum of existing percentage or 50 percent
Recent growers	Actual percentage or 50 percent	Maximum of existing percentage or 50 percent
Future growers	Actual percentage or 20 percent	Maximum of existing percentage or 80 percent
Rural	Actual percentage or 5 percent	Maximum of existing percentage or 5 percent

It is anticipated that it will take ten years of implementation to realize full compliance with the water waste prohibition. However, anecdotal evidence indicates that there is some fraction of rain sensors that will be out of order[14]. Therefore, "full compliance" is projected to be 90 percent participation.

The estimated potential water savings has been based on a requirement for rain sensors for automatic irrigation systems. As discussed previously, a water waste prohibition may address numerous other sources of waste, but it is not possible to predict what the ordinance for an individual WUG might prohibit. The potential water savings from other sources of water waste have not been estimated.

It is anticipated that the customer will replace the rain sensor at the end of its useful life at his or her own expense to maintain compliance with the water waste prohibition and that the projected water savings will be permanent.

7.3 *Additional Data Requirements*

The status of whether a WUG has implemented a water waste prohibition is known for WUGs that comprise 71 percent of 2060 municipal water demand. Additional information is necessary to project water savings for the remainder of the WUGs.

In addition, the percentage of customer accounts that have automatic irrigation systems is unknown for most WUGs. Additional data would improve the reliability of the assumptions shown in Section 7.2.

7.4 *Reliability*

For an individual automatic irrigation system with a rain sensor in working order, the reliability of the potential water savings should be high. However, for an entire WUG to realize its projected savings, there must be enforcement of the water waste prohibition to ensure that the projected number of rain sensors are installed, and automatic irrigation system owners must keep the rain sensor in working order. In addition, there are uncertainties associated with the estimates of the market penetration of automatic irrigation systems. Due to uncertainties described above, the reliability of the projected savings is medium.

7.5 *Opinion of Probable Cost*

The primary costs for this measure include adoption of an ordinance and enforcement of the ordinance. The costs for adoption of an ordinance are shown in Figure 6.1. The opinion of probable annual cost is the amortized cost of an ordinance (6 percent interest over a 20 year term) and an enforcement cost of $0.25 per capita per year. For a given WUG and given year, the probable unit cost was calculated as the probable annual cost divided by projected water savings.

8.0 COIN-OP CLOTHES WASHER REBATE

8.1 *Applicability*

The coin-op clothes washer rebate strategy was evaluated for municipal WUGs with the following characteristics:

- Existing or projected total water usage of more than 140 gpcd.
- Projected water need.
- No coin-op clothes washer rebate strategy.
- Identified sponsor to implement a coin-op clothes washer rebate strategy.

8.2 *Potential Water Savings*

In a given year, the projected water savings for a WUG is the sum of savings from multi-family coin-op clothes washer rebates and Laundromat coin-op clothes washer rebates.

The projected savings from multi-family coin-op clothes washer rebates is the product of the following parameters:

- Number of active multi-family rebates
- Multi-family clothes washer density
- Multi-family population density

- Projected per capita savings
- Percentage of rebates not given to freeriders

It has been assumed that, over the 8 year life of a commercial clothes washer[10], issued rebates would result in a final market penetration of efficient clothes washers of 15 percent, up from the assumed initial market penetration of 2 percent[10]. The assumed multi-family clothes washer density is 1 washer for every 18 housing units[10]. The multi-family population density was estimated from 2000 Census data. The projected per capita savings is 5.6 gpcd[11]. The projected water savings assume freeridership of 2 percent. Freeriders are defined as program participants that, in the absence of a rebate program, would have purchased efficient clothes washers at the same time at their own expense but instead took advantage of the rebate program. The rebate program incurs a cost for distributing rebates to freeriders but does not save water, because the savings would have been realized anyway at private expense.

The projected savings from laundromat coin-op clothes washer rebates is based on the following parameters:

- Number of active laundromat rebates
- Laundromat clothes washer density
- Percentage of single-family homes without clothes washers
- Single-family population density
- Projected per capita savings
- Percentage of rebates not given to freeriders

Assumptions for most of these factors are discussed above. The assumed laundromat clothes washer density is 1 washer for every 12 single-family housing units that do not have clothes washers. It has been assumed that 90 percent of single-family homes have clothes washers.

8.3 *Additional Data Requirements*

No additional data are required to project potential water savings.

8.4 *Reliability*

The per capita savings should be highly reliable because the savings are based on changes in clothes washer design. However, due to significant uncertainty in the final market penetration, the overall reliability of the savings estimate is low to medium.

8.5 *Opinion of Probable Cost*

The Austin Water Utility offers a $150 coin-op clothes washer rebate (with some customers that use gas water heaters receiving an additional $100 from the gas utility)[15], the San Antonio Water System offers a $100 coin-op clothes washer rebate[16], and El Paso Water Utilities offers a $300 coin-op clothes washer rebate[17]. Based on this information, the opinion of probable cost for a single rebate is $208, including the rebate, marketing, and overhead. The cost for a single rebate is amortized at 6 percent interest over 8 years, the expected life of the washer. The opinion of probable annual cost is the sum of amortized costs for all rebates given in the previous 8 years. For a given WUG and given year, the probable unit cost was calculated as the probable annual cost divided by projected water savings.

9.0 RESIDENTIAL CUSTOMER WATER AUDIT

9.1 *Applicability*

The residential customer water audit strategy was evaluated for municipal WUGs with the following characteristics:

- Existing or projected total water usage of more than 140 gpcd.
- Projected water need.
- No residential customer water audit strategy.
- Identified sponsor to implement a residential customer water audit strategy.

9.2 *Potential Water Savings*

A residential customer water audit involves both indoor and outdoor aspects. It is assumed that the auditor will replace showerheads and faucet aerators if they are high-flow devices and will replace toilet flappers if a leaking toilet flapper is discovered during the audit. In addition, the auditor will inspect the irrigation system and its operation and offer suggestions on how to irrigate more efficiently. Audits may result in changed customer behavior.

9.2.1 Indoor Savings

Based on the natural replacement rate and measure life projected for the showerheads and aerators, it is likely that many of the audited customers will already have low-flow showerheads and aerators, even if customers with pre-1995 housing are targeted for the audits. In addition, any savings from replacement of showerheads and faucet aerators would be short-lived because such savings would eventually be realized through natural replacement. No savings have been projected from replacement of showerheads and faucet aerators. In addition, the savings amount from changed behavior is difficult to quantify and has not been estimated.

It is projected that toilet flapper replacement will save an additional 4.6 gallons per day per audited single-family unit and 2.4 gallons per day per audited multi-family unit. This is calculated assuming a leakage rate of 24 gallons per day per leaking toilet[18], a 10.5 percent chance that a given toilet leaks[18], the number of bathrooms per unit (2.27 for single-family[19] and 1.2 for multi-family[10]), and the probability that a traditional toilet flapper will fit the leaking toilet (80 percent[18]).

The life of a toilet flapper is about 5 years[10]. Although many toilet flappers are low quality and deteriorate in the presence of chlorine[18], it is assumed that the installed toilet flappers would be chlorine-resistant.

In the absence of a residential customer water audit program, the initial market penetration is zero percent. It is assumed that approximately 20 percent of contacted customers will agree to an indoor water audit[18]. If the WUG targets that the top 25 percent of residential water users for customer water audits (both indoor and irrigation), then a reasonable final market penetration is 5 percent of all residential customers (20 percent of top 25 percent). Coupled with the measure life of 5 years, this indicates a participation rate of 1 percent of customers per year.

9.2.1 Outdoor Savings

The potential outdoor water savings is approximately 10 percent of irrigation water use for audited single-family customers and 15 percent of irrigation water use for audited multi-family customers[10]. In addition, since high-use customers are targeted for residential customer water audits, it is assumed that these customers will use twice as much water for irrigation as the average customer.

After the initial five-year implementation period, the residential customer water audit program must be continued indefinitely to maintain the projected final market penetration.

9.3 *Additional Data Requirements*

No additional data are required to project the potential water savings from the residential customer water audit program.

9.4 *Reliability*

Although replacement of a leaking toilet flapper repairs the initial leak, the replacement flapper may eventually develop a leak as well. There is also significant uncertainty in the following factors:

- Flapper leakage rate,
- Percentage of leaking toilets for each WUG,
- Savings from the irrigation portion of the audit,
- Customer participation rate,
- Final market penetration, and
- Measure life.

Therefore, the reliability of the potential water savings from residential customer water audits is low.

9.5 *Opinion of Probable Cost*

The opinion of probable cost for a single audit is $102, including the labor, marketing, materials, and overhead. The cost for a single audit is amortized at 6 percent interest over 5 years, the expected life of the measure. The opinion of probable annual cost is the sum of amortized costs for all audits conducted in the previous 5 years. For a given WUG and given year, the probable unit cost was calculated as the probable annual cost divided by projected water savings.

10.0 ICI GENERAL REBATE PROGRAM

10.1 *Applicability*

The ICI general rebate program strategy was evaluated for municipal WUGs with the following characteristics:

- Existing or projected total water usage of more than 140 gpcd.
- Projected water need.
- No ICI general rebate program.
- Identified sponsor to implement an ICI general rebate program.

10.2 *Potential Water Savings*

It has been assumed that the potential water savings for the ICI general rebate program is three percent of total ICI water usage for each WUG that implements the strategy and that the potential water savings will last for 15 years. These assumptions are consistent with the assumption in the TWDB-sponsored study of conservation potential in Texas[10].

It is anticipated that water savings will be realized at a rate of 0.2 percent per year for 15 years until the full 3 percent of total ICI water usage is realized. The 15-year implementation period is designed to match the projected life of the water savings. After the initial implementation period, the ICI general rebate program must be continued indefinitely to maintain the projected water savings.

10.3 *Additional Data Requirements*

Data regarding the amount of ICI water use was not available for every WUG. For WUGs that have not reported their ICI water use, no estimate of potential savings was made.

10.4 *Reliability*

The effectiveness of this strategy depends on the degree of participation of ICI customers. In addition, the estimate of potential water savings is not based on WUG-specific data. Therefore, the reliability of the potential water savings for the ICI general rebate program is low.

10.5 *Opinion of Probable Cost*

As an example of this type of program, the San Antonio Water System paid a rebate of $1.1 million to Philips Semiconductor for water conservation measures that saved approximately 462,000 gallons per day[20]. Roughly consistent with this example, the opinion of probable cost for rebates is $2.30 per gallon per day of savings, including the rebate, marketing, and overhead. The cost for a single rebate is amortized at 6 percent interest over 15 years, the expected life of the measure. The opinion of probable annual cost is the sum of amortized costs for all rebates given in the previous 15 years. For a given WUG and given year, the probable unit cost was calculated as the probable annual cost divided by projected water savings.

11.0 ICI WATER AUDIT, WATER WASTE REDUCTION, AND SITE-SPECIFIC CONSERVATION PROGRAM

11.1 *Applicability*

The ICI water audit, water waste reduction, and site-specific conservation program strategy was evaluated for municipal WUGs with the following characteristics:

- Existing or projected total water usage of more than 140 gpcd.
- Projected water need.
- No ICI water audit, water waste reduction, and site-specific conservation program.
- Identified sponsor to implement an ICI water audit, water waste reduction, and site-specific conservation program.

11.2 *Potential Water Savings*

Typical literature values for the potential water savings from an ICI water audit, water waste reduction, and site-specific water conservation program range from 10 to 40 percent of total water usage for audited ICI customers[1,4,6,9,11,18,21,22,23]. It is projected that the potential savings from this strategy will be 15 percent of total water usage for audited customers that implement the water conservation measures identified in the audit.

It is anticipated that the ICI water audit, water waste reduction, and site-specific water conservation program will reach 0.5 percent of ICI customers each year for 20 years[6] until the final market penetration of 10 percent[23] of ICI customers is achieved. The 20-year implementation period is designed to match the projected life of the water savings. After the initial implementation period, the program must be continued indefinitely to maintain the projected final market penetration.

11.3 *Additional Data Requirements*

Data regarding the amount of ICI water use was not available for every WUG. For WUGs that have not reported their ICI water use, no potential estimate of savings was made.

11.4 *Reliability*

The effectiveness of this strategy depends on the degree of participation of ICI customers. In addition, there is significant variability in literature values for potential water savings. Therefore, the reliability of the potential water savings for the ICI water audit, water waste reduction, and site-specific water conservation program is low.

11.5 *Opinion of Probable Cost*

The opinion of probable cost for each audit is $575. The cost for a single audit is amortized at 6 percent interest over 20 years, the expected life of the measure. The opinion of probable annual cost is the sum of amortized costs for all rebates given in the previous 20 years. For a given WUG and given year, the probable unit cost was calculated as the probable annual cost divided by projected water savings.

12.0 SHOWERHEAD AND FAUCET AERATOR RETROFIT PROGRAM

12.1 *Applicability*

The showerhead and faucet aerator retrofit program strategy was evaluated for municipal WUGs with the following characteristics:

- Existing or projected total water usage of more than 140 gpcd.
- Projected water need.
- No showerhead and faucet aerator retrofit program.
- Identified sponsor to implement a showerhead and faucet aerator retrofit program.

12.2 *Potential Water Savings*

Based on literature information, the recommended measure life is 15 years for showerheads and faucet aerators[10,11], and the recommended natural replacement rate is 6.7 percent per year. The projected existing market penetration is unique to each WUG.

Based on the measure life of 15 years, most inefficient showerheads and faucet aerators will have been naturally replaced with efficient models by 2010 (18 years after the Water Efficiency Plumbing Act was implemented in 1992). Therefore, there is little potential for water savings in Region C through a showerhead and faucet aerator retrofit program.

12.3 *Additional Data Requirements*

No additional data are necessary to project water savings from a showerhead and faucet aerator retrofit program.

12.4 *Reliability*

Any water savings from retrofit of showerheads and faucet aerators will eventually be realized through natural replacement with efficient models. The amount of savings from each retrofit is fairly reliable. However, there is uncertainty about the measure life for showerheads and faucet aerators, so the timing of the savings could be somewhat different than assumed above.

12.5 *Opinion of Probable Cost*

No costs for a showerhead and retrofit program were generated because the program is assumed to generate no water savings.

13.0 WATER-EFFICIENT TOILET REBATE PROGRAM

13.1 *Applicability*

The water-efficient toilet rebate program strategy was evaluated for municipal WUGs with the following characteristics:

- Existing or projected total water usage of more than 140 gpcd.
- Projected water need.
- No water-efficient toilet rebate program.
- Identified sponsor to implement a water-efficient toilet rebate program.

13.2 *Potential Water Savings*

For each residence (single- or multi-family), the potential water savings is the product of the following parameters:

- Projected per capita water savings
- Number of people per household
- Percentage of inefficient toilets in household replaced

The projected potential savings is 10.5 gpcd for single- and multi-family residents[10,11], assuming that all inefficient toilets in the living unit are replaced. Replacement of toilets has the additional benefit of repairing leaks from existing toilets; however, no additional savings have been credited for leak repair. The number of people per single- and multi-family household was estimated from 2000 Census data.

Based on literature information, the recommended toilet life is 30 years[4,18], and the recommended natural replacement rate is 3.3 percent per year. Assuming that 1995 is the first year in which replacement toilets are low-flow toilets, then about half of all inefficient toilets will be replaced naturally by 2010, and most inefficient toilets will be replaced naturally by 2025. Census data can be used to estimate the number of housing units with inefficient toilets.

Freeriders are defined as program participants that, in the absence of a toilet rebate program, would have replaced their toilets at the same time at their own expense but instead took advantage of the retrofit program. The retrofit program incurs a cost for distributing toilets to freeriders but does not save water, because the savings would have been realized anyway at private expense. It has been assumed that 10 percent of the toilet rebates will be distributed to freeriders[24].

A toilet rebate program accelerates the savings that would be realized due to natural replacement in the absence of the program, so the benefit of a toilet rebate program is temporary. It has been assumed that the water-efficient toilet rebate program will double the natural replacement rate.

13.3 *Additional Data Requirements*

No additional data are necessary to project water savings from a water-efficient toilet rebate program.

13.4 *Reliability*

The reliability of the potential water savings for each installed toilet is fairly high, although many of the replacement toilets will eventually develop toilet leaks[21]. The reliability of the initial market penetration, the measure life, the freeridership, and the natural replacement rate is lower. Therefore, the overall reliability of the potential water savings for a given WUG is medium.

13.5 *Opinion of Probable Cost*

The Austin Water Utility and El Paso Water Utilities each offer a rebate of up to $100 on water-efficient toilets[15, 17]. Based on this information, the opinion of probable cost for each rebate issued is approximately $120. This amount includes the rebate amount, marketing, and program administration and overhead. The projected annual expenditure is the rebate cost multiplied by the projected number of rebates in a given year. The projected annual expenditures can be amortized over the term of the realized benefits. Unfortunately, with the passage of time, each new rebate has a shorter and shorter benefit term. Based on the natural replacement rate and program replacement rates discussed above and a program start date of 2010, the average term of realized benefits is approximately 7.5 years. The opinion of probable annual cost is the sum of amortized costs for all rebates given in the previous 7.5 years. For a given WUG and given year, the probable unit cost was calculated as the probable annual cost divided by projected water savings.

14.0 SINGLE-FAMILY WATER-EFFICIENT CLOTHES WASHER REBATE PROGRAM

14.1 *Applicability*

The single-family water-efficient clothes washer rebate program strategy was evaluated for municipal WUGs with the following characteristics:

- Existing or projected total water usage of more than 140 gpcd.
- Projected water need.
- No single-family water-efficient clothes washer rebate program.
- Identified sponsor to implement a single-family water-efficient clothes washer rebate program.

14.2 *Potential Water Savings*

The projected water savings is the product of the projected per capita water savings and the number of people per single-family household. The projected per capita water savings is 5.6 gpcd[10], and the number of people per single-family household was estimated from 2000 Census data. The projected per capita savings is based on a “water factor” of 9.5 gallons per cubic foot. The “water factor” is equal to the number of gallons of water used per load divided by the washer tub capacity in cubic feet[11].

The life of a single-family clothes washer is about 13 years[10], and the recommended single-family natural replacement rate is 7.7 percent per year.

The initial market penetration for single-family households is 5 percent[10]. Given an increase in the market penetration of water-efficient clothes washers of 1 percent per year for single- and multi-family customers, the final market penetration of this strategy is projected to be 18 percent of single-family customers.

Freeriders are defined program participants that, in the absence of a clothes water rebate program, would have replaced their clothes washers with high-efficiency models at the same time at their own expense but instead took advantage of the rebate program. The rebate program incurs a cost for paying rebates to freeriders but does not save water, because the savings would have been realized anyway at private expense. It has been assumed that 10 percent of the water-efficient clothes washer rebates will be distributed to freeriders[25].

The implementation schedule of 13 years is designed to match the projected life of water-efficient clothes washers. After the initial implementation period, the rebate program must be continued indefinitely to maintain the final market penetration.

A single-family water-efficient clothes washer rebate program accelerates the savings that would be realized due to natural replacement in the absence of the program, so the benefit of the rebate program is temporary. It has been assumed that the single-family water-efficient clothes washer rebate program will double the natural replacement rate.

14.3 *Additional Data Requirements*

No additional data are necessary to project water savings from a single-family water-efficient clothes washer rebate program.

14.4 *Reliability*

The reliability of the potential water savings for each high-efficiency clothes washer is high. The reliability of the initial and final market penetrations, the measure life, the freeridership, and the natural and program replacement rates is lower. Therefore, the overall reliability of the potential water savings for a given WUG is medium.

14.5 *Opinion of Probable Cost*

The Austin Water Utility offers a $50 residential clothes washer rebate (with some customers eligible for an additional $50 energy rebate)[15], the San Antonio Water System offers a $100 clothes washer rebate[16], and El Paso Water Utilities offers a $200 residential clothes washer rebate[17]. Based on this information, the opinion of probable cost for each rebate issued is approximately $150. This amount includes the rebate amount, marketing, and program administration and overhead. The projected annual expenditure is the rebate cost multiplied by the projected number of rebates in a given year. The projected annual expenditures can be amortized over the term of the realized benefits. Unfortunately, with the passage of time, each new rebate has a shorter and shorter benefit term. Based on the natural replacement rate and program replacement rates discussed above and a program start date of 2010, the average term of realized benefits is approximately 5 years. The opinion of probable annual cost is the sum of amortized costs for all rebates given in the previous 5 years. For a given WUG and given year, the probable unit cost was calculated as the probable annual cost divided by projected water savings.

15.0 LANDSCAPE IRRIGATION SYSTEMS REBATE PROGRAM

15.1 *Applicability*

The landscape irrigation systems rebate strategy was evaluated for municipal WUGs with the following characteristics:

- Existing or projected total water usage of more than 140 gpcd.
- Projected water need.
- No landscape irrigation systems rebate program.
- Identified sponsor to implement a landscape irrigation systems rebate program.

15.2 *Potential Water Savings*

The landscape irrigation systems rebate program encompasses several types of irrigation system equipment. It is not known ahead of time which pieces of equipment a particular customer may wish to install, so it is not possible to estimate the potential water savings by adding up the savings from each type of equipment. In addition, very little literature information is available regarding much of this equipment.

The City of Houston, in its water conservation plan, assumed that low-precipitation-rate sprinkler heads and drip irrigation systems would save 5 percent of summer outdoor use[6]. According to the plan, this assumption is consistent with pilot tests conducted by the North Marin Water District, the East Bay Municipal Utility District, and the City of Austin[6].

Correspondingly, it has been assumed that the overall potential water savings for a landscape irrigation systems rebate program is 5 percent of irrigation water use for residential and ICI customers that use automatic irrigation systems and take advantage of rebates to install water-efficient irrigation equipment.

The percentage of customers that have automatic irrigation systems varies considerably across the region and is unknown in most cases. In the July 2004 RCWPG survey, 52 out of 129 total responses provided an estimate of the percentage of customers that have automatic irrigation systems. Table 7.2 shows the assumed percentage of customers that have automatic irrigation systems for different types of WUGs.

It has been assumed that the initial market penetration of water-efficient irrigation devices is zero and that the participation rate in a landscape irrigation systems rebate program will be 1 percent per year for single-family residential, multi-family residential, and ICI customers that have automatic irrigation systems. Based on the expected life of the installed equipment, a 10-year measure life[4] is recommended. The combination of the participation rates and the measure life will limit the final market penetration to approximately 10 percent of customers.

Freeriders are defined as program participants that, in the absence of a landscape irrigation systems rebate program, would have installed efficient irrigation equipment at their own expense but instead took advantage of the rebate program. The program incurs a cost for issuing rebates to freeriders but does not save water, because the savings would have been realized anyway at private expense. It has been assumed that 10 percent of the landscape irrigation systems rebates will be distributed to freeriders.

At the projected participation rates, it will take ten years to realize the maximum potential water savings. After the initial ten-year implementation period, the rebate program must be continued indefinitely to maintain the projected final market penetration.

15.3 *Additional Data Requirements*

Additional data regarding the number of single-family, multi-family, and ICI customers with automatic sprinklers are necessary to refine the projected water savings.

15.4 *Reliability*

The reliability of the potential water savings from the landscape irrigation systems rebate program is low, because there is little information available about the components eligible for a rebate, because there are so many combinations of components and potential uses.

No literature information was found regarding initial market penetration.

In addition, the percentage of customer accounts that have automatic irrigation systems is unknown for most WUGs. Additional data would improve the reliability of the assumptions shown in 7.2.

15.5 *Opinion of Probable Cost*

The opinion of probable cost for each rebate issued is approximately $100. This amount includes the rebate amount, marketing, and program administration and overhead. The projected annual expenditure is the rebate cost multiplied by the projected number of rebates in a given year. The projected annual expenditures can be amortized over the term of the realized benefits (10 years, the projected life of the measure). The opinion of probable annual cost is the sum of amortized costs for all rebates given in the previous 10 years. For a given WUG and given year, the probable unit cost was calculated as the probable annual cost divided by projected water savings.

16.0 LANDSCAPE DESIGN AND CONVERSION REBATE PROGRAM

16.1 *Applicability*

The landscape design and conversion rebate strategy was evaluated for municipal WUGs with the following characteristics:

- Existing or projected total water usage of more than 140 gpcd.
- Projected water need.
- No landscape design and conversion rebate program.
- Identified sponsor to implement a landscape design and conversion rebate program.

16.2 *Potential Water Savings*

The potential water savings from a landscape design and conversion program is approximately 30 percent of irrigation water use for the areas where turf is replaced with water wise landscaping[18,26].

There is a small degree of water wise landscaping in Region C, but it is recommended that the initial market penetration for the analysis of potential water savings and costs be zero. Given the relatively low projected participation rate and final market penetration, this will not significantly affect the analysis of potential water savings and costs for this strategy.

The San Antonio Water System (SAWS) implemented a WaterSaver Landscape rebate program in January 1995. By June 2001, the program had paid rebates totaling about $365,000 to 1,381 customers[27]. These numbers indicate participation of approximately 212 customers per year with an average rebate of $264. At the end of fiscal year 2001, SAWS had 294,286 connections[28], indicating that the participation rate for the WaterSaver Landscape rebate program is approximately 0.07 percent of water customers per year.

The City of Albuquerque implemented a xeriscape rebate program in 1997. As of October 2002, the City had paid rebates totaling $317,079 to 1,127 customers for xeriscaping of 1,586,819 square feet[29]. These numbers indicate participation of approximately 196 customers per year with an average rebate of $281 and an average xeriscape area of 1,408 square feet. As of 2002, the City had an estimated 189,928 single- and multi-family water connections[29]. Ignoring commercial connections, the participation rate for the xeriscape rebate program was approximately 0.1 percent per year. Including commercial connections, the actual participation rate was lower.

It is anticipated that the savings from the landscape design and conversion program will last for 10 years. Based on a participation rate of 0.1 percent of water customers per year[27,29] and a measure life of 10 years[4,30], the projected final market penetration is 1 percent of water customers. After the initial ten-year implementation period, the landscape design and conversion program must be continued indefinitely to maintain the projected final market penetration of 1 percent.

Freeriders are defined as program participants that, in the absence of a landscape design and conversion rebate program, would have installed water-wise landscaping at their own expense but instead took advantage of the rebate program. The program incurs a cost for issuing rebates to freeriders but does not save water, because the savings would have been realized anyway at private expense. It has been assumed that 10 percent of the landscape design and conversion rebates will be distributed to freeriders.

It has been assumed that the average single-family customer that receives a rebate irrigates 5,000 square feet of turf and will replace 28 percent of the turf area with water-wise landscaping. It has been assumed that a multi-family or ICI customer that receives a rebate irrigates 10,000 square feet of turf and will replace 28 percent of the turf area with water-wise landscaping.

16.3 *Additional Data Requirements*

No additional data are required to estimate potential water savings from a landscape design and conversion program.

16.4 *Reliability*

The reliability of water needs for water wise landscaping is high, but the potential water savings depend on customers maintaining efficient irrigation practices and maintaining a water wise landscape. Therefore, the overall reliability of the potential water savings from a landscape design and conversion program is medium.

16.5 *Opinion of Probable Cost*

The San Antonio Water System offers a rebate less than $0.10 per square foot of turf replaced with water-wise landscaping[16], the City of Albuquerque offers a $0.40 per square foot rebate[31], the Southern Nevada Water Authority (which serves Las Vegas) offers a $1.00 per square foot rebate[32], and El Paso Water Utilities offers a $1.00 per square foot rebate[17]. Based on this information, the opinion of probable cost for each rebate issued is approximately $0.24 per square foot of replaced turf. This amount includes the rebate amount, marketing, and program administration and overhead. The projected annual expenditure is the rebate cost multiplied by the projected number of rebates in a given year. The projected annual expenditures can be amortized over the term of the realized benefits (10 years, the projected life of the measure). The opinion of probable annual cost is the sum of amortized costs for all rebates given in the previous 10 years. For a given WUG and given year, the probable unit cost was calculated as the probable annual cost divided by projected water savings.

17.0 MANUFACTURING GENERAL REBATE PROGRAM

17.1 *Applicability*

The manufacturing general rebate program strategy was evaluated for manufacturing WUGs that have a projected water need.

17.2 *Potential Water Savings*

It has been assumed that where the strategy is implemented, the potential water savings for the manufacturing general rebate program is three percent of water sales from a municipal WUG to a manufacturing WUG and that the potential water savings will last for 15 years. These assumptions are consistent with the assumption in the TWDB-sponsored study of conservation potential in Texas[10].

It is anticipated that water savings will be realized at a rate of 0.2 percent per year for 15 years until the full 3 percent of total manufacturing water usage is realized. The 15-year implementation period is designed to match the projected life of the water savings. After the initial implementation period, the manufacturing general rebate program must be continued indefinitely to maintain the projected water savings.

It has also been assumed that the program will be implemented beginning in 2020.

17.3 *Additional Data Requirements*

No additional data are required to estimate potential water savings from a manufacturing general rebate program.

17.4 *Reliability*

The effectiveness of this strategy depends on the degree of participation of manufacturing customers. In addition, the estimate of potential water savings is not based on WUG-specific data. Therefore, the reliability of the potential water savings for the manufacturing general rebate program is low.

17.5 *Opinion of Probable Cost*

The opinion of probable cost for rebates is $2.30 per gallon per day of savings, including the rebate, marketing, and overhead. The cost for a single rebate is amortized at 6 percent interest over 15 years, the expected life of the measure. The opinion of probable annual cost is the sum of amortized costs for all rebates given in the previous 15 years. For a given WUG and given year, the probable unit cost was calculated as the probable annual cost divided by projected water savings.

18.0 GOLF COURSE CONSERVATION PROGRAM

18.1 *Applicability*

The golf course conservation strategy was evaluated for irrigation WUGs that have a projected water need.

18.2 *Potential Water Savings*

Projected irrigation demands for the current round of regional planning have increased from the 2001 *Region C Water Plan*[33] by a factor of 7.6 to 7.8. Prior to 2001, the Texas Water Development Board grouped most golf course demands with municipal water demand. Since 2001, the TWDB has grouped most golf course water demands with irrigation water demand. Based on this change, it has been assumed that the difference in projected irrigation water demand from the 2001 plan is a reasonable estimate of golf course water demand in Region C.

It has been assumed that where the strategy is implemented, the potential water savings for the golf course conservation program is 15 percent[11] of golf course water demand and that the potential water savings will last indefinitely (the golf course will continue to maintain and implement the conservation program at its own expense). In addition, it has been assumed that participation rates will be 0 percent in 2010, 40 percent in 2020, 50 percent in 2030, 60 percent in 2040, 70 percent in 2050, and 80 percent in 2060.

18.3 *Additional Data Requirements*

No additional data are required to estimate potential water savings from a golf course conservation program.

18.4 *Reliability*

The effectiveness of this strategy depends on the degree of participation of golf courses. In addition, the estimate of potential water savings is not based on course-specific data. Therefore, the reliability of the potential water savings for the golf course conservation program is low.

18.5 *Opinion of Probable Cost*

Implementation alternatives include voluntary implementation for self-supplied golf courses, rebates for courses supplied by a municipal WUG, and ordinances if supplied by a city. The opinion of probable cost assumes that a municipal WUG offers a rebate to a golf course to implement a conservation program.

The opinion of probable cost for rebates is $2.30 per gallon per day of savings, including the rebate, marketing, and overhead. The cost for a single rebate is amortized at 6 percent interest over 20 years. The opinion of probable annual cost is the sum of amortized costs for all rebates given in the previous 20 years. For a given WUG and given year, the probable unit cost was calculated as the probable annual cost divided by projected water savings.

19.0 RECYCLING OF WATER IN MINING OPERATIONS

19.1 *Applicability*

Recycling of water for mining use was evaluated for large-scale mining operations that have a projected need.

19.2 *Potential Water Savings*

Current mining operations in Wise County report recycled water use at 5 times the amount of raw water supply. This ratio was used to estimate currently available and future supplies from recycling activities for mining.

19.3 *Additional Data Requirements*

No additional data are required to estimate potential water savings from recycling of mining water.

19.4 *Reliability*

The reliability of this supply depends on the water quality of the source water and the mining operations. Water with high amounts of particulates and other constituents may be limited in the number of times it can be recycled. The reliability of the potential water savings for recycling of water for mining operations is medium.

19.5 *Opinion of Probable Cost*

It is assumed that this operation is currently in place and there are no additional costs.

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APPENDIX N

MODEL MUNICIPAL WATER CONSERVATION PLAN

REGION C WATER PLANNING GROUP

MODEL WATER CONSERVATION AND DROUGHT CONTINGENCY PLAN FOR MUNICIPAL WATER USER GROUPS

MAY 2005

Prepared for:

REGION C WATER PLANNING GROUP

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This model water conservation and drought contingency plan for the fictional City of Poca Agua was prepared by Freese and Nichols, Alan Plummer Associates, and Chiang, Patel, and Yerby for the Region C Water Planning Group. It is a template for municipal water user groups to use as they develop their own water conservation and drought contingency plans. Each municipal water user group should customize the details to match its unique situation. The model plan was prepared pursuant to Texas Commission on Environmental Quality rules. Some material is based on the existing water conservation plans listed in Appendix A. The water conservation and drought contingency plans for the North Texas Municipal Water District[1], the City of Fort Worth[2], and the City of Dallas[3] were used extensively.

Questions regarding this model water conservation and drought contingency plan should be addressed to the following:

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[1] Superscript numbers match references listed in Appendix A.

CITY OF POCA AGUA

WATER CONSERVATION AND DROUGHT CONTINGENCY PLAN

MAY 2005

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CITY OF POCA AGUA

Water Conservation and Drought Contingency Plan

May 2005

1. INTRODUCTION AND OBJECTIVES

Water supply has always been a key issue in the development of Texas. In recent years, the increasing population and economic development in Region C have led to growing demands for water. At the same time, local and less expensive sources of water supply are largely developed. Additional supplies to meet higher demands will be expensive and difficult to develop. Therefore, it is important that we make efficient use of existing supplies and make them last as long as possible. This will delay the need for new supplies, minimize the environmental impacts associated with developing new supplies, and delay the high cost of additional water supply development.

Recognizing the need for efficient use of existing water supplies, the Texas Commission on Environmental Quality (TCEQ) has developed guidelines and requirements governing the development of water conservation and drought contingency plans for public water suppliers[4]. The TCEQ guidelines and requirements for water suppliers are included in Appendix B. The City of Poca Agua has adopted this water conservation and drought contingency plan pursuant to TCEQ guidelines and requirements.

The objectives of the water conservation plan are:

- To reduce water consumption.
- To reduce the loss and waste of water.
- To identify the level of water reuse.
- To improve efficiency in the use of water.
- To extend the life of current water supplies by reducing the rate of growth in demand.

The objectives of the drought contingency plan are:

- To conserve the available water supply in times of drought and emergency
- To maintain supplies for domestic water use, sanitation, and fire protection
- To protect and preserve public health, welfare, and safety
- To minimize the adverse impacts of water supply shortages
- To minimize the adverse impacts of emergency water supply conditions.

2. TEXAS COMMISSION ON ENVIRONMENTAL QUALITY RULES

2.1 Conservation Plans

The TCEQ rules governing development of water conservation plans for public water suppliers are contained in Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.2 of the Texas Administrative Code, which is included in Appendix B. For the purpose of these rules, a water conservation plan is defined as:

"A strategy or combination of strategies for reducing the volume of water withdrawn from a water supply source, for reducing the loss or waste of water, for maintaining or improving the efficiency in the use of water, for increasing the recycling and reuse of water, and for preventing the pollution of water. A water conservation plan may be a separate document identified as such or may be contained within another water management document(s) [4]."

According to TCEQ rules, water conservation plans for public water suppliers must have a certain minimum content (Section 3), must have additional content for public water suppliers that are projected to supply 5,000 or more people in the next ten years (Section 4), and may have additional optional content (Section 5).

2.2 Drought Contingency Plans

The TCEQ rules governing development of drought contingency plans for public water suppliers are contained in Title 30, Part 1, Chapter 288, Subchapter B, Rule 288.20 of the Texas Administrative Code, which is included in Appendix B. For the purpose of these rules, a drought contingency plan is defined as:

"A strategy or combination of strategies for temporary supply and demand management responses to temporary and potentially recurring water supply shortages and other water supply emergencies. A drought contingency plan may be a separate document identified as such or may be contained within another water management document(s) [4]."

The drought contingency plan for the City of Poca Agua is contained in Section 6 of this water conservation and drought contingency plan.

3. MINIMUM REQUIRED WATER CONSERVATION PLAN CONTENT

The minimum requirements in the Texas Administrative Code for water conservation plans for public drinking water suppliers covered in this report are as follows:

- §288.2(a)(1)(A) – Utility Profile – Section 3.1 and Appendix C
- §288.2(a)(1)(B) – Specification of Goals Before May 1, 2005 – Section 3.2
- §288.2(a)(1)(C) – Specification of Goals After May 1, 2005 – Section 3.2
- §288.2(a)(1)(D) – Accurate Metering – Sections 3.3 and 3.4
- §288.2(a)(1)(E) – Universal Metering – Section 3.4
- §288.2(a)(1)(F) – Determination and Control of Unaccounted Water – Section 3.5
- §288.2(a)(1)(G) – Public Education and Information Program – Section 3.6
- §288.2(a)(1)(H) – Non-Promotional Water Rate Structure – Section 3.7
- §288.2(a)(1)(I) – Reservoir System Operation Plan – Section 3.8
- §288.2(a)(1)(J) – Means of Implementation and Enforcement – Section 3.9, Appendix D, and Appendix E
- §288.2(a)(1)(K) – Coordination with Regional Water Planning Group – Section 3.10 and Appendix F

3.1 Utility Profile

[The utility profile must include information regarding population and customer data, water use data, water supply system data, and wastewater system data.]

Appendix C to this water conservation plan is a water utility profile for the City of Poca Agua, based on the format recommended by the TCEQ[5]. Table 3.1 summarizes key facts from the Water Utility Profile.

3.2 Specification of Water Conservation Goals

[This section must include specific, quantified five-year and ten-year targets for water savings to include goals for water loss programs and goals for municipal use in gallons per capita per day.]

Table 3.2 shows historical and projected per capita municipal water use for the City of Poca Agua. Water use is shown in units of gallons per capita per day (gpcd). Municipal water use is total use less wholesale sales to other municipal suppliers less sales to industrial users. Per capita municipal water use is municipal water use divided by population. The per capita municipal water use does not include industrial use.

Projected per capita municipal uses were obtained from the Texas Water Development Board (TWDB)[6] and interpolated to match the appropriate years for the 5-year and 10-year goals. The TWDB projections are applicable for a dry year, in which outdoor water use would be high. Per capita municipal water use in a year with normal or high precipitation during the summer should be less than projected here.

Table 3.1 Summary of Water Utility Profile for the City of Poca Agua

Water Service Area = ____ square miles

Miles of Distribution Pipe = ____ miles

Population:

Current Population = ________ in ______
2000 Population = __________
Projected 2060 Population = ___________

Connections:

Current Connections = _______ in ____
Total Increase in Connections in Last 5 Years = ____________

Information on Water Use for the Last Five Years:

Year	Use (Million gallons)	Estimated Population*	Municipal per Capita	Unaccounted Water	Peak Day to Average Day
____	__________	_________	________	_______	_________
____	__________	_________	________	_______	_________
____	__________	_________	________	_______	_________
____	__________	_________	________	_______	_________
____	__________	_________	________	_______	_________

*Source of population estimate is ___________________________.

Water Supply Source(s) = Poca Agua Reservoir

Treatment and Distribution System:

Treatment Plant Capacity = _____ million gallons per day
Elevated storage = _____ million gallons
Ground storage = ____ million gallons

Current Total Annual Wastewater Flow = ____ million gallons in __________.

The TWDB projections include the impact of low-flow plumbing fixtures and water conservation measures that have been in effect since at least 2000 but do not include the effect of water conservation measures recommended in this plan. The impact of low-flow plumbing fixtures has been itemized to show the total amount of projected water conservation in the City of Poca Agua. Table 3.2 shows the projected per capita water use after implementation of this water conservation and drought contingency plan. Table 3.2 also shows how much of the projected per capita water use is supplied by reclaimed water.

Table 3.2

Projected Per Capita Use Without Implementation of Water Conservation Measures Beyond Those in Effect in 2000 and Water Conservation Goals

Description	**Highest Historical**		**Five-Year Goal**	**Ten-Year Goal**
	Year	**Gpcd**	**Gpcd**	**Gpcd**
Historical Per Capita Municipal Use			-	-
Projected Per Capita Municipal Use Without Low-Flow Plumbing Fixtures	-	-		
Projected Reduction Due to Low-Flow Plumbing Fixtures	-	-		
Projected Per Capita Municipal Use With Low-Flow Plumbing Fixtures[5]	-	-		
Projected Reduction Due to Water Conservation Measures in this Plan	-	-		
Projected Per Capita Water Use Goals	-	-		
Projected Per Capita Use of Reclaimed Water	-	-		
Projected Per Capita Use of Raw Water	-	-		

The City's water conservation goals include the following:

- Achieve _____ *[five years from date of plan]* per capita municipal water use of ____ gpcd or less, as shown in Table 3.2 (five-year target). This represents a reduction of ____ gpcd from the TWDB's projected per capita municipal water use without low-flow plumbing fixtures or other conservation measures.
- Achieve _____ *[ten years from date of plan]* per capita municipal water use of ____ gpcd or less, as shown in Table 3.2 (ten-year target). This represents a reduction of ____ gpcd from the TWDB's projected per capita municipal water use without low-flow plumbing fixtures or other conservation measures.
- Implement and maintain a meter replacement program (Section 3.4).
- Keep the level of unaccounted water in the system less than ___ percent in ____ *[target year]* and subsequent years (Section 3.5). *[For most urban and suburban water user groups, the goal should be between 10 and 15 percent. For some rural water user groups with long distances between customers, the goal should be between 10 and 20 percent.]*

- Raise public awareness of water conservation and encourage responsible public behavior through a public education and information program, as discussed in Section 3.6.

[Note that water conservation goals below this point are based on optional water conservation plan content. Customize this section to represent the measures that you are planning to implement.

- *Decrease waste in lawn irrigation through implementation and enforcement of a landscape water management ordinance (Section 5.4).*
- *Decrease indoor water use by implementing the following programs:*
    - *Showerhead and aerator retrofit program (Section 5.2.1)*
    - *Water-efficient toilet replacement program (Section 5.2.2)*
    - *Residential customer water audit (Section 5.6)*
    - *Water-efficient clothes washer rebate program (Section 5.7).*
- *Decrease outdoor water use by implementing the following programs:*
    - *Residential customer water audit (Section 5.6)*
    - *Landscape irrigation systems rebate program (Section 5.9)*
    - *Landscape design and conversion program (Section 5.10)*
- *Decrease industrial, commercial, and institutional (ICI) water use by implementing the following programs:*
    - *General ICI rebate (Section 5.11)*
    - *ICI water audit, water waste reduction program, and site-specific water conservation program (Section 5.12)]*

3.3 Accurate Metering of Raw Water Supplies and Treated Water Deliveries

[This section must include a description of metering device(s) with an accuracy of plus or minus 5 percent that are used to measure and account for the amount of water diverted from the source of supply.]

The City of Poca Agua meters all raw water diversions from Poca Agua Reservoir and meters all treated water deliveries to the distribution system from the water treatment plant. Each meter has an accuracy of plus or minus 2 percent. The meters are calibrated on a semiannual basis by City of Poca Agua personnel to maintain the required accuracy and are repaired and/or replaced as needed.

3.4 Metering of Customer and Public Uses and Meter Testing, Repair, and Replacement

[This section must include a program for universal metering of both customer and public uses of water, for meter testing and repair, and for periodic meter replacement.]

Water usage for all customers of the City of Poca Agua, including public and governmental users, is metered. *[If there are unmetered users , describe the current metering situation and outline any plans to achieve universal metering.]*

As part of this water conservation plan, the City of Poca Agua will implement a meter replacement program that will replace every meter on a 15-year cycle. Initial efforts will focus on the oldest meters in the system.

In addition, meters registering any unusual or questionable readings will be tested and repaired to restore full functionality.

3.5 Determination and Control of Unaccounted Water

[This section must include measures to determine and control unaccounted uses of water. In 2003, the Texas Water Code (Chapter 16.0121) was amended to require that every five years, a retail public utility that provides potable water shall perform and file with the TWDB a water audit computing the utility's most recent annual system water loss. The audit shall account for the various components of system water loss, including loss from distribution lines, inaccuracies in meters or accounting practices, and theft. At this time, the TWDB is developing the rules for water system audits.]

Unaccounted water is the difference between raw water drawn from Poca Agua Reservoir and metered deliveries to customers. (This includes authorized but unmetered uses such as fire fighting and releases for flushing of lines.) Unaccounted water can include several categories:

- Inaccuracies in customer meters (customer meters tend to run more slowly as they age and under-report actual use).
- Losses due to water main breaks and leaks in the water distribution system.
- Losses due to illegal connections.
- Other.

The City of Poca Agua will conduct an annual water audit using the International Water Association (IWA) format. The IWA format divides water losses into apparent losses and real losses. Apparent water losses include water that was actually used but not accounted for, such as customer meter errors or theft. Accounting for apparent losses increases the city's utility revenue but does not reduce water usage. Real losses include leakage and overflows at the water treatment plant. Identifying and preventing real losses decreases a utility's costs and decreases water usage. The City will target real losses under this water conservation strategy.

[Note that the annual water audit discussed above exceeds the requirement for a water system audit every five years. For a public water supplier that has not been performing water system audits, it may be helpful to perform annual audits for the first few years and to refine different parts of the audit each year.

As an example, the first year audit might involve gathering all available data and estimating quantities that have not been measured. Between the first and second year audits, the supplier might investigate distribution system leaks to refine and reduce the estimated leakage in the second year audit. Between the second and third audits, the supplier could investigate apparent losses, such as meter or accounting errors, to refine and reduce the estimated apparent losses in the third year audit. The actual implementation of this strategy may be different for different suppliers.

In addition, although the IWA format is discussed above, the TWDB has not yet published rules that identify the required audit format.]

As shown in Appendix C, unaccounted water for the City of Poca Agua has varied from ___ percent to ___ percent in the last five years. With the measures described in this plan, the City of Poca Agua intends to maintain the unaccounted water below ___ percent in ____ *[target year]* and subsequent years. If unaccounted water exceeds this goal, the City of Poca Agua will implement a more intensive audit to determine the source(s) of water loss and reduce the unaccounted water.

3.6 Continuing Public Education and Information Campaign

[This section must include a program of continuing public education and information regarding water conservation.]

The continuing public education and information campaign on water conservation for the City of Poca Agua includes the following elements:

- Promote the City's water conservation measures (presented in Sections 3, 4, and 5).
- Include inserts on water conservation with water bills at least twice per year. Inserts will include material developed by City of Poca Agua staff and material obtained from the TWDB, the TCEQ, and other sources.
- Encourage local media coverage of water conservation issues and the importance of water conservation.
- Notify local organizations, schools, and civic groups that City of Poca Agua staff is available to make presentations on the importance of water conservation and ways to save water.

- Make the *Texas Smartscape CD*, water conservation brochures, and other water conservation materials available to the public at the City of Poca Agua Utility Department and other public places.
- Make information on water conservation available online at www.ci.pocaagua.tx.us and will include links to the *Texas Smartscape* website and to information on water conservation on the TWDB and TCEQ web sites.

3.7 Non-Promotional Water Rate Structure

[This section must include a water rate structure that is not "promotional," i.e., a rate structure which is cost-based and which does not encourage excessive use of water.]

With the intent of encouraging water conservation and discouraging waste and excessive use of water, the City of Poca Agua has adopted an increasing block rate water structure where the unit price of water increases with increasing water use. Current water rates are shown in Tables 7.1 and 7.2.

Table 3.3

Monthly Customer Charges

Meter Size (in)	Total Charge	Meter Size (in)	Total Charge
5/8	$____	2	$____
3/4	$____	3	$____
1	$____	4	$____
1 1/4	$____	6	$____
1 1/2	$____		

Table 3.4

Volume Unit Charges

Water User	Type/Volume	Volume Unit Charge ($/1,000 gal)
Single-Family	0-2,000 gallons	$____
	2,001-9,000 gallons	$____
	9,001-15,000 gallons	$____
	More than 15,000 gallons	$____
Multi-Family		$____
Commercial		$____
Large Volume/Industrial		$____
Golf Courses		$____

[An increasing block rate structure, where the unit cost increases as water usage increases, is recommended. The price difference between blocks is very important in influencing water usage. Prices between blocks should increase at least 25 percent; for maximum effectiveness, consider a price increase between blocks of at least 50 percent[7]. Also consider peak and off-peak rates for non-residential uses to encourage water conservation.]

3.8 Reservoir System Operation Plan

[This section must include a reservoir system operation plan, if applicable, providing for the coordinated operation of reservoirs owned by the applicant within a common watershed or river basin in order to optimize available water supplies. Attach a copy of the reservoir system operation plan if available.]

The City of Poca Agua has the following rights to divert water from Poca Agua Reservoir:

- Up to 8,000 ac-ft/yr based on the natural yield of the reservoir
- Up to 2,000 ac-ft/yr based on the reclaimed water discharge from the City's North Wastewater Treatment Plant

Poca Agua Reservoir is not operated in coordination with any other raw water supply sources; therefore, no additional yield can be gained through system operation.

3.9 Implementation and Enforcement of the Water Conservation Plan

[This section must include a means of implementation and enforcement of the plan. This shall be evidenced by a copy of the ordinance, resolution, or tariff indicating official

adoption of the water conservation plan by the water supplier and a description of the authority by which the water supplier will implement and enforce the conservation plan.]

Appendix D contains a copy of the resolution of the City of Poca Agua City Council adopting this water conservation and drought contingency plan. The resolution designates responsible officials to implement and enforce the water conservation and drought contingency plan. Appendix E, the landscape water management ordinance for the City of Poca Agua, also includes information about enforcement.

3.10 Coordination with Regional Water Planning Group

[This section must include documentation of coordination with the Regional Water Planning Group(s) for the service area of the public water supplier in order to insure consistency with the appropriate approved regional water plan(s).]

Appendix F includes a copy of a letter sent to the Chair of the Region C Water Planning Group with this water conservation and drought contingency plan.

4. ADDITIONAL REQUIRED WATER CONSERVATION PLAN CONTENT

[Section 4 does not apply if you are not projected to supply a population of 5,000 people or more in the next ten years.]

The Texas Administrative Code also includes additional requirements for water conservation plans for public drinking water suppliers that serve a population of 5,000 people or more and/or a projected population of 5,000 people or more within the next ten years:

- §288.2(a)(2)(A) – Leak Detection, Repair, and Water Loss Accounting – Sections 3.5 and 4.1
- §288.2(a)(2)(B) – Record Management System – Section 4.2
- §288.2(a)(2)(C) – Requirement for Water Conservation Plans by Wholesale Customers – Section 4.3

4.1 Leak Detection and Repair; Pressure Control

[If you are projected to supply 5,000 people or more in the next ten years, this section must include a program of leak detection, repair, and water loss accounting for the water transmission, delivery, and distribution system in order to control unaccounted-for uses of water. Water loss accounting is also discussed in Sections 3.5 and 5.5.]

Measures to control unaccounted water are part of the routine operations of the City of Poca Agua. Meter readers watch for and report signs of illegal connections so they can be addressed quickly. Crews and personnel look for and report evidence of leaks in the water distribution system. Maintenance crews respond quickly to repair leaks reported by the public and city personnel. The City of Poca Agua spends $_____ per year to repair and replace water distribution lines and uses ___ *[number]* distribution line maintenance crews. Areas of the water distribution system in which numerous leaks and line breaks occur are targeted for replacement as funds are available.

To reduce real water losses, the City of Poca Agua will maintain a proactive water loss program. As part of this program, the City will implement the following actions:

[No actions have been specified here. Customize this section to fit your situation. Potential actions include[8]:

- *Conduct regular inspections and soundings of all water main fittings and connections;*
- *Use a leakage modeling program;*
- *Meter individual pressure zones;*
- *Establish district metering areas and measure monthly flows;*
- *Conduct intermittent night-flow measurements;*

- *Install temporary leak noise detectors and loggers;*
- *Reduce repair time on leaks by adding repair staff;*
- *Control pressure to just above the minimum standard-of-service level including fire requirements;*
- *Operate pressure zones based on topography;*
- *Limit surges in pressure; and*
- *Reduce nighttime pressure where feasible to reduce losses from background leaks.]*

4.2 Record Management System

[If you are projected to supply 5,000 people or more in the next ten years, this section must include a record management system to record water pumped, water deliveries, water sales, and water losses which allows for the desegregation of water sales and uses into residential, commercial, public and institutional, and industrial user classes.

If you are required to have such a record management system and you do not, please describe your plan to meet this requirement within the next five years.]

As required by TAC Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.2(a)(2)(B), the record management system for the City of Poca Agua records water pumped, water delivered, and water sold; estimates water losses; and allows for the separation of water sales and uses into residential, commercial, public/institutional, and industrial categories. This information will be included in an annual conservation report, as described in Section 5.5 below.

4.3 Requirement for Water Conservation Plans by Wholesale Customers

[If you are projected to supply 5,000 people or more in the next ten years, this section must include a requirement that every wholesale water supply contract entered into or renewed after official adoption of the plan (by either ordinance, resolution, or tariff), and including any contract extension, that each successive wholesale customer develop and implement a water conservation plan or water conservation measures using the applicable elements in TAC Title 30, Part 1, Chapter 288. If the customer intends to resell the water, then the contract between the initial supplier and customer must provide that the contract for the resale of the water must have water conservation requirements so that each successive customer in the resale of the water will be required to implement water conservation measures in accordance with applicable provisions of TAC Title 30, Part 1, Chapter 288.]

At this time, the City of Poca Agua is not a wholesale water provider. After adoption of this plan, each contract for the wholesale sale of water by the City of Poca Agua will include a requirement that the wholesale customer develop and implement a water conservation plan meeting the requirements of Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.2 of the Texas Administrative Code. This requirement will also extend to each successive wholesale customer in the resale of the water.

5. OPTIONAL WATER CONSERVATION PLAN CONTENT

[Any combination of the following optional strategies shall be selected by the water supplier, in addition to the requirements of Section 3 and Section 4, if they are necessary to achieve the stated water conservation goals of the plan.]

TCEQ rules also list optional (not required) conservation strategies, which may be adopted by suppliers to achieve the stated goals of the plan. The following optional strategies are listed in the rules and included in this plan:

- §288.2(a)(3)(A) – Conservation Oriented Water Rates – Section 3.7
- §288.2(a)(3)(B) – Ordinances, Plumbing Codes or Rules on Water-Conserving Fixtures – Section 5.1
- §288.2(a)(3)(C) – Programs for the Replacement or Retrofit of Water-Conserving Plumbing Fixtures in Existing Structures – Section 5.2
- §288.2(a)(3)(D) – Reuse and Recycling of Wastewater – Section 5.3
- §288.2(a)(3)(E) – Pressure Control and/or Reduction – Section 4.1
- §288.2(a)(3)(F) – Landscape Water Management Ordinance – Section 5.4 and Appendix E
- §288.2(a)(3)(G) – Monitoring Method – Section 5.5 and Appendix G
- §288.2(a)(3)(H) – Other Conservation Methods – Sections 5.6 through 5.11

[The final optional water conservation strategy listed in the TCEQ rules is "any other water conservation practice, method, or technique which the water supplier shows to be appropriate for achieving the stated goal or goals of the water conservation plan." Several more optional conservation methods have been listed below to assist you in conservation planning.]

In addition, the City of Poca Agua will also pursue the following optional water conservation strategies that exceed those suggested in the rules:

- Residential Customer Water Audit – Section 5.6
- Water-Efficient Clothes Washer Rebate Program – Section 5.7
- Landscape Irrigation System Rebate Program – Section 5.8
- Landscape Design and Conversion Program – Section 5.9
- General ICI Rebate Program – Section 5.10
- ICI Water Audit, Water Waste Reduction Program, and Site-Specific Water Conservation Program – Section 5.11

5.1 <u>Ordinances, Plumbing Codes, or Rules on Water-Conserving Fixtures</u>

[OPTIONAL STRATEGY: If you have a plumbing ordinance that requires water-conserving fixtures, please describe the ordinance here and include a copy in an appendix.]

The State of Texas has required water-conserving fixtures in new construction and renovations since 1992. The state standards call for flows of no more than 2.5 gallons per minute (gpm) for faucets, 3.0 gpm for showerheads, and 1.6 gallons per flush for toilets. Similar standards are also required under federal law. These state and federal standards assure that all new construction and renovations in the City of Poca Agua will use water-conserving fixtures.

In addition, federal rules requiring energy-conserving clothes washers by 2007 are expected to assure that new clothes washers in the City of Poca Agua will be water-efficient.

5.2 <u>Programs for the Replacement or Retrofit of Water-Conserving Plumbing Fixtures in Existing Structures</u>

[OPTIONAL STRATEGY: If you are planning programs to implement the replacement or retrofit of water-conservation plumbing fixtures in existing structure, please describe these programs below. Such programs might include distribution of free fixtures, vouchers for discounted fixtures, rebates on fixtures, etc.]

5.2.1 Showerhead and Faucet Aerator Retrofit Program

As discussed previously, state and federal plumbing standards require water-efficient plumbing fixtures for new construction and remodel projects. However, there are still a significant number of water-inefficient plumbing fixtures in use in the City of Poca Agua. Under this program, the City will provide free retrofit kits to City residents for their installation. High quality, low flow plumbing devices to be distributed under this program include: showerheads (2.0 gpm or less), kitchen faucet aerators (2.2 gpm or less), and bathroom faucet aerators (1.5 gpm or less). The showerhead and faucet aerator retrofit program is targeted toward single- and multi-family homes constructed before 1992 that have not been retrofitted with water-efficient plumbing fixtures.

The projected reduction in per capita use from a showerhead and faucet aerator retrofit program is ___ gpcd in _____ *[five years from date of plan]* and ___ gpcd in _____ *[ten years from date of plan]*.

5.2.2 Water-Efficient Toilet Replacement Program

As discussed previously, state and federal plumbing standards require water-efficient toilets for new construction and remodel projects. However, there are still a significant number of water-inefficient toilets in use in the City of Poca Agua. Under this program, the City will provide free water-efficient toilets (1.6 gallons per flush) to City residents, along with a $____ rebate for installation. The City of Poca Agua is targeting single- and multi-family residential customers with homes constructed before 1992 that have not been retrofitted with water-efficient toilets.

The projected reduction in per capita use from the water-efficient toilet replacement program is ___ gpcd in _____ *[five years from date of plan]* and ___ gpcd in _____ *[ten years from date of plan]*.

5.3 Reuse and Recycling of Wastewater

[OPTIONAL STRATEGY: If you are planning to reuse or recycle wastewater, please describe this program below.]

The City of Poca Agua operates two wastewater treatment plants: the North Wastewater Treatment Plant (WWTP) and the South WWTP. The North WWTP discharges approximately 2,000 ac-ft/yr of reclaimed water to Poca Agua Creek upstream of Poca Agua Reservoir, where it is mixed with ambient water. Based on its water right, the City of Poca Agua withdraws up to 2,000 ac-ft/yr of this reclaimed water from Poca Agua Reservoir for water treatment and potable use. This reuse project provides approximately 20 percent of the City's total water supply.

The South WWTP discharges approximately 3,000 ac-ft/yr of reclaimed water to Poca Agua Creek downstream of Poca Agua Reservoir. Reclaimed water discharged from the South WWTP is used to satisfy downstream water rights and to maintain instream flows.

5.4 Water Waste Prohibition

[OPTIONAL STRATEGY: If you have an ordinance that prohibits water waste, please describe the ordinance below and attach a copy of the ordinance.]

As part of the development of this water conservation plan, the City of Poca Agua adopted a landscape water management ordinance (Appendix E). This ordinance is intended to minimize waste in landscape irrigation. The ordinance[8] includes the following elements:

- Prohibition of outdoor watering with sprinklers from 10:00 a.m. to 6:00 p.m. every day from June 1 through September 30. (Watering with hand-held hoses, soaker hoses, or dispensers is allowed.)
- Requirement that all new irrigation systems include rain sensors capable of multiple programming.
- Requirement that all new irrigation systems be in compliance with state design and installation regulations (Texas Administrative Code Title 30, Part 1, Chapter 344).
- Prohibition of designs and installations that spray directly onto impervious surfaces such as sidewalks and roads or onto other non-irrigated areas.
- Prohibition of use of poorly maintained sprinkler systems that waste water.
- Prohibition of outdoor watering during any form of precipitation.

- Enforcement of the ordinance by a system of warnings followed by fines for continued or repeat violations.

5.5 Monitoring of Effectiveness and Efficiency - Annual Conservation Report

[OPTIONAL STRATEGY: If you are planning to monitor the effectiveness and efficiency of the water conservation plan, please describe how you will do so.]

Appendix G is a form that will be used in the development of an annual conservation report for the City of Poca Agua. This form will be developed by March 31 for the preceeding calendar year and will be used by the City of Poca Agua to monitor the effectiveness and efficiency of the water conservation program and to plan conservation-related activities for the next year. The form records the water use by category, per capita municipal use, and unaccounted water for the current year and compares them to historical values.

[The remainder of Section 5 includes "other" optional water conservation strategies that are not specifically enumerated in the TCEQ rules.]

5.6 Residential Customer Water Audit

[OPTIONAL STRATEGY: If you are planning a program to provide audits of residential water use, please describe the program below.]

The City of Poca Agua will conduct water audits for single- and multi-family residential customers. The four main purposes are: to educate customers about conservative water use habits and replacement of inefficient toilets, clothes washers, and dishwashers; to install water-efficient showerheads and faucet aerators; and to identify (and possibly repair) leaks; and to optimize irrigation water usage. The City's auditor will review the current watering schedule and recommend any appropriate changes to the watering schedule, will inspect the system operation, and will recommend any equipment repairs or changes to increase the efficiency of the irrigation system.

The projected reduction in per capita use from the customer indoor water audit program is ___ gpcd in _____ *[five years from date of plan]* and ___ gpcd in _____ *[ten years from date of plan]*.

5.7 Water-Efficient Clothes Washer Rebate Program

[OPTIONAL STRATEGY: If you are planning a program to encourage the use of water-efficient clothes washers, please describe the program below. Such programs generally include rebates on the purchase of water-efficient clothes washers. In addition, since water-efficient clothes washers are also energy efficient, water utilities can sometimes partner with energy providers in offering rebates.]

New, high-efficiency clothes washers use up to 40 percent less water than older, traditional clothes washers. Under this program, the City of Poca Agua will provide a $_____ rebate toward the purchase of residential clothes washers with a water efficiency factor (gallons per load divided by tub size in cubic feet) of 9.5 or less. In addition, the City of Poca Agua will provide a $_____ rebate toward the purchase of commercial clothes washers with a water efficiency factor (gallons per load divided by tub size in cubic feet) of 9.5 or less.

The projected reduction in per capita use from the water-efficient clothes washer rebate program is ___ gpcd in _____ *[five years from date of plan]* and ___ gpcd in _____ *[ten years from date of plan]*.

5.8 Landscape Irrigation System Rebate Program

[OPTIONAL STRATEGY: If you are planning a program to encourage the use of water-efficient landscape irrigation equipment, please describe the program below.]

The City of Poca Agua will offer a rebate to residential and industrial, commercial, and institutional (ICI) customers to improve the efficiency of their existing irrigation system. By improving the efficiency of irrigation system, outdoor water usage can be reduced while maintaining a healthy landscape. Irrigation system equipment that could qualify for a rebate includes: irrigation controllers that allow percentages of programmed amounts for use with evapotranspiration-based water budgets, low-precipitation-rate sprinkler heads, drip irrigation equipment, pressure regulators, soil moisture sensors, and rain sensors.

The City of Poca Agua will offer the following rebates, with a total not to exceed $____:

- $____ rebate on a new evapotranspiration-based irrigation controller
- $____ rebate on a pressure reducing valve
- $____ rebate on a rain shut-off device
- Other equipment such as sprinkler heads and valves are eligible.

The projected reduction in per capita use from the landscape irrigation system rebate program is ___ gpcd in _____ *[five years from date of plan]* and ___ gpcd in _____ *[ten years from date of plan]*.

5.9 Landscape Design and Conversion Program

[OPTIONAL STRATEGY: If you are planning a program to encourage the use of water-wise landscaping, please describe the program below.]

The City of Poca Agua will provide a rebate of $____ per square foot (up to 800 square feet) to residential and ICI customers that convert existing high-water-use landscaping to water wise landscaping. In addition, the City of Poca Agua encourages new construction to follow water wise landscaping principles on all or part of the property.

The seven principles of water wise landscaping include:

- Planning and design,
- Soil analysis and improvement,
- Appropriate plant selection,
- Practical turf areas,
- Efficient irrigation,
- Use of mulches, and
- Appropriate maintenance.

Customers must agree to refund the rebate to the City if water use does not decline after installation of water wise landscaping or if water use returns to previous levels within five years.

The projected reduction in per capita use from the landscape design and conversion program is ___ gpcd in _____ *[five years from date of plan]* and ___ gpcd in _____ *[ten years from date of plan]*.

5.10 General ICI Rebate Program

[OPTIONAL STRATEGY: If you are planning a general rebate program to encourage ICI water conservation, please describe the program below.]

The City of Poca Agua will encourage its industrial, commercial, and institutional (ICI) customers to convert to water-saving equipment and practices by rebating a portion of the acquisition and installation cost of new water-saving equipment. Examples of equipment changes that might be eligible for a rebate are:

- Replacement of single-pass cooling systems with recirculating or air-cooling systems.
- Reuse of high quality rinse water for landscape irrigation or for wash cycles in laundry equipment.
- Improvements in cleaning processes.
- Installation of water-savings equipment in a car wash.

The City will rebate the lesser of the following:

- Half the purchase price of the equipment (up to $_______) or
- $____ for each gallon per day saved up to ______ gallons and then $____ per gallon saved per day for the next ______ gallons up to a maximum rebate of up to $_______.

The projected reduction in per capita use from the general ICI rebate program is ___ gpcd in _____ *[five years from date of plan]* and ___ gpcd in _____ *[ten years from date of plan]*.

5.11 ICI Water Audit, Water Waste Reduction Program, and Site-Specific Water Conservation Program

[OPTIONAL STRATEGY: If you are planning a program to assist ICI water users in performing on-site water audits, identifying water waste, and developing a site-specific water conservation program, please describe the program below.]

The City of Poca Agua realizes that its ICI customers use water for a wide variety of purposes and have a wide variety of usage patterns. As such, the most feasible water conservation strategies for an individual ICI customer may be highly site-specific. The ICI water audit, water waste reduction program, and site-specific water conservation program is a strategy intended to serve as a way to identify, evaluate, and implement water conservation for individual ICI customers.

With the assistance of the customer, an ICI water audit will:

- Accurately measure all water entering the facility
- Inventory and calculate all on-site water uses
- Identify any unused water sources or waste streams available
- Calculate water related costs
- Identify potential water conservation measures within a facility

Potential water efficiency measures may include water waste reduction and/or best management practices. ICI water-wasting activities may include wasteful irrigation practices and scheduling, single-pass cooling, non-recycling decorative fountains, discharge of process water, inefficient use of water softeners, and wash and rinse processes. In addition to water waste reduction, ICI best management practices may include sub-metering, cooling tower audits, cooling system audits, rinsing/cleaning, boiler and steam systems, water treatment, refrigeration, management and employee programs, landscape, and alternative sources and reuse of process water.

The projected reduction in per capita use from the ICI water audit, water waste reduction program, and site-specific water conservation program is ___ gpcd in _____ *[five years from date of plan]* and ___ gpcd in _____ *[ten years from date of plan]*.

6. DROUGHT CONTINGENCY PLAN

6.1 Introduction

The purpose of this drought contingency plan is as follows:

- To conserve the available water supply in times of drought and emergency
- To maintain supplies for domestic water use, sanitation, and fire protection
- To protect and preserve public health, welfare, and safety
- To minimize the adverse impacts of water supply shortages
- To minimize the adverse impacts of emergency water supply conditions.

6.2 State Requirements for Drought Contingency Plans

This drought contingency plan is consistent with Texas Commission on Environmental Quality (TCEQ) guidelines and requirements for the development of drought contingency plans by public drinking water suppliers, contained in Title 30, Part 1, Chapter 288, Subchapter B, Rule 288.20 of the Texas Administrative Code. This rule is included in Appendix B.

TCEQ's minimum requirements for drought contingency plans are addressed in the following subsections of this report:

- 288.20(a)(1)(A) – Provisions to Inform the Public and Provide Opportunity for Public Input – Section 6.3
- 288.20(a)(1)(B) – Provisions for Continuing Public Education and Information – Section 6.4
- 288.20(a)(1)(C) – Coordination with the Regional Water Planning Group – Section 6.9
- 288.20(a)(1)(D) – Criteria for Initiation and Termination of Drought Stages – Section 6.6
- 288.20(a)(1)(E) – Drought and Emergency Response Stages – Section 6.6
- 288.20(a)(1)(F) – Specific, Quantified Targets for Water Use Reductions – Section 6.6
- 288.20(a)(1)(G) – Water Supply and Demand Management Measures for Each Stage – Section 6.6
- 288.20(a)(1)(H) – Procedures for Initiation and Termination of Drought Stages – Section 6.5
- 288.20(a)(1)(I) - Procedures for Granting Variances – Section 6.7
- 288.20(a)(1)(J) - Procedures for Enforcement of Mandatory Restrictions – Section 6.8
- 288.20(a)(3) – Consultation with Wholesale Supplier – Not applicable
- 288.20(b) – Notification of Implementation of Mandatory Measures – Section 6.5
- 288.20(c) – Review and Update of Plan – Section 6.10

[If you receive water from a wholesale supplier, you must include in your plan appropriate provisions for responding to reductions in the wholesale water supply.]

6.3 Provisions to Inform the Public and Opportunity for Public Input

The City of Poca Agua provided opportunity for public input in the development of this drought contingency plan by the following means:

- Providing written notice of the proposed plan and the opportunity to comment on the plan by newspaper, posted notice, and notice on City of Poca Agua's web site, www.ci.pocaagua.tx.us.
- Making the draft plan available on City of Poca Agua's web site, www.ci.pocaagua.tx.us.
- Providing the draft plan to anyone requesting a copy.
- Holding a public meeting at the City of Poca Agua City Hall at ______ *[time]* on __________________ *[date]*.

6.4 Provisions for Continuing Public Education and Information

The City of Poca Agua will inform and educate the public about its drought contingency plan by the following means:

- Preparing a bulletin describing the plan and making it available at city hall and other appropriate locations.
- Making the plan to the public available through the City of Poca Agua web site at www.ci.pocaagua.tx.us.
- Including information about the drought contingency plan on the City of Poca Agua's web site, www.ci.pocaagua.tx.us.
- Notifying local organizations, schools, and civic groups that City of Poca Agua staff members are available to make presentations on the drought contingency plan (usually in conjunction with presentations on water conservation programs).

At any time that the drought contingency plan is activated or the drought stage changes, the City of Poca Agua will notify local media of the issues, the drought response stage, and the specific actions required of the public. The information will also be publicized on the City of Poca Agua web site, www.ci.pocaagua.tx.us. Billing inserts will also be used as appropriate.

6.5 Initiation and Termination of Drought Response Stages

6.5.1 Initiation of Drought Response Stages

The Utility Director or his/her official designee may order the implementation of a drought response stage or water emergency when one or more of the trigger conditions for that stage is met. The following actions will be taken when a drought stage is initiated:

- The public will be notified through local media.
- Wholesale customers (none at present) will be notified by telephone with a follow-up letter or fax.
- If any mandatory provisions of the drought contingency plan are activated, the City of Poca Agua will notify the Executive Director of the TCEQ within 5 business days.

For other trigger conditions, the Utility Director or his/her designee may decide not to order the implementation of a drought response stage or water emergency even though one or more of the trigger criteria for the stage are met. Factors that could influence such a decision include, but are not limited to, the time of the year, weather conditions, the anticipation of replenished water supplies, or the anticipation that additional facilities will become available to meet needs.

6.5.2 Termination of Drought Response Stages

The Utility Director or official designee may order the termination of a drought response stage or water emergency when the conditions for termination are met or at his/her discretion. The following actions will be taken when a drought stage is terminated:

- The public will be notified through local media.
- Wholesale customers will be notified by telephone with a follow-up letter or fax.
- When any mandatory provisions of the drought contingency plan that have been activated are terminated, the City of Poca Agua will notify the Executive Director of the TCEQ within 5 business days.

The Utility Director or his/her designee may decide not to order the termination of a drought response stage or water emergency even though the conditions for termination of the stage are met. Factors that could influence such a decision include, but are not limited to, the time of the year, weather conditions, or the anticipation of potential changed conditions that warrant the continuation of the drought stage.

6.6 Drought and Emergency Response Stages

6.6.1 Stage 1, Mild

6.6.1.1 Triggering and Termination Conditions for Stage 1, Mild

- The water level in Poca Agua Reservoir has fallen below elevation 484.0 feet msl.
- Demand exceeds 90% of the amount that can be delivered to customers for seven consecutive days.
- Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate.
- Supply source becomes contaminated.
- Water supply system is unable to deliver water due to the failure or damage of major water system components.
- Water demand is approaching the limit of the permitted supply.

[The following are examples of other potential triggering criteria that may be used in one or more successive stages of a drought contingency plan. Select one or more of these if appropriate to your system, or devise additional triggering criteria tailored to your system[9]:

1. *Annually, beginning on May 1 through September 30.*
2. *When the water supply available to the City of Poca Agua is equal to or less than ______ (acre-feet, percentage of storage, etc.).*
3. *When, pursuant to requirements specified in the (name of water supplier) wholesale water purchase contract with (name of wholesale water supplier), notification is received requesting initiation of Stage 1 of the Drought Contingency Plan.*
4. *When flows in the (name of stream or river) are equal to or less than ____ cubic feet per second.*
5. *When the static water level in the (name of water supplier) well(s) is equal to or less than ____ feet above mean sea level.*
6. *When the specific capacity of the (name of water supplier) well(s) is equal to or less than ___ percent of the well's original specific capacity.*

7. *When total daily water demand equals or exceeds ____ million gallons for ___ consecutive days or ____ million gallons on a single day (e.g., based on the "safe" operating capacity of water supply facilities).*

8. *Continually falling treated water reservoir levels which do not refill above ___ percent overnight (e.g., based on an evaluation of minimum treated water storage required to avoid system outage).]*

Stage 1 can be terminated when the water level in Poca Agua Reservoir rises above 488.0 feet msl or when the circumstances that caused the initiation of Stage 1 no longer prevail.

6.6.1.2 GOAL FOR USE REDUCTIONS AND ACTIONS AVAILABLE UNDER STAGE 1, MILD

The goal for water use reduction under Stage 1, Mild, is a ____ percent reduction of the use that would have occurred in the absence of drought contingency measures. The purpose of actions under State 1, Mild is to raise public awareness of potential drought problems. The Utility Director or his/her designee can order the implementation of any of the actions listed below, as deemed necessary:

- Request voluntary reductions in water use by the public and by wholesale customers.
- Increase public education efforts on ways to reduce water use.
- Review the problems that caused the initiation of Stage 1.
- Notify major water users and work with them to achieve voluntary water use reductions.
- Intensify efforts on leak detection and repair.
- Reduce non-essential city government water use. (Examples include street cleaning, vehicle washing, operation of ornamental fountains, etc.)
- Reduce city government water use for landscape irrigation.
- Ask the public to follow voluntary landscape watering schedules.
- Notify wholesale customers of actions being taken in the City of Poca Agua and request implementation of similar procedures.

6.6.2 Stage 2, Moderate

6.6.2.1 TRIGGERING CONDITIONS FOR STAGE 2, MODERATE

- The water level in Poca Agua Reservoir has fallen below elevation 481.0 feet msl.
- Demand exceeds 95% of the amount that can be delivered to customers for 3 consecutive days.

- Water demand for all or part of the delivery system equals delivery capacity because delivery capacity is inadequate.
- Supply source becomes contaminated.
- Water supply system is unable to deliver water due to the failure or damage of major water system components.
- Water demand is approaching the limit of the permitted supply.

[If applicable select one or more of the additional triggering criteria discussed in Section 10.6.1.1, or devise additional triggering criteria tailored to your system.]

Stage 2 can terminate when the water level in Poca Agua Reservoir rises above elevation 485.0 feet msl or when the circumstances that caused the initiation of Stage 2 no longer prevail. Stage 1 becomes operative on termination of Stage 2.

6.6.2.2 GOAL FOR USE REDUCTION AND ACTIONS AVAILABLE UNDER STAGE 2, MODERATE

The goal for water use reduction under Stage 2, Moderate, is a ____ percent reduction of the use that would have occurred in the absence of drought contingency measures. The Utility Director or his/her designee can order the implementation of any of the actions listed below, as deemed necessary:

- Continue or initiate any actions available under Stage 1.
- Initiate engineering studies to evaluate alternatives should conditions worsen.
- Further accelerate public education efforts on ways to reduce water use.
- Halt non-essential city government water use. (Examples include street cleaning, vehicle washing, operation of ornamental fountains, etc.)
- Encourage the public to wait until the current drought or emergency situation has passed before establishing new landscaping.
- Notify wholesale customers of actions being taken in the City of Poca Agua and request them to implement similar procedures.

6.6.3 Stage 3, Severe

6.6.3.1 TRIGGERING CONDITIONS FOR STAGE 3, SEVERE

- The water level in Poca Agua Reservoir has fallen below elevation 478.0 feet msl.
- Demand exceeds 98% of the amount that can be delivered to customers for 3 consecutive days.
- Water demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate.
- Supply source becomes contaminated.

- Water supply system is unable to deliver water due to the failure or damage of major water system components.
- Water demand is approaching the limit of the permitted supply.

[If applicable select one or more of the additional triggering criteria discussed in Section 10.6.1.1, or devise additional triggering criteria tailored to your system.]

Stage 3 can terminate when the water level in Poca Agua Reservoir rises above elevation 482.0 feet msl or when the circumstances that caused the initiation of Stage 3 no longer prevail. Stage 2 becomes operative on termination of Stage 3.

6.6.3.2 GOAL FOR USE REDUCTION AND ACTIONS AVAILABLE UNDER STAGE 3, SEVERE

The goal for water use reduction under Stage 3, Severe, is a reduction of ____ percent of the use that would have occurred in the absence of drought contingency measures. If the circumstances warrant, the Utility Director or his/her designee can set a goal for greater water use reduction.

The Utility Director or his/her designee can order the implementation of any of the actions listed below, as deemed necessary. Measures described as “requires notification to TCEQ” impose mandatory requirements on retail and wholesale customers. The City of Poca Agua staff must notify TCEQ within five business days if these measures are implemented.

- Continue or initiate any actions available under Stages 1 and 2.
- Implement viable alternative water supply strategies.
- **Requires Notification to TCEQ –** Initiate mandatory water use restrictions as follows:
  - Prohibit hosing of paved areas, buildings, or windows.
  - Prohibit operation of ornamental fountains.
  - Prohibit washing or rinsing of vehicles by hose.
  - Prohibit using water in such a manner as to allow runoff or other waste.
- **Requires Notification to TCEQ –** Limit landscape watering at each service address to once every five days based on the last digit of the address. (Exceptions: Foundations, azaleas, new plantings (first year) of trees and shrubs may be watered for up to 2 hours on any day by a hand-held hose or a soaker hose. Golf courses may water greens and tee boxes without restrictions. Restrictions do not apply to locations using treated wastewater effluent for irrigation.)
- **Requires Notification to TCEQ –** Prohibit draining and filling of existing pools and filling of new pools. (Pools may add water to replace losses during normal use.)
- **Requires Notification to TCEQ –** Prohibit establishment of new landscaping.

- Initiate a 10% rate surcharge for all water use over 4,000 gallons per connection per month.
- Discontinue city government water use for landscape irrigation, except as needed to prevent foundation damage, keep golf course greens and tee boxes alive, and preserve new plantings.
- Notify wholesale customers of actions being taken in the City of Poca Agua and request them to implement similar procedures.

6.6.4 Stage 4, Emergency

6.6.4.1 TRIGGERING CONDITIONS FOR STAGE 4, EMERGENCY

- The water level in Poca Agua Reservoir has fallen below elevation 475.0 feet msl.
- Demand exceeds the amount that can be delivered to customers.
- Water demand for all or part of the delivery system seriously exceeds delivery capacity because the delivery capacity is inadequate.
- Supply source becomes contaminated.
- Water supply system unable to deliver water due to the failure or damage of major water system components.
- Water demand is approaching the limit of the permitted supply.

[If applicable select one or more of the additional triggering criteria discussed in Section 10.6.1.1, or devise additional triggering criteria tailored to your system.]

Stage 4 can terminate when the water level in Poca Agua Reservoir rises above elevation 479.0 feet msl or when the circumstances that caused the initiation of Stage 4 no longer prevail. Stage 3 becomes operative on termination of Stage 4.

6.6.4.2 GOAL FOR USE REDUCTION AND ACTIONS AVAILABLE UNDER STAGE 4, EMERGENCY

The goal for water use reduction under Stage 4, Emergency, is a reduction of ____ percent of the use that would have occurred in the absence of drought contingency measures. If circumstances warrant, the Utility Director or his/her designee can set a goal for greater water use reduction.

The Utility Director or his/her designee can order the implementation of any of the actions listed below, as deemed necessary. Measures described as “requires notification to TCEQ” impose mandatory requirements on retail and wholesale customers. The City of Poca Agua staff must notify TCEQ within five business days if these measures are implemented.

- Continue or initiate any actions available under Stages 1, 2, and 3.
- Implement viable alternative water supply strategies.

- **Requires Notification to TCEQ –** Prohibit washing of vehicles except as necessary for health, sanitation, or safety reasons
- **Requires Notification to TCEQ –** Prohibit commercial and residential landscape watering, except that foundations may be watered for 2 hours each day with a hand-held hose or a soaker hose.
- **Requires Notification to TCEQ –** Prohibit golf course watering except for greens and tee boxes.
- **Requires Notification to TCEQ –** Prohibit any filling of private pools. Commercial and public pools may refill to replace losses during normal use.
- **Requires Notification to TCEQ –** Require all commercial water users to reduce water use by a percentage established by the Utility Director or his/her designee.
- Initiate a 25% rate surcharge over normal rates for all water use over 4,000 gallons per month.
- Notify wholesale customers of actions being taken in the City of Poca Agua and request them to implement similar procedures.

6.7 Procedure for Granting Variances to the Plan

The Utility Director or his/her designee may grant temporary variances for existing water uses otherwise prohibited under this drought contingency plan if one or more of the following conditions is met:

- Failure to grant such a variance would cause an emergency condition adversely affecting health, sanitation, or fire safety for the public or the person requesting the variance.
- Compliance with this plan cannot be accomplished due to technical or other limitations.
- Alternative methods that achieve the same level of reduction in water use can be implemented.

Variances shall be granted or denied at the discretion of City of Poca Agua staff or his/her designee. All petitions for variances should be in writing and should include the following information:

- Name and address of the petitioner(s)
- Purpose of water use
- Specific provisions from which relief is requested
- Detailed statement of the adverse effect of the provision from which relief is requested
- Description of the relief requested
- Period of time for which the variance is sought

- Alternative measures that will be taken to reduce water use
- Other pertinent information.

6.8 Procedure for Enforcement of Mandatory Restrictions

Mandatory water use restrictions may be imposed in Stage 3 and Stage 4 drought stages. These mandatory water use restrictions will be enforced by warnings and penalties as follows:

- On the first violation, customers will be given a written warning that they have violated the mandatory water use restriction.
- On the second and subsequent violations, citations may be issued to customers, with fines not less than $___ and not to exceed $_____ per incident.
- After two violations have occurred, the City of Poca Agua may install a flow restrictor in the line to limit the amount of water that may pass through the meter in a 24-hour period.
- After three violations have occurred, the City of Poca Agua may cut off water service to the customer.

6.9 Coordination with the Regional Water Planning Group

The City of Poca Agua is located within the Region C water planning area. Appendix F includes a copy of a letter sent to the Chair of the Region C Water Planning Group (RCWPG) with this water conservation and drought contingency plan.

6.10 Review and Update of Drought Contingency Plan

As required by TCEQ rules, the City of Poca Agua will review this drought contingency plan every five years, beginning in _____ *[five years from date of plan]*. The plan will be updated as appropriate based on new or updated information. As the plan is reviewed and subsequently updated, a copy of the revised Drought Contingency Plan will be submitted to the TCEQ and the RCWPG for their records.

APPENDIX A
List of References

Appendix A
List of References

(1) Freese and Nichols, Inc.: "North Texas Municipal Water District Water Conservation and Drought Contingency Plan," prepared for North Texas Municipal Water District, Fort Worth, August 2004.

(2) City of Fort Worth: "Emergency Water Management Plan for the City of Fort Worth," Fort Worth, August 19, 2003.

(3) City of Dallas Water Utilities Department: "City of Dallas Water Conservation Plan," adopted by the City Council, Dallas, September 1999.

(4) Texas Commission on Environmental Quality: "Water Conservation Plans for Municipal Uses by Public Water Suppliers," *Texas Administrative Code* Title 30 Part I Subchapter A §288.2, effective October 7, 2004.

(5) Texas Commission on Environmental Quality: "Water Utility Profile," accessed online at http://www.tceq.state.tx.us/assets/public/permitting/forms/10218.pdf, September 2005

(6) Texas Water Development Board: "Water Demand Projections, 2006 Regional Water Plan Data," accessed online at http://www.twdb.state.tx.us/data/popwaterdemand/2003Projections/DemandProjections.asp , August 2004.

(7) Texas Water Development Board: *Report 362 Water Conservation Best Management Practices Guide*, prepared for the Water Conservation Implementation Task Force, Austin, November 2004.

(8) Modeled after the City of Dallas landscape irrigation ordinance, accessed online at http://www.dallascityhall.com/dallas/eng/pdf/dwu/DWUConservationOrd.pdf, August 2004.

(9) Texas Commission on Environmental Quality: "Model Drought Contingency Plan," accessed online at http://www.tnrcc.state.tx.us/permitting/waterperm/wrpa/contingency.html, August 2004.

APPENDIX B
Texas Commission on Environmental Quality Rules on Municipal Water Conservation and Drought Contingency Plans

SUBCHAPTER A: WATER CONSERVATION PLANS
§§288.1 - 288.7
Effective October 7, 2004

§288.1. Definitions.

The following words and terms, when used in this chapter, shall have the following meanings, unless the context clearly indicates otherwise.

(1) **Agricultural or Agriculture** - Any of the following activities:

(A) cultivating the soil to produce crops for human food, animal feed, or planting seed or for the production of fibers;

(B) the practice of floriculture, viticulture, silviculture, and horticulture, including the cultivation of plants in containers or non-soil media by a nursery grower;

(C) raising, feeding, or keeping animals for breeding purposes or for the production of food or fiber, leather, pelts, or other tangible products having a commercial value;

(D) raising or keeping equine animals;

(E) wildlife management; and

(F) planting cover crops, including cover crops cultivated for transplantation, or leaving land idle for the purpose of participating in any governmental program or normal crop or livestock rotation procedure.

(2) **Agricultural use** – Any use or activity involving agriculture, including irrigation.

(3) **Conservation** – Those practices, techniques, and technologies that reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water, or increase the recycling and reuse of water so that a water supply is made available for future or alternative uses.

(4) **Drought contingency plan** – A strategy or combination of strategies for temporary supply and demand management responses to temporary and potentially recurring water supply shortages and other water supply emergencies. A drought contingency plan may be a separate document identified as such or may be contained within another water management document(s).

(5) **Industrial use** – The use of water in processes designed to convert materials of a lower order of value into forms having greater usability and commercial value, commercial fish

production, and the development of power by means other than hydroelectric, but does not include agricultural use.

(6) **Irrigation** – The agricultural use of water for the irrigation of crops, trees, and pastureland, including, but not limited to, golf courses and parks which do not receive water through a municipal distribution system.

(7) **Irrigation water use efficiency** – The percentage of that amount of irrigation water which is beneficially used by agriculture crops or other vegetation relative to the amount of water diverted from the source(s) of supply. Beneficial uses of water for irrigation purposes include, but are not limited to, evapotranspiration needs for vegetative maintenance and growth, salinity management, and leaching requirements associated with irrigation.

(8) **Mining use** – The use of water for mining processes including hydraulic use, drilling, washing sand and gravel, and oil field repressuring.

(9) **Municipal per capita water use** – The sum total of water diverted into a water supply system for residential, commercial, and public and institutional uses divided by actual population served.

(10) **Municipal use** – The use of potable water within or outside a municipality and its environs whether supplied by a person, privately owned utility, political subdivision, or other entity as well as the use of sewage effluent for certain purposes, including the use of treated water for domestic purposes, fighting fires, sprinkling streets, flushing sewers and drains, watering parks and parkways, and recreational purposes, including public and private swimming pools, the use of potable water in industrial and commercial enterprises supplied by a municipal distribution system without special construction to meet its demands, and for the watering of lawns and family gardens.

(11) **Municipal use in gallons per capita per day** – The total average daily amount of water diverted or pumped for treatment for potable use by a public water supply system. The calculation is made by dividing the water diverted or pumped for treatment for potable use by population served. Indirect reuse volumes shall be credited against total diversion volumes for the purpose of calculating gallons per capita per day for targets and goals.

(12) **Nursery grower** – A person engaged in the practice of floriculture, viticulture, silviculture, and horticulture, including the cultivation of plants in containers or nonsoil media, who grows more than 50% of the products that the person either sells or leases, regardless of the variety sold, leased, or grown. For the purpose of this definition, grow means the actual cultivation or propagation of the product beyond the mere holding or maintaining of the item prior to sale or lease, and typically includes activities associated with the production or multiplying of stock such as the development of new plants from cuttings, grafts, plugs, or seedlings.

(13) **Pollution** – The alteration of the physical, thermal, chemical, or biological quality of, or the contamination of, any water in the state that renders the water harmful, detrimental, or injurious to humans, animal life, vegetation, or property, or to the public health, safety, or welfare, or impairs the usefulness or the public enjoyment of the water for any lawful or reasonable purpose.

(14) **Public water supplier** – An individual or entity that supplies water to the public for human consumption.

(15) **Regional water planning group** – A group established by the Texas Water Development Board to prepare a regional water plan under Texas Water Code, §16.053.

(16) Retail public water supplier – An individual or entity that for compensation supplies water to the public for human consumption. The term does not include an individual or entity that supplies water to itself or its employees or tenants when that water is not resold to or used by others.

(17) **Reuse** – The authorized use for one or more beneficial purposes of use of water that remains unconsumed after the water is used for the original purpose of use and before that water is either disposed of or discharged or otherwise allowed to flow into a watercourse, lake, or other body of state-owned water.

(18) **Water conservation plan** – A strategy or combination of strategies for reducing the volume of water withdrawn from a water supply source, for reducing the loss or waste of water, for maintaining or improving the efficiency in the use of water, for increasing the recycling and reuse of water, and for preventing the pollution of water. A water conservation plan may be a separate document identified as such or may be contained within another water management document(s).

(19) **Wholesale public water supplier** – An individual or entity that for compensation supplies water to another for resale to the public for human consumption. The term does not include an individual or entity that supplies water to itself or its employees or tenants as an incident of that employee service or tenancy when that water is not resold to or used by others, or an individual or entity that conveys water to another individual or entity, but does not own the right to the water which is conveyed, whether or not for a delivery fee.

Adopted September 15, 2004 Effective October 7, 2004

§288.2. Water Conservation Plans for Municipal Uses by Public Water Suppliers.

(a) A water conservation plan for municipal water use by public water suppliers must provide information in response to the following. If the plan does not provide information for each requirement, the public water supplier shall include in the plan an explanation of why the requirement is not applicable.

(1) Minimum requirements. All water conservation plans for municipal uses by public drinking water suppliers must include the following elements:

(A) a utility profile including, but not limited to, information regarding population and customer data, water use data, water supply system data, and wastewater system data;

(B) until May 1, 2005, specification of conservation goals including, but not limited to, municipal per capita water use goals, the basis for the development of such goals, and a time frame for achieving the specified goals;

(C) beginning May 1, 2005, specific, quantified five-year and ten-year targets for water savings to include goals for water loss programs and goals for municipal use, in gallons per capita per day. The goals established by a public water supplier under this subparagraph are not enforceable;

(D) metering device(s), within an accuracy of plus or minus 5.0% in order to measure and account for the amount of water diverted from the source of supply;

(E) a program for universal metering of both customer and public uses of water, for meter testing and repair, and for periodic meter replacement;

(F) measures to determine and control unaccounted-for uses of water (for example, periodic visual inspections along distribution lines; annual or monthly audit of the water system to determine illegal connections; abandoned services; etc.);

(G) a program of continuing public education and information regarding water conservation;

(H) a water rate structure which is not "promotional," i.e., a rate structure which is cost-based and which does not encourage the excessive use of water;

(I) a reservoir systems operations plan, if applicable, providing for the coordinated operation of reservoirs owned by the applicant within a common watershed or river basin in order to optimize available water supplies; and

(J) a means of implementation and enforcement which shall be evidenced by:

(i) a copy of the ordinance, resolution, or tariff indicating official adoption of the water conservation plan by the water supplier; and

(ii) a description of the authority by which the water supplier will implement and enforce the conservation plan; and

(K) documentation of coordination with the regional water planning groups for the service area of the public water supplier in order to ensure consistency with the appropriate approved regional water plans.

(2) Additional content requirements. Water conservation plans for municipal uses by public drinking water suppliers serving a current population of 5,000 or more and/or a projected population of 5,000 or more within the next ten years subsequent to the effective date of the plan must include the following elements:

(A) a program of leak detection, repair, and water loss accounting for the water transmission, delivery, and distribution system in order to control unaccounted-for uses of water;

(B) a record management system to record water pumped, water deliveries, water sales, and water losses which allows for the desegregation of water sales and uses into the following user classes:

(i) residential;

(ii) commercial;

(iii) public and institutional; and

(iv) industrial;

(C) a requirement in every wholesale water supply contract entered into or renewed after official adoption of the plan (by either ordinance, resolution, or tariff), and including any contract extension, that each successive wholesale customer develop and implement a water conservation plan or water conservation measures using the applicable elements in this chapter. If the customer intends to resell the water, the contract between the initial supplier and customer must provide that the contract for the resale of the water must have water conservation requirements so that each successive customer in the resale of the water will be required to implement water conservation measures in accordance with the provisions of this chapter.

(3) Additional conservation strategies. Any combination of the following strategies shall be selected by the water supplier, in addition to the minimum requirements in paragraphs (1) and (2) of this subsection, if they are necessary to achieve the stated water conservation goals of the plan. The commission may require that any of the following strategies be implemented by the water supplier if the commission determines that the strategy is necessary to achieve the goals of the water conservation plan:

(A) conservation-oriented water rates and water rate structures such as uniform or increasing block rate schedules, and/or seasonal rates, but not flat rate or decreasing block rates;

(B) adoption of ordinances, plumbing codes, and/or rules requiring water-conserving plumbing fixtures to be installed in new structures and existing structures undergoing substantial modification or addition;

(C) a program for the replacement or retrofit of water-conserving plumbing fixtures in existing structures;

(D) reuse and/or recycling of wastewater and/or graywater;

(E) a program for pressure control and/or reduction in the distribution system and/or for customer connections;

(F) a program and/or ordinance(s) for landscape water management;

(G) a method for monitoring the effectiveness and efficiency of the water conservation plan; and

(H) any other water conservation practice, method, or technique which the water supplier shows to be appropriate for achieving the stated goal or goals of the water conservation plan.

(b) A water conservation plan prepared in accordance with 31 TAC §363.15 (relating to Required Water Conservation Plan) of the Texas Water Development Board and substantially meeting the requirements of this section and other applicable commission rules may be submitted to meet application requirements in accordance with a memorandum of understanding between the commission and the Texas Water Development Board.

(c) Beginning May 1, 2005, a public water supplier for municipal use shall review and update its water conservation plan, as appropriate, based on an assessment of previous five-year and ten-year targets and any other new or updated information. The public water supplier for municipal use shall review and update the next revision of its water conservation plan not later than May 1, 2009, and every five years after that date to coincide with the regional water planning group.

SUBCHAPTER B: DROUGHT CONTINGENCY PLANS
§§288.20 - 288.22
Effective October 7, 2004

§288.20. Drought Contingency Plans for Municipal Uses by Public Water Suppliers.

(a) A drought contingency plan for a retail public water supplier, where applicable, must include the following minimum elements.

(1) Minimum requirements. Drought contingency plans must include the following minimum elements.

(A) Preparation of the plan shall include provisions to actively inform the public and affirmatively provide opportunity for public input. Such acts may include, but are not limited to, having a public meeting at a time and location convenient to the public and providing written notice to the public concerning the proposed plan and meeting.

(B) Provisions shall be made for a program of continuing public education and information regarding the drought contingency plan.

(C) The drought contingency plan must document coordination with the regional water planning groups for the service area of the retail public water supplier to ensure consistency with the appropriate approved regional water plans.

(D) The drought contingency plan must include a description of the information to be monitored by the water supplier, and specific criteria for the initiation and termination of drought response stages, accompanied by an explanation of the rationale or basis for such triggering criteria.

(E) The drought contingency plan must include drought or emergency response stages providing for the implementation of measures in response to at least the following situations:

(i) reduction in available water supply up to a repeat of the drought of record;

(ii) water production or distribution system limitations;

(iii) supply source contamination; or

(iv) system outage due to the failure or damage of major water system components (e.g., pumps).

(F) The drought contingency plan must include specific, quantified targets for water use reductions to be achieved during periods of water shortage and drought. The entity preparing the plan shall establish the targets. The goals established by the entity under this subparagraph are not enforceable.

(G) The drought contingency plan must include the specific water supply or water demand management measures to be implemented during each stage of the plan including, but not limited to, the following:

(i) curtailment of non-essential water uses; and

(ii) utilization of alternative water sources and/or alternative delivery mechanisms with the prior approval of the executive director as appropriate (e.g., interconnection with another water system, temporary use of a non-municipal water supply, use of reclaimed water for non-potable purposes, etc.).

(H) The drought contingency plan must include the procedures to be followed for the initiation or termination of each drought response stage, including procedures for notification of the public.

(I) The drought contingency plan must include procedures for granting variances to the plan.

(J) The drought contingency plan must include procedures for the enforcement of mandatory water use restrictions, including specification of penalties (e.g., fines, water rate surcharges, discontinuation of service) for violations of such restrictions.

(2) Privately-owned water utilities. Privately-owned water utilities shall prepare a drought contingency plan in accordance with this section and incorporate such plan into their tariff.

(3) Wholesale water customers. Any water supplier that receives all or a portion of its water supply from another water supplier shall consult with that supplier and shall include in the drought contingency plan appropriate provisions for responding to reductions in that water supply.

(b) A wholesale or retail water supplier shall notify the executive director within five business days of the implementation of any mandatory provisions of the drought contingency plan.

(c) The retail public water supplier shall review and update, as appropriate, the drought contingency plan, at least every five years, based on new or updated information, such as the adoption or revision of the regional water plan.

APPENDIX C
Water Utility Profile

Texas Commission on Environmental Quality

UTILITY PROFILE & WATER CONSERVATION PLAN REQUIREMENTS FOR MUNICIPAL WATER USE BY PUBLIC WATER SUPPLIERS

This form is provided to assist entities in water conservation plan development for municipal water use by a retail public water supplier. Information from this form should be included within a water conservation plan for municipal use. If you need assistance in completing this form or in developing your plan, please contact the conservation staff of the Resource Protection Team in the Water Supply Division at (512) 239-4691.

Name of Entity: ____

Address & Zip: ____

Telephone Number: ______________________ **Fax:** ______________

Form Completed By:____

Title: ____

Signature: ______________________ **Date:** ______________

Name and Phone Number of Person/Department responsible for implementing a water conservation program: ________________________________

UTILITY PROFILE

I. POPULATION AND CUSTOMER DATA

A. Population and Service Area Data

1. Attach a copy of your service-area map and, if applicable, a copy of your Certificate of Convenience and Necessity (CCN).

2. Service area size (square miles): ______________________

3. Current population of service area: ______________________________

4. Current population served:

a. water ______________________
b. wastewater ______________________

5. Population served by water utility for the previous five years:

Year	Population
________	_________
________	_________
________	_________
________	_________
________	_________

6. Projected population for service area in the following decades:

Year	Population
2010	_________
2020	_________
2030	_________
2040	_________
2050	_________

7. List source/method for the calculation of current and projected population:

____
____
____
____

B. Active Connections

1. Current number of active connections. Check whether multi-family service is counted as Residential _____ or Commercial _____

Treated water users:	Metered	Not-metered	Total
Residential	________	__________	______
Commercial	________	__________	______
Industrial	________	__________	______
Other	________	__________	______

2. List the net number of new connections per year for most recent three years:

Year	________	________	________
Residential	________	________	________
Commercial	________	________	________
Industrial	________	________	________
Other	________	________	________

C. High Volume Customers

List annual water use for the five highest volume customers
(indicate if treated or raw water delivery)

	Customer	Use (1,000gal./yr.)	Treated/Raw Water
(1)	________	________	________
(2)	________	________	________
(3)	________	________	________
(4)	________	________	________
(5)	________	________	________

II. WATER USE DATA FOR SERVICE AREA

A. Water Accounting Data

1. Amount of water use for previous five years (in 1,000 gal.):
Please indicate : Diverted Water ____________
Treated Water ____________

Year	________	________	________	________	________
January	________	________	________	________	________
February	________	________	________	________	________
March	________	________	________	________	________

April					
May					
June					
July					
August					
September					
October					
November					
December					
Total					

Indicate how the above figures were determined (e.g., from a master meter located at the point of a diversion from the source or located at a point where raw water enters the treatment plant, or from water sales).

____

____

____

2. Amount of water (in 1,000 gallons) delivered (sold) as recorded by the following account types for the past five years.

Year	Residential	Commercial	Industrial	Wholesale	Other	Total Sold

3. List previous five years records for water loss (the difference between water diverted (or treated) and water delivered (or sold))

Year	Amount (gal.)	%

4. Municipal water use for previous five years:

Year	Population	Total Water Diverted or Pumped for Treatment (1,000 gal.)

B. Projected Water Demands

If applicable, attach projected water supply demands for the next ten years using information such as population trends, historical water use, and economic growth in the service area over the next ten years and any additional water supply requirement from such growth.

III. WATER SUPPLY SYSTEM DATA

A. Water Supply Sources

List all current water supply sources and the amounts authorized with each:

	Source	Amount Authorized
Surface Water:	____________________	____________ acre-feet
Groundwater:	____________________	____________ acre-feet
Contracts:	____________________	____________ acre-feet
Other:	____________________	____________ acre-feet

B. Treatment and Distribution System

1. Design daily capacity of system: ________________ MGD

2. Storage Capacity: Elevated ________ MGD, Ground _______ MGD

3. If surface water, do you recycle filter backwash to the head of the plant? Yes ______ No ______. If yes, approximately ________ MGD.

4. Please attach a description of the water system. Include the number of

treatment plants, wells, and storage tanks. If possible, include a sketch of the system layout.

IV. WASTEWATER SYSTEM DATA

A. Wastewater System Data

1. Design capacity of wastewater treatment plant(s): ___________ MGD

2. Is treated effluent used for irrigation on-site _____, off-site _____, plant washdown _____, or chlorination/dechlorination ______?
   If yes, approximately ________ gallons per month.

3. Briefly describe the wastewater system(s) of the area serviced by the water utility. Describe how treated wastewater is disposed of. Where applicable, identify treatment plant(s) with the TCEQ name and number, the operator, owner, and, if wastewater is discharged, the receiving stream. If possible, attach a sketch or map which locates the plant(s) and discharge points or disposal sites.

B. Wastewater Data for Service Area

1. Percent of water service area served by wastewater system: ______%

2. Monthly volume treated for previous three years (in 1,000 gallons):

Year	________	________	________
January	________	________	________
February	________	________	________
March	________	________	________
April	________	________	________
May	________	________	________
June	________	________	________
July	________	________	________
August	________	________	________
September	________	________	________
October	________	________	________
November	________	________	________
December	________	________	________
Total	________	________	________

REQUIREMENTS FOR WATER CONSERVATION PLANS FOR MUNICIPAL WATER USE BY PUBLIC WATER SUPPLIERS

In addition to the utility profile, a water conservation plan for municipal use by a public water supplier must include, at a minimum, additional information as required by Title 30, Texas Administrative Code, §288.2. <u>Note: If the water conservation plan does not provide information for each requirement, an explanation must be included as to why the requirement is not applicable.</u>

Specific, Quantified 5 & 10-Year Targets

The water conservation plan must include specific, quantified five-year and ten-year targets for water savings to include goals for water loss programs and goals for ***municipal use in gallons per capita per day*** (see Appendix A). Note that the goals established by a public water supplier under this subparagraph are not enforceable.

Metering Devices

The water conservation plan must include a statement about the water supplier's metering device(s), within an accuracy of plus or minus 5.0% in order to measure and account for the amount of water diverted from the source of supply.

Universal Metering

The water conservation plan must include and a program for universal metering of both customer and public uses of water, for meter testing and repair, and for periodic meter replacement.

Unaccounted-For Water Use

The water conservation plan must include measures to determine and control unaccounted-for uses of water (for example, periodic visual inspections along distribution lines; annual or monthly audit of the water system to determine illegal connections; abandoned services; etc.).

Continuing Public Education & Information

The water conservation plan must include a description of the program of continuing public education and information regarding water conservation by the water supplier.

Non-Promotional Water Rate Structure

The water supplier must have a water rate structure which is not "promotional," i.e., a rate structure which is cost-based and which does not encourage the excessive use of water. This rate structure must be listed in the water conservation plan.

Reservoir Systems Operations Plan

The water conservation plan must include a reservoir systems operations plan, if applicable, providing for the coordinated operation of reservoirs owned by the applicant within a common watershed or river basin in order to optimize available water supplies.

Enforcement Procedure & Plan Adoption

The water conservation plan must include a means of implementation and enforcement which shall be evidenced by 1) a copy of the ordinance, resolution, or tariff indicating **official adoption** of the water conservation plan by the water supplier; and 2) a description of the authority by which the water supplier will implement and enforce the conservation plan.

Coordination with the Regional Water Planning Group(s)

The water conservation plan must include documentation of coordination with the regional water planning group(s) for the service area of the public water supplier in order to ensure consistency with the appropriate approved regional water plans.

Example statement to be included within the water conservation plan:

The service area of the _____________ (name of water supplier) is located within the ___________ (name of regional water planning area or areas) and ___________ (name of water supplier) has provided a copy of this water conservation plan to the ____________ (name of regional water planning group or groups).

Additional Requirements:

required of suppliers serving population of 5,000 or more or a projected population of 5,000 or more within ten years)

1. Program for Leak Detection, Repair, and Water Loss Accounting

The plan must include a description of the program of leak detection, repair, and water loss accounting for the water transmission, delivery, and distribution system in order to control unaccounted-for uses of water.

2. Record Management System

The plan must include a record management system to record water pumped, water deliveries, water sales, and water losses which allows for the desegregation of water sales and uses into the following user classes (residential; commercial; public and institutional; and industrial.

Plan Review and Update

Beginning May 1, 2005, a public water supplier for municipal use shall review and update its water conservation plan, as appropriate, based on an assessment of previous five-year and ten-year targets and any other new or updated information. The public water supplier for municipal use shall review and update the next revision of its water conservation plan not later than May 1, 2009, and every five years after that date to coincide with the regional water planning group. The revised plan must also include an implementation report.

Best Management Practices Guide

On November 2004, the Texas Water Development Board's (TWDB) Report 362 was completed by the Water Conservation Implementation Task Force. Report 362 is the Water Conservation Best Management Practices (BMP) Guide. The BMP Guide is a voluntary list of management practices that water users may implement in addition to the required components of Title 30, Texas Administrative Code, Chapter 288. The BMP Guide is available on the TWDB's website at the link below or by calling (512) 463-7847.

http://www.twdb.state.tx.us/assistance/conservation/TaskForceDocs/WCITFBMPGuide.pdf

Appendix A

Definitions of Commonly Used Terms

Conservation – Those practices, techniques, and technologies that reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water, or increase the recycling and reuse of water so that a water supply is made available for future or alternative uses.

Industrial use – The use of water in processes designed to convert materials of a lower order of value into forms having greater usability and commercial value, commercial fish production, and the development of power by means other than hydroelectric, but does not include agricultural use.

Irrigation – The agricultural use of water for the irrigation of crops, trees, and pastureland, including, but not limited to, golf courses and parks which do not receive water through a municipal distribution system.

Municipal per capita water use – The sum total of water diverted into a water supply system for residential, commercial, and public and institutional uses divided by actual population served.

Municipal use – The use of potable water within or outside a municipality and its environs whether supplied by a person, privately owned utility, political subdivision, or other entity as well as the use of sewage effluent for certain purposes, including the use of treated water for domestic purposes, fighting fires, sprinkling streets, flushing sewers and drains, watering parks and parkways, and recreational purposes, including public and private swimming pools, the use of potable water in industrial and commercial enterprises supplied by a municipal distribution system without special construction to meet its demands, and for the watering of lawns and family gardens.

Municipal use in gallons per capita per day – The total average daily amount of water diverted or pumped for treatment for potable use by a public water supply system. The calculation is made by dividing the water diverted or pumped for treatment for potable use by population served. Indirect reuse volumes shall be credited against total diversion volumes for the purpose of calculating gallons per capita per day for targets and goals.

Pollution – The alteration of the physical, thermal, chemical, or biological quality of, or the contamination of, any water in the state that renders the water harmful, detrimental, or injurious to humans, animal life, vegetation, or property, or to the public health, safety, or welfare, or impairs the usefulness or the public enjoyment of the water for any lawful or reasonable purpose.

Public water supplier – An individual or entity that supplies water to the public for human consumption.

Regional water planning group – A group established by the Texas Water Development Board to prepare a regional water plan under Texas Water Code, §16.053.

Retail public water supplier – An individual or entity that for compensation supplies water to the public for human consumption. The term does not include an individual or entity that supplies water to itself or its employees or tenants when that water is not resold to or used by others.

Reuse – The authorized use for one or more beneficial purposes of use of water that remains unconsumed after the water is used for the original purpose of use and before that water is either disposed of or discharged or otherwise allowed to flow into a watercourse, lake, or other body of state-owned water.

Water conservation plan – A strategy or combination of strategies for reducing the volume of water withdrawn from a water supply source, for reducing the loss or waste of water, for maintaining or improving the efficiency in the use of water, for increasing the recycling and reuse of water, and for preventing the pollution of water. A water conservation plan may be a separate document identified as such or may be contained within another water management document(s).

Water loss - The difference between water diverted or treated and water delivered (sold). Water loss can result from:

1. inaccurate or incomplete record keeping;
2. meter error;
3. unmetered uses such as firefighting, line flushing, and water for public buildings and water treatment plants;
4. leaks; and
5. water theft and unauthorized use.

Wholesale public water supplier – An individual or entity that for compensation supplies water to another for resale to the public for human consumption. The term does not include an individual or entity that supplies water to itself or its employees or tenants as an incident of that employee service or tenancy when that water is not resold to or used by others, or an individual or entity that conveys water to another individual or entity, but does not own the right to the water which is conveyed, whether or not for a delivery fee.

APPENDIX D
City Council Resolution Adopting this Water Conservation and Drought Contingency Plan

APPENDIX D
City Council Resolution Adopting the Water Conservation and Drought Contingency Plan

Ordinance No. 3566

AN ORDINANCE ADOPTING A CITY OF POCA AGUA WATER CONSERVATION AND DROUGHT CONTINGENCY PLAN; TO PROMOTE RESPONSIBLE USE OF WATER; ESTABLISHING RESTRICTIONS ON CERTAIN WATER USES RELATED TO DROUGHT OR SHORTAGES; PROVIDING A PENALTY OF NOT LESS THAN _________ DOLLARS ($____) PER DAY NOR MORE THAN ________ DOLLARS ($____) PER DAY FOR EACH DAY OF NONCOMPLIANCE WITH THE PROVISIONS OF THE DROUGHT CONTINGENCY PLAN, AND/OR DISCONNECTION OF WATER SERVICE FOR NONCOMPLIANCE WITH THE PROVISIONS OF THE DROUGHT CONTINGENCY PLAN AND WATER CONSERVATION PLAN.

WHEREAS, the City of Poca Agua, Texas (the "City"), recognizes that the amount of water available to the City and its water customers is limited;

WHEREAS, the City recognizes that due to natural limitations due to drought conditions, system failures and other acts of God which may occur, the City cannot guarantee an uninterrupted water supply for all purposes at all times;

WHEREAS, applicable law and regulations of the Texas Commission on Environmental Quality require that the City adopt a Water Conservation Plan and Drought Contingency Plan;

WHEREAS, the City has determined an urgent need in the best interest of the public to adopt a Water Conservation and Drought Contingency Plan; and

WHEREAS, the City Council of the City of Poca Agua desires approval of the Water Conservation and Drought Contingency Plan and adopt such Plan as official City policy; **NOW THEREFORE,**

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF POCA AGUA:

Section 1. The City Council hereby approves and adopts the City's Water Conservation and Drought Contingency Plan, attached hereto as Addendum A, and to be included in full as a part of this Ordinance as if recited verbatim herein. The City commits to implement the program according to the procedures set forth in the adopted Plan.

Section 2. THAT Ordinance No. _______ adopted on _________ is hereby repealed.

Section 3. City water customers that do not comply with the Drought Contingency Plan shall be subject to (i) a penalty and fine of not less than _______ dollars ($____) per day nor more than ________ dollars ($___) per day for each day of noncompliance; and/or (ii) discontinuance of water services to water customers by the City

Section 4. Water customers of the City that do not comply with the Drought Contingency Plan, adopted as part of this ordinance, shall be subject to the enforcement described in Section 10.8 of the attached Water Conservation and Drought Contingency Plan, including a penalty of discontinuance by the City of water services to such water customers.

Section 5. The City Council finds and declares that a sufficient written notice of the date, hour, place and subject of the meeting of the Council was posted at a designated place convenient to the public at the City Hall for the time required by law preceding this meeting, that such place of posting was readily accessible at all times to the general public, and that all of the foregoing was done as required by law at all times during which this Ordinance and the subject matter thereof has been discussed, considered and formally acted upon.

The City Council further ratifies, approves and confirms such written notice and the posting thereof.

Section 6. THAT should any paragraph, sentence, clause, phrase or word of this Ordinance be declared unconstitutional or invalid for any reason, the remainder of this Ordinance shall not be affected thereby.

Section 7. THAT the City Secretary is hereby authorized and directed to cause publication of the descriptive caption of this ordinance as an alternative method of publication provided by law.

AND SO IT IS ORDERED

Passed by the City Council on this ___th day of ___________, _____.

____
Mayor

Attest:

____
City Secretary

APPENDIX E
Landscape Water Management Ordinance

APPENDIX E
Landscape Water Management Ordinance[8]

A. Purpose

Some landscape irrigation practices can waste a significant quantity of water, particularly during the summer months. The purpose of this landscape water management ordinance is to ensure that water being used for lawn and landscape irrigation is being applied in a manner that prevents waste and conserves our water resources.

B. Lawn and Landscape Irrigation Restrictions

1. A person commits an offense if he or she irrigates, waters, or causes or allows the irrigation or water of any lawn of landscape located on any property owned, leased, or managed by him or her between the hours of 10:00 a.m. and 6:00 p.m. from June 1 through September 30 of any year.
2. A person commits an offense if he knowingly or recklessly irrigates, waters, or causes or allows the irrigation or watering of lawn or landscape located on any property owned, leased, or managed by that person in such a manner that causes:
   a. over-watering lawn or landscape, such that a constant stream of water overflows from the lawn or landscape onto a street or other drainage area, or
   b. irrigating lawn or landscape during any form of precipitation. This includes automatic sprinkler systems.
3. A person commits an offense if he or she operates a lawn or irrigation system or device on property that he or she owns, leases, or manages that:
   a. has broken or missing sprinkler head(s), or
   b. has not been properly maintained to prevent the waste of water

C. Rain Sensors

1. Any new irrigation system installed within the city's customer service area on or after August 5, 2004, must be equipped with rain sensing devices in compliance with state design and installation regulations.
2. A person commits an offense on property owned, leased or managed by him or her if he or she:
   a. installs or allows the installation of new irrigation systems in violation of Subsection C.1 or
   b. operates or allows the operation of an irrigation system that does not comply with Subsection C.1.

D. Variances

The City Manager or his/her designee may, in special cases, grant variances from the provisions in Subsection B.1 or Subsection C. to persons demonstrating extreme hardship or need. Variances may be granted only under all of the following circumstances and conditions:

1. Applicant must sign a compliance agreement agreeing to irrigate or water the lawn and/or landscape only in the amount and manner permitted by the variance.
2. The variance must not cause an immediate significant reduction to the City's water supply.
3. The extreme hardship or need requiring the variance must relate to the health, safety, or welfare of the person making the request.
4. The health, safety, and welfare of the public and the person making the request must not be adversely affected by the requested variance.

E. Revocation of Variances

The director of water utilities may revoke a variance granted when the director determines that:

1. the conditions of Subsection D are not being met or no longer apply,
2. the terms of the compliance agreement are violated, or
3. the health, safety, or welfare of other persons requires revocation.

(City of Poca Agua Ordinance 3567, effective 8/5/2004)

APPENDIX F
Letter to Region C Water Planning Group

APPENDIX F
Sample Letter to Region C Water Planning Group

Date

Mr. Jim Parks
Chair, Region C Water Planning Group
North Texas Municipal Water District
P.O. Box 2408
Wylie, TX 75098

Dear Mr. Parks:

Enclosed please find a copy of the recently adopted water conservation and drought contingency plan for the City of Poca Agua. I am also submitting a copy of this plan to the Region C Water Planning Group in accordance with the Texas Water Development Board and Texas Commission on Environmental Quality rules. These plans were developed in concert with the North Texas Municipal Water District's water conservation and drought contingency plan. The City Council of the City of Poca Agua adopted the attached plan on ___________ __, _____.

Sincerely,

Name
Utility Director
City of Poca Agua

Sample Letter to Raw Water Supplier

Date

Mr. John Doe
Raw Water Supplier
P.O. Box 12345
City, TX 77777

Dear Mr. Doe:

Enclosed please find a copy of the recently adopted water conservation and drought contingency plan for the City of ______________. I am submitting a copy of this plan to the ___________ (raw water supplier) in accordance with the Texas Water Development Board and Texas Commission on Environmental Quality rules. These plans were developed in concert with the sample water conservation and drought contingency plan provided by the Region C Water Planning Group. The City Council of ______ adopted the attached plan on _____.

Sincerely,

Name
Position, City of __________

APPENDIX G
Water Conservation Report

APPENDIX G
WATER CONSERVATION REPORT

Entity Reporting: ______________________
Filled Out By: ______________________
Date Completed: ______________________
Year Covered: ______________________
# of Connections ______________________

Recorded Deliveries and Sales by Month (in Million Gallons):

Month	Treated Water Deliveries	Other Supplies	Sales by Category						
			Residential	Commercial	Public/ Institutional	Industrial	Wholesale	Other	Total
January									0
February									0
March									0
April									0
May									0
June									0
July									0
August									0
September									0
October									0
November									0
December									0
TOTAL		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Unaccounted Water (Million Gallons):

Treated Water Deliveries	0	from Table above
Other Supplies	0	from Table above
Total Sales	0	from Table above
Estimated Fire Use		estimated from best available data
Estimated line flushing		estimated from best available data
Unaccounted Water	0	
% Unaccounted	#DIV/0!	
Goal for % Unaccounted	12.00%	

Per Capita Municipal Use (Gallons per person per day)

Municipal Use (MG) 0 from Table above (Deliveries - industrial sales - municipal sales - other sales)
Estimated Population please describe source of population estimate
Per Capita Use (gpcd) #DIV/0!
5-year Per Capita Goal (___)
10-year Per Capita Goal (___)

Recorded Wholesale Sales by Month (in Million Gallons):

Month	Sales to ______	Sales to ______	Sales to ______	Sales to ______	Sales to ______	Sales to ______	Sales to ______	Total Wholesale Sales
January								
February								
March								
April								
May								
June								
July								
August								
September								
October								
November								
December								
TOTAL		**0**	**0**	**0**	**0**	**0**	**0**	

Information on Wholesale Customers:

Customer	Estimated Population

Unusual Circumstances (use additional sheets if necessary):

Progress in Implementation of Conservation Plan (use additional sheets if necessary):

Conservation measures planned for next year (use additional sheets if necessary):

Other (use additional sheets if necessary):

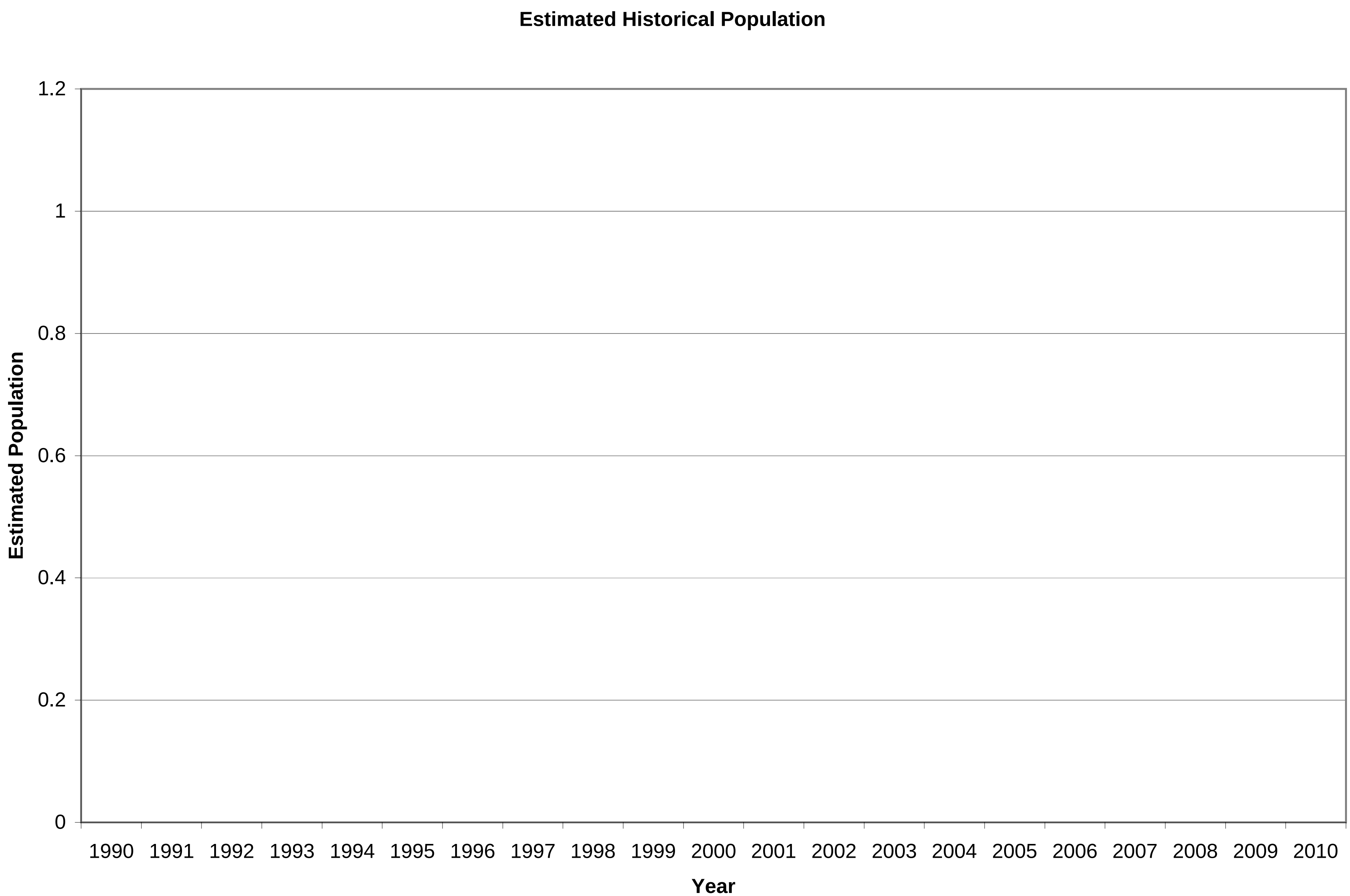
Historical Water Use Data for ____________

Year	Connections	Estimated Population	Treated Water Deliveries	Other Supplies	Metered Sales by Category						
					Residential	Commercial	Public/ Institutional	Industrial	Wholesale	Other	Total
1990											0
1991											0
1992											0
1993											0
1994											0
1995											0
1996											0
1997											0
1998											0
1999											0
2000											0
2001											0
2002											0
2003											0
2004											0
2005											0
2006											0
2007											0
2008											0
2009											0
2010											0

Historical Per Capita Use Data and Unaccounted Water for ____________

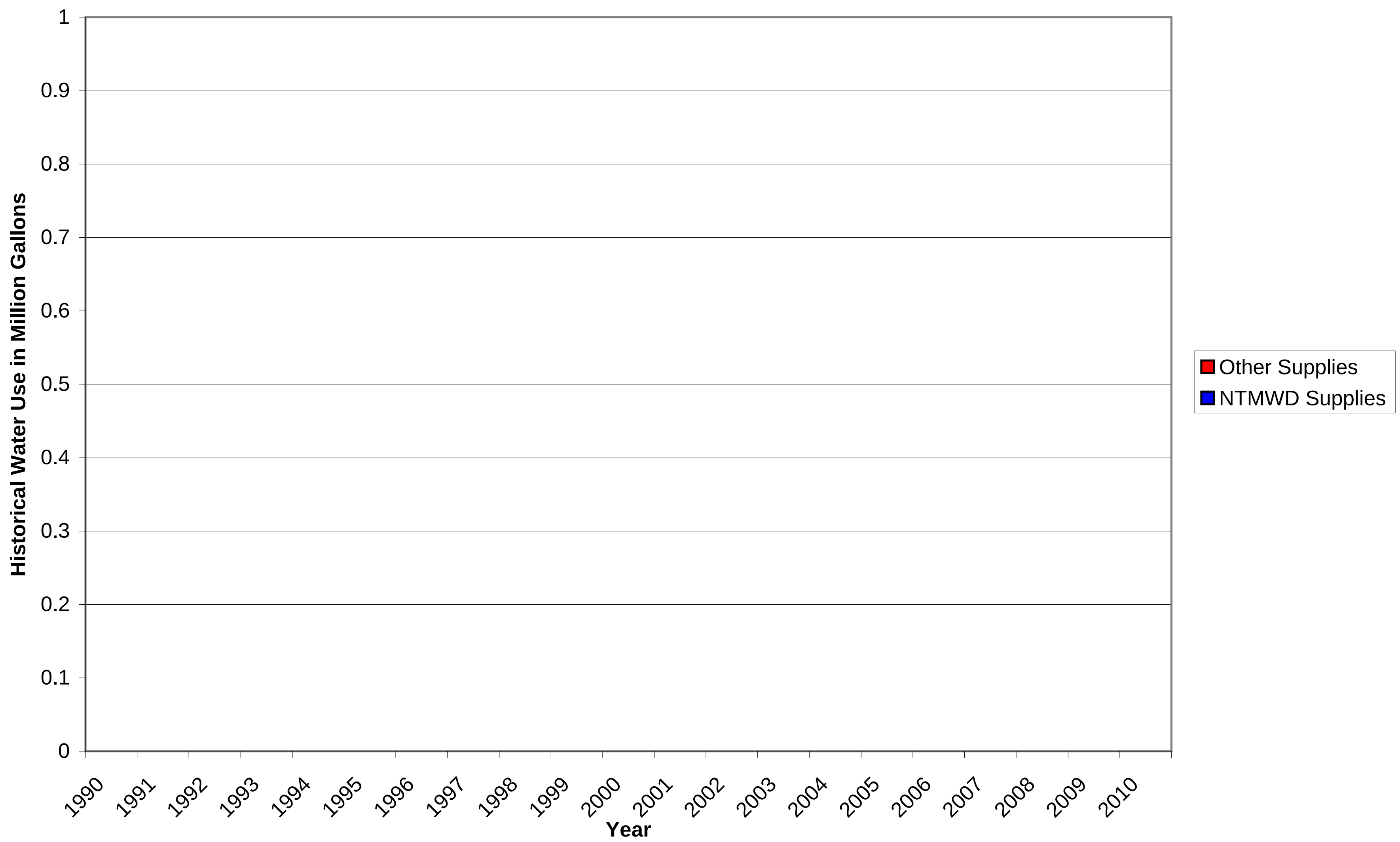
Year	Estimated Population	In-City Municipal Use	Per Capita Municipal Use	Treated Water Deliveries	Other Supplies	Total Metered Sales	Estimated Fire Use	Estimated Line Flushing	Unaccounted Water	% Unaccounted
1990									0	#DIV/0!
1991									0	#DIV/0!
1992									0	#DIV/0!
1993									0	#DIV/0!
1994									0	#DIV/0!
1995									0	#DIV/0!
1996									0	#DIV/0!
1997									0	#DIV/0!
1998									0	#DIV/0!
1999									0	#DIV/0!
2000									0	#DIV/0!
2001									0	#DIV/0!
2002									0	#DIV/0!
2003									0	#DIV/0!
2004									0	#DIV/0!
2005									0	#DIV/0!
2006									0	#DIV/0!
2007									0	#DIV/0!
2008									0	#DIV/0!
2009									0	#DIV/0!
2010									0	#DIV/0!

Note: In-city municipal use = total water supplied less sales to industry and wholesale sales.

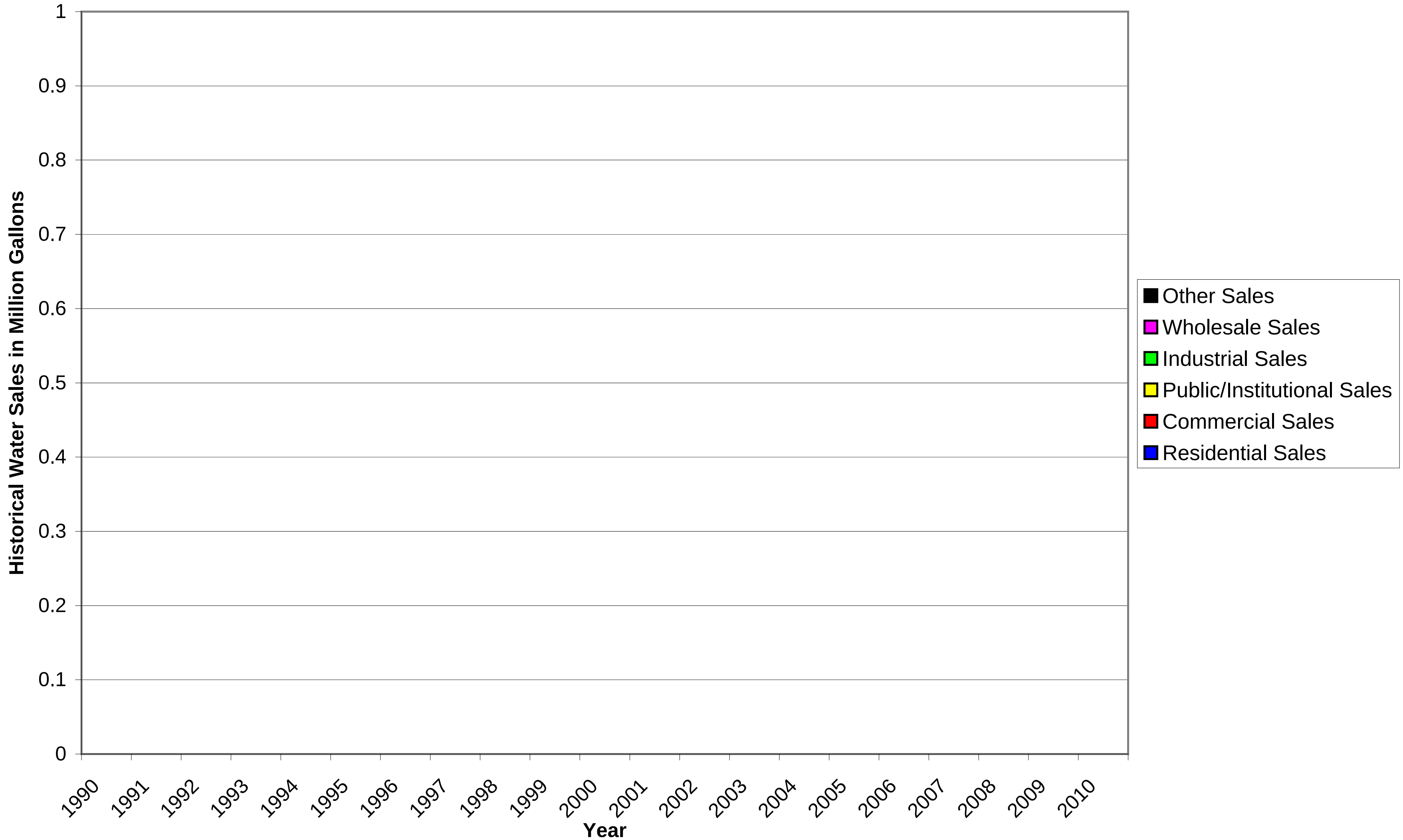


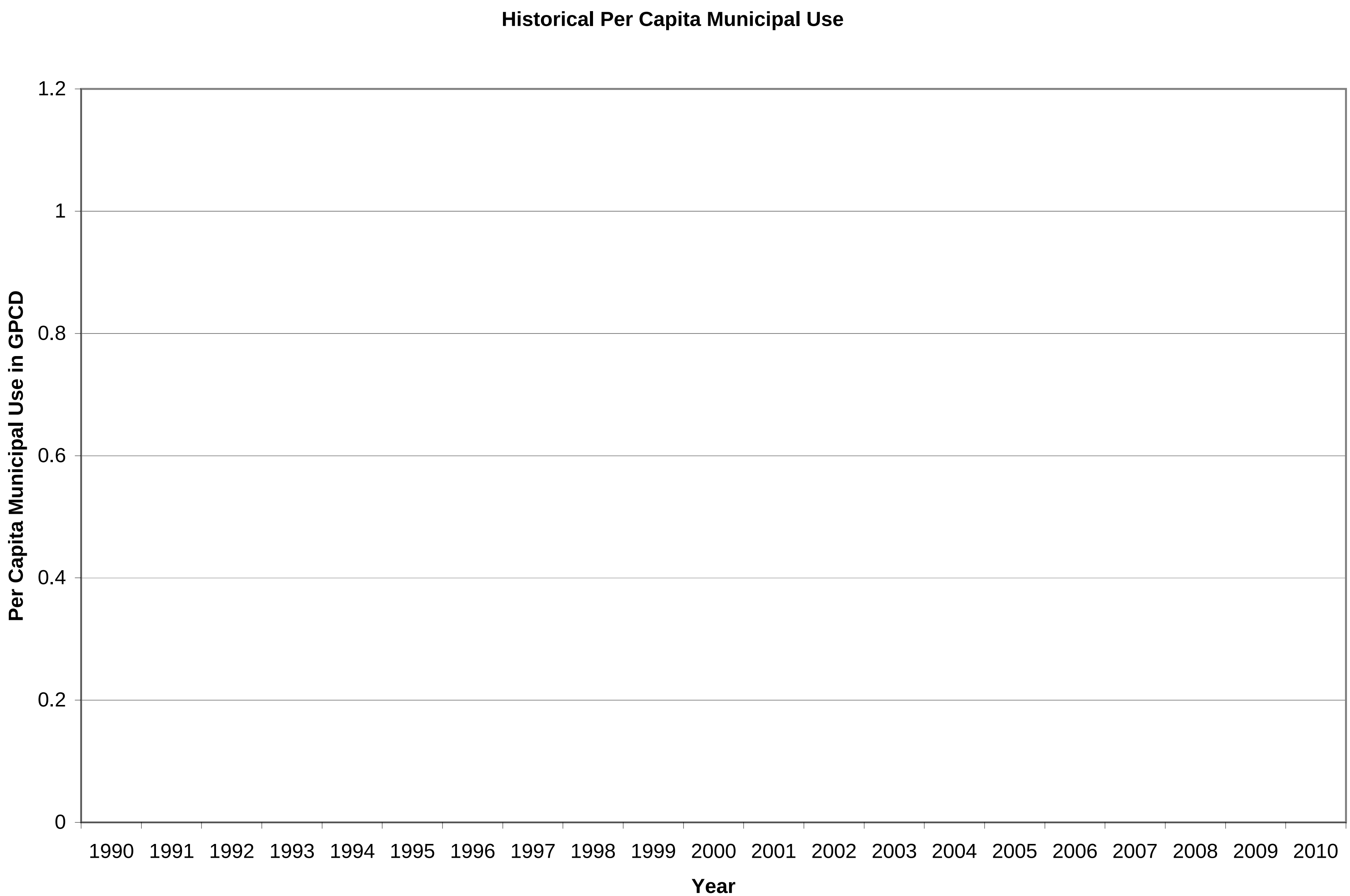
Estimated Historical Population
Estimated Population
1.2
1
0.8
0.6
0.4
0.2
0
1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010
Year

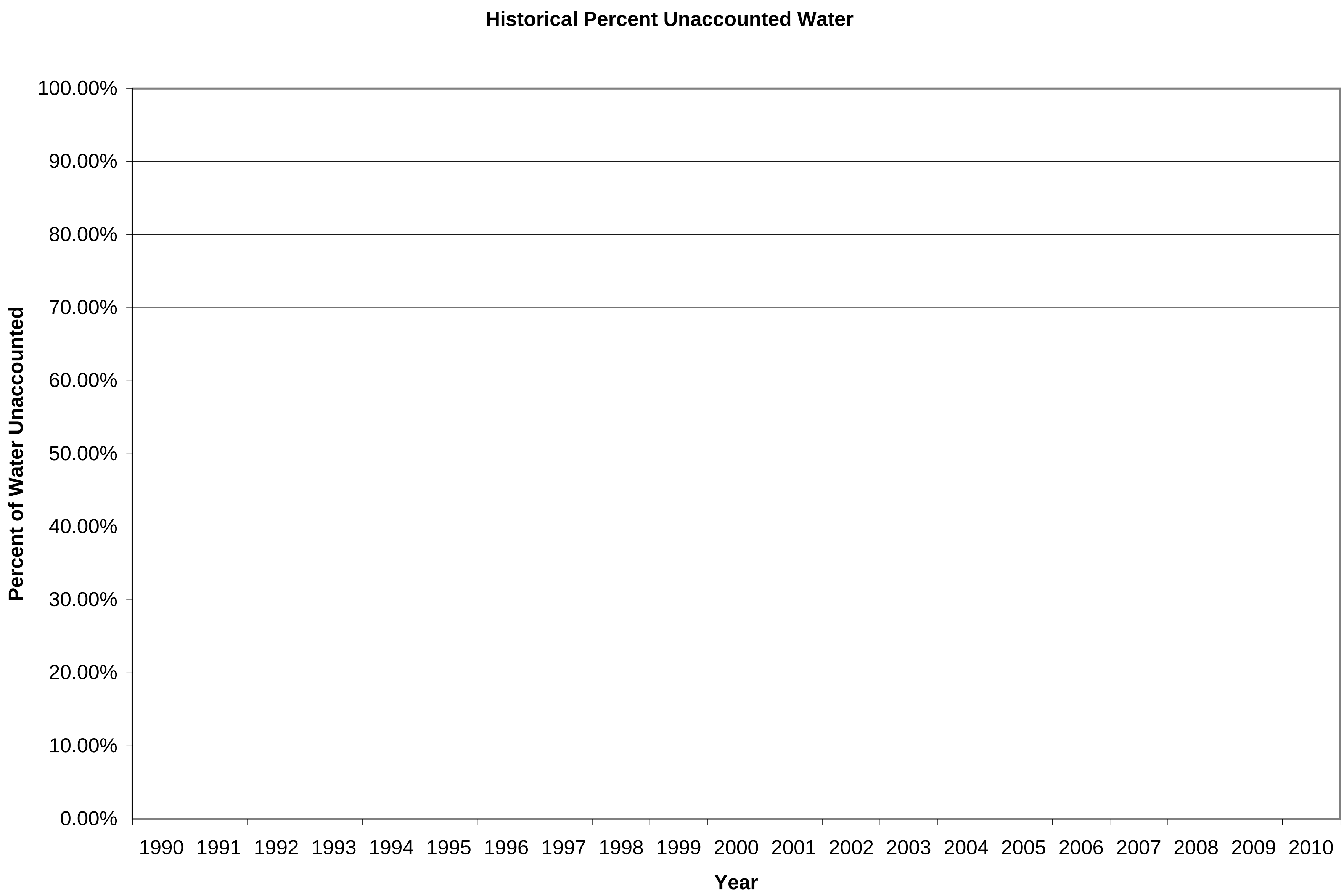
Historical Water Use



Historical Water Sales by Classification




Historical Per Capita Municipal Use
Per Capita Municipal Use in GPCD
1.2
1
0.8
0.6
0.4
0.2
0
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
Year


Historical Percent Unaccounted Water
100.00%
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
Percent of Water Unaccounted
1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010
Year

APPENDIX O

MODEL WATER CONSERVATION PLANS FOR MANUFACTURING, IRRIGATION AND STEAM ELECTRIC POWER USE

APPENDIX O
MODEL WATER CONSERVATION PLANS FOR MANUFACTURING, IRRIGATION AND STEAM ELECTRIC POWER USE

Appendix O includes three model mom-municipal water conservation plans:

- Model Manufacturing Water Conservation Plan
- Model Irrigation Water Conservation Plan
- Model Steam Electric Power Water Conservation Plan

REGION C WATER PLANNING GROUP

MODEL WATER CONSERVATION PLAN FOR MANUFACTURING WATER USES

MAY 2005

Prepared for:

REGION C WATER PLANNING GROUP

Prepared by:

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1820 Regal Row, Suite 200
Dallas, Texas 75235
214/638-0500

ACKNOWLEDGEMENTS

This model water conservation plan was prepared by Freese and Nichols, Alan Plummer Associates, and Chiang, Patel, and Yerby for the Region C Water Planning Group. It is intended as a template for manufacturers within Region C as they develop their own water conservation plans. Manufacturers should customize the details to match their unique situation. The model plan was prepared pursuant to Texas Commission on Environmental Quality rules. The rules do not require a drought contingency plan for manufacturers.

The other Region C model water conservation plans (for municipal, steam electric power, and irrigation users) include example text for a fictional water user that can be edited to match a real-life situation. However, there are a large number of manufacturers in Region C with widely varying processes and water uses, and it is difficult to generate example text that is applicable to most manufacturers. This template provides a plan structure and instructions for the type of content that belongs in each section.

Questions regarding this model water conservation plan should be addressed to the following:

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Freese and Nichols, Inc.
(817) 735-7300
tcg@freese.com

Stephanie Griffin, P.E.
Freese and Nichols, Inc.
(817) 735-7300
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Alan Plummer Associates, Inc.
(817) 806-1700
bmcdonald@apaienv.com

POCA AGUA MANUFACTURING COMPANY

WATER CONSERVATION PLAN

MAY 2005

Prepared by:

EFICIENTE ENGINEERS, INC.
123 MAIN STREET
POCA AGUA, TX 76026

TABLE OF CONTENTS

APPENDICES

Poca Agua Manufacturing Company

Water Conservation Plan
May 2005

1. INTRODUCTION AND OBJECTIVES

Water supply has always been a key issue in the development of Texas. In recent years, the increasing population and economic development in Region C have led to growing demands for water supplies. At the same time, local and less expensive sources of water supply are largely developed. Additional supplies to meet higher demands will be expensive and difficult to develop. It is therefore important that we make efficient use of our existing supplies and make them last as long as possible. This will delay the need for new supplies, minimize the environmental impacts associated with developing new supplies, and delay the high cost of additional water supply development.

Recognizing the need for efficient use of existing water supplies, the Texas Commission on Environmental Quality (TCEQ) has developed guidelines and requirements governing the development of water conservation plans for industrial or mining uses (Appendix B). The Poca Agua Manufacturing Company has adopted this water conservation plan pursuant to TCEQ guidelines and requirements.

The objectives of this plan are:

- To reduce water consumption from the level that would prevail without conservation efforts.
- To reduce the loss and waste of water.
- To improve efficiency in the use of water.
- To document the level of recycling and reuse within the manufacturing processes and for non-potable uses.

The plan lists the TCEQ rules; describes the manufacturing process at the Poca Agua Manufacturing Company and associated water uses; sets a water conservation goal; describes water measurement devices and methods; discusses leak detection, repair, and water loss accounting; and reports existing and future water use efficiency practices.

[This model water conservation plan was developed for the Region C Water Planning Group to assist manufacturers in preparing a site-specific water conservation plan. It contains a plan structure that meets all Texas Commission on Environmental Quality rules for industrial or mining use water conservation plans, along with recommendations on content to include in each section.]

2. TEXAS COMMISSION ON ENVIRONMENTAL QUALITY RULES

The TCEQ rules governing development of water conservation plans for industrial or mining use are contained in Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.3 of the Texas Administrative Code (TAC). Applicable TAC rules are presented in Appendix B. A water conservation plan is defined as "A strategy or combination of strategies for reducing the volume of water withdrawn from a water supply source, for reducing the loss or waste of water, for maintaining or improving the efficiency in the use of water, for increasing the recycling and reuse of water, and for preventing the pollution of water. A water conservation plan may be a separate document identified as such or may be contained within another water management document(s)[2]."

<u>Conservation Plan Requirements</u>

The minimum requirements in the TAC Title 30, Part 1, Chapter 288 for water conservation plans for industrial or mining uses are shown below.

TAC Reference	Subject	Plan Location
30 TAC §288.3(a)(1)	Water Use in the Production Process	Section 3
30 TAC §288.3(a)(2)	Water Conservation Goals Before May 1, 2005	Section 4
30 TAC §288.3(a)(3)	Water Conservation Goals After May 1, 2005	Section 4
30 TAC §288.3(a)(4)	Accurate Metering	Section 5
30 TAC §288.3(a)(5)	Leak Detection, Repair, and Water Loss Accounting	Section 6
30 TAC §288.3(a)(6)	Water Use Efficiency Process and/or Equipment Upgrades	Section 7
30 TAC §288.3(a)(7)	Other Conservation Practices	Section 8
30 TAC §288.3(b)	Review and Update of Plan	Section 9

[TCEQ rules do not require a drought contingency plan for industrial or mining water users.]

3. DESCRIPTION OF WATER USE IN THE PRODUCTION PROCESS

[Insert a description of water use in the production process. Show a schematic of the production process with all water use locations and flowrates in Appendix C.

This section must include a description of the use of the water in the production process, including how the water is diverted and transported from the source(s) of supply, how the water is utilized in the production process, and the estimated quantity of water consumed in the production process and therefore unavailable for reuse, discharge, or other means of disposal.

In typical manufacturing processes, water is used for cooling tower makeup water, steam generation, rinsing, washing, plating and metal finishing baths, conveyance of materials, wet scrubbers, and as an ingredient in products. Typical water sources include potable water purchased from a municipal water supplier, groundwater from wells, raw water diverted from lake or river, captured stormwater runoff, reclaimed wastewater purchased from a wastewater treatment plant, and reclaimed process water.]

4. SPECIFICATION OF WATER CONSERVATION GOALS

The Poca Agua Manufacturing Company has set a five-year goal of reducing water use to ____ ac-ft/yr by _____ *[five years from date of plan]* and a ten-year goal of reducing water use to ____ ac-ft/yr by _____ *[ten years from date of plan]*. These goals will be achieved using the following water conservation methods:

[Edit the water conservation goals and describe how they will be achieved.

This section must include specification of 5-year and 10-year water conservation goals and the basis for development of such goals.

To determine feasible water conservation goals, to provide the basis for these goals, and to identify a schedule for conservation savings, a four-step water conservation implementation process should be completed:

1. *The first step consists of a water audit for the manufacturing facility. A water audit consists of an inventory of all water supplied to the site and all on-site water uses, including the amount of water used for each purpose. A comparison of the water supplied to the water used will reveal the amount of unaccounted-for water. Unaccounted-for water should be no more than 5 percent of total water supplied.*

2. *The second step is to identify sources of water waste and to design procedures to reduce water waste and minimize unaccounted-for water. Water waste reduction measures may include reducing flow to process equipment, installing pressure-reducing valves, installing control or limit switches, or other measures.*

3. *The third step is to identify methods to conserve water use in the manufacturing process, landscape irrigation, and other water uses. Emphasize water conservation methods that address the largest water uses identified in the audit step. Conservation methods could involve upgrading to water-efficient process equipment, water-wise landscaping, retrofit of domestic plumbing fixtures with water-efficient fixtures, employee education, and other methods.*

4. *The fourth step is to identify opportunities to reuse process water. At the end of the process, is the water quality suitable for other uses? Is it economical to provide water treatment to improve the water quality to make it suitable for other uses?*

For each water conservation method, please provide a description of how the method will save water, a schedule for when the method will be implemented, and the projected water savings for each method.]

5. ACCURATE METERING TO MEASURE AND ACCOUNT FOR WATER

One of the key elements in water conservation is careful tracking of water use and control of losses. In order to carefully track and control losses, the Poca Agua Manufacturing Company meters water usage at several locations in the productions process.

[Insert a description of meter locations; meter types; meter calibration frequency; meter calibration tolerance; and meter data collection, tabulation, and storage. Refer to the water use diagram in Appendix C as necessary.]

This section must include a description of the device(s) and/or method(s) within an accuracy of plus or minus five percent to be used to measure and account for the amount of water diverted from the source of supply.

To assist in tracking of water usage, consider installing additional meters at key locations in the manufacturing process, particularly if unaccounted-for water is greater than 5 percent.]

6. LEAK DETECTION, REPAIR, AND WATER LOSS ACCOUNTING

At the Poca Agua Manufacturing Company, plant personnel observe, operate, and maintain facilities throughout the day. Inspection of aboveground piping and pump packing is a normal part of employee duties. In addition, flow meter readings are logged on a daily basis.

If a water leak is indicated by any of the above means, the source of the leak is investigated and a work order for repairs is issued as necessary.

[This section must include a description of leak-detection, repair, and water loss accounting in the water distribution system. Please amend the above description to match operations at your facility.

Consider implementing an active leak detection and repair program if unaccounted-for water is greater than 5 percent.]

7. WATER USE EFFICIENCY PROCESS AND/OR EQUIPMENT UPGRADES

[This section must include a description of equipment and/or process modifications to improve water use efficiency.

It is suggested that you also include a description of existing water-efficient equipment or processes to demonstrate any water conservation savings that is already being achieved.

Equipment upgrades or process modifications should be a result of the third step in the four-step process recommended in Section 4.]

8. OTHER CONSERVATION PRACTICES, METHODS, OR TECHNIQUES

[This section must include any other water conservation practice, method, or technique which the user shows to be appropriate for achieving the stated goal(s) of the water conservation plan.

Other sections emphasize process water usage, equipment upgrades, and process modifications. This section should report on proposed conservation practices, methods, or techniques that address other water uses, such as domestic water use, housekeeping water use, and landscape irrigation. Potential conservation methods include retrofit of water-efficient toilets, showerheads, and faucet aerators; water-wise landscaping; employee education; and other methods. Each of these is described below.

The water audit in Section 4 should include a survey of landscape irrigation water use. This includes measurement of the landscape area, measurement of the total irrigable area, irrigation system checks and distribution uniformity analysis, and review or development of irrigation system scheduling. The water use survey should identify currently irrigated areas where irrigation can be discontinued due to low visibility or the plant materials that do not need supplemental irrigation. The survey should also identify areas with the opportunity for process water reuse, stormwater reuse, and reuse of treated effluent for landscape irrigation.

State and federal water efficiency standards require water-efficient plumbing fixtures for new construction and remodeling projects. Replacing older plumbing fixtures with water-efficient plumbing fixtures will conserve water. Other methods include retrofitting toilet tank displacement devices (toilet dam), early closure toilet flappers, and installation of a dual-flush adapter.

An employee education program is important to reducing water waste and conserving water. The manufacturer should inform and educated employees about the adopted water conservation program through inserts in the monthly paychecks, with letters detailing program successes and goals, and through posters and pamphlets posted throughout the facility. Additional educational opportunities exist through employee water conservation seminars and workshops, email, company newsletter, and memos[1].

9. IMPLEMENTATION AND UPDATE OF THE WATER CONSERVATION PLAN

Appendix D contains a copy of the Board of Directors of the Poca Agua Manufacturing Company resolution adopting this water conservation plan. The resolution designates responsible officials to implement and enforce the water conservation plan.

Appendix E contains a copy of a letter to the chairman of the Region C Water Planning Group to inform the planning group of this water conservation plan.

This water conservation plan will be reviewed and updated every five years.

Appendix A
List of References

List of References

1. New Mexico Office of the State Engineer : "A Water Conservation Guide for Commercial, Institutional and Industrial Water Users," July 1999, accessed online at http://www.seo.state.nm.us/water-info/conservation/pdf-manuals/cii-users-guide.pdf

2. Texas Commission on Environmental Quality: "Water Conservation Plans for Industrial or Mining Use," *Texas Administrative Code* Title 30 Part I Subchapter A §288.3, effective October 7, 2004.

Appendix B

Texas Commission on Environmental Quality Rules on Water Conservation Plans for Industrial or Mining Water Use

SUBCHAPTER A: WATER CONSERVATION PLANS
§§288.1 - 288.7
Effective October 7, 2004

§288.1. Definitions.

The following words and terms, when used in this chapter, shall have the following meanings, unless the context clearly indicates otherwise.

(1) **Agricultural or Agriculture** - Any of the following activities:

(A) cultivating the soil to produce crops for human food, animal feed, or planting seed or for the production of fibers;

(B) the practice of floriculture, viticulture, silviculture, and horticulture, including the cultivation of plants in containers or non-soil media by a nursery grower;

(C) raising, feeding, or keeping animals for breeding purposes or for the production of food or fiber, leather, pelts, or other tangible products having a commercial value;

(D) raising or keeping equine animals;

(E) wildlife management; and

(F) planting cover crops, including cover crops cultivated for transplantation, or leaving land idle for the purpose of participating in any governmental program or normal crop or livestock rotation procedure.

(2) **Agricultural use** – Any use or activity involving agriculture, including irrigation.

(3) **Conservation** – Those practices, techniques, and technologies that reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water, or increase the recycling and reuse of water so that a water supply is made available for future or alternative uses.

(4) **Drought contingency plan** – A strategy or combination of strategies for temporary supply and demand management responses to temporary and potentially recurring water supply shortages and other water supply emergencies. A drought contingency plan may be a separate document identified as such or may be contained within another water management document(s).

(5) **Industrial use** – The use of water in processes designed to convert materials of a lower order of value into forms having greater usability and commercial value, commercial fish production, and the development of power by means other than hydroelectric, but does not include agricultural use.

(6) **Irrigation** – The agricultural use of water for the irrigation of crops, trees, and pastureland, including, but not limited to, golf courses and parks which do not receive water through a municipal distribution system.

(7) **Irrigation water use efficiency** – The percentage of that amount of irrigation water which is beneficially used by agriculture crops or other vegetation relative to the amount of water diverted from the source(s) of supply. Beneficial uses of water for irrigation purposes include, but are not limited to, evapotranspiration needs for vegetative maintenance and growth, salinity management, and leaching requirements associated with irrigation.

(8) **Mining use** – The use of water for mining processes including hydraulic use, drilling, washing sand and gravel, and oil field repressuring.

(9) **Municipal per capita water use** – The sum total of water diverted into a water supply system for residential, commercial, and public and institutional uses divided by actual population served.

(10) **Municipal use** – The use of potable water within or outside a municipality and its environs whether supplied by a person, privately owned utility, political subdivision, or other entity as well as the use of sewage effluent for certain purposes, including the use of treated water for domestic purposes, fighting fires, sprinkling streets, flushing sewers and drains, watering parks and parkways, and recreational purposes, including public and private swimming pools, the use of potable water in industrial and commercial enterprises supplied by a municipal distribution system without special construction to meet its demands, and for the watering of lawns and family gardens.

(11) **Municipal use in gallons per capita per day** – The total average daily amount of water diverted or pumped for treatment for potable use by a public water supply system. The calculation is made by dividing the water diverted or pumped for treatment for potable use by population served. Indirect reuse volumes shall be credited against total diversion volumes for the purpose of calculating gallons per capita per day for targets and goals.

(12) **Nursery grower** – A person engaged in the practice of floriculture, viticulture, silviculture, and horticulture, including the cultivation of plants in containers or nonsoil media, who grows more than 50% of the products that the person either sells or leases, regardless of the variety sold, leased, or grown. For the purpose of this definition, grow means the actual cultivation or propagation of the product beyond the mere holding or maintaining of the item prior to sale or lease, and typically includes activities associated with the production or multiplying of stock such as the development of new plants from cuttings, grafts, plugs, or seedlings.

(13) **Pollution** – The alteration of the physical, thermal, chemical, or biological quality of, or the contamination of, any water in the state that renders the water harmful, detrimental, or injurious to humans, animal life, vegetation, or property, or to the public health, safety, or welfare, or impairs the usefulness or the public enjoyment of the water for any lawful or reasonable purpose.

(14) **Public water supplier** – An individual or entity that supplies water to the public for human consumption.

(15) **Regional water planning group** – A group established by the Texas Water Development Board to prepare a regional water plan under Texas Water Code, §16.053.

(16) Retail public water supplier – An individual or entity that for compensation supplies water to the public for human consumption. The term does not include an individual or entity that supplies water to itself or its employees or tenants when that water is not resold to or used by others.

(17) **Reuse** – The authorized use for one or more beneficial purposes of use of water that remains unconsumed after the water is used for the original purpose of use and before that water is either disposed of or discharged or otherwise allowed to flow into a watercourse, lake, or other body of state-owned water.

(18) **Water conservation plan** – A strategy or combination of strategies for reducing the volume of water withdrawn from a water supply source, for reducing the loss or waste of water, for maintaining or improving the efficiency in the use of water, for increasing the recycling and reuse of water, and for preventing the pollution of water. A water conservation plan may be a separate document identified as such or may be contained within another water management document(s).

(19) **Wholesale public water supplier** – An individual or entity that for compensation supplies water to another for resale to the public for human consumption. The term does not include an individual or entity that supplies water to itself or its employees or tenants as an incident of that employee service or tenancy when that water is not resold to or used by others, or an individual or entity that conveys water to another individual or entity, but does not own the right to the water which is conveyed, whether or not for a delivery fee.

Adopted September 15, 2004 Effective October 7, 2004

§288.3. Water Conservation Plans for Industrial or Mining Use.

(a) A water conservation plan for industrial or mining uses of water must provide information in response to each of the following elements. If the plan does not provide information for each requirement, the industrial or mining water user shall include in the plan an explanation of why the requirement is not applicable.

(1) a description of the use of the water in the production process, including how the water is diverted and transported from the source(s) of supply, how the water is utilized in the production process, and the estimated quantity of water consumed in the production process and therefore unavailable for reuse, discharge, or other means of disposal;

(2) until May 1, 2005, specification of conservation goals, the basis for the development of such goals, and a time frame for achieving the specified goals;

(3) beginning May 1, 2005, specific, quantified five-year and ten-year targets for water savings and the basis for the development of such goals. The goals established by industrial or mining water users under this paragraph are not enforceable;

(4) a description of the device(s) and/or method(s) within an accuracy of plus or minus 5.0% to be used in order to measure and account for the amount of water diverted from the source of supply;

(5) leak-detection, repair, and accounting for water loss in the water distribution system;

(6) application of state-of-the-art equipment and/or process modifications to improve water use efficiency; and

(7) any other water conservation practice, method, or technique which the user shows to be appropriate for achieving the stated goal or goals of the water conservation plan.

(b) Beginning May 1, 2005, an industrial or mining water user shall review and update its water conservation plan, as appropriate, based on an assessment of previous five-year and ten-year targets and any other new or updated information. The industrial or mining water user shall review and update the next revision of its water conservation plan not later than May 1, 2009, and every five years after that date to coincide with the regional water planning group.

Adopted September 15, 2004 Effective October 7, 2004

Appendix C
Water Use Diagram

Water Use Diagram
Poca Agua Manufacturing Company

[Insert water use diagram here. Show all water uses, sources, and flowrates.]

Appendix D
Board Resolution Adopting the Water Conservation Plan

[Insert Board resolution adopting the water conservation plan.]

Appendix E
Letter to the Region C Water Planning Group

[Insert letter to the Region C Water Planning Group.]

REGION C WATER PLANNING GROUP

MODEL WATER CONSERVATION AND DROUGHT CONTINGENCY PLAN FOR IRRIGATION USERS

MAY 2005

Prepared for:

REGION C WATER PLANNING GROUP

Prepared by:

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This model water conservation and drought contingency plan for the fictional Poca Agua Golf Club and Turfgrass Nursery was prepared by Alan Plummer Associates, Freese and Nichols, and Chiang, Patel and Yerby for the Region C Water Planning Group. It is a template for large-scale irrigation water users to use as they develop their own water conservation and drought contingency plans. Each irrigation water user should customize the details to match their unique situation. The model plan was prepared pursuant to Texas Commission on Environmental Quality rules.

Questions regarding this model water conservation and drought contingency plan should be addressed to the following:

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POCA AGUA GOLF CLUB AND TURFGRASS NURSERY

WATER CONSERVATION AND DROUGHT CONTINGENCY PLAN

MAY 2005

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May 2005

1. INTRODUCTION AND OBJECTIVES

Water supply has always been a key issue in the development of Texas. In recent years, the increasing population and economic development in Region C have led to growing demands for water supplies. At the same time, local and less expensive sources of water supply are largely developed. Additional supplies to meet higher demands will be expensive and difficult to develop. It is therefore important that we make efficient use of our existing supplies and make them last as long as possible. This will delay the need for new supplies, minimize the environmental impacts associated with developing new supplies, and delay the high cost of additional water supply development.

Recognizing the need for efficient use of existing water supplies, the Texas Commission on Environmental Quality (TCEQ) has developed rules[1] governing the development of water conservation and drought contingency plans for irrigation users (Appendix B). The Poca Agua Golf Club and Turfgrass Nursery has adopted this water conservation and drought contingency plan pursuant to TCEQ rules.

This plan lists the TCEQ rules; describes the irrigation process at the Poca Agua Golf Club and Turfgrass Lawn Nursery; sets water conservation goals; describes water measurement devices and methods; discusses leak detection, repair, and water loss accounting; and reports existing and future water use efficiency practices.

[1] Superscript numbers refer to references in Appendix A.

2. TEXAS COMMISSION ON ENVIRONMENTAL QUALITY RULES

2.1 Conservation Plans

The TCEQ rules governing development of water conservation plans for agricultural use (irrigation users) are contained in Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.4 of the Texas Administrative Code (TAC), which is included in Appendix B.

A water conservation plan is defined as "A strategy or combination of strategies for reducing the volume of water withdrawn from a water supply source, for reducing the loss or waste of water, for maintaining or improving the efficiency in the use of water, for increasing the recycling and reuse of water, and for preventing the pollution of water. A water conservation plan may be a separate document identified as such or may be contained within another water management document(s)[1]." The minimum requirements plans for agricultural use ("individual irrigation user") are as follows:

TAC Reference	Subject	Plan Location
30 TAC §288.4(a)(2)(A)	Description of Irrigation Production Process	Section 3
30 TAC §288.4(a)(2)(B)	Description of the Irrigation Method or System and Equipment	Section 4
30 TAC §288.4(a)(2)(C)	Accurate Metering	Section 5
30 TAC §288.4(a)(2)(D)	Specification of Conservation Goals Before May 1, 2005	Section 6
30 TAC §288.4(a)(2)(E)	Specification of Conservation Goals After May 1, 2005	Section 6
30 TAC §288.4(a)(2)(F)	Description of Water-Conserving Irrigation Equipment and Application System	Section 7
30 TAC §288.4(a)(2)(G)	Leak Detection, Repair, and Water-Loss Control	Section 8
30 TAC §288.4(a)(2)(H)	Irrigation Timing and/or Measuring the Amount of Water Applied	Section 9
30 TAC §288.4(a)(2)(I)	Land Improvements for Retaining or Reducing Runoff and Increasing the Infiltration of Rain and Irrigation Water	Section 10
30 TAC §288.4(a)(2)(J)	Tailwater Recovery and Reuse	Section 11
30 TAC §288.4(a)(2)(K)	Other Conservation Practices, Methods, or Techniques	Section 12

[The required elements of a water conservation plan are somewhat different for "agricultural users other than irrigation" and a "system providing agricultural water to more than one user." See Appendix B for guidance.]

2.2 Drought Contingency Plans

The TCEQ rules governing development of drought contingency plans for irrigation users are contained in Title 30, Part 1, Chapter 288, Subchapter B, Rule 288.21 of the TAC, which is included in Appendix B. For the purpose of these rules, a drought contingency plan is defined as "a strategy or combination of strategies for temporary supply and demand management responses to temporary and potentially recurring water supply shortages and other water supply emergencies. A drought contingency plan may be a separate document identified as such or may be contained within another water management document(s)[1].” The drought contingency plan for the Poca Agua Golf Club and Turfgrass Nursery is contained in Section 14 of this water conservation and drought contingency plan.

3. DESCRIPTION OF THE IRRIGATION PRODUCTION PROCESS

[This section must include a description of the irrigation production process which shall include, but is not limited to, the type of crops and acreage of each crop to be irrigated, monthly irrigation diversions, any seasonal or annual crop rotation, and soil types of the land to be irrigated. Please amend the description below to match your situation.]

The Poca Agua Golf Club and Turfgrass Nursery, located at 8311 Poca Agua Road in the City of Poca Agua, Texas, is an approximately 450-acre complex owned and operated by Golf Course Associates, Inc. on the western shore of Poca Agua Reservoir. The complex consists of two 18-hole golf courses occupying 400 acres with the remaining 50 acres occupied by a bermudagrass sod operation. Both golf courses were constructed in 1978 with the turfgrass nursery going into production in 1983.

The current irrigation supply sources for the operation are:

- Approximately 550 acre-feet per year (ac-ft/yr) of raw water purchased from the City of Poca Agua. This water is diverted from Poca Agua Reservoir under the City's existing water right and pumped to Eagle Lake, the largest of 5 ponds located on the golf course grounds;
- Three groundwater wells; and
- Treated water purchased from the City of Poca Agua.

The wells and the treated water connection to the City of Poca Agua are for emergency purposes and are not used under normal operating conditions.

3.1 Acreage and Type of Vegetation to be Irrigated

The Poca Agua Golf Club irrigates a total of approximately 300 acres of fairways, rough, tee boxes, greens, and common grounds. The remaining 100 acres is natural and not irrigated. The vegetation located in the fairway, rough, tee boxes, and common grounds consists of a hybrid common bermudagrass with the greens planted in Tifsport 319.

The turfgrass nursery irrigates approximately 45-acres of Tifgrass in production. The remaining 5-acres consists of storage and office buildings and a network of maintenance roads. Tifgrass is a hybrid form of bermudagrass suited for landscape lawn purposes.

Table 3-1 Type of Vegetation and Acreage to be Irrigated

Type of Crop/Plant	Growing Season	Acres Irrigated/Year
1. Common Bermuda	May – October	290
2. Tifsport 319	May – October	10
3. Tifgrass	May – October	45
	Total Number of Acres	345

3.2 Monthly Irrigation Diversions

Raw water is diverted from the Poca Agua Reservoir to Eagle Lake through a 10-inch PVC pipe. A pump station is located along the reservoir and houses a variable speed pump that is capable of delivering 600 gallons per minute at maximum efficiency. A variable speed pump was chosen because of its ability to conserve energy by using only the horsepower required to deliver the required amount of water. The water supplied by the Poca Agua Reservoir to Eagle Lake not only supplements water to the remaining 4 ponds but it provides the primary source of water for irrigation purposes for both golf courses and the turfgrass nursery. The following table details the projected amount of water necessary to maintain 495.0 feet mean sea level in Eagle Lake. During an emergency, the Poca Agua Golf Club and Turfgrass Nursery has the ability to utilize three ground water wells located within the premises and treated water from the City of Poca Agua for irrigation purposes.

Table 3-2 Estimated Monthly Irrigation Diversions from the Supply Source

Month	Acre-Feet
January	0
February	7
March	7
April	21
May	35
June	102
July	103
August	103
September	102
October	35
November	35
December	0
TOTAL	550

3.3 Description of the Soil Type(s)

The Poca Agua Golf Club and Turfgrass Nursery have five different soil types within the 450-acres as determined by the soil survey for Poca Agua County, published by the United States Department of Agriculture, Soil Conservation Service, in cooperation with the Texas Agricultural Experiment Station. The following table details the soils that can be observed as well as their permeability characteristics.

Table 3-3 Soil Types and Permeability Classification

Soil Type	Permeability
Altoga silty clay, 3 to 5 percent slopes	Moderate
Bastrop fine sandy loam, 1 to 3 percent slopes	Moderate
Konsil fine sandy loam, 3 to 8 percent slopes	Moderate
Ovan clay, occasionally flooded	Slow
Wilson clay loam, 1 to 3 percent slopes	Very Slow

4. DESCRIPTION OF THE IRRIGATION METHOD OR SYSTEM AND EQUIPMENT

[This section must include a description of the irrigation method or system and equipment including pumps, flow rates, plans, and/or sketches of the system layout. Please amend the description below to match your situation.]

The Poca Agua Golf Club and Turfgrass Nursery uses a solid set irrigation system with impact sprinkler rotors for both golf courses. The rotors are placed on 60 feet by 80 feet centers and maintain a pressure of 70 psi. The entire system currently operates on a timer configuration with weather patterns monitored. Hand application of water to the greens is used during times of drought.

During normal operations, both golf courses use water that is pumped from Eagle Lake. Under emergency conditions, water is also available from three groundwater wells and through an emergency treated water supply agreement with the City of Poca Agua. Under normal operations, water is pumped from Eagle Lake into the system using a variable speed pump. A variable speed pump is used because of its efficiency and energy savings. Water is distributed to each of the golf courses' lateral lines through a six-inch diameter PVC main line. All of the lateral lines are PVC pipe and range from two to four inches in diameter. Valves, located in valve boxes, distribute water to each zone throughout the golf courses so that pressure is maintained throughout the entire system. An electrically activated solenoid valve is tied to the timer system that engages each zone. The impact sprinkler rotors are pressure-driven once the valve is engaged. All main and lateral lines are buried ten inches or greater to prevent freeze/thawing effects. All sprinkler heads have bleed valves to further prevent damage from freeze/thawing effects.

The turfgrass nursery also uses water from Eagle Lake for irrigation purposes. A variable speed pump pumps water from Eagle Lake to the central valve box. From there, lateral lines distribute the water to a central hose attachment that is attached to a linear move irrigation system. The linear move system distributes the water through a rolling sprinkler apparatus that travels in a straight line over the growing area. The rolling sprinkler apparatus irrigates through an elevated pipe with impact sprinkler rotors attached at 50 feet intervals. The nursery has four growing areas with grasses at various levels of maturity. At each growing area, the irrigation implement operates on a timer. The system maintains a pressure of 70 psi.

A diagram of the irrigation system for the golf courses and the turfgrass nursery is included in Appendix C.

5. ACCURATE METERING

[This section must include a description of the device(s) and/or methods within an accuracy of plus or minus 5.0%, to be used in order to measure and account for the amount of water diverted from the source of supply. Please amend the description below to match your situation.]

The Poca Agua Golf Club and Turfgrass Nursery uses a totalizing meter at the intake structure located along the Poca Agua Reservoir that is calibrated on an annual basis to within two percent accuracy. Meter readings are logged each day and reported to the City of Poca Agua on a monthly basis.

Meters are also present at each groundwater well and at the treated water connection to the City of Poca Agua. These meters are also calibrated annually to within two percent accuracy. Meter readings are logged each day that these water supplies are used.

Within the irrigation process itself, magnetic flow meters measure the following flows:

- Water distributed to the Eagle Golf Course
- Water distributed to the Hills Golf Course
- Water distributed to the Turfgrass Nursery
- Water distributed to the common grounds for irrigation uses

Each of the magnetic flow meters is calibrated on an annual basis to within two percent accuracy. If the meters appear to be malfunctioning, they are repaired or replaced as necessary.

Meter readings from all of the above meters are logged daily and monitored for any water losses. Any future water supply sources will be metered in a similar fashion.

6. SPECIFICATION OF CONSERVATION GOALS

[This section must include specification of 5-year and 10-year targets for water savings, including, where appropriate, quantitative goals for irrigation water use efficiency, and a pollution abatement and prevention plan. Please amend the description below to match your situation.]

This section presents the water conservation goal at the Poca Agua Golf Club and Turfgrass Nursery and describes pollution prevention and abatement.

6.1 Water Conservation Goal

The Poca Agua Golf Club and Turfgrass Nursery has set a five-year water conservation goal of reducing total water usage by 20 percent (from 550 ac-ft/yr to 440 ac-ft/yr) by the year _____ *[five years from date of plan]*. The ten-year goal is the same as the five-year goal. This reduction in water use will be achieved by the following methods:

- Switch to a central, computer-controlled irrigation system with weather monitoring stations located throughout the 450-acre property (golf courses and nursery). This change is projected to save ____ ac-ft/yr.

- Replacement of golf-course sprinkler rotors with more efficient models. This change is projected to save ____ ac-ft/yr.

- Replacement of the linear move irrigation system with a drip/micro-emitter irrigation system. This change is projected to save ____ ac-ft/yr.

- Reduce irrigation to the rough on both golf courses. This change is projected to save ____ ac-ft/yr.

6.2 Pollution Prevention and Abatement

The Poca Agua Golf Club and Turfgrass Nursery is committed to maintaining water quality in its golf course ponds. Potential threats to water quality from golf and turfgrass operations include pesticides, herbicides, and fertilizers. The Golf Club and Nursery minimizes chemical runoff from the golf courses and turfgrass growing areas through the following best management practices:

- Integrated pest management (IPM) approach to controlling pests. This approach includes use of biological pest control agents such as milky spore, bats, and nematodes and limited application of pesticides. When pesticides are applied, only Category III and IV pesticides (as designated by the U.S. Environmental Protection Agency) are used; these are the least toxic pesticides available.
- Careful limiting of irrigation water application rates.
- Avoiding application of pesticides, herbicides, and fertilizers when rain is in the near-term forecast.
- Use of low-phosporus, slow-release fertilizers that are applied based on soil analysis.

- Vegetative buffers around each golf course pond.
- Furrow diking around turfgrass growing areas to retain runoff on-site.
- 40-foot “no-spray” zones around each water feature.

Other potential pollutant sources during normal operations include parts washing, golf cart and vehicle maintenance, oil and chemical storage, and waste disposal. These potential sources are managed by following all applicable federal, state, and local regulations and through good housekeeping practices. In this way, the Golf Club and Nursery maintains a clean, organized, environmentally responsible maintenance facility.

7. DESCRIPTION OF WATER-CONSERVING IRRIGATION EQUIPMENT AND APPLICATION SYSTEM

[This section must include a description of water-conserving irrigation equipment and application system or method including, but not limited to, surge irrigation, low pressure sprinkler, drip irrigation, and nonleaking pipe. Please amend the description below to match your situation.]

At present, personnel use general information provided by the Texas Agricultural Extension Agency to calculate evapotranspiration rates. With these data, personnel adjust the amount of irrigation applied by reprogramming the timer system. By _____ *[five years from date of plan]*, the current timer system will be upgraded to a centrally-controlled computer system with weather stations placed periodically throughout the 450 acre property. This system is a software-based irrigation control center that will allow for more precision in irrigation management. Weather stations will provide rainfall, high and low ambient temperatures, wind speed and direction, soil temperatures, barometric pressures, relative humidity, and solar radiation data. The control system will analyze data provided by the weather stations and by soil-moisture sensors to estimate the current evapotranspiration rate. Once the evapotranspiration rate is estimated, the system determines an irrigation schedule that will provide only the amount of water needed under existing atmospheric and terrestrial conditions. The system can also shut down irrigation during periods of high wind, rain, or other climatic conditions not favorable to optimal irrigation.

By _____ *[five years from date of plan]*, the Poca Agua Golf Club and Turfgrass Nursery will replace existing impact rotors with higher efficiency rotors from Rain Bird, Inc. These sprinkler heads will apply water more evenly, thereby, reducing water usage.

By _____ *[five years from date of plan]*, the turfgrass nursery will convert from the linear move irrigation system to a micro-emitter irrigation system. The micro-emitter irrigation system will further increase water conservation by reducing the evaporative losses.

8. LEAK DETECTION, REPAIR, AND WATER-LOSS CONTROL

[This section must include a description of leak detection, repair, and water loss control. Please amend the description below to match your situation.]

At the Poca Agua Golf Club and Turfgrass Nursery, leaks are identified through the following means:

- Golf course and turfgrass personnel observe, operate, and maintain facilities throughout the day. Inspection of sprinkler heads, piping, and pump stations are a normal component of employee duties.
- Golf course and turfgrass personnel log and aggregate meter readings into a daily log. Abnormal values may signify a leak from the readings.
- Leak detection equipment is used on occasion if a below-ground leak is suspected.

If a water leak is indicated by any of the above means, the source of the leak is investigated and personnel are instructed to repair the leak as necessary.

9. SCHEDULING THE TIMING AND/OR MEASURING THE AMOUNT OF WATER APPLIED

[This section must include a description of scheduling the timing and/or measuring the amount of water applied (for example, soil moisture monitoring). Please amend the description below to match your situation.]

The Poca Agua Golf Club and Turfgrass Nursery currently uses a timer system and evapotranspiration-based calculations from weather data collected from the Texas Agricultural Experiment Station to obtain an optimal water schedule. However, by _____ *[five years from date of plan]*, the operation will convert to an automated, computer-controlled system. The centrally-controlled system will analyze data obtained from various weather stations and soil moisture sensors located throughout the 450-acre property. The data obtained will consist of rainfall, high or low temperatures, wind speed and direction, soil temperatures, soil moisture, barometric pressure, relative humidity, and solar radiation. From these data, the program will determine an irrigation schedule that will complement the atmospheric and terrestrial conditions to optimize irrigation scheduling.

When possible, irrigation will not be conducted between the hours of 10 AM and 8 PM to minimize evaporative losses. Furthermore, during periods or high wind, rain, or other climatic conditions not favorable to optimal irrigation, the system will shut down.

In addition to the central control system, meters will be monitored to track and record the amount of water being applied through the system.

10. LAND IMPROVEMENTS FOR RETAINING OR REDUCING RUNOFF AND INCREASING THE INFILTRATION OF RAIN AND IRRIGATION WATER

[This section must include a description of any land improvements for retaining or reducing runoff, and increasing the infiltration of rain and irrigation water including, but not limited to, land leveling, furrow diking, terracing, and weed control. Please amend the description below to match your situation.]

The Poca Agua Golf Club maintains 100 acres of natural areas surrounding both golf courses as well as 5 ponds on the golf courses. Each course is sloped to allow all excess water from irrigation or storm events to flow to the natural areas or to the water features, thereby retaining and reducing runoff.

The Poca Agua Turfgrass Nursery uses furrow dikes, which are small earthen dams, to retain irrigation/storm water on-site. In so doing, much of the excess water infiltrates into the soil. Surrounding the turfgrass area is a small drainage channel that discharges collected water back into Eagle Lake, which is the primary irrigation water supply.

11. TAILWATER RECOVERY AND REUSE

[This section must include a description of tailwater recovery and reuse. Please amend the description below to match your situation.]

The Poca Agua Turfgrass Nursery uses uses a small drainage channel to route any excess water from the turfgrass area to Eagle Lake, where it is used/reused for irrigation.

12. OTHER CONSERVATION PRACTICES, METHODS, OR TECHNIQUES

[This section must include information on any other water conservation practice, method, or technique which the user shows to be appropriate for preventing waste and achieving conservation. Please amend the section below to match your situation.]

No other water conservation practices, methods, or techniques are necessary to achieve the water conservation goals for the Poca Agua Golf Club and Turfgrass Nursery.

13. IMPLEMENTATION OF THE WATER CONSERVATION PLAN

Appendix D contains a copy of the resolution of the Board of Directors of the Poca Agua Golf Club and Turfgrass Nursery adopting this water conservation plan. The resolution designates responsible officials to implement and enforce the water conservation plan.

Appendix E contains a copy of a letter to the chairman of the Region C Water Planning Group to inform the group of this water conservation plan.

14. DROUGHT CONTINGENCY PLAN

14.1 Introduction

The purpose of this drought contingency plan is as follows:

- To conserve the available water supply in times of drought and emergency
- To minimize the adverse impacts of water supply shortages
- To minimize the adverse impacts of emergency water supply conditions.
- To coordinate drought contingency efforts with the City of Poca Agua, the wholesale water supplier for the Poca Agua Golf Club and Turfgrass Nursery.

14.2 State Requirements for Drought Contingency Plans

This drought plan is consistent with Texas Commission on Environmental Quality (TCEQ) guidelines and requirements for the development of drought contingency plans by irrigation users, contained in Title 30, Part 1, Chapter 288, Subchapter B, Rule 288.21 of the Texas Administrative Code. This rule is included in Appendix B.

Minimum Requirements

TCEQ's minimum requirements for drought contingency plans are addressed in the following subsections of this report:

TAC Reference	Subject	Plan Location
30 TAC §288.21(a)(1)(A)	Provisions to Inform the Public and Provide Opportunity for Public Input	Section 14.3
30 TAC §288.21(a)(1)(B)	Document Coordination with Regional Planning Group	Section 14.4
30 TAC §288.21(a)(1)(C)	Criteria for Initiation and Termination of Drought Stages	Section 14.7
30 TAC §288.21(a)(1)(D)	Specific, Quantified Targets for Water Use Reduction	Section 14.7
30 TAC §288.21(a)(1)(E)	Procedures for Determining the Allocation of Irrigation Supplies to Individual Users	Section 14.6
30 TAC §288.21(a)(1)(F)	Procedures for Initiation and Termination of Drought Stages	Section 14.5
30 TAC §288.21(a)(1)(G)	Procedures for Use Accounting	Section 14.8
30 TAC §288.21(a)(1)(H)	Procedures for the Transfer of Water Allocations Among Individual Users	Section 14.9
30 TAC §288.21(a)(1)(I)	Procedures for Enforcement of Water Allocation Policies	Section 14.10
30 TAC §288.21(a)(2)	Consultation with Wholesale Supplier	Section 14.11
30 TAC §288.21(a)(3)	Protection of Public Water Supplies	Section 14.12
30 TAC §288.21(a)(3)(b)	Review and Update of Plan	Section 14.13

14.3 Provisions to Inform the Public and Opportunity for Public Input

The Poca Agua Golf Club and Turfgrass Nursery is a private business that uses water for irrigation. It is not a supplier of irrigation water to any other users. Therefore, it is not obligated to inform the public or provide opportunity for public input.

[If you are a public entity or are otherwise required to inform the public and provide opportunity for public input, alternatives include, but are not limited to:

- *Providing written notice of the proposed plan and the opportunity to comment on the plan by newspaper and posted notice.*
- *Providing the draft plan to anyone requesting a copy.*
- *Holding a public meeting.]*

14.4 Coordination with the Region C Water Planning Group

Appendix E includes a copy of a letter sent to the Chair of the Region C water planning group with a copy of this water conservation and drought contingency plan.

14.5 Initiation and Termination of Drought Response Stages

Initiation of a Drought Response Stage

The City of Poca Agua may order implementation of a drought response stage or water emergency if one or more of the trigger conditions for that stage is met, according to the City's Drought Contingency Plan. When a drought stage is initiated, the City's Utility Director will notify the Poca Agua Golf Club and Turfgrass Nursery by telephone with a follow-up letter or fax.

For other trigger conditions, the City of Poca Agua may decide not to order the implementation of a drought response stage or water emergency even though one or more of the trigger criteria for the stage are met. Factors that could influence such a decision include, but are not limited to, the time of the year, weather conditions, the anticipation of replenished water supplies, or the anticipation that additional facilities will become available to meet needs.

[If you are not subject to a municipal drought contingency plan, include in this section a description of who is authorized to order implementation of drought response stages or water emergencies.]

Termination of a Drought Stage

The City of Poca Agua may order the termination of a drought response stage or water emergency when the conditions for termination are met or at its discretion. When a drought stage is terminated, the City's Utility Director will notify the Poca Agua Golf Club and Turfgrass Nursery by telephone with a follow-up letter or fax.

The City of Poca Agua may decide not to order the termination of a drought response stage or water emergency even though the conditions for termination of the stage are met. Factors that could influence such a decision include, but are not limited to, the time of the year, weather conditions, or the anticipation of potential changed conditions that warrant the continuation of the drought stage.

[If you are not subject to a municipal drought contingency plan, include in this section a description of who is authorized to terminate drought response stages or water emergencies.]

14.6 Procedures for Determining the Allocation of Irrigation Supplies to Individual Users

The Poca Agua Golf Club and Turfgrass Nursery does not supply water to other water users.

[If you supply irrigation supplies to other users, include in this section a description of the procedure for allocating supplies during drought response stages or water emergencies.]

14.7 Drought and Emergency Response Stages

Upon the implementation of a drought response stage or water emergency, the City of Poca Agua will determine whether to curtail water supply to the Poca Agua Golf Club and Turfgrass Nursery based on the severity of the drought or water emergency and according to the Drought Contingency Plan for the City of Poca Agua. A curtailed allocation would depend on the severity of the drought and/or emergency stage. The following sections of this plan describe the planned response of the Poca Agua Golf Club and Turfgrass Nursery to drought and/or emergency stages as declared by the City of Poca Agua.

[In this example, the irrigator is subject to a municipal drought contingency plan. If you are not subject to a municipal drought contingency plan, please describe what conditions trigger each of the drought response or water emergency stages below and what conditions allow termination of each drought response or water emergency stage.

The following are examples of other potential triggering criteria that may be used in one or more successive stages of a drought contingency plan. Select one or more of these if appropriate to your system, or devise additional triggering criteria tailored to your system[2]:

1. *Annually, beginning on May 1 through September 30.*
2. *When the water supply available to the City of Poca Agua is equal to or less than ______ (acre-feet, percentage of storage, etc.).*
3. *When, pursuant to requirements specified in the <u>(name of water supplier)</u> wholesale water purchase contract with <u>(name of wholesale water supplier)</u>, notification is received requesting initiation of Stage 1 of the Drought Contingency Plan.*

4. *When flows in the <u>(name of stream or river)</u> are equal to or less than ____ cubic feet per second.*
5. *When the static water level in the <u>(name of water supplier)</u> well(s) is equal to or less than ____ feet above mean sea level.*
6. *When the specific capacity of the (name of water supplier) well(s) is equal to or less than ___ percent of the well's original specific capacity.*
7. *When total daily water demand equals or exceeds ____ million gallons for ___ consecutive days or ____ million gallons on a single day (e.g., based on the "safe" operating capacity of water supply facilities).*
8. *Continually falling treated water reservoir levels which do not refill above ___ percent overnight (e.g., based on an evaluation of minimum treated water storage required to avoid system outage).]*

14.7.2 Stage 1, Mild

According to the City of Poca Agua Drought Contingency Plan, the stated goal for Stage 1 conditions is to reduce water usage by ___ percent from normal levels, and the emphasis is on public education, voluntary irrigation scheduling, and reducing non-essential water usage.

In Stage 1, the Poca Agua Golf Club and Turfgrass Nursery will voluntarily limit irrigation water usage to the hours of 6 AM to 10 AM and 8 PM to midnight. In addition, watering times for fairway areas will be reduced by ___ percent.

14.7.3 Stage 2, Moderate

According to the City of Poca Agua Drought Contingency Plan, the stated goal for Stage 2 conditions is to reduce water usage by ___ percent from normal levels, and the emphasis is on additional public education and halting non-essential water usage.

In Stage 2, the Poca Agua Golf Club and Turfgrass Nursery will voluntarily limit irrigation water usage to the hours of 6 AM to 10 AM and 8 PM to midnight. Watering times for fairway areas will be reduced to ___ percent of normal watering times, and watering of rough areas will be discontinued. Greens, tee boxes, and turfgrass growing areas will receive normal water amounts.

14.7.4 Stage 3, Severe

According to the City of Poca Agua Drought Contingency Plan, the stated goal for Stage 3 conditions is to reduce water usage by ___ percent from normal levels, and the emphasis is on alternative water supply strategies and mandatory water use restrictions and schedules.

In Stage 3, the Poca Agua Golf Club and Turfgrass Nursery will obtain ___ percent of its irrigation water from the three on-site wells. Irrigation will be limited to the hours of 6 AM to 10 AM and 8 PM to midnight. In addition, watering times for fairway areas will be reduced to ___ percent of normal watering times (watering of rough areas will still be discontinued). Greens, tee boxes, and turfgrass growing areas will receive normal water amounts.

14.7.5 Stage 4, Emergency

According to the City of Poca Agua Drought Contingency Plan, the stated goal for Stage 4 conditions is to reduce water usage by ___ percent from normal levels, and the emphasis is on alternative water supply strategies and mandatory water use prohibitions.

In Stage 4, the Poca Agua Golf Club and Turfgrass Nursery will obtain ___ percent of its irrigation water from the three on-site wells. Irrigation will be limited to the hours of 6 AM to 10 AM and 8 PM to midnight. In addition, watering times for fairway areas will be reduced to ___ percent of normal watering times (watering of rough areas will still be discontinued). Greens, tee boxes, and turfgrass growing areas will receive normal water amounts.

14.8 Procedures for Use Accounting

As discussed in Section 5, metered flows are logged daily, checked for indications of potential leaks, and reported to the City of Poca Agua on a monthly basis. Upon the initiation of a drought or emergency response stage, the Poca Agua Golf Club and Turfgrass Nursery will report withdrawals from Poca Agua Reservoir on a more frequent basis if requested by the City. This reporting will verify that the allocations provided by the initiation of a drought or emergency response stage are being satisfied.

14.9 Procedures for the Transfer of Water Allocations Among Individual Users

The Poca Agua Golf Club and Turfgrass Nursery will not transfer any water allocations to individual users.

14.10 Procedures for Enforcement of Water Allocation Policies

This is section is not applicable, because the Poca Agua Golf Club and Turfgrass Nursery does not allocate water to other users.

14.11 Consultation with Wholesale Supplier

A draft of this plan was sent to Utility Director of the City of Poca Agua for review and comment, and a copy of the final plan will also be provided to the Utility Director.

Upon initiation of a drought or emergency response state, the Poca Agua Golf Club and Turfgrass Nursery will be in direct communication with the Utility Director for the City of Poca Agua or his/her designee.

14.12 Protection of Public Water Supplies

All of the drought contingency measures discussed prior to this section are intended to protect the public water supply in Poca Agua Reservoir. No additional measures are contemplated.

14.13 Review and Update of Drought Contingency Plan

The Poca Agua Golf Club and Turfgrass Nursery will update this drought contingency plan every five years, beginning in _____ *[five years from date of plan]*. The plan will be updated as appropriate based on new information.

As the plans are reviewed and subsequently updated, a copy of the revised Drought Contingency Plan will be submitted to the Region C Water Planning Group for their records.

Appendix A
List of References

Appendix A
List of References

(1) Texas Commission on Environmental Quality: "Water Conservation Plans for Agricultural Use," *Texas Administrative Code* Title 30 Part I Subchapter A §288.4, effective October 7, 2004.

(2) Texas Commission on Environmental Quality: "Model Drought Contingency Plan," accessed online at http://www.tnrcc.state.tx.us/permitting/waterperm/wrpa/contingency.html, August 2004.

Appendix B

Texas Commission on Environmental Quality Rules on Agricultural Water Conservation and Drought Contingency Plans

SUBCHAPTER A: WATER CONSERVATION PLANS
§§288.1 - 288.7
Effective October 7, 2004

§288.1. Definitions.

The following words and terms, when used in this chapter, shall have the following meanings, unless the context clearly indicates otherwise.

(1) **Agricultural or Agriculture** - Any of the following activities:

(A) cultivating the soil to produce crops for human food, animal feed, or planting seed or for the production of fibers;

(B) the practice of floriculture, viticulture, silviculture, and horticulture, including the cultivation of plants in containers or non-soil media by a nursery grower;

(C) raising, feeding, or keeping animals for breeding purposes or for the production of food or fiber, leather, pelts, or other tangible products having a commercial value;

(D) raising or keeping equine animals;

(E) wildlife management; and

(F) planting cover crops, including cover crops cultivated for transplantation, or leaving land idle for the purpose of participating in any governmental program or normal crop or livestock rotation procedure.

(2) **Agricultural use** – Any use or activity involving agriculture, including irrigation.

(3) **Conservation** – Those practices, techniques, and technologies that reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water, or increase the recycling and reuse of water so that a water supply is made available for future or alternative uses.

(4) **Drought contingency plan** – A strategy or combination of strategies for temporary supply and demand management responses to temporary and potentially recurring water supply shortages and other water supply emergencies. A drought contingency plan may be a separate document identified as such or may be contained within another water management document(s).

(5) **Industrial use** – The use of water in processes designed to convert materials of a lower order of value into forms having greater usability and commercial value, commercial fish production, and the development of power by means other than hydroelectric, but does not include agricultural use.

(6) **Irrigation** – The agricultural use of water for the irrigation of crops, trees, and pastureland, including, but not limited to, golf courses and parks which do not receive water through a municipal distribution system.

(7) **Irrigation water use efficiency** – The percentage of that amount of irrigation water which is beneficially used by agriculture crops or other vegetation relative to the amount of water diverted from the source(s) of supply. Beneficial uses of water for irrigation purposes include, but are not limited to, evapotranspiration needs for vegetative maintenance and growth, salinity management, and leaching requirements associated with irrigation.

(8) **Mining use** – The use of water for mining processes including hydraulic use, drilling, washing sand and gravel, and oil field repressuring.

(9) **Municipal per capita water use** – The sum total of water diverted into a water supply system for residential, commercial, and public and institutional uses divided by actual population served.

(10) **Municipal use** – The use of potable water within or outside a municipality and its environs whether supplied by a person, privately owned utility, political subdivision, or other entity as well as the use of sewage effluent for certain purposes, including the use of treated water for domestic purposes, fighting fires, sprinkling streets, flushing sewers and drains, watering parks and parkways, and recreational purposes, including public and private swimming pools, the use of potable water in industrial and commercial enterprises supplied by a municipal distribution system without special construction to meet its demands, and for the watering of lawns and family gardens.

(11) **Municipal use in gallons per capita per day** – The total average daily amount of water diverted or pumped for treatment for potable use by a public water supply system. The calculation is made by dividing the water diverted or pumped for treatment for potable use by population served. Indirect reuse volumes shall be credited against total diversion volumes for the purpose of calculating gallons per capita per day for targets and goals.

(12) **Nursery grower** – A person engaged in the practice of floriculture, viticulture, silviculture, and horticulture, including the cultivation of plants in containers or nonsoil media, who grows more than 50% of the products that the person either sells or leases, regardless of the variety sold, leased, or grown. For the purpose of this definition, grow means the actual cultivation or propagation of the product beyond the mere holding or maintaining of the item prior to sale or lease, and typically includes activities associated with the production or multiplying of stock such as the development of new plants from cuttings, grafts, plugs, or seedlings.

(13) **Pollution** – The alteration of the physical, thermal, chemical, or biological quality of, or the contamination of, any water in the state that renders the water harmful, detrimental, or injurious to humans, animal life, vegetation, or property, or to the public health, safety, or welfare, or impairs the usefulness or the public enjoyment of the water for any lawful or reasonable purpose.

(14) **Public water supplier** – An individual or entity that supplies water to the public for human consumption.

(15) **Regional water planning group** – A group established by the Texas Water Development Board to prepare a regional water plan under Texas Water Code, §16.053.

(16) Retail public water supplier – An individual or entity that for compensation supplies water to the public for human consumption. The term does not include an individual or entity that supplies water to itself or its employees or tenants when that water is not resold to or used by others.

(17) **Reuse** – The authorized use for one or more beneficial purposes of use of water that remains unconsumed after the water is used for the original purpose of use and before that water is either disposed of or discharged or otherwise allowed to flow into a watercourse, lake, or other body of state-owned water.

(18) **Water conservation plan** – A strategy or combination of strategies for reducing the volume of water withdrawn from a water supply source, for reducing the loss or waste of water, for maintaining or improving the efficiency in the use of water, for increasing the recycling and reuse of water, and for preventing the pollution of water. A water conservation plan may be a separate document identified as such or may be contained within another water management document(s).

(19) **Wholesale public water supplier** – An individual or entity that for compensation supplies water to another for resale to the public for human consumption. The term does not include an individual or entity that supplies water to itself or its employees or tenants as an incident of that employee service or tenancy when that water is not resold to or used by others, or an individual or entity that conveys water to another individual or entity, but does not own the right to the water which is conveyed, whether or not for a delivery fee.

Adopted September 15, 2004 Effective October 7, 2004

§288.4. Water Conservation Plans for Agricultural Use.

(a) A water conservation plan for agricultural use of water must provide information in response to the following subsections. If the plan does not provide information for each requirement, the agricultural water user must include in the plan an explanation of why the requirement is not applicable.

(1) For an individual agricultural user other than irrigation:

(A) a description of the use of the water in the production process, including how the water is diverted and transported from the source(s) of supply, how the water is utilized in the production process, and the estimated quantity of water consumed in the production process and therefore unavailable for reuse, discharge, or other means of disposal;

(B) until May 1, 2005, specification of conservation goals, the basis for the development of such goals, and a time frame for achieving the specified goals;

(C) beginning May 1, 2005, specific, quantified five-year and ten-year targets for water savings and the basis for the development of such goals. The goals established by agricultural water users under this subparagraph are not enforceable;

(D) a description of the device(s) and/or method(s) within an accuracy of plus or minus 5.0% to be used in order to measure and account for the amount of water diverted from the source of supply;

(E) leak-detection, repair, and accounting for water loss in the water distribution system;

(F) application of state-of-the-art equipment and/or process modifications to improve water use efficiency; and

(G) any other water conservation practice, method, or technique which the user shows to be appropriate for achieving the stated goal or goals of the water conservation plan.

(2) For an individual irrigation user:

(A) a description of the irrigation production process which shall include, but is not limited to, the type of crops and acreage of each crop to be irrigated, monthly irrigation diversions, any seasonal or annual crop rotation, and soil types of the land to be irrigated;

(B) a description of the irrigation method or system and equipment including pumps, flow rates, plans, and/or sketches of the system layout;

(C) a description of the device(s) and/or methods within an accuracy of plus or minus 5.0%, to be used in order to measure and account for the amount of water diverted from the source of supply;

(D) until May 1, 2005, specification of conservation goals including, where appropriate, quantitative goals for irrigation water use efficiency and a pollution abatement and prevention plan;

(E) beginning May 1, 2005, specific, quantified five-year and ten-year targets for water savings including, where appropriate, quantitative goals for irrigation water use efficiency and a pollution abatement and prevention plan. The goals established by an individual irrigation water user under this subparagraph are not enforceable;

(F) water-conserving irrigation equipment and application system or method including, but not limited to, surge irrigation, low pressure sprinkler, drip irrigation, and nonleaking pipe;

(G) leak-detection, repair, and water-loss control;

(H) scheduling the timing and/or measuring the amount of water applied (for example, soil moisture monitoring);

(I) land improvements for retaining or reducing runoff, and increasing the infiltration of rain and irrigation water including, but not limited to, land leveling, furrow diking, terracing, and weed control;

(J) tailwater recovery and reuse; and

(K) any other water conservation practice, method, or technique which the user shows to be appropriate for preventing waste and achieving conservation.

(3) For a system providing agricultural water to more than one user:

(A) a system inventory for the supplier's:

(i) structural facilities including the supplier's water storage, conveyance, and delivery structures;

(ii) management practices, including the supplier's operating rules and regulations, water pricing policy, and a description of practices and/or devices used to account for water deliveries; and

(iii) a user profile including square miles of the service area, the number of customers taking delivery of water by the system, the types of crops, the types of irrigation systems, the types of drainage systems, and total acreage under irrigation, both historical and projected;

(B) until May 1, 2005, specification of water conservation goals, including maximum allowable losses for the storage and distribution system;

(C) beginning May 1, 2005, specific, quantified five-year and ten-year targets for water savings including maximum allowable losses for the storage and distribution system. The goals established by a system providing agricultural water to more than one user under this subparagraph are not enforceable;

(D) a description of the practice(s) and/or device(s) which will be utilized to measure and account for the amount of water diverted from the source(s) of supply;

(E) a monitoring and record management program of water deliveries, sales, and losses;

(F) a leak-detection, repair, and water loss control program;

(G) a program to assist customers in the development of on-farm water conservation and pollution prevention plans and/or measures;

(H) a requirement in every wholesale water supply contract entered into or renewed after official adoption of the plan (by either ordinance, resolution, or tariff), and including any contract extension, that each successive wholesale customer develop and implement a water conservation plan or water conservation measures using the applicable elements in this chapter. If the customer intends to resell the water, the contract between the initial supplier and customer must provide that the contract for the resale of the water must have water conservation requirements so that each successive customer in the resale of the water will be required to implement water conservation measures in accordance with applicable provisions of this chapter;

(I) official adoption of the water conservation plan and goals, by ordinance, rule, resolution, or tariff, indicating that the plan reflects official policy of the supplier;

(J) any other water conservation practice, method, or technique which the supplier shows to be appropriate for achieving conservation; and

(K) documentation of coordination with the regional water planning groups in order to ensure consistency with appropriate approved regional water plans.

(b) A water conservation plan prepared in accordance with the rules of the United States Department of Agriculture Natural Resource Conservation Service, the Texas State Soil and Water Conservation Board, or other federal or state agency and substantially meeting the requirements of this section and other applicable commission rules may be submitted to meet application requirements in accordance with a memorandum of understanding between the commission and that agency.

(c) Beginning May 1, 2005, an agricultural water user shall review and update its water conservation plan, as appropriate, based on an assessment of previous five-year and ten-year targets and any other new or updated information. An agricultural water user shall review and update the next revision of its water conservation plan not later than May 1, 2009, and every five years after that date to coincide with the regional water planning group.

SUBCHAPTER B: DROUGHT CONTINGENCY PLANS
§§288.20 - 288.22
Effective October 7, 2004

§288.21. Drought Contingency Plans for Irrigation Use.

(a) A drought contingency plan for an irrigation use, where applicable, must include the following minimum elements.

(1) Minimum requirements. Drought contingency plans for irrigation water suppliers must include policies and procedures for the equitable and efficient allocation of water on a pro rata basis during times of shortage in accordance with Texas Water Code, §11.039. Such plans shall include the following elements as a minimum.

(A) Preparation of the plan shall include provisions to actively inform and to affirmatively provide opportunity for users of water from the irrigation system to provide input into the preparation of the plan and to remain informed of the plan. Such acts may include, but are not limited to, having a public meeting at a time and location convenient to the water users and providing written notice to the water users concerning the proposed plan and meeting.

(B) The drought contingency plan must document coordination with the regional water planning groups to ensure consistency with the appropriate approved regional water plans.

(C) The drought contingency plan must include water supply criteria and other considerations for determining when to initiate or terminate water allocation procedures, accompanied by an explanation of the rationale or basis for such triggering criteria.

(D) The drought contingency plan must include specific, quantified targets for water use reductions to be achieved during periods of water shortage and drought. The entity preparing the plan shall establish the targets. The goals established by the entity under this subparagraph are not enforceable.

(E) The drought contingency plan must include methods for determining the allocation of irrigation supplies to individual users.

(F) The drought contingency plan must include a description of the information to be monitored by the water supplier and the procedures to be followed for the initiation or termination of water allocation policies.

(G) The drought contingency plan must include procedures for use accounting during the implementation of water allocation policies.

(H) The drought contingency plan must include policies and procedures, if any, for the transfer of water allocations among individual users within the water supply system or to users outside the water supply system.

(I) The drought contingency plan must include procedures for the enforcement of water allocation policies, including specification of penalties for violations of such policies and for wasteful or excessive use of water.

(2) Wholesale water customers. Any irrigation water supplier that receives all or a portion of its water supply from another water supplier shall consult with that supplier and shall include in the drought contingency plan, appropriate provisions for responding to reductions in that water supply.

(3) Protection of public water supplies. Any irrigation water supplier that also provides or delivers water to a public water supplier(s) shall consult with that public water supplier(s) and shall include in the plan, mutually agreeable and appropriate provisions to ensure an uninterrupted supply of water necessary for essential uses relating to public health and safety. Nothing in this provision shall be construed as requiring the irrigation water supplier to transfer irrigation water supplies to non-irrigation use on a compulsory basis or without just compensation.

(b) Irrigation water users shall review and update, as appropriate, the drought contingency plan, at least every five years, based on new or updated information, such as adoption or revision of the regional water plan.

Adopted September 15, 2004 Effective October 7, 2004

Appendix C
Diagram of the Irrigation System

Irrigation System Diagram
Poca Agua Golf Club and Turfgrass Nursery

[Insert irrigation system diagram here. Show all water uses, sources, and flowrates.]

Appendix D

Board of Directors Resolution Adopting the Water Conservation and Drought Contingency Plan

[Insert Board resolution adopting the water conservation plan.]

Appendix E
Letter to Region C Water Planning Group

[Insert letter to the Region C Water Planning Group.]

REGION C WATER PLANNING GROUP

MODEL WATER CONSERVATION PLAN FOR STEAM ELECTRIC POWER GENERATORS

MAY 2005

Prepared for:

REGION C WATER PLANNING GROUP

Prepared by:

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ACKNOWLEDGEMENTS

This model water conservation plan for the fictional Poca Agua Steam Electric Power Station was prepared by Alan Plummer Associates, Freese and Nichols, and Chiang, Patel and Yerby for the Region C Water Planning Group. It is a template for steam electric power generators to use as they develop their own water conservation plans. Each steam electric power generator should customize the details to match their unique situation. The model plan was prepared pursuant to Texas Commission on Environmental Quality rules. The rules do not require a drought contingency plan for steam electric power generators.

Questions regarding this model water conservation plan should be addressed to the following:

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POCA AGUA STEAM ELECTRIC POWER STATION

WATER CONSERVATION PLAN

MAY 2005

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APPENDICES

Poca Agua Steam Electric Power Station
Water Conservation Plan

May 2005

1. INTRODUCTION AND OBJECTIVES

Water supply has always been a key issue in the development of Texas. In recent years, the increasing population and economic development in Region C have led to growing demands for water supplies. At the same time, local and less expensive sources of water supply are largely developed. Additional supplies to meet higher demands will be expensive and difficult to develop. It is therefore important that we make efficient use of our existing supplies and make them last as long as possible. This will delay the need for new supplies, minimize the environmental impacts associated with developing new supplies, and delay the high cost of additional water supply development.

Recognizing the need for efficient use of existing water supplies, the Texas Commission on Environmental Quality (TCEQ) has developed rules governing the development of water conservation plans for industrial and mining water use (Appendix B). The Poca Agua Steam Electric Power Station has adopted this water conservation plan pursuant to TCEQ rules.

The plan lists the TCEQ rules; describes the power generation process at the Poca Agua Steam Electric Power Station and associated water uses; sets a water conservation goal; describes water measurement devices and methods; discusses leak detection, repair, and water loss accounting; and reports existing and future water use efficiency practices.

2. TEXAS COMMISSION ON ENVIRONMENTAL QUALITY RULES

The TCEQ rules governing development of water conservation plans for industrial or mining use are contained in Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.3 of the Texas Administrative Code (TAC), which is included in Appendix B.

A water conservation plan is defined as "a strategy or combination of strategies for reducing the volume of water withdrawn from a water supply source, for reducing the loss or waste of water, for maintaining or improving the efficiency in the use of water, for increasing the recycling and reuse of water, and for preventing the pollution of water. A water conservation plan may be a separate document identified as such or may be contained within another water management document(s)[1]." The minimum requirements for water conservation plans for industrial or mining use are as follows:

TAC Reference	Subject	Plan Location
30 TAC §288.3(a)(1)	Production Process	Section 3, Appendix C
30 TAC §288.3(a)(2)	Water Conservation Goals Before May 1, 2005	Section 4
30 TAC §288.3(a)(3)	Water Conservation Goals After May 1, 2005	Section 4
30 TAC §288.3(a)(4)	Accurate Metering	Section 5
30 TAC §288.3(a)(5)	Leak Detection, Repair, and Water Loss Accounting	Section 6
30 TAC §288.3(a)(6)	Water Use Efficiency Process and/or Equipment Upgrades	Section 7
30 TAC §288.3(a)(7)	Other Conservation Practices	Section 8
30 TAC §288.3(b)	Review and Update of Plan	Section 9

[TCEQ rules do not require a drought contingency plan for industrial or mining water users.]

[1] Superscripted numbers match references listed in Appendix A.

3. DESCRIPTION OF THE WATER USES IN THE ELECTRIC GENERATION PROCESS

[This section must include a description of the use of the water in the production process, including how the water is diverted and transported from the source(s) of supply, how the water is utilized in the production process, and the estimated quantity of water consumed in the production process and therefore unavailable for reuse, discharge, or other means of disposal. If your facility uses other cooling methods, such as once-through cooling or dry-type cooling, please amend the process description below. Also modify the water sources and water uses to match those at your facility.]

The Poca Agua Steam Electric Power Station is a natural gas-fired electric generating facility located at 4220 Poca Agua Road in the City of Poca Agua, Texas, on the south shore of Poca Agua Reservoir. The facility consists of one natural gas-fired, 300 megawatt (MW) steam electric generating unit that has been in service since 1972.

Water used for cooling and industrial uses is supplied with surface water from Poca Agua Reservoir, a man-made reservoir that was constructed in part to meet water demands from the generating facility. This water is used for cooling, boiler feed, fire protection, and service water. A water use diagram for the Poca Agua Steam Electric Power Station is presented in Appendix C.

Cooling water is pumped from Poca Agua Reservoir through the condensers and returned to the reservoir (a “once-through” cooling process). Service water is taken from the cooling water and used for boiler feed and miscellaneous purposes. Service water is treated using a reverse osmosis/demineralization process to create a high-purity boiler feed water. Reverse osmosis reject water and boiler blowdown are monitored and treated as necessary before being returned to the reservoir along with the cooling water.

Miscellaneous non-potable water uses include equipment washdown and fire protection. The amount of miscellaneous surface water use is estimated by multiplying the capacity of the service water pumps by their run times. Average flowrates under normal operating conditions are shown on the water use diagram in Appendix C.

Stormwater from the facility is collected and routed through oil-water separators, monitored, and discharged to the reservoir.

Potable water for domestic purposes is supplied by the City of Poca Agua. Wastewater treatment is provided by an on-site septic system.

The largest consumptive water use at the Poca Agua Steam Electric Power Station is forced evaporation from the once-through cooling process. The forced evaporation is estimated to be 0.35 gallons per kilowatt-hour (kWh) of generation[2]. The exact amount varies from year to year depending on the amount of power generated at the facility and climatic conditions. Assuming a 50 percent load factor, approximately 1,411 acre-feet per year (ac-ft/yr) of cooling makeup water is required.

Miscellaneous uses consume approximately 7 ac-ft/yr, and domestic uses consume an average of approximately 2 ac-ft/yr. Because water is used for fire protection on a very infrequent, as-needed basis, no average annual quantity has been estimated.

4. SPECIFICATION OF WATER CONSERVATION GOALS

[This section must include specification of 5-year and 10-year water conservation goals and the basis for development of such goals. Please amend the water conservation goals, basis, and time frame to match those at your facility. Examples of methods that could be used to conserve water include switching to a higher quality source water for cooling tower makeup water, using advanced treatment processes to allow more cycling of process water and to reduce water waste, switching to reclaimed water as a source for most uses, water wise landscaping, retrofit of domestic plumbing fixtures with water-efficient fixtures, and employee education[3,4].]

The Poca Agua Steam Electric Power Station has set a five-year water conservation goal of reducing total water usage by ___ percent (from 1,411 ac-ft/yr to ____ ac-ft/yr assuming a 50 percent load factor) by _____ *[five years from date of plan]*. The ten-year goal is the same as the five-year goal. This will be achieved by __________________________ *[insert proposed water conservation methods]*.

5. ACCURATE METERING TO MEASURE AND ACCOUNT FOR WATER

[This section must include a description of the device(s) and/or method(s) within an accuracy of plus or minus five percent to be used to measure and account for the amount of water diverted from the source of supply. Please amend the metering description to match those at your facility.]

The Poca Agua Steam Electric Power Station estimates water usage by multiplying pump run times and pump capacity (from manufacturers' pump curves). This is the best available technology for measuring cooling water flows that can reach 360 million gallons per day when the plant is operating at full capacity. Daily cooling water flows are reported to the Texas Commission on Environmental Quality (TCEQ).

Domestic water supply obtained from the City of Poca Agua is metered by the City. The meter is calibrated according to the City's schedule and specifications.

6. LEAK DETECTION, REPAIR, AND WATER LOSS ACCOUNTING

[This section must include a description of leak-detection, repair, and water loss accounting in the water distribution system. Please amend the description below to match operations at your facility.]

At the Poca Agua Steam Electric Power Station, leaks are identified through the following methods:

- Plant personnel routinely observe, operate, and maintain facilities throughout the day. Inspection of aboveground piping and pump packing is a normal part of employee duties.

- Plant personnel collect water samples from various points in the process and have them analyzed for key water quality parameters. Water quality problems can be indicative of water leaks.

- Operators monitor the water level in various ponds and sumps. A large change in water level can also signify a water leak.

If a water leak is indicated by any of the above means, the source of the leak is investigated and a work order for repairs is issued as necessary.

7. WATER USE EFFICIENCY PROCESS AND/OR EQUIPMENT UPGRADES

[This section must include a description of equipment and/or process modifications to improve water use efficiency. Please amend the description below to match operations at your facility.]

Several water conservation methods are already in use at the Poca Agua Steam Electric Power Station, including the following:

- Cooling water is pumped from Poca Agua Reservoir through the condensers and returned to the reservoir (once-through cooling). Much of the cooling water returned to the reservoir is eventually drawn into the cooling water intake and reused for cooling purposes.

- Water/steam is circulated through the boiler process multiple times to reduce water usage.

- Chemical dosages and concentrations are closely monitored to allow maximum cycling of boiler water/steam without scaling or corrosion.

- Reverse osmosis treatment equipment has been placed ahead of the demineralizer in the boiler feed treatment process to increase the run time of the demineralizer between regeneration events. This has extended the run time of the demineralizer by a factor of ten and has resulted in 90 percent less water wasted from the regeneration process.

- Boiler wash water is recycled.

- Stormwater, floor/equipment drainage, and miscellaneous low-volume wastes are passed through oil-water separators and discharged back to the reservoir under an existing Texas Pollutant Discharge Elimination System (TPDES) permit. Much of this water is eventually drawn into the cooling water intake and reused for cooling purposes.

- Landscape areas around the generating station are not irrigated.

8. OTHER CONSERVATION PRACTICES, METHODS, OR TECHNIQUES

[This section must include any other water conservation practice, method, or technique that the user shows to be appropriate for achieving the stated goal(s) of the water conservation plan. Please amend the description below to match operations at your facility.]

No other water conservation methods are necessary to achieve the water conservation goals for the Poca Agua Steam Electric Power Station.

9. IMPLEMENTATION OF THE WATER CONSERVATION PLAN

Appendix D contains a copy of the resolution of the Board of Directors of the Poca Agua Power Company adopting this water conservation plan. The resolution designates responsible officials to implement and enforce the water conservation plan.

Appendix E contains a copy of a letter to the chairman of the Region C Water Planning Group to inform the planning group of this water conservation plan.

This plan will be reviewed and updated every five years.

Appendix A
List of References

List of References

1. Texas Commission on Environmental Quality: "Water Conservation Plans for Industrial or Mining Use," *Texas Administrative Code* Title 30 Part I Subchapter A §288.3, effective October 7, 2004.

2. *Power Generation Water Use in Texas for the Years 2000 Through 2060*, prepared for the Texas Water Development Board by representatives of investor-owned utility companies of Texas, January 2003.

3. New Mexico Office of the State Engineer: *A Water Conservation Guide for Commercial, Institutional, and Industrial Users*, July 1999.

4. Texas Water Development Board: *Report 362 Water Conservation Best Management Practices Guide*, prepared for the Water Conservation Implementation Task Force, Austin, November 2004.

Appendix B

Texas Commission on Environmental Quality Rules on Water Conservation Plans for Industrial or Mining Water Use

SUBCHAPTER A: WATER CONSERVATION PLANS
§§288.1 - 288.7
Effective October 7, 2004

§288.1. Definitions.

The following words and terms, when used in this chapter, shall have the following meanings, unless the context clearly indicates otherwise.

(1) **Agricultural or Agriculture** - Any of the following activities:

(A) cultivating the soil to produce crops for human food, animal feed, or planting seed or for the production of fibers;

(B) the practice of floriculture, viticulture, silviculture, and horticulture, including the cultivation of plants in containers or non-soil media by a nursery grower;

(C) raising, feeding, or keeping animals for breeding purposes or for the production of food or fiber, leather, pelts, or other tangible products having a commercial value;

(D) raising or keeping equine animals;

(E) wildlife management; and

(F) planting cover crops, including cover crops cultivated for transplantation, or leaving land idle for the purpose of participating in any governmental program or normal crop or livestock rotation procedure.

(2) **Agricultural use** – Any use or activity involving agriculture, including irrigation.

(3) **Conservation** – Those practices, techniques, and technologies that reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water, or increase the recycling and reuse of water so that a water supply is made available for future or alternative uses.

(4) **Drought contingency plan** – A strategy or combination of strategies for temporary supply and demand management responses to temporary and potentially recurring water supply shortages and other water supply emergencies. A drought contingency plan may be a separate document identified as such or may be contained within another water management document(s).

(5) **Industrial use** – The use of water in processes designed to convert materials of a lower order of value into forms having greater usability and commercial value, commercial fish production, and the development of power by means other than hydroelectric, but does not include agricultural use.

(6) **Irrigation** – The agricultural use of water for the irrigation of crops, trees, and pastureland, including, but not limited to, golf courses and parks which do not receive water through a municipal distribution system.

(7) **Irrigation water use efficiency** – The percentage of that amount of irrigation water which is beneficially used by agriculture crops or other vegetation relative to the amount of water diverted from the source(s) of supply. Beneficial uses of water for irrigation purposes include, but are not limited to, evapotranspiration needs for vegetative maintenance and growth, salinity management, and leaching requirements associated with irrigation.

(8) **Mining use** – The use of water for mining processes including hydraulic use, drilling, washing sand and gravel, and oil field repressuring.

(9) **Municipal per capita water use** – The sum total of water diverted into a water supply system for residential, commercial, and public and institutional uses divided by actual population served.

(10) **Municipal use** – The use of potable water within or outside a municipality and its environs whether supplied by a person, privately owned utility, political subdivision, or other entity as well as the use of sewage effluent for certain purposes, including the use of treated water for domestic purposes, fighting fires, sprinkling streets, flushing sewers and drains, watering parks and parkways, and recreational purposes, including public and private swimming pools, the use of potable water in industrial and commercial enterprises supplied by a municipal distribution system without special construction to meet its demands, and for the watering of lawns and family gardens.

(11) **Municipal use in gallons per capita per day** – The total average daily amount of water diverted or pumped for treatment for potable use by a public water supply system. The calculation is made by dividing the water diverted or pumped for treatment for potable use by population served. Indirect reuse volumes shall be credited against total diversion volumes for the purpose of calculating gallons per capita per day for targets and goals.

(12) **Nursery grower** – A person engaged in the practice of floriculture, viticulture, silviculture, and horticulture, including the cultivation of plants in containers or nonsoil media, who grows more than 50% of the products that the person either sells or leases, regardless of the variety sold, leased, or grown. For the purpose of this definition, grow means the actual cultivation or propagation of the product beyond the mere holding or maintaining of the item prior to sale or lease, and typically includes activities associated with the production or multiplying of stock such as the development of new plants from cuttings, grafts, plugs, or seedlings.

(13) **Pollution** – The alteration of the physical, thermal, chemical, or biological quality of, or the contamination of, any water in the state that renders the water harmful, detrimental, or injurious to humans, animal life, vegetation, or property, or to the public health, safety, or welfare, or impairs the usefulness or the public enjoyment of the water for any lawful or reasonable purpose.

(14) **Public water supplier** – An individual or entity that supplies water to the public for human consumption.

(15) **Regional water planning group** – A group established by the Texas Water Development Board to prepare a regional water plan under Texas Water Code, §16.053.

(16) Retail public water supplier – An individual or entity that for compensation supplies water to the public for human consumption. The term does not include an individual or entity that supplies water to itself or its employees or tenants when that water is not resold to or used by others.

(17) **Reuse** – The authorized use for one or more beneficial purposes of use of water that remains unconsumed after the water is used for the original purpose of use and before that water is either disposed of or discharged or otherwise allowed to flow into a watercourse, lake, or other body of state-owned water.

(18) **Water conservation plan** – A strategy or combination of strategies for reducing the volume of water withdrawn from a water supply source, for reducing the loss or waste of water, for maintaining or improving the efficiency in the use of water, for increasing the recycling and reuse of water, and for preventing the pollution of water. A water conservation plan may be a separate document identified as such or may be contained within another water management document(s).

(19) **Wholesale public water supplier** – An individual or entity that for compensation supplies water to another for resale to the public for human consumption. The term does not include an individual or entity that supplies water to itself or its employees or tenants as an incident of that employee service or tenancy when that water is not resold to or used by others, or an individual or entity that conveys water to another individual or entity, but does not own the right to the water which is conveyed, whether or not for a delivery fee.

Adopted September 15, 2004 Effective October 7, 2004

§288.3. Water Conservation Plans for Industrial or Mining Use.

(a) A water conservation plan for industrial or mining uses of water must provide information in response to each of the following elements. If the plan does not provide information for each requirement, the industrial or mining water user shall include in the plan an explanation of why the requirement is not applicable.

(1) a description of the use of the water in the production process, including how the water is diverted and transported from the source(s) of supply, how the water is utilized in the production process, and the estimated quantity of water consumed in the production process and therefore unavailable for reuse, discharge, or other means of disposal;

(2) until May 1, 2005, specification of conservation goals, the basis for the development of such goals, and a time frame for achieving the specified goals;

(3) beginning May 1, 2005, specific, quantified five-year and ten-year targets for water savings and the basis for the development of such goals. The goals established by industrial or mining water users under this paragraph are not enforceable;

(4) a description of the device(s) and/or method(s) within an accuracy of plus or minus 5.0% to be used in order to measure and account for the amount of water diverted from the source of supply;

(5) leak-detection, repair, and accounting for water loss in the water distribution system;

(6) application of state-of-the-art equipment and/or process modifications to improve water use efficiency; and

(7) any other water conservation practice, method, or technique which the user shows to be appropriate for achieving the stated goal or goals of the water conservation plan.

(b) Beginning May 1, 2005, an industrial or mining water user shall review and update its water conservation plan, as appropriate, based on an assessment of previous five-year and ten-year targets and any other new or updated information. The industrial or mining water user shall review and update the next revision of its water conservation plan not later than May 1, 2009, and every five years after that date to coincide with the regional water planning group.

Adopted September 15, 2004 Effective October 7, 2004

Appendix C
Water Use Diagram

Water Use Diagram
Poca Agua Steam Electric Power Station

[Insert water use diagram here. Show all water uses, sources, and flowrates.]

Appendix D

Board Resolution Adopting the Water Conservation Plan

[Insert Board resolution adopting the water conservation plan.]

Appendix E
Letter to the Region C Water Planning Group

[Insert letter to the Region C Water Planning Group.]

APPENDIX P

KEY WATER QUALITY PARAMETERS

Key Water Quality Parameters and Baseline Conditions

PROJECT: 312-1705

DATE: November 15, 2004

PREPARED FOR: Region C Water Planning Group

PREPARED BY: Brian K. McDonald, Texas P.E. 83332 Alan Plummer Associates, Inc. (APAI)
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1.0 INTRODUCTION

Task 5 of the current regional water planning cycle requires that the regional planning groups evaluate the impacts of selected water management strategies on key water quality parameters within the region. The first phase of this task includes selection of key water quality parameters and definition of baseline conditions for these parameters. This memorandum describes the selection of the key water quality parameters and provides a summary of baseline conditions for each parameter.

In order to develop a manageable and meaningful list of key water quality parameters, the following general guidelines were established for parameter selection:

1) Selected parameters should be representative of water quality conditions that may be impacted on a regional scale and that are likely to be impacted by multiple water management strategies within the region. Water quality issues associated with localized conditions (such as elevated levels of a toxic material within one water body) will be addressed as necessary within the environmental impact evaluations of the individual water management strategies for each water user group.
2) Sufficient data must be available for a parameter in order to include it as a key water quality parameter. If meaningful statistical summaries cannot be carried out on the parameter, it should not be designated as a key water quality parameter.

In order to provide some basis for selection of parameters and for quantitative comparisons between different water bodies within the region, regulatory standards and screening levels are referenced throughout this memorandum. However, it is not the intent of this memorandum to evaluate regulatory compliance of any water body within the region. These regulatory standards are only used as "yardsticks" for relative comparisons of water quality within the region.

2.0 SELECTION OF KEY WATER QUALITY PARAMETERS

Selection of key water quality parameters was carried out using a two-stage approach. As described in the following sections, a list of candidate water quality parameters was identified based on specific criteria applied to surface water and groundwater. Key water quality parameters were then selected from these lists of potential parameters based on the general guidelines described above in Section 1.0. Details of this selection process are described in the following sections.

2.1 Candidate Water Quality Parameters

2.1.1 Surface Water

Identification of candidate water quality parameters for surface water was based on consideration of each of the following categories:

1) Parameters regulated by the Texas Commission on Environmental Quality (TCEQ) in the Texas Surface Water Quality Standards (TSWQS);
2) Parameters considered for the TCEQ Water Quality Inventory in evaluation of whether water body uses are supported, not supported, or have water quality concerns. The designated water body uses included in the Water Quality Inventory are:
    a) Aquatic life use
    b) Contact recreation use
    c) General use
    d) Fish consumption use
    e) Public water supply use;
3) Parameters that may impact suitability of water for irrigation; and
4) Parameters that may impact treatability of water for municipal or industrial supply.

Categories 1 and 2 above were selected to represent environmental water quality parameters, and Categories 3 and 4 were selected to be representative of water quality as related to irrigation uses and treatability for municipal or industrial supplies.

Based on an evaluation of parameters in each of the above categories, the candidate water quality parameters were identified for surface waters in Region C (Table 1).

Table 1: Candidate Water Quality Parameters (Surface Water)

Candidate Parameters	Basis for Candidacy
Total dissolved solids Chloride Sulfate	• Regulated by the TSWQS • Regulated in secondary drinking water standards • Can impact suitability of water for irrigation
Ammonia-nitrogen Nitrate-nitrogen Total phosphorus Chlorophyll-a	• Ammonia and total phosphorus often regulated in discharges to surface water • Ammonia, total phosphorus, and chlorophyll-a addressed by the TCEQ in the form of secondary nutrient screening levels that are used to evaluate parameters for the Water Quality Inventory • USEPA has indicated that states must develop nutrient criteria and begin incorporating them into their water quality standards by the end of 2004
Total organic carbon Alkalinity	• Total organic carbon regulated at the federal level by the Stage 1 Disinfection Byproducts Rule (1DBPR) as a measure of disinfection by-product precursors • Alkalinity is an important parameter in the 1DBPR regulation for total organic carbon
Dissolved iron Dissolved manganese	• Related to taste and odor • Affects water treatment costs

2.1.2 Groundwater

Based on similar considerations, candidate water quality parameters were also identified for groundwater (Table 2).

Table 2: Candidate Water Quality Parameters (Groundwater)

Candidate Parameters	Basis for Candidacy
Total dissolved solids Chloride Sulfate	• Regulated in secondary drinking water standards • Can impact suitability of water for irrigation
Nitrate-nitrogen Fluoride Arsenic Selenium Uranium	• Regulated in primary drinking water standards • Known to be potential problems for groundwater in Texas

2.2 Selection of Key Water Quality Parameters

To evaluate baseline water quality conditions for the candidate water quality parameters, the TCEQ Surface Water Quality Monitoring and Texas Water Development Board Groundwater Quality databases were used to perform statistical summaries for data collected within Region C since 1993. Data were also acquired for surface water sources located outside of Region C that are currently being considered for use or are in use as raw water sources for the region.

Using the baseline water quality conditions, key water quality parameters were selected for surface water and groundwater. The selected parameters have the potential for being affected by water management strategies on a regional scale and have enough available data to generate meaningful comparisons between water bodies. A number of potential water quality parameters were not included as key parameters. Water quality issues associated with these parameters will be addressed as necessary within the environmental impact evaluations of the individual water management strategies for each water user group.

2.2.1 Surface Water

Key water quality parameters for surface water are:

- Total dissolved solids (TDS)
- Nutrients:
    - Ammonia-nitrogen
    - Nitrate-nitrogen
    - Total phosphorus
    - Chlorophyll-a

The above parameters were all selected based on their regional influence on water quality and because they are all likely to be impacted by multiple water management strategies among many user groups within Region C.
Water bodies with high chloride and sulfate typically also have high TDS. The impact of a given water management strategy on these parameters will not be substantially different from the impact on TDS. Therefore, chloride and sulfate were not included as key parameters.

Total organic carbon, alkalinity, dissolved iron and dissolved manganese were all identified as potential water quality parameters based on their relationship to treatability of water for municipal or industrial supply. Although treatability is important, it is more appropriate to address this aspect of water quality within each of the individual water management strategies as it relates to treatment costs. Consequently, these parameters were excluded from the list of key parameters for surface water.

2.2.2 Groundwater

The key water quality parameter for groundwater is total dissolved solids (TDS). It was selected because of its potential to be impacted by multiple water management strategies within Region C.

As discussed above, there is a strong correlation between TDS and chloride and sulfate, so chloride and sulfate were not selected as key water quality parameters

Available groundwater data for Region C aquifers indicate that there is not a widespread occurrence of elevated nitrate-nitrogen, fluoride, arsenic and selenium levels within Region C. Therefore, these parameters were not selected as key water quality parameters. These parameters will be evaluated on a case-by-case basis as necessary during the evaluation of environmental impacts of water management strategies.

Very limited data are available for uranium in Region C aquifers. Consequently, meaningful statistical summaries of this parameter are not possible, and this parameter was not included in the list of key parameters.

3.0 BASELINE WATER QUALITY CONDITIONS

To evaluate baseline water quality conditions for each of the key parameters, the TCEQ Surface Water Quality Monitoring and Texas Water Development Board Groundwater Quality databases were used to perform statistical summaries for data collected within Region C since 1993. Water quality data collected from Lake Texoma by the City of Sherman in 2003 and 2004 were also used in the summary. Key parameter data were also acquired for surface water sources located outside of Region C that are currently being considered for use or are in use as raw water sources for the region. Statistical summaries of the surface water (by TCEQ stream segment) and groundwater (by county and aquifer) data are presented in Appendices A and B of this document. For each parameter, these summaries report the number of data points (count), mean, median, 75th percentile, maximum and minimum values for each surface water segment and county/aquifer combination. These data summaries have grouped data from a given surface water segment and wells from a given county/aquifer together. Therefore, localized variations in water quality (such as within a particular arm of a lake or for individual wells) are not represented by this summary. Surface water data collected from reporting stations located on tributary streams or located upstream of the main body of a reservoir have been excluded from this summary because these data do not represent the quality of the water supply.

To further present the baseline conditions, surface water and groundwater sources were grouped into three "bins" for each parameter. The lowest bin (Bin 1) represents levels that generally do not present a water quality problem for a given parameter, with data suggesting that typical conditions are less than regulatory or literature levels of concern. The second bin (Bin 2) represents parameter levels that are approaching regulatory standards or levels of concern (nominally 80 percent of regulated standard, although for some parameters this intermediate bin has been set as low as 50 percent of the regulatory level of concern). The highest bin (Bin 3) represents parameter levels that exceed the stated regulatory standards, levels of concern, or screening criteria. Tables 1 and 2 describe the numerical levels chosen for each parameter in defining these bins, and the relevant numerical regulatory standard, level of concern, or screening criterion upon which the bins are based.

It is important to note that placement in Bins 2 or 3 does not necessarily indicate a violation of a water quality standard or the need for additional treatment levels. As mentioned earlier, the data presented here are summarized over the entire surface water segment (at all depths and all stations located in the main water body) or the entire aquifer/county area. In many cases, regulatory application of the standard or level of concern is performed on a different group of data than are summarized here (e.g., for lake mixed layer samples only). The bin designations, while derived from regulatory standards, are only provided as a "yardstick" for assessing water quality conditions and as a basis for comparisons between water bodies. The bin designations are not to be used to evaluate whether conditions within a given water body are in compliance with regulatory standards.

For TDS, the median value is used for comparison with the numerical regulatory standard or level of concern, but for nutrients and chlorophyll-a (parameters subject to the TCEQ secondary screening levels), the 75th percentile is used. This value was used for comparison because the TCEQ secondary screening levels are applied such that a source water is "of concern" when more than 25 percent of the samples taken exceed the numerical screening limit.

The maps in Appendices A and B present the baseline conditions for each key parameter by bin, as described in the previous section. The maps also show TCEQ-designated stream segments. Segments and county/aquifer pairs that fall into Bin 1 are shown as blue-green in these maps, while segments falling into Bins 2 and 3 (as defined in Tables 1 and 2) are shown as orange and red, respectively.

While the maps included in Appendices A and B provide a visual summary of baseline water quality conditions, it is important to consider all of the statistical quantities, including the number of samples, before drawing conclusions related to baseline conditions for each parameter. There also may be biases inherent to the data, associated with sampling location, frequency, analytical techniques or other factors, that cannot be identified by the analysis performed here. For example, in the case of groundwater data, when wells are drilled and found to have poor water quality, they are often plugged without reporting the water quality data to the TWDB. Therefore, the TWDB groundwater database is potentially skewed to reflect better water quality than may actually be present within a given aquifer.

3.1 Surface Water Baseline Conditions

The following sections summarize the baseline water quality conditions for each key surface water quality parameter. As discussed earlier, this review of baseline conditions is not intended to provide an evaluation of compliance with regulatory standards. When referenced, regulatory standards are only used as a means of making relative comparisons between water bodies.

With respect to nutrients, it should be noted that the impact of nutrients on chlorophyll-a concentrations is site-specific and can vary significantly between water bodies. Therefore, high levels of nutrients are not necessarily indicative of poor water quality in any given water body.

Table 1: Definition of Baseline Surface Water Quality Bins by Parameter

Parameter	Statistic Used for Comparison	Lower Bound of Bin 3	Basis of Lower Bound, Bin 3	Lower Bound of Bin 2	Basis of Lower Bound, Bin 2
Total Dissolved Solids	Median	500 mg/L	National Secondary Drinking Water Standard	400 mg/L	80 percent of secondary standard
Ammonia-Nitrogen (as N)	75th percentile	0.106 mg/L (reservoir) 0.17 mg/L (stream)	TCEQ nutrient screening level	0.085 mg/L (reservoir) 0.136 mg/L (stream)	80 percent of screening level
Nitrate-Nitrogen (as N)	75th percentile	0.32 mg/L (reservoir) 2.76 mg/L (stream)	TCEQ nutrient screening level	0.256 mg/L (reservoir) 2.21 mg/L (stream)	80 percent of screening level
Total Phosphorus (as P)	75th percentile	0.18 mg/L (reservoir) 0.80 mg/L (stream)	TCEQ nutrient screening level	0.144 mg/L (reservoir) 0.64 mg/L (stream)	80 percent of screening level
Chlorophyll-a	75th percentile	21.4 µg/L (reservoir) 11.6 µg/L (stream)	TCEQ nutrient screening level	17.1 µg/L (reservoir) 9.28 µg/L (stream)	80 percent of screening level

Table 2: Definition of Baseline Groundwater Quality Bins by Parameter

Parameter	Statistic Used for Comparison	Lower Bound of Bin 3	Basis of Lower Bound, Bin 3	Lower Bound of Bin 2	Basis of Lower Bound, Bin 2
Total Dissolved Solids	Median	1000 mg/L	State of Texas Secondary Drinking Water Standard	500 mg/L	National Secondary Drinking Water Standard

3.1.1 Total Dissolved Solids

In general, the surface water supplies used by Region C are relatively low in TDS, though some segments in the northern and western portions of the Region exceed or are approaching the secondary standard of 500 mg/L for total dissolved solids. Segments in the Red River Basin are particularly high in TDS, while those segments located outside of Region C east of the Trinity River Basin are generally lower in TDS. Within the Trinity River Basin, those segments heavily impacted by wastewater discharges also tend to contain slightly elevated TDS concentrations. These include the Lower West Fork Trinity River (Segment 841) and the East Fork Trinity River (Segment 819), both of which have median TDS concentrations greater than 400 mg/L.

3.1.2 Ammonia-Nitrogen

As a whole, Region C contains several source waters that exceed existing TCEQ ammonia screening levels (Figure A-2). Four of the twenty-four reservoirs for which ammonia data were available fell into Bin 3, indicating that the 75th percentile ammonia nitrogen concentrations in these reservoirs are greater than the screening level of 0.106 mg/L. These reservoirs include Lake Lewisville (Segment 823), Lake Ray Hubbard (Segment 820), Benbrook Lake (Segment 830), and Lake O' the Pines (Segment 403). Four more reservoirs fell into Bin 2, indicating that the 75th percentile value was greater than 80 percent of the screening level. These reservoirs include Lake Ray Roberts (Segment 840), Cedar Creek Reservoir (Segment 818), Wright-Patman Lake (Segment 302), and Eagle Mountain Reservoir (Segment 809). Elevated ammonia concentrations in reservoirs did not exhibit a specific geographical pattern, though many of the elevated concentrations were observed near or downstream of urban or suburban areas. Two East Texas reservoirs were also identified as exceeding or approaching the screening level.

For streams, the highest ammonia concentrations are limited to urban areas with significant wastewater input (Figure A-2). Streams with the highest 75th percentile ammonia concentrations (those falling in Bin 3) include the East Fork Trinity River (Segment 819), the Elm Fork Trinity River Below Lake Lewisville (Segment 822), Denton Creek (Segment 825), and the Upper Trinity River (Segment 805). In addition, both segments comprising the Lower West Fork Trinity River (Segments 806 and 841) fell into Bin 2, with ammonia concentrations approaching the screening level. Each of the above-mentioned stream segments is highly influenced by wastewater discharges. Of these, the Elm Fork Trinity River Below Lake Lewisville (Segment 822), Denton Creek (Segment 825), and the West Fork Trinity River Below Lake Worth (Segment 806) are currently designated for use as public water supplies.

3.1.3 Nitrate-Nitrogen

Nitrate concentrations approach or exceed the TCEQ nitrate screening level of 0.32 mg/L in many Region C reservoirs. In all, eleven of the twenty-four reservoirs for which nitrate data were available fell into Bin 3. Four more reservoirs have nitrate concentrations approaching the screening level. All of the reservoirs falling into Bin 3 were located in the Trinity River Basin. In the Trinity River Basin, only Lake Weatherford (Segment 832), Benbrook Lake (Segment 830), and Joe Pool Lake (Segment 838) do not approach the TCEQ nitrate screening level. Lake Texoma (Segment 203) contains little nitrate, as do all reservoirs East of the Trinity Basin with the exception of Lake Tawakoni and Lake Fork, which have nitrate concentrations approaching the screening level.

The TCEQ nitrate screening level in freshwater streams is much higher than for reservoirs (2.76 mg/L), but five Region C streams exceed this level more than 25 percent of the time, and therefore fall into Bin 3. These segments are the Red River Above Lake Texoma (Segment 204), the Elm Fork Trinity River

Above Ray Roberts Lake (Segment 824), the Lower West Fork Trinity River (Segment 841), the East Fork Trinity River (Segment 819), and the Upper Trinity River (Segment 805). In addition, the Trinity River Above Lake Livingston (Segment 804) in the extreme southern portion of Region C was found to approach the nitrate screening level.

3.1.4 Total Phosphorus

None of the twenty-four Region C reservoirs had 75th percentile concentrations greater than the TCEQ screening level for total phosphorus (0.18 mg/L). Wright-Patman Lake (Segment 302) was found to approach the screening level of 0.18 mg/L. No geographical pattern is apparent from the total phosphorus data for reservoirs.

With the exception of the Red River Above Lake Texoma (Segment 204), the same streams that fell into Bin 3 for nitrate also fell into Bin 3 for total phosphorus, along with the Trinity River Above Lake Livingston (Segment 804). Most of the streams in Bin 3 are significantly impacted by wastewater discharges. No other streams approached the screening level of 0.80 mg/L.

3.1.5 Chlorophyll-a

The TCEQ chlorophyll-a screening levels for reservoirs and freshwater streams are 21.4 mg/L and 11.6 mg/L, respectively. Ten of twenty-four reservoirs were found to exceed the screening level, with five more found to be approaching the screening level (see Appendix A). In general, no geographical pattern was evident from the chlorophyll-a data for reservoirs supplying Region C.

Nine streams exceeded the screening criterion for chlorophyll-a. Of these, five streams -- Red River Above Lake Texoma (Segment 204), Elm Fork Trinity River Above Ray Roberts Lake (Segment 824), Lower West Fork Trinity River (Segment 841), Upper Trinity River (Segment 805), and Trinity River Above Lake Livingston (Segment 804) -- also exceeded the screening criteria for total phosphorus or nitrate. The other four streams that exceed the chlorophyll-a screening level are: Elm Fork Trinity River Below Lake Lewisville (Segment 822), the West Fork Trinity River Below Lake Worth (Segment 806), Chambers Creek Below Richland-Chambers Reservoir (Segment 835), and the Red River Below Lake Texoma (Segment 202).

3.2 <u>Groundwater Baseline Conditions</u>

The key water quality parameter selected for groundwater is TDS. Its baseline condition in Region C is summarized below.

3.2.1 Total Dissolved Solids

With the exception of the Carrizo-Wilcox Aquifer, most groundwater sources in Region C report median TDS concentrations greater than 500 mg/L, the secondary drinking water standard. The Trinity Aquifer beneath these counties generally reports median concentrations between 500 mg/L and 1,000 mg/L, with the majority of the wells reporting greater than 1,000 mg/L located in Wise, Denton, Collin, Tarrant, Dallas, and Ellis Counties. TDS concentrations in the Woodbine Aquifer are even greater, with the highest median concentrations occurring in the most urban counties and those counties immediately down-gradient (Dallas, Tarrant, Ellis, and Navarro). The southern portion of the Woodbine Aquifer in Dallas, Ellis, and Navarro Counties contains median TDS levels greater than 1,000 mg/L. Limited data were available for the Nacatoch Aquifer, and no data were available for the Queen City Aquifer.

4.0 CONCLUSIONS

The following general conclusions can be made related to baseline conditions of the selected key water quality parameters for Region C surface water:

- The baseline condition for dissolved solids in the Region C portion of the Red River Basin is high compared to national secondary drinking water standards. However, these high concentrations occur naturally within these segments and do not exceed the TSWQS.

- A significant portion of the reservoirs in Region C (as well as many outside of Region C used as a raw water source for the Region) have 75th percentile concentrations of nutrients (particularly nitrate nitrogen) and/or chlorophyll-a greater than the TCEQ nutrient screening criteria. Elevated nutrient and chlorophyll-a concentrations are indicators of potential aesthetic problems in reservoirs and potential taste and odor problems in potable water. They can also be associated with changes in TOC, pH, and dissolved oxygen levels.

- Portions of the Trinity River receiving significant wastewater discharges also have elevated nutrient concentrations compared to the TCEQ screening levels. The Upper Trinity River (Segment 805), Lower West Fork Trinity River (Segment 841), Elm Fork Trinity River Below Lake Lewisville (Segment 822), and East Fork Trinity River (Segment 819) are examples of streams with elevated nutrient and/or chlorophyll-a concentrations.

The following general conclusion can be made related to baseline TDS conditions in Region C groundwater:

- In many Region C counties, TDS levels in groundwater are high compared to the national secondary drinking water standard of 500 mg/L. In particular, the southern portion of the Woodbine Aquifer in Region C contains median TDS concentrations greater than 1,000 mg/L.

APPENDIX A: SURFACE WATER QUALITY DATA SUMMARY AND MAPS

Region C Surface Water Quality Data Summary by Segment and Parameter

Data collected 1993-2004 (Source: TCEQ Water Quality Monitoring Database)

Storet Code: 610   NITROGEN, AMMONIA, TOTAL (MG/L AS N)

Segment	SegmentName	Count	Mean	Median	75th Pctile	Max	Min
819	East Fork Trinity River	33	0.302	0.16	0.33	2.04	0.025
822	Elm Fork Trinity River Below Lewisville Lake	153	0.180	0.12	0.21	1.42	0.01
825	Denton Creek	23	0.225	0.09	0.1925	2.146	0.025
805	Upper Trinity River	149	0.131	0.11	0.17	0.47	0.005
806	West Fork Trinity River Below Lake Worth	48	0.110	0.095	0.1525	0.4	0.01
841	Lower West Fork Trinity River	91	0.135	0.1	0.15	1.03	0.01
839	Elm Fork Trinity River Below Ray Roberts Lake	10	0.083	0.05	0.1325	0.24	0.01
830	Benbrook Lake	222	0.089	0.05	0.12	0.89	0.01
824	Elm Fork Trinity River Above Ray Roberts Lake	117	0.197	0.06	0.12	6.74	0.005
403	Lake O' the Pines	183	0.087	0.07	0.12	0.35	0.005
823	Lewisville Lake	63	0.101	0.04	0.12	0.61	0.01
820	Lake Ray Hubbard	100	0.087	0.05	0.11	0.49	0.01
840	Ray Roberts Lake	66	0.115	0.045	0.105	1.62	0.01
814	Chambers Creek Above Richland-Chambers Reservoir	11	0.056	0.025	0.1	0.13	0.005
818	Cedar Creek Reservoir	400	0.086	0.06	0.1	1.69	0.005
833	Clear Fork Trinity River Above Lake Weatherford	34	0.057	0.035	0.0975	0.17	0.005
302	Wright-Patman Lake	171	0.069	0.025	0.097	0.409	0.005
827	White Rock Lake	2	0.070	0.07	0.095	0.12	0.02
804	Trinity River Above Lake Livingston	256	0.074	0.05	0.09	0.5	0.01
809	Eagle Mountain Reservoir	386	0.077	0.025	0.09	0.85	0.01
810	West Fork Trinity River Below Bridgeport Reservoir	61	0.064	0.04	0.09	0.211	0.005
831	Clear Fork Trinity River Below Lake Weatherford	67	0.067	0.05	0.09	0.35	0.005
828	Lake Arlington	31	0.056	0.04	0.085	0.21	0.005
829	Clear Fork Trinity River Below Benbrook Lake	39	0.054	0.03	0.08	0.18	0.02
836	Richland-Chambers Reservoir	662	0.113	0.025	0.08	2.62	0.01
832	Lake Weatherford	12	0.040	0.025	0.0625	0.08	0.005
815	Bardwell Reservoir	13	0.070	0.025	0.06	0.43	0.01
817	Navarro Mills Lake	14	0.048	0.025	0.06	0.12	0.02
811	Bridgeport Reservoir	273	0.052	0.025	0.06	0.6	0.01
816	Lake Waxahachie	15	0.069	0.025	0.06	0.47	0.005
826	Grapevine Lake	113	0.060	0.03	0.06	0.69	0.01
507	Lake Tawakoni	214	0.049	0.025	0.06	0.28	0.0005
812	West Fork Trinity River Above Bridgeport Reservoir	20	0.041	0.0275	0.0575	0.1	0.005
821	Lake Lavon	39	0.040	0.03	0.055	0.23	0.005
307	Chapman/Cooper Lake	32	0.038	0.025	0.0525	0.11	0.02
504	Toledo Bend Reservoir	113	0.069	0.025	0.052	2.36	0.0005
204	Red River Above Lake Texoma	43	0.054	0.03	0.05	0.3	0.005
303	Sulphur/South Sulphur River	85	0.049	0.025	0.05	0.43	0.005
203	Lake Texoma	39	0.048	0.05	0.05	0.1	0.005
837	Richland Creek Above Richland-Chambers Reservoir	12	0.033	0.025	0.04	0.08	0.005
838	Joe Pool Lake	52	0.034	0.02	0.04	0.18	0.005
202	Red River Below Lake Texoma	111	0.037	0.025	0.035	0.35	0.005
835	Chambers Creek Below Richland-Chambers Reservoir	11	0.045	0.025	0.03	0.16	0.005
807	Lake Worth	12	0.032	0.025	0.025	0.07	0.025
512	Lake Fork	171	0.036	0.025	0.025	0.185	0.0005
605	Lake Palestine	58	0.044	0.025	0.025	0.34	0.005

Region C Surface Water Quality Data Summary by Segment and Parameter

Data collected 1993-2004 (Source: TCEQ Water Quality Monitoring Database)

Storet Code: 620 **NITRATE NITROGEN, TOTAL (MG/L AS N)**

Segment	SegmentName	Count	Mean	Median	75th Pctile	Max	Min
819	East Fork Trinity River	19	8.087	7.44	11.5	17.8	0.56
841	Lower West Fork Trinity River	23	7.057	7.63	10.65	12.9	0.13
805	Upper Trinity River	52	5.758	5.255	8.895	13.1	0.07
824	Elm Fork Trinity River Above Ray Roberts Lake	39	4.647	4.38	7.385	12.82	0.18
204	Red River Above Lake Texoma	4	3.330	0.25	3.545	12.8	0.02
804	Trinity River Above Lake Livingston	10	2.265	1.645	2.4425	8.22	0.02
817	Navarro Mills Lake	6	1.071	0.3225	2.045	3.23	0.005
814	Chambers Creek Above Richland-Chambers Reservoir	3	1.380	1.24	1.67	2.1	0.8
825	Denton Creek	10	0.634	0.495	0.8975	1.25	0.31
839	Elm Fork Trinity River Below Ray Roberts Lake	8	0.629	0.54	0.8125	1.32	0.17
822	Elm Fork Trinity River Below Lewisville Lake	81	0.557	0.47	0.73	1.73	0.0015
816	Lake Waxahachie	5	0.360	0.35	0.61	0.81	0.005
826	Grapevine Lake	42	0.313	0.255	0.56	1.15	0.0015
815	Bardwell Reservoir	4	0.408	0.335	0.515	0.8	0.16
810	West Fork Trinity River Below Bridgeport Reservoir	13	0.357	0.32	0.5	1.09	0.025
820	Lake Ray Hubbard	95	0.272	0.19	0.455	0.96	0.0015
840	Ray Roberts Lake	61	0.285	0.18	0.41	1.01	0.0015
821	Lake Lavon	19	0.251	0.22	0.4	0.69	0.005
828	Lake Arlington	8	0.281	0.36	0.3725	0.4	0.005
818	Cedar Creek Reservoir	47	0.289	0.25	0.36	0.73	0.02
823	Lewisville Lake	58	0.223	0.105	0.3575	1.13	0.0015
836	Richland-Chambers Reservoir	45	0.288	0.25	0.34	0.79	0.005
829	Clear Fork Trinity River Below Benbrook Lake	11	0.244	0.22	0.32	0.54	0.05
303	Sulphur/South Sulphur River	22	0.225	0.12	0.315	1.44	0.005
507	Lake Tawakoni	63	0.193	0.21	0.31	0.5	0.0015
809	Eagle Mountain Reservoir	82	0.217	0.19	0.3	0.68	0.005
806	West Fork Trinity River Below Lake Worth	27	0.300	0.14	0.295	1.4	0.01
831	Clear Fork Trinity River Below Lake Weatherford	16	0.219	0.045	0.2925	1.67	0.005
811	Bridgeport Reservoir	24	0.235	0.19	0.29	0.5	0.14
512	Lake Fork	9	0.165	0.14	0.27	0.36	0.025
830	Benbrook Lake	24	0.229	0.235	0.25	0.32	0.18
203	Lake Texoma	30	0.195	0.25	0.25	0.3	0.01
835	Chambers Creek Below Richland-Chambers Reservoir	3	0.162	0.18	0.24	0.3	0.005
838	Joe Pool Lake	6	0.125	0.115	0.215	0.25	0.02
307	Chapman/Cooper Lake	13	0.147	0.16	0.2	0.36	0.025
504	Toledo Bend Reservoir	3	0.140	0.14	0.145	0.15	0.13
605	Lake Palestine	15	0.097	0.025	0.085	0.41	0.005
833	Clear Fork Trinity River Above Lake Weatherford	8	0.046	0.045	0.065	0.1	0.005
403	Lake O' the Pines	22	0.074	0.025	0.05125	0.56	0.005
202	Red River Below Lake Texoma	20	0.071	0.025	0.03375	0.34	0.02
832	Lake Weatherford	5	0.035	0.025	0.03	0.09	0.005
812	West Fork Trinity River Above Bridgeport Reservoir	6	0.028	0.025	0.02875	0.04	0.02
302	Wright-Patman Lake	42	0.048	0.025	0.025	0.487	0.005
827	White Rock Lake	2	0.008	0.0075	0.00875	0.01	0.005

Region C Surface Water Quality Data Summary by Segment and Parameter

Data collected 1993-2004 (Source: TCEQ Water Quality Monitoring Database)

Storet Code: 665 PHOSPHORUS, TOTAL, WET METHOD (MG/L AS P)

Segment	SegmentName	Count	Mean	Median	75th Pctile	Max	Min
819	East Fork Trinity River	35	1.799	1.7	2.385	4.37	0.12
805	Upper Trinity River	257	1.123	1.06	1.65	2.519	0.03
824	Elm Fork Trinity River Above Ray Roberts Lake	114	0.850	0.245	1.4825	4.12	0.02
804	Trinity River Above Lake Livingston	203	0.882	0.76	1.175	2.8	0.025
841	Lower West Fork Trinity River	92	0.920	0.89	1.1525	2.09	0.21
204	Red River Above Lake Texoma	42	0.320	0.18	0.4925	1.08	0.03
831	Clear Fork Trinity River Below Lake Weatherford	106	0.250	0.125	0.3825	1.6	0.01
812	West Fork Trinity River Above Bridgeport Reservoir	18	0.246	0.225	0.2875	0.55	0.02
825	Denton Creek	23	0.172	0.165	0.195	0.48	0.03
303	Sulphur/South Sulphur River	83	0.148	0.13	0.19	0.43	0.025
837	Richland Creek Above Richland-Chambers Reservoir	13	0.150	0.1	0.18	0.35	0.06
810	West Fork Trinity River Below Bridgeport Reservoir	60	0.145	0.115	0.18	0.42	0.02
202	Red River Below Lake Texoma	104	0.186	0.12	0.17	3.11	0.025
833	Clear Fork Trinity River Above Lake Weatherford	52	0.127	0.08	0.165	0.72	0.01
302	Wright-Patman Lake	171	0.113	0.1	0.147	0.587	0.005
822	Elm Fork Trinity River Below Lewisville Lake	141	0.134	0.1	0.14	2.87	0.005
835	Chambers Creek Below Richland-Chambers Reservoir	11	0.095	0.05	0.135	0.28	0.02
814	Chambers Creek Above Richland-Chambers Reservoir	88	0.145	0.07	0.12	2.8	0.005
818	Cedar Creek Reservoir	400	0.099	0.08	0.12	0.69	0.01
307	Chapman/Cooper Lake	32	0.079	0.065	0.11	0.17	0.025
507	Lake Tawakoni	161	0.081	0.07	0.1	0.28	0.01
809	Eagle Mountain Reservoir	388	0.081	0.07	0.1	0.63	0.005
806	West Fork Trinity River Below Lake Worth	114	0.081	0.07	0.1	0.303	0.005
827	White Rock Lake	2	0.090	0.09	0.095	0.1	0.08
830	Benbrook Lake	228	0.072	0.06	0.08	0.29	0.005
836	Richland-Chambers Reservoir	662	0.076	0.05	0.08	0.9	0.005
823	Lewisville Lake	61	0.074	0.05	0.08	0.6	0.01
820	Lake Ray Hubbard	95	0.080	0.05	0.075	1.5	0.01
203	Lake Texoma	39	0.177	0.05	0.075	4.2	0.02
815	Bardwell Reservoir	13	0.048	0.03	0.07	0.1	0.025
826	Grapevine Lake	109	0.064	0.04	0.07	0.58	0.01
829	Clear Fork Trinity River Below Benbrook Lake	41	0.056	0.05	0.07	0.2	0.01
403	Lake O' the Pines	183	0.089	0.042	0.07	2.29	0.005
821	Lake Lavon	36	0.060	0.055	0.07	0.22	0.03
832	Lake Weatherford	12	0.049	0.04	0.07	0.1	0.025
605	Lake Palestine	58	0.060	0.05	0.07	0.51	0.005
817	Navarro Mills Lake	14	0.055	0.06	0.0675	0.08	0.025
807	Lake Worth	12	0.053	0.06	0.0625	0.09	0.025
840	Ray Roberts Lake	61	0.056	0.04	0.06	0.39	0.005
811	Bridgeport Reservoir	273	0.046	0.04	0.06	0.22	0.005
512	Lake Fork	120	0.055	0.049	0.06	0.47	0.003
816	Lake Waxahachie	15	0.047	0.025	0.055	0.16	0.02
828	Lake Arlington	31	0.042	0.04	0.05	0.09	0.02
839	Elm Fork Trinity River Below Ray Roberts Lake	7	0.036	0.04	0.04	0.06	0.01
504	Toledo Bend Reservoir	77	0.034	0.023	0.04	0.32	0.005
838	Joe Pool Lake	48	0.030	0.02	0.03	0.27	0.005

Region C Surface Water Quality Data Summary by Segment and Parameter

Data collected 1993-2004 (Source: TCEQ Water Quality Monitoring Database)

Storet Code: 32211 CHLOROPHYLL-A UG/L SPECTROPHOTOMETRIC ACID. METH

Segment	SegmentName	Count	Mean	Median	75th Pctile	Max	Min
507	Lake Tawakoni	198	27.66	24	41.7	95	0.5
820	Lake Ray Hubbard	49	25.22	25	34	49.8	1
827	White Rock Lake	2	27.35	27.35	30.275	33.2	21.5
807	Lake Worth	12	14.19	5.005	30.075	50.7	0.5
818	Cedar Creek Reservoir	403	22.09	19.1	29.6	76.5	0.5
828	Lake Arlington	31	23.11	22	26.95	46.3	7.11
809	Eagle Mountain Reservoir	385	18.76	18.4	25.4	49.8	1.3
830	Benbrook Lake	219	17.44	14.7	25.1	73	1.1
302	Wright-Patman Lake	169	17.66	14.4	25	63	0.5
823	Lewisville Lake	29	20.03	19.6	24	39	6.2
806	West Fork Trinity River Below Lake Worth	63	17.02	14.9	21.4	94	0.5
204	Red River Above Lake Texoma	43	14.54	5.93	19.8	110	0.5
512	Lake Fork	183	14.02	11.2	19.6	47.3	0.5
832	Lake Weatherford	12	11.60	10.95	18.75	27.8	0.5
804	Trinity River Above Lake Livingston	157	12.44	8	18.6	98.6	0.01
203	Lake Texoma	18	11.98	9.4	18.125	34.6	0.5
605	Lake Palestine	59	17.20	10.7	17.95	237	0.5
826	Grapevine Lake	87	12.28	9.3	17.25	38.4	0.5
836	Richland-Chambers Reservoir	663	11.83	9.4	16.6	58.7	0.5
815	Bardwell Reservoir	13	10.15	11	15.4	24	0.5
822	Elm Fork Trinity River Below Lewisville Lake	86	11.63	9.45	15.275	45	0.3
824	Elm Fork Trinity River Above Ray Roberts Lake	87	14.20	6.41	14.75	163	0.5
805	Upper Trinity River	147	10.43	9.7	13.8	48.9	0.1
307	Chapman/Cooper Lake	34	7.77	8.365	12.8	26.2	0.5
835	Chambers Creek Below Richland-Chambers Reservoir	12	14.15	6.545	12.75	73.3	0.5
202	Red River Below Lake Texoma	100	9.52	5.485	12.625	73.4	0.5
840	Ray Roberts Lake	31	9.37	8	12.05	37.4	1.65
403	Lake O' the Pines	186	7.90	6.7	12	37	0.5
841	Lower West Fork Trinity River	80	9.61	9.105	11.9	32	0.5
816	Lake Waxahachie	15	9.13	4.98	10.2	41.4	0.5
303	Sulphur/South Sulphur River	84	6.69	6.1	9.615	31.2	0.5
821	Lake Lavon	35	6.97	3.12	9.225	51.7	0.5
819	East Fork Trinity River	32	7.73	4.995	9.075	45.6	0.5
817	Navarro Mills Lake	14	6.12	5.48	8.4075	16.9	0.5
833	Clear Fork Trinity River Above Lake Weatherford	45	13.39	5	8.1	222	0.5
504	Toledo Bend Reservoir	109	6.33	5	8	23.2	0.5
829	Clear Fork Trinity River Below Benbrook Lake	38	5.02	3.105	7.7425	20.4	0.5
812	West Fork Trinity River Above Bridgeport Reservoir	19	4.78	2.18	7.08	15	0.5
825	Denton Creek	23	3.83	1.78	6.46	15.6	0.5
831	Clear Fork Trinity River Below Lake Weatherford	98	5.76	4.245	6.1675	45.2	0.1
810	West Fork Trinity River Below Bridgeport Reservoir	61	5.04	1.87	6.16	41.6	0.5
839	Elm Fork Trinity River Below Ray Roberts Lake	1	6.00	6	6	6	6
837	Richland Creek Above Richland-Chambers Reservoir	13	3.54	1.25	5.87	12.8	0.5
811	Bridgeport Reservoir	264	4.16	3.65	5.3	13.7	0.5
814	Chambers Creek Above Richland-Chambers Reservoir	11	2.77	1.87	4.45	8.01	0.5
838	Joe Pool Lake	37	2.36	0.5	3.5	16	0.5

Region C Surface Water Quality Data Summary by Segment and Parameter

Data collected 1993-2004 (Source: TCEQ Water Quality Monitoring Database)

Storet Code: 70300 DISSOLVED SOLIDS, TOTAL (mg/L) - as RESIDUE, TOTAL FILTRABLE (dried at 180C)

Segment	SegmentName	Count	Mean	Median	75th Pctile	Max	Min
204	Red River Above Lake Texoma	42	2675.381	2850	3332.5	4830	696
203	Lake Texoma	33	954.576	980	1024	1170	648
202	Red River Below Lake Texoma	111	738.577	702	906.5	2364	45
833	Clear Fork Trinity River Above Lake Weatherford	31	562.387	558	603	874	330
812	West Fork Trinity River Above Bridgeport Reservoir	18	566.333	553	687	1110	236
841	Lower West Fork Trinity River	41	453.122	468	502	707	253
819	East Fork Trinity River	26	433.885	454	525.5	636	188
824	Elm Fork Trinity River Above Ray Roberts Lake	107	480.533	429	557	1310	144
810	West Fork Trinity River Below Bridgeport Reservoir	58	447.017	417	566.5	1640	170
831	Clear Fork Trinity River Below Lake Weatherford	74	413.595	408	449.5	740	260
805	Upper Trinity River	118	374.610	389.5	439.5	1080	73
838	Joe Pool Lake	71	344.366	334	373	770	175
814	Chambers Creek Above Richland-Chambers Reservoir	79	406.582	316	512	1350	140
804	Trinity River Above Lake Livingston	187	323.310	312	402.5	612	71
829	Clear Fork Trinity River Below Benbrook Lake	37	297.838	284	332	798	28
837	Richland Creek Above Richland-Chambers Reservoir	13	369.462	280	414	1010	154
806	West Fork Trinity River Below Lake Worth	49	283.265	264	289	962	140
832	Lake Weatherford	11	243.909	248	255	276	166
822	Elm Fork Trinity River Below Lewisville Lake	136	255.485	246.5	282.75	708	69
809	Eagle Mountain Reservoir	376	241.109	238	259.25	338	137
807	Lake Worth	12	238.083	230	263.5	287	185
835	Chambers Creek Below Richland-Chambers Reservoir	10	287.700	228	259.5	882	163
825	Denton Creek	30	231.959	227	255.5	306	152
811	Bridgeport Reservoir	273	221.839	224	233	290	178
821	Lake Lavon	34	239.441	223.5	277.5	466	134
826	Grapevine Lake	157	203.503	212	224	298	92
830	Benbrook Lake	222	210.176	209	227	330	152
815	Bardwell Reservoir	12	208.750	205.5	229	248	162
817	Navarro Mills Lake	13	208.615	201	226	256	180
303	Sulphur/South Sulphur River	95	235.579	199	267	948	99
823	Lewisville Lake	104	203.173	198.5	219.5	344	67
839	Elm Fork Trinity River Below Ray Roberts Lake	23	196.000	195	204.5	241	169
820	Lake Ray Hubbard	155	195.768	191	209.5	835	118
840	Ray Roberts Lake	98	181.214	179.5	188	344	102
816	Lake Waxahachie	13	172.846	178	186	228	64
828	Lake Arlington	30	176.700	175.5	185.5	201	159
836	Richland-Chambers Reservoir	665	175.501	174	191	383	59.1
827	White Rock Lake	1	166.000	166	166	166	166
302	Wright-Patman Lake	171	135.409	130	155	536	56
307	Chapman/Cooper Lake	34	132.735	122.5	133.5	384	101
818	Cedar Creek Reservoir	402	115.056	116	121	155	55
605	Lake Palestine	59	115.068	111	126.5	290	74
507	Lake Tawakoni	116	108.836	107.5	118	150	78
512	Lake Fork	17	91.294	91	101	117	75
403	Lake O' the Pines	82	98.927	90.5	100	276	57
504	Toledo Bend Reservoir	3	77.667	77	81	85	71

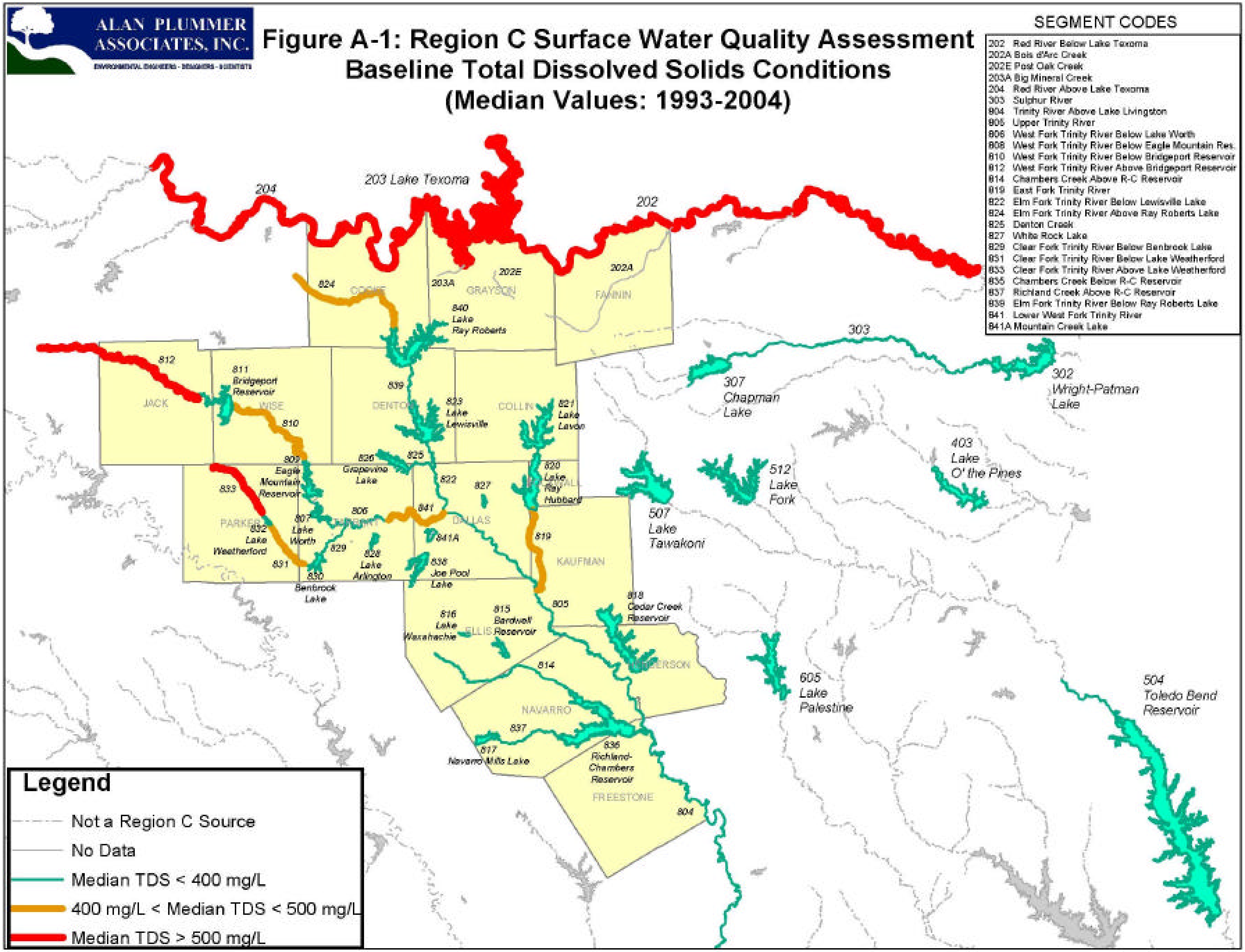
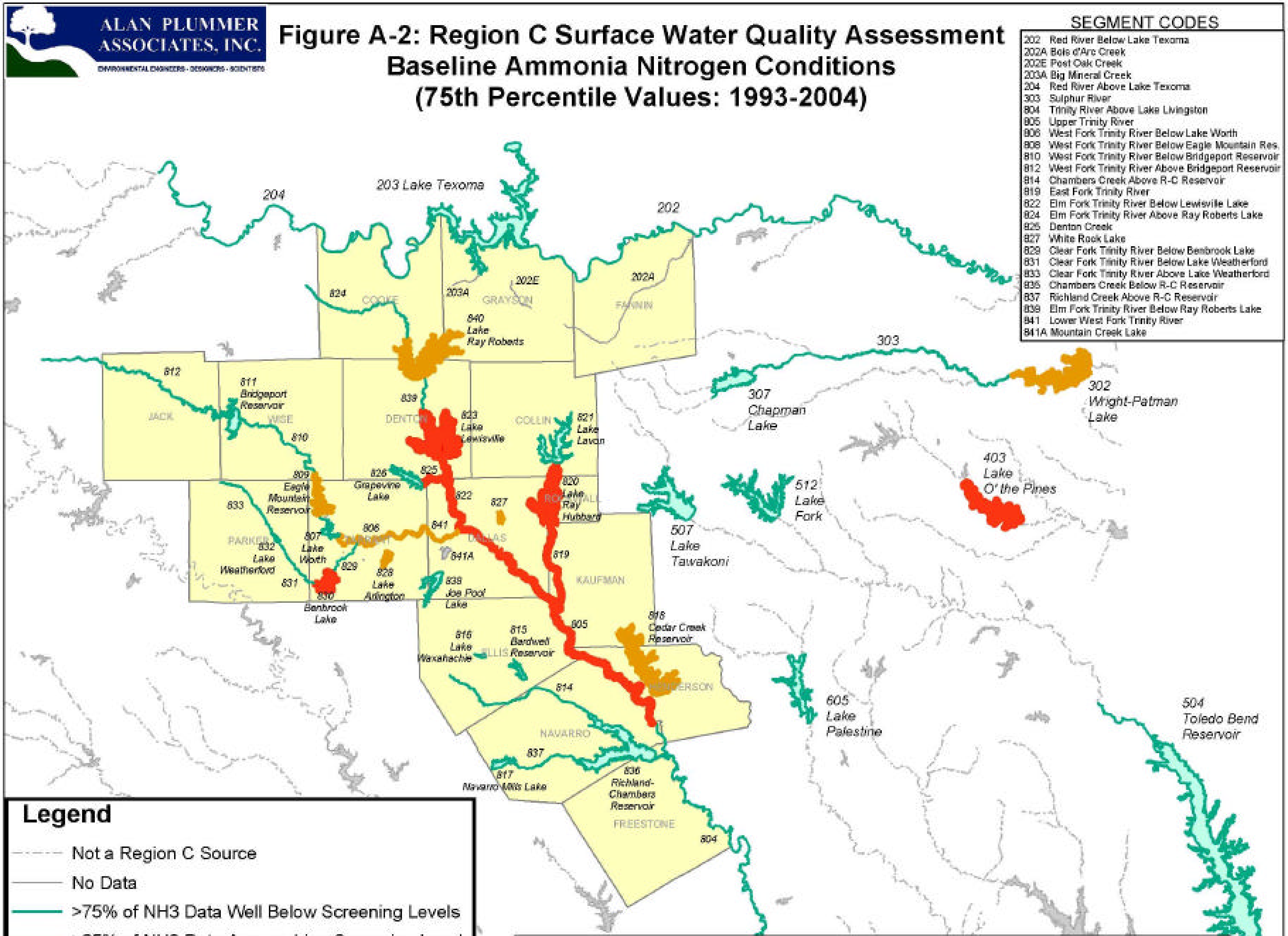


Figure A-1: Region C Surface Water Quality Assessment
Baseline Total Dissolved Solids Conditions
(Median Values: 1993-2004)

Figure A-2: Region C Surface Water Quality Assessment Baseline Ammonia Nitrogen Conditions (75th Percentile Values: 1993-2004)



Note: Nutrient Screening Levels For Ammonia: 0.106 mg/L for Reservoirs, 0.17 mg/L for Streams

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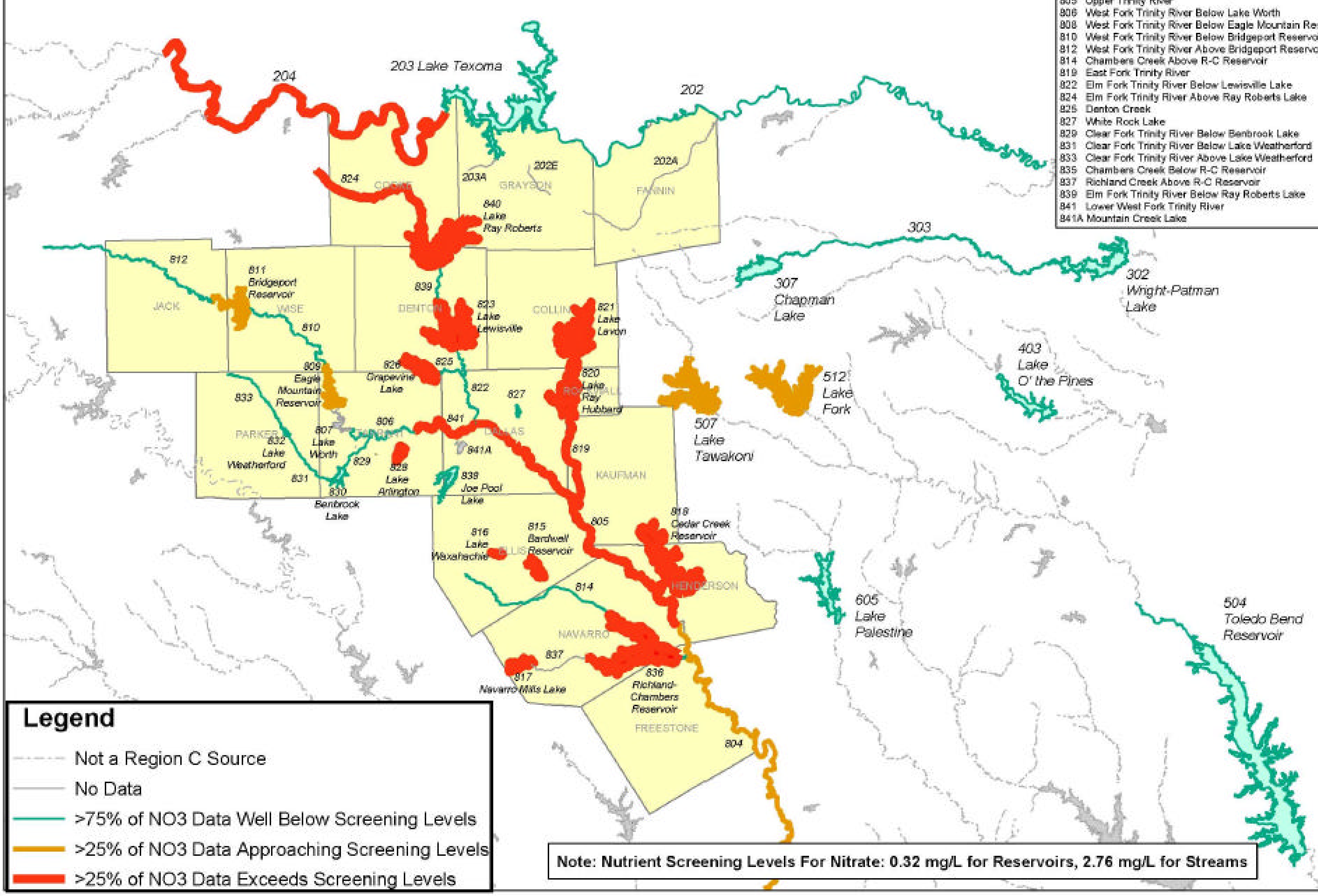
Figure A-3: Region C Surface Water Quality Assessment Baseline Nitrate Nitrogen Conditions (75th Percentile Values: 1993-2004)

SEGMENT CODES

202	Red River Below Lake Texoma
202A	Bois d'Arc Creek
202E	Post Oak Creek
203A	Big Mineral Creek
204	Red River Above Lake Texoma
303	Sulphur River
804	Trinity River Above Lake Livingston
805	Upper Trinity River
806	West Fork Trinity River Below Lake Worth
808	West Fork Trinity River Below Eagle Mountain Res.
810	West Fork Trinity River Below Bridgeport Reservoir
812	West Fork Trinity River Above Bridgeport Reservoir
814	Chambers Creek Above R-C Reservoir
819	East Fork Trinity River
822	Elm Fork Trinity River Below Lewisville Lake
824	Elm Fork Trinity River Above Ray Roberts Lake
825	Denton Creek
827	White Rock Lake
829	Clear Fork Trinity River Below Benbrook Lake
831	Clear Fork Trinity River Below Lake Weatherford
833	Clear Fork Trinity River Above Lake Weatherford
835	Chambers Creek Below R-C Reservoir
837	Richland Creek Above R-C Reservoir
839	Elm Fork Trinity River Below Ray Roberts Lake
841	Lower West Fork Trinity River
841A	Mountain Creek Lake



Note: Nutrient Screening Levels For Nitrate: 0.32 mg/L for Reservoirs, 2.76 mg/L for Streams

Figure A-4: Region C Surface Water Quality Assessment
Baseline Total Phosphorus Conditions
(75th Percentile Values: 1993-2004)

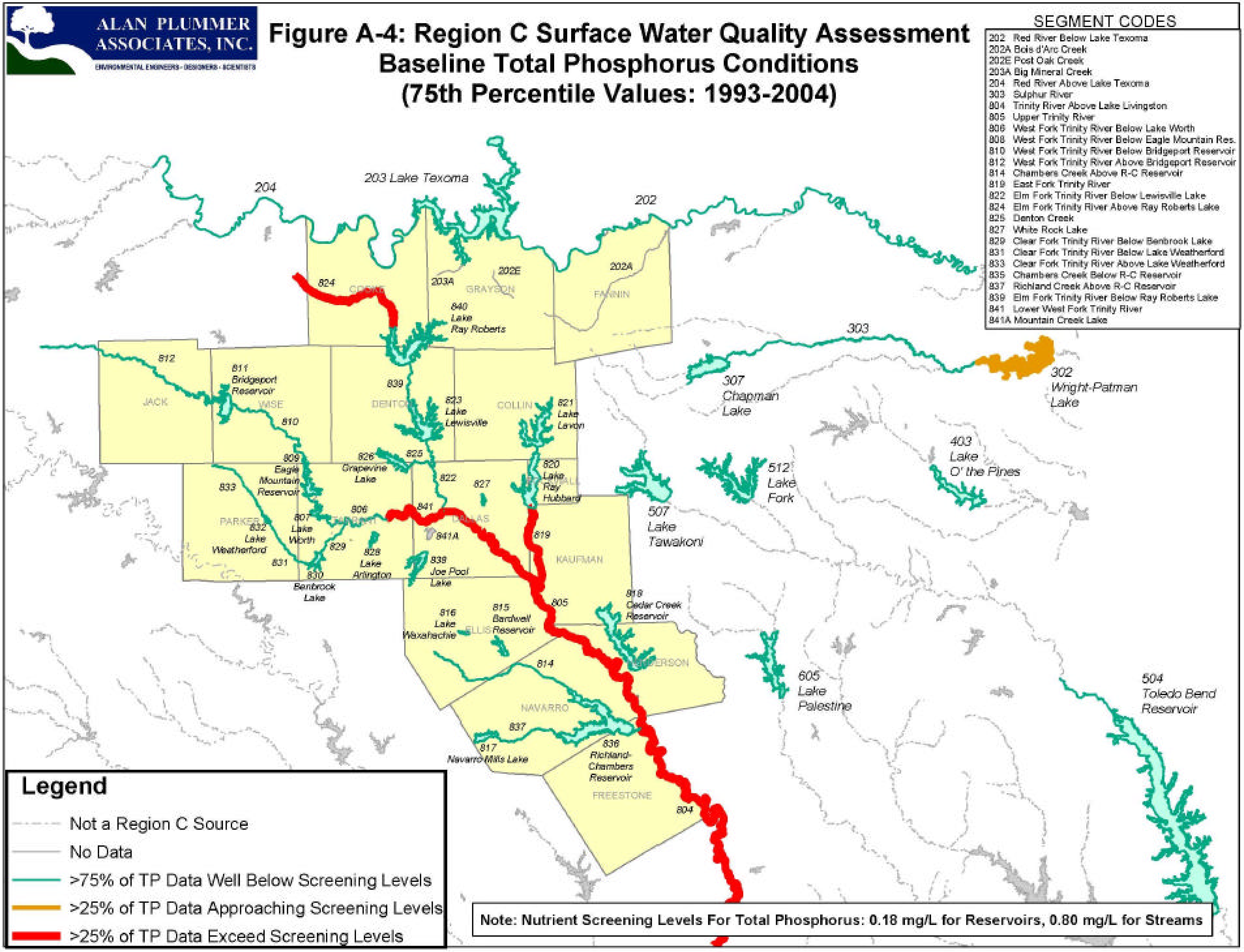
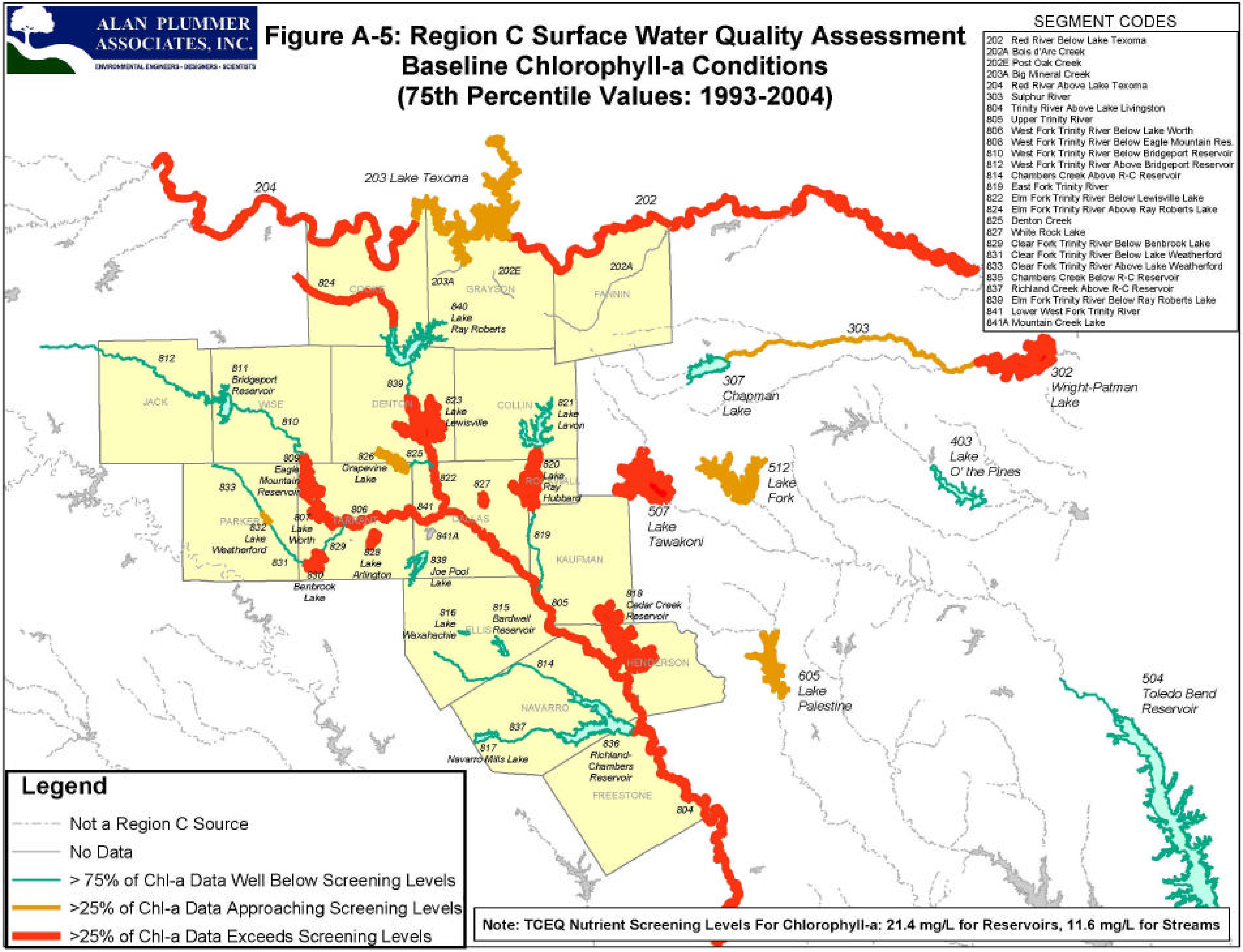


Figure A-5: Region C Surface Water Quality Assessment Baseline Chlorophyll-a Conditions (75th Percentile Values: 1993-2004)



APPENDIX B: GROUNDWATER QUALITY DATA SUMMARY AND MAPS

Region C Groundwater Quality Data Summary by Aquifer and County

Data Collected 1993-2004 (Source: TCEQ Groundwater Quality Monitoring Database)

Storet Code: 70304 SOLIDS, TOTAL DISSOLVED (MG/L)

Aquifer	County	Count	Mean	Median	75th Percentile	Max	Min
Carrizo-Wilcox	Navarro	2	310.50	310.5	318.25	326	295
Carrizo-Wilcox	Freestone	33	307.15	289	344	632	99
Carrizo-Wilcox	Henderson	24	247.58	248	309.5	571	47
Nacatoch	Kaufman	6	876.67	865	992.5	1041	730
Nacatoch	Navarro	7	467.57	453	526.5	642	316
Queen City	Freestone	3	173.33	108	207	306	106
Trinity	Jack	3	1072.67	1094	1268.5	1443	681
Trinity	Kaufman	1	1062.00	1062	1062	1062	1062
Trinity	Ellis	33	929.88	927	1177	1432	634
Trinity	Fannin	12	890.17	888.5	905	932	851
Trinity	Dallas	44	999.30	832.5	1007.25	4606	255
Trinity	Collin	30	848.47	767	945.75	1688	565
Trinity	Grayson	69	700.03	683	831	1492	269
Trinity	Denton	50	662.04	603	779.25	1291	408
Trinity	Tarrant	71	675.42	598	803.5	3302	274
Trinity	Wise	43	639.74	534	705.5	2186	304
Trinity	Cooke	29	503.76	450	563	835	399
Trinity	Parker	40	504.80	417	647.25	1086	289
Woodbine	Navarro	3	1601.67	1615	1624.5	1634	1556
Woodbine	Ellis	21	1414.86	1391	1576	2144	785
Woodbine	Dallas	17	1140.41	1239	1462	1700	436
Woodbine	Tarrant	53	1445.60	896	1356	8150	166
Woodbine	Fannin	25	762.80	802	869	940	408
Woodbine	Collin	16	691.88	621	759.25	1388	394
Woodbine	Denton	13	720.77	515	779	1841	291
Woodbine	Grayson	26	539.35	514	712.25	919	186
Woodbine	Cooke	6	595.83	409.5	623.5	1505	184

Figure B-1: Region C Groundwater Quality Assessment
Baseline TDS Conditions - Major Aquifers
(Median Values: 1993-2004)

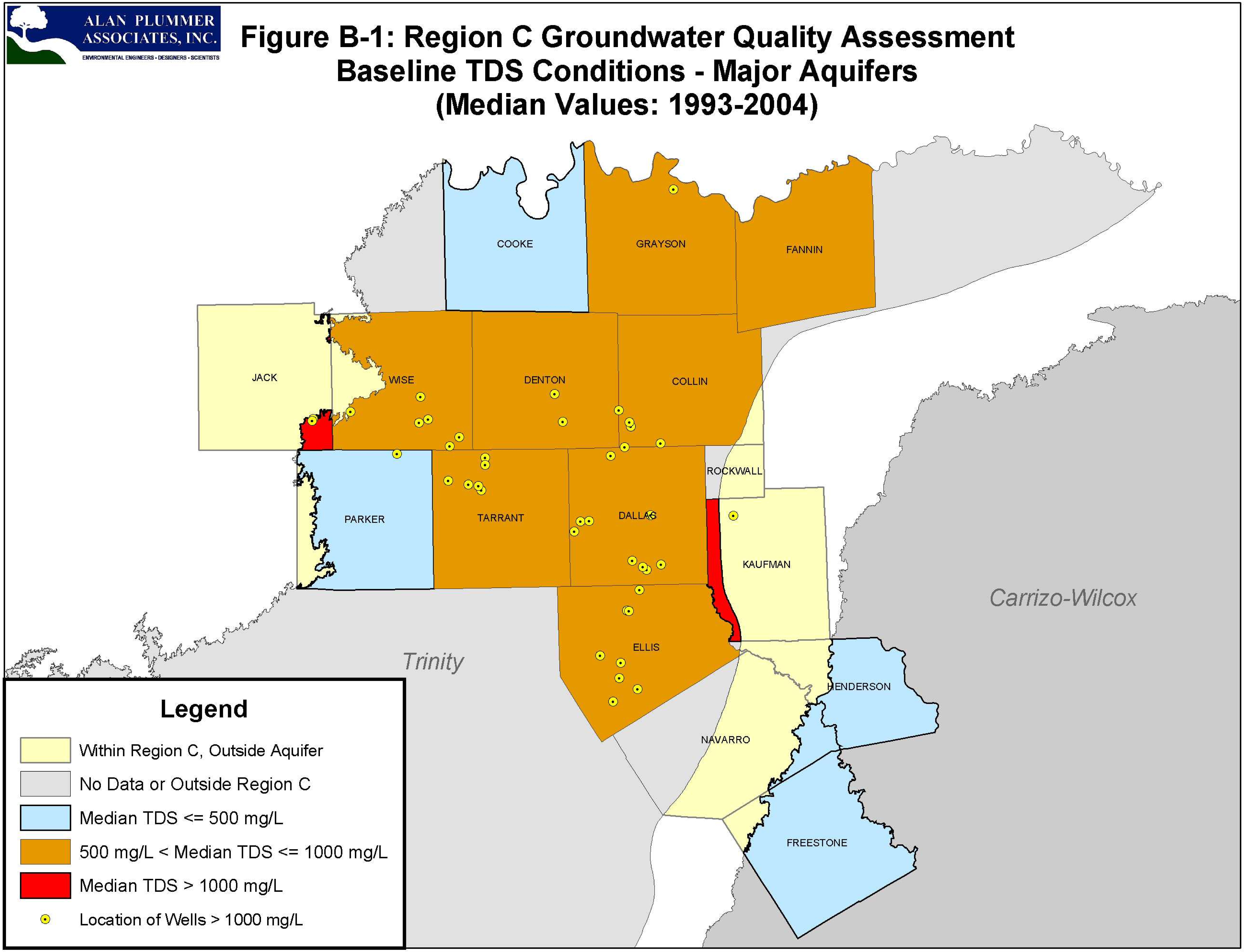
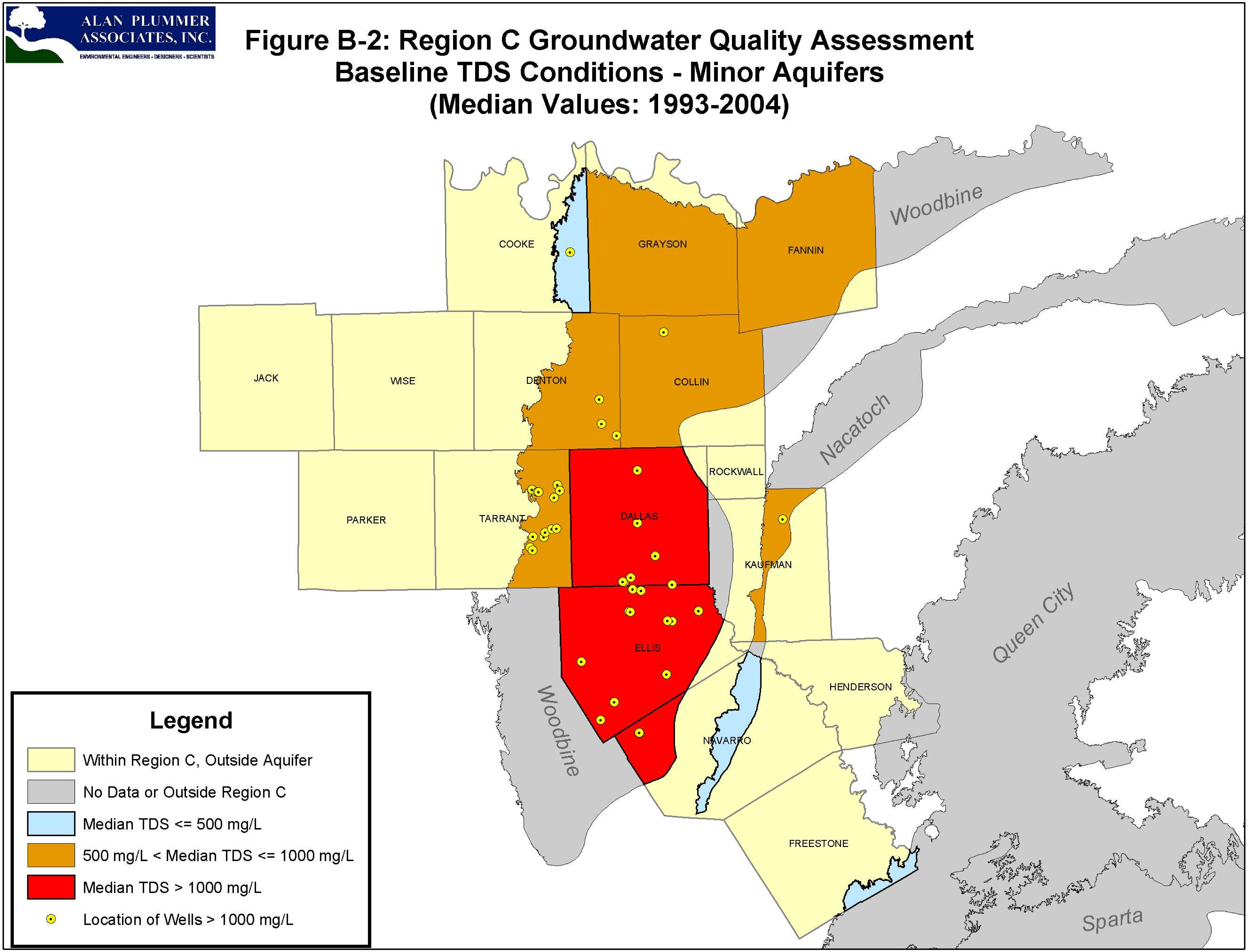


Figure B-2: Region C Groundwater Quality Assessment Baseline TDS Conditions - Minor Aquifers (Median Values: 1993-2004)



APPENDIX Q

SOCIO-ECONOMIC IMPACTS OF NOT MEETING WATER NEEDS

Socioeconomic Impacts of Unmet Water Needs in the Region C Water Planning Area

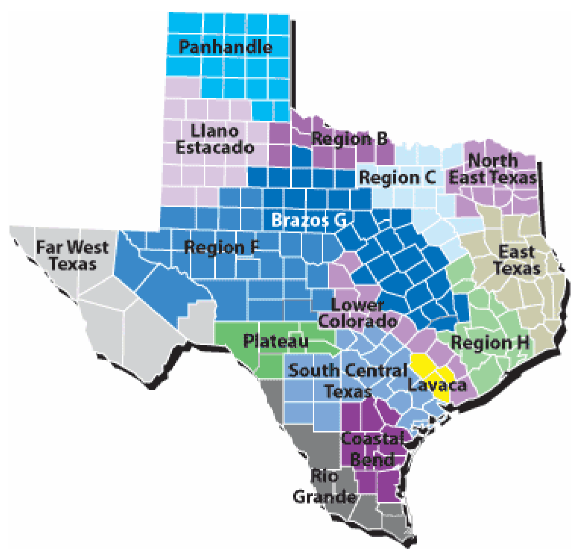
Prepared by:

Stuart Norvell and Kevin Kluge of The Texas Water Development Board's Office of Water Resources Planning

Prepared in support of the:

Region C Water Planning Group and the 2006 Texas State Water Plan

May 2005



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Executive Summary

Background

Water shortages due to severe drought combined with infrastructure limitations would likely curtail or eliminate economic activity in business and industries heavily reliant on water. For example, without water farmers cannot irrigate; refineries cannot produce gasoline and paper mills cannot make paper. Unreliable water supplies would not only have an immediate and real impact on business and industry, but they might also bias corporate decision makers against plant expansion or plant location in Texas. From a societal perspective, water supply reliability is critical as well. Shortages would disrupt activity in homes, schools and government and could adversely affect public health and safety. For all of the above reasons, it is important to analyze and understand how restricted water supplies during drought could affect communities throughout the state.

Section 357.7(4) of the rules for implementing Texas Senate Bill 1 requires regional water planning groups to evaluate the social and economic impacts of projected water shortages (i.e., "unmet water needs") as part of the planning process. The rules contain provisions that direct the Texas Water Development Board (TWDB) to provide technical assistance to complete socioeconomic impact assessments. In response to requests from regional planning groups, staff of the TWDB's Office of Water Resources Planning designed and conducted analyses to evaluate socioeconomic impacts of unmet water needs.

Overview of Methodology

Two components make up the overall approach to this study: 1) an economic impact module and 2) a social impact module. Economic analysis addresses potential impacts of unmet water needs including effects on residential water consumers and losses to regional economies stemming from reductions in economic output for agricultural, industrial and commercial water uses. Impacts to agriculture, industry and commercial enterprises were estimated using regional "input-output" models commonly used by researchers to estimate how reductions in business activity might affect a given economy. Estimated impacts are *independent* and distinct "what if" scenarios for a given point in time (i.e., 2010, 2020, 2030, 2040, 2050 and 2060). Reported figures are scenarios that illustrate what could happen in a given year if: 1) water supply infrastructure and/or water management strategies do not change through time, 2) the drought of record recurs. Details regarding the methodology and assumptions for individual water use categories (i.e., municipal consumers including residential and commercial water users, manufacturing, steam-electric, mining, and agriculture) are in the main body of the report.

The social component focuses on demographic effects including changes in population and school enrollment. Methods are based on population projection models developed by the TWDB for regional and state water planning. With the assistance of the Texas State Data Center, TWDB staff modified these models and applied them for use here. Basically, the social impact module incorporates results from the economic impact module and assesses how changes in a region's economy due to water shortages could affect patterns of migration in a region.

Summary of Results

Table E-1 and Figure E-1 summarize estimated economic impacts. Variables shown include:[1]

- **sales** - economic output measured by sales revenue;
- **jobs -** number of full and part-time jobs required by a given industry including self-employment;
- **regional income -** total payroll costs (wages and salaries plus benefits) paid by industries, corporate income, rental income and interest payments for the region; and
- **business taxes -** sales, excise, fees, licenses and other taxes paid during normal operation of an industry (does not include any type of income tax).

If drought of record conditions return and water supplies are not developed, study results indicate that the Region C Water Planning Area would suffer significant losses. If such conditions occurred 2010 lost income to residents in the region could total $3,021 million with associated job losses as high 27,760. State and local governments could lose $128 million in tax receipts. If such conditions occurred in 2060, income losses could run $58,800 million, and job losses could be as high 691,090. Nearly $2,505 million worth of state and local taxes would be lost. Reported figures are probably conservative because they are based on estimated costs for a single year; but in much of Texas, the drought of record lasted several years.

Table E-1: Annual Economic Impacts of Unmet Water Needs
(years, 2010, 2020, 2030, 2040, 2050 and 2060, constant year 2000 dollars)

Year	Sales ($millions)	Income ($millions)	Jobs	State and Local Taxes ($millions)
2010	$4,806.27	$3,020.91	27,760	$128.44
2020	$15,204.93	$9,158.73	91,670	$350.69
2030	$21,765.47	$13,408.22	137,340	$514.86
2040	$35,995.20	$22,189.51	245,050	$865.81
2050	$62,713.40	$37,365.98	423,405	$1,390.51
2060	$96,777.71	$58,799.50	691,060	$2,505.72

Source: Texas Water Development Board, Office of Water Resources Planning

[1] When aggregated at a regional level, total sales are not necessarily a good measure of economic prosperity because they include sales to other industries for further processing. For example, a farmer sells rice to a rice mill, which the rice mill processes and sells it to another consumer. Both transactions are counted in an input-output model. Thus, total sales "double count." Regional income plus business taxes are more suitable because they are a better measure of net economic returns.

Figure E-1: Distribution of Lost Income by Water Use Category
(years, 2010, 2020, 2030, 2040, 2050 and 2060, constant year 2000 dollars)

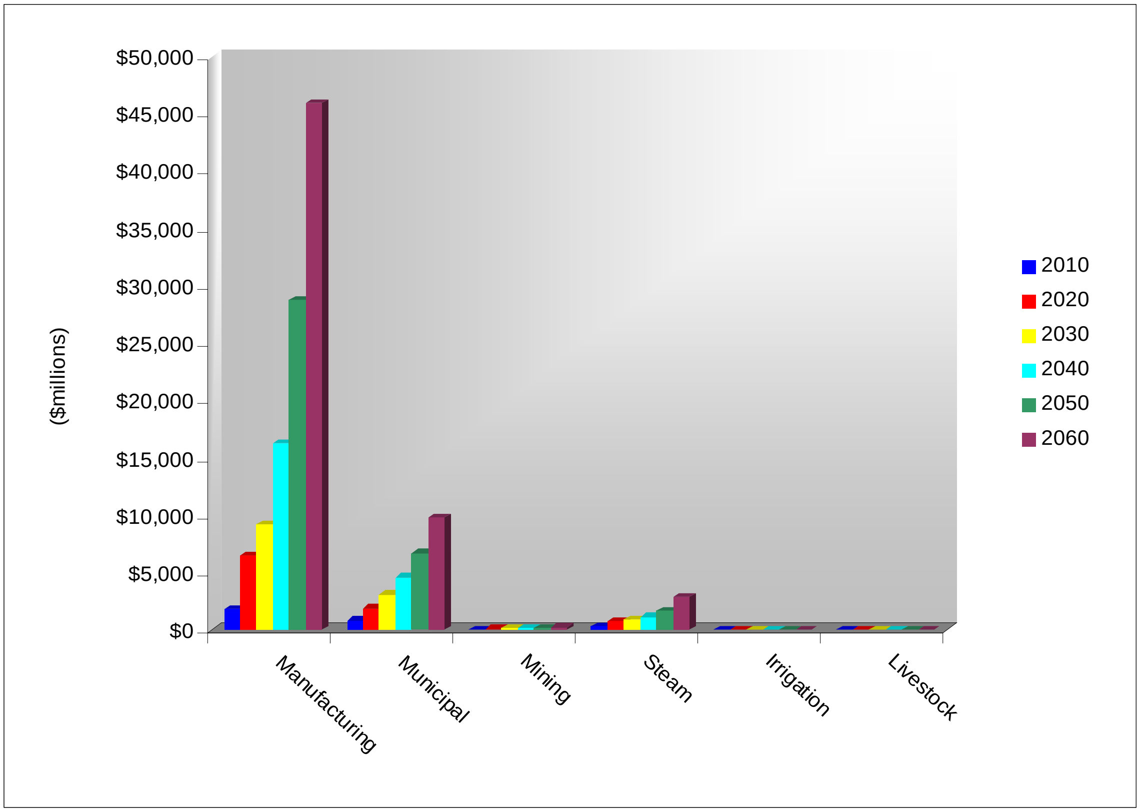

Table E-2 shows potential losses in population and school enrollment. Changes in population stem directly from the number of lost jobs estimated as part of the economic impact module. In other words, many – but not all - people would likely relocate due to a job loss and some have families with school age children. Section 1.2 in the main body of the report discusses methodology in detail.

Table E-2: Estimated Regional Social Impacts of Unmet Water Needs
(years, 2010, 2020, 2030, 2040, 2050 and 2060)

Year	Population Losses	Declines in School Enrollment
2010	38,500	8,700
2020	130,700	30,000
2030	199,500	46,400
2040	356,700	83,300
2050	616,600	144,100
2060	1,007,000	235,500

Source: Based on models developed by the Texas Water Development Board, Office of Water Resources Planning and the Texas State Data Center.

Introduction

Texas is one the nation's fastest growing states. From 1950 to 2000, population in the state grew from about 8 million to nearly 21 million. By the year 2050, the total number of people living in Texas is expected to reach 40 million. Rapid growth combined with Texas' susceptibility to severe drought makes water supply a crucial issue. If water infrastructure and water management strategies are not improved, Texas could face serious social, economic and environmental consequences - not only in our large metropolitan cities, but also on our farms and rural areas.

Water shortages due to severe drought combined with infrastructure limitations would likely curtail or eliminate economic activity in business and industries heavily reliant on water. For example, without water farmers cannot irrigate; refineries cannot produce gasoline and paper mills cannot make paper. Unreliable water supplies would not only have an immediate and real impact on business and industry, but they might also bias corporate decision makers against plant expansion or plant location in Texas. From a societal perspective, water supply reliability is critical as well. Shortages would disrupt activity in homes, schools and government and could adversely affect public health and safety. For all of the above reasons, it is important to analyze and understand how restricted water supplies during drought could affect communities throughout the state.

Section 357.7(4) of the rules for implementing Texas Senate Bill 1 requires regional water planning groups to evaluate the social and economic impacts of unmet water needs as part of the planning process. The rules contain provisions that direct the Texas Water Development Board (TWDB) to provide technical assistance to complete socioeconomic impact analyses. In response to requests from regional planning groups, TWDB staff designed and conducted required studies. The following document prepared by the TWDB's Office of Water Resources Planning summarizes analysis and results for the Region C Water Planning Area. Section 1 provides an overview of concepts and methodologies used in the study. Sections 2 and 3 provide detailed information and analyses for each water use category employed in the planning process (i.e., irrigation, livestock, municipal, manufacturing, mining and steam-electric).

1. Overview of Terms and Methodology

Section 1 provides a general overview of how economic and social impacts were measured. In addition, it summarizes important clarifications, assumptions and limitations of the study.

1.1 Measuring Economic Impacts

Economic analysis as it relates to water resources planning generally falls into two broad areas. Supply side analysis focuses on costs and alternatives of developing new water supplies or implementing programs that provide additional water from current supplies. Demand side analysis concentrates on impacts and benefits of providing water to people, businesses and the environment. Analysis in this report focuses strictly on demand side impacts. Specifically, it addresses the potential economic impacts of unmet water needs including: 1) losses to regional economies stemming from reductions in economic output, and 2) costs to residential water consumers associated with implementing emergency water procurement and conservation programs.

1.1.2 Impacts to Agriculture, Business and Industry

As mentioned earlier, severe water shortages would likely affect the ability of business and industry to operate resulting in lost output, which would adversely affect the regional economy. A variety tools are available to estimate such impacts, but by far, the most widely used today are input-output models (IO models) combined with social accounting matrices (SAMs). Referred to as IO/SAM models, these tools formed the basis for estimating economic impacts for agriculture (irrigation and livestock water uses) and industry (manufacturing, mining, steam-electric and commercial business activity for municipal water uses).

Basically, an IO/SAM model is an accounting framework that traces spending and consumption between different economic sectors including businesses, households, government and "foreign" economies in the form of exports and imports. As an example, Table 1 shows a highly aggregated segment of an IO/SAM model that focuses on key agricultural sectors in a local economy. The table contains transactions data for three agricultural sectors (cattle ranchers, dairies and alfalfa farms). Rows in Table 1 reflect sales from each sector to other local industries and institutions including households, government and consumers outside of the region in the form of exports. Columns in the table show purchases by each sector in the same fashion. For instance, the dairy industry buys $11.62 million worth of goods and services needed to produce milk. Local alfalfa farmers provide $2.11 million worth of hay and local households provide about $1.03 million worth of labor. Dairies import $4.17 million worth of inputs and pay $2.37 million in taxes and profits. Total economic activity in the region amounts to about $807.45 million. The entire table is like an accounting balance sheet where total sales equal total purchases.

Table 1: Example of a County-level Transaction and Social Accounting Matrix for Agricultural Sectors ($millions)

Sectors	Cattle	Dairy	Alfalfa	All other Industries	Taxes, govt. & profits	Households	Exports	Total
Cattle	$3.10	$0.01	$0.00	$0.03	$0.02	$0.06	$10.76	$13.98
Dairy	$0.07	$0.13	$0.00	$0.25	$0.01	$0.00	$11.14	$11.60
Alfalfa	$0.00	$2.11	$0.00	$0.01	$0.02	$0.01	$10.38	$12.53
Other industries	$2.20	$1.56	$2.90	$50.02	$70.64	$66.03	$48.48	$241.83
Taxes, govt. & profits	$2.37	$2.61	$5.10	$77.42	$0.23	$49.43	$83.29	$220.45
Households	$0.82	$1.03	$1.38	$50.94	$45.36	$7.13	$14.64	$121.30
Imports	$5.41	$4.17	$3.16	$63.32	$104.17	$5.53	$0.00	$185.76
Total	$13.97	$11.62	$12.54	$241.99	$220.45	$128.19	$178.69	$807.45

* Columns contain purchases and rows represent sales. Source: Adapted from Harris, T.R., Narayanan, R., Englin, J.E., MacDiarmid, T.R., Stoddard, S.W. and Reid, M.E. "*Economic Linkages of Churchill County.*" University of Nevada Reno. May 1993.

To understand how an IO/SAM model works, first visualize that $1 of additional sales of milk is injected into the dairy industry in Table 1. For every $1 the dairies receive in revenue, they spend 18 cents on alfalfa to feed their cows; nine cents is paid to households who provide farm labor, and another 13 cents goes to the category "other industries" to buy items such as machinery, fuel, transportation, accounting services etc. Nearly 22 cents is paid out in the form of profits (i.e., returns to dairy owners) and taxes/fees to local, state and federal government. The value of the initial $1 of revenue in the dairy sector is referred to as a first-round or **direct effect**.

As the name implies, first-round or direct effects are only part of the story. In the example above, alfalfa farmers must make 18 cents worth of hay to supply the increased demand for their product. To do so, they purchase their own inputs, and thus, they spend part of the original 18 cents that they received from the dairies on firms that support their own operations. For example, 12 cents is spent on fertilizers and other chemicals needed to grow alfalfa. The fertilizer industry in turn would take these 12 cents and spend them on inputs in its production process and so on. The sum of all re-spending is referred to as the **indirect effect** of an initial increase in output in the dairy sector.

While direct and indirect impacts capture how industries respond to a change, **induced impacts** measure the behavior of the labor force. As demand for production increases, employees in base industries and supporting industries will have to work more; or alternatively, businesses will have to hire more people. As employment increases, household spending rises. Thus, seemingly unrelated businesses such as video stores, supermarkets and car dealers also feel the effects of an initial change.

Collectively, indirect and induced effects are referred to as **secondary impacts**. In their entirety, all of the above changes (direct and secondary) are referred to as **total economic impacts**. By nature, total impacts are greater than initial changes because of secondary effects. The magnitude of the increase is what is popularly termed a multiplier effect. Input-output models generate numerical multipliers that estimate indirect and induced effects.

In an IO/SAM model impacts stem from changes in output measured by sales revenue that in turn come from changes in consumer demand. In the case of water shortages, one is not assuming a change in demand, but rather a supply shock – in this case severe drought. Demand for a product such as corn has not necessarily changed during a drought. However, farmers in question lack a crucial input (i.e., irrigation water) for which there is no *short-term* substitute. Without irrigation, she cannot grow irrigated crops. As a result, her cash flows decline or cease all together depending upon the severity of the situation. As cash flows dwindle, the farmer's income falls, and she has to reduce expenditures on farm inputs such as labor. Lower revenues not only affect her operation and her employees directly, but they also indirectly affect businesses who sell her inputs such as fuel, chemicals, seeds, consultant services, fertilizer etc.

The methodology used to estimate regional economic impacts consists of three steps: 1) develop IO/SAM models for each county in the region and for the region as whole, 2) estimate direct impacts to economic sectors resulting from water shortages, and 3) calculate total economic impacts (i.e., direct plus secondary effects).

Step 1*: Generate IO/SAM Models and Develop Economic Baseline*

IO/SAM models were estimated using propriety software known as IMPLAN PRO™ (Impact for Planning Analysis). IMPLAN is a modeling system originally developed by the U.S. Forestry Service in the late 1970s. Today, the Minnesota IMPLAN Group (MIG Inc.) owns the copyright and distributes data and software. It is probably the most widely used economic impact model in existence. IMPLAN comes with databases containing the most recently available economic data from a variety of sources.[2] Using IMPLAN software and data, transaction tables conceptually similar to the one discussed previously (see Table 1 on page 9) were estimated for

[2]The basic IMPLAN database consists of national level technology matrices based on the Benchmark Input-Output Accounts generated the U.S. Bureau of Economic Analysis and estimates of final demand, final payments, industry output and employment for various economic sectors. IMPLAN's regional data (i.e. states, a counties or groups of counties within a state) are divided into two basic categories: 1) data on an industry basis including value-added, output and employment and 2) data on a commodity basis including final demands and institutional sales. State-level data are balanced to the national totals using a matrix ratio allocation system and county data are balanced to state totals. In other words, much of the data in IMPLAN is based on a national average for all industries.

each county in the region and for the region as a whole. Each transaction table contains 528 economic sectors and allows one to estimate a variety of economic statistics including:

- **total sales -** total production measured by sales revenues;
- **intermediate sales -** sales to other businesses and industry within a given region;
- **final sales** – sales to end users in a region and exports out of a region;
- **employment -** number of full and part-time jobs (annual average) required by a given industry including self-employment;
- **regional income -** total payroll costs (wages and salaries plus benefits) paid by industries, corporate income, rental income and interest payments; and
- **business taxes -** sales, excise, fees, licenses and other taxes paid during normal operation of an industry (does not include income taxes).

TWDB analysts developed an economic baseline containing each of the above variables using year 2000 data. Since the planning horizon extends through 2060, economic variables in the baseline were allowed to change in accordance with projected changes in demographic and economic activity. Growth rates for municipal water use sectors (i.e., commercial, residential and institutional) are based on TWDB population forecasts. Projections for manufacturing, agriculture, and mining and steam-electric activity are based on the same underlying economic forecasts used to estimate future water use for each category. Monetary impacts in future years are reported in year 2000 dollars.

It is important to stress that employment, income and business taxes are the most useful variables when comparing the relative contribution of an economic sector to a regional economy. Total sales as reported in IO/SAM models are less desirable and can be misleading because they include sales to other industries in the region for use in the production of other goods. For example, if a mill buys grain from local farmers and uses it to produce feed, sales of both the processed feed and raw corn are counted as "output" in an IO model. Thus, total sales double-count or overstate the true economic value of goods and services produced in an economy. They are not consistent with commonly used measures of output such as Gross National Product (GNP), which counts only final sales.

Another important distinction relates to terminology. Throughout this report, the term *sector* refers to economic subdivisions used in the IMPLAN database and resultant input-output models (528 individual sectors based on Standard Industrial Classification Codes). In contrast, the phrase *water use category* refers to water user groups employed in state and regional water planning including irrigation, livestock, mining, municipal, manufacturing and steam electric. All sectors in the IMPLAN database were assigned to a specific water use category (see Attachment A of this report).

Step 2: *Estimate Direct Economic Impacts of Water Shortages*

As mentioned above, direct impacts accrue to immediate businesses and industries that rely on water. Without water industrial processes could suffer. However, output responses would likely vary depending upon the severity of a shortage. A small shortage relative to total water use may have a nominal effect, but as shortages became more critical, effects on productive capacity would increase.

For example, farmers facing small shortages might fallow marginally productive acreage to save water for more valuable crops. Livestock producers might employ emergency culling strategies, or they may consider hauling water by truck to fill stock tanks. In the case of manufacturing, a good example occurred in the summer of 1999 when Toyota Motor Manufacturing experienced water shortages at a facility near Georgetown, Kentucky. As water levels in the Kentucky River fell to historic lows due to drought, plant managers sought ways to curtail water use such as reducing rinse operations to a bare minimum and recycling water by funneling it from paint shops to boilers. They even considered trucking in water at a cost of 10 times what they were paying. Fortunately, rains at the end of the summer restored river levels, and Toyota managed to implement cutbacks without affecting production. But it was a close call. If rains had not replenished the river, shortages could have severely reduced output.[3]

Note that the efforts described above are not planned programmatic or long-term operational changes. They are emergency measures that individuals might pursue to alleviate what they consider a temporary condition. Thus, they are not characteristic of long-term management strategies designed to ensure more dependable water supplies such as capital investments in conservation technology or development of new water supplies.

To account for uncertainty regarding the relative magnitude of impacts to farm and business operations, the following analysis employs the concept of elasticity. Elasticity is a number that shows how a change in one variable will affect another. In this case, it measures the relationship between a percentage reduction in water availability and a percentage reduction in output. For example, an elasticity of 1.0 indicates that a 1.0 percent reduction in water availability would result in a 1.0 percent reduction in economic output. An elasticity of 0.50 would indicate that for every 1.0 percent of unavailable water, output is reduced by 0.50 percent and so on. Output elasticities used in this study are:[4]

- if unmet water needs are 0 to 5 percent of total water demand, no corresponding reduction in output is assumed;
- if water shortages are 5 to 30 percent of total water demand, for every 1.0 one percent of unmet need, there is a corresponding 0.25 percent reduction in output;
- if water shortages are 30 to 50 percent of total water demand, for every 1.0 one percent of unmet need, there is a corresponding 0.50 percent reduction in output; and
- if water shortages are greater than 50 percent of total water demand, for every 1.0 one percent of unmet need, there is a corresponding 1.0 percent (i.e., a proportional reduction).

Once output responses to water shortages were estimated, direct impacts to total sales, employment, regional income and business taxes were derived using regional level economic multipliers estimating using IO/SAM models. When calculating direct effects for the municipal, steam electric, manufacturing and livestock water use categories, sales to final demand were applied to avoid double counting impacts. The formula for a given IMPLAN sector is:

$$D_{i,t} = Q_{i,t} *_{,} S_{i,t} * E_Q * RFD_i * DM_{i(Q, L, I, T)}$$

where:

[3] See, Royal, W. "*High And Dry - Industrial Centers Face Water Shortages*." in Industry Week, Sept, 2000.

[4] Elasticities are based on one of the few empirical studies that analyze potential relationships between economic output and water shortages in the United States. The study, conducted in California, showed that a significant number of industries would suffer reduced output during water shortages. Using a survey based approach researchers posed two scenarios to different industries. In the first scenario, they asked how a 15 percent cutback in water supply lasting one year would affect operations. In the second scenario, they asked how a 30 percent reduction lasting one year would affect plant operations. In the case of a 15 percent shortage, reported output elasticities ranged from 0.00 to 0.76 with an average value of 0.25. For a 30 percent shortage, elasticities ranged from 0.00 to 1.39 with average of 0.47. For further information, see, California Urban Water Agencies, "*Cost of Industrial Water Shortages*." Prepared by Spectrum Economics, Inc. November, 1991.

$D_{i,t}$ = direct economic impact to sector *i* in period *t*

$Q_{i,t}$ = total sales for sector *i* in period *t* in an affected county

$RFD_{i,}$ = ratio of final demand to total sales for sector *i* for a given region

$S_{i,t}$ = water shortage as percentage of total water use in period *t*

E_Q = elasticity of output and water use

$DM_{i(L, I, T)}$ = direct output multiplier coefficients for labor (L), income (I) and taxes (T) for sector *i*.

Direct impacts to irrigation and mining are based upon the same formula; however, total sales as opposed to final sales were used. To avoid double counting, secondary impacts in sectors other than irrigation and mining (e.g., manufacturing) were reduced by an amount equal to or less than direct losses to irrigation and mining. In addition, in some instances closely linked sectors were moved from one water use category to another. For example, although meat packers and rice mills are technically manufacturers, in some regions they were reclassified as either livestock or irrigation. All direct effects were estimated at the county level and then summed to arrive at a regional figure. See Section 2 of this report for additional discussion regarding methodology and caveats used when estimating direct impacts for each water use category.

Step 3: *Estimate Secondary and Total Economic Impacts of Water Shortages*

As noted earlier, the effects of reduced output would extend well beyond sectors directly affected. Secondary impacts were derived using the same formula used to estimate direct impacts; however, regional level *indirect* and *induced* multiplier coefficients were applied and only final sales were multiplied.

1.1.3 Impacts Associated with Domestic Water Uses

IO/SAM models are not well suited for measuring impacts of shortages for domestic uses, which make up the majority of the municipal category.[5] To estimate impacts associated with domestic uses, municipal water demand and thus needs were subdivided into two categories – residential and commercial. Residential water is considered “domestic” and includes water that people use in their homes for things such as cooking, bathing, drinking and removing household waste and for outdoor purposes including lawn watering, car-washing and swimming pools. Shortages to residential uses were valued using a tiered approach. In other words, the more severe the shortage, the more costly it becomes. For instance, a 2 acre-foot shortage for a group of households that use 10 acre-feet per year would not be as severe as a shortage that amounted to 8 acre-feet. In the case of a 2 acre-foot shortage, households would probably have to eliminate some or all outdoor water use, which could have implicit and explicit economic costs including losses to the horticultural and landscaping industry. In the case of an 8 acre-foot shortage, people would have to forgo all outdoor water use and most indoor water consumption. Economic costs would be much higher in this case because people could probably not live with such a reduction, and would be forced to find emergency alternatives. The alternative assumed in this study is a very uneconomical and worst-case scenario (i.e., hauling water in from other communities by truck or rail). Section 2.3.3 of this report discusses methodology for municipal uses in greater detail.

[5] A notable exception is the potential impacts to the nursery and landscaping industry that could arise due to reductions in outdoor residential uses and impacts to “water intensive” commercial businesses (see Section 2.3.3).

1.2 Measuring Social Impacts

As the name implies, the effects of water shortages can be social or economic. Distinctions between the two are both semantic and analytical in nature – more so analytic in the sense that social impacts are much harder to measure in quantitative terms. Nevertheless, social effects associated with drought and water shortages usually have close ties to economic impacts. For example, they might include:

- demographic effects such as changes in population,
- disruptions in institutional settings including activity in schools and government,
- conflicts between water users such as farmers and urban consumers,
- health-related low-flow problems (e.g., cross-connection contamination, diminished sewage flows, increased pollutant concentrations),
- mental and physical stress (e.g., anxiety, depression, domestic violence),
- public safety issues from forest and range fires and reduced fire fighting capability,
- increased disease caused by wildlife concentrations,
- loss of aesthetic and property values, and
- reduced recreational opportunities.[6]

Social impacts measured in this study focus strictly on demographic effects including changes in population and school enrollment. Methods are based on models used by the TWDB for state water planning and by the U.S. Census Bureau for national level population projections. With the assistance of the Texas State Data Center (TSDC), TWDB staff modified population projection models used for state water planning and applied them here. Basically, the social impact model incorporates results from the economic component of the study and assesses how changes in labor demand due to unmet water needs could affect migration patterns in a region. Before discussing particulars of the approach model, some background information regarding population projection models is useful in understanding the overall approach.

1.2.1 Overview of Demographic Projection Models

More often than not, population projections are reported as a single number that represents the size of an overall population. While useful in many cases, a single number says nothing about the composition of projected populations, which is critical to public officials who must make decisions regarding future spending on public services. For example, will a population in the future have more elderly people relative to today, or will it have more children? More children might mean that more schools are needed. Conversely, a population with a greater percentage of elderly people may need additional healthcare facilities. When projecting future populations, cohort-survival models break down a population into groups (i.e., cohorts) based on factors such as age, sex and race. Once a population is separated into cohorts, one can estimate the magnitude and composition of future population changes.

Changes in a population's size and makeup in survival cohort models are driven by three factors:

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[6] Based on information from the website of the National Drought Mitigation Center at the University of Nebraska Lincoln. Available online at: http://www.drought.unl.edu/risk/impacts.htm. See also, Vanclay, F. "*Social Impact Assessment*." in Petts, J. (ed) International Handbook of Environmental Impact Assessment. 1999.

1. *Births:* Obviously, more babies mean more people. However, only certain groups in a population are physically capable of bearing children– typically women between the ages of 13 and 49. The U.S. Census Bureau and the TSDC continually updates fertility rates for different cohorts. For each race/ethnicity category, birth rates decline and then stabilize in the future.

2. *Deaths:* When people die, populations shrink. Unlike giving birth, however, everyone is capable of dying and mortality rates are applied to all cohorts in a given population. Hence their name, cohort-survival models use survival rates as opposed to mortality rates. A survival rate is simply the probability that a given person with certain attributes (i.e., race, age and sex) will survive over a given period of time.

3. *Migration*: Migration is the movement of people in or out of a region. Migration rates used to project future changes in a region are usually based on historic population data. When analyzing historic data, losses or increases that are not attributed to births or deaths are assumed to be the result of migration. Migration can be further broken down into changes resulting from economic and non-economic factors. Economic migrants include workers and their families that relocate because of job losses (or gains), while non-economic migrants move due to lifestyles choices (e.g., retirees fleeing winter cold in the nation's heartland and moving to Texas).

In summary, knowledge of a population's composition in terms of age, sex and race combined with information regarding birth and survival rates, and migratory patterns, allows a great deal of flexibility and realism when estimating future populations. For example, an analyst can isolate population changes due to deaths and births from changes due to people moving in and out of a region. Or perhaps, one could analyze how potential changes in medical technology would affect population by reducing death rates among certain cohorts. Lastly, one could assess how changes in *economic conditions* might affect a regional population

1.2.2 Methodology for Social Impacts

Two components make up the model. The first component projects populations for a given year based on the following six steps:

1) *Separate "special" populations from the "general" population of a region:* The general population of a region includes the portion subject to rates of survival, fertility, economic migration and non-economic migration. In other words, they live, die, have children and can move in and out of a region freely. "Special populations," on the other hand, include college students, prisoners and military personnel. Special populations are treated differently than the general population. For example, fertility rates are not applied to prisoners because in general inmates at correctional facilities do not have children, and they are incapable of freely migrating or out of a region. Projections for special populations were compiled by the TSDC using data from the Higher Education Coordinating Board, the Texas Department of Criminal Justice and the U.S. Department of Defense. Starting from the 2000 Census, general and special populations were broken down into the following cohorts:

- age cohorts ranging from age zero to 75 and older,
- race/ethnicity cohorts, including Anglo, Black, Hispanic and "other," and
- gender cohorts (male and female).

2) *Apply survival and fertility rates to the general population* : Survival and fertility rates were compiled by the TSDC with data from the Texas Department of Health (TDH). Natural decreases (i.e., deaths) are estimated by applying survival rates to each cohort and then subtracting estimated deaths from the total population. Birth rates were then applied to females in each age

and race cohort in general and special populations (college and military only) to arrive at a total figure for new births.

3) *Estimate economic migration based on labor supply and demand*: TSDC year 2000 labor supply estimates include all non-disabled and non-incarcerated civilians between the ages of 16 and 65. Thus, prisoners are not included. Labor supply for years beyond 2001 was calculated by converting year 2000 data to rates according to cohort and applying these rates to future years. Projected labor demand was estimated based on historical employment rates. Differences between total labor supply and labor demand determines the amount of in or out migration in a region. If supply is greater than demand, there is an out-migration of labor. Conversely, if demand is greater than supply, there is an in-migration of labor. The number of migrants does not necessarily reflect total population changes because some migrants have families. To estimate how many people might accompany workers, a migrant worker profile was developed based on the U.S. Census Bureau's Public Use Microdata Samples (PUMs) data. Migrant profiles estimate the number of additional family members, by age and gender that accompany migrating workers. Together, workers and their families constitute economic migration for a given year.

4) *Estimate non-economic migration*: As noted previously, migration patterns of individuals age 65 and older are generally independent of economic conditions. Retirees usually do not work, and when they relocate, it is primarily because of lifestyle preferences. Migratory patterns for people age 65 or older are based on historical PUMs data from the U.S. Census.

5) *Calculate ending population for a given year*: The total year-ending population is estimated by adding together: 1) surviving population from the previous year, 2) new births, 3) net economic migration, 4) net non-economic migration and 5) special populations. This figure serves as the baseline population for the next year and the process repeats itself.

The second component of the social impact model is identical to the first and includes the five steps listed above for each year where water shortages are reported (i.e., 2010, 2020, 2030, 2040, 2050 and 2060). The only difference is that labor demand changes in years with shortages. Shifts in labor demand stem from employment impacts estimated as part of the economic analysis component of this study with some slight modifications. IMPLAN employment data is based on the number of full and part-time jobs as opposed to the number of people working. To remedy discrepancies, employment impacts from IMPLAN were adjusted to reflect the number of people employed by using simple ratios (i.e., labor supply divided by number of jobs) at the county level. Declines in labor demand as measured using adjusted IMPLAN data are assumed to affect net economic migration in a given regional water planning area. Employment losses are adjusted to reflect the notion that some people would not relocate but would seek employment in the region and/or public assistance and wait for conditions to improve. Changes in school enrollment are simply the proportion of lost population between the ages of 5 and 17.

1.3 Clarifications, Assumptions and Limitations of Analysis

As with any attempt to measure and quantify human activities at a societal level, assumptions are necessary and every model has limitations. Assumptions are needed to maintain a level of generality and simplicity such that models can be applied on several geographic levels and across different economic sectors. In terms of the general approach used here several clarifications and cautions are warranted:

1) While useful for planning purposes, this study is not a benefit-cost analysis (BCA). BCA is a tool widely used to evaluate the economic feasibility of specific policies or projects as opposed to estimating economic impacts of unmet water needs. Nevertheless, one could include some impacts measured in this study as part of a BCA if done so properly.

2) Since this is not a BCA, future impacts are not weighted differently. In other words, estimates are not “discounted.” If used as a measure of benefits in a BCA, one must consider the uncertainty of estimated monetary impacts.

3) All monetary figures are reported in constant year 2000 dollars.

4) Shortages reported by regional planning groups are the starting point for socioeconomic analyses. No adjustments or assumptions regarding the magnitude or distributions of unmet needs among different water use categories are incorporated in the analysis.

5) Estimated impacts are point estimates for years in which needs are reported (i.e., 2010, 2020, 2030, 2040, 2050 and 2060).They are independent and distinct “what if” scenarios for each particular year and water shortages are assumed to be temporary events resulting from severe drought conditions combined with infrastructure limitations. In other words, growth occurs and future shocks are imposed on an economy at 10-year intervals and resultant impacts are measured. Given, that reported figures are not cumulative in nature, it is inappropriate to sum impacts over the entire planning horizon. Doing so, would imply that the analysis predicts that drought of record conditions will occur every ten years in the future, which is not the case. Similarly, authors of this report recognize that in many communities needs are driven by population growth, and in the future total population will exceed the amount of water available due to infrastructure limitations, *regardless of whether or not there is a drought*. This implies that infrastructure limitations would constrain economic growth. However, since needs as defined by planning rules are based upon water supply and demand under the assumption of drought of record conditions, it improper to conduct economic analysis that focuses on growth related impacts over the planning horizon. Figures generated from such an analysis would presume a 50-year drought of record, which is unrealistic. Estimating lost economic activity related to constraints on population and commercial growth due to lack of water would require developing water supply and demand forecasts under “normal” or “most likely” future climatic conditions.

6) IO multipliers measure the strength of backward linkages to supporting industries (i.e., those who sell inputs to an affected sector). However, multipliers say nothing about forward linkages consisting of businesses that purchase goods from an affected sector for further processing. For example, ranchers in many areas sell most of their animals to local meat packers who process animals into a form that consumers ultimately see in grocery stores and restaurants. Multipliers do not capture forward linkages to meat packers, and since meat packers sell livestock purchased from ranchers as “final sales,” multipliers for the ranching sector do fully account for all losses to a region’s economy. Thus, as mentioned previously, in some cases closely linked sectors were moved from on water use category to another.

7) Cautions regarding interpretations of direct and secondary impacts are warranted. IO/SAM multipliers are based on ”fixed-proportion production functions,” which basically means that input use - including labor - moves in lockstep fashion with changes in levels of output. In a scenario where output (i.e., sales) declines, losses in the immediate sector or supporting sectors could be much less than predicted by an IO/SAM model for several reasons. For one, businesses will likely expect to continue operating so they might maintain spending on inputs for future use; or they may be under contractual obligations to purchase inputs for an extended period regardless of external conditions. Also, employers may not lay-off workers given that experienced labor is sometimes scarce and skilled personnel may not be readily available when water shortages subside. Lastly people who lose jobs might find other employment in the region. As a result, direct losses for employment and secondary losses in sales and employment should be considered an *upper bound*. Similarly, since population projections are based on reduced employment in the region, they should be considered an upper bound as well.

8) IO models are static in nature. Models and resultant multipliers are based upon the structure of the U.S. and regional economies in the year 2000. In contrast, unmet water needs are projected to occur well into the future (i.e., 2010 through 2060). Thus, the analysis assumes that the general structure of the economy remains the same over the planning horizon.

9) With respect to municipal needs, an important assumption is that people would eliminate all outdoor water use before indoor water uses were affected, and people would implement emergency indoor water conservation measures before commercial businesses had to curtail operations, and households had to seek alternative sources of water. Section 2.3.3 discusses this in greater detail.

10) Impacts are annual estimates. If one were to assume that conditions persisted for more than one year, figures should be adjusted to reflect the extended duration. The drought of record in Texas for many communities lasted several years.

2. Economic Impact Analysis

Part 2 of this report summarizes analysis for individual water use categories. Section 2.1 presents the year 2000 economic baseline for Region C. Section 2.2 summarizes results for agricultural water uses including livestock and irrigated crop production, while Section 2.3 reviews impacts to municipal and industrial water uses including manufacturing, mining, steam-electric and municipal demands. Attachment B of this report contains tables showing the distribution of impacts at the county level and city level (municipal uses only).

2.1 Regional Economic Baseline

Table 2 summarizes baseline economic variables for Region C.[7] In 2000, the region generated nearly $220 billion worth of income (about 30 percent of the state's total income) that supported an about 3,271,000 jobs (25 percent of all jobs in Texas). Business and industry in Region C also generated slightly more $22 billion in taxes for state and local government. Sections 2.2.and 2.3 discuss contributions of individual water use categories in greater detail.

Table 2: Year 2000 Regional Economic Baseline (monetary figures are in $millions)

	Sales Activity			Jobs	Regional Income	Business Taxes
	Total	Intermediate	Final			
Crop Production[1]	$218.83	$32.83	$186.00	13,870	$150.73	$14.61
% of Total	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%
Livestock	$316.80	$204.60	$112.20	11,770	$178.40	$9.30
% of Total	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%
Manufacturing	$88,204.48	$18,283.54	$69,920.95	382,090	$33,283.27	$943.77
% of Total	21%	17%	22%	12%	15%	4%
Mining[2]	$30,149.95	$5,983.65	$24,166.30	46,445	$13,955.04	$1,728.38
% of Total	7%	6%	8%	1%	6%	8%
Steam Electric	$4,098.49	$1,306.64	$2,791.85	6,060	$2,931.03	$524.89
% of Total	1%	1%	1%	0%	1%	2%
Municipal[3]	$296,990.31	$81,868.68	$215,121.63	2,811,340	$169,246.10	$19,296.42
% of Total	71%	76%	69%	86%	77%	86%
Total	$419,978.90	$107,679.97	$312,298.93	3,271,575	$219,744.53	$22,517.40
% of Total	100%	100%	100%	100%	100%	100%

[1.] Crops include dry-land acreage. [2.] Mining sales represent transactions by corporate entities within Region C, but do not necessarily reflect the physical production of mined goods particularly for the natural gas and oil industry see Section 2.3.2). [3.] "Municipal includes" all non-industrial commercial enterprises and institutional water uses such as the military, schools and other government organizations. Source: Generated using data from MIG, Inc., and models developed by the Texas Water Development Board using IMPLAN Pro™ software.

[7] Baseline figures for income and employment may differ than those presented in year 2002 regional water plans for several reasons. For one, estimates shown in 2002 stem from 1995 economic data. In contrast, current figures are based upon year 2000 data. In addition, previous estimates included annual payroll costs only. Income as defined in Table 2 includes additional measures of wealth such as corporate income, payroll benefits, rental income, proprietor income and interest payments. Figures for jobs in Table 2 are higher because they include full *and* part-time positions. Baseline employment data in 2002 plans reported full-time jobs only

2.2 Agriculture

Irrigated agriculture and livestock make up a relatively small portion of Region C's economy. As shown above, irrigated crop production and the livestock industry accounted for less the one percent of all economic activity in the region.

2.2.1 Irrigation

Significant irrigation shortages were identified in several counties in Region C including Cooke, Collin, Dallas, Kaufman, Rockwall and Tarrant. TWDB data show that most irrigated acreage in the above counties is used for sod and horticultural applications including ornamental landscape plants and trees. Impacts to the horticultural industry were included as part of the analysis for the municipal category (see Section 2.3.3). To avoid double counting, impacts are not tallied as irrigation impacts.

2.2.2 Livestock

No water shortages associated with the livestock industry were reported for Region C.

2.3 Municipal and Industrial Uses

Municipal and industrial (M&I) water uses make up the majority of economic activity in Region C. In 2000, M&I water users generated $419 billion in sales and accounts for 99 percent of all jobs, income and tax generation in the region.

2.3.1 Manufacturing

Table 3 summarizes baseline economic data for manufacturing sectors in the region. Computer semiconductors, aircraft manufacturing, telephone related industries and other electronics manufacturers are the largest individual sectors with a combined income figure of $12.2 billion. Collectively, these industries supported about 83,600 jobs in Region C.

Direct impacts to manufacturing uses were estimated by distributing water shortages among industrial sectors at the county level. Care was taken to include only sectors recorded in the TWDB Water Uses database. Some sectors in IMPLAN databases are not part of the TWDB database given that they use relatively small amounts of water - primarily for on-site sanitation and potable uses. To maintain consistency between IMPLAN and TWDB databases, Standard Industrial Classification (SIC) codes in TWDB databases were matched to IMPLAN sector codes for each affected county. Non-matches were excluded when calculating direct impacts.

The distribution of water shortages among TWDB manufacturing sectors is weighted according to year 2000 water use. Thus, industries most reliant of water for industrial processes are affected the most. In general, these sectors include petroleum and chemical refineries, plastic producers, paper mills, food processors and cement manufacturers. Other manufacturing sectors use considerably less water and are less likely to suffer substantial negative affects due to water shortages.

Table 3: Year 2000 Economic Baseline for Manufacturing (monetary figures are in $millions)						
Sector	Sales Activity			Jobs	Regional Income	Business Taxes
	Total	Intermediate	Final			
Telephone and Telegraph Apparatus	$9,003.98	$1,150.47	$7,853.51	15,419	$3,383.31	$77.24
Semiconductors and Related Devices	$8,573.62	$2,626.91	$5,946.71	26,883	$4,854.15	$80.31
Aircraft	$5,065.08	$281.92	$4,783.16	18,239	$1,426.59	$56.62
Radio and TV Communication Equipment	$4,009.70	$831.35	$3,178.35	10,281	$1,468.82	$35.51
Electronic Components	$3,705.82	$2,463.35	$1,242.47	12,806	$1,074.04	$37.94
All other manufacturing sectors	$57,846.29	$10,929.54	$46,916.75	298,462	$21,076.36	$656.15
Total	$88,204.50	$18,283.50	$69,920.90	382,090	$33,283.30	$943.80
Source: Generated using data from MIG, Inc., and models developed by the TWDB using IMPLAN Pro™ software.						

Direct impacts to manufacturing were estimated by distributing water shortages among industrial sectors at the county level. Care was taken to include only sectors recorded in the TWDB Water Uses database. Some sectors in IMPLAN databases are not part of the TWDB database given that they use relatively small amounts of water - primarily for on-site sanitation and potable uses. To maintain consistency between IMPLAN and TWDB databases, Standard Industrial Classification (SIC) codes in TWDB databases were matched to IMPLAN sector codes for each affected county. Non-matches were excluded when calculating direct impacts.

The distribution of water shortages among TWDB manufacturing sectors is weighted according to year 2000 water use. Accordingly, industries with the greatest use are affected the most. As a general observation, these sectors include petroleum and chemical refineries, plastic producers, paper mills, food processors and cement manufacturers. Other manufacturing sectors use considerably less water for productive processes and are less likely to suffer substantial negative effects due to water shortages. In other words, they would likely be able to haul in enough water by truck to keep their operations running.

The Region C 2006 Water Plan indicates that under drought of record conditions, shortages to manufacturing could occur in Dallas, Denton, Grayson, Henderson, Kaufman, Navarro, Parker, Rockwall, Tarrant and Wise counties. Table 14 summarizes estimated impacts while Attachment B of this report shows impacts by county, and Attachment C shows impacts by major river basin. Simply put, shortages to manufacturing would be devastating to the region's and the state's economy.

Table 4: Annual Economic Impacts of Unmet Water Needs for Manufacturing in Region H (years 2010, 2020, 2030, 2040, 2050 and 2060, constant year 2000 dollars)				
Year	Sales ($millions)	Regional Income ($millions)	Jobs	Business Taxes ($millions)
2010	$3,744.57	$1,814.73	22,200	$43.32
2020	$12,978.66	$6,458.06	78,560	$173.60
2030	$18,430.97	$9,228.40	112,6135	$262.24
2040	$31,340.71	$16,268.86	202,120	$527.57
2050	$55,859.23	$28,794.76	351,930	$871.61
2060	$85,966.30	$45,958.62	568,835	$1,580.37
* Estimates are based on *projected* economic activity in the region. Source: Generated by the Texas Water Development Board, Office of Water Planning.				

2.3.2 Mining

Table 5 summarizes sales, employment and regional income for the mining industry in Region C. In 2000, mining firms generated about $13.9 billion worth of income and provided jobs for nearly 46,000 workers. They also contributed nearly $1.3 billion to state and local taxes. At this juncture, it important to note that output for the natural gas and oil sectors represent transactions by corporate entities based in Region C. However, it does not necessarily reflect the physical production of gas or oil in the region. For instance, company A might employ 300 people at its corporate headquarters in Fort Worth, but it does not drill oil in Tarrant County because most of its well leases are in West Texas. Thus, from an accounting standpoint sales or output appear in Tarrant County as do employment, taxes and income. For example, year 2000 IMPLAN data show nearly $10 billion worth of sales for the gas and oil sector. Clearly, this does not represent production from wells located in Tarrant County. Another related complication is that shortages reported in areas with significant oil and gas extraction would have a significant effect on Region C even though the shortages are reported for another planning region. However, determining the interconnectivity of such relationships would be fairly complex, and hence they are not considered in this report.

To account for potential discrepancies, analysts used data from the Texas Railroad Commission to estimate the actual physical product for the gas and oil sectors in affected counties by comparing average well-head market prices for crude and gas to TRC production statistics. If there were large discrepancies, which was indeed the case in Region C, estimates that based on TRC data were used to assess direct impacts of unmet needs.

Other considerations with respect to mining include:

1) Petroleum and gas extraction industry only uses water in significant amounts for secondary recovery. Known in the industry as “enhanced” or “water flood” extraction, secondary recovery involves pumping water down injection wells to increase underground pressure thereby pushing oil or gas into other wells. IMPLAN output numbers do not distinguish between secondary and non-secondary recovery. To account for the discrepancy, county-level TRC data that shows the proportion of barrels produced using secondary methods were used to adjust IMPLAN data to reflect only the portion of sales attributed to secondary recovery.

2) A substantial portion of output from the crude extraction sector goes directly to other regional industries in the form of intermediate sales. Obviously, most goes to oil refineries, which are an important forward linkage for the gas and crude mining sector. Thus, reduced drilling activity resulting from water shortages might affect regional oil refineries. However, these impacts were not included here to avoid double counting. Impacts to refineries were incorporated when estimating impacts to manufacturing sectors (see Section 2.3.1).

3) Unlike output in other sectors including manufacturing and municipal, output in the crude and natural gas sectors is not assumed to grow over the planning horizon. Water use will likely increase as secondary recovery occurs in more fields, but the volume of oil and gas extracted from on-shore wells in the state is not likely to grow significantly. However, the analysis does presume that real prices of oil and gas will increase through time and thus sales revenues will increase.

Table 5: Year 2000 Economic Baseline for Mining (monetary figures are in $millions)

Sector	Sales			Jobs	Regional Income	Business Taxes
	Total	Intermediate	Final			
Natural Gas & Crude Petroleum	$24,600.03 ($205.36) *	$4,900.92	$19,699.11	43,305	$11,494.18	$1,347.94
Natural Gas Liquids	$5,252.30 ($1,648.17)*	$1,046.38	$4,205.91	1,680	$2,306.45	$362.64
All Other Mining Sectors	$297.63	$36.35	$261.28	1,460	$154.41	$17.79
Total	$30,150.00	$5,983.60	$24,166.30	46,445	$13,955.00	$1,728.40

* Figures in parenthesis represent sales of oil and gas produced by wells located in Region C counties. Remaining sales are from oil and gas mined from wells outside the region but owned and operated by companies based in Region C. Source: Generated using data from MIG, Inc., and models developed by the TWDB using IMPLAN Pro™ software. Figures for physical output in the region are on data from the Texas Railroad Commission and the U.S. Energy Information Agency.

The 2006 Region C Water Plan indicates that under drought of record conditions, shortages to mining would occur in Collin, Cooke, Dallas, Denton, Tarrant and Wise counties. Table 6 summarizes estimated impacts. Attachment B of this report shows impacts by county, and Attachment C shows impacts by major river basin.

Table 6: Annual Economic Impacts of Unmet Water Needs for Mining (years 2010, 2020, 2030, 2040, 2050 and 2060, constant year 2000 dollars)				
Year	Sales ($millions)	Regional Income ($millions)	Jobs	Business Taxes ($millions)
2010	$87.34	$39.10	315	$9.19
2020	$154.05	$71.64	380	$12.42
2030	$302.66	$143.89	510	$19.58
2040	$352.83	$168.60	545	$21.60
2050	$405.10	$193.88	600	$24.32
2060	$450.59	$215.87	650	$26.72
* Estimates are based on *projected* economic activity in the region. Source: Generated by the Texas Water Development Board, Office of Water Planning.				

2.3.3 Municipal Uses

Table 7 summarizes economic activity for municipal uses. In 2000, businesses and institutions that make up the municipal category sold $296.9 billion worth of goods and services. In return, they received $169.2 billion in wages, salaries and profits. Municipal uses generate the bulk of business taxes in the region – nearly $19.3 billion (87 percent of all business taxes in the region). Top commercial sectors in terms of income and output include wholesale trade, real estate, banking, communications services, computer related businesses and banking.

Table7: Year 2000 Economic Baseline for Municipal Sectors (monetary figures are in $millions)						
Sector	Sales Activity			Jobs	Regional Income	Business Taxes
	Total	Intermediate	Final			
Wholesale Trade	$34,517.30	$10,690.44	$23,826.86	221,030	$19,046.98	$4,953.78
Real Estate	$30,208.73	$7,751.02	$22,457.72	117,200	$17,915.08	$3,573.32
Communications	$19,376.30	$4,435.94	$14,940.36	56,590	$10,042.57	$1,068.76
Computer and Data Services	$10,972.69	$5,498.78	$5,473.91	93,755	$8,877.90	$166.56
Banking	$8,457.53	$3,609.58	$4,847.95	33545	$5,464.02	$136.70
All Other Municipal Sectors	$184,759.00	$49,200.24	$135,558.77	2,289,220	$103,051.39	$8,702.97
Total	$296,990.31	$81,868.68	$215,121.63	2,811,340	$169,246.10	$19,296.40
Source: Generated using data from MIG, Inc., and models developed by the TWDB using IMPLAN Pro™ software.						

Estimating direct economics impacts for the municipal category is complicated for a number of reasons. For one, municipal uses comprise a range of different consumers including commercial businesses, institutions (e.g., schools and government) and households. However, reported shortages do not specify how needs are distributed among different consumers. In other words, how much of a municipal need is commercial and how much is residential? The amount of commercial water use as a percentage of total municipal demand was estimated based on "GED" coefficients (gallons per employee per day) published in secondary sources (see Attachment A). For example, if year 2000 baseline data for a given economic sector (e.g., amusement and recreation services) shows employment at 30 jobs and the GED coefficient is 200, then average daily water use by that sector is (30 x 200 = 6,000 gallons) and thus annual use is 6.7 acre-feet. Water not attributed to commercial use is considered domestic, which includes single and multi-family residential consumption, institutional uses and all use designated as "county-other." The estimated proportion of water used for commercial purposes ranges from about 5 to 35 percent of total municipal demand at the county level. Less populated rural counties occupy the lower end of the spectrum, while larger metropolitan counties are at the higher end.

As mentioned earlier, a key study assumption is that people would eliminate outdoor water use before indoor water consumption was affected; and they would implement *voluntary* emergency indoor water conservation measures before people had to curtail business operations or seek emergency sources of water. This is logical because most water utilities have drought contingency plans. Plans usually specify curtailment or elimination of outdoor water use during periods of drought. In Texas, state law requires retail and wholesale water providers to prepare and submit plans to the Texas Commission on Environmental Quality (TCEQ). Plans must specify demand management measures for use during drought including curtailment of "non-essential water uses."[8] Thus, when assessing municipal needs there are several important considerations: 1) how much of a need would people reduce via eliminating outdoor uses and implementing emergency indoor conservation measures; and 2) what are the economic implications of such measures?

Determining how much water is used for outdoor purposes is key to answering these questions. The proportion used here is based on several secondary sources. The first is a major study sponsored by the American Water Works Association, which surveyed cities in states including Colorado, Oregon, Washington, California, Florida and Arizona. On average across all cities surveyed 58 percent of residential water use was for outdoor activities. In cities with climates comparable to large metropolitan areas of Texas, the average was 40 percent.[9]Earlier findings of the U.S. Water Resources Council showed a national average of 33 percent. Similarly, the United States Environmental Protection Agency (USEPA) estimated that landscape watering accounts for 32 percent of total residential and commercial water use on annual basis.[10] A study conducted for the California Urban Water Agencies (CUWA) calculated values ranging from 25 to 35 percent.[11] Unfortunately, there does not appear to be any comprehensive research that has estimated non-agricultural outdoor water use in Texas. As an approximation, an average annual value of 30 percent based on the above references was selected to serve as a rough estimate in this study. With respect to emergency indoor conservation measures, this analysis assumes that citizens in affected communities would reduce needs by an additional 20 percent. Thus, 50

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[8] Non-essential uses include, but are not limited to, landscape irrigation and water for swimming pools or fountains. For further information see the Texas Environmental Quality Code §288.20.

[9] See, Mayer, P.W., DeOreo, W.B., Opitz, E.M., Kiefer, J.C., Davis, W., Dziegielewski, D., Nelson, J.O. "*Residential End Uses of Water*." Research sponsored by the American Water Works Association and completed by Aquacraft, Inc. and Planning and Management Consultants, Ltd. (PMCL@CDM).

[10] U.S. Environmental Protection Agency. *"Cleaner Water through Conservation*." USEPA Report no. 841-B-95-002. April, 1995.

[11] Planning and Management Consultants, Ltd. "*Evaluating Urban Water Conservation Programs: A Procedures Manual*." Prepared for the California Urban Water Agencies. February 1992.

percent of total needs could be eliminated before households and businesses had to implement emergency water procurement activities.

Eliminating outdoor watering would have a range of economic implications. For one, such a restriction would likely have adverse impacts on the landscaping and horticultural industry. If people are unable to water their lawns, they will likely purchase less lawn and garden materials such as plants and fertilizers. On the other hand, during a bad drought people may decide to invest in drought tolerant landscaping, or they might install more efficient landscape plumbing and other water saving devices. But in general, the horticultural industry would probably suffer considerable losses if outdoor water uses were restricted or eliminated. For example, many communities in Colorado, which is in the midst of a prolonged drought, have severely restricted lawn irrigation. In response, the turf industry in Colorado has laid off at least 50 percent of its 2,000 employees.[12] To capture impacts to the horticultural industry, regional sales net of exports for the greenhouse and nursery sectors and the landscaping services sector were reduced by proportion equal to reductions in outdoor water use. Note that these losses would not necessarily appear as losses to the regional or state economies because people would likely spend the money that they would have spent on landscaping on other goods in the economy. Thus, the net effect to state or regional accounts could be neutral.

Other considerations include the "welfare" losses to consumers who had to forgo outdoor and indoor water uses to reduce needs. In other words, the water that people would have to give up has an economic value. Estimating the economic value of this forgone water for each planning area would be a very time consuming and costly task, and thus secondary sources served as a proxy. Previous research funded by the TWDB, explored consumer "willingness to pay" for avoiding restrictions on water use.[13] Surveys revealed that residential water consumers in Texas would be willing to pay – on average across all income levels - $36 to avoid a 30 percent reduction in water availability lasting for at least 28 days. Assuming the average person in Texas uses 140 gallons per day and the typical household in the state has 2.7 persons (based on U.S. Census data), total monthly water use is 13,205 gallons per household. Therefore, the value of restoring 30 percent of average monthly water use during shortages to residential consumers is roughly one cent per gallon or $2,930 per acre-foot. This figure serves as a proxy to measure consumer welfare losses that would result from restricted outdoor uses and emergency indoor restrictions.

The above data help address the impacts of incurring water needs that are 50 percent or less of projected use. Any amount greater than 50 percent would result in municipal water consumers having to seek alternative sources. Costs to residential and non-water intensive commercial operations (i.e., those that use water only for sanitary purposes) are based on the most likely alternative source of water in the absence of water management strategies. In this case, the most likely alternative is assumed to be "hauled-in" water from other communities at annual cost of $6,530 per acre-foot for small rural communities and approximately and $10,995 per acre-foot for metropolitan areas.[14]

This is not an unreasonable assumption. It happened during the 1950s drought and more recently in Texas and elsewhere. For example, in 2000 at the heels of three consecutive drought years Electra - a small town in North Texas - was down to its last 45 days worth of reservoir water when rain replenished the lake, and the city was able to refurbish old wells to provide

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[12] Based on assessments of the Rocky Mountain Sod Growers. See, "*Drought Drying Up Business for Landscapers*." Associated Press. September, 17 2002.

[13] See, Griffin, R.C., and Mjelde, W.M. "*Valuing and Managing Water Supply Reliability*. Final Research Report for the Texas Water Development Board: Contract no. 95-483-140." December 1997.

[14] For rural communities, figure assumes an average truck hauling distance of 50 miles at a cost of 8.4 cents per ton-mile (an acre foot of water weighs about 1,350 tons) with no rail shipment. For communities in metropolitan areas, figure assumes a 50 mile truck haul, and a rail haul of 300 miles at a cost of 1.2 cents per ton-mile. Cents per ton-mile are based on figures in: Forkenbrock, D.J., "*Comparison of External Costs of Rail and Truck Freight Transportation*." Transportation Research. Vol. 35 (2001).

supplemental groundwater. At the time, residents were forced to limit water use to 1,000 gallons per person per month - less than half of what most people use - and many were having water hauled delivered to their homes by private contractors.[15] In 2003 citizens of Ballinger, Texas, were also faced with a dwindling water supply due to prolonged drought. After three years of drought, Lake Ballinger, which supplies water to more than 4,300 residents in Ballinger and to 600 residents in nearby Rowena, was almost dry. Each day, people lined up to get water from a well in nearby City Park. Trucks hauling trailers outfitted with large plastic and metal tanks hauled water to and from City Park to Ballinger.[16] In Australia, four cities have run out of water as a result of drought, and residents have been trucking in water since November 2002. One town has five trucks carting about one acre-foot eight times daily from a source 20 miles away. They had to build new roads and infrastructure to accommodate the trucks. Residents are currently restricted to indoor water use only.[17]

Direct impacts to commercial sectors were estimated in a fashion similar to other business sectors. Output was reduced among "water intensive" commercial sectors according to the severity of projected shortages. Water intensive is defined as non-medical related sectors that are heavily dependent upon water to provide their services. These include:

- car-washes,
- laundry and cleaning facilities,
- sports and recreation clubs and facilities including race tracks,
- amusement and recreation services,
- hotels and lodging places, and
- eating and drinking establishments.

For non-water intensive sectors, it is assumed that businesses would haul water by truck and/or rail.

An example will illustrate the breakdown of municipal water needs and the overall approach to estimating impacts of municipal needs. Assume City B has an unmet need of 50 acre feet in 2020 and projected demands of 200 acre-feet. In this case, residents of City B could eliminate needs via restricting all outdoor water use. City A, on the other hand, has an unmet need of 150 acre-feet in 2020 with a projected demand of 200 acre-feet. Thus, total shortages are 75 percent of total demand. Emergency outdoor and indoor conservation measures would eliminate 50 acre-feet of projected needs; however, 50 acre-feet would still remain. This remaining portion would result in costs to residential and commercial water users. Water intensive businesses such as car washes, restaurants, motels, race tracks would have to curtail operations (i.e., output would decline), and residents and non-water intensive businesses would have to have water hauled-in assuming it was available.

The last element of municipal water shortages considered focused on lost water utility revenues. Estimating these was straightforward. Analyst used annual data from the "*Water and Wastewater Rate Survey*" published annually by the Texas Municipal League to calculate an average value per acre-foot for water and sewer. For water revenues, averages rates multiplied by total water needs served as a proxy. For lost wastewater, total unmet needs were adjusted for return flow factor of 0.60 and multiplied by average sewer rates for the region. Needs reported as "county-other" were excluded under the presumption that these consist primarily of self-supplied water uses. In addition, 15 percent of water demand and needs are considered non-billed or "unaccountable" water that comprises things such leakages and water for municipal government functions (e.g., fire departments). Lost tax receipts are based on current rates for the

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[15] Zewe, C. "*Tap Threatens to Run Dry in Texas Town*." July 11, 2000. CNN Cable News Network.

[16] Associated Press, "*Ballinger Scrambles to Finish Pipeline before Lake Dries Up*." May 19, 2003.

[17] Healey, N. (2003) *Water on Wheels*, Water: Journal of the Australian Water Association, June 2003.

“miscellaneous gross receipts tax, “which the state collects from utilities located in most incorporated cities or towns in Texas.

The Region C 2006 Water Plan indicates that under drought of record conditions, shortages to municipal water uses would occur in Collin, Cooke, Dallas, Denton, Ellis, Fannin, Freestone, Grayson, Henderson, Kaufman, Navarro, Parker, Rockwall, Tarrant and Wise counties. Tables 8 through 11 summarize estimated impacts to domestic uses, commercial businesses, water utilities and the horticultural industry. Attachment B of this report shows impacts by county, and Attachment C shows impacts by major river basin.

Table 8: Annual Economic Impacts of Unmet Water Needs for Commercial Businesses
(years 2010, 2020, 2030, 2040, 2050 and 2060, constant year 2000 dollars)

Year	Sales ($millions)	Regional Income ($millions)	Jobs	Business Taxes ($millions)
2010	$77.14	$44.63	1,475	$4.61
2020	$177.01	$103.21	3,380	$10.76
2030	$495.54	$290.02	9,440	$34.47
2040	$1,135.84	$665.85	21,620	$80.97
2050	$2,158.99	$1,265.64	40,875	$150.46
2060	$4,155.61	$2,429.72	78,045	$332.29

* Estimates are based on *projected* economic activity in the region. Source: Source: Generated by the Texas Water Development Board, Office of Water Planning.

Table 9: Annual Economic Impacts of Unmet Water Needs for the Horticultural Industry
(years 2010, 2020, 2030, 2040, 2050 and 2060, constant year 2000 dollars)

Year	Sales ($millions)	Regional Income ($millions)	Jobs	Business Taxes ($millions)
2010	$128.20	$79.12	2,630	$2.90
2020	$287.04	$177.15	6,885	$6.50
2030	$429.46	$265.05	11,630	$9.72
2040	$568.02	$350.56	17,095	$12.86
2050	$729.41	$450.17	24,510	$16.51
2060	$910.06	$561.65	34,160	$20.60

Source: Generated by the Texas Water Development Board, Office of Water Planning.

Table 10: Annual Costs to Domestic Water Users (years 2010, 2020, 2030, 2040, 2050 and 2060, constant year 2000 dollars)	
Year	($millions)
2010	$697.64
2020	$1,598.43
2030	$2,524.87
2040	$3,620.29
2050	$4,992.68
2060	$6,782.83
Source: Generated by the Texas Water Development Board, Office of Water Planning.	

Table 11: Annual Losses of Water Utility Revenues and Taxes due to Unmet Water Needs (years 2010, 2020, 2030, 2040, 2050 and 2060, constant year 2000 dollars)		
Year	Revenues ($millions)	Utility Taxes ($millions)
2010	$368.87	$6.50
2020	$739.76	$13.04
2030	$1,000.24	$17.63
2040	$1,306.76	$23.03
2050	$1,628.94	$28.71
2060	$1,995.32	$35.17
Source: Generated by the Texas Water Development Board, Office of Water Planning.		

2.3.4 Steam-Electric Uses

The steam electric sector represents economy activity associated with retail and wholesale transactions of electricity. As shown in Table 12, in 2000 the electric services sector generated annual sales of approximately $4.1 billion that resulted in nearly $2.9 billion in income for Region C residents. The electric services sector directly provides an estimated 6,060 full and part-time jobs for the region.

Table 10: Year 2000 Economic Baseline for Steam-Electric (monetary figures are in $millions)						
Sector	Sales Activity			Jobs	Regional Income	Business Taxes paid by Sector
	Total	Intermediate	Final			
Electric Services	$4,098.50	$1,306.60	$2,791.90	6,060	$2,931.00	$524.90
Source: Generated using data from MIG, Inc., and models developed by the TWDB using IMPLAN Pro™ software.						

Without adequate cooling water, power plants cannot safely operate. As water availability falls below projected demands, water levels in lakes and rivers that provide cooling water would also decline, particularly during drought when surface flows are reduced. Low water levels could affect raw water intakes and water discharge outlets (i.e., outfalls) at power facilities in several ways. For one, power plants are regulated by thermal emission guidelines that specify the maximum amount of heat that can go back into a river or lake via discharged cooling water. Low lake or river levels could result in permit compliance issues due to reduced dilution and dispersion of heat and subsequent impacts on aquatic biota near outfalls.[18] But the primary concern would be a loss of head (i.e., pressure) over intake structures that would decrease flows through intake tunnels. This could affect safety related pumps, increase operating costs and/or result in sustained shut-downs. Assuming plants did shutdown, they would not be able to generate electricity, which implies that output (i.e., sales of electricity) would decline.

Among all water use categories steam-electric is unique and cautions are necessary when applying methods used in this study. Measured changes to an economy using input-output models stem directly from changes in sales revenue. In the case of water shortages, one assumes that businesses will suffer lost output if process water is in short supply. For power generation facilities this is true as well. However, the electric services sector in IMPLAN represents a corporate entity that may own and operate several power plants in a given region. If one plant became inoperable due to water shortages, plants in other areas or generation facilities that do not rely heavily water (e.g., gas powered turbines or "peaking plants") might be able to compensate for lost generating capacity. Utilities could also offset lost production via purchases on the spot market.[19] Thus, to presume that electricity would stop flowing may be unrealistic, but to maintain consistency, the model assumes that water shortages would result in lost sales of electricity.[20] Another related consideration is that IMPLAN output data report all sales transactions for particular utility in a given county - including sales generated from stations outside a county. As a countermeasure, analysts estimated sales for affected counties using production and price data from the U.S. Energy Information Administration.

The Region C 2006 Water Plan indicates that under drought of record conditions, shortages to steam-electric water uses would occur in Harris and Liberty counties. Table 19

[18] Section 316 (b) of the Clean Water Act requires that thermal wastewater discharges do not harm fish and other wildlife.

[19] Today, most utilities participate in large interstate "power pools" and can buy or sell electricity "on the grid" from other utilities or power marketers. Thus, assuming power was available to buy, and assuming that no contractual or physical limitations were in place (e.g., transmission constraints); utilities could offset lost power that resulted from waters shortages with purchases via the power grid.

[20] Losses offset through grid purchases or from peaking plants would likely result in higher production costs, which utilities would ultimately pass on to consumers in the form of higher utility bills. Determining the impacts of higher costs is not considered in this study.

summarizes estimated impacts. Attachment B of this report shows impacts by county, and Attachment C shows impacts by major river basin.

Table 19: Annual Economic Impacts of Unmet Water Needs for Steam-electric Water Uses (years 2010, 2020, 2030, 2040, 2050 and 2060, constant year 2000 dollars)				
Year	Total Sales	Regional Income ($millions)	Jobs	Business Taxes
2010	$400.14	$345.69	1,140	$61.92
2020	$868.42	$750.24	2,470	$134.37
2030	$1,106.58	$956.00	3,150	$171.23
2040	$1,291.03	$1,115.34	3,770	$199.77
2050	$1,931.73	$1,668.86	5,490	$298.90
2060	$3,299.83	$2,850.80	9,380	$510.57
Source: Generated by the Texas Water Development Board, Office of Water Planning.				

3. Regional Social Impacts

As discussed previously in Section 1.2, estimated social impacts focus changes including population loss and subsequent related in school enrollment. As shown in Table 20, water shortages in 2010 could result in a population loss of 38,500 people with a corresponding reduction is school enrollment of 8,700. Models indicate that shortages in 2060 could cause population in the region to fall by 1,007,000 people and school enrollment by 235,500 students.

Table 20: Estimated Regional Social Impacts of Unmet Water Needs (years, 2010, 2020, 2030, 2040, 2050 and 2060)		
Year	Population Losses	Declines in School Enrollment
2010	38,500	8,700
2020	130,700	30,000
2030	199,500	46,400
2040	356,700	83,300
2050	616,600	144,100
2060	1,007,000	235,500
Source: Generated by the Texas Water Development Board, Office of Water Planning.		

Attachment A: Baseline Regional Economic Data

Tables A-1 through A-6 contain data from several sources that form a basis of analyses in this report. Economic statistics were extracted and processed via databases purchased from MIG, Inc. using IMPLAN Pro™ software. Values for gallons per employee (i.e. GED coefficients) for the municipal water use category are based on several secondary sources.[21] County-level data sets along with multipliers are not included given their large sizes (i.e., 528 sectors per county each with 12 different multiplier coefficients). Fields in Tables A-1 through A-6 contain the following variables:

- *GED -* average gallons of water use per employee per day (municipal use only);
- *total sales -* total industry production measured in millions of dollars (equal to shipments plus net additions to inventories);
- *intermediate sales -* sales to other industries in the region measured in millions of dollars;
- *final sales -* all sales to end-users including sales to households in the region and exports out of the region;
- *jobs -* number of full and part-time jobs (annual average) required by a given industry;
- *regional income -* total payroll costs (wages and salaries plus benefits), proprietor income, corporate income, rental income, interest, and corporate transfer payments;
- *business taxes –* sales taxes, excise taxes, fees, licenses and other taxes paid during normal business operations (includes all payments to federal, state and local government except income taxes).

Table A-1: Baseline Economic Data for Crop Production in Region C (Year 2000)

Sector	Total Sales	Intermediate Sales	Final Sales	Jobs	Regional Income	Business Taxes
Cotton	$12.99	$0.18	$12.81	206	$10.10	$0.88
Food Grains	$14.32	$1.94	$12.38	699	$10.26	$1.00
Feed Grains	$59.13	$6.90	$52.23	1628	$46.57	$5.22
Hay and Pasture	$103.25	$12.04	$91.20	10452	$61.04	$6.00
Fruits	$2.83	$0.03	$2.80	100	$1.64	$0.09
Tree Nuts	$4.64	$2.27	$2.38	128	$3.12	$0.08
Vegetables	$8.21	$2.02	$6.20	151	$6.92	$0.26
Oil Bearing Crops	$13.46	$7.46	$6.00	509	$11.08	$1.08
Total	$218.83	$32.83	$186.00	13,873	$150.73	$14.61

* Includes dry-land production.

[21] Sources for GED coefficients include: Gleick, P.H., Haasz, D., Henges-Jeck, C., Srinivasan, V., Wolff, G. Cushing, K.K., and Mann, A. "*Waste Not, Want Not*: *The Potential for Urban Water Conservation in California*." Pacific Institute. November 2003. U.S. Bureau of the Census. 1982 Census of Manufacturers: Water Use in Manufacturing. USGPO, Washington D.C. See also: "*U.S. Army Engineer Institute for Water Resources, IWR Report 88-R-6.*," Fort Belvoir, VA. See also, Joseph, E. S., 1982, "*Municipal and Industrial Water Demands of the Western United States*." Journal of the Water Resources Planning and Management Division, Proceedings of the American Society of Civil Engineers, v. 108, no. WR2, p. 204-216. See also, Baumann, D. D., Boland, J. J., and Sims, J. H., 1981, "*Evaluation of Water Conservation for Municipal and Industrial Water Supply*." U.S. Army Corps of Engineers, Institute for Water Resources, Contract no. 82-C1.

Table A-2: Baseline Economic Data for Livestock Sectors, Region C (Year 2000)

Sector	Total Sales	Intermediate Sales	Final Sales	Jobs	Regional Income	Business Taxes
Dairy Farm Products	$45.58	$21.34	$24.24	656	$35.60	$0.26
Poultry and Eggs	$19.38	$10.07	$9.31	170	$5.80	$0.10
Ranch Fed Cattle	$128.10	$97.77	$30.33	4935	$66.42	$4.77
Range Fed Cattle	$67.69	$48.39	$19.30	2880	$40.82	$2.63
Cattle Feedlots	$15.24	$14.88	$0.36	84	$13.36	$1.04
Sheep, Lambs and Goats	$0.30	$0.28	$0.02	49	$0.13	$0.01
Hogs, Pigs and Swine	$3.07	$3.01	$0.06	87	$1.28	$0.15
Other Meat Animal Products	$0.02	$0.02	$0.00	1	$0.00	$0.00
Miscellaneous Livestock	$37.45	$8.87	$28.57	2,910	$14.95	$0.38
Total	$316.82	$204.63	$112.19	11,773	$178.37	$9.30

Table A-3: Baseline Economic Data for Manufacturing Sectors, Region C (Year 2000)

Sector	Total Sales	Intermediate Sales	Final Sales	Jobs	Regional Income	Business Taxes
Abrasive Products	$12.55	$0.45	$12.10	66	$3.84	$0.14
Adhesives and Sealants	$182.16	$104.14	$78.02	636	$70.48	$1.92
Agricultural Chemicals, N.E.C	$40.79	$5.00	$35.79	154	$23.83	$0.48
Aircraft	$5,065.08	$281.92	$4,783.16	18239	$1,426.59	$56.62
Aircraft and Missile Engines and Parts	$459.57	$177.57	$282.00	2156	$147.74	$3.78
Aircraft and Missile Equipment,	$1,605.25	$26.57	$1,578.68	9769	$857.60	$16.91
Aluminum Foundries	$63.10	$4.94	$58.16	552	$24.39	$0.61
Aluminum Rolling and Drawing	$494.43	$24.26	$470.16	1591	$101.22	$4.77
Ammunition, Except For Small Arms,	$0.13	$0.00	$0.12	4	$0.11	$0.00
Analytical Instruments	$175.17	$22.32	$152.85	727	$71.85	$2.23
Animal and Marine Fats and Oils	$31.68	$12.92	$18.77	116	$9.87	$0.23
Apparel Made From Purchased	$832.73	$13.80	$818.94	7009	$263.80	$4.34
Architectural Metal Work	$128.11	$4.40	$123.71	1074	$75.11	$1.26
Asphalt Felts and Coatings	$412.19	$121.58	$290.61	864	$276.63	$3.74
Automatic Merchandising Machine	$1.50	$0.75	$0.74	9	$0.59	$0.02
Automatic Temperature Controls	$4.71	$4.14	$0.57	64	$2.65	$0.05
Automotive and Apparel Trimmings	$157.49	$81.37	$76.12	1062	$35.68	$1.05
Automotive Stampings	$84.88	$29.63	$55.25	511	$18.93	$0.65
Bags, Paper	$6.16	$0.04	$6.12	36	$1.92	$0.06
Bags, Plastic	$453.66	$2.66	$451.00	2100	$157.62	$5.17
Ball and Roller Bearings	$0.95	$0.00	$0.95	8	$0.27	$0.01
Blankbooks and Looseleaf Binder	$129.14	$19.22	$109.92	1028	$47.15	$1.61
Blast Furnaces and Steel Mills	$527.78	$90.02	$437.76	1611	$102.35	$4.84
Blended and Prepared Flour	$168.69	$1.55	$167.13	550	$27.22	$1.43
Blinds, Shades, and Drapery Hardware	$102.27	$0.48	$101.79	1112	$47.96	$0.71
Blowers and Fans	$169.69	$2.53	$167.16	1653	$67.87	$1.41
Boat Building and Repairing	$10.15	$0.05	$10.09	100	$2.89	$0.06
Book Printing	$74.73	$26.04	$48.69	486	$28.06	$1.03
Book Publishing	$580.06	$23.96	$556.11	2447	$186.65	$6.48
Bookbinding & Related	$38.54	$10.33	$28.21	601	$19.21	$0.42
Bottled and Canned Soft Drinks & Water	$567.89	$4.40	$563.49	1651	$123.89	$4.53
Brass, Bronze, and Copper Foundries	$0.88	$0.06	$0.82	30	$0.47	$0.01
Bread, Cake, and Related Products	$461.67	$147.32	$314.35	2750	$159.74	$2.72
Brick and Structural Clay Tile	$66.31	$0.40	$65.91	573	$27.83	$0.86
Broadwoven Fabric Mills and Finishing	$12.35	$3.52	$8.83	77	$5.61	$0.15
Brooms and Brushes	$4.03	$0.16	$3.88	25	$2.26	$0.06
Burial Caskets and Vaults	$5.26	$0.33	$4.93	50	$4.11	$0.05
Calculating and Accounting Machines	$50.57	$8.26	$42.31	308	$25.94	$0.43
Canned and Cured Sea Foods	$0.17	$0.00	$0.17	1	$0.04	$0.00
Canned Fruits and Vegetables	$26.83	$0.25	$26.58	105	$10.38	$0.23
Canned Specialties	$34.93	$0.27	$34.67	76	$11.10	$0.26
Canvas Products	$17.62	$10.39	$7.23	217	$9.04	$0.13
Carbon and Graphite Products	$82.57	$13.07	$69.50	407	$33.80	$0.81
Carbon Black	$0.67	$0.58	$0.10	2	$0.29	$0.00
Carbon Paper and Inked Ribbons	$11.47	$0.29	$11.19	84	$6.28	$0.16
Carburetors, Pistons, Rings, Valves	$13.10	$1.64	$11.47	112	$4.02	$0.09

Table A-3: Baseline Economic Data for Manufacturing Sectors, Region C (Year 2000)

Carpets and Rugs	$22.59	$0.30	$22.28	97	$8.85	$0.30
Cement, Hydraulic	$149.49	$0.47	$149.02	395	$56.21	$2.40
Ceramic Wall and Floor Tile	$202.60	$2.95	$199.65	2043	$98.55	$2.74
Cheese, Natural and Processed	$16.31	$3.50	$12.81	37	$2.59	$0.13
Chemical Preparations, N.E.C	$181.86	$122.75	$59.11	500	$62.21	$1.80
Clay Refractories	$16.33	$0.03	$16.30	106	$9.01	$0.24
Coated Fabrics, Not Rubberized	$23.91	$0.85	$23.06	141	$4.88	$0.16
Cold Finishing Of Steel Shapes	$4.37	$0.75	$3.62	21	$1.03	$0.03
Commercial Laundry Equipment	$1.54	$1.08	$0.46	10	$0.75	$0.02
Commercial Printing	$2,115.84	$928.38	$1,187.47	16729	$838.78	$25.09
Communications Equipment N.E.C.	$341.63	$70.83	$270.80	2522	$228.94	$3.18
Complete Guided Missiles	$2.34	$0.07	$2.26	8	$1.32	$0.03
Computer Peripheral Equipment,	$206.78	$85.61	$121.17	674	$53.28	$1.67
Computer Storage Devices	$2.22	$0.92	$1.30	6	$0.66	$0.02
Computer Terminals	$0.07	$0.03	$0.04	3	$0.07	$0.00
Concrete Block and Brick	$49.94	$0.36	$49.58	259	$20.72	$0.93
Concrete Products, N.E.C	$267.85	$1.80	$266.05	2136	$100.31	$3.71
Condensed and Evaporated Milk	$13.06	$2.98	$10.08	26	$2.81	$0.08
Confectionery Products	$100.23	$1.91	$98.32	405	$24.91	$0.57
Construction Machinery and Equipment	$92.01	$3.69	$88.32	352	$19.38	$0.77
Converted Paper Products, N.E.C	$114.26	$1.61	$112.65	544	$35.32	$1.12
Conveyors and Conveying Equipment	$171.52	$32.89	$138.63	1028	$62.89	$1.56
Cookies and Crackers	$12.98	$0.46	$12.52	93	$4.88	$0.09
Copper Rolling and Drawing	$28.67	$4.66	$24.02	82	$4.58	$0.32
Cordage and Twine	$28.51	$0.46	$28.05	251	$9.66	$0.33
Costume Jewelery	$14.42	$0.15	$14.27	115	$9.47	$0.17
Cottonseed Oil Mills	$6.17	$5.84	$0.33	15	$1.09	$0.06
Creamery Butter	$0.34	$0.10	$0.23	1	$0.05	$0.00
Curtains and Draperies	$80.76	$11.33	$69.43	899	$21.13	$0.48
Cut Stone and Stone Products	$58.50	$0.49	$58.01	721	$31.13	$0.64
Cyclic Crudes, Interm. & Indus. Organic	$736.41	$463.01	$273.40	817	$239.89	$17.32
Dehydrated Food Products	$13.35	$0.39	$12.97	68	$4.55	$0.09
Dental Equipment and Supplies	$5.04	$3.37	$1.66	27	$1.07	$0.05
Die-cut Paper and Board	$45.71	$0.56	$45.15	360	$13.16	$0.44
Dog, Cat, and Other Pet Food	$0.93	$0.03	$0.90	2	$0.10	$0.00
Dolls	$0.63	$0.02	$0.61	27	$0.58	$0.01
Drugs	$1,084.77	$280.01	$804.75	3296	$619.49	$12.97
Electric Housewares and Fans	$64.52	$1.65	$62.87	710	$27.25	$0.56
Electric Lamps	$3.65	$0.04	$3.61	16	$2.42	$0.04
Electrical Equipment, N.E.C.	$38.53	$8.60	$29.93	173	$9.21	$0.23
Electrical Industrial Apparatus, N.E.C.	$31.76	$4.77	$26.99	107	$7.82	$0.32
Electromedical Apparatus	$56.18	$19.29	$36.89	227	$14.91	$0.55
Electrometallurgical Products	$1.52	$0.42	$1.10	8	$0.20	$0.01
Electron Tubes	$0.81	$0.73	$0.08	6	$0.23	$0.01
Electronic Components, N.E.C.	$3,705.82	$2,463.35	$1,242.47	12806	$1,074.04	$37.94
Electronic Computers	$177.27	$89.52	$87.75	514	$81.70	$1.69
Elevators and Moving Stairways	$83.37	$26.73	$56.64	494	$23.05	$0.58
Engine Electrical Equipment	$127.41	$68.33	$59.08	752	$47.76	$1.17
Envelopes	$178.29	$1.45	$176.84	1060	$62.10	$1.92
Explosives	$45.11	$14.02	$31.09	220	$24.59	$0.45
Fabricated Metal Products, N.E.C.	$136.73	$27.23	$109.50	992	$45.45	$1.10
Fabricated Plate Work (Boiler Shops)	$287.35	$4.05	$283.30	2774	$164.05	$2.83
Fabricated Rubber Products, N.E.C.	$335.11	$2.87	$332.23	2178	$107.94	$2.46
Fabricated Structural Metal	$542.87	$17.34	$525.53	2924	$232.45	$6.00
Fabricated Textile Products, N.E.C.	$128.31	$51.61	$76.70	900	$36.42	$0.81
Farm Machinery and Equipment	$7.63	$4.18	$3.45	46	$1.86	$0.05
Fasteners, Buttons, Needles, Pins	$1.55	$0.04	$1.51	34	$1.31	$0.02
Fertilizers, Mixing Only	$26.03	$1.94	$24.09	67	$7.33	$0.42
Flavoring Extracts and Syrups, N.E.C.	$672.23	$16.05	$656.18	1458	$445.38	$5.07
Flour and Other Grain Mill Products	$126.40	$5.95	$120.45	394	$20.72	$0.69
Fluid Milk	$460.40	$32.73	$427.66	1172	$97.66	$4.38
Fluid Power Cylinders & Actuators	$53.77	$1.38	$52.39	251	$17.00	$0.53
Fluid Power Pumps & Motors	$1.72	$0.04	$1.67	14	$0.86	$0.01
Food Preparations, N.E.C	$1,284.22	$5.60	$1,278.62	5438	$527.98	$11.28
Food Products Machinery	$34.76	$9.35	$25.41	283	$19.14	$0.35
Footwear Cut Stock	$3.01	$0.01	$2.99	17	$1.40	$0.04
Frozen Fruits, Juices and Vegetables	$0.43	$0.02	$0.41	2	$0.11	$0.00
Frozen Specialties	$156.43	$1.68	$154.75	847	$54.93	$1.17
Furniture and Fixtures, N.E.C	$79.34	$13.53	$65.82	381	$22.17	$0.44
Games, Toys, and Childrens Vehicles	$17.12	$0.13	$16.99	87	$10.45	$0.24
Gaskets, Packing and Sealing Devices	$53.85	$0.49	$53.36	422	$20.56	$0.36
General Industrial Machinery, N.E.C	$70.85	$1.27	$69.58	355	$23.43	$0.60
Glass and Glass Products, Exc	$255.27	$177.08	$78.19	1942	$117.80	$2.97
Glass Containers	$44.83	$39.39	$5.44	253	$20.81	$0.60
Greeting Card Publishing	$48.53	$1.48	$47.05	251	$20.00	$0.61

Table A-3: Baseline Economic Data for Manufacturing Sectors, Region C (Year 2000)

Gypsum Products	$98.80	$1.03	$97.77	305	$23.59	$1.72
Hand and Edge Tools, N.E.C.	$106.37	$19.33	$87.05	755	$63.27	$1.14
Hand Saws and Saw Blades	$7.81	$2.30	$5.51	49	$3.28	$0.08
Hard Surface Floor Coverings	$0.26	$0.02	$0.25	2	$0.22	$0.00
Hardware, N.E.C.	$200.64	$48.25	$152.39	1049	$91.44	$2.09
Hardwood Dimension and Flooring Mills	$94.18	$71.37	$22.80	720	$56.15	$1.20
Heating Equipment, Except Electric	$61.47	$1.92	$59.54	317	$31.73	$0.57
Hoists, Cranes, and Monorails	$53.03	$16.58	$36.45	216	$13.73	$0.35
Hosiery, N.E.C	$0.26	$0.00	$0.26	3	$0.09	$0.00
Housefurnishings, N.E.C	$265.36	$31.46	$233.91	1905	$85.68	$2.05
Household Cooking Equipment	$1.66	$0.01	$1.64	10	$0.35	$0.01
Household Furniture, N.E.C	$15.90	$10.14	$5.76	202	$5.99	$0.09
Household Laundry Equipment	$0.26	$0.00	$0.26	1	$0.09	$0.00
Household Vacuum Cleaners	$6.12	$0.08	$6.04	28	$1.73	$0.04
Ice Cream and Frozen Desserts	$115.06	$35.48	$79.57	504	$32.03	$0.93
Industrial and Fluid Valves	$349.26	$65.88	$283.39	1414	$101.91	$3.00
Industrial Furnaces and Ovens	$23.55	$0.45	$23.10	192	$7.39	$0.16
Industrial Gases	$89.16	$56.06	$33.10	652	$68.70	$2.07
Industrial Machines N.E.C.	$373.15	$4.87	$368.28	3453	$166.12	$3.27
Industrial Patterns	$0.71	$0.01	$0.70	10	$0.43	$0.01
Industrial Trucks and Tractors	$34.30	$8.74	$25.55	191	$8.84	$0.29
Inorganic Chemicals Nec.	$62.15	$39.08	$23.07	211	$28.77	$1.89
Inorganic Pigments	$9.22	$5.80	$3.42	32	$3.18	$0.18
Instruments To Measure Electricity	$116.16	$22.79	$93.36	612	$36.99	$0.93
Internal Combustion Engines, N.E.C.	$17.42	$11.84	$5.58	54	$2.23	$0.10
Iron and Steel Forgings	$51.14	$6.48	$44.66	316	$25.46	$0.50
Iron and Steel Foundries	$230.40	$1.34	$229.06	1752	$79.71	$2.16
Jewelers Materials and Lapidary Work	$1.10	$0.00	$1.10	9	$0.44	$0.01
Jewelry, Precious Metal	$169.87	$1.82	$168.05	1035	$80.44	$2.01
Knit Fabric Mills	$3.81	$3.03	$0.78	22	$0.74	$0.04
Knit Outerwear Mills	$0.34	$0.02	$0.32	4	$0.12	$0.00
Laboratory Apparatus & Furniture	$10.15	$0.90	$9.25	45	$2.06	$0.10
Lead Pencils and Art Goods	$0.36	$0.01	$0.36	7	$0.25	$0.00
Leather Goods, N.E.C	$16.66	$2.30	$14.35	263	$12.62	$0.11
Leather Tanning and Finishing	$24.69	$13.63	$11.06	93	$4.88	$0.18
Lighting Fixtures and Equipment	$228.47	$3.18	$225.29	1389	$86.69	$2.62
Lime	$1.41	$0.02	$1.39	5	$0.61	$0.03
Logging Camps and Logging	$21.08	$18.56	$2.52	55	$12.95	$0.37
Lubricating Oils and Greases	$193.13	$129.93	$63.20	412	$30.01	$1.54
Luggage	$25.76	$4.34	$21.42	240	$11.33	$0.19
Macaroni and Spaghetti	$9.29	$0.69	$8.61	52	$3.65	$0.08
Machine Tools, Metal Cutting Types	$2.70	$1.19	$1.51	34	$1.18	$0.02
Machine Tools, Metal Forming Types	$5.43	$2.19	$3.25	50	$2.26	$0.04
Magnetic & Optical Recording Media	$1.30	$1.03	$0.27	2	$0.69	$0.03
Malt Beverages	$525.99	$6.61	$519.38	813	$185.81	$104.47
Manifold Business Forms	$245.33	$33.49	$211.84	1609	$92.25	$3.19
Manufactured Ice	$43.52	$0.35	$43.17	490	$30.05	$0.27
Manufacturing Industries, N.E.C.	$205.68	$6.91	$198.77	1881	$90.73	$2.25
Marking Devices	$10.67	$0.94	$9.73	205	$8.72	$0.09
Mattresses and Bedsprings	$194.85	$18.17	$176.68	1520	$66.95	$0.93
Measuring and Dispensing Pumps	$28.96	$1.36	$27.60	77	$10.10	$0.50
Meat Packing Plants	$465.72	$104.63	$361.09	1204	$47.00	$3.37
Mechanical Measuring Devices	$396.43	$67.27	$329.16	2585	$169.70	$4.70
Metal Barrels, Drums and Pails	$21.01	$5.74	$15.27	102	$6.35	$0.19
Metal Cans	$46.16	$19.80	$26.36	110	$11.80	$0.59
Metal Coating and Allied Services	$203.90	$62.10	$141.80	1225	$83.00	$1.94
Metal Doors, Sash, and Trim	$490.72	$22.30	$468.42	3683	$237.30	$5.26
Metal Heat Treating	$47.07	$6.78	$40.29	246	$16.08	$0.43
Metal Household Furniture	$19.54	$2.47	$17.07	156	$5.40	$0.11
Metal Office Furniture	$7.94	$1.90	$6.03	42	$2.35	$0.05
Metal Partitions and Fixtures	$277.78	$36.81	$240.97	2021	$99.67	$1.71
Metal Sanitary Ware	$48.76	$1.15	$47.61	389	$35.46	$0.51
Metal Stampings, N.E.C.	$153.85	$68.36	$85.48	914	$58.68	$1.36
Metalworking Machinery, N.E.C.	$43.07	$14.36	$28.71	156	$10.21	$0.31
Millwork	$242.84	$232.64	$10.19	2345	$92.69	$2.29
Mineral Wool	$130.65	$1.84	$128.81	690	$65.84	$1.74
Minerals, Ground Or Treated	$30.56	$0.27	$30.29	132	$16.50	$0.45
Mining Machinery, Except Oil Field	$66.10	$4.27	$61.83	402	$29.12	$0.76
Miscellaneous Fabricated Wire Products	$144.14	$33.88	$110.26	1398	$62.71	$1.17
Miscellaneous Metal Work	$476.59	$16.82	$459.77	1130	$72.42	$4.20
Miscellaneous Plastics Products	$2,601.64	$45.99	$2,555.65	14676	$765.94	$17.97
Miscellaneous Publishing	$229.50	$119.71	$109.78	1498	$123.58	$2.77
Mobile Homes	$324.70	$0.41	$324.30	2690	$136.26	$4.47
Motor Homes	$93.33	$0.16	$93.17	473	$46.24	$0.47
Motor Vehicle Parts and Accessories	$698.03	$321.14	$376.89	3233	$155.64	$2.12
Motor Vehicles	$3,333.57	$39.27	$3,294.30	5162	$775.07	$17.46
Motorcycles, Bicycles, and Parts	$20.54	$0.42	$20.12	153	$6.70	$0.14
Motors and Generators	$76.82	$29.19	$47.63	513	$35.75	$1.02

Table A-3: Baseline Economic Data for Manufacturing Sectors, Region C (Year 2000)

Musical Instruments	$10.67	$0.20	$10.47	125	$6.33	$0.09
Narrow Fabric Mills	$5.39	$0.87	$4.51	76	$2.69	$0.05
Newspapers	$775.90	$419.34	$356.57	7000	$438.40	$10.11
Nitrogenous and Phosphatic Fertilizers	$34.68	$3.45	$31.23	89	$10.08	$0.44
Nonclay Refractories	$12.86	$0.11	$12.75	51	$7.35	$0.21
Nonferrous Castings, N.E.C.	$22.51	$1.78	$20.73	53	$3.10	$0.16
Nonferrous Forgings	$49.64	$4.10	$45.54	256	$16.70	$0.44
Nonferrous Rolling and Drawing, N.E.C.	$43.27	$2.14	$41.13	172	$12.43	$0.51
Nonferrous Wire Drawing and Insulating	$857.52	$41.06	$816.45	3008	$199.15	$7.73
Nonmetallic Mineral Products, N.E.C.	$59.74	$1.58	$58.16	687	$23.64	$0.57
Oil Field Machinery	$510.21	$78.94	$431.27	3773	$248.79	$5.18
Ophthalmic Goods	$145.96	$4.66	$141.30	1305	$50.42	$1.30
Optical Instruments & Lenses	$49.92	$6.36	$43.56	605	$28.41	$0.46
Other Ordnance and Accessories	$0.81	$0.00	$0.81	3	-$0.10	$0.01
Packaging Machinery	$29.47	$11.38	$18.09	154	$11.13	$0.30
Paints and Allied Products	$512.66	$10.03	$502.63	1442	$176.44	$5.18
Paper Coated & Laminated N.E.C.	$211.46	$10.00	$201.46	1000	$84.01	$2.03
Paper Coated & Laminated Packaging	$54.45	$2.58	$51.88	211	$15.91	$0.48
Paper Industries Machinery	$7.91	$4.11	$3.80	61	$2.49	$0.06
Paper Mills, Except Building Paper	$20.91	$0.07	$20.84	80	$5.35	$0.16
Paperboard Containers and Boxes	$1,009.25	$857.60	$151.65	4629	$268.01	$10.12
Paperboard Mills	$363.68	$1.23	$362.45	711	$95.05	$3.61
Paving Mixtures and Blocks	$175.18	$132.14	$43.04	374	$84.78	$1.57
Periodicals	$372.44	$155.31	$217.13	2101	$152.74	$3.82
Personal Leather Goods	$0.10	$0.00	$0.10	1	$0.07	$0.00
Petroleum Refining	$438.26	$254.96	$183.30	153	$66.31	$4.63
Phonograph Records and Tape	$38.93	$12.20	$26.73	463	$23.77	$0.29
Photographic Equipment and Supplies	$71.30	$13.24	$58.07	272	$11.35	$0.51
Pickles, Sauces, and Salad Dressings	$255.87	$4.38	$251.49	637	$109.84	$2.02
Pipe, Valves, and Pipe Fittings	$91.95	$17.34	$74.61	690	$41.10	$0.80
Plastics Materials and Resins	$250.52	$188.65	$61.87	386	$54.12	$2.07
Plate Making	$131.22	$23.43	$107.79	1621	$108.16	$1.70
Plating and Polishing	$100.20	$52.35	$47.85	1355	$80.46	$0.98
Pleating and Stitching	$14.37	$3.98	$10.39	288	$9.43	$0.14
Plumbing Fixture Fittings and Trim	$139.28	$4.96	$134.32	1001	$67.88	$1.36
Polishes and Sanitation Goods	$487.19	$38.40	$448.79	1532	$306.00	$5.11
Porcelain Electrical Supplies	$9.79	$0.37	$9.42	102	$5.23	$0.09
Potato Chips & Similar Snacks	$1,150.72	$7.15	$1,143.57	2785	$489.34	$11.79
Pottery Products, N.E.C	$4.73	$0.02	$4.71	59	$2.02	$0.07
Poultry Processing	$123.42	$17.28	$106.13	920	$29.25	$0.94
Power Driven Hand Tools	$23.21	$3.02	$20.19	68	$11.30	$0.36
Power Transmission Equipment	$172.34	$1.39	$170.95	1127	$55.60	$1.43
Prefabricated Metal Buildings	$228.19	$6.88	$221.31	1526	$109.75	$2.20
Prefabricated Wood Buildings	$15.94	$0.12	$15.81	135	$4.62	$0.13
Prepared Feeds, N.E.C	$177.75	$1.88	$175.87	438	$29.70	$1.91
Primary Batteries, Dry and Wet	$0.47	$0.02	$0.45	1	$0.31	$0.01
Primary Metal Products, N.E.C	$4.11	$0.72	$3.39	13	$1.77	$0.06
Primary Nonferrous Metals, N.E.C.	$0.30	$0.03	$0.27	2	$0.06	$0.00
Printed Circuit Boards	$428.57	$284.88	$143.69	4606	$275.56	$3.63
Printing Ink	$82.59	$71.67	$10.92	311	$29.20	$0.87
Printing Trades Machinery	$77.46	$11.88	$65.59	471	$28.05	$0.66
Public Building Furniture	$440.96	$96.16	$344.80	2419	$118.63	$2.63
Pulp Mills	$9.88	$0.05	$9.83	49	$2.24	$0.05
Pumps and Compressors	$132.87	$3.42	$129.45	538	$31.88	$1.02
Radio and Tv Communication	$4,009.70	$831.35	$3,178.35	10281	$1,468.82	$35.51
Radio and TV Receiving Sets	$125.06	$23.45	$101.61	752	$40.72	$1.15
Railroad Equipment	$808.84	$24.26	$784.58	3097	$176.89	$6.06
Ready-mixed Concrete	$672.56	$4.78	$667.78	3882	$270.51	$10.94
Reconstituted Wood Products	$42.76	$39.37	$3.39	193	$10.78	$0.35
Refrigeration and Heating Equipment	$1,449.70	$486.05	$963.64	6781	$391.75	$13.71
Relays & Industrial Controls	$78.71	$34.30	$44.40	430	$29.30	$0.70
Roasted Coffee	$141.14	$32.50	$108.64	202	$40.23	$1.28
Rolling Mill Machinery	$0.18	$0.00	$0.17	2	$0.08	$0.00
Rubber and Plastics Hose and Belting	$1.02	$0.01	$1.02	9	$0.29	$0.01
Salted and Roasted Nuts & Seeds	$75.91	$1.41	$74.50	196	$8.78	$0.43
Sanitary Paper Products	$33.69	$0.19	$33.50	63	$15.58	$0.41
Sausages and Other Prepared Meats	$748.69	$105.19	$643.50	3341	$146.37	$5.56
Sawmills and Planing Mills, General	$46.94	$42.45	$4.50	247	$15.40	$0.58
Scales and Balances	$5.07	$1.76	$3.31	38	$2.08	$0.03
Schiffi Machine Embroideries	$1.21	$0.82	$0.39	11	$0.27	$0.00
Screw Machine Products and Bolts, Etc.	$117.14	$52.68	$64.45	819	$53.42	$1.14
Search & Navigation Equipment	$1,428.22	$330.18	$1,098.04	6624	$513.28	$15.94
Secondary Nonferrous Metals	$107.44	$6.94	$100.51	293	$15.06	$1.04
Semiconductors and Related Devices	$8,573.62	$2,626.91	$5,946.71	26883	$4,854.15	$80.31
Service Industry Machines, N.E.C.	$89.84	$25.85	$63.99	499	$29.99	$0.83
Sheet Metal Work	$974.84	$33.61	$941.23	6452	$440.83	$9.31
Ship Building and Repairing	$0.27	$0.00	$0.27	3	$0.08	$0.00
Shoes, Except Rubber	$8.04	$0.01	$8.02	104	$3.71	$0.06

Table A-3: Baseline Economic Data for Manufacturing Sectors, Region C (Year 2000)

Shortening and Cooking Oils	$377.57	$93.07	$284.50	580	$71.63	$3.33
Signs and Advertising Displays	$270.08	$84.93	$185.15	2613	$132.35	$3.04
Silverware and Plated Ware	$2.18	$0.05	$2.12	17	$1.13	$0.04
Small Arms	$22.67	$0.04	$22.63	166	$16.39	$2.16
Soap and Other Detergents	$97.91	$18.33	$79.58	512	$54.13	$1.11
Special Dies and Tools and Accessories	$100.19	$66.74	$33.44	1047	$56.07	$0.92
Special Industry Machinery N.E.C.	$174.09	$25.98	$148.11	456	$28.57	$0.84
Sporting and Athletic Goods, N.E.C.	$287.23	$2.27	$284.97	2069	$123.85	$10.49
Stationery Products	$109.78	$1.40	$108.37	357	$40.31	$1.30
Steam Engines and Turbines	$24.28	$11.02	$13.26	84	$7.17	$0.16
Steel Pipe and Tubes	$59.96	$9.82	$50.14	261	$12.99	$0.49
Steel Springs, Except Wire	$13.79	$4.11	$9.68	76	$4.07	$0.08
Steel Wire and Related Products	$65.93	$13.86	$52.07	216	$21.30	$0.95
Storage Batteries	$114.63	$30.85	$83.78	549	$45.17	$1.19
Structural Clay Products, N.E.C	$0.40	$0.00	$0.40	9	$0.32	$0.01
Structural Wood Members, N.E.C	$80.82	$75.94	$4.88	731	$26.91	$0.73
Sugar	$17.89	$8.19	$9.70	31	$6.98	$0.32
Surface Active Agents	$1.04	$0.82	$0.22	2	$0.22	$0.01
Surgical and Medical Instrument	$252.07	$73.47	$178.60	1524	$59.87	$2.08
Surgical Appliances and Supplies	$459.91	$100.83	$359.08	2377	$121.80	$4.93
Switchgear and Switchboard Apparatus	$171.48	$56.98	$114.50	978	$76.70	$1.50
Synthetic Rubber	$0.63	$0.57	$0.06	3	$0.13	$0.00
Telephone and Telegraph Apparatus	$9,003.98	$1,150.47	$7,853.51	15419	$3,383.31	$77.24
Textile Bags	$4.84	$3.11	$1.73	65	$1.23	$0.03
Textile Goods, N.E.C	$10.43	$0.36	$10.07	69	$2.03	$0.11
Textile Machinery	$9.28	$2.05	$7.22	58	$3.88	$0.10
Thread Mills	$1.27	$0.43	$0.83	22	$0.34	$0.01
Tires and Inner Tubes	$0.24	$0.00	$0.24	2	$0.06	$0.01
Toilet Preparations	$559.71	$22.21	$537.50	1480	$255.69	$5.38
Transformers	$49.53	$4.89	$44.63	352	$22.93	$0.45
Transportation Equipment, N.E.C	$62.78	$1.28	$61.50	267	$13.39	$0.45
Travel Trailers and Camper	$29.19	$0.12	$29.07	181	$7.06	$0.23
Truck and Bus Bodies	$137.83	$9.21	$128.62	739	$55.98	$0.57
Truck Trailers	$173.75	$6.49	$167.26	1174	$59.14	$0.83
Typesetting	$29.52	$12.16	$17.35	288	$13.78	$0.30
Typewriters and Office Machines N.E.C.	$94.72	$15.72	$79.00	636	$48.37	$0.98
Upholstered Household Furniture	$92.51	$2.00	$90.51	972	$36.42	$0.66
Vegetable Oil Mills, N.E.C	$3.12	$1.95	$1.17	5	$0.02	$0.01
Veneer and Plywood	$2.06	$1.95	$0.11	20	$0.51	$0.01
Watches, Clocks, and Parts	$0.22	$0.02	$0.21	1	$0.03	$0.00
Welding Apparatus	$133.35	$11.19	$122.15	619	$38.17	$1.15
Wiring Devices	$342.01	$13.08	$328.93	2269	$166.66	$3.33
Women's Handbags and Purses	$0.78	$0.01	$0.77	15	$0.29	$0.00
Wood Containers	$12.77	$10.22	$2.55	172	$6.13	$0.11
Wood Household Furniture	$37.37	$1.74	$35.63	405	$14.45	$0.27
Wood Kitchen Cabinets	$372.98	$176.53	$196.46	4557	$174.55	$3.51
Wood Office Furniture	$96.68	$21.03	$75.65	825	$37.15	$0.51
Wood Pallets and Skids	$60.18	$58.14	$2.04	758	$26.54	$0.56
Wood Partitions and Fixtures	$83.43	$32.95	$50.49	805	$28.70	$0.45
Wood Preserving	$17.72	$17.09	$0.63	58	$2.60	$0.13
Wood Products, N.E.C	$112.55	$44.70	$67.85	1104	$40.67	$1.07
Wood Tv and Radio Cabinets	$10.04	$4.23	$5.81	151	$4.48	$0.13
Woodworking Machinery	$3.48	$0.60	$2.88	17	$2.13	$0.04
Yarn Mills and Finishing Of Textiles,	$0.15	$0.10	$0.06	1	$0.03	$0.00
Total	$88,204.48	$18,283.54	$69,920.95	382,089	$33,283.27	$943.77

NEC = not elsewhere classified. "na" = not available.

Table A-4: Baseline Economic Data for Municipal Sectors, Region C (Year 2000)

Sector	GED	Total Sales	Intermediate Sales	Final Sales	Jobs	Regional Income	Business Taxes
Accounting, Auditing and Bookkeeping	120.3	$3,668.60	$2,307.00	$1,361.60	45799	$2,891.16	$32.90
Advertising	116.5	$1,486.62	$1,100.83	$385.79	10756	$866.76	$15.66
Agricultural, Forestry, Fishery Services	-	$56.35	$2.54	$53.82	2326	$33.13	$1.46
Air Transportation	171.1	$8,705.65	$689.59	$8,016.06	66061	$4,855.00	$694.32
Amusement and Recreation Services,	427.1	$864.02	$9.34	$854.67	32828	$490.44	$47.50
Apparel & Accessory Stores	67.7	$1,190.22	$74.07	$1,116.15	25824	$657.88	$189.91
Arrangement Of Passenger	129.7	$1,032.24	$440.34	$591.90	6344	$712.81	$30.83
Automobile Parking and Car Wash	680.8	$320.70	$69.40	$251.29	7366	$216.58	$14.84
Automobile Rental and Leasing	147.3	$1,049.18	$530.07	$519.12	8559	$612.52	$82.90
Automobile Repair and Services	54.5	$2,095.29	$725.81	$1,369.48	22724	$1,095.26	$99.23
Automotive Dealers & Service Stations	48.9	$5,275.97	$833.31	$4,442.67	53219	$3,146.47	$815.92

Table A-4: Baseline Economic Data for Municipal Sectors, Region C (Year 2000)

Banking	58.9	$8,457.53	$3,609.58	$4,847.95	33546	$5,464.02	$136.70
Beauty and Barber Shops	215.6	$601.17	$66.20	$534.97	17809	$374.78	$7.36
Bowling Alleys and Pool Halls	85.6	$51.98	$0.10	$51.88	2515	$27.83	$4.55
Building Materials & Gardening	34.6	$1,060.55	$135.09	$925.46	18674	$756.70	$174.45
Business Associations	159.7	$464.80	$179.77	$285.02	8222	$362.15	$0.32
Child Day Care Services	119.5	$765.46	$0.00	$765.46	16194	$320.85	$9.22
Colleges, Universities, Schools	74.8	$534.96	$14.02	$520.95	15827	$379.99	$0.00
Commercial Sports Except Racing	-	$5.10	$0.58	$4.52	193	$4.63	$0.16
Commodity Credit Corporation	390.8	$816.57	$276.45	$540.12	6110	$561.29	$46.01
Communications, Except Radio and TV	-	0.000	$0.00	0.000	0	$0.00	$0.00
Computer and Data Processing Services	47.3	$19,376.30	$4,435.94	$14,940.36	56590	$10,042.57	$1,068.76
Credit Agencies	40	$10,972.69	$5,498.78	$5,473.91	93754	$8,877.90	$166.56
Detective and Protective Services	156.4	$5,342.69	$1,962.21	$3,380.48	83186	$3,328.88	$209.48
Doctors and Dentists	84.1	$835.84	$370.75	$465.09	23305	$636.98	$11.63
Domestic Services	202.9	$7,382.19	$0.00	$7,382.19	61972	$5,099.00	$97.85
Dummy	-	21.564	$21.56	0.000	2,944	$21.58	$0.00
Dummy	-	0.000	$0.00	0.000	0	$0.00	$0.00
Eating & Drinking	-	0.000	$0.00	0.000	0	$0.00	$0.00
Electrical Repair Service	156.6	$8,412.81	$551.11	$7,861.70	193729	$4,263.54	$594.86
Elementary and Secondary Schools	37.4	$615.69	$213.98	$401.71	7151	$268.08	$23.11
Engineering, Architectural Services	168.89	$318.31	$0.00	$318.31	11346	$211.15	$0.00
Equipment Rental and Leasing	87.1	$4,651.06	$3,052.11	$1,598.96	42942	$2,357.70	$34.76
Federal Government - Military	28.5	$956.53	$728.33	$228.21	7282	$441.48	$30.65
Federal Government - Non-Military	-	30.959	$30.96	0.000	953	$30.96	$0.00
Food Stores	-	149.057	$149.06	0.000	2,632	$149.06	$0.00
Funeral Service and Crematories	97.9	$2,539.07	$93.05	$2,446.03	60089	$1,903.55	$405.70
Furniture & Home Furnishings Stores	-	$4.14	$0.21	$3.93	119	$2.35	$0.10
Gas Production and Distribution	-	$26.83	$0.08	$26.76	280	$20.32	$4.19
General Merchandise Stores	110.6	$167.88	$0.00	$167.88	4044	$111.19	$4.77
Hospitals	41.7	$2,356.58	$130.66	$2,225.92	37694	$1,529.26	$369.62
Hotels and Lodging Places	51	$1,235.19	$721.60	$513.59	1207	$310.47	$85.87
Insurance Agents and Brokers	46.8	$3,248.79	$91.81	$3,156.98	67883	$2,043.00	$518.41
Insurance Carriers	-	$175.13	$83.40	$91.73	4194	$115.39	$1.58
Inventory Valuation Adjustment	75.5	$4,833.25	$6.42	$4,826.83	66125	$3,116.46	$17.49
Job Trainings & Related Services	229.8	$2,348.92	$1,160.26	$1,188.66	33004	$1,329.82	$171.14
Labor and Civic Organizations	88.9	$2,366.87	$1,287.18	$1,079.69	36274	$1,836.82	$25.23
Landscape and Horticultural Services	136.3	$6,281.42	$385.69	$5,895.73	34944	$3,592.76	$368.01
Laundry, Cleaning and Shoe Repair	-	(6.902)	-$6.90	0.000	0	-$6.84	$0.00
Legal Services	141.3	$142.86	$53.64	$89.22	2865	$89.47	$0.39
Local, Interurban Passenger Transit	121.6	$552.36	$2.39	$549.97	30510	$437.85	$0.08
Maintenance and Repair Oil and Gas	-	$894.43	$484.19	$410.24	23744	$533.91	$22.96
Maintenance and Repair Other Facilities	516.7	$671.19	$146.43	$524.75	26001	$493.97	$17.14
Maintenance and Repair, Residential	76.3	$3,914.02	$1,855.03	$2,058.99	31427	$3,012.82	$35.08
Management and Consulting Services	-	$91.17	$19.15	$72.01	1649	-$141.58	$0.00
Membership Sports and Recreation	67.7	$391.81	$83.20	$308.62	8354	$239.75	$8.59
Miscellaneous Personal Services	24.8	$388.14	$388.14	$0.00	2128	$224.00	$15.27
Miscellaneous Repair Shops	24.8	$4,585.67	$2,932.15	$1,653.52	66879	$3,185.04	$21.29
Miscellaneous Retail	24.8	$2,984.25	$979.62	$2,004.63	21191	$935.14	$12.68
Motion Pictures	87.1	$4,650.91	$2,754.16	$1,896.75	43806	$2,708.52	$35.85
Motor Freight Transport and	427.1	$517.11	$15.15	$501.96	16201	$280.41	$19.84
New Government Facilities	128.8	$840.31	$118.71	$721.60	11366	$263.13	$19.97
New Highways and Streets	124.3	$641.22	$420.02	$221.19	7995	$322.12	$20.12
New Industrial and Commercial	132.2	$5,568.85	$343.57	$5,225.28	114787	$3,493.13	$850.62
New Mineral Extraction Facilities	112.9	$1,530.35	$872.86	$657.49	15503	$650.16	$22.75
New Residential Structures	84.6	$8,070.80	$4,177.57	$3,893.23	73949	$3,381.14	$106.23
New Utility Structures	62.8	$5,218.06	$0.00	$5,218.06	31895	$2,158.34	$33.92
Noncomparable Imports	44.6	$1,279.27	$0.00	$1,279.27	10869	$530.41	$8.69
Nursing and Protective Care	62.8	$4,999.58	$0.00	$4,999.58	40003	$1,918.59	$39.75
Other Business Services	62.8	$3,610.64	$35.91	$3,574.73	47242	$2,308.98	$186.28
Other Educational Services	35.1	$9,192.05	$0.00	$9,192.05	57096	$1,960.77	$66.02
Other Federal Government Enterprises	62.8	$2,199.52	$0.00	$2,199.52	19557	$971.94	$12.66
Other Medical and Health Services	-	0.000	$0.00	0.000	0	$0.00	$0.00
Other Nonprofit Organizations	196.7	$903.86	$0.00	$903.86	24560	$665.64	$22.54
Other State and Local Govt Enterprises	84.1	$7,637.48	$3,742.83	$3,894.65	62014	$3,653.16	$132.78
Owner-occupied Dwellings	115.8	$756.93	$61.83	$695.10	12514	$354.95	$26.59
Personnel Supply Services	-	$663.15	$125.46	$537.69	3894	$216.29	$0.00
Photofinishing, Commercial	168.1	$2,013.42	$128.93	$1,884.48	37092	$1,127.22	$35.19
Pipe Lines, Except Natural Gas	121.6	$190.63	$20.66	$169.97	7517	$101.43	$1.25
Portrait and Photographic Studios	-	$1,642.10	$484.41	$1,157.69	8032	$620.74	$0.00
Racing and Track Operation	89	$14,898.98	$0.00	$14,898.98	0	$9,353.76	$1,931.92
Radio and TV Broadcasting	483.5	$3,375.47	$2,244.97	$1,130.50	128098	$3,250.70	$64.15
Railroads and Related Services	111.6	$902.71	$585.15	$317.56	7530	$385.34	$23.73
Real Estate	49.3	$105.04	$30.88	$74.16	268	$72.93	$8.62
Religious Organizations	184	$148.02	$20.91	$127.11	3297	$73.56	$3.70
Research, Development & Testing	390.8	$151.39	$20.40	$130.99	3339	$59.09	$27.66
Residential Care	64.2	$1,182.71	$817.68	$365.03	5045	$593.49	$21.79
Rest Of The World Industry	67.7	$791.17	$329.07	$462.09	2822	$469.75	$24.90
Sanitary Services and Steam Supply	89	$30,208.73	$7,751.02	$22,457.72	117200	$17,915.08	$3,573.32

Table A-4: Baseline Economic Data for Municipal Sectors, Region C (Year 2000)

Scrap	327.9	$435.82	$0.00	$435.82	3263	$78.43	$0.00
Security and Commodity Brokers	122.7	$761.24	$585.86	$175.38	11153	$444.51	$8.08
Services To Buildings	110.6	$184.57	$0.00	$184.57	5153	$129.63	$1.82
Social Services, N.E.C.	-	0.000	$0.00	0.000	0	$0.00	$0.00
State & Local Government - Education	51	$517.50	$431.70	$85.80	1784	$216.28	$94.78
State & Local Government - Non-	-	0.000	$0.00	0.000	0	$0.00	$0.00
State and Local Electric Utilities	58.9	$3,282.96	$2,522.89	$760.07	16504	$1,361.27	$115.37
Theatrical Producers, Bands Etc.	67.2	$1,094.09	$947.21	$146.87	26774	$516.44	$20.49
Transportation Services	42.2	$456.53	$34.62	$421.91	7237	$222.50	$0.68
U.S. Postal Service	-	492.130	$492.13	0.000	15,395	$492.13	$0.00
Used and Secondhand Goods	-	414.915	$414.91	0.000	9,970	$414.92	$0.00
Watch, Clock, Jewelry and Furniture	-	$380.15	$120.65	$259.50	675	$163.28	$0.00
Water Supply and Sewerage Systems	36.2	$468.46	$319.46	$149.00	5211	$202.60	$17.89
Water Transportation	39.8	$649.09	$283.22	$365.87	5055	$484.76	$5.61
Wholesale Trade	-	$1,415.08	$871.06	$544.02	17229	$1,055.20	$0.00
Total		$296,990.31	$81,868.68	$215,121.63	2,811,340	$169,246.10	$19,296.42

NEC = not elsewhere classified. "na" = not available.

Table A-5: Baseline Economic Data for Mining Sectors, Region C (Year 2000)

Sector	Total Sales	Intermediate Sales	Final Sales	Jobs	Regional Income	Business Taxes
Chemical, Fertilizer Mineral Mininig,	$1.14	$0.35	$0.79		$0.74	$0.05
Clay, Ceramic, Refractory Minerals,	$50.42	$0.76	$49.66	126	$30.04	$1.68
Coal Mining	$81.13	$13.02	$68.11	229	$28.83	$11.10
Dimension Stone	$70.55	$3.19	$67.36	402	$42.96	$2.15
Gold Ores	$13.09	$12.25	$0.85	74	$1.73	$0.23
Misc. Nonmetallic Minerals, N.E.C.	$4.54	$0.08	$4.45	18	$2.81	$0.15
Natural Gas & Crude Petroleum	$205.36	$40.91	$164.45	361	$95.95	$11.25
Natural Gas Liquids	$1,648.17	$70.11	$281.79	113	$154.53	$24.30
Sand and Gravel	$74.55	$4.62	$69.93	555	$46.45	$2.33
Uranium-radium-vanadium Ores	$2.22	$2.08	$0.14	46	$0.84	$0.12
Total	$30,149.95	$5,983.65	$24,166.30	46,445	$13,955.04	$1,728.38

Table A-6: Baseline Economic Data for the Steam Electric Sector, Region C (Year 2000)

Sector	Total Sales	Intermediate Sales	Final Sales	Jobs	Regional Income	Business Taxes
Electric Services	$4,098.49	$1,306.64	$2,791.85	6,055	$2,931.03	$524.89

na = "not available"

Attachment B: Distribution of Economic Impacts by County and Water User Group

Tables B-1 through B-7 show economic impacts by county and water user group; however, caution is warranted. Figures shown for specific counties are *direct* impacts only. For the most part, figures reported in the main text for all water use categories uses include *direct and secondary* impacts. Secondary effects were estimated using regional level multipliers that treat each regional water planning area as an aggregate and autonomous economy. Multipliers do not specify where secondary impacts will occur at a sub-regional level (i.e., in which counties or cities). All economic impacts that would accrue to a region as a whole due to secondary economic effects are reported in Tables B-1 through B-7 as "secondary regional level impacts."

For example, assume that in a given county (or city) water shortages caused significant reductions in output for a manufacturing plant. Reduced output resulted in lay-offs and lost income for workers and owners of the plant. This is a *direct* impact. Direct impacts were estimated at a county level; and thus one can say with certainty that direct impacts occurred in that county. However, secondary impacts accrue to businesses and households throughout the region where the business operates, and it is impossible using input-output models to determine where these businesses are located spatially.

The same logic applies to changes in population and school enrollment. Since employment losses and subsequent out-migration from a region were estimated using *direct* and *secondary* multipliers, it is impossible to say with any degree of certainty how many people a given county would lose regardless of whether the economic impact was direct or secondary. For example, assume the manufacturing plant referred to above is in County A. If the firm eliminated 50 jobs, one could state with certainty that water shortages in County A resulted in a loss of 50 jobs in that county. However, one could not unequivocally say whether 100 percent of the population loss due to lay-offs at the manufacturing would accrue to County A because many affected workers might commute from adjacent counties. This is particularly true in large metropolitan areas that overlay one or counties. Thus, population and school enrollment impacts cannot be reported at a county level.

Manufacturing

Table B-1: Distribution of Economic Impacts by County and Water User Groups: Manufacturing						
Lost Output (Total Sales, $millions)						
County	2010	2020	2030	2040	2050	2060
Collin						
Direct Impacts	$395.84	$724.30	$814.82	$2,431.84	$2,879.23	$3,401.45
Secondary Regional Level Impacts	$287.37	$525.84	$591.55	$1,765.49	$2,090.29	$2,469.41
Cooke						
Direct Impacts	$24.25	$68.31	$95.50	$117.48	$136.43	$321.38
Secondary Regional Level Impacts	$17.77	$50.11	$69.98	$86.09	$99.98	$235.50
Dallas						
Direct Impacts	$1,561.42	$5,014.07	$6,360.61	$7,681.33	$18,108.15	$20,197.78
Secondary Regional Level Impacts	$1,202.34	$3,860.97	$4,897.85	$5,914.84	$13,943.79	$15,552.86
Denton						
Direct Impacts	$43.55	$261.27	$851.66	$1,150.44	$1,483.78	$2,193.93
Secondary Regional Level Impacts	$26.87	$161.21	$525.49	$709.84	$915.52	$1,353.68
Grayson						
Direct Impacts	$46.51	$369.55	$401.47	$524.41	$648.72	$1,626.73
Secondary Regional Level Impacts	$36.79	$292.30	$317.55	$414.79	$513.11	$1,286.69
Henderson						
Direct Impacts	$29.34	$6.01	$7.94	$10.25	$25.88	$32.35
Secondary Regional Level Impacts	$21.25	$4.36	$5.75	$7.42	$18.75	$23.43
Kaufman						
Direct Impacts	$24.52	$72.43	$94.97	$113.97	$264.91	$306.44
Secondary Regional Level Impacts	$15.73	$47.58	$62.38	$74.86	$174.01	$201.29
Navarro						
Direct Impacts	$0.00	$7.19	$20.44	$34.03	$98.54	$132.65
Secondary Regional Level Impacts	$0.00	$5.33	$15.15	$25.23	$73.05	$98.34
Parker						
Direct Impacts	$6.27	$9.13	$23.23	$27.57	$31.57	$36.20
Secondary Regional Level Impacts	$4.75	$6.91	$17.58	$20.86	$23.89	$27.39
Rockwall						
Direct Impacts	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Secondary Regional Level Impacts	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Tarrant						
Direct Impacts	$0.00	$856.23	$1,869.76	$5,873.79	$8,228.93	$20,942.00
Secondary Regional Level Impacts	$0.00	$627.10	$1,369.42	$4,301.98	$6,026.90	$15,338.00
Wise						
Direct Impacts	$0.00	$4.78	$10.11	$30.68	$41.77	$106.82
Secondary Regional Level Impacts	$0.00	$3.67	$7.76	$23.54	$32.05	$81.97
Total	$3,744.57	$12,978.66	$18,430.97	$31,340.71	$55,859.23	$85,966.30
Job Losses (numbers may not sum to figures in text due to rounding)						
County	2010	2020	2030	2040	2050	2060
Collin						
Direct Impacts	1,472	2,693	3,030	9,043	10,707	12,648
Secondary Regional Level Impacts	2,925	5,352	6,021	17,970	21,276	25,134
Cooke						
Direct Impacts	134	379	529	651	756	1,780
Secondary Regional Level Impacts	163	460	643	791	919	2,165
Dallas						
Direct Impacts	5,383	17,286	21,928	26,481	62,427	69,631

Secondary Regional Level Impacts	10,572	33,950	43,067	52,010	122,609	136,758
Denton						
Direct Impacts	87	523	1,705	2,304	2,971	4,393
Secondary Regional Level Impacts	234	1,406	4,583	6,190	7,984	11,805
Grayson						
Direct Impacts	175	1,392	1,512	1,975	2,443	6,126
Secondary Regional Level Impacts	319	2,538	2,757	3,601	4,455	11,170
Henderson						
Direct Impacts	182	37	49	64	161	201
Secondary Regional Level Impacts	192	39	52	67	169	212
Kaufman						
Direct Impacts	119	329	431	517	1,203	1,391
Secondary Regional Level Impacts	146	439	575	690	1,605	1,856
Navarro						
Direct Impacts	0	37	106	176	511	688
Secondary Regional Level Impacts	0	50	142	237	686	923
Parker						
Direct Impacts	49	71	181	215	246	282
Secondary Regional Level Impacts	45	66	168	199	228	262
Rockwall						
Direct Impacts	0	0	0	0	0	0
Secondary Regional Level Impacts	0	0	0	0	0	0
Tarrant						
Direct Impacts	0	2,914	6,364	19,992	28,008	71,278
Secondary Regional Level Impacts	0	8,531	18,629	58,522	81,986	208,649
Wise						
Direct Impacts	0	31	66	199	271	693
Secondary Regional Level Impacts	0	35	74	226	307	786
Total	22,200	78,558	112,613	202,120	351,928	568,833
Income Losses ($Millions)						
County	2010	2020	2030	2040	2050	2060
Collin						
Direct Impacts	$147.01	$268.98	$302.59	$903.09	$1,069.23	$1,263.17
Secondary Regional Level Impacts	$169.95	$310.97	$349.83	$1,044.09	$1,236.17	$1,460.38
Cooke						
Direct Impacts	$6.74	$19.02	$26.52	$32.63	$37.89	$89.26
Secondary Regional Level Impacts	$10.65	$29.99	$41.95	$51.60	$59.93	$141.16
Dallas						
Direct Impacts	$665.01	$2,135.51	$2,709.00	$3,271.50	$7,712.31	$8,602.29
Secondary Regional Level Impacts	$708.18	$2,274.12	$2,884.84	$3,483.85	$8,212.92	$9,160.67
Denton						
Direct Impacts	$10.76	$64.57	$210.46	$284.30	$366.68	$542.17
Secondary Regional Level Impacts	$14.89	$89.32	$291.16	$393.31	$507.28	$750.06
Grayson						
Direct Impacts	$13.86	$110.15	$119.66	$156.31	$193.36	$484.87
Secondary Regional Level Impacts	$21.07	$167.37	$181.82	$237.50	$293.80	$736.74
Henderson						
Direct Impacts	$9.19	$1.88	$2.49	$3.21	$8.10	$10.13
Secondary Regional Level Impacts	$12.61	$2.59	$3.41	$4.40	$11.13	$13.91
Kaufman						
Direct Impacts	$9.92	$28.16	$36.92	$44.30	$102.98	$119.12
Secondary Regional Level Impacts	$9.48	$28.63	$37.54	$45.05	$104.71	$121.12
Navarro						
Direct Impacts	$0.00	$2.48	$7.04	$11.73	$33.96	$45.71
Secondary Regional Level Impacts	$0.00	$3.20	$9.11	$15.17	$43.93	$59.15

Parker						
Direct Impacts	$2.58	$3.75	$9.55	$11.33	$12.98	$14.88
Secondary Regional Level Impacts	$2.83	$4.13	$10.50	$12.46	$14.27	$16.36
Rockwall						
Direct Impacts	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Secondary Regional Level Impacts	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Tarrant						
Direct Impacts	$0.00	$276.91	$604.69	$1,899.63	$2,661.29	$6,772.79
Secondary Regional Level Impacts	$0.00	$632.03	$1,380.18	$4,335.79	$6,074.26	$15,458.54
Wise						
Direct Impacts	$0.00	$2.14	$4.53	$13.73	$18.70	$47.81
Secondary Regional Level Impacts	$0.00	$2.16	$4.58	$13.88	$18.90	$48.34
Total	$1,814.73	$6,458.06	$9,228.40	$16,268.86	$28,794.76	$45,958.62

Business Taxes ($Millions)

County	2010	2020	2030	2040	2050	2060
Collin						
Direct Impacts	$3.78	$6.91	$7.77	$23.20	$27.47	$32.46
Secondary Regional Level Impacts	$5.21	$9.53	$10.72	$31.99	$37.87	$44.74
Cooke						
Direct Impacts	$0.15	$0.43	$0.60	$0.74	$0.86	$2.02
Secondary Regional Level Impacts	$0.24	$0.68	$0.95	$1.17	$1.35	$3.19
Dallas						
Direct Impacts	$14.45	$46.41	$58.87	$71.10	$167.61	$186.95
Secondary Regional Level Impacts	$16.47	$52.87	$67.07	$81.00	$190.95	$212.99
Denton						
Direct Impacts	$0.26	$1.54	$5.02	$6.78	$8.75	$12.94
Secondary Regional Level Impacts	$0.36	$2.15	$7.01	$9.47	$12.21	$18.05
Grayson						
Direct Impacts	$0.46	$3.63	$3.95	$5.15	$6.38	$15.99
Secondary Regional Level Impacts	$0.73	$5.83	$6.34	$8.28	$10.24	$25.67
Henderson						
Direct Impacts	$0.21	$0.04	$0.06	$0.07	$0.19	$0.23
Secondary Regional Level Impacts	$0.29	$0.06	$0.08	$0.10	$0.26	$0.32
Kaufman						
Direct Impacts	$0.26	$0.75	$0.99	$1.19	$2.76	$3.19
Secondary Regional Level Impacts	$0.27	$0.86	$1.13	$1.36	$3.15	$3.65
Navarro						
Direct Impacts	$0.00	$0.07	$0.20	$0.33	$0.96	$1.30
Secondary Regional Level Impacts	$0.00	$0.09	$0.27	$0.44	$1.29	$1.73
Parker						
Direct Impacts	$0.09	$0.13	$0.32	$0.38	$0.44	$0.50
Secondary Regional Level Impacts	$0.10	$0.14	$0.35	$0.42	$0.48	$0.55
Rockwall						
Direct Impacts	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Secondary Regional Level Impacts	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Tarrant						
Direct Impacts	$0.00	$13.09	$28.60	$89.83	$125.85	$320.28
Secondary Regional Level Impacts	$0.00	$28.23	$61.65	$193.67	$271.33	$690.51
Wise						
Direct Impacts	$0.00	$0.07	$0.15	$0.44	$0.60	$1.54
Secondary Regional Level Impacts	$0.00	$0.07	$0.15	$0.45	$0.61	$1.57
Total	$43.32	$173.60	$262.24	$527.57	$871.61	$1,580.37

Source: Texas Water Development Board, Office of Water Resources Planning

Municipal

Impacts to the horticultural industry were estimated at the regional level only and are not included.

Table B-2: Distribution of Economic Impacts by County: Water Intensive Commercial Uses (Municipal)						
Lost Output (Total Sales, $millions)						
County	2010	2020	2030	2040	2050	2060
Collin						
Direct Impacts	$8.85	$40.30	$146.86	$357.88	$603.95	$942.97
Secondary Regional Level Impacts	$7.50	$34.15	$124.45	$303.27	$511.79	$799.08
Cooke						
Direct Impacts	$0.01	$0.12	$0.30	$0.46	$0.93	$1.22
Secondary Regional Level Impacts	$0.01	$0.10	$0.23	$0.36	$0.73	$0.96
Dallas						
Direct Impacts	$0.00	$4.12	$43.41	$123.48	$357.00	$906.00
Secondary Regional Level Impacts	$0.00	$3.50	$36.93	$105.03	$303.64	$770.60
Denton						
Direct Impacts	$0.40	$4.50	$14.97	$39.39	$75.74	$118.16
Secondary Regional Level Impacts	$0.34	$3.83	$12.74	$33.52	$64.47	$100.58
Ellis						
Direct Impacts	$0.51	$13.96	$15.74	$19.05	$27.03	$49.94
Secondary Regional Level Impacts	$0.43	$11.80	$13.31	$16.10	$22.85	$42.21
Fannin						
Direct Impacts	$0.00	$0.01	$0.11	$0.30	$0.63	$1.36
Secondary Regional Level Impacts	$0.00	$0.01	$0.09	$0.26	$0.53	$1.16
Freestone						
Direct Impacts	$0.05	$0.05	$0.06	$0.11	$0.20	$0.35
Secondary Regional Level Impacts	$0.04	$0.04	$0.05	$0.09	$0.17	$0.30
Grayson						
Direct Impacts	$0.00	$0.44	$0.79	$1.21	$1.56	$1.77
Secondary Regional Level Impacts	$0.00	$0.37	$0.67	$1.02	$1.32	$1.50
Henderson						
Direct Impacts	$31.89	$31.89	$31.89	$31.89	$31.89	$31.89
Secondary Regional Level Impacts	$27.09	$27.09	$27.09	$27.09	$27.09	$27.09
Kaufman						
Direct Impacts	$0.00	$0.25	$2.03	$2.36	$6.04	$17.16
Secondary Regional Level Impacts	$0.00	$0.21	$1.73	$2.01	$5.14	$14.59
Parker						
Direct Impacts	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Secondary Regional Level Impacts	$0.00	$0.13	$2.05	$5.26	$10.37	$22.30
Navarro						
Direct Impacts	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Secondary Regional Level Impacts	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Rockwall						
Direct Impacts	$0.00	$0.00	$4.86	$13.57	$25.42	$36.23
Secondary Regional Level Impacts	$0.00	$0.00	$4.08	$11.42	$21.38	$30.47
Tarrant						
Direct Impacts	$0.00	$0.08	$5.88	$21.06	$29.08	$121.65
Secondary Regional Level Impacts	$0.00	$0.07	$5.06	$18.14	$25.05	$104.79
Wise						
Direct Impacts	$0.00	$0.00	$0.08	$0.74	$2.48	$5.64
Secondary Regional Level Impacts	$0.00	$0.00	$0.08	$0.74	$2.48	$5.64

Total	$77.14	$177.01	$495.54	$1,135.84	$2,158.99	$4,155.61
Lost Income ($millions)						
County	2010	2020	2030	2040	2050	2060
Collin						
Direct Impacts	$5.24	$23.85	$86.93	$211.84	$357.49	$558.17
Secondary Regional Level Impacts	$4.35	$19.83	$72.28	$176.13	$297.23	$464.08
Cooke						
Direct Impacts	$0.01	$0.11	$0.25	$0.39	$0.80	$1.04
Secondary Regional Level Impacts	$0.01	$0.06	$0.14	$0.22	$0.45	$0.59
Dallas						
Direct Impacts	$0.00	$2.41	$25.40	$72.24	$208.84	$530.00
Secondary Regional Level Impacts	$0.00	$2.02	$21.29	$60.56	$175.09	$444.34
Denton						
Direct Impacts	$0.25	$2.79	$9.29	$24.45	$47.02	$73.35
Secondary Regional Level Impacts	$0.22	$2.45	$8.13	$21.40	$41.16	$64.21
Ellis						
Direct Impacts	$0.29	$7.99	$9.01	$10.90	$15.47	$28.57
Secondary Regional Level Impacts	$0.25	$6.83	$7.70	$9.32	$13.22	$24.43
Fannin						
Direct Impacts	$0.00	$0.00	$0.06	$0.16	$0.33	$0.73
Secondary Regional Level Impacts	$0.00	$0.00	$0.05	$0.15	$0.30	$0.66
Freestone						
Direct Impacts	$0.03	$0.03	$0.03	$0.06	$0.11	$0.19
Secondary Regional Level Impacts	$0.02	$0.02	$0.03	$0.05	$0.10	$0.17
Grayson						
Direct Impacts	$0.00	$0.24	$0.43	$0.66	$0.86	$0.97
Secondary Regional Level Impacts	$0.00	$0.21	$0.38	$0.58	$0.75	$0.85
Henderson						
Direct Impacts	$18.32	$18.32	$18.32	$18.32	$18.32	$18.32
Secondary Regional Level Impacts	$15.64	$15.64	$15.64	$15.64	$15.64	$15.64
Kaufman						
Direct Impacts	$0.00	$0.13	$1.10	$1.28	$3.27	$9.29
Secondary Regional Level Impacts	$0.00	$0.12	$0.98	$1.14	$2.91	$8.27
Parker						
Direct Impacts	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Secondary Regional Level Impacts	$0.00	$0.08	$1.20	$3.07	$6.05	$13.00
Navarro						
Direct Impacts	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Secondary Regional Level Impacts	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Rockwall						
Direct Impacts	$0.00	$0.00	$2.74	$7.66	$14.34	$20.44
Secondary Regional Level Impacts	$0.00	$0.00	$2.34	$6.55	$12.27	$17.49
Tarrant						
Direct Impacts	$0.00	$0.04	$3.27	$11.72	$16.19	$67.72
Secondary Regional Level Impacts	$0.00	$0.04	$2.92	$10.46	$14.45	$60.42
Wise						
Direct Impacts	$0.00	$0.00	$0.05	$0.45	$1.49	$3.39
Secondary Regional Level Impacts	$0.00	$0.00	$0.05	$0.45	$1.49	$3.39
Total	$44.63	$103.21	$290.02	$665.85	$1,265.64	$2,429.72
Job Losses (numbers may not sum to figures in text due to rounding)						
County	2010	2020	2030	2040	2050	2060
Collin						
Direct Impacts	238	1,085	3,955	9,639	16,267	25,398

Secondary Regional Level Impacts	79	362	1,320	3,216	5,427	8,473
Cooke						
Direct Impacts	0	4	10	16	32	42
Secondary Regional Level Impacts	0	1	3	4	8	10
Dallas						
Direct Impacts	0	101	1,064	3,027	8,751	22,208
Secondary Regional Level Impacts	0	37	391	1,111	3,211	8,150
Denton						
Direct Impacts	10	113	377	992	1,908	2,977
Secondary Regional Level Impacts	4	40	134	353	679	1,059
Ellis						
Direct Impacts	13	359	405	490	696	1,285
Secondary Regional Level Impacts	5	124	139	169	239	442
Fannin						
Direct Impacts	0	0	3	8	16	34
Secondary Regional Level Impacts	0	0	1	3	6	12
Freestone						
Direct Impacts	1	1	1	3	5	9
Secondary Regional Level Impacts	0	0	1	1	2	3
Grayson						
Direct Impacts	0	11	19	29	38	43
Secondary Regional Level Impacts	0	4	7	11	14	16
Henderson						
Direct Impacts	837	837	837	837	837	837
Secondary Regional Level Impacts	285	285	285	285	285	285
Kaufman						
Direct Impacts	0	6	51	59	150	427
Secondary Regional Level Impacts	0	2	18	21	53	151
Parker						
Direct Impacts	0	0	0	0	0	0
Secondary Regional Level Impacts	0	3	47	122	239	515
Navarro						
Direct Impacts	0	0	0	0	0	0
Secondary Regional Level Impacts	0	0	0	0	0	0
Rockwall						
Direct Impacts	0	0	130	363	680	968
Secondary Regional Level Impacts	0	0	43	120	225	321
Tarrant						
Direct Impacts	0	2	143	513	709	2,964
Secondary Regional Level Impacts	0	1	53	191	263	1,101
Wise						
Direct Impacts	0	0	2	21	69	157
Secondary Regional Level Impacts	0	0	2	21	69	157
Total	1,473	3,379	9,441	21,620	40,876	78,043
Lost Business Taxes ($millions)						
Total	2010	2020	2030	2040	2050	2060
Collin						
Direct Impacts	$0.49	$2.24	$8.17	$19.91	$33.60	$52.46
Secondary Regional Level Impacts	$0.44	$2.02	$7.38	$17.98	$30.33	$47.36
Cooke						
Direct Impacts	$0.00	$0.00	$0.01	$0.01	$0.03	$0.04
Secondary Regional Level Impacts	$0.00	$0.00	$0.01	$0.01	$0.02	$0.03
Dallas						
Direct Impacts	$0.00	$0.25	$2.65	$7.54	$21.79	$55.29
Secondary Regional Level Impacts	$0.00	$0.23	$2.40	$6.83	$19.75	$50.12

Denton						
Direct Impacts	$0.03	$0.28	$0.93	$2.45	$4.72	$7.36
Secondary Regional Level Impacts	$0.02	$0.26	$0.86	$2.25	$4.33	$6.75
Ellis						
Direct Impacts	$0.03	$0.80	$0.91	$1.10	$1.55	$2.87
Secondary Regional Level Impacts	$0.03	$0.72	$0.81	$0.98	$1.39	$2.58
Fannin						
Direct Impacts	$0.00	$0.00	$0.01	$0.02	$0.04	$0.09
Secondary Regional Level Impacts	$0.00	$0.00	$0.01	$0.02	$0.04	$0.08
Freestone						
Direct Impacts	$0.00	$0.00	$0.00	$0.01	$0.01	$0.02
Secondary Regional Level Impacts	$0.00	$0.00	$0.00	$0.01	$0.01	$0.02
Grayson						
Direct Impacts	$0.00	$0.03	$0.05	$0.08	$0.10	$0.11
Secondary Regional Level Impacts	$0.00	$0.03	$0.05	$0.07	$0.09	$0.10
Henderson						
Direct Impacts	$1.87	$1.87	$1.87	$1.87	$1.87	$1.87
Secondary Regional Level Impacts	$1.70	$1.70	$1.70	$1.70	$1.70	$1.70
Kaufman						
Direct Impacts	$0.00	$0.25	$2.03	$2.36	$6.04	$17.16
Secondary Regional Level Impacts	$0.00	$0.01	$0.12	$0.14	$0.36	$1.02
Parker						
Direct Impacts	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Secondary Regional Level Impacts	$0.00	$0.01	$0.11	$0.27	$0.54	$1.15
Navarro						
Direct Impacts	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Secondary Regional Level Impacts	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Rockwall						
Direct Impacts	$0.00	$0.00	$0.29	$0.82	$1.54	$2.19
Secondary Regional Level Impacts	$0.00	$0.00	$0.27	$0.74	$1.39	$1.98
Tarrant						
Direct Impacts	$0.00	$0.00	$0.36	$1.29	$1.78	$7.43
Secondary Regional Level Impacts	$0.00	$0.05	$3.48	$12.46	$17.20	$71.95
Wise						
Direct Impacts	$0.00	$0.00	$0.00	$0.04	$0.12	$0.28
Secondary Regional Level Impacts	$0.00	$0.00	$0.00	$0.04	$0.12	$0.28
Total	$4.61	$10.76	$34.47	$80.97	$150.46	$332.29

Source: Texas Water Development Board, Office of Water Resources Planning

Table B-3: Lost Water Utility Revenues (Municipal)						
County	2010	2020	2030	2040	2050	2060
Collin	$65.22	$138.16	$195.90	$260.35	$322.40	$390.08
Cooke	$0.72	$1.33	$2.17	$2.83	$3.96	$4.99
Dallas	$175.09	$280.96	$346.67	$410.94	$497.99	$618.18
Denton	$93.01	$184.43	$217.80	$289.51	$334.49	$368.91
Ellis	$6.04	$12.48	$20.38	$29.00	$39.81	$53.07
Fannin	$0.45	$0.93	$1.69	$3.99	$7.01	$10.00
Freestone	$0.27	$0.33	$0.46	$0.61	$0.79	$0.99
Grayson	$1.94	$5.81	$8.94	$11.97	$16.43	$21.87
Henderson	$4.44	$6.48	$8.44	$10.41	$12.98	$16.25
Kaufman	$3.60	$9.30	$13.78	$18.15	$23.03	$29.24
Navarro	$0.02	$0.14	$0.81	$1.63	$2.72	$4.26
Parker	$2.32	$7.04	$13.22	$18.60	$24.73	$31.00
Rockwall	$5.84	$14.50	$20.18	$25.32	$29.15	$32.13
Tarrant	$9.42	$75.49	$144.27	$214.69	$300.64	$396.94
Wise	$0.49	$2.37	$5.52	$8.74	$12.81	$17.43
Total	$368.87	$739.76	$1,000.24	$1,306.76	$1,628.94	$1,995.32
Source: Texas Water Development Board, Office of Water Resources Planning						

Table B-4: Lost Water Utility Taxes (Municipal)						
County	2010	2020	2030	2040	2050	2060
Collin	$1.15	$2.44	$3.45	$4.59	$5.68	$6.88
Cooke	$0.01	$0.02	$0.04	$0.05	$0.07	$0.09
Dallas	$3.09	$4.95	$6.11	$7.24	$8.78	$10.90
Denton	$1.64	$3.25	$3.84	$5.10	$5.90	$6.50
Ellis	$0.11	$0.22	$0.36	$0.51	$0.70	$0.94
Fannin	$0.01	$0.02	$0.03	$0.07	$0.12	$0.18
Freestone	$0.00	$0.01	$0.01	$0.01	$0.01	$0.02
Grayson	$0.03	$0.10	$0.16	$0.21	$0.29	$0.39
Henderson	$0.08	$0.11	$0.15	$0.18	$0.23	$0.29
Kaufman	$0.06	$0.16	$0.24	$0.32	$0.41	$0.52
Navarro	$0.00	$0.00	$0.01	$0.03	$0.05	$0.08
Parker	$0.04	$0.12	$0.23	$0.33	$0.44	$0.55
Rockwall	$0.10	$0.26	$0.36	$0.45	$0.51	$0.57
Tarrant	$0.17	$1.33	$2.54	$3.78	$5.30	$7.00
Wise	$0.01	$0.04	$0.10	$0.15	$0.23	$0.31
Total	$6.50	$13.04	$17.63	$23.03	$28.71	$35.17
Source: Texas Water Development Board, Office of Water Resources Planning						

Table B-5: Costs to Non-Water Intensive Commercial Businesses and Households						
County	2010	2020	2030	2040	2050	2060
Collin	$10.20	$29.33	$115.77	$314.48	$528.31	$770.37
Cooke	$2.81	$4.99	$7.39	$9.23	$12.49	$15.43
Dallas	$467.26	$751.53	$943.04	$1,146.80	$1,473.00	$2,017.73
Denton	$85.06	$192.80	$337.28	$499.72	$691.02	$922.44
Ellis	$56.04	$283.06	$511.42	$745.42	$1,031.02	$1,316.35
Fannin	$2.35	$4.23	$7.19	$14.91	$27.24	$22.45
Freestone	$1.08	$1.27	$1.70	$2.45	$3.64	$5.34
Grayson	$5.19	$17.86	$28.09	$38.34	$52.41	$68.09
Henderson	$7.98	$18.39	$28.02	$37.16	$51.72	$72.01
Kaufman	$9.62	$24.75	$36.26	$47.10	$58.89	$73.85
Navarro	$0.06	$0.42	$2.27	$4.53	$7.48	$11.65
Parker	$6.20	$18.83	$36.22	$52.48	$70.71	$91.97
Rockwall	$15.79	$39.41	$56.92	$74.47	$89.16	$96.64
Tarrant	$25.14	$202.21	$395.32	$605.49	$853.36	$1,237.42
Wise	$2.86	$9.35	$17.98	$27.72	$42.22	$61.09
Total	$697.64	$1,598.43	$2,524.87	$3,620.29	$4,992.68	$6,782.83

Source: Texas Water Development Board, Office of Water Resources Planning

Steam Electric

Table B-6: Distribution of Economic Impacts by County and Water User Groups: (Steam Electric)						
Lost Output (Total Sales, $millions)						
County	2010	2020	2030	2040	2050	2060
Collin						
Direct Impacts	$92.76	$8.60	$11.71	$28.47	$70.34	$92.76
Secondary Regional Level Impacts	$10.39	$0.96	$1.31	$3.19	$7.88	$10.39
Dallas						
Direct Impacts	$22.64	$19.68	$26.13	$40.50	$56.80	$158.04
Secondary Regional Level Impacts	$2.54	$2.21	$2.93	$4.54	$6.36	$17.71
Ellis						
Direct Impacts	$231.61	$365.53	$441.65	$533.36	$644.87	$780.60
Secondary Regional Level Impacts	$25.95	$40.96	$49.49	$59.76	$72.26	$87.47
Freestone						
Direct Impacts	$0.00	$0.00	$0.00	$33.83	$91.35	$318.22
Secondary Regional Level Impacts	$0.00	$0.00	$0.00	$3.79	$10.24	$35.66
Jack						
Direct Impacts	$0.00	$117.42	$137.30	$137.30	$226.98	$226.98
Secondary Regional Level Impacts	$0.00	$13.16	$15.38	$15.38	$25.43	$25.43
Kaufman						
Direct Impacts	$0.00	$17.56	$41.61	$48.95	$213.34	$600.95
Secondary Regional Level Impacts	$0.00	$1.97	$4.66	$5.49	$23.90	$67.34
Parker						
Direct Impacts	$0.00	$158.90	$185.75	$218.55	$258.47	$307.11
Secondary Regional Level Impacts	$0.00	$17.80	$20.81	$24.49	$28.96	$34.41
Tarrant						
Direct Impacts	$0.00	$9.73	$22.48	$75.67	$116.50	$333.53
Secondary Regional Level Impacts	$0.00	$1.09	$2.52	$8.48	$13.05	$37.37
Wise						
Direct Impacts	$12.82	$83.48	$128.45	$44.32	$58.43	$149.14
Secondary Regional Level Impacts	$1.44	$9.35	$14.39	$4.97	$6.55	$16.71
Total	$400.14	$868.42	$1,106.58	$1,291.03	$1,931.73	$3,299.83
Lost Income ($Millions)						
County	2010	2020	2030	2040	2050	2060
Collin						
Direct Impacts	$66.34	$6.15	$8.38	$20.36	$50.31	$66.34
Secondary Regional Level Impacts	$22.78	$2.11	$2.88	$6.99	$17.28	$22.78
Dallas						
Direct Impacts	$16.19	$14.08	$18.69	$28.96	$40.62	$113.02
Secondary Regional Level Impacts	$5.56	$4.83	$6.42	$9.95	$13.95	$38.81
Ellis						
Direct Impacts	$165.63	$261.40	$315.84	$381.42	$461.17	$558.23

Secondary Regional Level Impacts	$56.88	$89.77	$108.46	$130.99	$158.37	$191.70
Freestone						
Direct Impacts	$0.00	$0.00	$0.00	$24.19	$65.33	$227.57
Secondary Regional Level Impacts	$0.00	$0.00	$0.00	$8.31	$22.43	$78.15
Jack						
Direct Impacts	$0.00	$83.97	$98.19	$98.19	$162.32	$162.32
Secondary Regional Level Impacts	$0.00	$28.84	$33.72	$33.72	$55.75	$55.75
Kaufman						
Direct Impacts	$0.00	$12.56	$29.76	$35.01	$152.57	$429.77
Secondary Regional Level Impacts	$0.00	$4.31	$10.22	$12.02	$52.39	$147.59
Parker						
Direct Impacts	$0.00	$113.63	$132.83	$156.29	$184.84	$219.62
Secondary Regional Level Impacts	$0.00	$39.02	$45.62	$53.67	$63.48	$75.42
Tarrant						
Direct Impacts	$0.00	$6.96	$16.08	$54.12	$83.31	$238.52
Secondary Regional Level Impacts	$0.00	$2.39	$5.52	$18.58	$28.61	$81.91
Wise						
Direct Impacts	$9.17	$59.70	$91.86	$31.70	$41.79	$106.66
Secondary Regional Level Impacts	$3.15	$20.50	$31.55	$10.88	$14.35	$36.63
Total	$345.69	$750.24	$956.00	$1,115.34	$1,668.86	$2,850.80

Lost Jobs (Numbers May Not Sum To Figures In Text Due To Rounding)

	2010	2020	2030	2040	2050	2060
Collin						
Direct Impacts	69	6	9	21	52	69
Secondary Regional Level Impacts	225	21	28	69	170	225
Dallas						
Direct Impacts	17	15	19	30	42	117
Secondary Regional Level Impacts	55	48	63	98	137	383
Ellis						
Direct Impacts	171	270	326	394	476	577
Secondary Regional Level Impacts	561	885	1069	1291	1561	1890
Freestone						
Direct Impacts	0	0	0	25	67	235
Secondary Regional Level Impacts	0	0	0	82	221	770
Jack						
Direct Impacts	0	87	101	101	168	168
Secondary Regional Level Impacts	0	284	332	332	550	550
Kaufman						
Direct Impacts	0	13	31	36	158	444
Secondary Regional Level Impacts	0	43	101	119	516	1455
Parker						
Direct Impacts	0	117	137	161	191	227

Secondary Regional Level Impacts	0	385	450	529	626	743
Tarrant						
Direct Impacts	0	7	17	56	86	246
Secondary Regional Level Impacts	0	24	54	183	282	807
Wise						
Direct Impacts	9	62	95	33	43	110
Secondary Regional Level Impacts	31	202	311	107	141	361
Total	1137	2,467	3,144	3,668	5,488	9,376
Lost Business Taxes ($Millions)						
County	2010	2020	2030	2040	2050	2060
Collin						
Direct Impacts	$11.88	$1.10	$1.50	$3.65	$9.01	$11.88
Secondary Regional Level Impacts	$4.08	$0.38	$0.52	$1.25	$3.09	$4.08
Dallas						
Direct Impacts	$2.90	$2.52	$3.35	$5.19	$7.27	$20.24
Secondary Regional Level Impacts	$1.00	$0.87	$1.15	$1.78	$2.50	$6.95
Ellis						
Direct Impacts	$29.67	$46.82	$56.57	$68.32	$82.60	$99.98
Secondary Regional Level Impacts	$10.19	$16.08	$19.43	$23.46	$28.37	$34.34
Freestone						
Direct Impacts	$0.00	$0.00	$0.00	$4.33	$11.70	$40.75
Secondary Regional Level Impacts	$0.00	$0.00	$0.00	$1.49	$4.02	$14.00
Jack						
Direct Impacts	$0.00	$15.04	$17.58	$17.58	$29.07	$29.07
Secondary Regional Level Impacts	$0.00	$5.16	$6.04	$6.04	$9.98	$9.98
Kaufman						
Direct Impacts	$0.00	$2.25	$5.33	$6.27	$27.32	$76.96
Secondary Regional Level Impacts	$0.00	$0.77	$1.83	$2.15	$9.38	$26.43
Parker						
Direct Impacts	$0.00	$20.35	$23.79	$28.00	$33.11	$39.34
Secondary Regional Level Impacts	$0.00	$6.99	$8.17	$9.61	$11.37	$13.51
Tarrant						
Direct Impacts	$0.00	$1.25	$2.88	$9.69	$14.92	$42.72
Secondary Regional Level Impacts	$0.00	$0.43	$0.99	$3.33	$5.12	$14.67
Wise						
Direct Impacts	$1.64	$10.69	$16.45	$5.68	$7.48	$19.10
Secondary Regional Level Impacts	$0.56	$3.67	$5.65	$1.95	$2.57	$6.56
Total	$61.92	$134.37	$171.23	$199.77	$298.90	$510.57
Source: Texas Water Development Board, Office of Water Resources Planning						

Mining

Table B-7: Distribution of Economic Impacts by County and Water User Groups: (Mining)						
Lost Output (Total Sales, $Millions)						
County	2010	2020	2030	2040	2050	2060
Collin						
Direct Impacts	$31.48	$31.48	$31.53	$29.14	$30.40	$31.67
Secondary Regional Level Impacts	$18.41	$18.41	$18.43	$17.00	$17.73	$18.47
Cooke						
Direct Impacts	$0.64	$0.76	$0.88	$0.99	$1.20	$1.32
Secondary Regional Level Impacts	$0.36	$0.43	$0.50	$0.56	$0.68	$0.75
Dallas						
Direct Impacts	$0.00	$0.58	$0.61	$0.64	$0.67	$0.70
Secondary Regional Level Impacts	$0.00	$0.35	$0.37	$0.39	$0.40	$0.42
Denton						
Direct Impacts	$10.86	$11.41	$11.95	$12.49	$13.04	$13.58
Secondary Regional Level Impacts	$5.66	$5.95	$6.23	$6.51	$6.79	$7.08
Tarrant						
Direct Impacts	$0.63	$0.93	$2.26	$2.65	$3.03	$3.35
Secondary Regional Level Impacts	$0.36	$0.52	$1.27	$1.49	$1.70	$1.88
Wise						
Direct Impacts	$17.61	$77.90	$214.08	$263.12	$308.53	$347.81
Secondary Regional Level Impacts	$1.33	$5.33	$14.56	$17.85	$20.91	$23.55
Total	$87.34	$154.05	$302.66	$352.83	$405.10	$450.59
Lost Jobs (numbers may not sum to figures in text due to rounding)						
County	2010	2020	2030	2040	2050	2060
Collin						
Direct Impacts	61	61	61	57	59	62
Secondary Regional Level Impacts	140	140	141	130	135	141
Cooke						
Direct Impacts	1	1	2	2	2	2
Secondary Regional Level Impacts	3	3	4	4	5	6
Dallas						
Direct Impacts	0	4	5	5	5	5
Secondary Regional Level Impacts	0	3	4	4	4	4
Denton						
Direct Impacts	39	41	43	45	47	49
Secondary Regional Level Impacts	48	50	52	55	57	60
Tarrant						
Direct Impacts	4	6	14	16	19	21
Secondary Regional Level Impacts	3	5	12	14	16	17
Wise						
Direct Impacts	4	14	39	48	56	63
Secondary Regional Level Impacts	12	49	135	165	194	218
Total	315	379	510	545	600	649
Lost Income ($millions)						
	2010	2020	2030	2040	2050	2060
Collin						
Direct Impacts	$11.71	$11.71	$11.71	$10.79	$11.26	$11.73
Secondary Regional Level Impacts	$8.35	$8.35	$8.36	$7.70	$8.04	$8.37
Cooke						

Direct Impacts	$0.30	$0.36	$0.41	$0.46	$0.56	$0.62
Secondary Regional Level Impacts	$0.20	$0.24	$0.28	$0.31	$0.38	$0.42
Dallas						
Direct Impacts	$0.00	$0.33	$0.34	$0.36	$0.37	$0.39
Secondary Regional Level Impacts	$0.00	$0.20	$0.21	$0.22	$0.23	$0.24
Denton						
Direct Impacts	$5.61	$5.89	$6.17	$6.45	$6.73	$7.01
Secondary Regional Level Impacts	$3.25	$3.42	$3.58	$3.74	$3.90	$4.07
Tarrant						
Direct Impacts	$0.27	$0.40	$0.98	$1.15	$1.31	$1.45
Secondary Regional Level Impacts	$0.19	$0.28	$0.67	$0.79	$0.90	$1.00
Wise						
Direct Impacts	$8.43	$37.31	$102.55	$126.04	$147.80	$166.61
Secondary Regional Level Impacts	$0.78	$3.16	$8.63	$10.58	$12.40	$13.97
Total	$39.10	$71.64	$143.89	$168.60	$193.88	$215.87
Lost Business Taxes ($millions)						
County	2010	2020	2030	2040	2050	2060
Collin						
Direct Impacts	$4.31	$4.31	$4.32	$3.97	$4.15	$4.32
Secondary Regional Level Impacts	$3.03	$3.03	$3.03	$2.79	$2.91	$3.03
Cooke						
Direct Impacts	$0.03	$0.04	$0.05	$0.05	$0.07	$0.07
Secondary Regional Level Impacts	$0.02	$0.03	$0.03	$0.04	$0.04	$0.05
Dallas						
Direct Impacts	$0.00	$0.03	$0.03	$0.03	$0.03	$0.03
Secondary Regional Level Impacts	$0.00	$0.02	$0.02	$0.02	$0.02	$0.02
Denton						
Direct Impacts	$0.53	$0.56	$0.59	$0.61	$0.64	$0.67
Secondary Regional Level Impacts	$0.31	$0.32	$0.34	$0.35	$0.37	$0.38
Tarrant						
Direct Impacts	$0.02	$0.03	$0.07	$0.08	$0.09	$0.10
Secondary Regional Level Impacts	$0.01	$0.02	$0.05	$0.06	$0.07	$0.07
Wise						
Direct Impacts	$0.89	$3.93	$10.81	$13.29	$15.58	$17.57
Secondary Regional Level Impacts	$0.03	$0.09	$0.25	$0.30	$0.35	$0.39
Total	$9.19	$12.42	$19.58	$21.60	$24.32	$26.72
Source: Texas Water Development Board, Office of Water Resources Planning						

Attachment C: Allocation of Economic Impacts by River Basin

Tables C-1 through C-3 distribute regional economic and social impacts by major river basin. Impacts were allocated based on distribution of water shortages among counties. For instance, if 50 percent of water shortages in River Basin A and 50 percent occur in River Basin then impacts were split equally among the two basins.

Manufacturing

Table C-1: Distribution of Impacts among Major River Basins (Manufacturing Uses)

Lost Sales ($millions)

Basin	2010	2020	2030	2040	2050	2060
Brazos	$56.34	$114.09	$128.88	$189.25	$296.67	$424.97
Red	$237.28	$1,192.23	$1,721.94	$2,928.39	$5,175.79	$8,397.32
Sabine	$0.70	$2.39	$2.94	$5.36	$8.76	$12.75
Trinity	$3,450.25	$11,669.96	$16,577.21	$28,217.71	$50,378.01	$77,131.26
Total	$3,744.57	$12,978.66	$18,430.97	$31,340.71	$55,859.23	$85,966.30

Lost Income ($millions)

Basin	2010	2020	2030	2040	2050	2060
Brazos	$27.31	$56.77	$64.53	$98.24	$152.93	$227.19
Red	$114.99	$593.24	$862.18	$1,520.12	$2,668.06	$4,489.31
Sabine	$0.34	$1.19	$1.47	$2.78	$4.51	$6.82
Trinity	$1,672.09	$5,806.86	$8,300.22	$14,647.72	$25,969.26	$41,235.30
Total	$1,814.73	$6,458.06	$9,228.40	$16,268.86	$28,794.76	$45,958.62

Job Losses (numbers may not sum to figures in text due to rounding)

Basin	2010	2020	2030	2040	2050	2060
Brazos	334	691	787	1,220	1,869	2,812
Red	1,407	7,216	10,521	18,886	32,609	55,565
Sabine	4	14	18	35	55	84
Trinity	20,455	70,637	101,287	181,979	317,395	510,372
Total	22,200	78,558	112,613	202,120	351,928	568,833

Lost Business Taxes ($millions)

Basin	2010	2020	2030	2040	2050	2060
Brazos	$0.65	$1.53	$1.83	$3.19	$4.63	$7.81
Red	$2.74	$15.95	$24.50	$49.29	$80.76	$154.37
Sabine	$0.01	$0.03	$0.04	$0.09	$0.14	$0.23
Trinity	$39.91	$156.10	$235.86	$475.00	$786.08	$1,417.95
Total	$43.32	$173.60	$262.24	$527.57	$871.61	$1,580.37

Source: Texas Water Development Board, Office of Water Resources Planning

Municipal

Table C-2: Distribution of Regional Impacts among Major River Basins
(Municipal Uses)

Lost Sales ($millions)						
Basin	2010	2020	2030	2040	2050	2060
Brazos	$0.34	$0.50	$0.89	$1.97	$2.52	$3.54
Red	$1.98	$4.65	$8.33	$18.77	$38.21	$71.06
Sabine	$2.40	$6.88	$10.07	$17.47	$27.39	$44.03
Sulphur	$0.56	$0.64	$1.08	$1.54	$2.24	$3.63
Trinity	$568.93	$1,191.13	$1,904.87	$2,970.88	$4,447.00	$6,938.74
Total	$574.21	$1,203.80	$1,925.25	$3,010.62	$4,517.35	$7,061.00
Lost Income ($millions)						
Basin	2010	2020	2030	2040	2050	2060
Brazos	$1.01	$0.77	$1.42	$3.03	$3.74	$4.68
Red	$5.94	$7.26	$13.33	$28.91	$56.74	$94.00
Sabine	$7.20	$10.74	$16.12	$26.90	$40.68	$58.24
Sulphur	$1.68	$1.00	$1.73	$2.37	$3.32	$4.80
Trinity	$1,706.36	$1,859.02	$3,047.34	$4,575.49	$6,604.00	$9,178.09
Total	1,722	1,879	3,080	4,637	6,708	9,340
Job Losses (numbers may not sum to figures in text due to rounding)						
Basin	2010	2020	2030	2040	2050	2060
Brazos	2	4	10	25	36	56
Red	14	40	91	241	553	1,129
Sabine	17	59	110	225	396	700
Sulphur	4	5	12	20	32	58
Trinity	4,066	10,154	20,847	38,204	64,370	110,260
Total	4,104	10,262	21,071	38,715	65,388	112,203
Lost Business Taxes ($millions)						
Basin	2010	2020	2030	2040	2050	2060
Brazos	$0.01	$0.01	$0.03	$0.05	$0.11	$0.19
Red	$0.05	$0.12	$0.27	$0.44	$1.66	$3.91
Sabine	$0.06	$0.17	$0.32	$0.41	$1.19	$2.42
Sulphur	$0.01	$0.02	$0.03	$0.04	$0.10	$0.20
Trinity	$13.89	$29.98	$61.17	$69.43	$192.64	$381.35
Total	$14.02	$30.29	$61.82	$70.36	$195.68	$388.07

Source: Texas Water Development Board, Office of Water Resources Planning

Mining

Table C-3: Distribution of Impacts among Major River Basins (Mining Uses)						
Lost Sales ($millions)						
Basin	2010	2020	2030	2040	2050	2060
Brazos	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Red	$0.23	$0.23	$0.37	$0.39	$0.41	$0.42
Sabine	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Trinity	$87.11	$153.82	$302.29	$352.44	$404.69	$450.16
Total	$87.34	$154.05	$302.66	$352.83	$405.10	$450.59
Lost Income ($millions)						
Basin	2010	2020	2030	2040	2050	2060
Brazos	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Red	$0.10	$0.11	$0.18	$0.18	$0.20	$0.20
Sabine	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Trinity	$38.99	$71.53	$143.71	$168.42	$193.69	$215.67
Total	$39.10	$71.64	$143.89	$168.60	$193.88	$215.87
Job Losses (numbers may not sum to figures in text due to rounding)						
Basin	2010	2020	2030	2040	2050	2060
Brazos	0	0	0	0	0	0
Red	1	1	1	1	1	1
Sabine	0	0	0	0	0	0
Trinity	314	379	510	544	599	648
Total	315	379	510	545	600	649
Lost Business Taxes ($millions)						
Basin	2010	2020	2030	2040	2050	2060
Brazos	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Red	$0.02	$0.02	$0.02	$0.02	$0.02	$0.03
Sabine	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Trinity	$9.17	$12.40	$19.55	$21.58	$24.30	$26.69
Total	$9.19	$12.42	$19.58	$21.60	$24.32	$26.72
Source: Texas Water Development Board, Office of Water Resources Planning						

Steam-Electric

All impacts for steam-electric are allocated to the Trinity River Basin.

APPENDIX R

DROUGHT CONTINGENCY TRIGGERS

Table R-1
Triggers Included in Drought Contingency Plans Developed by Water Suppliers in Region C

Water User Group	Date	1		2		3		4		5		6	
		Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions
ABLES SPRINGS WATER SUPPLY CO. - TERRELL	Jul-00	**Mild Conditions**	1. Water consumption has created plant to produce water at 75% of capacity for three consecutive days. 2. There is an extended period (at least 8 weeks) of low rainfall.	**Moderate Conditions**	1. Must be implemented when The Macbee Treatment Plant exceeds 70 % of the safe operating capacity of 2 mgpd for five consecutive days or 80% on a single day.	**Severe Conditions**	1. Must be implented when an emergency water shortage condition exists for a major water line break; or pump or major component or a system failure occurs, which caused unprecedented loss of capability to provide water service; or there is a natural or man-made contamination of water source.						
ADDISON	Aug-99	**Water Watch**	Total raw water supply in connected lakes drops below 55% of total conservation storage, demand exceeds 90% of deliverable capacity for three consecutive day, or short term deficiencies in distribution system limit supply capability.	**Water Warning**	Total raw water supply in connected lakes drops below 50% of total conservation storage, demand exceeds 95% of deliverable capacity for two consecutive day.	**Water Emergency**	Total raw water supply in connected lakes drops below 35% of total conservation storage, demand exceeds 95% of deliverable capacity for five consecutive days.	**Water Crisis**	Total raw water supply in connected lakes drops below 20% of total conservation storage, demand exceeds 100% of deliverable capacity for two consecutive day.				
ALLEN	Apr-05	**Mild**	1. Demand exceeds 90% of amount that can be delivered to customers for three consecutive days. 2. Demand for all or part of the delivery system approaches capacity because delivery capacity is inadequate. 3. Source becomes contaminated. 4. Water supply system is unable to deliver water due to failure or damage of major water system components. 5. NTMWD has initiated Stage 1. Goal: raise public awareness.	**Moderate**	1. Demand exceeds 95% of amount that can be delivered to customers for three consecutive days. 2. Demand for all or part of the delivery system approaches capacity because delivery capacity is inadequate. 3. Source becomes contaminated. 4. Water supply system is unable to deliver water due to failure or damage of major water system components. 5. NTMWD has initiated Stage 2. Goal: 2% reduction in water use.	**Severe**	1. Demand exceeds 98% of amount that can be delivered to customers for three consecutive days. 2. Demand for all or part of the delivery system approaches capacity because delivery capacity is inadequate. 3. Source becomes contaminated. 4. Water supply system is unable to deliver water due to failure or damage of major water system components. 5. NTMWD has initiated Stage 3. Goal: 5% reduction in water use.	**Emergency**	1. Demand exceeds amount that can be delivered to customers. 2. Demand for all or part of the delivery system approaches capacity because delivery capacity is inadequate. 3. Source becomes contaminated. 4. Water supply system is unable to deliver water due to failure or damage of major water system components. 5. NTMWD has initiated Stage 4. Goal: 10% reduction in water use.				
ALPHA UTILITY OF CAMP COUNTY-PITTSBURG	Aug-00	**Customer Awareness**	Stage will begin April 1 and end September 30.	**Moderate Water Shortage Conditions**	Supply-Based- Total daily water demands equal or exceed 70% of plants original capacity. Demand-Based- Production or distribution limitations	**Mandatory Water Use Restrictions**	Supply-Based- Total daily water demands equal or exceed 80% of plants original capacity. Demand-Based- Production or distribution limitations	**Critical Water Use Restrictions**	Supply-Based- 1. Supply contamination 2. Total daily water demands equal or exceed 85% of plants original capacity. Demand-Based- System outage				
ANNA	Sep-05	**Mild Conditions**	Demand exceeds 90% of amount that can be delivered to customers for seven consecutive days. Goal: 1% reduction in water use	**Moderate Conditions**	Demand exceeds 95% of amount that can be delivered to customers for three consecutive days. Goal: 2% reduction in water use	**Severe Conditions**	Demand exceeds 98% of amount that can be delivered to customers for three consecutive days. Goal: 5% reduction in water use	**Emergency Conditions**	1. Water demand exceeds capacity. 2. Supply source becomes contaminated. 3. System unable to deliver water due to failure or damage of major water system components. Goal: 10% reduction in water use				
AQUASOURCE UTILITY INC.	Aug-00	**Customer Awareness**	Stage I will begin every April 1 and end Sept. 30 customers will receive notice by mail. Goal: 5% reduction in water use.	**Voluntary Water Conservation**	Supply-Based- Stage will be initiated upon notice from wholesaler. Demand Based - Initiated when total daily demand equals or exceeds 85% of the daily well production capacity for three consecutive days or 100% on a single day. Permit Based - Systems that are within the jurisdiction of a special district, the regulatory entity will formally notify to initiate stage. Goal: 15% reduction in water use.	**Mandatory Water Use Restrictions**	Supply-Based- Stage will be initiated upon notice from wholesaler. Demand Based - Initiated when total daily demand equals or exceeds 90% of the daily well production capacity for three consecutive days or 100% on a single day. Permit Based - Systems that are within the jurisdiction of a special district, the regulatory entity will formally notify to initiate stage. Goal: 20% reduction in water use.	**Critical Water Use Restrictions**	Supply-Based- Stage will be initiated upon notice from wholesaler. Demand Based - Initiated when total daily demand equals or exceeds 100% of the daily well production capacity for three consecutive days or the entity will recognize that an emergency water shortage condition exists when contamination, natural or man-made, of the water source occurs or a major water line breaks, pump or system failures occur, or when prolonged maintenance is required for storage facilities, which cause unprecedented loss of capability to provide water service. Permit Based - Systems that are within the jurisdiction of a special district, the regulatory entity will formally notify to initiate stage. Goal: 30% reduction in water use.				
ARGYLE	Sep-93	***Drought contingency plan is provided by the Argyle WSC.**											
ARGYLE WSC	Jun-01	**Mild Conditions**	1. Water consumption has reached 80% of supply for three consecutive days. 2. Water supply is reduced to a level that is only 20% greater than the average consumption for the previous month. 3. There is an extended period (at least 8 weeks) of low rainfall and daily use has risen 20% above use for same period of previous year.	**Moderate Conditions**	1. Water consumption has reached 90% of amount available for three consecutive days. 2. The normal water level in any of the water storage tanks cannot be replenished for three consecutive days.	**Severe Conditions**	1. Failure of major component of the system or an event which reduces the minimum residual pressure in the system below 20 psi for 24 hrs or longer. 2. Water consumption of 95% or more of maximum available for three consecutive days. 3. Water consumption of 100% and water storage levels drop during one 24 hr period. 4. Contamination of supply. 5. Declaration of a state of disaster due to drought condition. 6. Reduction of wholesale wter supply. 7. Other unforeseen events which could cause imminent health or safety risks to the public.						

Table R-1, Continued

Water User Group	Date	1		2		3		4		5		6	
		Condition	**Trigger Conditions**	**Condition**	**Trigger Conditions**	**Condition**	**Trigger Conditions**	**Condition**	**Trigger Conditions**	**Condition**	**Trigger Conditions**	**Condition**	**Trigger Conditions**
ARLEDGE RIDGE WSC	Jun-00	**Mild Water Shortage Conditions**	Continually falling treated water reservoir levels which do not refill above 100% overnight.	**Moderate Water Shortage Conditions**	Continually failing treated water reservoir levels which do not refill above 90% overnight.	**Severe Water Shortage Conditions**	Continually falling treated water reservoir levels which do not refill above 85% overnight.	**Critical Water Shortage Conditions**	Continually falling treated water reservoir levels which do not refill above 75% overnight.	**Emergency Water Shortage Conditions - Stage 6: Water Allocation**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources. - Stage 6 will be implemented when continually falling treated water reservoirs levels do not refill above 50% overnight.		
ARLINGTON	Aug-99	**Excessive Demand Report**	TRWD's actual monthly demands are greater than 25% above anticipated.	**Excessive Demand Alert**	1. TRWD's acutal monthly demands are greater than 25% above anticipated monthly system demands for two consecutive months. 2. City's water treatment plants have operated at or above 85% of production capacity for five consecutive days.	**Water Watch**	1. TRWD's acutal monthly demands are greater than 25% above anticipated monthly system demands for two consecutive months. 2. City's water treatment plants have operated at or above 90% of production capacity for three consecutive days.	**Water Warning**	1. When demands esceed East Texas Delivery System capacity for 24hr period 2. City's water treatment plants have operated at or above 95% of production capacity for two consecutive days.	**System Emergency**	1. Pipeline or equipment emergency or contamination. 2. City anticipates water deliveries to be to be adversely affected or otherwise disrupted.		
ATHENS	Jan-02	**Mild Water Shortage Conditions**	Daily usage exceeds 4.5 mgd. Goal: 10% reduction in water use.	**Moderate Water Shortage Conditions**	Daily usage exceeds 4.5 mgd and the storage facilities do not refill above 80% overnight. Goal: Reduce Daily water usage to 4.0 mgd.	**Severe Water Shortage Conditions**	Daily usage exceeds 4.5 mgd and the storage facilities do not refill above 65% overnight. Goal: Reduce Daily water usage to 4.0 mgd.	**Critical Water Shortage Conditions**	Daily usage exceeds 4.5 mgd and the storage facilities do not refill above 50% overnight. Goal: Reduce Daily water usage to 3.6 mgd.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources. Goal: Reduce Daily water usage to 4.0 mgd.		
ATHENS(Bethel-Ash Water Supply Corp.)	Apr-00	**Moderate Water Shortage Conditions**	Gallons pumped per month exceed 20,500,000 gallons. Goal: 8% reduction in water use.	**Severe Water Shortage Conditions**	Gallons pumped per month exceed 23,000,000 gallons. Goal: 20% reduction in water use.	**Critical Water Shortage Conditions**	Gallons pumped per month exceed 24,500,000 gallons. Goal: 25% reduction in water use.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources. Goal: Achieve a reduction in water usage to offset the loss of available water caused by the emergency.				
AUBREY	Jun-02	**Mild Water Shortage Conditions**	1. Notification from UTRWD to begin Stage 1 of the Plan. 2. When the combined specific capacity of the City's well is equal to or less than 90% of the wells original capacity. Goal: 10% reduction in water use.	**Moderate Water Shortage Conditions**	1. Notification from UTRWD to begin Stage 2 of the Plan. 2. When the combined specific capacity of the City's well is equal to or less than 85% of the wells original capacity. 3. When the total daily demands equal or exceed .400 mgd for three consecutive days or .425 mgd for a single day. Goal: 20% reduction in water use.	**Severe Water Shortage Conditions**	1. Notification from UTRWD to begin Stage 3 of the Plan. 2. When the combined specific capacity of the City's well is equal to or less than 80% of the wells original capacity. 3. When the total daily demands equal or exceed .425 mgd for three consecutive days or .450 mgd for a single day. Goal: 30% reduction in water use.	**Critical Water Shortage Conditions**	1. Notification from UTRWD to begin Stage 4 of the Plan. 2. When the combined specific capacity of the City's well is equal to or less than 75% of the wells original capacity. 3. When the total daily demands equal or exceed .450 mgd for three consecutive days or .475 mgd for a single day. Goal: 40% reduction in water use.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources. Goal: 50% reduction in water use.		
AZLE	May-01	**Dry Conditions**	As initiated by TRWD.	**Water Watch**	As initiated by TRWD.	**Water Warning**	As initiated by TRWD.	**Emergency Water Use Management**	As initiated by TRWD.				
BACK FORTY UTILITIES	Aug-00	**Voluntary Water Use Restrictions**	Stage I will begin every year on April 1 and ends September 30.	**Mild Water Use Restrictions**	Total daily demand reaches 70% of pumping capacity.	**Remaining stage not present in the received plan.**							
BALCH SPRINGS		***Refer to Dallas County Water Control & Improvement District #6**											
BARRY	Aug-00	**Mild Water Shortage Conditions**	At the request of the Supplier. Goal: Achieve a 10% reduction in water use.	**Moderate Water Shortage Conditions**	Notification is received from B & B WSC. Goal: Achieve a 20% reduction in water use.	**Severe Water Shortage Conditions**	Notification is received from B & B WSC. Goal: Achieve a 36% reduction in water use.	**Critical Water Shortage Conditions**	Notification is received from B & B WSC. Goal: Achieve a 54% reduction in water use.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources. Goal: Achieve a 67% reduction in water use.		
BEDFORD	Aug-05	**Mild Conditions**	WTP operates at greater than 85% of capacity for seven consecutive days. Goal: 5% reduction in daily demand	**Moderate Conditions**	WTP operates at greater than 90% of capacity for seven consecutive days. Goal: 10% reduction in daily demand	**Severe Conditions**	WTP operates at greater than 95% of capacity for seven consecutive days. Goal: 15% reduction in daily demand	**Emergency Conditions**	1. Major water line break, or pump or system failure occur. 2. Natural or man-made contamination of the water supply source.				
BELLS	Jun-05	**Mild Conditions**	Demand exceeds 90% of amount that can be delivered to customers for seven consecutive days	**Moderate Conditions**	Demand exceeds 95% of amount that can be delivered to customers for three consecutive days. Goal: 2% reduction in water use	**Severe Conditions**	Demand exceeds 98% of amount that can be delivered to customers for three consecutive days. Goal: 5% reduction in water use	**Emergency Conditions**	1. Demand exceeds amount that can be delivered to customers. 2. Supply source becomes contaminated. 3. System unable to deliver water due to failure or damage of major water system components. Goal: 10% reduction in water use				
BENBROOK WSA	Aug-99	**Mild Drought**	Daily water use equals or exceeds 10.0 mgd for seven consecutive days.	**Moderate Drought**	Daily water use equals or exceeds 12.0 mgd (120% of treatment capacity) for five consecutive days; and/or water begins to drop below 35 psi in segments of the distribution system.	**Severe Drought or System Limitations**	Daily water use equals or exceeds 15 mgd (150% of treatment capacity) for five consecutive days; and/or the storage capacity levels continually recede on a daily basis and remain below 50% of storage capacity for 72 consecutive hours, and the Water Authority Manager determines that such conditions are a hazard to the public health and safety. Failure of any system component which limits the treatment, storage, or distribution capabilities of the system.						

Table R-1, Continued

Water User Group	Date	1		2		3		4		5		6	
		Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions
BETHESDA WSC	Nov-00	**Mild Conditions**	1. Water consumption has reached 80% of daily max supply for three days. 2. Water supply is reduced to a level that is only 20% greater than the average consumption for the previous month. 3. There is an extended period (at least 8 weeks) of low rainfall	**Moderate Conditions**	1. Water consumption has reached 90% of the available amount for three consecutive days. 2. The water level in any of the water storage tanks cannot be replenished for three consecutive days	**Severe Conditions**	1. Failure of a major component of the system or a event which reduces the min residual pressure below 20 psi for a period of 24 hours or longer. 2. Water consumption of 95% or more of the max available for three consecutive days. 3. Water storage levels in the system drop during one 24-hour period. 4. Natural or man-made contamination of the water supply source. 5. The declaration of a state of disaster due to drought conditions in a county or counties served by the Corporation. 6. Other unforeseen events which could cause imminent health or safety risks to the public.						
BFE WATER COMPANY-WEATHERFORD	Jul-00	**Customer Awareness**	Will begin every April 1 and last until September 30.	**Voluntary Water Conservation**	Supply-Based- Water consumption has reached 80% of daily max supply for three consecutive days. Demand-Based- There is an extended period(at least 8 weeks) of low rainfall and daily use has risen 20% above the use for the same period during the previous year.	**Mandatory Water Use Restrictions**	Supply-Based- Water consumption has reached 90% of daily max supply for three consecutive days. Demand-Based- The water level in any of the water storage tanks cannot be replenished for three consecutive days.	**Critical Water Use Restrictions**	Supply-Based- Water consumption has reached 95% of daily max supply for three consecutive days. Demand-Based- Water consumption of 100% of the max available and the water storage levels in the system drop during a 24-hour period.				
BHP WATER SUPPLY	Aug-00	**Mild Water Shortage Conditions**	When continually falling treated water reservoir levels do not refill above 100% overnight or on such occasion as the water suppliers curtail the delivery of water to the Corporation, or during occasions when water mains break or other operational problems hinder the systems ability to meet demands.	**Moderate Water Shortage Conditions**	When continually falling treated water reservoir levels do not refill above 90% overnight or on such occasion as the water suppliers curtail the delivery of water to the Corporation, or during occasions when water mains break or other operational problems hinder the systems ability to meet demands.	**Severe Water Shortage Conditions**	When continually falling treated water reservoir levels do not refill above 85% overnight or on such occasion as the water suppliers curtail the delivery of water to the Corporation, or during occasions when water mains break or other operational problems hinder the systems ability to meet demands.	**Critical Water Shortage Conditions**	When continually falling treated water reservoir levels do not refill above 75% overnight or on such occasion as the water suppliers curtail the delivery of water to the Corporation, or during occasions when water mains break or other operational problems hinder the systems ability to meet demands.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources. 3. Water suppliers curtail the delivery of water to the Corporation. 4. Water main breaks or other operational problems diminish the ability of the system to meet the demand.		
BLACKLAND WSC	Jan-00	**Mild Water Shortage Conditions**	1. Rockwall initiates Stage 1. 2. Total daily water demand equals or exceeds 2.0 milion gallons for three consecutive days or 2.1 million gallons on a single day. Goal: 10% reduction in water usage.	**Moderate Water Shortage Conditions**	1. Rockwall initiates Stage 2. 2. Total daily water demand equals or exceeds 2.1 milion gallons for three consecutive days or 2.2 million gallons on a single day. Goal: 15% reduction in water usage.	**Severe Water Shortage Conditions**	1. Rockwall initiates Stage 3. 2. Total daily water demand equals or exceeds 2.3 milion gallons for three consecutive days. Goal: 20% reduction in water usage.	**Emergency Water Shortage Conditions**	1. Major water line brekas, or pump or system failures occur. 2. Contamination of supply. 3. Natural disaster or massive power outage. 4. Rockwall initiages Stage 4. Goal: Prohibit all uses of public water supply, except in emergency cases, until further notice that emergency conditions have been resolved.				
BLUE RIDGE		**Mild Conditions**	Daily water demand reaches or exceeds 80% of the production capacity of the system for five consecutive days.	**Moderate Conditions**	Daily water demand reaches or exceeds 90% of the production capacity of the system for five consecutive days.	**Severe Conditions**	Daily water demand reaches or exceeds 100% of the production capacity of the system for five consecutive days; or the imminent or actual failure of a major component of the system is experienced which can cause an immediate health or safety hazard.						
BLUEBERRY HILL HOMEOWNERS ASSC.	Jul-00	**Voluntary Water Use Restrictions**	Stage will begin on April 1. Goal: 10% reduction in water use.	**Mild Water Use Restrictions**	Goal: 25% reduction in water use.	**Moderate Water Use Restrictions**	Goal: 35% reduction in water use.	**Critical Water Use Restrictions**	1. Major water lline breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service; or 2. Natural or man-made contamination of the water supply source(s).				
BOLIVAR WSC	May-05	**Mild**	1. Demand exceeds 90% of amount that can be delivered to customers for seven consecutive days. 2. Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. 3. Supply source becomes contaminated. 4. Water supply system is unable to deliver water due to the failure or damage of major water system components. 5. Water demand is approaching the limit of permitted supply.	**Moderate**	1. Demand exceeds 95% of amount that can be delivered to customers for three consecutive days. 2. Water demand for all or part of the delivery system equals delivery capacity because delivery capacity is inadequate. 3. Supply source becomes contaminated. 4. Water supply system is unable to deliver water due to the failure or damage of major water system components. 5. Water demand is approaching the limit of permitted supply.	**Severe**	1. Demand exceeds 98% of amount that can be delivered to customers for three consecutive days. 2. Water demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate. 3. Supply source becomes contaminated. 4. Water supply system is unable to deliver water due to the failure or damage of major water system components. 5. Water demand is approaching the limit of permitted supply.	**Emergency**	1. Demand exceeds amount that can be delivered to customers. 2. Water demand for all or part of the delivery system seriously exceeds delivery capacity because delivery capacity is inadequate. 3. Supply source becomes contaminated. 4. Water supply system is unable to deliver water due to the failure or damage of major water system components. 5. Water demand is approaching the limit of permitted supply.				
BONHAM	Jul-05	**Mild Water Shortage Conditions**	1. Daily demand exceeds 2.5 MGD for seven consecutive days or 3 MGD for one day. 2. Water reservoir levels do not refill above 100% overnight. 3. Combined storage falls below 90% capacity at the beginning of a 24-hour demand period. Goal: 10% reduction in daily water demand	**Moderate Water Shortage Conditions**	1. Daily water demand equals or exceeds 2.5 MGD for 14 consecutive days. 2. Combined storage falls below 80% capacity at the beginning of a 24-hour demand period. Goal: 15% reduction in daily water demand	**Severe Water Shortage Conditions**	1. Daily water demand equals or exceeds 3.0 MGD for seven consecutive days or 3.5 MGD for one day. 2. Water reservoir levels do not refill above 90% overnight. 3. Combined storage falls below 70% capacity at the beginning of a 24-hour demand period. Goal: 20% reduction in daily water demand	**Critical Water Shortage Conditions**	1. Daily water demand equals or exceeds 3.5 MGD for 4 consecutive days or 4.0 MGD for one day. 2. Combined storage falls below 65% capacity at the beginning of a 24-hour demand period. Goal: 30% reduction in daily water demand	**Emergency Water Shortage Conditions**	1. Major water line breaks or pump system failures occur. 2. Power failure. 3. Natural or man-made contamination of the water supply source.		
BOYD ACRES WATER SYSTEM - FRISCO	Aug-00	**Customer Awareness**	Stage will begin April 1 and end September 30.	**Voluntary Water Conservation**	Well down 10-ft greater than normal pumping level. Total daily demand reaches 80% of pumping capacity. Production or system limitation arise.	**Mandatory Water Use Restrictions**	Well down 15-ft greater than normal pumping level. Total daily demand reaches 90% of pumping capacity. Production or system limitation arise.	**Critical Water Use Restrictions**	Supply contamination occurs. Well down 20-ft greater than normal pumping level. Total daily demand reaches 100% of pumping capacity. Production or system limitation arise, or there is a system outage.				

Table R-1, Continued

Water User Group	Date	1		2		3		4		5		6	
		Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions
BRADBERRY WSC - BOYD	Sep-00	**Voluntary Water Use Restrictions**	Will begin every April 1 with public announcement to customers. Goal: 10% reduction in water use.	**Mild Water Use Restrictions**	Bradberry WSC well(s) is equal to or less than 20% of the well's original specific capacity; or when the storage tank does not refill overnight, or as normal. Goal: 20% reduction in water use.	**Moderate Water Use Restrictions**	Bradberry WSC well(s) is equal to or less than 25% of the well's original specific capacity; or when the storage tank does not refill overnight, or as normal. Goal: 25% reduction in water use.	**Critical Water Use Restrictions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources. Goal: Achieve a per customer limit in water usage equivalent to or below the witner months average per customer.				
BRAZOS RIVER AUTHORITY	Aug-99	**Drought Watch Conditions**	1. The local use reservoir is at or below 50% of its total active water supply capacity and reasonable estimates of current annual demands, coupled with inflows and evaporation representative of the drought of record, indicate that the amount of water supply in storage could be reduced during the next succeeding 12-month period to 40% or less of its total active water supply capacity. 2. The total storage in all system reservoirs is at or below 75% of the total active water supply capacity and reasonable estimates of current annual demands, coupled with inflows and evaporation representative of the drought of record, indicate that the amount of water supply in storage could be reduced during the next succeeding 12-month period to 60% or less of its total active water supply capacity.	**Drought Warning Conditions**	1. The local use reservoir is at or below 40% of its total active water supply capacity and reasonable estimates of current annual demands, coupled with inflows and evaporation representative of the drought of record, indicate that the amount of water supply in storage could be reduced during the next succeeding 12-month period to 30% or less of its total active water supply capacity. 2. The total storage in all system reservoirs is at or below 60% of the total active water supply capacity and reasonable estimates of current annual demands, coupled with inflows and evaporation representative of the drought of record, indicate that the amount of water supply in storage could be reduced during the next succeeding 12-month period to 30% or less of its total active water supply capacity.	**Drought Emergency Conditions**	1. The local use reservoir is at or below 30% of its total active water supply capacity, or if the remaining capacity is less than one year's estimated demand. 2. The total storage in all system reservoirs is at or below 30% of the total active water supply capacity.						
BRIDGEPORT	Aug-90	**Mild Conditions**	1. Average daily water consumption reaches 90% of production capacity for three consecutive days. 2. Weather conditions are to be considered in drought classification determination. Predicted long, cold or dry periods are to be considered in impact analysis.	**Moderate Conditions**	1. Average daily water consumption reaches 100% of rated production capacity for a 3 day period. 2. Weather conditions indicate mild drought will exist five days or more. 3. The clear well or elevated tanks are taken out of service during mild drought period. 4. Storage capacity is not being maintained during a period of 100% rated production periods for a duration of 36 hours. 5. Water main breaks occur on the major 12-inch lines and cannot be repaired with in 12-hours.	**Severe Conditions**	1. Average daily water consumption reaches 110% of production capacity. 2. Average daily water consumption will not enable storage levels to maintained. 3. System demand exceeds available high service pump capacity. 4. Any two conditions listed in moderate drought classification occurs at the same time for a 24-hour period. 5. Water system is contaminated either accidentally or intentionally. Severe condition is reached immediately detection. 6. Water system fails from acts of God or man. Severe conditions is reached immediately upon detection.						
BRIGHTON WATER SYSTEMS - DECATUR	Aug-00	**Customer Awareness**	Supply-Based- Overnight recovery rate reaches 15-ft. Demand or Capacity-Based- Total daily demand reaches 50% of pumping capacity or Pumps are pumping 12 hrs per day.	**Mandatory Water Use Restrictions**	Supply-Based- Overnight recovery rate reaches 10-ft. Demand or Capacity-Based- Total daily demand reaches 65% of pumping capacity or Pumps are pumping 16 hrs per day.	**Critical Water Use Restrictions**	Supply-Based- Overnight recovery rate reaches 8-ft. Demand or Capacity-Based- Total daily demand reaches 75% of pumping capacity or Pumps are pumping 24 hrs per day.						
BRYSON	Aug-00	**Mild Water Shortage Conditions**	When the reservoir level reaches the 50% level.	**Moderate Water Shortage Conditions**	When the reservoir level reaches the 40% level.	**Severe Water Shortage Conditions**	When the reservoir level reaches the 30% level.	**Critical Water Shortage Conditions**	When the reservoir level reaches the 15% level.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of the water supply sources.		
BUENA VISTA-BETHEL SPECIAL UTILITY DISTRICT	Aug-00	**Mild Water Shortage Conditions**	Average daily well pump run time is eighteen hours for three consecutive days.	**Moderate Water Shortage Conditions**	Average daily well pump run time is 20 hours for three consecutive days and the net water storage is continually decreasing on a daily basis.	**Severe/Emergency Water Shortage Conditions**	Average daily well pump run time is 22 hours for three consecutive days.						
BURLESON	Jan-00	**Water Awareness**	1. Demand for Burleson, Forth Worth, or TRWD exceeds 90% of capacity for three consecutive days. 2. Water demand approaches a reduced delivery capacity for all or part of the system due to supply or production capacity limitations including contamination of the system. 3. As initiated by TRWD.	**Water Watch**	1. TRWD Demand exceeds East Texas delivery system capacity for a 24hr period. 2. Water demand equals a reduced delivery capacity for all or part of the system due to supply or production capacity limitations including contamination of the system. 3. Demand exceeds 95% of capacity for two consecutive days. 4. As initiated by TRWD.	**Water Warning**	1. Water demand exceeds a reduced delivery capacity for all or part of the system due to supply or production capacity limitations including contamination of the system. 2. Demand exceeds 95% of capacity for five consecutive days. 3. As initiated by TRWD.	**Water Emergency**	1. Demand exceeds capacity for two consecutive days. 2. Water demand seriously exceeds a reduced delivery capacity limitations including contamination of the system. 3. As initiated by TRWD.				
CAHILL COUNTRY WSC- ALVARADO	Aug-00	**Customer Awareness**	Stage will begin every April 1 and end September 30.	**Voluntary Water Conservation**	Supply-Based - Production falls below 30 gpm.	**Mandatory Water Use Restrictions**	Supply-Based - 1. Well levels reach 5-ft MSL 2. Well production below 31 gpm	**Critical Water Use Restrictions**	Supply-Based - Supply contamination Demand-Based - 1. Production or distribution limitations 2. System outage				
CALLISBURG	Jun-05	**Mild Conditions**	Demand exceeds 90% of amount that can be delivered to customers for seven consecutive days.	**Moderate Conditions**	Demand exceeds 95% of amount that can be delivered to customers for three consecutive days. Goal: 2% reduction in water use	**Severe Conditions**	Demand exceeds 98% of amount that can be delivered to customers for three consecutive days. Goal: 5% reduction in water use	**Emergency Conditions**	1. Demand exceeds amount that can be delivered to customers. 2. Supply source becomes contaminated. 3. System unable to deliver water due to failure or damage of major water system components. Goal: 10% reduction in water use				
CANEY COVE WSC-MALAKOFF	Aug-00	**Voluntary Water Use Restrictions**	Stage will be implemented when the total pump hours per day equals or exceeds 16-hrs.	**Mandatory Water Use Restrictions**	Total daily demand equals or exceeds 90% of the storage capacity, and the pump hours per day equals or exceeds 18.	**Critical Water Use Conditions**	Total daily demand equals or exceeds 95% of the storage capacity, and the pump hours per day equals or exceeds 20.	**Emergency Conditions**	Production or distribution limitations, system outage, or water main breaks.				

Table R-1, Continued

Water User Group	Date	1		2		3		4		5		6	
		Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions
CARROLLTON	Apr-05	**Peak Day Water Use Management**	Will begin every May 1 and last until September 30. Goal: 1% reduction in water use	**Water Watch**	1. After 30 consecutive days without measurable precipitation at DFW Airport. 2. When total daily water demand equals or exceeds 90% of capacity for three consecutive days. 3. As initiated by DWU. 4. Water supply system is unable to deliver water due to the failure or damage of major water system components. Goal: 1% reduction in water use.	**Water Warning**	1. When total daily water demand equals or exceeds 100 percent of capacity for three consecutive days. 2. As initiated by DWU. 3. Water supply system is unable to deliver water due to the failure or damage of major water system components. Goal: 1% reduction in water use.	**Water Emergency**	1. When total daily water demand equals or exceeds 110 percent of capacity for three consecutive days. 2. As initiated by DWU. 3. Water supply system is unable to deliver water due to the failure or damage of major water system components. Goal: 1% reduction in water use.				
CEDAR HILL	Jan-00	**Water Watch**	1. DWU initiates action. 2. Consumption (90%) has existed for a period of three days. 3. Equipment failure; failure to maintain 35 psi at all points in the system and a minimum of 20 psi under combined fire and drinking water flow conditions. 4. Electrical power failures or restrictions.	**Water Emergency**	1. DWU initiates action. 2. Consumption of 100% of capacity has existed for a period of five days. 3. Equipment failure; failure to maintain 35 psi at all points in the system and a minimum of 20 psi under combined fire and drinking water flow conditions. 4. Electrical power failures or restrictions. 5. Combined ground storage leves fall below 50% of capacity at beginning of any 24 hr period. 6. There are long term shortages of water supply within a pressure district.								
CELINA	May-87	**Mild Drought**	The warning light on the 150,000 gallon ground storage tank is activated intermittently for five consecutive days.	**Moderate Drought**	The warning light on the 150,000 gallon ground storage tank remains activated for five consecutive days.	**Major Drought**	The warning light on the 150,000 gallon ground storage tank remains activated for ten consecutive days after declaration of a moderate drought.						
CHAMBERS MEADOW WATER- FROST	Aug-00	**Customer Awareness**	Stage will begin every April 1 and end September 30.	**Voluntary Water Conservation**	Supply-Based - Overnight recovery rate reaches 4-ft. Demand-Based - Pumps hours per day is 14.	**Mandatory Water Use Restrictions**	Supply-Based - Overnight recovery rate reaches 2-ft. Demand-Based - Pumps hours per day is 17.	**Critical Water Use Restrictions**	Supply-Based - Supply contamination. Demand-Based - Pumps hours per day is 19.				
CHICO	Sep-00	**Mild Water Shortage Conditions**	1. When the total dailly water demand equals or exceeds 175,000 gallons for five consecutive days or 200,000 gallons for a single day. 2. Continually falling treated water reservoir levels which do not refill above 75% overnight based on an evaluation of minimum treated water storage required to avoid system outage.	**Moderate Water Shortage Conditions**	1. When the total dailly water demand equals or exceeds 200,000 gallons for five consecutive days or 220,000 gallons for a single day.	**Severe Water Shortage Conditions**	1. When the total dailly water demand equals or exceeds 225,000 gallons for five consecutive days or 240,000 gallons for a single day.	**Critical Water Shortage Conditions**	1. When the total dailly water demand equals or exceeds 250,000 gallons for five consecutive days or 260,000 gallons for a single day.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of the water supply sources.		
CHUCK BELL WATER SYSTEMS- CROWLEY	Aug-00	**Customer Awareness**	Stage will begin April 1 and end September 30.	**Voluntary Water Conservation**	1. When overnight recovery rate reaches less than 10-ft of head in storage. 2. Total daily demand reaches a pumping capacity of 90%. 3. Total daily demand reaches 90% of storage capacity.	**Mandatory Water Use Restrictions**	1. When overnight recovery rate reaches less than 8-ft of head in storage. 2. Total daily demand reaches a pumping capacity of 95%. 3. Total daily demand reaches 95% of storage capacity.	**Critical Water Use Restrictions**	1. When overnight recovery rate reaches less than 6-ft of head in storage. 2. Total daily demand reaches a pumping capacity of 100%. 3. Total daily demand reaches 100% of storage capacity. 4. System outage 5. One or more combined mechanical failures.				
COCKRELL HILL		***No Emergency/Drought Contingency Plan Submitted**											
COLLEGE MOUND WSC	Dec-87	**Mild Drought**	1. Average daily water use reaches 0.45MGD (90% of firm plant capacity) for three consecutive days. 2. Consideration will be given to weather conditions, time of year, and customer complaints of low pressures.	**Moderate Drought**	1. Average daily water use reaches 0.756 MGD for three consecutive days. 2. Net storage in water storage is continually decreasing on a daily basis and falls below 460,000 gallons (60% capacity) for 48 hours. 3. water pressures approaching 35 psi in the distribution system.	**Severe Drought**	1. The imminent or actual failure of a major component of the system which would cause an immediate health or safety hazard. 2. Water demand is exceeding the firm system capacity of 0.756 mgd for three consecutive days. 3. Notification by NTMWD that supply is being reduced. 4. All water is being pumped from system's storage reservoirs and all replenishment of water reservoirs has ceased.						
COLLEYVILLE	Jul-94	**Mild Conditions**	1. Average daily water use is approaching 14.4 mgd (80% of system design capacity) for three consecutive days. 2. Consideration will be given to weather conditions, time of year, and customer complaints of low pressure.	**Moderate Conditions**	1. Average daily water use reaches system design capacity of 18.0 mgd for three consecutive days. 2. Net storage in elevated and ground storage reservoirs is continually decreasing on a daily basis and falls below 1.25 million gallons for a period of 72 hours. 3. Water pressures approach 40 psi in the distribution system.	**Severe Conditions**	1. The imminent or actual failure of a major component of the system which would cause an immediate health or safety hazard. 2. Water demand is exceeding the water system design capacity of 18.0 mgd for three consecutive days. 3. The TRA (treated water supply) cannot, by virtue of their own water shortages, meet the demands of the City of Colleyville for furnishing the required supply per the contractual agreement between the 2 entities.						
COMMUNITY WATER COMPANY - CORSICANA	Aug-00	**Voluntary Water Use Restrictions**	Stage will begin upon notification from the City of Corsicana. Goal: 5% reduction in water use.	**Mild Water Use Restrictions**	Stage will begin upon notification from the City of Corsicana. Goal: 5% reduction in water use.	**Moderate Water Use Restrictions**	Stage will begin upon notification from the City of Corsicana. Goal: 5% reduction in water use.	**Critical Water Use Restrictions**	Stage will begin upon notification from the City of Corsicana, major water line breaks, pump or system failures occur, which cause unprecedented loss of capability to provide water service; or natural or man-made contamination of the water supply source(s). Goal: Achieve a per customer limit in water usage equivalent or below the winter months average per customer.				

Table R-1, Continued

Water User Group	Date	1		2		3		4		5		6	
		Condition	**Trigger Conditions**	**Condition**	**Trigger Conditions**	**Condition**	**Trigger Conditions**	**Condition**	**Trigger Conditions**	**Condition**	**Trigger Conditions**	**Condition**	**Trigger Conditions**
COMMUNITY WATER SERVICES, INC. - BALCH SPRINGS	Aug-00	**Customer Awareness**	Stage will begin every April 1 and end September 30	**Voluntary Water Conservation**	Supply-Based - When the wholesale supplier's implement stage 2. The facility has two systems: Danieldale and Grand Prairie. The Danieldale system will follow the guidelines of the City of Dallas and the Grand Prairie system will follow the City of Grand Prairie guidelines.	**Mandatory Water Use Restrictions**	Supply-Based - When the wholesale supplier's implement stage 3. The facility has two systems: Danieldale and Grand Prairie. The Danieldale system will follow the guidelines of the City of Dallas and the Grand Prairie system will follow the City of Grand Prairie guidelines.	**Critical Water Use Restrictions**	Supply-Based - When the wholesale supplier's implement stage 4. The facility has two systems: Danieldale and Grand Prairie. The Danieldale system will follow the guidelines of the City of Dallas and the Grand Prairie system will follow the City of Grand Prairie guidelines.				
COMMUNITY WSC		**Mild Water Shortage Conditions**	As initiated by wholesale provider.	**Moderate Water Shortage Conditions**	As initiated by wholesale provider.	**Severe Water Shortage Conditions**	As initiated by wholesale provider.	**Critical Water Shortage Conditions**	As initiated by wholesale provider.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources. 3. Low lake levels.		
COPEVILLE WSC	May-00	**Mild Water Shortage Conditions**	Lake Lavon water surface elevation lies between 480 & 475 feet above MSL to be determined by NTMWD; Notification is given by NTMWD and the City of Farmersville to initiate STAGE 1.	**Moderate Water Shortage Conditions**	Lake Lavon water surface elevation lies between 475 & 470 feet above MSL to be determined by NTMWD or the City of Farmersville; or continually falling storage tank levels which do not refill above 50% overnight.	**Severe Water Shortage Conditions**	Lake Lavon water surface elevation lies between 470 & 453 feet above MSL to be determined by NTMWD or the City of Farmersville.	**Critical Water Shortage Conditions**	When STAGE 3 fails to work after a reasonable period of time.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources.		
COPPELL	Apr-05	**Water Awareness**	1. Annually, beginning on May 15 through September 15. 2. Short term deficiencies in the distribution system limits supply capabilities. Goal: Voluntary reduction in water use.	**Water Watch**	1. As requested by DWU. 2. Water demands exceed 90% of contracted flow from DWU for five consecutive days. 3. Ground storage reservoir levels do not recover for two consecutive days. 4. Short term deficiencies in system limit supply. Goal: Reduce demand below 90% of contracted supply with DWU.	**Water Warning**	1. As requested by DWU. 2. Water demand exceeds 95% of contracted flow from DWU for five consecutive days. 3. Ground storage reservoir levels do not recover for three consecutive days 4. Short term deficiencies in system limit supply. Goal: Reduce demand below 95% of contracted supply with DWU.	**Water Emergency**	1. As requested from DWU. 2. Water demand exceeds 100% of current maximum flow rate contracted with DWU for two consecutive days. 3. Ground storage reservoir levels do not recover for 4 consecutive days. 4.Short term deficiencies in system limit supply. Goal: Reduce demand below 95% of contracted supply with DWU.				
CORSICANA	Mar-97	**Mild Drought**	Average daily water use equals or exceeds 85% of treatment capacity for seven consecutive days.	**Moderate Drought**	Average daily water use equals or exceeds 95% of treatment capacity for seven consecutive days.	**Severe Drought**	Water level at Navarro Mills Reservoir receds to 418 feet (or 419 feet after Navarro Mills Water Treatment Plant expansion).	**Critical Emergency**	1. Catastrophic failure in city's raw water sources, treatment, storage, or distribution system. 2. Water supply is not suitable for human consumption.				
COUNTY RIDGE WATER COMPANY-MELISSA	Sep-00	**Customer Awareness**	Stage is started whenever the need arises.	**Mandatory Water Use Restrictions**	1. Well level reaches 900-ft. when the pumps are running. 2. Storage tank level at 25% of both tanks. 3. Any other production or distribution limitations.	**Critical Water Use Restrictions**	When a Catastrophic equipment failure occurs.						
CRANDALL	Oct-00	**Mild Conditions**	1. Water demand stresses distribution system or equipment. 2. Storage tank levels do not return to safe operating levels overnight. 3. As requested by NTMWD.	**Moderate Conditions**	1. Stage 1 will not achieve conservation requirements. 2. Storage tank levels do not return to safe operating levels overnight. 3. As requested by NTMWD.	**Severe Conditions**	1. Severe stress placed on supply and distribution facilities. 2. Water demand exceeds supply. 3. As requested by NTMWD.	**Critical Emergency Conditions**	Natural disasters, massive power outages, massive equipment or facility failures, or public water supply contamination				
CRAZY HORSE WATER CO.- WEATHERFORD	Jul-00	**Customer Awareness**	Will begin every April 1 and last until September 30.	**Voluntary Water Conservation**	Supply-Based- Overnight recovery rate reaches 10-feet. Demand-Based- Production or distribution limitations occur.	**Mandatory Water Use Restrictions**	Supply-Based- Overnight recovery rate reaches 7-feet. Demand-Based- Production or distribution limitations occur.	**Critical Water Use Restrictions**	Supply-Based- Overnight recovery rate reaches 5-feet; or a catastrophic equipment failure. Demand-Based- Production or distribution limitations or catastrophic equipment failure occurs.				
CRESSON WATER WORKS	Aug-00	**Customer Awareness**	Will begin every April 1 and last until September 30.	**Voluntary Water Conservation**	Supply-Based- Cresson has no way to measure the well level, and when the well stops they are out of water. Demand-Based- Representive try to get the customers to conserve water by not watering lawns.	**Mandatory Water Use Restrictions**	Supply-Based- Well has not ran out of water to date.	**Critical Water Use Restrictions**	No triggers provided by entity.				
CREST WATER COMPANY- KEENE	Sep-00	**Customer Awareness**	Stage will begin every April 1 and end September 30.	**Voluntary Water Conservation**	Supply-Based - Storage Tanks are 50% capacity or less at 8 am for three consecutive days. Demand-Based - Pumps hours per day approach 20-hrs for three consecutive days.	**Mandatory Water Use Restrictions**	Supply-Based - Storage Tanks are 25% capacity or less at 8 am for three consecutive days. Demand-Based - Pumps hours per day approach 22-hrs for three consecutive days.	**Critical Water Use Restrictions**	Supply-Based - Storage Tanks are 20% capacity or less at 8 am for three consecutive days. Demand-Based - Pumps hours per day approach 24-hrs for three consecutive days.				
CROSS ROADS COMMUNITY WSC-ATHENS	Aug-00	**Voluntary Water Conservation**	Stage will be implemented when the total pump hours per day equals or exceeds 16-hrs.	**Mandatory Water Use Restrictions**	Stage will be implemented when the total pump hours per day equals or exceeds 18-hrs.	**Critical Water Use Restrictions**	Total daily demand equals or exceeds 95% of the storage capacity, and the pump hours per day equals or exceeds 20.	**Emergency Conditions**	Production or distribution limitations, system outage, or water main breaks.				
CULLEOKA		**Mild Rationing Conditions**	No triggers indicated	**Limited Water Use Conditions**	No triggers indicated	**Moderate Rationing Conditions**	No triggers indicated	**Severe Rationing Conditions**	No triggers indicated				
DALLAS COUNTY PARK CITIES MUD	Apr-96	**Water Shortage Possibility**	1. Water level in Grapevine Res. Has fallen below 527 feet but remains above 525 feet. 2. Grapevine Res. Becomes contaminated. 3. Demand exceeds 90% of delivery capacity for seven consecutive days. 4. Water supply system is unable to deliver water to its customers due to failure or damage of major water system components. Goal: voluntary reduction of 2% in water use.	**Water Shortage Watch**	1. Water level in Grapevine Res. Has fallen below 525 feet but remains above 520 feet. 2. Grapevine Res. Becomes contaminated. 3. Demand exceeds 95% of delivery capacity for five consecutive days. 4. Water supply system is unable to deliver water to its customers due to failure or damage of major water system components. Goal: reduction of 5% in water use.	**Water Shortage Warning**	1. Water level in Grapevine Res. Has fallen below 520 feet but remains above 515 feet. 2. Grapevine Res. Becomes contaminated. 3. Demand exceeds 98% of delivery capacity for three consecutive days. 4. Water supply system is unable to deliver water to its customers due to failure or damage of major water system components. 5. Water use is approaching limit of permitted supply. Goal: reduction of 10% in water use.	**Water Shortage Emergency**	1. Water level in Grapevine Res. Has fallen below 515 feet. 2. Grapevine Res. Becomes contaminated. 3. Demand exceeds delivery capacity. 4. Water supply system is unable to deliver water to its customers due to failure or damage of major water system components. 5. Water use is approaching limit of permitted supply. Goal: reduction of 25% in water use.				

Table R-1, Continued

Water User Group	Date	1		2		3		4		5		6	
		Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions
DALLAS COUNTY WATER CONTROL & IMPROVEMENT DISTRICT #6	Jan-00	**Water Watch**	1. Dallas initiates action and requests customer cities to do likewise during high demand months. 2. Combined ground storage falls below 35% of capacity at the beginning of a 24-hour demand period.	**Water Warning**	1. Dallas supply cut by 20% on a continuous basis during high demand months. 2. Combined ground storage falls below 30% of total capacity at the beginning of a 24 hour demand period.	**Water Emergency**	1. Dallas supply cut by 30% on a continuous basis during high demand months. 2. Combined ground storage falls below 25% of total capacity.	**Water Crisis**	1. Dallas supply cut by 45% on a continuous basis. 2. Combined ground storage falls below 20% of total capacity.				
DALLAS(DWU)	Sep-99	**Water Awareness**	1. Water reservoir levels drop below 65% of capacity. 2. Water demand exceeds 85% of system capacity for 4 consecutive days. 3. A short-term emergency situation occurs.	**Water Watch**	1. Water reservoir levels drop below 55% of capacity. 2. Water demand exceeds 90% of system capacity for three consecutive days. 3. A short-term emergency situation occurs.	**Water Warning**	1. Water reservoir levels drop below 45% of capacity. 2. Water demand exceeds 95% of system capacity for two consecutive days. 3. A short-term emergency situation occurs.	**Water Emergency**	1. Water reservoir levels drop below 30% of capacity. 2. Water demand exceeds 98% of system capacity for 1 day. 3. A short-term emergency situation occurs.				
DAWSON	Jan-00	**Stage 1**	1. Annually, from May 1 through September 30. 2. Lake level drops below 422.5 feet.	**Stage 2**	1. Annually, from May 1 through September 30. 2. Lake level drops below 419 feet. 3. Total daily water demand exceeds 1.14 million gallons for three consecutive days or 0.4 mgd for a single day.	**Stage 3**	1. Annually, from May 1 through September 30. 2. Lake level drops below 415.5 feet. 3. Total daily water demand exceeds 1.08 million gallons for three consecutive days or 0.38 mgd for a single day.	**Stage 4**	1. Annually, from May 1 through September 30. 2. Lake level drops below 388.0 feet. 3. System outage due to equipment failure.				
DEER CREEK WATERWORKS, INC.-ALEDO	Aug-00	**Voluntary Water Use Restrictions**	Will begin every May 1st. Goal: Achieve a voluntary reduction in water use.	**Mild Water Use Restrictions**	Total daily demand reaches 75% of production capacity per day. Goal: Achieve a 5% reduction in water use.	**Severe Water Use Restrictions**	Daily demand reaches 80% of production capacity per day. Goal: Achieve a 10% reduction in water use.	**Critical Use Restrictions**	Daily demand reaches 90% of production capacity. Goal: Achieve a 20% reduction in water use.	**Emergency Water Use Restrictions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of the water supply sources. Goal: Achieve a per customer limit in water usage equivalent or below the winter months average per customer.		
DENISON	Apr-05	**Mild Water Shortage Conditions**	Demand exceeds 11 MGD of amount that can be delivered to customers for seven consecutive days	**Moderate Water Shortage Conditions**	Demand exceeds 12 MGD of amount that can be delivered to customers for three consecutive days. Goal: 2% reduction in water use	**Server Water Shortage Conditions**	Demand exceeds 12.5 MGD of amount that can be delievered to customers for three consecutive days. Goal: 5% reduction in water use	**Emergency Water Shortage Conditions**	1. Demand exceeds amount that can be delivered to customers. 2. Supply source becomes contaminated. 3. System unable to deliver water due to failure or damage of major water system components. Goal: 10% reduction in water use				
DENTON	Apr-05	**Mild Conditions**	Type A - Total raw water supply in Denton and Dallas connected lakes has dropped below 65% of the total conservation storage. Type B - Water demand reaches or exceeds 85% of delivery capacity for 4 consecutive days. Type C - Water demand approaches a reduced delivery capacity for all or part of the system, as determined by DWU. Goal: 5% reduction in water use	**Moderate Conditions**	Type A - Total raw water supply in Denton and Dallas connected lakes has dropped below 55% of the total conservation storage. Type B - Water demand reaches or exceeds 90% of delivery capacity for three consecutive days. Type C - Water demand equals a reduced delivery capacity for all or part of the system, as determined by DWU. Goal: 10% reduction in water use	**Severe Conditions**	Type A- Total raw water supply in Denton and Dallas connected lakes has dropped below 45% of the total conservation storage. Type B- Water demand has reached or exceeded 95% of delivery capacity for three consecutive days. Type C- Water demand exceeds a reduced delivery capacity for all or part of the system, as determined by DWU. Goal: 15% reduction in water use	**Emergency Conditions**	Type A- Total raw water supply in Denton and Dallas connected lakes has dropped below 30% of the total conservation storage. Type B- Water demand has reached or exceeded 98% of delivery capacity for two consecutive days. Type C- Water demand seriously exceeds a reduced delivery capacity for all or part of the system, as determined by DWU. Goal: 25% reduction in water use				
DENTON COUNTY FWSD #1	Aug-00	**Voluntary Water Conservation**	1. Average daily water consumption reaches 90% of water treatment capacity for three consecutive days. 2. Weather conditions will be considered.	**Moderate Water Shortage Conditions**	1. Average dily water consumption reaches 100% of rated production/distribution capacity for a 3 day period. 2. A drought exists. 3. Storage capacity is not being maintained during period of 100% rated production.	**Severe Water Shortage Conditions**	1. Average daily water consumptionn reaches 110% of rated production/distribution capacity for a 3 day period. 2. Daily water consumption will not enable storage levels to be maintained. 3. System demand exceeds available high service pump capacity. 4. Water system is contaminated. 5. Water system fails (from acts of God or man). 6. Any mechanical failure of pumping equipment which will require more than 12 hours to repair which causes unprecedented loss of capability to provide water service.						
DESERT WSC	Mar-00	**Mild Water Shortage Conditions**	When continually falling treated water reservoir levels which do not refill above 100% overnight or on such occasion as a water well may be temporarily out of service or when water well pumping levels continue to decline.	**Moderate Water Shortage Conditions**	When continually falling treated water reservoir levels which do not refill above 90% overnight or on such occasion as a water well may be temporarily out of service or when water well pumping levels continue to decline.	**Severe Water Shortage Conditions**	When continually falling treated water reservoir levels which do not refill above 85% overnight or on such occasion as a water well may be temporarily out of service or when water well pumping levels continue to decline.	**Critical Water Shortage Conditions**	When continually falling treated water reservoir levels which do not refill above 75% overnight or on such occasion as a water well may be temporarily out of service or when water well pumping levels continue to decline.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of the water supply sources.		
DESOTO	May-00	**Mild Water Shortage Conditions**	1. Daily water demand reaches or exceeds 80% of production capacity for five consecutive days.	**Moderate Water Shortage Conditions**	1. Daily water demand reaches or exceeds 90% of production capacity for five consecutive days.	**Severe Water Shortage Conditions**	1. Daily water demand reaches or exceeds 100% of production capacity for three consecutive days.	**Critical Water Shortage Conditions**	1. Daily water demand reaches or exceeds 100% of production capacity for three consecutive days and Stage 3 requirements have not permitted system recovery.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur. 2. Contamination of water supply source.		
DOGWOOD ESTATES WC-ATHENS	Oct-00	**Customer Awareness**	Stage to begin every year starting April 1 and lasting until September 30.	**Voluntary Water Conservation**	Water level in storage tanks approaches 20% of capacity.	**Mandatory Water Use Restrictions**	Water level in storage tanks becomes less than 20% of capacity.	**Critical Water Use Restrictions**	Stage III restriction fail to reduce demand sufficiently; or pump hours per day is equal to 24-hrs.				
DONIE (DONIE WATER WORKS, INC.)	Oct-05	**Customer Awareness**	Begins every April 1 and lasts until September 30.	**Voluntary Water Conservation**	1. Demand reaches 75% of avaliable amount for three consecutive days. 2. Water in storage tank declines 10 feet and is not replenished in 3 days. 3. Pumpage level of water in the well has reached 250 feet. Goal: 10% reduction in water use	**Mandatory Water Use Restrictions**	1. Demand reaches 85% of avaliable amount for three consecutive days. 2. Water in storage tank declines 15 feet and is not replenished in 3 days. 3. Pumpage level of water in the well has reached 275 feet. Goal: 15% reduction in water use	**Critical Water Use Restrictions**	1. Demand reaches 90% of avaliable amount for three consecutive days. 2. Water in storage tank declines 25 feet and is not replenished in 3 days. 3. Pumpage level of water in the well has reached 300 feet. Goal: 20% reduction in water use				

Table R-1, Continued

Water User Group	Date	1		2		3		4		5		6	
		Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions
DORCHESTER	Aug-00	**Mild Water Shortage Conditions**	1. Continually falling treated water reservoir levels do not refill above 100% overnight. 2. A water well is temporarily out of service. 3. Water well pumping levels continue to decline.	**Moderate Water Shortage Conditions**	1. Continually falling treated water reservoir levels do not refill above 90% overnight. 2. A water well is temporarily out of service. 3. Water well pumping levels continue to decline.	**Severe Water Shortage Conditions**	1. Continually falling treated water reservoir levels do not refill above 85% overnight. 2. A water well is temporarily out of service. 3. Water well pumping levels continue to decline.	**Critical Water Shortage Conditions**	When continually falling treated water reservoir levels which do not refill above 75% overnight or on such occasion as a water well may be temporarily out of service or when water well pumping levels continue to decline.	**Emergency Water Shortage Conditions**	Manager, or designee, determines water supply emergency exists based on following: 1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources. 3. one or more water wells are out of service. 4. One or more water wells are experiencing dangerouly declining pumping levels.		
DUNCANVILLE		***Refer to the Ten Mile Creek Regional Wastewater System in Dallas County**											
DYEGARD WATER COMPANY - WEATHERFORD	Jul-00	**Customer Awareness**	Will begin every April 1 and last until September 30.	**Voluntary Water Conservation**	Supply-Based- Water consumption has reached 80% of daily max supply for three consecutive days. Demand-Based- There is an extended period(at least 8 weeks) of low rainfall and daily use has risen 20% above the use for the same period during the previous year.	**Mandatory Water Use Restrictions**	Supply-Based- Water consumption has reached 90% of daily max supply for three consecutive days. Demand-Based- The water level in any of the water storage tanks cannot be replenished for three consecutive days. The highest recorded level drops 8-ft or more for two consecutive days.	**Critical Water Use Restrictions**	Supply-Based- Water consumption has reached 95% of daily max supply for three consecutive days. Demand-Based- Water consumption of 100% of the max available and the water storage levels in the system drop during a 24-hour period.				
EAST CEDAR CREEK FRESH WATER SUPPLY DISTRICT	Aug-99	**Mild Water Shortage Conditions**	Daily water demand consumption exceeds 80% of WTP capacity; or storage tank levels do not refill above 95% overnight. Goal: 10% reduction in water use.	**Moderate Water Shortage Conditions**	Daily water demand consumption exceeds 85% of WTP capacity; or storage tank levels do not refill above 85% overnight. Goal: 15% reduction in water use.	**Severe Water Shortage Conditions**	Daily water demand consumption exceeds 90% of WTP capacity; or storage tank levels do not refill above 75% overnight. Goal: 20% reduction in water use.	**Critical Water Shortage Conditions**	Daily water demand consumption exceeds 95% of WTP capacity; or storage tank levels do not refill above 65% overnight. Goal: 25% reduction in water use.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources. Goal: 30% reduction in water use.		
EAST FORK SPECIAL UTILITY DISTRICT	Jun-00	**Mild Water Shortage Conditions**	When notification is received from NTMWD requesting initiation of Stage 1. Goal: 10% reduction in water use.	**Moderate Water Shortage Conditions**	When notification is received from NTMWD requesting initiation of Stage 2; or when the maximum daily demand per meter exceeds 500 gpd for seven consecutive days, or when due to system repairs, excessive leakage or equipment malfunction. Goal: 20% reduction in water use.	**Severe Water Shortage Conditions**	When notification is received from NTMWD requesting initiation of Stage 3; or when the maximum daily demand per meter exceeds 600 gpd for six consecutive days, or when due to system repairs, excessive leakage or equipment malfunction, or when ground storage tanks remain only 50% full for six consecutive days. Goal: 30% reduction in water use.	**Critical Water Shortage Conditions**	When notification is received from NTMWD requesting initiation of Stage 4; or when the maximum daily demand per meter exceeds 700 gpd for five consecutive days, or when due to system repairs, excessive leakage or equipment malfunction, or when ground storage tanks remain only 40% full for five consecutive days. Goal: 40% reduction in water use.	**Emergency Water Shortage Conditions - Stage 6: Water Allocation**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources. Stage 6 - when notification is received from NTMWD requesting initiation of Stage 6; or when the maximum daily demand per meter exceeds 1200 gpd for two consecutive days, or when due to system repairs, excessive leakage, equipment malfunction, power outages, natural disasters, contamination of water, or when the system demand exceeds the system supply for two consecutive days and ground storage tanks remain only 30% full for two consecutive days. Goal: 50% reduction in water use.		
ECHO VALLEY WSC	Aug-00	**Mild Conditions**	1. Water consumption has reached 80% of daily max supply for three days. 2. Water supply is reduced to a level that is only 20% greater than the average consumption for the previous month. 3. There is an extended period (at least 8 weeks) of low rainfall	**Moderate Conditions**	1. Water consumption has reached 90% of the available amount for three consecutive days. 2. The water level in any of the water storage tanks cannot be replenished for three consecutive days	**Severe Conditions**	1. Failure of a major component of the system or a event which reduces the min residual pressure below 20 psi for a period of 24 hours or longer. 2. Water consumption of 95% or more of the max available for three consecutive days. 3. Water storage levels in the system drop during one 24-hour period. 4. Natural or man-made contamination of the water supply source. 5. The declaration of a state of disaster due to drought conditions in a county or counties served by the Corporation. 6. Other unforeseen events which could cause imminent health or safety risks to the public.						
ECTOR	Apr-05	**Mild**	1. Demand exceeds 90% of amount that can be delivered to customers for seven consecutive days. 2. Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. 3. Supply source becomes contaminated 4. Failure or damage of major water system components. 5. Water demand is approaching limit of permitted supply.	**Moderate**	1. Demand exceeds 95% of amount that can be delivered to customers for three consecutive days. 2. Water demand for all or part of the delivery system equals delivery capacity because delivery capacity is inadequate. 3. Supply source becomes contaminated 4. Failure or damage of major water system components. 5. Water demand is approaching limit of permitted supply. Goal: 2% reduction in water use.	**Severe**	1. Demand exceeds 98% of amount that can be delivered to customers for three consecutive days. 2. Water demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate. 3. Supply source becomes contaminated 4. Failure or damage of major water system components. 5. Water demand is approaching limit of permitted supply. Goal: 5% reduction in water use.	**Emergency**	1. Demand exceeds amount that can be delivered to customers. 2. Water demand for all or part of the delivery system seriously exceeds delivery capacity because delivery capacity is inadequate. 3. Supply source becomes contaminated 4. Failure or damage of major water system components. 5. Water demand is approaching limit of permitted supply. Goal: 10% reduction in water use.				
EDGECLIFF VILLAGE	Aug-00	**Water Awareness**	1. Demand for Edgecliff Village, Forth Worth, or TRWD exceeds 90% of capacity for three consecutive days. 2. Water demand approaches a reduced delivery capacity for all or part of the system due to supply or production capacity limitations including contamination of the system. 3. As initiated by TRWD.	**Water Watch**	1. TRWD Demand exceeds East Texas delivery system capacity for a 24hr period. 2. Water demand equals a reduced delivery capacity for all or part of the system due to supply or production capacity limitations including contamination of the system. 3. Demand exceeds 95% of capacity for two consecutive days. 4. As initiated by TRWD.	**Water Warning**	1. Water demand exceeds a reduced delivery capacity for all or part of the system due to supply or production capacity limitations including contamination of the system. 2. Demand exceeds 95% of capacity for five consecutive days. 3. As initiated by TRWD.	**Water Emergency**	1. Demand exceeds capacity for two consecutive days. 2. Water demand seriously exceeds a reduced delivery capacity limitations including contamination of the system. 3. As initiated by TRWD.				

Table R-1, Continued

Water User Group	Date	1		2		3		4		5		6	
		Condition	**Trigger Conditions**	**Condition**	**Trigger Conditions**	**Condition**	**Trigger Conditions**	**Condition**	**Trigger Conditions**	**Condition**	**Trigger Conditions**	**Condition**	**Trigger Conditions**
EL DORADO WATER COMPANY-MATAGORDA CO.	Apr-05	**Customer Awareness**	Stage will begin April 1 and end September 30.	**Voluntary Water Conservation**	Total daily demand reaches 80% pumping or storage capacity. Goal: 10% reduction in total water use	**Mandatory Water Use Restrictions**	Total daily demand reaches 90% pumping or storage capacity. Goal: 10% reduction in total water use	**Critical Water Use Restrictions**	Total daily demand reaches 100% pumping or storage capacity. Goal: 10% reduction in total water use				
Ellis County Water Control and Improvement District #1	Apr-05	**Stage 0 - Normal Water Conditions**	Monitor weather conditions, activate Lake Bardwell Pump Station at elevation 530 feet. **Goal:** Monitor weather conditions	**Stage 1 - Mild Water Shortage Conditions**	Lake elevation drops to 527 feet. **Goal:** Achieve a 2% reduction in water use	**Stage 2 - Moderate Water Shortage Conditions**	Lake elevation drops to 524 feet. **Goal:** Achieve a 5% reduction in water use	**Stage 3 - Severe Water Shortage Conditions**	Lake elevation drops to 520 feet. **Goal:** Achieve a 10% reduction in water use.	**Stage 4 - Critical Water Shortage Conditions**	Lake elevation drops to 517.5 feet. **Goal:** Achieve a 15% reduction in water use	**Stage 5 - Emergency Water Outage Conditions**	1. Major water line breaks, or pump or system failures. 2. Natural or man-made contamination of water supply source(s). **Goal:** Achieve a 30% reduction in water use.
ENNIS	Jul-05	**Water Watch**	The elevation of Lake Bardwell is less than 421' MSL or the daily water usage is greater than 45% of capacity.	**Mild Water Shortage Conditions**	The elevation of Lake Bardwell is equal to or less than 417' MSL or 74% of capacity, or the daily potable water supply system demand is at 6 MGD or 75% capacity.	**Moderate Water Shortage Conditions**	The elevation of Lake Bardwell is equal to or less than 414' MSL or 54% of capacity, or the daily potable water supply system demand is at 6.8 MGD or 85% capacity.	**Severe Water Shortage Conditions**	The elevation of Lake Barwell is equal to or less than 412' MSL or 40% capacity, or the daily potable water supply system demand is 7.2 MGD or 90% capacity	**Critical Water Shortage Conditions**	The elevation of Lake Barwell is equal to or less than 409' MSL or 20% of capacity, or the daily potable water supply system demand is 7.6 MGD or 95% capacity	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of the water supply source.
EULESS	Oct-02	**Mild Conditions**	1. Total raw water storage in TRWD West Fork Lakes is projected to decline to less than 50% of storage capacity within 2 weeks. 2. Storage has dropped to 60% of capacity. 3. Total demand reaches 90% of TRA's water supply capacity.	**Moderate Condtions**	1. Total raw water storage in TRWD reservoirs drops to less than 50% of storage capacity. 2. Total demand reaches 95% of TRA's water supply capacity for 30 consecutive days.	**Severe Conditions**	1. Total raw water storage in TRWD reservoirs drops to less than 25% of storage capacity. 2. Total demand reaches 100% of TRA's water supply capacity for 30 consecutive days.	**Emergency Conditions**	1. Total raw water storage in TRWD reservoirs drops to less than 20% of storage capacity. 2. System failure at TRA TCWSP.				
FAIRVIEW	Aug-05	**Mild Conditions**	Demand exceeds 90% of amount that can be delivered to customers for three consecutive days	**Moderate Conditions**	Demand exceeds 95% of amount that can be delivered to customers for three consecutive days. Goal: 2% reduction in water use	**Severe Conditions**	Demand exceeds 98% of amount that can be delivered to customers for three consecutive days. Goal: 5% reduction in water use	**Emergency Conditions**	1. Demand exceeds amount that can be delivered to customers. 2. Supply source becomes contaminated. 3. System unable to deliver water due to failure or damage of major water system components. Goal: 10% reduction in water use				
FARMERSVILLE (Retail Supplier & Wholesale Public Supplier)	Nov-99	**Mild Conditions**	Operations may be initiated by the NTMWD.	**Moderate Conditions**	Operations may be initiated by the NTMWD.	**Severe Conditions**	Operations may be initiated by the NTMWD.	**Critical Water Shortage Conditions**	Operations may be initiated by the NTMWD.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources.		
FERRIS		***Refer to the Ten Mile Creek Regional Wastewater System in Dallas County**											
FILES VALLEY WSC		**Mild Water Shortage Conditions**	Total daily water demands equal or exceed 80% of the safe operating capacity of 1 mgd for three consecutive days or 95% on a single day. Goal: 10% reduction in demand.	**Moderate Water Shortage Conditions**	Total daily water demands equal or exceed 90% of the safe operating capacity of 1 mgd for two consecutive days. Goal: 20% reduction in demand.	**Severe Water Shortage Conditions**	Total daily water demands equal or exceed 95% of the safe operating capacity of 1 mgd for two consecutive days. Goal: 25% reduction in demand.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources.				
FLO COMMUNITY WSC	Jun-00	**Mild Water Shortage Conditions**	1. Water consumption has reached 80% of daily max supply for three days. 2. Water supply is reduced to a level that is only 20% greater than the average consumption for the previous month. 3. There is an extended period (at least 8 weeks) of low rainfall and daily use has risen 20% above the use for the same period during the previous year	**Moderate Water Shortage Conditions**	1. Water consumption has reached 90% of the available amount for three consecutive days. 2. The water level in any of the water storage tanks cannot be replenished for three consecutive days	**Severe Water Shortage Conditions**	1. Failure of a major component of the system or a event which reduces the min residual pressure below 20 psi for a period of 24 hours or longer. 2. Water consumption of 95% or more of the max available for three consecutive days. 3. Water storage levels in the system drop during one 24-hour period. 4. Natural or man-made contamination of the water supply source. 5. The declaration of a state of disaster due to drought conditions in a county or counties served by the Corporation. 6. Other unforeseen events which could cause imminent health or safety risks to the public.						
FLOWER MOUND	Jul-02	**Water Awareness**	1. Conditions associated with water supply sources that reduces or limit the quality or quantity of water available for treatment and distribution. 2. A condition exists with a water treatment available for treatment and distribution. 3. Total water consumption reaches 75% of system's pumping capacity.	**Water Alert**	1. Average daily water consumption reaches 90% of available supply for two consecutive days. 2. Average daily water consumption reaches 90% of system's capacity for two consecutive days. 3. Failures occur with town or wholesale supplier equipment or systems that result in a situation where demand reaches 90% of remaining supply or system capacity. 4. Wholesale suppliers implement similar restrictions for reasons such as conserving reservoir levels, maintaining system pressures, or other items requiring cooperation.	**Water Warning**	1. Average daily water consumption reaches 100% of available supply for two consecutive days. 2. Average daily water consumption reaches 100% of system's capacity for two consecutive days. 3. Failures occur with town or wholesale supplier equipment or systems that result in a situation where demand reaches 100% of remaining supply or system capacity. 4. Wholesale suppliers implement similar restrictions for reasons such as conserving reservoir levels, maintaining system pressures, or other items requiring cooperation.	**Water Emergency**	1. Average daily water demand exceeds deliverable capacity causing some regions of the service area to fall below standards established by state and federal agencies. 2. Failures occur with town or wholesale supplier equipment or systems that result in a situation where demand reaches 110% of remaining supply or system capacity. 3. Water system is contaminated. 4. Any two conditions listed in the water warning classification occur at the same time.				
FOREST ACRE GARDENS WATER SYSTEM-TEXAS H2O-MANSFIELD	Aug-00	**Customer Awareness**	Stage I will begin every year on April 1 and ends September 30.	**Voluntary Water Conservation**	Supply-Based: Overnight recovery rates reach 6-feet. Demand-Based: Pumps are pumping for 14-hrs per day or a production or distribution limitations.	**Mandatory Water Use Restrictions**	Supply-Based: Overnight recovery rates reach 4-feet. Demand-Based: Pumps are pumping for 18-hrs per day or a production or distribution limitations.	**Critical Water Use Restrictions**	Supply-Based: Overnight recovery rates reach 2-feet, or supply contamination. Demand-Based: Pumps are pumping for 24-hrs per day, production or distribution limitations, or a system outage.				
FOREST HILL NO. 2 WSC- FOREST HILL	Aug-00	**Water Awareness**	Stage will begin each year from May 1 through September 30.	**Water Watch**	Only Well #3 pumping and/or degraded distribution system capacity.	**Water Warning**	Only Wells #1 and #2 pumping and/or degraded distribution system capacity.	**Water Emergency**	Only Well #1 or Well #2 is pumping and/or degraded distribution system capacity.	**Water Crisis**	System outage and/or source contamination		

Table R-1, Continued

Water User Group	Date	1		2		3		4		5		6	
		Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions
FORNEY		**Mild Water Drought Conditions**	1. Total daily water demand equals or exceeds 85% of firm pumping capacity for three consecutive days or 95% on a single day. 2. As initiated by NTMWD. Goal: 10% reduction in water use.	**Moderate Drought Conditions**	1. Total daily water demand equals or exceeds 90% of firm pumping capacity for three consecutive days or 95% on a single day. 2. As initiated by NTMWD. Goal: 20% reduction in water use.	**Severe Drought Conditions**	1. Total daily water demand equals or exceeds 100% of firm pumping capacity. 2. As initiated by NTMWD. Goal: 30% reduction in water use.	**Critical Emergency Conditions**	1. Natural disasters, massive power outages, massive equipment or facility failures. 2. Contamination. 3. As initiated by NTMWD.				
FORT WORTH	Apr-05	**Dry Conditions**	Ongoing or as initiated by TRWD. Goal: achieve voluntary reduction in water use.	**Water Watch**	One or more sectors of the city are at 95% of reliable pumping capacity for three consecutive days or as initiated by TRWD. Goal: 5% reduction in system demand within one week.	**Water Warning**	One or more sectors of the city are at 98% of reliable pumping capacity for three consecutive days or as initiated by TRWD. Goal: 10% reduction in system demand within one week.	**Water Emergency**	1. Contamination. 2. Failure of major system compononent. 3. Damage to major system component. 4. Demand exceeds supply. 5. As initiated by TRWD. Goal: Reduce system demand enough to address and rectify emergency situation.				
FORT WORTH (Wholesale)	Oct-92	**Mild Conditions**	Daily water demand reaches 80% of the production capacity of the system for three consecutive days.	**Moderate Conditions**	Daily water demand reaches 90% of the production capacity of the system for three consecutive days.	**Severe Conditions**	Daily water demand reaches 100% of the production capacity of the system for three consecutive days; or the imminent or actual failure of a major component of the system is experienced which can cause an immediate health or safety hazard; or a significant reduction in the production capacity of the system is experienced.						
FRIENDLY OAKS WSC	Aug-00	**Mild Water Shortage Conditions**	Will begin every May 1 and last until September 30.	**Moderate Water Shortage Conditions**	Supply-Based: Stage is initiated when total daily water demand from the Well is greater than 12,000 gallons, or exceeds 84,000 in a 7 consecutive day period. Demand-Based: Total daily demand reaches 85% of pumping or storage capacity.	**Critical Water Shortage Conditions**	Stage is initiated when total dail water demand from the Well is greater than 17,000 gallons						
FRISCO	May-05	**Mild (Voluntary) Conditions**	1. NTMWD intiates Stage 1, Mild. 2. Maximum daily flow exceeds 2.5 times the avg daily flow from the preceding months of Jan, Feb, and March for 7 consecutive months	**Moderate (Voluntary - Mandatory Upgrade) Conditions**	1. NTMWD intiates Stage 2, Moderate. 2. Maximum daily flow exceeds 3.0 times the avg daily flow from the preceding months of Jan, Feb, and March for five consecutive days for voluntary restrictions and 1five consecutive days for mandatory restrictions. Goal: 10% reduction in water use	**Severe (Mandatory) Conditions**	1. NTMWD intiates Stage 3, Severe. 2. Maximum daily flow exceeds 3.5 times the avg daily flow from the preceding months of Jan, Feb, and March for three consecutive days. Goal: 20% reduction in water use	**Emergency Conditions**	1. NTMWD initiates Stage 4, Emeregency. 2. Demand exceeds amount that can be delivered to customers. 2. Supply source becomes contaminated. 3. System unable to deliver water due to failure or damage of major water system components.				
FROST	Sep-00	**Mild Water Shortage Conditions**	As initiated by contract with the City of Corsicana. Goal: 10% reduction in water use.	**Moderate Water Shortage Conditions**	As initiated by contract with the City of Corsicana. Goal: 20% reduction in water use.	**Severe Water Shortage Conditions**	As initiated by contract with the City of Corsicana. Goal: 30% reduction in water use.	**Critical Water Shortage Conditions**	As initiated by contract with the City of Corsicana. Goal: 40% reduction in water use.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur. 2. Contamination of water supply source.		
GAINESVILLE	Aug-05	**Mild Water Shortage Conditions**	Demand exceeds 90% of amount that can be delivered to customers for seven consecutive days.	**Moderate Water Shortage Conditions**	Demand exceeds 95% of amount that can be delivered to customers for three consecutive days. Goal: 2% reduction in water use	**Severe Water Shortage Conditions**	Demand exceeds 98% of amount that can be delivered to customers for three consecutive days. Goal: 5% reduction in water use	**Emergency Water Shortage Conditions**	1. Demand exceeds amount that can be delivered to customers. 2. Supply source becomes contaminated. 3. System unable to deliver water due to failure or damage of major water system components. Goal: 10% reduction in water use				
GARLAND	Nov-99	**Mild Water Shortage Conditions**	The City's provider, NTMWD requests initiation of STAGE 1; or total daily water demand equals 80% of the safe operating capacity, and continually falling treated water reservoir levels that do not refill above 80% overnight.	**Moderate Water Shortage Conditions**	The City's provider, NTMWD requests initiation of STAGE 2; or total daily water demand equals 90% of the safe operating capacity, and continually falling treated water reservoir levels that do not refill above 65% overnight.	**Severe Water Shortage Conditions**	The City's provider, NTMWD requests initiation of STAGE 3; or total daily water demand equals the safe operating capacity, and continually falling treated water reservoir levels that do not refill above 50% overnight.	**Critical Water Shortage Conditions**	The City's provider, NTMWD requests initiation of STAGE 4; or total daily water demand exceeds the safe operating capacity, and continually falling treated water reservoir levels that do not refill above 20% overnight.	**Emergency Water Shortage/Water Rationing Conditions**	The water system experiences catastrophically decreasing reservoir levels or delivery capacities' major water line breaks or pump or system failures occur' natural or man-made contamination of the water supply occurs or is suspected; or other conditions arise that constitute an unprecedented loss of capability to provide water service adequate for the public health, safety, or welfare.		
GARRETT	Sep-00	**Voluntary Water Use Restrictions**	When, pursuant to requirements specified in the Community Water Company wholesale water purchase contract with the City of Ennis, notification is received requesting initiation of Mild drought conditions.	**Mild Water Use Restrictions**	When, pursuant to requirements specified in the Community Water Company wholesale water purchase contract with the City of Ennis, notification is received requesting initiation of Moderate drought conditions.	**Moderate Water Use Restrictions**	When, pursuant to requirements specified in the Community Water Company wholesale water purchase contract with the City of Ennis, notification is received requesting initiation of Emergency conditions.	**Critical Water Use Restrictions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources. 3. When, pursuant to requirements specified in the Community Water Company wholesale water purchase contract with the City of Ennis, notification is received requesting initiation of Crises Conditions.				
GASTONIA - SCURRY WSC	Jan-99	**Mild Condition**	Annually beginning on May 1 through September 30. Goal: raise public awareness and lower non-essential water use by 20%.	**Moderate Drought**	Total daily water demand equals or exceeds 90% of daily supply capacity for 10 consecutive days. Goal: raise public awareness and lower non-essential water use by 20%.	**Severe Condition**	Total daily water demand equals or exceeds 100% of daily supply capacity for five consecutive days. Goal: Lower non-essential water use by 50% and stay under 600,000 gpd.	**Critical Condition**	When initiated by NTMWD. Goal: To lower non-essential water uses by 90% and stay in guidelines set by NTMWD.	**Emergency Condition**	System outage due to depletion at water supply or equipment failure. Goal: Discontinue all water system operations.		
GLENN HEIGHTS	Sep-84	**Minor - Water Shortage Alert (Voluntary)**	Discretionary. 1. Based on static waters in the wells, whether or not within the 10% of normal. 2. Water demands above normal. 3. Time of the year is major factor. 4. No measurable rainfall in the last 30 days. 5. Weather forecast	**Moderate - Water Use Curtailment (Voluntary)**	All wells being monitored as to the static water level below the ground surface. Normal water level being 600.0 feet in Glenn Heights for the Woodbine Sand Aquifer. Maximum level is 640.0 for STAGE 2 Emergency. Previous days water demand between 60-80% of peak.	**Severe - Warning (Mandatory)**	All static water levels are below 640.0 and falling. The City has experienced failure to achieve water demand reduction objectives through voluntary curtailment. The previous days demand exceeded 80% of peak. The storage tanks fill no more than 65% overnight.	**Critical - Emergency Price Rationing (Mandatory)**	Static levels of wells are at or below 680.0 feet below the natural ground surface; failure to achieve water demand reduction objectives through STAGE 3 restrictions. Storage tanks filling up to less than 50% overnight; or emergency condition.	**Termination of Emergency Condition/Water Shortage (Discretionary)**	Emergency condition may be terminated at such time the storage reservoirs are able to fill 95% overnight for three consecutive nights, with favorable weather conditions prevailing.		

Table R-1, Continued

Water User Group	Date	1		2		3		4		5		6	
		Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions
GRAND PRAIRIE	May-99	**Water Watch**	1. As requested by DWU. 2. Combined storage falls below 200 gallons per capita at the beginning of a 24 hr demand period. 3. Daily water use exceeds supply. 4. Continued storage depletion indicates an inability to continue to supply water at the water usage rate encountered.	**Water Warning**	1. As requested by DWU. 2. Total water supply reduced by 10% on a continuous basis during high water usage months. 3. Combined storage falls below 150 gallons per capita at the beginning of a 24 hr period. 4. Long term deficiencies in supply within an entire pressure district. 5. Failure to maintain 35 psi at up to 750 service locations or up to 15 fire hydrants. 6. Power failure or restrictions.	**Water Emergency**	1. As requested by DWU. 2. Total water supply reduced by 20% on a continuous basis during high water usage months. 3. Combined storage falls below 130 gallons per capita at the beginning of a 24 hr period. 4. Long term deficiencies in supply within an entire pressure district. 5. Failure to maintain 35 psi at up to 750 service locations or up to 15 fire hydrants. 6. Power failure or restrictions.	**Water Crisis**	1. As requested by DWU. 2. Total water supply reduced by 25% on a continuous basis during high water usage months. 3. Combined storage falls below 130 gallons per capita at the beginning of a 24 hr period. 4. Any unanticipated situations that limit distribution of water. 6. Power failure or restrictions.				
GRAPEVINE	Apr-05	**Moderate Conditions**	1. Surface water demand reaches (90% of pumping capacity- City of Grapevine/TRA WTPS)(Design 22.273 mgd), Peak 22.273 mgd. 2. Production at the combined City of Grapevine and TRA surface WTP reduced to a point such that the aggregate surface water demand of the system is 90% of the reduced pumping capacity. Goal: 5% reduction in daily water demand or 10% reduction in max day demand.	**Severe Conditions**	1. Surface water demand reaches (95% of pumping capacity- City of Grapevine/TRA WTPS)(Design 22.273 mgd), Peak 22.273 mgd. 2. Production at the combined City of Grapevine and TRA surface WTP reduced to a point such that the aggregate surface water demand of the system is 100% of the reduced pumping capacity. Goal: 10% reduction in daily water demand or 20% reduction in max day water demand.	**Critical Conditions**	1. Surface water demand reaches (7 day period) (100% of pumping capacity- City of Grapevine/TRA WTPS)(Design 22.273 mgd), Peak 22.273 mgd. 2. Production at the combined City of Grapevine and TRA surface WTP reduced to a point such that the aggregate surface water demand of the system exceeds the reduced production, including a complete failure of the plant to produce any water. Goal: 15% reduction in daily water demand or 40% reduction in max day water demand.	**Emergency Conditions**	1. Catastrophic failure of a critical component of the treatment, delivery or distribution system that would limit water available to meet demand. Goal: 20% reduction in daily water demand or 40% reduction in max day water demand.				
GREATER TEXOMA UTILITY AUTHORITY-GAINESVILLE	Jun-00	**Mild Conditions**	1. Total daily water demand equals or exceeds 80% of the safe operating capacity for five consecutive days. Goal: 5% reduction in water use.	**Moderate Conditions**	1. Total daily water demand equals or exceeds 90% of the safe operating capacity for five consecutive days. Goal: 15% reduction in water use.	**Severe Conditions**	1. Total daily water demand equals or exceeds 100% of the safe operating capacity for five consecutive days. Goal: 20% reduction in water use.	**Emergency Water Shortage Conditions**	Contamination of water supply.				
GUNTER	Apr-05	**Mild Water Shortage Conditions**	Demand exceeds 90% of amount that can be delivered to customers for seven consecutive days	**Moderate Water Shortage Conditions**	Demand exceeds 95% of amount that can be delivered to customers for three consecutive days. Goal: 2% reduction in water use	**Severe Water Shortage Conditions**	Demand exceeds 98% of amount that can be delivered to customers for three consecutive days. Goal: 5% reduction in water use	**Emergency Water Shortage Conditions**	1. Demand exceeds amount that can be delievered to customers. 2. Supply source becomes contaminated. 3. System unable to dliver water due to failure or damage of major water system components. Goal: 10% reduction in water use				
HALTOM CITY	Apr-05	**Water Watch**	One or more sectors of the City are at 95% of reliable supply and have had three consecutive days of temperature highs of more than 100° without rain. Goal: 5% reduction in system demand.	**Water Warning**	One or more sectors of the City are at 98% of reliable supply and have had three consecutive days of temperature highs of more than 100° without rain. Goal: 10% reduction in system demand	**Water Emergency**	1. Contamination of the water supply. 2. Failure of or damage to major system components. 3. Demand on the system exceeds delivery capacity.						
HASLET	May-00	**Water Awareness**	1. Annually from May 1 to September 30. 2. Water available to city is equal to or less than 50% of storage. 3. Demand exceeds 90% of deliverable capacity for three consecutive days. 4. Water demand approaches a reduced delivery capacity for all or part of the system due to supply or production capacity limitations including contamination of the system. 5. Pursuant to requirements of any wholesale water purchase contract.	**Water Watch**	1. Water available to city is equal to or less than 60% of storage. 2. Total daily demand equals or exceeds 380,000 gallons for three consecutive days or 400,000 gallons on a single day. 3. Demand exceeds 95% of deliverable capacity for two consecutive days. 4. Water demand equals a reduced delivery capacity for all or part of the system due to supply or production capacity limitations including contamination of the system. 5. Pursuant to requirements of any wholesale water purchase contract.	**Water Warning**	1. Water available to city is equal to or less than 65% of storage. 2. Total daily demand equals or exceeds 400,000 gallons for two consecutive days or 450,000 gallons on a single day. 3. Demand exceeds 95% of deliverable capacity for five consecutive days. 4. Water demand exceeds a reduced delivery capacity for all or part of the system due to supply or production capacity limitations including contamination of the system. 5. Pursuant to requirements of any wholesale water purchase contract.	**Water Emergency**	1. Water available to city is equal to or less than 70% of storage. 2. Total daily demand equals or exceeds 450,000 gallons for two consecutive days or 475,000 gallons on a single day. 3. Demand exceeds 100% of deliverable capacity for two consecutive days. 4. Water demand seriously exceeds a reduced delivery capacity for all or part of the system due to supply or production capacity limitations including contamination of the system. 5. Pursuant to requirements of any wholesale water purchase contract.				
HEATH	Aug-00	**Mild Water Shortage Conditions**	Notification from the City of Rockwall(supplier) to initiate stage 1	**Moderate Water Shortage Conditions**	Notification from the City of Rockwall(supplier) to initiate stage 2	**Severe Water Shortage Conditions**	Notification from the City of Rockwall(supplier) to initiate stage 3	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources. 3. Natural disaster, massive power outage; or 4. City of Rockwall gives notification to initiate stage 4.				
HERITAGE OAKS-TEXAS H2O, INC.-MANSFIELD	Aug-00	**Customer Awareness**	Annually from April 1 to September 30.	**Voluntary Water Conservation**	1. Overnight recover rate reaches 6 feet. 2. Pumps have pumped for 14 hours per day. 3. Production or distribution limitations.	**Mandatory Water Use Restrictions**	1. Overnight recover rate reaches 4 feet. 2. Pumps have pumped for 18 hours per day. 3. Production or distribution limitations.	**Critical Water Use Restrictions**	1. Overnight recover rate reaches 2 feet. 2. Pumps have pumped for 24 hours per day. 3. Production or distribution limitations. 4. System outage.				
HICKORY CREEK		**Mild Water Shortage Conditions**	When continually falling treated water reservoir levels which do not refill above 100% overnight or on such occasion as a water well may be temporarily out of service or when water well pumping levels continue to decline.	**Moderate Water Shortage Conditions**	When continually falling treated water reservoir levels which do not refill above 90% overnight or on such occasion as a water well may be temporarily out of service or when water well pumping levels continue to decline.	**Severe Water Shortage Conditions**	When continually falling treated water reservoir levels which do not refill above 85% overnight or on such occasion as a water well may be temporarily out of service or when water well pumping levels continue to decline.	**Critical Water Shortage Conditions**	When continually falling treated water reservoir levels which do not refill above 75% overnight or on such occasion as a water well may be temporarily out of service or when water well pumping levels continue to decline.	**Emergency Water Shortage Conditions**	Manager, or designee, determines water supply emergency exists based on following: 1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources. 3. one or more water wells are out of service. 4. One or more water wells are experiencing dangerouly declining pumping levels.		
HIDEAWAY BAY LAKE SHORES WSC	Oct-02	**Voluntary Water Use Restrictions**	Annually from April 1 to September 30.	**Mild Water Use Restrictions**	As initiated by wholesaler.	**Mandatory Water Use Restrictions**	As initiated by wholesaler.	**Critical Water Use Restrictions**	As initiated by wholesaler.				

Table R-1, Continued

Water User Group	Date	1		2		3		4		5		6	
		Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions
HIGHLAND PARK	May-05	**Water Shortage Possibility**	1. Water use is approaching the limit of contracted supply. 2. Demand exceeds 90% of delivery capacity for three consecutive days. 3. Water demand for any portion of the delivery system approaches the delivery capacity. 4. Supply source(s) or delivery system becomes contaminated. 5. System is unable to deliver water due to failure or damage of major water system components. 6. DCPCMUD has initiated Stage 1. Goal: Voluntary reduction of 2% of water use.	**Water Shortage Watch**	1. Demand exceeds 95% of delivery capacity for three consecutive days. 2. Demand for any portion of the delivery system equals the delivery capacity. 3. Supply source becomes contaminated. 4. Water supply system is unable to deliver water due to the failure or damage of major water system components. 5. DCPCMUD has initiated Stage 2. Goal: Reduction of 5% of water use.	**Water Shortage Warning**	1. Demand exceeds 98% of delivery capacity for three consecutive days. 2. Demand for any portion of the delivery system exceeds the delivery capacity. 3. Supply source becomes contaminated. 4. Water supply system is unable to deliver water due to failure or damage of major water system components. 5. DCPCMUD has initiated Stage 3. Goal: Reduction of 10% of water use.	**Water Shortage Emergency**	1. Demand exceeds the amount that can be delivered to customers. 2. Demand for any portion of the delivery system exceeds the delivery capacity. 3. Supply source becomes contaminated. 4. Water supply system is unable to deliver water due to failure or damage of major water system components. 5. DCPCMUD has initiated Stage 4. Goal: Reduction of 25% of water use.				
HIGHLAND VILLAGE	Feb-02	**Seasonal Conservation**	Annually from May 1 to September 30. Goal: To reduce peak daylight hour demand on the municipal water supply during the high water use season and to enforce prudent outside watering practices.	**Water Management**	1. When the opinion of the city manager is the supply of water is inadequate to meet the previous Phase. 2. When total system supply is reduced by a minimum 8% for greater than 8 days. 3. When demand exceeds 80% of supply for three consecutive days or 100% for two consecutive days. 4. As requested by UTRWD or State of Texas. Goal: To ensure an adequate supply of water for normal domestic use and firefighting during periods of short term sustained system degradation, inadequacy or drought.	**Water Management Alert**	1. When the opinion of the city manager is the supply of water is inadequate to meet the previous Phase. 2. When total system supply is reduced by a minimum 10% for greater than 10 days. 3. When demand exceeds 100% of supply for 4 consecutive days or 120% for three consecutive days. 4. As requested by UTRWD or State of Texas. Goal: To ensure an adequate supply of water for normal domestic use and firefighting during periods of short term sustained system degradation, inadequacy or drought.	**Water Management Emergency**	1. Resolution by city council. 2. When total system supply is reduced by a minimum 25% for greater than 10 days. 3. When demand exceeds 125% of supply for 4 consecutive days or 150% for three consecutive days. 4. As requested by UTRWD or State of Texas. 5. Contamination of system. 6. System failure from catastrophic causes. Goal: To ensure an adequate supply of water for normal domestic use and firefighting during periods of short term sustained system degradation, inadequacy or drought.				
HIGHLAND WATER SUPPLY	Aug-00	**Mild Condition**	1. Water consumption has reached 80% of daily max supply for three days. 2. Water supply is reduced to a level that is only 20% greater than the average consumption for the previous month. 3. There is an extended period (at least 8 weeks) of low rainfall and daily use has risen 20% above the use for the same period during the previous year	**Moderate Conditions**	1. Water consumption has reached 90% of the available amount for three consecutive days. 2. The water level in any of the water storage tanks cannot be replenished for three consecutive days	**Severe Conditions**	1. Failure of a major component of the system or a event which reduces the min residual pressure below 20 psi for a period of 24 hours or longer. 2. Water consumption of 95% or more of the max available for three consecutive days. 3. Water storage levels in the system drop during one 24-hour period. 4. Natural or man-made contamination of the water supply source. 5. The declaration of a state of disaster due to drought conditions in a county or counties served by the Corporation. 6. Other unforeseen events which could cause imminent health or safety risks to the public.						
HILLCREST WATER-TEXAS H2O, INC.-MANSFIELD	Aug-00	**Customer Awareness**	Annually from April 1 to September 30.	**Voluntary Water Conservation**	1. Overnight recover rate reaches 6 feet. 2. Pumps have pumped for 14 hours per day. 3. Production or distribution limitations.	**Mandatory Water Use Restrictions**	1. Overnight recover rate reaches 4 feet. 2. Pumps have pumped for 18 hours per day. 3. Production or distribution limitations.	**Critical Water Use Restrictions**	1. Overnight recover rate reaches 2 feet. 2. Pumps have pumped for 24 hours per day. 3. Production or distribution limitations. 4. System outage.				
HILLTOP WATER SUPPLY - GARLAND	Aug-00	**Customer Awareness**	Stage will begin April 1 and end September 30.	**Voluntary Water Conservation**	When metered water usage reaches approx. 2,400 gpd and pumps run about one hour each day.	**Mandatory Water Use Restrictions**	When metered water usage reaches approx. 2,400 gpd and pumps run about two hours each day.	**Critical Water Use Restrictions**	When metered water usage reaches approx. 2,400 gpd and pumps run about three hours each day.				
HONEY GROVE	Apr-02	**Mild Water Shortage Conditions**	1. System water production exceeds 650,000 gpd for two consecutive days or 550,000 gpd for seven consecutive days. Goal: Achieve a 10% reduction in water use.	**Moderate Water Shortage Conditions**	1. System water production exceeds 750,000 gpd for two consecutive days or 650,000 gpd for seven consecutive days. Goal: Achieve a 20% reduction in water use.	**Severe Water Shortage Conditions**	1. System water production exceeds 850,000 gpd for two consecutive days or 700,000 gpd for seven consecutive days. Goal: Achieve a 30% reduction in water use.	**Emergency Water Shortage Conditions**	1. Major power outage. 2. malfunction of major system component. 3. Depletion of storage. 4. Contamination of water supply source.				
HORSE BEND WATER WORKS-WEATHERFORD	Jul-00	**Customer Awareness**	Will begin every April 1 and last until September 30.	**Voluntary Water Conservation**	Supply-Based- Water consumption has reached 80% of daily max supply for three consecutive days. Demand-Based- There is an extended period(at least 8 weeks) of low rainfall and daily use has risen 20% above the use for the same period during the previous year.	**Mandatory Water Use Restrictions**	Supply-Based- Water consumption has reached 90% of daily max supply for three consecutive days. Demand-Based- The water level in any of the water storage tanks cannot be replenished for three consecutive days.	**Critical Water Use Restrictions**	Supply-Based- Water consumption has reached 95% of daily max supply for three consecutive days. Demand-Based- Water consumption of 100% of the max available and the water storage levels in the system drop during a 24-hour period.				
HOWARD & SONS WATER COMPANY	Aug-00	**Voluntary Water Use Restrictions**	Stage will begin April 1 and end September 30. Goal: 20% reduction in daily water demand.	**Mild Water Use Restrictions**	Pump runs for 5 hours in a 24 hour period. Goal: 30% reduction in daily water demand.	**Moderate Water Use Restrictions**	The well pump runs 6 hours in a 24 hour period. Goal: 35% reduction in daily water demand.	**Critical Water Use Restrictions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources.				
HOWE	May-05	**Mild Conditions**	Demand exceeds 90% of amount that can be delivered to customers for seven consecutive days	**Moderate Conditions**	Demand exceeds 95% of amount that can be delivered to customers for three consecutive days. Goal: 2% reduction in water use	**Severe Conditions**	Demand exceeds 98% of amount that can be delivered to customers for three consecutive days. Goals: 5% reduction in water use	**Emergency Conditions**	1. Demand exceeds amount that can be delivered to customers. 2. Supply source becomes contaminated. 3. System unable to deliver water due to failure or damage of major water system components. Goal: 10% reduction in water use				
HUDSON OAKS	Feb-02	**Mild**	Certain system stresses are noted	**Severe**	System is showing difficulty in keeping up with demands	**Emergency**	No trigger identified.						

Table R-1, Continued

Water User Group	Date	1		2		3		4		5		6	
		Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions
IRVING	Apr-05	**Conservation**	1. Pursuant to requirements specified in the wholesale treated water purchase contract, notification is received from DWU requesting initiation of STAGE 1. 2. Water demand exceeds 90% of the current maximum flow rate contracted with DWU for three consecutive days. 3. Short-term deficiencies in the City's distribution system limit supply capabilities. 4. Supply source becomes contaminated. 5. Annually from May 15 to September 30. Goal: Achieve voluntary reduction in water use.	**Water Warning**	1. Pursuant to requirements specified in the wholesale treated water purchase contract, notification is received from DWU requesting initiation of STAGE 2. 2. Water demand exceeds 100% of the current maximum flow rate contracted with DWU for five consecutive days. 3. Short-term deficiencies in the City's distribution system limit supply capabilities. 4. Supply sources become contaminated. 5. Inability to maintain or replenish volumes of storage to provide for public health and safety. Goal: Reduction of average daily water demand below 100% of the combined maximum contracted flow rate.	**Water Emergency**	1. Pursuant to requirements specified in the wholesale treated water purchase contract, notification is received from DWU requesting initiation of STAGE 3. 2. Short-term deficiencies in the City's distribution system limit supply capabilities. 3. Inability to maintain or replenish volumes of storage to provide for public health and safety. 4. Supply sources become contaminated. Goal: Reduction of average daily water demand below 100% of the combined maximum contracted flow rate.	**Water Crisis**	1. Pursuant to requirements specified in the wholesale treated water purchase contract, notification is received from DWU requesting initiation of STAGE 4. 2. Short-term deficiencies in the City's distribution system limit supply capabilities. 3. Inability to maintain or replenish volumes of storage to provide for public health and safety. 4. Supply sources become contaminated. Goal: Reduction of average daily water demand below 100% of the combined maximum contracted flow rate.	**Emergency Water Shortage Condition**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources. Goal: restrict water usage to allow water system to recover from emergency condition.		
ITALY	Jun-00	**Mild Water Shortage Conditions**	Total daily demand equals or exceeds 350,000 gallons for five consecutive days or 400,000 gallons on a single day. Goal: Achieve a 5% reduction in daily water demand.	**Moderate Water Shortage Conditions**	Total daily demand equals or exceeds 400,000 gallons for five consecutive days or 425,000 gallons on a single day. Goal: Achieve a 7% reduction in daily water demand.	**Severe Water Shortage Conditions**	Total daily demand equals or exceeds 425,000 gallons for five consecutive days or 450,000 gallons on a single day. Goal: Achieve a 8% reduction in daily water demand.	**Critical Water Shortage Conditions**	Total daily demand equals or exceeds 450,000 gallons for five consecutive days or 475,000 gallons on a single day. Goal: Achieve a 10% reduction in daily water demand.	**Emergency Water Shortage Conditions- Stage 6: Water Allocation**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contaminatio n of the water supply sources. - Total daily demand equals 475,000 gallons for five consecutive days or 500,000 gallons for 2 days. Goal: Achieve a 15% reduction in daily water demand.		
JACKSBORO	Jun-88	**Mild Conditions**	1. Treatment plant production exceeds 0.9 mgd for three consecutive days. 2. A major component of the treatment plant or distribution system fails, limiting the capacity of the facilities to 0.8 mgd. 3. The lake level in Lake Jacksboro reaches an elevation of 1006 MSL (before Lost Creek Reservoir is built). 4. The combined storage in Lake Jacksboro and Lost Creek Reservoir reaches 1400 acre-feet (after first fill of Lost Creek Reservoir).	**Moderate Conditions**	1. Treatment plant production exceeds 1.0 mgd for three consecutive days. 2. A major component of the treatment plant or distribution system fails, limiting the capacity of the facilities to 0.6 mgd during October through May or 0.8 mgd June through September. 3. The lake level in Lake Jacksboro reaches an elevation of 1005 MSL (before Lost Creek Reservoir is built). 4. The combined storage in Lake Jacksboro and Lost Creek Reservoir reaches 1200 acre-feet (after first fill of Lost Creek Reservoir).	**Severe Conditions**	1. Treatment plant production exceeds 1.1 mgd for three consecutive days. 2. A major component of the treatment plant or distribution system fails, limiting the capacity of the facilities to 0.4 mgd during October through May or 0.6 mgd June through September. 3. The lake level in Lake Jacksboro reaches an elevation of 1004 MSL (before Lost Creek Reservoir is built). 4. The combined storage in Lake Jacksboro and Lost Creek Reservoir reaches 1000 acre-feet (after first fill of Lost Creek Reservoir).						
JOSEPHINE	Aug-00	**Mild Water Shortage Conditions**	When Lake Lavon water surface elevations lies between 480 and 475 ft MSL- as determined by NTMWD	**Moderate Water Shortage Conditions**	When Lake Lavon water surface elevations lies between 475 and 470 ft MSL- as determined by NTMWD, or when notified by NTMWD to initiate stage or when storage tank levels do not refill above 50% overnight.	**Severe Water Shortage Conditions**	When Lake Lavon water surface elevations lies between 470 and 453 ft MSL- as determined by NTMWD, or when notified by NTMWD to initiate stage.						
JUSTIN	Feb-89	**Mild Conditions**	1. Daily demand exceeds 200,000 gpd for three consecutive days. 2. Distribution pressure remains below 45 psi for more than 6 consecutive hours.	**Moderate Conditions**	1. Daily demand exceeds 220,000 gpd for three consecutive days. 2. Distribution pressure remains below 40 psi for more than 6 consecutive hours. 3. Elevated storage reservoir remains below 50 percent of full capacity for more than two consecutive days. 4. Failure of one well simultaneous to a mild condition occurrence.	**Severe Conditions**	1. Daily demand exceeds 240,000 gpd for three consecutive days. 2. Failure of two wells during June, July, or August or simultaneous to a mild or moderate condition occurrence. 3. Imminent failure of system component where immediate health or safety hazards exist.						
KAUFMAN	Oct-99	**Mild Conditions**	Daily water demand exceeds 2,000,000 gpd for three consecutive days; or water pressure in system remains below 45 psi for 6 consecutive hours; or water levels in Lake Lavon fall between 482-475 feet MSL.	**Moderate Conditions**	Daily water demand exceeds 2,200,000 gpd for three consecutive days; or water pressure in system remains below 40 psi for 6 consecutive hours; or ground water storage reservoir remains below 70% of total storage for three consecutive days; or failure of raw water transmission line from NTMWD for more than 6 consecutive hours; or water levels in Lake Lavon fall between 475-468 feet MSL.	**Severe Conditions**	Daily water demand exceeds 2,500,000 gpd for three consecutive days; or failure of raw water transmission line from NTMWD for more than 12 consecutive hours during June, July, or August; or water levels in Lake Lavon fall between 468-453 feet MSL; or imminent or actual failure of system component where immediate health or safety hazards exist.	**Critical Emergency Conditions**	Natural disasters, massive power outages, massive equipment or facility failures, or public water supply contamination				
KELLER	Aug-05	**Water Watch**	Total daily water demand equals or exceeds 80% of functional pumping capacity with one pump out of service for three consecutive days	**Water Warning**	Total daily water demand exceeds 95% of functional pumping capacity with one pump out of service for one day. Goal: 2% reduction in water use	**Water Emergency**	Total daily water demand exceeds 95% of functional pumping capacity for one day. Goal: 5% reduction in water use	**Water Crisis**	1. Demands reach 100% or more of pumping capacity. 2. Contamination of water system or supplies. 3. System or equipment failure. Goal: 10% reduction in water use				
KEMP		**Mild Water Shortage Conditions**	1. Average daily water use reaches 80% of plant capacity. 2. Consideration will be given to weather conditions, time of year, low water pressure conditions.	**Moderate Water Shortage Conditions**	1. Average daily water use reaches 90% of plant's capacity. 2. Net storage is continuously decreasing on a daily basis and falls below 60% total capacity for 48 consecutive hours.	**Severe Water Shortage Conditions**	1. Failure of a major component of the water system which would cause an immediate health or safety hazard. 2. Water demand exceeds the plant's cpacity for three consecutive days.	**Emergency Water Shortage Conditions**	Major line breaks, or pump or system failures occur				
KENNEDALE		**Voluntary Water Rationing**	85% of peak capacity	**Mandatory Water Rationing**	93% of peak capacity								

Table R-1, Continued

Water User Group	Date	1		2		3		4		5		6	
		Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions
KENTUCKYTOWN WSC	May-00	**Mild Water Shortage Conditions**	When continually falling treated water reservoir levels which do not refill above 100% overnight or on such occasion as a water well may be temporarily out of service or when water well pumping levels continue to decline.	**Moderate Water Shortage Conditions**	When continually falling treated water reservoir levels which do not refill above 90% overnight or on such occasion as a water well may be temporarily out of service or when water well pumping levels continue to decline.	**Severe Water Shortage Conditions**	When continually falling treated water reservoir levels which do not refill above 85% overnight or on such occasion as a water well may be temporarily out of service or when water well pumping levels continue to decline.	**Critical Water Shortage Conditions**	When continually falling treated water reservoir levels which do not refill above 75% overnight or on such occasion as a water well may be temporarily out of service or when water well pumping levels continue to decline.	**Emergency Water Shortage Conditions**	Manager, or designee, determines water supply emergency exists based on following: 1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources. 3. one or more water wells are out of service. 4. One or more water wells are experiencing dangerouly declining pumping levels.		
KERENS		**Mild Water Shortage Conditions**	Total daily water demand exceeds 80% for five consecutive days or 85% on a single day. Goal: 5% reduction in water use.	**Moderate Water Shortage Conditions**	Total daily water demand exceeds 85% for five consecutive days or 90% on a single day. Goal: 5% reduction in water use.	**Severe Water Shortage Conditions**	Total daily water demand exceeds 90% for five consecutive days or 95% on a single day. Goal: 5% reduction in water use.	**Critical Water Shortage Conditions**	Total daily water demand exceeds 95% for five consecutive days. Goal: 5% reduction in water use.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of the water supply sources.		
KIOWA HOMEOWNERS WSC	Aug-00	**Mild Water Shortage Conditions**	Total daily water demand equals or exceeds 1.25 mg for five consecutive days or 1.4 mg on a single day.	**Moderate Water Shortage Conditions**	Total daily water demand equals or exceeds 1.5 mg for five consecutive days or 1.5 mg on a single day.	**Critical Water Shortage Conditions**	Total daily water demand equals or exceeds 1.7 mg for five consecutive days or 1.8 mg on a single day.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources.				
KNOB HILL WATER SYSTEM- LITTLE ELM	Aug-00	**Customer Awareness**	Stage will begin April 1 and end September 30.	**Voluntary Water Conservation**	Supply-Based- Storage capacity not being maintained during 100% rated production by one pump or storage tank out of service. Demand-Based- 1. Total daily demand reaches 90% of pumping capacity. 2. Production or distribution limitations.	**Mandatory Water Use Restrictions**	Supply-Based- System demand exceeds storage capacity for two consecutive days. Demand-Based- 1. Total daily demand reaches 100% of pumping capacity. 2. Production or distribution limitations.	**Critical Water Use Restrictions**	Supply-Based- 1. Supply contamination 2. Average daily water consumption reaches 110% of rated production capacity. Demand-Based- 1. Drinking water treatment reaches 110% of capacity. 2. Total daily demand reaches 110% of pumping capacity. 3. System outage.				
LADONIA	Oct-94	**Mild Conditions**	Daily water demand exceeds 500,000 gpd for three consecutive days.	**Moderate Conditions**	1. Daily water demand exceeds 625,000 gpd for three consecutive days. 2. Water pressures in distribution system remain below 40 psi for 6 consecutive hours. 3. Failure in either well.	**Severe Conditions**	1. Daily water demand exceeds 75,000 gpd for three consecutive days. 2. Imminent failure of system where immediate health or safety hazards exist.						
LAKE DALLAS(LAKE CITIES MUA)	Sep-93	**Mild Conditions**	1. Average daily water consumption reaches 90% of rated production capacity for a 3 day period. 2. Weather conditions are to be considered in determining severity of water navigability. Predicted long, cold or hot, dry periods need to be considered.	**Moderate Conditions**	1. Average daily water consumption reaches 100% of rated production capacity for three consecutive days. 2. A ground storage tank at one of the pump stations is taken out of service during a period of mild water unavailability. 3. Storage capacity is not being maintained during period of 100% rated production. 4. Existence of any one listed condition for a duration of 36 hours.	**Severe Conditions**	1. Average daily water consumption will not allow the storage levels in the ground storage tanks or elevated storage tanks to be maintained. 2. System demand exceeds the high service pumping capacity. 3. Water system is contaminated. 4. Water system fails from acts of God or man. 5. One pump station is taken out of service during a period of heavy demand.						
LAKE WORTH	Aug-00	**Mild Water Shortage Conditions**	1. Annually, beginning on May 1 through September 30. 2. When the water supply available to the city is equal to or less than 1.4 MGD. 3. When notification from provider the City of Fort Worth is received to initate Stage 1 of the Plan. 4. The specific capacity of the city's wells is equal to or less than 95% of the well's original specific capacity. 5. The total daily demand equals or exceeds 1.2 MGD for three consecutive days or 1.4 MGD on a single day. 6. Continually falling ground and/or elevated storage levels which do not refill above 95% overnight.	**Moderate Water Shortage Conditions**	1. When the water supply available to the city is equal to or less than 1.2 MGD. 2. When notification from provider the City of Fort Worth is received to initate Stage 2 of the Plan. 3. The specific capacity of the city's wells is equal to or less than 85% of the well's original specific capacity. 4. The total daily demand equals or exceeds 1.4 MGD for three consecutive days or 1.6 MGD on a single day. 5. Continually falling ground and/or elevated storage levels which do not refill above 85% overnight.	**Severe Water Shortage Conditions**	1. When the water supply available to the city is equal to or less than 1.1 MGD. 2. When notification from provider the City of Fort Worth is received to initate Stage 3 of the Plan. 3. The specific capacity of the city's wells is equal to or less than 75% of the well's original specific capacity. 4. The total daily demand equals or exceeds 1.5 MGD for three consecutive days or 1.7 MGD on a single day. 5. Continually falling ground and/or elevated storage levels which do not refill above 75% overnight.	**Critical Water Shortage Conditions**	1. When the water supply available to the city is equal to or less than 1.0 MGD. 2. When notification from provider the City of Fort Worth is received to initate Stage 4 of the Plan. 3. The specific capacity of the city's wells is equal to or less than 65% of the well's original specific capacity. 4. The total daily demand equals or exceeds 1.6 MGD for three consecutive days or 1.8 MGD on a single day. 5. Continually falling ground and/or elevated storage levels which do not refill above 65% overnight.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of the water supply sources.		
LAKECREST ESTATES-TEXAS H2O, INC.-MANSFIELD	Aug-00	**Customer Awareness**	Annually from April 1 to September 30.	**Voluntary Water Conservation**	1. Overnight recover rate reaches 6 feet. 2. Pumps have pumped for 14 hours per day. 3. Production or distribution limitations.	**Mandatory Water Use Restrictions**	1. Overnight recover rate reaches 4 feet. 2. Pumps have pumped for 18 hours per day. 3. Production or distribution limitations.	**Critical Water Use Restrictions**	1. Overnight recover rate reaches 2 feet. 2. Pumps have pumped for 24 hours per day. 3. Production or distribution limitations. 4. System outage.				
LAKESHORE UTILITY CO. - ATHENS TX	Oct-00	**Customer Awareness**	Annually from April 1 to September 30.	**Voluntary Water Conservation**	1. Well level reaches 90 ft MSL. 2. Pumps have pumped for 5.5 hours per day.	**Mandatory Water Use Restrictions**	1. Well level reaches 105 ft MSL. 2. Pumps have pumped for 7 hours per day.	**Critical Water Use Restrictions**	1. Well level reaches 110 ft MSL. 2. Pumps have pumped for 11 hours per day.				
LAKEWOOD WATER CORP. - GRAND PRAIRIE	Aug-00	**Customer Awareness**	Stage will begin April 1 and end September 30.	**Voluntary Water Conservation**	Supply-Based- Well levels reach 295-ft MSL Demand-Based- Total daily demand reaches 85% of total pumping capacity.	**Mandatory Water Use Restrictions**	Supply-Based- Well levels reach 290-ft MSL Demand-Based- Total daily demand reaches 90% of total pumping capacity.	**Critical Water Use Restrictions**	Supply-Based- Well levels reach 285-ft MSL Demand-Based- Total daily demand reaches 95% of total pumping capacity.				
LANCASTER		***Refer to the Ten Mile Creek Regional Wastewater System in Dallas County**											
LAST RESORT PROPERTIES - LITTLE ELM	Aug-00	**Customer Awareness**	Stage I will begin every April 1 and end September 30.	**Voluntary Water Conservation**	Production or distribution limitations; or pressure drops	**Mandatory Water Use Restrictions**	Production or distribution limitations; or pressure drops	**Critical Water Use Restrictions**	Production or distribution limitations, or pressure drops, or system outages				

Table R-1, Continued

Water User Group	Date	1		2		3		4		5		6	
		Condition	**Trigger Conditions**	**Condition**	**Trigger Conditions**	**Condition**	**Trigger Conditions**	**Condition**	**Trigger Conditions**	**Condition**	**Trigger Conditions**	**Condition**	**Trigger Conditions**
LEONARD	Apr-05	**Mild Water Shortage Conditions**	1. Demand exceeds 90% of amount that can be delivered to customers for seven consecutive days. 2. Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. 3. Supply source becomes contaminated 4. Failure or damage of major water system components. 5. Water demand is approaching limit of permitted supply. **Goal:** 0% reduction in water use.	**Moderate Water Shortage Conditions**	1. Demand exceeds 95% of amount that can be delivered to customers for three consecutive days. 2. Water demand for all or part of the delivery system equals delivery capacity because delivery capacity is inadequate. 3. Supply source becomes contaminated 4. Failure or damage of major water system components. 5. Water demand is approaching limit of permitted supply. **Goal:** 2% reduction in water use.	**Severe Water Shortage Conditions**	1. Demand exceeds 98% of amount that can be delivered to customers for three consecutive days. 2. Water demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate. 3. Supply source becomes contaminated 4. Failure or damage of major water system components. 5. Water demand is approaching limit of permitted supply. **Goal:** 5% reduction in water use.	**Critical Water Shortage Conditions**	1. Demand exceeds amount that can be delivered to customers. 2. Water demand for all or part of the delivery system seriously exceeds delivery capacity because delivery capacity is inadequate. 3. Supply source becomes contaminated 4. Failure or damage of major water system components. 5. Water demand is approaching limit of permitted supply. **Goal:** 10% reduction in water use.				
LEWISVILLE	Aug-02	**Water Watch**	1. As requested by DWU. 2. Total raw water supply in DWU connected lakes for western or eastern reservoirs has dropped below 65% of DWU's share of total conservation storage. 3. Potable water storage depletion indicates an inability to continue to supply water at the demand encountered. 4. Equipment failure or failure to maintain 20 psi at up to 50 service locations or up to 10 fire hydrants. 5. Short-term deficiencies within a gridded pressure zone.	**Water Emergency**	1. As requested by DWU. 2. Total raw water supply in DWU connected lakes for western or eastern reservoirs has dropped below 45% of DWU's share of total conservation storage. 3. Potable water storage depletion indicates an inability to continue to supply water at the demand encountered. 4. Equipment failure or failure to maintain 20 psi at up to 500 service locations or up to 10 fire hydrants. 5. Short-term deficiencies within a gridded pressure zone.	**Water Crisis**	1. As requested by DWU. 2. Total raw water supply in DWU connected lakes for western or eastern reservoirs has dropped below 30% of DWU's share of total conservation storage. 3. Potable water storage depletion indicates an inability to continue to supply water at the demand encountered. 4. Equipment failure or failure to maintain 20 psi at up to 500 service locations or up to 10 fire hydrants. 5. Short-term deficiencies within a gridded pressure zone.						
LINDSAY	Nov-00	**Mild Water Shortage Conditions**	Total daily water demand exceeds 80% for five consecutive days. Goal: 5% reduction in water use.	**Moderate Water Shortage Conditions**	Total daily demand reaches 90% of production capacity per day. Goal: Achieve a 15% reduction in water use.	**Severe Water Shortage Conditions**	When total daily demand exceeds 100% of the daily pumping capacity for three consecutive days. Goal: 20% reduction in water use.						
LINDSAY PURE WATER COMPANY - LINDSAY	Aug-00	**Voluntary Water Use Restrictions**	Stage will begin every April 1 and end September 30	**Mild Water Use Restrictions**	When total daily demand exceeds 90% of the daily pumping capacity for three consecutive days.	**Moderate Water Use Restrictions**	When total daily demand exceeds 95% of the daily pumping capacity for three consecutive days.	**Critical Water Use Restrictions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources.				
LITTLE ELM	Mar-91	**Mild Drought**	1. Average daily water consumption reaches 90% of water treatment plant capacity exists for three consecutive days. 2. Weather conditions are to be considered in determining severity of water unavailability. Predicted long, cold or hot, dry periods need to be considered in impact analysis.	**Moderate Drought**	1. Average daily water consumption reaches 100% of rated production capacity for three consecutive days. 2. Weather conditions indicate mild drought will exist five days or more. 3. One ground storage tank or one clearwell is taken out of service during a period of mild water unavailability. 4. Storage capacity is not being maintained during a period of 100% rated production. 5. Existence of any one listed condition for a duration of 36 hours.	**Severe Conditions**	1. Average daily water consumption reaches 110% of production capacity. 2. Average daily water consumption will not allow storage levels to be maintained. 3. System demand exceeds available high service pump capacity. 4. Any two conditions listed in Moderate condition stage occur at the same time for 24-hour period. 5. Water system is contaminated either accidentally or intentionally. Severe condition is reached immediately upon detection. 6. Water system fails from acts of God or man. Severe condition is reached immediately upon detection.						
LONGHORN WATER COMPANY	Aug-00	**Voluntary Water Use Restrictions**	Stage will begin April 1 and end September 30.	**Mild Water Use Restrictions**	Storage tank does not fill overnight or as usual.	**Moderate Water Use Restrictions**	Service pump runs continuously for more than 3 hours.	**Critical Water Use Restrictions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources.				
LUCAS	Jan-00	**Water Watch**	No triggers indicated	**Water Warning**	No triggers indicated	**Water Emergency**	No triggers indicated						
LUELLA		**Mild Conditions**	1. Water consumption has reached 80% of daily max supply for three days. 2. Water supply is reduced to a level that is only 20% greater than the average consumption for the previous month. 3. There is an extended period (at least 8 weeks) of low rainfall	**Moderate Conditions**	1. Water consumption has reached 90% of the available amount for three consecutive days. 2. The water level in any of the water storage tanks cannot be replenished for three consecutive days	**Severe Conditions**	1. Failure of a major component of the system or a event which reduces the min residual pressure below 20 psi for a period of 24 hours or longer. 2. Water consumption of 95% or more of the max available for three consecutive days. 3. Water storage levels in the system drop during one 24-hour period. 4. Natural or man-made contamination of the water supply source. 5. The declaration of a state of disaster due to drought conditions in a county or counties served by the Corporation. 6. Other unforeseen events which could cause imminent health or safety risks to the public.						

Table R-1, Continued

Water User Group	Date	1		2		3		4		5		6	
		Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions
M & L WSC	Aug-00	**Mild Conditions**	1. Water consumption has reached 80% of daily max supply for three days. 2. Water supply is reduced to a level that is only 20% greater than the average consumption for the previous month. 3. There is an extended period (at least 8 weeks) of low rainfall	**Moderate Conditions**	1. Water consumption has reached 90% of the available amount for three consecutive days. 2. The water level in any of the water storage tanks cannot be replenished for three consecutive days	**Severe Conditions**	1. Failure of a major component of the system or a event which reduces the min residual pressure below 20 psi for a period of 24 hours or longer. 2. Water consumption of 95% or more of the max available for three consecutive days. 3. Water storage levels in the system drop during one 24-hour period. 4. Natural or man-made contamination of the water supply source. 5. The declaration of a state of disaster due to drought conditions in a county or counties served by the Corporation. 6. Other unforeseen events which could cause imminent health or safety risks to the public.						
MABANK	Feb-00	**Mild Drought**	1. Average daily water consumption reaches 85% of production capacity for three days and weather conditions are considered in drought classification.	**Moderate Drought Conditions**	1. Average daily water consumption reaches 90% of rated production capacity for 3 day period. 2. Weather conditions indicate mild drought will exist for five days or more. 3. One ground storage tank or one clear well is taken out of service. 4. Storage capacity is not being maintained during period of 100% rated production. 5. Existence of any preceding conditions for 36 hours.	**Severe Drought Classification**	1. Average daily water consuption reaches 100% of production capacity for 24 hr period. 2. Average daily water soncumption will not enable storage levels to be maintained. 3. System demand exceeds available high service pump capacity. 4. Any two conditions listed in Moderate Classification exist for 24 hrs. 5. System is contaminated. 6. System fails from acts of God or man.						
MACBEE SUD WSC		**Mild Condition**	1. Water consumption has reached 80% of daily max supply for three days. 2. Water supply is reduced to a level that is only 20% greater than the average consumption for the previous month. 3. There is an extended period (at least 8 weeks) of low rainfall and daily use has risen 20% above the use for the same period during the previous year	**Moderate Conditions**	1. Water consumption has reached 90% of the available amount for three consecutive days. 2. The water level in any of the water storage tanks cannot be replenished for three consecutive days	**Severe Conditions**	1. Failure of a major component of the system or a event which reduces the min residual pressure below 20 psi for a period of 24 hours or longer. 2. Water consumption of 95% or more of the max available for three consecutive days or 100% for one day. 3. Water storage levels in the system drop during one 24-hour period. 4. Natural or man-made contamination of the water supply source. 5. The declaration of a state of disaster due to drought conditions in a county or counties served by the Corporation. 6. Other unforeseen events which could cause imminent health or safety risks to the public.						
MALAKOFF	Jul-00	**Mild Water Shortage Conditions**	Pumping rates exceed 400,000 gpd for three days.	**Moderate Water Shortage Conditions**	Pumping rates exceed 420,000 gpd for three days.	**Severe Water Shortage Conditions**	Pumping rates exceed 440,000 gpd for three days.	**Critical Water Shortage Conditions**	Pumping rates exceed 440,000 gpd for three days.	**Emergency Water Shortage Conditions**	Manager, or designee, determines water supply emergency exists based on following: 1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination	**Water Rationing**	Continually falling treated water reservoir levels do not refill above 50% overnight.
MANSFIELD	May-05	**Water Watch**	1. TRWD West Fork reservoirs 50% of capacity within 2 weeks. 2. Total system at 60% of capacity. Goal: Hold demand at current levels.	**Water Warning**	1. Water supply, production, storage, and/or pumping capacity is currently or has been projected to be insufficient to meet water demand. 2. TRWD total system at 50% of capacity. Goal: Reduce current demand by 20% or more.	**Water Emergency**	1. Water supply, production, storage, and/or pumping capacity have failed to meet water demand for two consecutive 24hr periods. 2. If water system emergency threatens health and welfare of customers and consumers of the municipal water system. 3. TRWD total system at 25% of capacity. Goal: Reduce water demand by 50% or more and effectively communicate emergency status.	**Water System Failure**	1. Natural Disasters 2. Water system failures Goal: Reduce water demand by 75% or more and effectively communicate emergency status.				
MATTHEW ROAD WSC	Oct-00	**Customer Awareness**	Stage will begin every April 1 and end September 30	**Voluntary Water Conservation**	Supply-Based - Overnight recovery rate reaches 15-ft. Demand-Based - Production or distribution limitations. Or as requested by Grand Prairie.	**Mandatory Water Use Restrictions**	Supply-Based - Overnight recovery rate reaches 15-ft or Well level reaches 15 ft. Demand-Based - Production or distribution limitations. Or as requested by Grand Prairie.	**Critical Water Use Restrictions**	Supply-Based - Overnight recovery rate reaches 15-ft or Contamination. Demand-Based - Production or distribution limitations. Pump hours per day equals 8 hours. System outage. Or as requested by Grand Prairie.				
McKEE WATER SYSTEM	Jan-01	**Voluntary Water Use Restrictions**	Ongoing or as required by high temperatures (30 days of 95 degrees). Goal: 5% reduction in water use.	**Mild Water Use Restrictions**	Service area experiences 30 days of 100 degree temperatures without rainfall. Goal: 10% reduction in water use.	**Moderate Water Use Restrictions**	Service area experiences 30 days of 100 degree temperatures without rainfall. Goal: 20% reduction in water use.	**Critical Water Use Restrictions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of the water supply sources.				
MCKINNEY	Jan-02	**Mild Drought Conditions**	1. Total daily water demand equals or exceeds 90% of firm pumping capacity for three consecutive days or 95% for a single day. 2. As requested by NTMWD.	**Moderate Drought Conditions**	1. Total daily water demand equals or exceeds 95% of firm pumping capacity for three consecutive days or 100% for a single day. 2. As requested by NTMWD.	**Severe Drought Conditions**	1. Total daily water demand equals or exceeds 100% of firm pumping capacity for three consecutive days. 2. As requested by NTMWD.	**Critical Emergency Conditions**	1. Natural disasters, massive power outages, massive equipment or facility failures. 2. Contamination. 3. As initiated by NTMWD.				
MEADOWCREEK LANE WATER COMPANY-BURLESON	Aug-00	**Customer Awareness**	Stage will begin every April 1 and end September 30.	**Voluntary Water Conservation**	Supply-Based - 100% overnight tank recovery; raise water rates' restrictive billings. Demand-Based - Production or distribution limitations.	**Mandatory Water Use Restrictions**	Supply-Based - 75% overnight tank recovery Demand-Based - Production or distribution limitations.	**Critical Water Use Restrictions**	Supply-Based - 50% overnight tank recovery Demand-Based - System outage				

Table R-1, Continued

Water User Group	Date	1		2		3		4		5		6	
		Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions
MELISSA	Oct-03	**Mild Conditions**	Daily water demand exceeds 80% of the production capacity for five consecutive days. Goal: 10% reduction in water demand.	**Moderate Conditions**	Daily water demand exceeds 90% of the production capacity for five consecutive days. Goal: 20% reduction in water demand.	**Severe Conditions**	1. Daily water demand exceeds 100% of the production capacity for five consecutive days. 2. Imminent or actual failure of a major component of system. Goal: 30% reduction in water demand.						
MEN WSC- CORSICANA	Aug-00	**Mild Water Shortage Conditions**	Stage will begin upon notification from the City of Corsicana.	**Moderate Water Shortage Conditions**	Stage will begin upon notification from the City of Corsicana.	**Severe Water Shortage Conditions**	Stage will begin upon notification from the City of Corsicana.	**Emergency Water Shortage Conditions**	Stage will begin upon notification from the City of Corsicana; or 1. 1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of the water supply sources.				
MESA GRANDE WATER SUPPLY	Aug-00	**Mild Condition**	1. Water consumption has reached 80% of daily max supply for three days. 2. Water supply is reduced to a level that is only 20% greater than the average consumption for the previous month. 3. There is an extended period (at least 8 weeks) of low rainfall and daily use has risen 20% above the use for the same period during the previous year	**Moderate Conditions**	1. Water consumption has reached 90% of the available amount for three consecutive days. 2. The water level in any of the water storage tanks cannot be replenished for three consecutive days	**Severe Conditions**	1. Failure of a major component of the system or a event which reduces the min residual pressure below 20 psi for a period of 24 hours or longer. 2. Water consumption of 95% or more of the max available for three consecutive days. 3. Water storage levels in the system drop during one 24-hour period. 4. Natural or man-made contamination of the water supply source. 5. The declaration of a state of disaster due to drought conditions in a county or counties served by the Corporation. 6. Other unforeseen events which could cause imminent health or safety risks to the public.						
MESQUITE	Nov-99	**Mild Water Shortage Conditions**	Total daily water demand equals or exceeds 37 million gallons for 14 consecutive days or 40 million gallons for seven consecutive days; or continually falling treated water ground reservoir levels do not refill above 60% overnight for seven consecutive days; or continually falling treated water overhead storage levels do not refill above 60% overnight for three consecutive days.	**Moderate Water Shortage Conditions**	Total daily water demand equals or exceeds 40 million gallons for seven consecutive days or 42 million gallons for three consecutive days; or continually falling treated water ground reservoir levels do not refill above 50% overnight for 4 consecutive days; or continually falling treated water overhead storage levels do not refill above 50% overnight for three consecutive days.	**Severe Water Shortage Conditions**	Total daily water demand equals or exceeds 42 million gallons for three consecutive days or 44 million gallons on a single day; or the available water supply to the City of Mesquite is equal to or less than 44 mgd; or continually falling treated water ground reservoir levels do not refill above 40% overnight for three consecutive days; or continually falling treated water overhead storage levels do not refill above 40% overnight for three consecutive days.	**Critical Water Shortage Conditions**	*Not listed in the report(page missing)	**Emergency Water Shortage Conditions**	*Not listed in the report(page missing)		
MIDLOTHIAN	Jul-92	**Mild Conditions**	Joe Pool Lake water elevations are between 506-510 feet MSL, and water demand has reached 75% of the treatment plant's max. daily demand for two consecutive weeks.	**Moderate Conditions**	Joe Pool Lake water elevations are between 496-506 feet MSL; or water demand has reached 90% of the treatment plant's max. daily demand for five consecutive days, and if no more rain occurs, Joe Pool Lake has an 18-month supply in storage.	**Severe Conditions**	Joe Pool Lake water elevations are between 482-496 feet MSL; or water demand has exceeded the treatment plant's max. daily demand on a regular basis and presents imminent danger of a major system failure; or water levels are low enough in the storage reservoirs to hinder fire protection, the imminent or actual failure of a major component of the system has occurred which will cause an immediate health or safety hazard, and due to natural or other disaster, the public water supply is not dependable and may not be suitable for human consumption.						
MIDWAY WATER UTILITIES , INC. PLANO	Aug-00	**Customer Awareness**	Stage will begin April 1 and end September 30.	**Voluntary Water Conservation**	1. Supply-Based : Occurs when MUSTANG WATER SUPPLY CORP.'s drought Stage 2 begins. 2. Demand or Capacity- Based: Total daily demand as % of pumping capacity 65% & if there are production or distribution limitations.	**Mandatory Water Use Restrictions**	1. Supply Based: Occurs when MUSTANG WATER SUPPLY CORP's drought Stage 3 begins . 2. Demand or Capacity Based: Total daily demand as % of pumping capacity is 95%.	**Critical Water Use Restrictions**	1. Suppy Based: Occurs when MUSTANG WATER SUPPLY CORP's drought Stage 4 begins. 2. Demand or Capacity Based: Production or distribution limitations or system outages occur.				
MILLSAP WSC	Aug-00	**Mild Drought Conditions**	1. Notification from wholesaler, City of Mineral Wells, to initate stage 1 of the plan. 2. When the average daily water consumption reaches 90% of production capacity and has existed for a period of three days.	**Moderate Drought Conditions**	1. Notification from wholesaler, City of Mineral Wells, to initate stage 2 of the plan. 2. When the average daily water consumption reaches 100% of production capacity and has existed for a period of three days. 3. Weather conditions indicate a mild drought will exist for five days or more or upon the mechanical failure of pumping equipment, which will require more than 24-hrs to repair.	**Severe Drought Conditions**	1. Notification from wholesaler, City of Mineral Wells, to initate stage 3 of the plan. 2. When the average daily water consumption reaches 110% of production capacity for a 24-hr period; average daily water consumption will not enable storage levels to be maintained; water system is contaminated either accidently or intentionally; any mechanical failure of pumping equipment, which will require more than 12-hrs to repair.						

Table R-1, Continued

Water User Group	Date	1		2		3		4		5		6	
		Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions
MINERAL WELLS	Apr-05	**Mild Water Shortage Conditions**	1. Palo Pinto reservoir elevation at or below 860 feet (50% of storage capacity). 2. Total daily water demand equals or exceeds 90% of the safe operating capacity of the system for three consecutive days or 95% for a single day. Goal: 10% reduction in water use.	**Moderate Water Shortage Conditions**	1. Palo Pinto reservoir elevation at or below 858 feet (40% of storage capacity). 2. Total daily water demand equals or exceeds 100% of the safe operating capacity of the system for three consecutive days. 3. Any mechanical failure of pumping equipment which will require more than 24 hours to repair while a drought is in progress. Goal: Additional 10% reduction in water use.	**Severe Water Shortage Conditions**	1. Palo Pinto reservoir elevation at or below 856 feet (30% of storage capacity). 2. Total daily water demand equals or exceeds 110% of the capacity of the system for 1 day. 3. Any mechanical failure of pumping equipment which will require more than 12 hours to repair while a drought is in progress. 4. Average daily water consumption will not enable storage levels to be maintained. 5. System exceeds available high service pump capacity. Goal: 25% reduction in water use.	**Emergency Water Shortage Conditions**	1. Water system is contaminated. 2. Water system failure from acts of God. 3. Any interruption of water service throught main water supply lines for more than 12 hours.				
MOODY WATER SYSTEM-CENTERVILLE	Aug-00	**Customer Awareness**	Stage will begin April 1 and end September 30.	**Voluntary Water Conservation**	Supply-Based - Stage will be implemented when any pump/well malfunctions which reduce or impair the maximum pumping capacity of any well; or any mainline break which impairs the storage or pumping capacity. Demand-Based - Pump hours reach or exceed 20-21 hrs per day.	**Mandatory Water Use Restrictions**	Supply-Based - Stage will be implemented when any pump/well malfunctions which reduce or impair the maximum pumping capacity of any well; or any mainline break which impairs the storage or pumping capacity. Demand-Based - Pump hours reach or exceed 22-23 hrs per day; or production or distribution limitations.	**Critical Water Use Restrictions**	Supply-Based - Stage will be implemented when or any pump/well malfunctions which reduce or impair the maximum pumping capacity of any well; or any mainline break which impairs the storage or pumping capacity. Demand-Based - Pump hours reach or exceed 23-24 hrs per day, production or distribution limitations, or system outage.				
MOUNTAIN PEAK WSC	Jul-02	**Mild Water Shortage Conditions**	1. Water consumption has reached 80% of daily maximum supply for three consecutive days. 2. Supply has been reduced to 120% of average consumption for previous month. 3. As required by City of Midlothian. 4. As determined by the Board.	**Moderate Water Shortage Conditions**	1. Water consumption has reached 90% of daily maximum supply for three consecutive days. 2. Water level in any of the water storage tanks cannot be replenished for three consecutive days.	**Severe Water Shortage Conditions**	1. Water consumption has reached 100% of daily aximum supply for 24 hrs. 2. Water consumption has reached 95% or more of daily maximum supply for three consecutive days. 3. Water consumption of 100% of the maximum available and the water storage levels drop during 24 hour period.	**Critical Water Shortage Conditions**	1. Declaration of a state of disaster. 2. Failure of a major component of the system or event which reduces the minimum residual pressure in the system below 20 psi for a period of 24 hours or longer.				
MOUNTAIN RIVER WATER - SANTO, PALO PINTO COUNTY	Aug-00	**Customer Awareness**	Will begin every April 1 and last until September 30.	**Voluntary Water Conservation**	Total daily demand reaches 50% of pumping capacity.	**Mandatory Water Use Restrictions**	Total daily demand reaches 60% of pumping capacity.	**Critical Water Use Restrictions**	Total daily demand reaches 70% of pumping capacity.				
MURCHISON	Aug-00	**Mild Water Shortage Conditions**	1. The specific capacity of the water wells is equal to or less than 75% of the well's original specific capacity. 2. Continually falling treated water storage tank levels that do not refill above 75% overnight. Goal: 25% reduction.	**Moderate Conditions**	1. The specific capacity of the water wells is equal to or less than 50% of the well's original specific capacity. 2. Continually falling treated water storage tank levels that do not refill above 50% overnight. Goal: 50% reduction.	**Severe Conditions**	1. The specific capacity of the water wells is equal to or less than 35% of the well's original specific capacity. 2. Continually falling treated water storage tank levels that do not refill above 35% overnight. Goal: 65% reduction.	**Critical Water Shortage Conditions**	1. The specific capacity of the water wells is equal to or less than 25% of the well's original specific capacity. 2. Continually falling treated water storage tank levels that do not refill above 25% overnight. Goal: 75% reduction.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources. Goal: 85% reduction.		
MURPHY	Aug-00	**Mild Water Shortage Conditions**	Stage will begin upon notification from wholesaler NTMWD.	**Moderate Water Shortage Conditions**	Stage will begin upon notification from wholesaler, NTMWD, total daily demand equals or exceeds 90% of the system's safe operating capacity for three consecutive days, or equals or exceeds 95% of the system's capacity on a single day.	**Severe Water Shortage Conditions**	Stage will begin upon notification from wholesaler, NTMWD, total daily demand equals or exceeds 95% of the system's safe operating capacity for three consecutive days, or equals or exceeds 100% of the system's capacity on a single day.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources.				
MUSTANG WSC	Feb-93	**Mild Rationing Conditions**	Peak daily water use is approaching 75% of potential daily production rate (existing volume 588,600 gpd) for three consecutive days. Consideration will be given to time of year and weather conditions.	**Limited Water Use Conditions**	The potential daily production rate is reduced due to failure in the water plant's mechanical capabilities, therefore refilling the water storage facilities is rendered impossible. The restriction will be inforced if repairs can not be made within 48 hrs.	**Moderate Rationing Conditions**	Peak Daily Water use is approaching 90% of potential daily production rate (existing volume 706,320 gpd), for three consecutive days.	**Severe Rationing Conditions**	The imminent or actual failure of a major component of the system which would cause an immediate health of safety hazard. Water demand is exceeding the capacity of the plant- 784,800 gpd for three consecutive days.				
MYRA WATER SYSTEM	Aug-00	**Customer Awareness**	Stage will begin every April 1 and end September 30	**Voluntary Water Conservation**	Supply-Based - Overnight recovery rate reaches 14-ft and no rainfall for 30 consecutive days. Demand-Based - Pumps hours per day equal 18 hours.	**Mandatory Water Use Restrictions**	Supply-Based - Overnight recovery rate reaches 18-ft and no rainfall for 4five consecutive days. Demand-Based - Pumps hours per day equal 20 hours.	**Critical Water Use Restrictions**	Supply-Based - Overnight recovery rate reaches 20-ft Demand-Based - Pumps hours per day equal 24 hours, or if either of the pumps goes out.				
N. WHISPERING MEADOWS WATER - JOSHUA	Aug-00	**Customer Awareness**	Stage will begin April 1 and end September 30.	**Moderate Water Shortage Conditions**	Stage will begin when overnight recovery rate reaches 8-ft, or due to production or distribution limitations.	**Mandatory Water Use Restrictions**	Stage will begin when overnight recovery rate reaches 4-ft, or due to production or distribution limitations.	**Critical Water Use Restrictions**	Stage will begin when supply is contaminated or there is a system outage.				
NEWARK	Aug-00	**Mild Water Shortage Conditions**	Ongoing	**Moderate Water Shortage Conditions**	Maximum demand per meter exceeds 350 gpd for seven consecutive days or as required by system leakage or malfunction.	**Severe Water Shortage Conditions**	Maximum demand per meter exceeds 450 gpd for 6 consecutive days or as required by system leakage or malfunction, or when ground storage tanks remain ony 50% full for 6 consecutive days.	**Critical Water Shortage Conditions**	Maximum demand per meter exceeds 500 gpd for five consecutive days or as required by system leakage or malfunction, or when ground storage tanks remain ony 40% full for five consecutive days.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or when pump or system failures occur. 2. Water supply to city is exceeded by the system usage demand for two consecutive days. 3. Storage tanks remain 35% full for two consecutive days. 4. Contamination of water supply source.	**Water Allocation**	1. Maximum daily demand per meter exceeds 600 gpd for two consecutive days. 2. Water supply to city is exceeded by the system usage demand for two consecutive days. 3. Storage tanks remain 30% full for two consecutive days. 4. As required for repairs.
NORTH COLLIN WATER SUPPLY	Aug-00	**Mild Water Shortage Conditions**	When NTWMD Plan Mild trigger is achieved.	**Moderate Water Shortage Conditions**	When NTWMD Plan Moderate trigger is achieved.	**Severe Water Shortage Conditions**	When the NTWMD Plan Severe trigger is achieved.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources.				
NORTH FARMERSVILLE WSC	Feb-00	**Mild Water Shortage Conditions**	Notification by the City of Farmersville to implement stage 1.	**Moderate Water Shortage Conditions**	Notification by the City of Farmersville to implement stage 2.	**Severe Water Shortage Conditions**	Notification by the City of Farmersville to implement stage 3.	**Critical Water Shortage Conditions**	Notification by the City of Farmersville to implement stage 4.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources.		

Table R-1, Continued

Water User Group	Date	1		2		3		4		5		6	
		Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions
NORTH HUNT WSC	Nov-02	**Mild Water Shortage Conditions**	1. Average daily water consumption reaches 90% of production capacity for three consecutive days. 2. Weather conditions suggest a period of drought is occuring.	**Moderate Drought Conditions**	1. Average daily water donsumption reaches 100% of production capacity for three consecutive days, and weather conditions indicate mild drought will exist five days or more. 2. One ground storage tank or one clear well is taken out of service during mild drought period for 36 hours. 3. Storage capacity is not maintained during period of 100% rated production for 24 hours or more.	**Severe Drought Conditions**	1. Average daily water consumption reaches 100% of production capacity for three consecutive days. 2. Average daily water consumption will not enable storage levels to be maintained for 48 hours. 3. System demand exceeds available high-service pump capacity for 24 hours. 4. Any two conditions listed in moderate drought classification occur at the same time for a 24 hr period. 5. Water system is contaminated. 6. Water system fails from acts of God or man.						
NORTH RICHLAND HILLS	Aug-99	**Water Watch**	Daily water demand exceeds 90% of production capacity of the system for three consecutive days or short term deficiencies in the distribution system limit supply capability.	**Water Warning**	Daily water demand exceeds 95% of the production capacity of the system for two consecutive days.	**Water Emergency**	Daily water demand exceeds 95% of the production capacity of the system for five consecutive days.	**Water Crisis**	Daily water demand exceeds 100% of the production capacity of the system for two consecutive days.				
NORTHERN HILL DEVELOPMENT COMPANY, INC.-DENISON	Jul-00	**Customer Awareness**	Upon notice from the utility's wholesale supplier to begin stage 1; or when distribution limitations of its supplier reaches 70% of its capacity.	**Voluntary Water Conservation**	Upon notice from the utility's wholesale supplier to begin stage 2; or when distribution limitations of its supplier reaches 80% of its capacity.	**Mandatory Water Use Restrictions**	Upon notice from the utility's wholesale supplier to begin stage 3; or when distribution limitations of its supplier reaches 90% of its capacity.	**Critical Water Use Restrictions**	Upon notice from the utility's wholesale supplier to begin stage 4; or when distribution limitations of its supplier reaches 95% of its capacity.				
WATER ASSOCIATION OF NORTHLAKE	Dec-98	**Customer Awareness**	Every April 1st, the utility will mail a public announcement to its customers.	**Voluntary Water Conservation**	The total daily demand exceeds 70% of pumping capacity.	**Mandatory Water Use Restrictions**	Total daily demand exceeds 80% of pumping capacity.	**Critical Water Use Restrictions**	Total daily demand exceeds 90% of pumping capacity.				
NORTHTOWN ACRES WATER SUPPLY-DAWSON	Aug-00	**Customer Awareness**	Stage will begin every April 1 and end September 30.	**Voluntary Water Conservation**	Supply-Based - Wholesale will notify to implement stage 2 of drought contingency plan(City of Corsicana). Demand-Based - Production or distribution limitations.	**Mandatory Water Use Restrictions**	Supply-Based - Wholesale will notify to implement stage 3 of drought contingency plan(City of Corsicana). Demand-Based - Production or distribution limitations.	**Critical Water Use Restrictions**	Supply-Based - Wholesale will notify to implement stage 4 of drought contingency plan(City of Corsicana). Demand-Based - Production or distribution limitations.				
NORTHWEST GRAYSON COUNTY WCID NO. 1	Sep-05	**Mild Water Shortage Conditions**	Demand exceeds 90% of amount that can be delivered to customers for seven consecutive days. Goal: achieve voluntary reduction in water use	**Moderate Water Shortage Conditions**	Demand exceeds 95% of amount that can be delivered to customers for three consecutive days. Goal: 2% reduction in water use	**Severe Water Shortage Conditions**	Demand exceeds 98% of amount that can be delivered to customers for three consecutive days. Goal: 5% reduction in water use	**Emergency Water Shortage Conditions**	1. Demand exceeds amount that can be delievered to customers. 2. Supply becomes contaminated. 3. System unable to deliver water due to failure or damage of major water system components Goal: 10% reduction in water use				
NTMWD	Aug-99	**Mild Drought**	WSE of Lake Lavon lies between 480-475 feet MSL; or the water demand equals or exceeds 95% of the plant capacity for 30 consecutive days; or if any reservoir in the District is not able to recover 90% of the normal operating elevation within 45 consecutive days.	**Moderate Drought**	WSE of Lake Lavon lies between 475-470 feet MSL; or the water demand equals or exceeds 97% of the plant capacity for 30 consecutive days; or if any reservoir in the District is not able to recover 80% of the normal operating elevation within 45 consecutive days.	**Severe Drought**	WSE of Lake Lavon lies between 470-453 feet MSL; or the water demand equals or exceeds 99% of the plant capacity for 30 consecutive days; or if any reservoir in the District is not able to recover 60% of the normal operating elevation within 45 consecutive days.						
OAK BEND HOMEOWNERS WATER SUPPLY	Sep-00	**Voluntary Water Use Restrictions**	Stage will begin April 1 and end September 30.	**Mild Water Use Restrictions**	Usage is greater than water level in storage.	**Moderate Water Use Restrictions**	Usage is greater than water level in storage.	**Critical Water Use Restrictions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources.				
OAK GROVE TEXAS WSC-OAKGROVE	Jun-00	**Mild Water Shortage Conditions**	When provider City of Kaufman requests initiation of Stage 1; or when the total daily demand equals or exceeds 85% of the supply capacity per day for three consecutive days or 95% on a single day.	**Moderate Water Shortage Conditions**	When provider City of Kaufman requests initiation of Stage 2; or when the total daily demand equals or exceeds 90% of the supply capacity per day for three consecutive days or 100% on a single day.	**Severe Water Shortage Conditions**	When provider City of Kaufman requests initiation of Stage 3; or when the total daily demand equals or exceeds 100% of the supply capacity per day for three consecutive days.	**Critical Emergency Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of the water supply sources. 3. Massive power outages, massive equipment failures, public water supply contamination. 4. Notification from the provider, City of Kaufman, to initiate stage 4 of the Plan.				
OAK RIDGE - SOUTH GALE WSC	Sep-05	**Mild Water Shortage Conditions**	Demand exceeds 90% of amount that can be delivered to customers for seven consecutive days. Goal: achieve voluntary reduction in water use	**Moderate Water Shortage Conditions**	Demand exceeds 95% of amount that can be delivered to customers for three consecutive days. Goal: 2% reduction in water use	**Severe Water Shortage Conditions**	Demand exceeds 98% of amount that can be delivered to customers for three consecutive days. Goal: 5% reduction in water use	**Emergency Water Shortage Conditions**	1. Demand exceeds amount that can be delievered to customers. 2. Supply becomes contaminated. 3. System unable to deliver water due to failure or damage of major water system components Goal: 10% reduction in water use				
OAKWOOD POA-ATHENS	Jul-00	**Customer Awareness**	Will begin every April 1 and last until September 30.	**Voluntary Water Conservation**	Total daily demand reaches 60% of total pumping capacity.	**Mandatory Water Use Restrictions**	Total daily demand reaches 70% of total pumping capacity.	**Critical Water Use Restrictions**	Total daily demand reaches 90% of total pumping capacity.				
OVILLA	Nov-91	**Mild Condition**	1. Water consumption has reached 80% of daily maximum supply for three consecutive days. 2. Supply has been reduced to 120% of average consumption for previous week. 3. There is an extended period of at least 8 weeks of low rainfall and water use has risen 20% above the use for the same period during the previous year.	**Moderate Condition**	1. Water consumption has reached 90% of daily maximum supply for three consecutive days. 2. The highest level measured each day in the water storage standpipe drops by 2 feet or more for three consecutive days.	**Severe Condition**	1. Failure of a major component of the system or an event which reduces the minimum residual pressure below 20 psi for a period of 2 days or longer. 2. Water consumption has reached 95% of daily maximum supply for three consecutive days. 3. Water consumption of 100% or more of the maximum available and the water level in the water storage standpipe drops in one 24 hour period. 4. Other unforeseen events which could cause imminent health or safety risks to the public.						

Table R-1, Continued

Water User Group	Date	1		2		3		4		5		6	
		Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions
P & M SERVICE COMPANY - LITTLE ELM	Aug-00	**Customer Awareness**	Stage I will begin every April 1 and end September 30.	**Voluntary Water Conservation**	Daily usage exceeds 20,000 gpd.	**Mandatory Water Use Restrictions**	Daily usage exceeds 21,000 gpd.	**Critical Water Use Restrictions**	Daily usage exceeds 23,000 gpd.				
PALO DURO SERVICE COMPANY- FORT WORTH	Aug-00	**Customer Awareness**	Stage will begin April 1 and end September 30.	**Voluntary Water Conservation**	1. When overnight recovery rate reaches less than -6-ft. 2. Total daily demand reaches 35% of storage capacity.	**Mandatory Water Use Restrictions**	1. When overnight recovery rate reaches less than -8-ft of head in storage. 2. Total daily demand reaches 40% of storage capacity.	**Critical Water Use Restrictions**	1. When overnight recovery rate reaches less than -10-ft of head in storage. 2. Total daily demand reaches 45% of storage capacity.				
PARKER	Jul-98	**Water Watch**	Annually from May 1 to September 30.	**Water Warning**	Inability to recover 90% in one or more storage facilities within a 24 hr period.	**Water Emergency**	Inability to recover 90% in one or more storage facilities within a 48 hr period.						
PARKERVILLE EAST WATER SYSTEM - LANCASTER	Jul-00	**Customer Awareness**	Stage will begin April 1 and end September 30.	**Voluntary Water Conservation**	Supply-Based- Stage will be initiated when overnight recovery rate reaches 5-ft.	**Mandatory Water Use Restrictions**	Supply-Based- Stage will be initiated when overnight recovery rate reaches 5-ft.	**Critical Water Use Restrictions**	Supply-Based- Stage will be initiated when overnight recovery rate reaches 6-ft.				
PELICAN BAY	Aug-98	**Mild Conditions**	1. Average daily water consumption reaches 90% of rated production capacity for a three day period. 2. Weather conditions are to be considered in determining severity of water unavailability. Predicted long, cold or hot, dry periods need to b considered.	**Moderate Conditions**	1. Average daily water consumption reaches 100% of rated production capacity for a 3 day period. 2. A ground storage tank at one of the pump stations is taken out of service during a period of mild water unavailability. 3. Storage capacity is not being maintained during period of 100% rated production. 4. Existence of any one listed condition for a duration of 36 hours.	**Severe Conditions**	1. Average daily water consumption will not allow the storage levels in the ground storage tanks or elevated tanks to be maintained. 2. System demand exceeds the high service pumping capacity. 3. Water system is contaminated. 4. Water system fails from acts of God or man. 5. One pump station is taken out of service during a period of heavy demand.						
PERRIN WATER SYSTEMS, INC.	Mar-02	**Customer Awareness**	Stage will begin April 1 and end September 30.	**Voluntary Water Conservation**	Production limitations.	**Mandatory Water use Restrictions**	Production limitations.	**Critical Water Use Restrictions**	Production limitations.				
PILOT POINT RURAL WSC	Aug-00	**Customer Awareness**	Stage I will begin every April 1 and end September 30.	**Voluntary Water Conservation**	Well production exceeds 189,000 gallons per week and pumps pump for 18 hours a day.	**Mandatory Water Use Restrictions**	Well production exceeds 210,000 gallons per week and pumps pump for 20 hours a day.	**Critical Water Use Restrictions**	Well production exceeds 231,000 gallons per week and pumps pump for 22 hours a day.				
Pink Hill Water Supply Corp. -BELLS	Apr-00	**Mild Water Shortage Conditions**	City of Sherman will notify Pink Hill Water Supply requesting initiation of Stage 1.	**Moderate Water Shortage Conditions**	City of Sherman will notify Pink Hill Water Supply requesting initiation of Stage 2; or the specific capacity of the PHWS well is less than or equal to 90% of its original capacity; or total daily demand equals or exceeds the PHWS safe operating capacity.	**Severe Water Shortage Conditions**	City of Sherman will notify Pink Hill Water Supply requesting initiation of Stage 3; or the specific capacity of the PHWS well is less than or equal to 90% of its original capacity; or total daily demand equals or exceeds the PHWS safe operating capacity; or continually falling treated water reservoir levels do not refill above 90% overnight.	**Critical Water Shortage Conditions**	City of Sherman will notify Pink Hill Water Supply requesting initiation of Stage 4; or the specific capacity of the PHWS well is less than or equal to 90% of its original capacity; or total daily demand equals or exceeds the PHWS safe operating capacity; or continually falling treated water reservoir levels do not refill above 80% overnight.				
PINNACLE CLUB UTILITY - MABANK	Sep-00	**Customer Awareness**	Annually from May 1 to September 30.	**Voluntary Water Conservation**	As initiated by wholesaler.	**Mandatory Water Use Restrictions**	As initiated by wholesaler.	**Critical Water Use Restrictions**	1. As initiated by wholesaler. 2. Contamination. 3. System failure. 4. Production or distribution limitations.				
PIONEER VALLEY WATER COMPANY- COOKE CO.	Apr-05	**Customer Awareness**	Stage will begin April 1 and end September 30.	**Voluntary Water Conservation**	Total daily demand reaches 80% pumping or storage capacity. Goal: 10% reduction in total water use	**Mandatory Water Use Restrictions**	Total daily demand reaches 90% pumping or storage capacity. Goal: 10% reduction in total water use	**Critical Water Use Restrictions**	Total daily demand reaches 100% pumping or storage capacity. Goal: 10% reduction in total water use				
PLANO	Oct-99	**Water Warning**	Inability to recover 90% in all storage facilities within a 24-hour period.	**Stage 2 & 3 are missing from the report**	1. General or Geographic emergency 2. Water system failures/emergencies 3. Supply failure from NTMWD 4. An inability to recover 90% in all storage facilities within a 24-hour period. 5. An inability to recover 90% in all storage facilities within 48-hour period.								
POINT ROYAL WATER SYSTEM- CHANDLER	Aug-00	**Customer Awareness**	Will begin every April 1 and last until September 30.	**Voluntary Water Conservation**	Supply-Based Triggers: Well level reaches 194-ft MSL	**Mandatory Water Use Restrictions**	Supply-Based Triggers: Well level reaches 169-ft MSL	**Critical Water Use Restrictions**	Supply-Based Triggers: Well level reaches 144-ft MSL				
PRESTON CLUB-SHERMAN	Aug-00	**Customer Awareness**	Stage will begin April 1 and end September 30.	**Voluntary Water Conservation**	Supply-Based: Over night recovery rate reaches 30%. Demand-Based: Pump hours per day are at 80%.	**Mandatory Water Use Restrictions**	Supply-Based: Over night recovery rate reaches 50%. Demand-Based: Pump hours per day are at 90%.	**Critical Water Use Restrictions**	Supply-Based: Over night recovery rate reaches 70%. Demand-Based: Pump hours per day are at 95%.				
PRINCETON	Feb-03	**Mild Condition**	Average daily water consumption reaches 90% of the system's firm pumping capacity; or average daily water consumption reaches 90% of the production capacity and/or the contractual amount of the water provider. Goal: Voluntary reduction in total water use.	**Moderate Conditions**	Average daily water consumption reaches 100% of the system's firm pumping capacity for a period of three days; or average daily water consumption reaches 100% of the production capacity and/or the contractual amount of the water provider; or water levels in ground and/or elevated storage tanks are not being maintained(greater than 50% of full volume) during periods when the water plant is operating @ 100% of its production capacity. Goal: 30% reduction in non-essential outdoor water use.	**Severe Conditions**	Average daily water consumption reaches 100% of the system's total pumping capacity for a period of three days; or average daily water consumption exceeds 100% of the production capacity and/or the contractual amount of the water provider; or water levels in ground and/or elevated storage tanks are less than 25% of full volume; or water system fails due to acts of God or man. Goal: 90% reduction in non-essential outdoor water use and 30% reduction in total water use.						
PROSPER	May-96	**Mild Condition**	System water production exceeds 400,000 gpd for two consecutive days or 360,000 gpd for seven consecutive days.	**Moderate Condition**	System water production exceeds 460,000 gpd for two consecutive days or 400,000 gpd for seven consecutive days.	**Severe Condition**	System water production exceeds 520,000 gpd for two consecutive days or 440,000 gpd for seven consecutive days.	**Emergency Condition**	Major power outage. Malfunction of major system component.				
RED RIVER AUTHORITY	Apr-05	**Mild Water Shortage Conditions**	2.5 times the system's average daily pumpage over a continuous 14-day period.	**Moderate Water Shortage Conditions**	3.5 times the system's average daily pumpage over a continuous 7-day period.	**Severe Water Shortage Conditions**	5 times the system's average daily pumpage over a continuous 3-day period.						

Table R-1, Continued

Water User Group	Date	1		2		3		4		5		6	
		Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions
RENO	Aug-00	**Mild Water Shortage Conditions**	Wells are producing at 100% capability and storage tank levels are below 20 feet. Goal: Achieve a voluntary 4 foot increase in water available in storage.	**Moderate Water Shortage Conditions**	Wells are producing at 100% capability and storage tank levels are below 16 feet. Goal: Achieve a voluntary 8 foot increase in water available in storage.	**Severe Water Shortage Conditions**	Wells are producing at 100% capability and storage tank levels are below 10 feet. Goal: Achieve a voluntary 14 foot increase in water available in storage.		1.Wells are producing at 100% capability and storage tank levels are below 8 feet. 2. Major line breaks, or pump or system failure. 3. Contamination. Goal: Achieve a voluntary 16 foot increase in water available in storage.				
RHOME		**Mild Drought Conditions**	Annually from May 1 to September 30 . Goal: Raise awareness and achieve voluntary reductions in non-essential water use.	**Moderate Drought Conditions**	1. If rainfall for given year is 15% below normal. 2. Water storage facilities are unable to maintain a 75% capacity level. Goal: Maintain satisfactory water level in storage facilities and minimize effects on customers.	**Severe to Critical Drought Conditions**	Water supplies storage facilities are unable to maintain a 50% capacity level. Goal: Keep customers aware of drought conditions and to maintain an uninterrupted water supply for essential uses.	**Emergency Conditions**	1. Water supply storage facilities fall below 10% capacity level. 2. Water outage.				
RICHARDSON	Sep-99	**Water Watch**	By April 30 of each year the Director of Public Services shall forecast water supply and potential water demands for May 1 through September 30 of that year. The forecast will be based on supply information from NTMWD and from City pumping reports.	**Water Warning**	The City's inability to recover water storage approximately 90% in all storage facilities within a 24-hour period.	**Water Emergency**	The City's inability to recover water storage approximately 90% in all storage facilities within a 48-hour period.	**Water Crisis**	1. Natural Disasters 2. Water system failures 3. Supply failure from the NTMWD or initiation of any stage in the NTMWD Drought Contingency Plan.				
RICHLAND	Aug-00	**Mild Water Shortage Conditions**	Stage will begin upon notification from the City of Corsicana.	**Moderate Water Shortage Conditions**	Stage will begin upon notification from the City of Corsicana.	**Severe Water Shortage Conditions**	Stage will begin upon notification from the City of Corsicana.	**Critical Water Shortage Conditions**	Stage will begin upon notification from the City of Corsicana.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of the water supply sources.		
RIVER OAKS	Jul-00	**Water Awareness**	1. Water storage in TRWD West Fork reservoirs is projected to decline to less than 295,670 acre-feet(50% of capacity) within 2 weeks. 2. Water storage in the TRWD reservoirs has declined to 1,426,752 acre-feet(60% of capacity) 3. Demand for River Oaks or TRWD exceeds 90% of deliverable capacity for three consecutive days. 4. Water demand approaches a reduced delivery capacity for all or part of the system due to supply or production limitations including contamination of the system.	**Water Watch**	1. TRWD demands exceed East Texas delivery system capacity for a 24-hour period. 2. Water storage in TRWD reservoirs has declined to 50% of capacity. 3. Demand exceeds 95% of deliverable capacity for two consecutive days. 4. Water demand equals a reduced delivery capacity for all or part of the system due to supply or production capacity limitations including contamination of the system.	**Water Warning**	1. Water storage in TRWD reservoirs has declined to 25% of capacity. 2. Demand exceeds 95% of deliverable capacity for five consecutive days. 3. Water demand exceeds a reduced delivery capacity for all or part of the system due to supply or production capacity limitations including contamination of the system.	**Water Emergency**	1. Water storage in TRWD reservoirs has declined to 20% of capacity. 2. Demand exceeds 100% of deliverable capacity for two consecutive days. 3. Water demand seriously exceeds a reduced delivery capacity for all or part of the system due to supply or production capacity limitations including contamination of the system.				
ROANOKE		**Water Awareness**	1. Demand exceeds 85% of deliverable capacity for three consecutive days. 2. Water demand approaches a reduced delivery capacity due to dupply or production capacity limitations (including contamination). 3. As initiated by city of Fort Worth.	**Water Watch**	1. Demand exceeds 90% of deliverable capacity for three consecutive days. 2. Water demand equals a reduced delivery capacity due to dupply or production capacity limitations (including contamination). 3. As initiated by city of Fort Worth.	**Water Warning**	1. Demand exceeds 95% of deliverable capacity for three consecutive days. 2. Water demand exceeds a reduced delivery capacity due to dupply or production capacity limitations (including contamination). 3. As initiated by city of Fort Worth.	**Water Emergency**	1. Demand exceeds 100% of deliverable capacity for two consecutive days. 2. Water demand seriously exceeds a reduced delivery capacity due to dupply or production capacity limitations (including contamination). 3. As initiated by city of Fort Worth.				
ROCKETT WSC	Apr-90	**Mild Drought**	1. Average daily water use is approaching 4.7 mgd (90% of firm plant capacity) for three consecutive days. 2. Consideration will be given to weather conditions, time of year, and customer complaints of low water pressures.	**Moderate Drought**	1. Average daily water use reaches firm plant capacity of 4.8 mgd for three consecutive days. 2. Net storage in water storage is continually decreasing on a daily basis and falls below 2.0 million gallons (60% capacity) for 48 hours. 3. Water pressures approaching 35 psi in the distribution system as measured by the pressure gauges in the system.	**Severe Drought**	1. The imminent or actual failure of a major component of the system which would cause an immediate health or safety hazard. 2. Water demands is exceeding the capacity of 5.2 mgd for three consecutive days. 3. All available water supply, such as the water wells, level is so low that the pumps cannot pump the daily water demand. 4. All water is being pumped from System's storage reservoirs and all replenishment of water reservoirs has stopped.						
ROCKWALL	Dec-99	**Mild Water Shortage Conditions**	City's wholesaler, NTMWD notifies requesting initiation of STAGE 1; or the total daily water demand equals or exceeds 15.2 mgd for three consecutive days or 16.1 mgd on a single day.	**Moderate Water Shortage Conditions**	City's wholesaler, NTMWD notifies requesting initiation of STAGE 2; or the total daily water demand equals or exceeds 16.1 mgd for three consecutive days or 16.9 mgd on a single day.	**Severe Water Shortage Conditions**	City's wholesaler, NTMWD notifies requesting initiation of STAGE 3; or the total daily water demand equals or exceeds 16.9 mgd for three consecutive days.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources. 3. Natural disaster, massive power outage; or 4. City's wholesaler, NTMWD notifies requesting initiation of STAGE 4.				
ROLLINS HILL ESTATES WATER CORPORATION	Jul-00	**Customer Awareness**	Stage will begin April 1 and end September 30.	**Voluntary Water Conservation**	Supply-Based Triggers- Water level reaches 286.50 MSL stabilized hydrographic during pumping cycle. Demand-Based Trigger- Total demand as % of storage capacity reaches 155%.	**Mandatory Water Use Restrictions**	Supply-Based Triggers- Water level reaches 285.50 MSL stabilized hydrographic during pumping cycle. Demand-Based Trigger- Total demand as % of storage capacity reaches 180%.	**Critical Water Use Restrictions**	Supply-Based Triggers- Water level reaches 284.50 MSL stabilized hydrographic during pumping cycle; or supply contamination; or there is an equipment failure. Demand-Based Trigger- Total demand as % of storage capacity reaches 200%.				
ROSE HILL WSC	Mar-87	**Mild Drought**	1. Average daily water use reaches 0.236 MGD (90% of firm plant capacity) for three consecutive days. 2. Consideration will be given to weather conditions, time of year, and customer complaints of low pressures.	**Moderate Drought**	1. Average daily water use reaches 0.262 MGD for three consecutive days. 2. Net storage in water storage is continually decreasing on a daily basis and falls below 180,000 gallons (60% capacity) for 48 hours. 3. Water pressures approaching 35 psi in the distribution system.	**Severe Drought**	1. The imminent or actual failure of a major component of the system which would cause an immediate health or safety hazard. 2. Water demand is exceeding the firm system capacity of 0.262 mgd for three consecutive days. 3. Notification by the City of Terrel or NTMWD that supply is being reduced. 4. All water is being pumped from system's storage reservoirs and all replenishment of water reservoirs has ceased.						

Table R-1, Continued

Water User Group	Date	1		2		3		4		5		6	
		Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions
ROWLETT	Feb-00	**Mild Water Shortage Conditions**	1. NTMWD notifies the Director of Utilities of delivery or source shortages and requests initiation of STAGE 1. 2. Total daily water demand equals 80% of the safe operating capacity. 3. Continually falling treated water reservoir levels do not fill above 80% overnight.	**Moderate Water Shortage Conditions**	1. NTMWD notifies the Director of Utilities of delivery or source shortages and requests initiation of STAGE 2. 2. Total daily water demand equals 90% of the safe operating capacity. 3. Continually falling treated water reservoir levels do not fill above 65% overnight.	**Severe Water Shortage Conditions**	1. NTMWD notifies the Director of Utilities of delivery or source shortages and requests initiation of STAGE 3. 2. Total daily water demand equals the safe operating capacity. 3. Continually falling treated water reservoir levels do not fill above 50% overnight.	**Critical Water Shortage Conditions**	1. NTMWD notifies the Director of Utilities of delivery or source shortages and requests initiation of STAGE 4. 2. Total daily water demand exceeds the safe operating capacity. 3. Continually falling treated water reservoir levels do not fill above 20% overnight.	**Emergency Water Shortage Condition**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources.		
RUNAWAY BAY	Feb-88	**Mild Drought**	1. Average daily water use is approaching 648,000 gallons per day, present plant rated as 288,000 gallons per day, an additional 432,000 gallons to be added (90% of plant capacity) for three consecutive days. 2. Consideration will be given to weather conditions, time of year.	**Moderate Drought**	1. Average daily water use is approaching 648,000 gallons per day, present plant rated as 288,000 gallons per day, an additional 432,000 gallons to be added (90% of plant capacity) for three consecutive days. 2. When the level of Lake Bridgeport reaches 820.0 MSL.	**Severe Drought**	1. The imminent or actual failure of a major component of the system which would cause an immediate health or safety hazard. 2. Water demand is exceeding the capacity of the plant -720,000 for three consecutive days or when the level of the lake is down to 810 MSL.						
RURAL BARDWELL WSC	Aug-00	**Mild Water Shortage Conditions**	Reservoirs levels do not refill above 90% overnight.	**Moderate Water Shortage Conditions**	Reservoirs levels do not refill above 85% overnight.	**Severe Water Shortage Conditions**	Reservoirs levels do not refill above 80% overnight.	**Critical Water Shortage Conditions**	Reservoirs levels do not refill above 75% overnight.	**Emergency Water Shortage Conditions- Stage 6: Water Allocation**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of the water supply sources. - Reservoirs levels do not refill above 70% overnight.		
SA WATER, INC.-WEATHERFORD	Jul-00	**Customer Awareness**	Will begin every April 1 and last until September 30.	**Voluntary Water Conservation**	Supply-Based- Water consumption has reached 80% of daily max supply for three consecutive days. Demand-Based- There is an extended period(at least 8 weeks) of low rainfall and daily use has risen 20% above the use for the same period during the previous year.	**Mandatory Water Use Restrictions**	Supply-Based- Water consumption has reached 90% of daily max supply for three consecutive days. Demand-Based- The water level in any of the water storage tanks cannot be replenished for three consecutive days.	**Critical Water Use Restrictions**	Supply-Based- Water consumption has reached 95% of daily max supply for three consecutive days. Demand-Based- Water consumption of 100% of the max available and the water storage levels in the system drop during a 24-hour period.				
SADDLE CLUB WATER COMPANY, INC.-WEATHERFORD	Jul-00	**Customer Awareness**	Will begin every April 1 and last until September 30.	**Voluntary Water Conservation**	Supply-Based- Water consumption has reached 80% of daily max supply for three consecutive days. Demand-Based- There is an extended period(at least 8 weeks) of low rainfall and daily use has risen 20% above the use for the same period during the previous year.	**Mandatory Water Use Restrictions**	Supply-Based- Water consumption has reached 90% of daily max supply for three consecutive days. Demand-Based- The water level in any of the water storage tanks cannot be replenished for three consecutive days.	**Critical Water Use Restrictions**	Supply-Based- Water consumption has reached 95% of daily max supply for three consecutive days. Demand-Based- Water consumption of 100% of the max available and the water storage levels in the system drop during a 24-hour period.				
SADLER	Jun-05	**Mild Conditions**	Demand exceeds 90% of amount that can be delivered to customers for seven consecutive days	**Moderate Conditions**	Demand exceeds 95% of amount that can be delivered to customers for three consecutive days. Goal: 2% reduction in water use	**Severe Conditions**	Demand exceeds 98% of amount that can be delivered to customers for three consecutive days. Goal: 5% reduction in water use	**Emergency Water Shortage Conditions**	1. Demand exceeds amount that can be delivered to customers. 2. Supply source becomes contaminated. 3. System unable to deliver water due to failure or damage of major water system components. Goal: 10% reduction in water use				
SANGER	Mar-96	**Mild Drought**	1. Peak daily water use is approaching 880,000 gpd, or 80% of the water supply rated as 1,100,000 gpd, for three consecutive days. 2. Consideration will be given to weather conditions, time of year.	**Moderate Drought**	1. Peak daily water use is approaching 990,000 gpd, or 90% of the water supply rated as 1,100,000 gpd, for three consecutive days.	**Severe Drought**	1. The imminent or actual failure of a major component of the system which would cause an immediate health or safety hazard. 2. Water demands is exceeding the capacity of the system - 1,100,00 gallons per day for three consecutive days.						
SAVOY	May-05	**Mild Water Shortage Conditions**	Demand exceeds 90% of amount that can be delivered to customers for seven consecutive days	**Moderate Water Shortage Conditions**	Demand exceeds 95% of amount that can be delivered to customers for three consecutive days. Goal: 2% reduction in water use	**Severe Water Shortage Conditions**	Demand exceeds 98% of amount that can be delivered to customers for three consecutive days. Goal: 5% reduction in water use	**Emergency Water Shortage Conditions**	1. Demand exceeds amount that can be delivered to customers. 2. Supply source becomes contaminated. 3. System unable to deliver water due to failure or damage of major water system components. Goal: 10% reduction in water use				
SEAGOVILLE		**Mild**	As initiated by DWU.	**Moderate**	As initiated by DWU.	**Severe**	As initiated by DWU.						
S-ESTATES WSC	Aug-00	**Mild Conditions**	1. Water consumption has reached 80% of daily max supply for three days. 2. Water supply is reduced to a level that is only 20% greater than the average consumption for the previous month. 3. There is an extended period (at least 8 weeks) of low rainfall	**Moderate Conditions**	1. Water consumption has reached 90% of the available amount for three consecutive days. 2. The water level in any of the water storage tanks cannot be replenished for three consecutive days	**Severe Conditions**	1. Failure of a major component of the system or a event which reduces the min residual pressure below 20 psi for a period of 24 hours or longer. 2. Water consumption of 95% or more of the max available for three consecutive days. 3. Water storage levels in the system drop during one 24-hour period. 4. Natural or man-made contamination of the water supply source. 5. The declaration of a state of disaster due to drought conditions in a county or counties served by the Corporation. 6. Other unforeseen events which could cause imminent health or safety risks to the public.						
SEIS LAGOS UTILITY DISTRICT - WYLIE	Oct-00	**Mild Water Shortage Conditions**	1. As initiated by NTMWD. 2. District is unable to meet customer's demands for quantity and/or pressure when at full pumping capacity.	**Moderate Water Shortage Conditions**	1. As initiated by NTMWD. 2. District is suffering multiple main breaks or equipment failures and cannot meet customer's demands for quantity and/or pressure when at full pumping capacity.	**Severe Water Shortage Conditions**	1. As initiated by NTMWD. 2. District is having major ongoing problems meeting the demands of customers, in terms of quantity and/or pressure.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of the water supply sources.				

Table R-1, Continued

Water User Group	Date	1		2		3		4		5		6	
		Condition	**Trigger Conditions**	**Condition**	**Trigger Conditions**	**Condition**	**Trigger Conditions**	**Condition**	**Trigger Conditions**	**Condition**	**Trigger Conditions**	**Condition**	**Trigger Conditions**
SHADED LANE WATER COMPANY- FORT WORTH	Aug-00	**Customer Awareness**	Stage will begin April 1 and end September 30.	**Voluntary Water Conservation**	1. Storage in the 12-ft by 80-ft standpipe has dropped to 70% capacity. 2. Demands exceed 90% of deliverable capacity for three consecutive days. 3. Short-term deficiencies in the distribution system limit supply capability.	**Mandatory Water Use Restrictions**	1. Storage in the 12-ft by 80-ft standpipe has dropped to 50% capacity. 2. Demands exceed 95% of deliverable capacity for three consecutive days. 3. Short-term deficiencies in the distribution system limit supply capability.	**Critical Water Use Restrictions**	1. Storage in the 12-ft by 80-ft standpipe has dropped to 10% capacity. 2. Demands exceed 100% of deliverable capacity for three consecutive days. 3. Short-term deficiencies in the distribution system limit supply capability.				
SHERMAN	Apr-05	**Mild Water Shortage Conditions**	Daily water demand equals or exceeds 80% for five consecutive days	**Moderate Water Shortage Conditions**	Daily water demand equals or exceeds 90% for three consecutive days. Goal: 5% voluntary reduction in daily water demand	**Severe Water Shortage Conditions**	Daily water demand equals 100% for three consecutive days. Goal: 15% reduction in daily water demand	**Emergency Water Shortage Conditions**	1. Natural or man-made contamination of water supply sources. 2. Water production or distribution system limitations. 3. System outage due to the failure or damage of major water system components. Goal: 20% reduction in daily water demand				
SOUTH ELLIS COUNTY WSC	Jun-00	**Mild Water Shortage Conditions**	Total daily demand equals or exceeds 220,000 gallons for five consecutive days or 250,000 gallons on a single day.	**Moderate Water Shortage Conditions**	Total daily demand equals or exceeds 250,000 gallons for five consecutive days or 275,000 gallons on a single day.	**Severe Water Shortage Conditions**	Total daily demand equals or exceeds 275,000 gallons for five consecutive days or 300,000 gallons on a single day.	**Critical Water Shortage Conditions**	Total daily demand equals or exceeds 300,000 gallons for five consecutive days or 325,000 gallons on a single day.	**Emergency Water Shortage Conditions- Stage 6: Water Allocation**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of the water supply sources. - Total daily demand equals 325,000 gallons for five consecutive days or 350,000 gallons for 2 days.		
SOUTHEAST KAUFMAN WSC - KAUFMAN	Aug-00	**Mild Conditions**	1. Daily water demand exceeds 2 mgd for three consecutive days. 2. Water pressure in distribution system remains below 45 psi for more than 6 hours. 3. Water levels in Lake Lavon fall between 482 to 475 feet MSL.	**Moderate Conditions**	1. Daily water demand exceeds 2.2 mgd for three consecutive days. 2. Water pressure in distribution system remains below 40 psi for more than 6 hours. 3. Ground storage reservoir remains below 70% of total storage for more than three consecutive days. 4. Water levels in Lake Lavon fall between 475 to 468 feet MSL.	**Severe Conditions**	1. Daily water demand exceeds 2.5 mgd for three consecutive days. 2. Failure of raw water transmission line from NTMWD for more than 12 consecutive hours during June, July, or August. 3. Water levels in Lake Lavon fall between 468 to 453 feet MSL. 4. Imminent or actual failure of system component where immediate health or safety hazards exist.	**Critical Emergency Conditions**	Natural disasters, massive power outages, massive equipment or facility failures, or public water supply contamination				
SOUTHLAKE	Aug-96	**Mild Conditions**	Daily water demand reaches or exceeds 70% of the production capacity of the system for five consecutive days.	**Moderate Conditions**	Daily water demand reaches or exceeds 80% of the production capacity of the system for five consecutive days.	**Severe Conditions**	Daily water demand reaches or exceeds 90% of the production capacity of the system for five consecutive days or imminint or actual failure of a major component of the system.	**Critical Emergency Conditions**	Due to natural or other disaster, water supply is not dependable and may not be suitable for human consumption.				
SOUTHLAKE PARK SERVICES, INC.-SOUTHLAKE	Aug-00	**Customer Awareness**	Stage will begin April 1 and end September 30.	**Voluntary Water Conservation**	Water level less than 13-ft above pump depth. Production or distribution limitations occur.	**Mandatory Water Use Restrictions**	Well level reaches 6-ft MSL. Production or distribution limitations occur.	**Critical Water Use Restrictions**	Well level reaches 2-ft MSL. Production or distribution limitations occur.				
SOUTHWEST FANNIN COUNTY WATER SUPPLY CORP.	Feb-00	**Mild Water Shortage Conditions**	Continually falling treated water reservoir levels do not refill to a 100% overnight.	**Moderate Water Shortage Conditions**	Continually falling treated water reservoir levels do not refill to a 90% overnight.	**Severe Water Shortage Conditions**	Continually falling treated water reservoir levels do not refill to a 85% overnight.	**Critical Water Shortage Conditions**	Continually falling treated water reservoir levels do not refill to a 75% overnight.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources.		
SPRINGTOWN	Jan-00	**Mild Water Shortage Conditions**	1. Total daily water demand equals or exceeds 80% of firm pumping capacity for three consecutive days or 85% for a single day. 2. As requested by TRWD. Goal: 5% reduction in daily water demand.	**Moderate Water Shortage Conditions**	1. Total daily water demand equals or exceeds 85% of firm pumping capacity for three consecutive days or 90% for a single day. 2. As requested by TRWD. Goal: 5% reduction in daily water demand.	**Severe Water Shortage Conditions**	1. Total daily water demand equals or exceeds 90% of firm pumping capacity for three consecutive days or 95% for a single day. 2. As requested by TRWD. Goal: 10% reduction in daily water demand.	**Critical Water Shortage Conditions**	1. Total daily water demand equals or exceeds 95% of firm pumping capacity for three consecutive days or 100% for a single day. 2. As requested by TRWD. Goal: 15% reduction in daily water demand.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources. 3. As required by TRWD. Goal: 20% reduction in daily water demand.	**Water Rationing**	1. Total daily water demand equals or exceeds 95% of firm pumping capacity for three consecutive days or 100% for a single day. 2. As requested by TRWD. Goal: 15% reduction in daily water demand.
STARR WSC-DENISON	May-00	**Mild Water Shortage Conditions**	Continually falling treated water reservoir levels do not refill to a 100% overnight; or on such occasion as a water well may be temp. out of service.	**Moderate Water Shortage Conditions**	Continually falling treated water reservoir levels do not refill to a 90% overnight; or on such occasion as a water well may be temp. out of service.	**Severe Water Shortage Conditions**	Continually falling treated water reservoir levels do not refill to a 85% overnight; or on such occasion as a water well may be temp. out of service.	**Critical Water Shortage Conditions**	Continually falling treated water reservoir levels do not refill to a 75% overnight; or on such occasion as a water well may be temp. out of service.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources. 3. One or more wells out of service. 4. One or more wells experiencing dangerously declining pumping levels.		
SUNNYVALE		**Voluntary Conservation**	Annually from May 1 to September 30.	**Water Alert**	Annually from May 1 to September 30 or for unusual drought conditions.	**Water Warning**	Annually from May 1 to September 30 or for unusual drought conditions.	**Water Emergency**	Annually from May 1 to September 30 or for unusual drought conditions.				
TALTY WSC - FORNEY	Aug-00	**Mild Water Shortage Conditions**	Notification from the City of Forney to initiate stage 1, or when the total daily demand equals or exceeds 85% of the supply capacity per day for three consecutive days or 95% in a single day.	**Moderate Water Shortage Conditions**	Notification from the City of Forney to initiate stage 2, or when the total daily demand equals or exceeds 90% of the supply capacity per day for three consecutive days or 100% in a single day.	**Severe Water Shortage Conditions**	Notification from the City of Forney to initiate stage 3, or when the total daily demand equals or exceeds 100% of the supply capacity per day for three consecutive days.						
TARRANT REGIONAL WATER DISTRICT (TRWD)	Apr-05	**Water Supply Condition**	Total storage in TRWD West Fork Reservoirs is projected to decline to 50% of capacity within 3 months.	**Water Watch**	Total storage in TRWD West Fork Reservoirs is projected to decline to 50% of capacity within 2 weeks, or actual storage has declined below 60% capacity.	**Water Warning**	Total storage in TRWD West Fork Reservoirs has declined below 50% capacity. Goal: Reduction in demand to 200 gpcd.	**Emergency Water Use Management**	Total storage in TRWD West Fork Reservoirs has declined below 25% capacity. Goal: Reduction in demand to 144 gpcd.				

Table R-1, Continued

Water User Group	Date	1		2		3		4		5		6	
		Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions
TECON WATER COMPANIES	Aug-00	**Mild Water Shortage Conditions**	Annually beginning on May 1 through September 30.	**Moderate Water Shortage Conditions**	1. When the water supply available to TWCI is equal or to less than 60% of storage. 2. When notification is received from the Public Water Regulatory authority or the wholesale water supplier requesting initiation of Stage 1 of the drought plan. 3. When the static water level in the TWCI wells is equal to or less than 40-feet below normal.	**Severe Water Shortage Conditions**	When all conditions of stage 2 are exceeded plus: 1. When the specific capacity of the TWCI wells is equal to or less than 70% of the well's original specific capacity. 2. When the total daily demand equals or exceeds the safe operating capacity for three consecutive days. 3. Continually falling treated water reservoir levels which do not refill above 50% overnight.	**Critical Water Shortage Conditions**	Same as stage 3.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water. 2. Natural or man-made contamination of water sources.		
TERRELL	Feb-03	**Mild Water Shortage Conditions**	1. Total daily water demand equals or exceeds 80% of safe operating capacity for three consecutive days or 95% on a single day. 2. New City Lake at Elmo recedes 5 feet below spillway. Goal: 5% reduction in water use.	**Moderate Water Shortage Conditions**	1. Total daily water demand equals or exceeds 100% of safe operating capacity for three consecutive days or 100% on a single day. 2. New City Lake at Elmo recedes 6 feet below spillway. Goal: 20% reduction in water use.	**Severe Water Shortage Conditions**	1. Total daily water demand equals or exceeds 95% of safe operating capacity for three consecutive days or 100% on a single day. 2. New City Lake at Elmo recedes 8 feet below spillway. 3. Maximum water level attained in the ground storage tanks or elevated tanks falls more than 5% per day for three consecutive days. Goal: 30% reduction in water use.	**Critical Water Shortage Conditions**	1. Total daily water demand equals or exceeds 100% of safe operating capacity for three consecutive days or 100% on a single day. 2. New City Lake at Elmo recedes 8 feet below spillway. 3. Maximum water level attained in the ground storage tanks or elevated tanks falls more than 10% per day for three consecutive days. Goal: 40% reduction in water use.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water. 2. Natural or man-made contamination of water sources.		
TEXAS WATER SYSTEMS, INC. - TYLER	Aug-00	**Customer Awareness**	Stage will begin April 1 and end September 30.	**Moderate Water Shortage Conditions**	Supply-Based- Well level reaches 30-ft above pump. Demand-Based- Total daily demand reaches 80% of total pumping capacity.	**Mandatory Water Use Restrictions**	Supply-Based- Well level reaches 15-ft above pump. Demand-Based- Total daily demand reaches 90% of total pumping capacity.	**Critical Water Use Restrictions**	Supply-Based- Well level reaches 0-ft above pump. Demand-Based- Total daily demand reaches 100% of total pumping capacity.				
THE COLONY	May-05	**Voluntary Water Rationing**	1. DWU declares Stage 2 Water Watch. 2. Daily water consumption reaches 75% of the system capacity for three consecutive days.	**Mandatory Water Rationing**	1. DWU declares Stage 3 Water Warning. 2. Daily water consumption reaches 85% of the system capacity or exceeds avaliable high service pump capacity. 3. Storage levels cannot be maintained.	**Emergency Condition - Water Crisis**	1. DWU declares Stage 4 Water Emergency. 2. Daily water consumption reaches 95% of system capacity. 2. System fails from acts of nature. 3. Supply is contaminated.						
THE OAKS WATER SYSTEM-SHERMAN	Aug-00	**Customer Awareness**	Annually from April 1 to September 30.	**Voluntary Water Conservation**	1. Overnight recovery rate reaches 30%. 2. Pump hours per day reaches 80%.	**Mandatory Water Use Restrictions**	1. Overnight recovery rate reaches 50%. 2. Pump hours per day reaches 90%.	**Critical Water Use Restrictions**	1. Overnight recovery rate reaches 70%. 2. Pump hours per day reaches 95%.				
THOMPSON WATER AND CONSTRUCTION-FAIRFIELD	Aug-00	**Mild Rationing Conditions**	*No triggering conditions supplied	**Moderate Rationing Conditions**	*No triggering conditions supplied	**Severe Rationing Conditions**	*No triggering conditions supplied						
TIOGA	Jul-05	**Mild Conditions**	Daily water demand exceeds 290,000 gpd for three consecutive days (50% of rated capacity of the wells). Goal: reduce water to below 290,000 gpd	**Moderate Conditions**	1. Daily water demand exceeds 350,000 gpd for three consecutive days (60% of rated capacity of the wells). 2. Water pressures in distribution system remain below 40 psi for more than 6 consecutive hours. 3. Failure of any well, coupled with demand over 220,000 gpd (75% of capacity of the smaller wells). Goal: reduce water use to below 350,000 gpd	**Severe Conditions**	1. Daily water demand exceeds 437,000 gpd for three consecutive days (75% of rated capacity of all wells) 2. Imminent failure of system component where immediate health or safety hazards exist. 3. Water pressures in distribution system continue to drop after implementing management steps. Goal: reduce water use to below 437,000 gpd	**Emergency Conditions**	1. Contamination of the water source. 2. System failures				
TOM BEAN	May-05	**Mild Conditions**	Demand exceeds 90% of amount that can be delivered to customers for seven consecutive days	**Moderate Conditions**	Demand exceeds 95% of amount that can be delivered to customers for three consecutive days. Goal: 2% reduction in water use	**Severe Conditions**	Demand exceeds 98% of amount that can be delivered to customers for three consecutive days. Goal: 5% reduction in water use	**Emergency Conditions**	1. Demand exceeds amount that can be delivered to customers. 2. Supply source becomes contaminated. 3. System unable to deliver water due to failure or damage of major water system components. Goal: 10% reduction in water use				
TRA- CENTRAL REGIONAL WASTEWATER SYSTEM	Jan-98	**Mild Conditions**	Daily water demand reaches or exceeds 80% of the production capacity of the system for five consecutive days.	**Moderate Conditions**	Daily water demand reaches or exceeds 90% of the production capacity of the system for five consecutive days.	**Severe Conditions**	Daily water demand reaches or exceeds 100% of the production capacity of the system for five consecutive days; or the imminent or actual failure of a major component of the system is experienced which can cause an immediate health or safety hazard.						
TRA- TEN MILE CREEK REGIONAL WASTEWATER SYSTEM	Sep-96	**Mild Conditions**	Daily water demand reaches or exceeds 80% of the production capacity of the system for five consecutive days.	**Moderate Conditions**	Daily water demand reaches or exceeds 90% of the production capacity of the system for five consecutive days.	**Severe Conditions**	Daily water demand reaches or exceeds 100% of the production capacity of the system for five consecutive days; or the imminent or actual failure of a major component of the system is experienced which can cause an immediate health or safety hazard.						
TRA-BARDWELL RESERVOIR	Apr-05	**Mild Water Shortage Conditions**	WSE declines to below 417.0 feet.	**Moderate Water Shortage Conditions**	WSE declines to below 414.0 feet.	**Severe Water Shortage Conditions**	WSE declines to below 408.0 feet.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of the water supply sources.				
TRA-JOE POOL RESERVOIR	Apr-05	**Mild Water Shortage Conditions**	WSE declines to below 516.0 feet.	**Moderate Water Shortage Conditions**	WSE declines to below 511.0 feet.	**Severe Water Shortage Conditions**	WSE declines to below 501.0 feet.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of the water supply sources.				

Table R-1, Continued

Water User Group	Date	1		2		3		4		5		6	
		Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions
TRA-NAVARRO MILLS RESERVOIR	Apr-05	**Mild Water Shortage Conditions**	WSE declines to below 421.5 feet.	**Moderate Water Shortage Conditions**	WSE declines to below 419.0 feet.	**Severe Water Shortage Conditions**	WSE declines to below 414.5 feet.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of the water supply sources.				
TRA - Tarrant County Water Supply Project	Apr-05	**Mild Water Shortage Conditions**	Authority's WTP is operating at greater than 85% of capacity for seven consecutive days.	**Moderate Water Shortage Conditions**	Authority's WTP is operating at greater than 90% of capacity for seven consecutive days.	**Severe Water Shortage Conditions**	Authority's WTP is operating at greater than 95% of capacity for seven consecutive days.	**Emergency Water Shortage Conditions**	Emergency - A major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water services; or matural or man-made contamination of the water supply source occurs				
TREETOP UTILITIES, INC. - FORT WORTH	Aug-00	**Customer Awareness**	Stage I will begin every year on April 1 and ends September 30.	**Voluntary Water Conservation**	Stage II begins when there is an equipment malfunction or leaks in the disturbution system. Also when drinking water treatment is at 80% capacity.	**Mandatory Water Use Restrictions**	Stage III begins when there is an equipment failure or production or distribution limitations.	**Critical Water Use Restrictions**	Stage IV begins when there is a supply contaminaiton, production or disturbution limitations, or a system outage.				
TRINIDAD	Aug-00	**Mild Water Shortage Conditions**	The water supply available to the City of Trinidad is equal to or less than 230 acre-feet.	**Moderate Water Shortage Conditions**	The water supply available to the City of Trinidad is equal to or less than 155 acre-feet.	**Severe Water Shortage Conditions**	The water supply available to the City of Trinidad is equal to or less than 75 acre-feet.	**Critical Water Shortage Conditions**	The water supply available to the City of Trinidad is equal to or less than 50 acre-feet.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of the water supply sources.		
TROPHY CLUB MUNICIPAL UTILITY DISTRICT	Aug-00	**Water Awareness**	Daily water demand reaches 90% of the production capacity of the system for three consecutive days; or demand approaches a reduced delivery capacity for all or part of the system due to supply or production capacity limitations; or when the City of Fort Worth gives notification to begin Stage 1 restrictions.	**Water Watch**	Daily water demand reaches 95% of the production capacity of the system for two consecutive days; or demand approaches a reduced delivery capacity for all or part of the system due to supply or production capacity limitations; or when the City of Fort Worth gives notification to begin Stage 2 restrictions.	**Water Warning**	Daily water demand reaches 95% of the production capacity of the system for five consecutive days; or demand approaches a reduced delivery capacity for all or part of the system due to supply or production capacity limitations; or when the City of Fort Worth gives notification to begin Stage 3 restrictions.	**Water Emergency**	Daily water demand reaches 100% of the production capacity of the system for two consecutive days; or demand approaches a reduced delivery capacity for all or part of the system due to supply or production capacity limitations; or when the City of Fort Worth gives notification to begin Stage 4 restrictions.				
TWO WAY WSC	May-05	**Mild Water Shortage Conditions**	Demand has reached 80% of daily maximum supply for three consecutive days.	**Moderate Water Shortage Conditions**	Demand has reached 90% of amount avaliable for three consecutive days.	**Severe Water Shortage Conditions**	1. Demand reaches 95% of capacity for three consecutive days or 100% for one day. 2. Natural or man-made contamination of the water supply sources. 3. Failure of a major component of the system.						
UNION HILL WATER COMPANY-MANSFIELD	Aug-00	**Customer Awareness**	Stage I will begin every year on April 1 and ends September 30.	**Voluntary Water Conservation**	Supply-Based: Overnight recovery rates reach 12-feet. Demand-Based: Pumps are pumping for 12-hrs per day or a production or distribution limitations.	**Mandatory Water Use Restrictions**	Supply-Based: Overnight recovery rates reach 10-feet. Demand-Based: Pumps are pumping for 14-hrs per day or a production or distribution limitations.	**Critical Water Use Restrictions**	Supply-Based: Overnight recovery rates reach 8-feet. Demand-Based: Pumps are pumping for 16-hrs per day or a production or distribution limitations.				
UNIVERSITY PARK	Apr-05	**Mild Conditions**	1. District has initiated Stage II. 2. Demand exceeds 90% of amount that can be delivered to customers for three consecutive days. Goal: 2% reduction in water use	**Moderate Conditions**	1. District has initiated Stage II. 2. Demand exceeds 95% of amount that can be delivered to customers for three consecutive days. Goal: 5% reduction in water use	**Severe Conditions**	1. District has initiated Stage III. 2. Demand exceeds 98% of amount that can be delivered to customers for three consecutive days. Goal: 10% reduction in water use	**Emergency Conditions**	1. District has initiated Stage IV. 2. Demand exceeds amount that can be delivered to customers. 3. Supply source becomes contaminated. 4. System unable to deliver water due to failure or damage of major water system components. Goal: 25% reduction in water use				
UPPER NECHES RIVER MUNICIPAL WATER AUTHORITY	Apr-97	**Mild Conditions**	1. Daily water demand reaches the level of 90% of system capacity for three consecutive days. 2. Distribution pressure remains below normal for more than six consecutive hours.	**Moderate Conditions**	1. Daily water demands reach 100% of system capacity for three consecutive days. 2. The supply of water is continually decreasing on a daily basis and the water supply utility is advised to conserve by UNRMWA, the TNRCC, or TDH. 3. Decrease in the water pressures in the distribution system as measured by the pressure gauges and customer complaints.	**Severe Conditions**	1. The imminent of actual failure of a major component of the system which would cause an immediate health or safety hazard. 2. Water demand is exceeding 100% of system capacity for three consecutive days. 3. The full allotment of raw water is being pumped from the system's supply source.						
UTRWD	Feb-02	**Mild Conditions**	1. Average daily water consumption reaches 90% of water treatment plant capacity for three consecutive days. 2. Weather conditions are to be considered in determining severity of water unavailability. Predicted long, cold or hot, dry periods need to be considered in impact analysis.	**Moderate Conditions**	1. Average daily water consumption reaches 100% of rated production capacity for three consecutive days. 2. One ground storage tank at the pump station or one clearwell at the water treatment plant is taken out of service during a period of mild water unavailability. 3. Storage capacity is not being maintained during a period of 100% rated production. 4. Existence of any one listed condition for a duration of 36 hours.	**Severe Conditions**	1. Average daily water consumption reaches 110% of rated production capacity. 2. Average daily water consumption will not allow storage levels to be maintained in District clearwells and ground storage tanks. 3. System demand exceeds available high service pump capacity. 4. Any two conditions listed in Moderate condition stage occur at the same time for 24-hour period. 5. Water system is contaminated. Severe condition is reached immediately upon detection. 6. Water system fails from acts of God or man. Severe condition is reached immediately upon detection.						
VACATION VILLAGE WATER SUPPLY - DENTON	Aug-00	**Customer Awareness**	Stage I will begin every April 1 and end September 30.	**Voluntary Water Conservation**	Supply-Based: Reservoir elevation reaches 10-ft MSL. Demand-Based: Total daily demand 110% of the total pumping capacity for three consecutive days.	**Mandatory Water Use Restrictions**	Supply-Based: Reservoir elevation reaches 8-ft MSL. Demand-Based: Total daily demand 115% of the total pumping capacity for three consecutive days.	**Critical Water Use Restrictions**	Supply-Based: Reservoir elevation reaches 6-ft MSL. Demand-Based: Total daily demand 120% of the total pumping capacity for three consecutive days.				

Water User Group	Date	1		2		3		4		5		6	
		Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions
VAN ALSTYNE	Apr-05	**Mild Water Shortage Conditions**	1. Demand exceeds 90% of amount that can be delivered to customers for seven consecutive days. 2. Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. 3. Supply source becomes contaminated 4. Failure or damage of major water system components. 5. Water demand is approaching limit of permitted supply. **Goal:** 0% reduction in water use.	**Moderate Water Shortage Conditions**	1. Demand exceeds 95% of amount that can be delivered to customers for three consecutive days. 2. Water demand for all or part of the delivery system equals delivery capacity because delivery capacity is inadequate. 3. Supply source becomes contaminated 4. Failure or damage of major water system components. 5. Water demand is approaching limit of permitted supply. **Goal:** 2% reduction in water use.	**Severe Water Shortage Conditions**	1. Demand exceeds 98% of amount that can be delivered to customers for three consecutive days. 2. Water demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate. 3. Supply source becomes contaminated 4. Failure or damage of major water system components. 5. Water demand is approaching limit of permitted supply. **Goal:** 5% reduction in water use.	**Critical Water Shortage Conditions**	1. Demand exceeds amount that can be delivered to customers. 2. Water demand for all or part of the delivery system seriously exceeds delivery capacity because delivery capacity is inadequate. 3. Supply source becomes contaminated 4. Failure or damage of major water system components. 5. Water demand is approaching limit of permitted supply. **Goal:** 10% reduction in water use.				
Virginia Hill WSC	Aug-00	**Mild Water Shortage Conditions**	Total daily water demand exceeds 800,000 gallons for two consecutive days or total daily water demand exceeds 825,000 gallons on a single day.	**Moderate Water Shortage Conditions**	Total daily water demand exceeds 900,000 gallons for two consecutive days or total daily water demand exceeds 925,000 gallons on a single day.	**Severe Water Shortage Conditions**	Total daily water demand exceeds 950,000 gallons for two consecutive days or total daily water demand exceeds 1,000,000 gallons on a single day.	**Critical Water Shortage Conditions**	Total daily water demand exceeds 1,000,000 gallons for two consecutive days or total daily water demand exceeds 1,500,000 gallons on a single day.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of the water supply sources.		
WALNUT CREEK ISD	Jul-05	**Mild Water Shortage Conditions**	1. Water supply is equal to or less than 200 gallons per connection in storage. 2. Specific capacity is equal to or less than 75% of the wells original specific capacity. 3. Daily demand equals or exceeds 50,000 gallons for seven consecutive days or 10,000 gallons for one day	**Moderate Water Shortage Conditions**	1. Water capacity reaches a level of less than 200 gallons per connection or meter. 2. Storage tank reaches a level below 4,000 gallons in reserve.	**Severe Water Shortage Conditions**	1. Large, 50 gallons per minute well exhibits non-operation or less than full capacity pumping. 2. Main distribution line failure.	**Critical Water Shortage Conditions**	1. Well number 2 is in failure. 2. Storage is below 4,000 gallons.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of the water sources.	**Water Allocation**	Water avaliable is not at least 50% of each meter requirements allowance.
WALNUT CREEK SUD	Apr-00	**Seasonal Water Shortage**	Beginning on May 1 through September 30. **Goal:** Achieve a 5% reduction in total water use.	**Dry Conditions**	Water in storage in the TRWD West Fork reservoirs is projected to decline to less than 295,670 acre-feet (50% of capacity) within 3 months. **Goal:** Achieve a 10% reduction in total water use	**Water Watch**	Water in storage in the TRWD West Fork reservoirs is projected to decline to less than 295,670 acre-feet (50% of capacity) within 2 weeks, or water in storage in the TRWD reservoirs has declined to 1,426,752 acre-feet (60%). **Goal:** Achieve a 15% reduction in total water use	**Water Warning**	Water in storage in the TRWD reservoirs has declined to 1,188,960 Acre-feet (50% of capacity). **Goal:** Achieve a 20% reduction in water use.	**Emergency Water Use Management**	Water in storage in the TRWD reservoirs has declined to 594,480 Acre-feet (25% of capacity). **Goal:** Achieve a 30% reduction in water use.		
WALTER J. CARROLL WATER COMPANY-RED OAK	Sep-00	**Customer Awareness**	Stage will begin April 1 and end September 30.	**Voluntary Water Conservation**	Overnight recovery rate reaches 30-ft or production or distribution limitations.	**Mandatory Water Use Restrictions**	Overnight recovery rate reaches 28-ft or production or distribution limitations.	**Critical Water Use Restrictions**	Overnight recovery rate reaches 15-ft, supplly contamintation, or system outage.				
WATAUGA	Apr-05	**Water Watch**	Daily water demand exceeds 90% of capacity of the system for three consecutive days or short-term deficiencies in the distribution system limit supply capability	**Water Warning**	Daily water demand exceeds 95% of the production capacity of the system for two consecutive days. Goal: 2% reduction in water use	**Water Emergency**	Daily water demand exceeds 95% of the production capacity of the system for five consecutive days. Goal: 5% reduction in water use	**Water Crisis**	Daily water demand exceeds 100% of the production capacity of the system for two consecutive days. Goal: 10% reduction in water use				
WAXAHACHIE	Jun-02	**Stage 0 - Normal Water Conditions**	Monitor weather conditions, activate Lake Bardwell Pump Station at elevation 530 feet. **Goal:** Monitor weather conditions	**Stage 1 - Mild Water Shortage Conditions**	Lake elevation drops to 527 feet. **Goal:** Achieve a 2% reduction in water use	**Stage 2 - Moderate Water Shortage Conditions**	Lake elevation drops to 524 feet. **Goal:** Achieve a 5% reduction in water use	**Stage 3 - Severe Water Shortage Conditions**	Lake elevation drops to 520 feet. **Goal:** Achieve a 10% reduction in water use.	**Stage 4 - Critical Water Shortage Conditions**	Lake elevation drops to 517.5 feet. **Goal:** Achieve a 15% reduction in water use	**Stage 5 - Emergency Water Outage Conditions**	1. Major water line breaks, or pump or system failures. 2. Natural or man-made contamination of water supply source(s). **Goal:** Achieve a 30% reduction in water use.
WEATHERFORD	Aug-02	**Mild Water Shortage Conditions**	Stage will begin May 1 and end September 30. **Goal:** Achieve a 5% reduction in water use	**Moderate Water Shortage Conditions**	System storage falls and remains below 75% of capacity for a period of three consecutive days Goal: Achieve a 15% reduction in water use.	**Severe Water Shortage Conditions**	System storage falls and remains below 50% of capacity for a period of three consecutive days Goal: Achieve a 30% reduction in water use.	**Critical Water Shortage Conditions**	System storage falls and remains below 35% of capacity for a period of three consecutive days Goal: Achieve a 50% reduction in water use.	**Emergency Water Shortage Conditions**	Major water line breaks, or pump system failures occurs, or natural or man-made contamination of the water supplies sources, or system storage falls and remains below 25% of capacity for a period of three consecutive days Goal: The % reduction will vary depneding on the type of emergency.		
WEST CEDAR CREEK MUD	Jul-99	**Voluntary Stage**	During peak usage, customers will be asked to voluntarily conserve water.	**Mild Drought**	1. Average daily water use reaches 3,812,400 gpd (90% of firm line capacity) for three consecutive days. 2. Consideration will be given to weather conditions, time of year, and customer complaints of low water pressure. **Goal:** Schedule restriction for water usage for outside purposes.	**Moderate Drought**	1. Average daily water use reaches firm line capacity of 4.0 mgd for three consecutive days. 2. Net storage in water storage is continually decreasing on a daily basis and falls below 572,000 gallons (60% capacity) for 48 hours. 3. Water pressures reach 35 psi in the distribution system as measured by the pressure gauges in the system. **Goal:** all outside use of water is prohibited from 12:00 noon to 12:00 midnight.	**Severe Drought**	1. Imminent or actual failure of a major component of the system that would cause an immediate health or safety hazard. 2. Water demand exceeds the firm system capacity of 4.0 mgd for three consecutive days. 3. Pumps cannot pump the daily water demand due to low Cedar Creek Lake level. 4. All water is being pumped from System's storage reservoirs and all replenishment of water reservoirs has stopped. Goal: All outside use of water is prohibited.				
WEST LEONARD WSC	May-00	**Mild Water Shortage Conditions**	Continually falling treated water reservoir levels do not refill above 100% overnight. Goal: 10% reduction in daily water demand.	**Moderate Water Shortage Conditions**	Continually falling treated water reservoir levels do not refill above 90% overnight. Goal: 15% reduction in daily water demand.	**Severe Water Shortage Conditions**	Continually falling treated water reservoir levels do not refill above 85% overnight. Goal: 20% reduction in daily water demand.	**Critical Water Shortage Conditions**	Continually falling treated water reservoir levels do not refill above 75% overnight. Goal: 30% reduction in daily water demand.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources. Goal: 50% reduction in daily water demand.		
WEST WISE RURAL WSC	Aug-99	**Mild Water Shortage Conditions**	When water pressures leaving the water plant drops to 100 psi or total water demand equals or exceeds 600,000 gallons for three consecutive days.	**Moderate Water Shortage Conditions**	When water pressures leaving the water plant drops to 98 psi or total water demand equals or exceeds 650,000 gallons for three consecutive days.	**Severe Water Shortage Conditions**	When water pressures leaving the water plant drops to 96 psi or total water demand equals or exceeds 750,000 gallons for three consecutive days.	**Critical Water Shortage Conditions**	When water pressures leaving the water plant drops to 94 psi or total water demand equals or exceeds 850,000 gallons for three consecutive days.	**Emergency Water Shortage Conditions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of water supply sources.		

Table R-1, Continued

Water User Group	Date	1		2		3		4		5		6	
		Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions
WESTWOOD UTILITY CORP.- FAIRFIELD	Jul-00	**Customer Awareness**	Stage will begin April 1 and end September 30.	**Voluntary Water Conservation**	Any pump/well malfunctions which reduce or impair the max. pumping capacity of any well; or any mainline break which impairs the storage or pumping capacity of the plant. Pumping exceeds 20-21 hours per day.	**Mandatory Water Use Restrictions**	Any pump/well malfunctions which reduce or impair the max. pumping capacity of any well; or any mainline break which impairs the storage or pumping capacity of the plant. Pumping exceeds 21-22 hours per day or production or distribution limitations arise.	**Critical Water Use Restrictions**	Any pump/well malfunctions which reduce or impair the max. pumping capacity of any well; or any mainline break which impairs the storage or pumping capacity of the plant. Pumping exceeds 23-24 hours per day, production or distribution limitations arise, or a system outage occurs.				
WHITE SETTLEMENT	Aug-99	**Water Watch**	1. Demand exceeds 90% of deliverable capacity for three consecutive days. 2. Short term deficiencies in distribution system limit supply capability. 3. Storage in all TRWD reservoirs has dropped to 60% of capacity. 4. Total raw water storage in TRWD West Fork Lake is projected to decline to less than 50% of capacity within 2 weeks.	**Water Warning**	1. Total raw water supply in TRWD lakes drops to 50% of storage capacity. 2. Demand exceeds 95% of deliverable capacity for two consecutive days.	**Water Emergency**	1. Total raw water supply in TRWD lakes drops to 25% of storage capacity. 2. Demand exceeds 95% of deliverable capacity for five consecutive days.	**Water Crisis**	1. Total raw water supply in TRWD lakes drops to 20% of conservation storage capacity. 2. Demand exceeds 100% of deliverable capacity for two consecutive days.				
WHITE SHED WSC	Aug-00	**Mild Condition**	Water consumption has reached 85% of daily maximum supply for three consecutive days.	**Moderate Conditions**	Water consumption has reached 90% of the amount available for three consecutive days.	**Severe Conditions**	1. Total daily demand equals or exceeds 95% of the system's safe operating capacity. 2. Total daily demand equals or exceeds 100% of capacity on a single day. 3. There is a natural or man-made contamination of the water supply. 4. The declaration of a state of disaster due to drought conditions in a county or counties served by the Corp. 5. Reduction of wholesale water supply due to drought conditions. 6. Other unforeseen events which could cause imminent health or safety risks to the public.						
WHITESBORO	N/A	**Mild Condition**	System water production exceeds 1MGD for two consecutive days or 0.95MGD for seven consecutive days.	**Moderate Condition**	System water production exceeds 1.6MGD for two consecutive days or 1.55MGD (80% production) for seven consecutive days.	**Severe Condition**	System water demand exceeds 98% of production capacity.	**Emergency Condition**	Water system contamination is detected, or Water sytem fails from acts of natural forces or man.				
WHITEWRIGHT	Jun-05	**Mild Condition**	Demand exceeds 90% of amount that can be delivered to customers for seven consecutive days	**Moderate Conditions**	Demand exceeds 95% of amount that can be delivered to customers for three consecutive days. Goal: 2% reduction in water use	**Severe Conditions**	Demand exceeds 98% of amount that can be delivered to customers for three consecutive days. Goal: 5% reduction in water use	**Emergency Water Shortage Conditions**	1. Demand exceeds amount that can be delivered to customers. 2. Supply source becomes contaminated. 3. System unable to deliver water due to failure or damage of major water system components. Goal: 10% reduction in water use				
WILDEWOOD WATER COMPANY, INC. - CHANDLER	Aug-00	**Customer Awareness**	Will begin every April 1 and last until September 30.	**Voluntary Water Conservation**	Total daily demand equals or exceeds 90% of the daily well production capacity for three consecutive days or 100% on a single day.	**Mandatory Water Use Restrictions**	Total daily demand equals or exceeds 95% of the daily well production capacity for three consecutive days or 100% on a single day; or exceeds 75% daily storage capacity for three days or 90% for one day.	**Critical Water Use Restrictions**	1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of the water supply sources.				
WINDOM	Dec-99	**Mild Water Shortage Conditions**	Total daily water demands equal or exceed 75% of the safe operating capacity of 100,000 gallons per day for 30 consecutive days.	**Moderate Water Shortage Conditions**	Total daily water demands equal or exceed 95% of the safe operating capacity of 100,000 gallons per day for 30 consecutive days.	**Severe Water Shortage Conditions**	Total daily water demands equal or exceed 100% of the safe operating capacity of 100,000 gallons per day for 30 consecutive days.	**Emergency Water Shortage Conditions**	Major water line breaks, or pump or system failures occur, which causes unprecedented loss of capability to provide water service; or natural or man-made contamination of the water supply source.				
WOODBINE WSC - GAINESVILLE	Aug-00	**Mild Water Shortage Conditions**	1. When water supply available to the Corporation is equal to or less than 200 gallons per connection in shortage. 2. When the specific capacity of the Corp. is equal to less than 75% of the well's original specific capacity. 3. When total daily demand equals or exceeds 1,000,000 gallons for seven consecutive days or 500,000 gallons on a single day.	**Moderate Water Shortage Conditions**	Water capacity reaches a critical level of less than 200 gallons per connection or meter; or when the large storage tank reaches a level of below 186,000 gallons in reserve.	**Severe Water Shortage Conditions**	1. Large, 500 gpm well exhibits non-operation or less than full capacity pumping. 2. Main distribution line failure.	**Critical Water Shortage Conditions**	1. 2 of the 6 wells are in failure. 2. Storage is below 186,000 gallons.	**Emergency Water Shortage Conditions - Stage 6: Water Allocation**	1. Major water line breaks, or pump system failures occur, which cause unprecedented loss of capability to provide water service. 2. Natural or man-made contamination of the water source. - Water is to be allocated according to the decision of the Board.		
WOODVALE WATER INC- FORT WORTH	Sep-00	**Customer Awareness**	Stage will begin April 1 and end September 30.	**Voluntary Water Conservation**	Drinking water treatment reaches 100% of capacity. Total daily demand reaches 70% of pumping capacity. Pump hours per day reaches 24-hrs.	**Mandatory Water Use Restrictions**	Drinking water treatment reaches 100% of capacity. Total daily demand reaches 50% of pumping capacity. Pump hours per day reaches 24-hrs.	**Critical Water Use Restrictions**	Supply less than 50% of base capacity, drinking water treatment reaches 100% of capacity, total daily demand reaches less than 100% of pumping capacity and 80% of total storage capacity, or production or distribution limitations.				
WORTHAM	Jul-98	**Mild Conditions**	1. Average daily water consumption reaches 90% of plant capacity for three consecutive days. 2. Water level in Lake Wortham drops below 85% of full capacity.	**Moderate Conditions**	1. Average daily water consumption reaches 100% of plant capacity for three consecutive days. 2. Water level in Lake Wortham drops below 65% of full capacity. 3. City of Mexia water supply is in time of drought, and requiring storage tank near Mexia to be filled at a specified time.	**Severe Conditions**	1. Failure of elevated storage tank or other major system component which reduce the availability of water to less than 50% of the average daily usage or causes health or safety hazard. 2. Water level in Lake Wortham drops below 50% of full capacity. 3. Water supply from City of Mexia is out of service.						

Table R-1, Continued

Water User Group	Date	1		2		3		4		5		6	
		Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions	Condition	Trigger Conditions
WYLIE	Jul-02	**Mild Conditions**	1. Average daily water consumption reaches 90% of the system's firm pumping capacity. 2. Average daily water use reaches 90% of the production capacity and/or the contractual amount of the water provider. **Goal:** Restrict watering from 10AM to 7PM, request to voluntarily limit watering to two days a week.	**Moderate Conditions**	1. Average daily water consumption reaches 95% of the system's firm pumping capacity for a period of three days. 2. Average daily water use reaches 95% of the production capacity and/or the contractual amount of the water provider. 3. Water levels in ground and/or elevated storage facilities are not being maintained (greated than 50% of full volume) during periods when the water plant is operating at 100% of its production capacity. Goal: Restrict watering from 10AM to 7PM, request to limit watering and outodoor use of water to 2 days a week.	**Severe Conditions**	1. Average daily water consumption reaches 100% of the system's firm pumping capacity for a period of three days. 2. Average daily water use reaches 100% of the production capacity and/or the contractual amount of the water provider. 3. Water levels in ground and/or elevated storage facilities are less than 25% of full volume. 4. water system fails due to acts of God. Goal: Restrict watering from 10AM to 7PM, request to limit watering and outodoor use of water to 1 day every five days.	**Critical or Emergency Conditions**	1. Average daily water consumption reaches 100% of the system's firm pumping capacity for a period of 10 days. 2. Average daily water use reaches 100% of the production capacity and/or the contractual amount of the water provider. 3. Water levels in ground and/or elevated storage facilities are less than 15% of full volume.4. water source is identified as contaminated by the supplier, 5. water system fails due to acts of God. **Goal:** All watering and outodoor use of water is prohibited.				

APPENDIX S

POTENTIALLY FEASIBLE WATER MANAGEMENT STRATEGIES

APPENDIX S
POTENTIALLY FEASIBLE WATER MANAGEMENT STRATEGIES

Consultants to the Region C Water Planning Group conducted a survey of Region C water user groups, wholesale water providers, county judges, and groundwater conservation districts to discuss the recommended strategies in the 2001 Plan and to identify potentially feasible projects for the 2006 Plan. The questionnaires were mailed in March and April 2004.

In this appendix, the following information is presented regarding the potentially feasible water management strategies:

- List of water user groups, wholesale water providers, county judges, and groundwater conservation districts to whom questionnaires were mailed.
- Water user group questionnaire.
- Wholesale water provider questionnaire (same as water user group questionnaire).
- County judge questionnaire.
- Groundwater conservation district questionnaires.
    - Mid-East Texas Groundwater Conservation District
    - Neches and Trinity Valleys Groundwater Conservation District
- Summary of water user group survey responses. (Table S-1)
- Summary of wholesale water provider survey responses. (Table S-2)
- Summary of county judge survey responses. (Table S-3)
- Summary of groundwater conservation district survey responses. (Table S-4)
- Summary of potentially feasible water management strategies by water user group and county. (Table S-5 through Table S-20)
- Summary of potentially feasible strategies by wholesale water provider. (Table S-21)

Water User Groups Receiving Questionnaire on Potentially Feasible Water Management Strategies

Questionnaires on potentially feasible water management strategies were mailed to the following water user groups:

Able Springs WSC
Addison
Aledo
Allen
Alvord
Anna
Annetta
Annetta South
Argyle
Argyle WSC
Arlington
Athens
Aubrey
Aurora
Azle
Balch Springs
Bardwell
Bartonville
Bartonville WSC
Bedford
Bells
Benbrook
Bethel-Ash WSC
Bethesda WSC
Blackland WSC
Blooming Grove
Blue Mound
Blue Ridge
Bolivar WSC
Bonham
Boyd
Brandon-Irene WSC
Bridgeport
Bryson
Buena Vista - Bethel SUD
Burleson
Caddo Basin SUD
Carrollton
Cash SUD
Celina
Chatfield WSC
Chico
Cockrell Hill
College Mound WSC
Colleyville
Collinsville
Combine
Combine WSC
Community Water Company
Community WSC
Coppell
Copper Canyon
Corinth
Crandall
Cross Roads
Crowley
Culleoka WSC
Dallas County WCID #6
Dalworthington Gardens
Danville WSC
Dawson
Decatur
Denison
Denton County FWSD
DeSoto
Double Oak
Duncanville
East Cedar Creek FWSD
East Fork SUD
Ector
Edgecliff Village
Ennis
Euless
Eustace
Everman
Fairfield
Fairview
Farmers Branch
Farmersville
Ferris
Files Valley WSC
Flo Community WSC
Flower Mound
Forest Hill
Forney Lake WSC
Frisco
Frost
Gainesville
Gastonia-Scurry WSC
Glenn Heights
Grand Prairie
Grapevine
Gun Barrel City
Gunter
Gunter Rural WSC
Hackberry
Haltom City
Haslet
Heath
Hebron
Hickory Creek
Hickory Creek SUD
High Point WSC
Highland Park
Highland Village
Honey Grove
Howe
Hudson Oaks
Hurst
Hutchins
Irving
Italy
Jacksboro
Johnson County SUD
Josephine
Justin

Kaufman
Keller
Kemp
Kennedale
Kerens
Kiowa Homeowners WSC
Krugerville
Krum
Ladonia
Lake Dallas
Lake Worth
Lakeside
Lancaster
Lavon WSC
Leonard
Lewisville
Lincoln Park
Lindsay
Little Elm
Log Cabin
Lowry Crossing
Lucas
Luella WSC
M E N WSC
Mabank
Mac Bee WSC
Malakoff
Mansfield
Maypearl
McKinney
McLendon-Chisholm
Melissa
Mesquite
Milford
Milligan WSC
Mineral Wells
Mountain Peak WSC
Mt Zion WSC
Muenster
Murphy
Mustang SUD
Navarro Mills WSC
Nevada
New Fairview
New Hope
Newark
North Collin WSC
North Hunt WSC
Northlake
Oak Grove
Oak Leaf
Oak Point
Ovilla
Palmer
Pantego
Parker
Payne Springs
Pecan Hill
Pelican Bay
Pilot Point
Plano
Ponder
Pottsboro
Princeton
Prosper
R C H WSC
Red Oak
Reno
Rhome
Rice
Rice WSC
Richardson
Richland Hills
River Oaks
Roanoke
Rockett SUD
Rowlett
Royse City
Runaway Bay
Sachse
Saginaw
Saint Paul
Sanger
Sansom Park
Sardis-Lone Elm WSC
Savoy
Seagoville
Seven Points
Shady Shores
Sherman
South Grayson WSC
Southlake
Southmayd
Southwest Fannin County SUD
Springtown
Sunnyvale
Talty
Teague
The Colony
Tioga
Tom Bean
Tool
Trenton
Trinidad
Trophy Club
Turlington WSC
Two Way SUD
University Park
Valley View
Van Alstyne
Virginia Hill WSC
Walnut Creek SUD
Watauga
West Cedar Creek MUD
West Wise SUD
Weston
Westover Hills
Westworth Village
White Settlement
Whitesboro
Whitewright
Willow Park
Wilmer
Woodbine WSC
Wortham
Wylie

Wholesale Water Providers Receiving Questionnaire on Potentially Feasible Water Management Strategies

Questionnaires on potentially feasible water management strategies were mailed to the following wholesale water providers:

Athens Municipal Water Authority
Cedar Hill
Corsicana
Dallas
Dallas County Park Cities MUD
Denton
Forney
Fort Worth
Garland
Greater Texoma Utility Authority
Lake Cities Municipal Utility Authority
Midlothian
Midlothian Water District
North Richland Hills
North Texas Municipal Water District
Parker County Utility District #1
Rockwall
Sabine River Authority
Sulphur River Water District
Tarrant Regional Water District
Terrell
Trinity River Authority
Upper Neches Municipal Water Authority
Upper Trinity Regional Water District
Waxahachie
Weatherford
Wise County Water Supply District

County Judges Receiving Questionnaire on Potentially Feasible Water Management Strategies

Questionnaires on potentially feasible water management strategies were mailed to the following county judges:

Collin	Ellis	Henderson	Parker
Cooke	Fannin	Jack	Rockwall
Dallas	Freestone	Kaufman	Tarrant
Denton	Grayson	Navarro	Wise

Groundwater Conservation Districts Receiving Questionnaire on Potentially Feasible Water Management Strategies

Questionnaires on potentially feasible water management strategies were mailed to the following groundwater conservation districts:

Mid-East Texas Groundwater Conservation District
Neches and Trinity Valleys Groundwater Conservation District

REGION C WATER PLANNING GROUP

Senate Bill One Second Round of Regional Water Planning - Texas Water Development Board

c/o NTMWD
505 E. Brown Street
P. O. Box 2408
Wylie, Texas 75098-2408
972/442-5405
972/442-5405/Fax
jparks@ntmwd.com
www.regioncwater.org

April 13, 2004

Mr. _____________
Title
City of ______ or Wholesale Water Provider
Address

Subject: Water Management Strategies for Regional Water Planning

Dear Mr. ______:

The Region C Water Planning Group is actively working on the update to the 2001 *Region C Water Plan*. The updated *Region C Water Plan* is to be completed by January 5, 2006. In September 2002 and again in January 2003, we surveyed you regarding projected population and water demands for the [*City / Wholesale Water Provider*]. With your input, the population and water demand projections have been updated and have been approved by the Region C Water Planning Group and the Texas Water Development Board. The Planning Group is now evaluating available water supplies and proposed water management strategies. We are again seeking your input on your available water supplies and proposed water management strategies.

We have attached summaries of the following information for the [*City / Wholesale Water Provider*]:

- population projections
- water demand projections
- currently available water supplies
- recommended water management strategies from 2001 *Region C Water Plan*
- potential water management strategies for 2006 *Region C Water Plan*

We are asking that you review this information and provide any comments or corrections needed to accurately reflect your water needs and proposed projects for additional water supplies. Please call Stephanie Griffin of Freese and Nichols, Inc. at 817-735-7353 with any questions, comments, or corrections you may have regarding this survey. Please return your completed survey to the address shown on the second page of the attached survey by April 30, 2004. We greatly appreciate your attention and cooperation in reviewing this information, which will provide the basis for long-range water supply planning in Region C.

Sincerely,

Jim Parks
Chairman

Cc: Roy Eaton, Secretary

Region C Water Planning Group
Confirmation of Water Needs Projections and Proposed Water Management Strategies of Water User Groups (WUGs)
Please Return by April 30, 2004

Name of Water User Group: _[*City / Wholesale Water Provider*]
Contact Person:____
Telephone Number:__________________________FAX:____________________
Email Address:____
Mailing Address:____

1. Do you agree with the projected water demands? If not, what changes would you suggest? What is the basis for your suggested changes? (Note: The demands have been approved by the TWDB and cannot be changed at this time. However, we can plan for additional supplies to meet any demands that you believe are significantly underestimated.)

2. Do you agree with the list of available water supply sources? If not, what changes are needed? (Note: Surface water supplies have been adjusted to reflect availability as determined from the state Water Availability Models. Groundwater supplies have not been updated from the 2001 *Region C Water Plan*.)

3. Do you agree with the proposed water management strategies listed in the 2002 State Water Plan and those being considered for this update. If not, what strategies are you considering? What strategies are you NOT considering?

4. Please give any other comments you have on these data. Use the back (or other sheets) if needed.

Please return by April 30, 2004, to:

Stephanie Griffin
Freese and Nichols, Inc.
4055 International Plaza, Suite 200
Fort Worth, Texas 76109
817-735-7491 (fax)

City of _________

REGION C WATER PLANNING GROUP

Senate Bill One Second Round of Regional Water Planning - Texas Water Development Board

c/o NTMWD
505 E. Brown Street
P. O. Box 2408
Wylie, Texas 75098-2408
972/442-5405
972/442-5405/Fax
jparks@ntmwd.com
www.regioncwater.org

March 24, 2004

The Honorable __________
____ County Judge
Address

Subject: Proposed Water Management Strategies for Regional Water Planning

Dear Judge _________

The Region C Water Planning Group is actively working on the update to the 2002 State Water Plan. The updated Region C Water Plan is to be completed by January 5, 2006. In September 2002 and again in January 2003, we sent you a survey on the projected population and water demands for ________ County. With your input, the population and water demand projections for this updated plan were approved by the Region C Water Planning Group and the Texas Water Development Board. The Planning Group is now evaluating available water supplies and proposed water management strategies. We again are seeking your input regarding the sources of water supplies and identification of water management strategies. Since a specific municipality or wholesale water provider will implement most of the strategies identified for municipal water needs, we are only asking your input on non-municipal water management strategies.

To help you understand the water issues in your county, we have attached a summary for ________ County that shows four sets of data. The first table presents the approved county population and water demand projections through 2060. The following graph compares the updated demands to those developed for the 2002 State Water Plan. The second table lists the sources of water for non-municipal water needs and the graph at the bottom of the page shows a comparison of the projected non-municipal demands to available supplies. Based on this data, we have identified the following key issues for your county.

- [Demand comparison summary]
- [Non-municipal water needs]
- [Major water providers in the county]
- [Other county-specific issues]
- [County summary for all needs]

To meet the projected non-municipal shortages in Collin County, the following water management strategies were proposed in the 2002 State Water Plan:

- [Insert Recommended Strategies from 2001 *Region C Water Plan*]

Additional strategies that are being considered for this update include:

- [Insert list of potential strategies]
-
-
-
-

We understand that you may not be directly familiar with these proposed strategies. However, if you are aware of any additional proposals to develop water for non-municipal uses, please provide your comments in the attached survey response sheet. If you have no comments or are in agreement with these water supply sources and management strategies, please check the appropriate box. Your response can be mailed or faxed to:

Stephanie Griffin
Freese and Nichols, Inc.
4055 International Plaza, Suite 200
Fort Worth, TX 76109
(817) 735-7353
FAX (817) 735-7491

Please provide your response by April 30, 2004. If you have any questions as you review these data, please call Stephanie Griffin. We greatly appreciate your attention and cooperation in reviewing these data, which will provide the basis for long-range water supply planning in Region C.

Yours very truly,

Jim Parks
Chairman, Region C Water Planning Group

C. Roy Eaton, Secretary

Region C Water Planning Group
Water Sources and Management Strategies for Non-Municipal Water Needs
Survey of Counties
Please Return by April 30, 2004

County:____________
Contact Person:_____________________________________
Telephone Number:_____________________FAX:_________________________________
Email Address:____
Mailing Address:____

☐ I have no comments on the identified water supply sources and proposed water management strategies for non-municipal use

☐ I have the following comments:
____
____
____
____
____
____
____
____

Please return by April 30, 2004, to:
Stephanie Griffin
Freese and Nichols, Inc.
4055 International Plaza, Suite 200
Fort Worth, Texas 76109

FAX (817) 735-7491

Region C Water Planning Group
Survey of Groundwater Conservation Districts
Please Return by July 31, 2004

Name of Groundwater Conservation District: ___________________________________
Contact Person:____
Telephone Number:____________________FAX:________________________________
Email Address:____
Mailing Address:____

1. Do you agree with the water availability of _______ acre-feet per year as recommended in the paragraph below Table 1 in the cover letter? If not, please provide documentation supporting the water availability you recommend.

2. The estimated demands for entities supplied from the Carrizo-Wilcox aquifer are shown in Table 2. Do you feel that these projected demands could be met from the Carrizo-Wilcox Aquifer in ________ County? These demands have taken into account other available supplies and have been reduced accordingly.

3. Do you have any comments on the comparison of supply and demand in Table 3?

4. Please provide any knowledge you may have regarding any of the water user groups listed in Table 2 and their future water supply plans. Do you expect that all of these entities will continue to use groundwater from the Carrizo-Wilcox aquifer? Do you know of any entities planning to develop additional groundwater or surface water supplies or enter into any contracts to purchase surface water?

5. Please give any other comments you have on these data. Use the back (or other sheets) if needed.

Please return by July 31, 2004, to:
Stephanie Griffin
Freese and Nichols, Inc.
4055 International Plaza, Suite 200
Fort Worth, Texas 76109

(817) 735-7491 (fax)

REGION C WATER PLANNING GROUP

Senate Bill One Second Round of Regional Water Planning - Texas Water Development Board

c/o NTMWD
505 E. Brown Street
P. O. Box 2408
Wylie, Texas 75098-2408
972/442-5405
972/442-5405/Fax
jparks@ntmwd.com

July 15, 2004

Mr. Robert Gresham
Mid-East Texas Groundwater Conservation District
P.O. Box 1359
Centerville, TX 75833

Subject: Groundwater Availability for Regional Water Planning

Dear Mr. Gresham:

The Region C Water Planning Group is actively working on the update to the 2002 State Water Plan. As part of this update, the Planning Group has to develop projected water demands for water user groups, quantify water supplies, and, if needed, identify water management strategies to meet projected shortages. We would appreciate input from the Mid-East Texas Groundwater Conservation District on groundwater availability in Freestone County, which is the only part of your district in our region.

One of the key elements we are trying to determine at this time is the amount of groundwater that is available for use. The Texas Water Development Board (TWDB) rules require that the Regional Water Planning Groups apply the Groundwater Availability Models (GAMs) to determine groundwater supplies available for long-term use, unless better information is available within the region.

Region C asked the TWDB to run the Northern and Central Carrizo-Wilcox GAMs assuming that the amount of available water supply was equivalent to recharge. The two models returned vastly different results for Freestone, Henderson, and Navarro Counties. The differing results are due to the fact that these counties are on the boundary of each model and the models do not necessarily behave as expected along the boundary. Region C used the more conservative water availability and asked the TWDB to rerun both models assuming the demand was equivalent to the water availability determined in the first request.

Table 1 shows the water availability as a result of the GAM. At this time, we are seeking your input as to whether or not these water availabilities seem reasonable to you. If they are unreasonable, we need documentation as to what you might consider a reasonable amount of dependable water supply to be. Over 50 years, the GAM indicates that the water level in Freestone County in the Carrizo layer of the aquifer would drop by 20 feet and the water level in the Simsboro layer would drop by 120 feet with these demands.

Table 1
Groundwater Supplies Available in the Carrizo-Wilcox Aquifer Based on Results of Central Carrizo-Wilcox GAM during Average Year Weather Conditions (Acre-Feet per Year)

County	Basin	2000	2010	2020	2030	2040	2050	2060
Freestone	Trinity	31,096	31,096	31,096	31,096	31,096	31,096	31,096
Freestone	Brazos	5,320	5,320	5,320	5,320	5,320	5,320	5,320
Henderson	Trinity	10,008	10,008	10,008	10,008	10,008	10,008	10,008
Navarro	Trinity	2,199	2,199	2,199	2,199	2,199	2,199	2,199
Region C Total		48,623	48,623	48,623	48,623	48,623	48,623	48,623

We understand that the Mid-East Texas Groundwater Conservation District has concerns with the groundwater availability as shown in Table 1. An alternative approach would be to assume an availability of approximately twice the year 2000 demand at 5,000 acre-feet per year throughout the planning period for Freestone County. This would be significantly less than the availability shown in Table 1 but would be sufficient to allow the entities in Freestone County currently using groundwater to continue using that water supply.

Table 2 shows the year 2000 demand placed on the Carrizo-Wilcox aquifer in Freestone County according to TWDB records. Table 2 also shows the projected groundwater demands for entities that are currently supplied from the Carrizo-Wilcox aquifer.

Table 2
Historical and Projected Water Demands Expected for Entities Currently Supplied from the Carrizo-Wilcox Aquifer in Freestone County (Acre-Feet per Year)

Water User Group	2000	2010	2020	2030	2040	2050	2060
Fairfield	707	1,120	1,208	1,297	1,383	1,482	1,588
Flo Community WSC	20	20	20	20	20	19	19
Teague	378	536	720	773	839	906	982
Turlington WSC	24	29	36	35	35	34	34
Wortham	144	246	253	255	252	251	251
County-Other	685	808	881	924	941	967	995
Livestock	507	507	507	507	507	507	507
Mining	57	77	87	93	99	105	110
Freestone County Total	2,522	3,343	3,712	3,904	4,076	4,271	4,486

Notes:

- Livestock and mining also have groundwater supplies in the Queen City aquifer. The GAM for that aquifer is not yet available. Livestock also has supplies from Other Aquifer. Region C is assuming that the supplies available from these aquifers are the same as what was approved in the 2002 State Water Plan and have subtracted those supplies from the demands being placed on the Carrizo-Wilcox aquifer.
- County-Other also has surface water supplies from Tarrant Regional Water District. The demand shown has been reduced by the amount of surface water supplies available.

Table 3 shows the comparison of groundwater supplies assumed to be available from Table 1 and the demands for entities currently supplied from the aquifer as shown in Table 2.

Table 3
Comparison of Supply and Demand in Carrizo-Wilcox Aquifer in Freestone County
(Acre-Feet per Year)

Comparison	2000	2010	2020	2030	2040	2050	2060
Supply	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Demand	2,522	3,343	3,712	3,904	4,076	4,271	4,486
Supply Less Demand	2,478	1,657	1,288	1,096	924	729	514

The attached survey provides space for you to respond to the information presented in this letter. Region C would greatly appreciate your input as to the amount of groundwater you believe is available on a long-term reliable basis in your area.

If you have any questions or want additional information as you review these data, please call Stephanie Griffin at (817) 735-7353. We greatly appreciate your attention and cooperation in reviewing these data, which will provide the basis for long-range water supply planning in Region C.

Sincerely,

Tom Gooch
Freese and Nichols, Lead Consultant for Region C Water Planning Group

C: Jim Parks, Chair of Region C Water Planning Group
Roy Eaton, Secretary
Connie Standridge
Jim McCarter

Region C Water Planning Group
Survey of Groundwater Conservation Districts
Please Return by July 31, 2004

Name of Groundwater Conservation District:
<u>Mid-East Texas Groundwater Conservation District</u>
Contact Person:____
Telephone Number:____________________FAX:______________________________
Email Address:____
Mailing Address:____

1. Do you agree with the water availability of 5,000 acre-feet per year as recommended in the paragraph below Table 1 in the cover letter? If not, please provide documentation supporting the water availability you recommend.

2. The estimated demands for entities supplied from the Carrizo-Wilcox aquifer are shown in Table 2. Do you feel that these projected demands could be met from the Carrizo-Wilcox Aquifer in Freestone County? These demands have taken into account other available supplies and have been reduced accordingly.

3. Do you have any comments on the comparison of supply and demand in Table 3?

4. Please provide any knowledge you may have regarding any of the water user groups listed in Table 2 and their future water supply plans. Do you expect that all of these entities will continue to use groundwater from the Carrizo-Wilcox aquifer? Do you know of any entities planning to develop additional groundwater or surface water supplies or enter into any contracts to purchase surface water?

5. Please give any other comments you have on these data. Use the back (or other sheets) if needed.

Please return by July 31, 2004, to:
Stephanie Griffin
Freese and Nichols, Inc.
4055 International Plaza, Suite 200
Fort Worth, Texas 76109

(817) 735-7491 (fax)

REGION C WATER PLANNING GROUP

Senate Bill One Second Round of Regional Water Planning - Texas Water Development Board

July 15, 2004

Ms. Glenda Kindle
Neches and Trinity Valleys Groundwater Conservation District
P.O. Box 1387
Jacksonville, TX 75766

Subject: Groundwater Availability for Regional Water Planning

Dear Ms. Kindle:

The Region C Water Planning Group is actively working on the update to the 2002 State Water Plan. As part of this update, the Planning Group has to develop projected water demands for water user groups, quantify water supplies, and, if needed, identify water management strategies to meet projected shortages. We would appreciate input from the Neches and Trinity Valleys Groundwater Conservation District on groundwater availability in the Trinity Basin portion of Henderson County, which is the only part of your district in our region.

One of the key elements we are trying to determine at this time is the amount of groundwater that is available for use. The Texas Water Development Board (TWDB) rules require that the Regional Water Planning Groups apply the Groundwater Availability Models (GAMs) to determine groundwater supplies available for long-term use, unless better information is available within the region.

Region C asked the TWDB to run the Northern and Central Carrizo-Wilcox GAMs assuming that the amount of available water supply was equivalent to recharge. The two models returned vastly different results for Freestone, Henderson, and Navarro Counties. The differing results are due to the fact that these counties are on the boundary of each model and the models do not necessarily behave as expected along the boundary. Region C used the more conservative water availability and asked the TWDB to rerun both models assuming the demand was equivalent to the water availability determined in the first request.

Table 1 shows the water availability as a result of the GAM. At this time, we are seeking your input as to whether or not these water availabilities seem reasonable to you. If they are unreasonable, we need documentation as to what you might consider a reasonable amount of dependable water supply to be. In Henderson County over the 50 year time period, the GAM indicates that the water level in the Carrizo layer of the aquifer would drop by 20 feet and the water level in the Simsboro layer would drop by 40 feet with these demands.

c/o NTMWD
505 E. Brown Street
P. O. Box 2408
Wylie, Texas 75098-2408
972/442-5405
972/442-5405/Fax
jparks@ntmwd.com

Table 1
Groundwater Supplies Available in the Carrizo-Wilcox Aquifer Based on Results of Central Carrizo-Wilcox GAM during Average Year Weather Conditions
(Acre-Feet per Year)

County	Basin	2000	2010	2020	2030	2040	2050	2060
Freestone	Trinity	31,096	31,096	31,096	31,096	31,096	31,096	31,096
Freestone	Brazos	5,320	5,320	5,320	5,320	5,320	5,320	5,320
Henderson	Trinity	10,008	10,008	10,008	10,008	10,008	10,008	10,008
Navarro	Trinity	2,199	2,199	2,199	2,199	2,199	2,199	2,199
Region C Total		48,623	48,623	48,623	48,623	48,623	48,623	48,623

The Mid-East Texas Groundwater Conservation District (Freestone County-area) has concerns with the groundwater availability as shown in Table 1. An alternative approach would be to assume an availability of approximately twice the year 2000 demand at 4,200 acre-feet per year throughout the planning period in the Trinity Basin portion of Henderson County. This would be significantly less than the availability shown in Table 1 but would be sufficient to allow the entities in Henderson County (Trinity Basin) currently using groundwater to continue using that water supply.

Table 2 shows the year 2000 demand placed on the Carrizo-Wilcox aquifer in the Trinity Basin of Henderson County according to TWDB records. Table 2 also shows the projected groundwater demands for entities that are currently supplied from the Carrizo-Wilcox aquifer.

Table 2
Historical and Projected Water Demands Expected for Entities Currently Supplied from the Carrizo-Wilcox Aquifer in the Trinity Basin of Henderson County
(Acre-Feet per Year)

Water User Group	2000	2010	2020	2030	2040	2050	2060
Athens	562	562	562	562	562	562	562
Bethel-Ash WSC	139	163	194	222	253	290	342
Eustace	118	149	161	172	183	199	221
Log Cabin	71	96	128	144	142	141	141
Malakoff	210	210	210	210	210	210	210
Virginia Hill WSC	353	393	384	375	366	361	364
County-Other	110	107	105	103	100	99	99
Livestock	503	503	503	503	503	503	503
Mining	48	111	148	173	198	224	245
Henderson County Total	2,114	2,294	2,395	2,464	2,517	2,589	2,687

Notes:

- Livestock also has groundwater supplies in the Queen City aquifer. The GAM for that aquifer is not yet available. County Other and Livestock also have supplies from Other Aquifer. Region C is assuming that the supplies available in the 2001 plan are available for this plan.
- Athens gets surface water from Lake Athens. County-Other and Mining also have surface water supplies from Tarrant Regional Water District. Livestock has

run-of-river supplies as well. The demand shown has been reduced by the amount of surface water supplies for these uses.

Table 3 shows the comparison of groundwater supplies assumed to be available from Table 1 and the demands for entities currently supplied from the aquifer as shown in Table 2.

Table 3
Comparison of Supply and Demand in Carrizo-Wilcox Aquifer in Freestone County
(Acre-Feet per Year)

Comparison	2000	2010	2020	2030	2040	2050	2060
Supply	4,200	4,200	4,200	4,200	4,200	4,200	4,200
Demand	2,114	2,307	2,420	2,503	2,573	2,667	2,790
Supply Less Demand	2,086	1,893	1,780	1,697	1,627	1,533	1,410

The attached survey provides space for you to respond to the information presented in this letter. Region C would greatly appreciate your input as to the amount of groundwater you believe is available on a long-term reliable basis in your area.

If you have any questions or want additional information as you review these data, please call Stephanie Griffin at (817) 735-7353. We greatly appreciate your attention and cooperation in reviewing these data, which will provide the basis for long-range water supply planning in Region C.

Sincerely,

Tom Gooch
Freese and Nichols, Lead Consultant for Region C Water Planning Group

C: Jim Parks, Chair of Region C Water Planning Group
Roy Eaton, Secretary
Connie Standridge
Jim McCarter

Region C Water Planning Group
Survey of Groundwater Conservation Districts
Please Return by July 31, 2004

Name of Groundwater Conservation District:
Neches and Trinity Valleys Groundwater Conservation District
Contact Person:____
Telephone Number:____________________FAX:____________________
Email Address:____
Mailing Address:____

1. Do you agree with the water availability of 4,200 acre-feet per year as recommended in the paragraph below Table 1 in the cover letter? If not, please provide documentation supporting the water availability you recommend.

2. The estimated demands for entities supplied from the Carrizo-Wilcox aquifer are shown in Table 2. Do you feel that these projected demands could be met from the Carrizo-Wilcox Aquifer in the Trinity Basin portion of Henderson County? These demands have taken into account other available supplies and have been reduced accordingly.

3. Do you have any comments on the comparison of supply and demand in Table 3?

4. Please provide any knowledge you may have regarding any of the water user groups listed in Table 2 and their future water supply plans. Do you expect that all of these entities will continue to use groundwater from the Carrizo-Wilcox aquifer? Do you know of any entities planning to develop additional groundwater or surface water supplies or enter into any contracts to purchase surface water?

5. Please give any other comments you have on these data. Use the back (or other sheets) if needed.

Please return by July 31, 2004, to:
Stephanie Griffin
Freese and Nichols, Inc.
4055 International Plaza, Suite 200
Fort Worth, Texas 76109

(817) 735-7491 (fax)

Table S-1
Summary of Survey Responses by Water
User Groups on Current and Future Water Supplies

WUG/Name of Political Subdivision	Survey Returned	Demands	Sources	Proposed Strategies	Follow-Up?	Comments
Able Springs WSC						
Addison	Yes	Okay	Okay	Okay	Yes	Implementing conservation rate and other conservation measures. Considering ASR. City Engineer wants to study ASR to use for shaving peak needs, but he has not been able to convince the City Manager to study the idea. City Engineer would like to pursue TWDB funding to study the project.
Aledo						
Allen	Yes	Too High	Okay	Okay		Considering NTMWD model plan conservation strategies.
Alvord						
Anna						
Annetta						
Annetta South						
Argyle						
Argyle WSC	Yes	???	Okay	Okay		Expect to grow 5-7% per year for at least 10-20 years.
Arlington	Yes	Okay	Okay	Okay		
Athens	Yes	Okay	Okay	Okay		Communicated with Athens MWA, which is also okay with the projections.
Aubrey						
Aurora						
Azle						
Balch Springs						
Bardwell	Yes	Okay	Okay	???	Attempted	Left message with assistant on June 23, 2004.
Bartonville						
Bartonville WSC						
Bedford	Yes	Okay	Okay			
Bells	Yes	Okay to High	Okay	Okay		Population projections may be high.
Benbrook	Yes	Okay	Okay	Okay		Expansion may be faster than shown.
Bethel-Ash WSC	Yes	Too Low		Okay		Population should be about twice as high in 2060.
Bethesda WSC	Yes	Okay	Okay	Okay		
Blackland WSC	Yes	Okay	Okay	Okay		
Blooming Grove						
Blue Mound						Served by Tecon and will not respond.
Blue Ridge						
Bolivar WSC	Yes	Okay	See Comment	Okay		Denton and GTUA are possible additional sources.
Bonham	Yes	Okay	Okay	Okay		
Boyd						
Brandon-Irene WSC	Yes	Okay	Okay	Okay		
Bridgeport						
Bryson						
Buena Vista - Bethel SUD	Yes	Okay	Okay	Okay		
Burleson	Yes	Okay	Okay	Okay		Population may be too low.

Table S-1
Summary of Survey Responses by Water
User Groups on Current and Future Water Supplies

WUG/Name of Political Subdivision	Survey Returned	Demands	Sources	Proposed Strategies	Follow-Up?	Comments
Caddo Basin SUD	Yes	Too Low	Okay	Okay		Population growing 10% per year.
Carrollton	Yes	Okay	See Comment	See Comment		Feels survey is too early to identify future strategies.
Cash WSC	Yes	Too Low	See Comment	See Comment		2003 population is 15,740; 1,562 acre-feet retail sales; 315 acre-feet wholesale sales. Cash has been growing 4% per year. Cash has 1,792 ac-ft/yr with NTMWD and 3,585 acre-feet per year with SRA.
Cedar Hill	***** See Wholesale Water Provider survey results. *****					
Celina	Yes	Too Low	See Comment	See Comment	Yes	Demand should be based on 250 gpcd (like other area suburbs). City now has a contract with UTRWD (1.5 mgd, to 3.0 mgd by 2007). We will note the 250 gpcd request. Celina currently produces their own groundwater and purchases treated surface water from Upper Trinity RWD. City would like to include NTMWD and GTUA as potential additional sources of supply to their current groundwater and UTRWD water supplies.
Chatfield WSC	Yes	Okay	Okay	See Comment		"Until the state of Texas gets enough backbone to stop the unlimited pumping of good treated water on the ground to grow grass, etc., so that everybody can keep up with the 'Jones' as who has the greenest yard, all strategies are a joke."
Chico						
Cockrell Hill						
College Mound WSC						
Colleyville						
Collinsville	Yes	Okay - See Comment	Okay	Okay		Demands may be too low if growth continues at current rate.
Combine	Yes	Too Low	Okay	Okay		NCTCOG and city project faster growth. Served by Combine WSC.
Combine WSC	Yes		Okay	See Comment		"Conservation is a must. Elimination of outside sprinkling systems is the most practical answer."
Community Water Company	Yes	Okay	Okay	Okay		
Community WSC	Yes	Okay	Okay	Okay		
Coppell	Yes	2000 Actual too Low	Okay	Okay	Yes	Feels that 2000 actual demands are inaccurate (low). Wants to see projected supplies with new supply projects as well as current supply. We will show future supplies and future demands on the same graph once the future supplies have been determined.
Copper Canyon						
Corinth						
Corsicana	***** See Wholesale Water Provider survey results. *****					
Crandall	Yes	Too Low	Okay	Okay		Want to participate in future regional water supplies developed by NTMWD or any other wholesaler.
Cross Roads						
Crowley	Yes	Too Low	Okay	Okay		
Culleoka WSC	Yes	Okay	See Comment	See Comment	*	Currently contracting with the City of Princeton. Princeton has indicated that it will not increase amount (inadequate) and will not extend contract beyond 2020. NTMWD will not respond to requests for direct purchase. Help would be appreciated.
Dallas	***** See Wholesale Water Provider survey results. *****					
Dallas County WCID #6						
Dalworthington Gardens						
Danville WSC	Yes	Okay	Okay	Okay		
Dawson	Yes	Okay	Okay	Okay		
Decatur						

Table S-1
Summary of Survey Responses by Water
User Groups on Current and Future Water Supplies

WUG/Name of Political Subdivision	Survey Returned	Demands	Sources	Proposed Strategies	Follow-Up?	Comments
Denison						
Denton	***** See Wholesale Water Provider survey results. *****					
Denton County FWSD	Yes	See Comment	See Comment	See Comment	Yes	Population and demand projections too low early, too high late. May turn to Lewisville for additional supply when they need more than the 2.7 mgd currently contracted with UTRWD. Denton County FWSD is annexable by Lewisville. They have a good relationship with the City. The FWSD would likely get additional supplies above the 2.7 MGD currently contracted with UTRWD from the City of Lewisville.
DeSoto						
Double Oak	Yes	Okay	Okay	Okay		
Duncanville						
East Cedar Creek FWSD						
East Fork SUD						
Ector	Yes	Too Low	See Comment			May also go to the Trinity aquifer.
Edgecliff Village						
Ennis	Yes					Ennis should get 55 percent of the yield of Lake Bardwell (by contract). Beginning 10/01/05, Ennis can get 3,988 acre-feet per year from TRWD. Ennis sells to East Garrett, Community, and Rice WSCs.
Euless	Yes	Okay	Okay	Okay		
Eustace	Yes	Okay	Okay	Okay		
Everman						
Fairfield	Yes	Okay	Okay	Okay		
Fairview	Yes	Okay	Okay	Okay		
Farmers Branch						
Farmersville						
Ferris	Yes	Too Low	See Comment			Expects population to double in next 10 years. Add Dallas as a water supply option.
Files Valley WSC	Yes	Too Low	See Comment			They only use surface water from Aquilla WSC. They supply Milford (84 ac-ft from Files, 43 from wells in 2003) and Parker WSC (151 ac-ft from Files, 82 from wells in 2003). They used 701 ac-ft in 2003.
Flo Community WSC						
Flower Mound						
Forest Hill	Yes	Okay	Okay	Okay		
Forney	***** See Wholesale Water Provider survey results. *****					
Forney Lake WSC						
Fort Worth	***** See Wholesale Water Provider survey results. *****					
Frisco	Yes	See Comment	Okay	Okay		Population and demand projections too low early, too high late.
Frost	Yes	Okay	Okay	Okay	*	
Gainesville	Yes	Okay	See Comment	See Comment	*	Survey says "Woodbine Aquifer?" Gainesville plans to develop surface water from Moss Lake up to 8,060 acre-feet per year.
Garland	***** See Wholesale Water Provider survey results. *****					
Gastonia-Scurry WSC	Yes	Okay	Okay	Okay		
Glenn Heights						

Table S-1
Summary of Survey Responses by Water
User Groups on Current and Future Water Supplies

WUG/Name of Political Subdivision	Survey Returned	Demands	Sources	Proposed Strategies	Follow-Up?	Comments
Grand Prairie	Yes	Too Low - See Comment	Okay	See Comment		Refers to Freese and Nichols Water System Master Plan currently underway for projections. Considering wholesale purchase from Midlothian.
Grapevine	Yes	Too High	Okay	Okay	*	
Gun Barrel City	Yes					Water/Sewer utilities are provided by East Cedar Creek Fresh Water
Gunter						
Gunter SUD	Yes	Okay	Okay	Okay		
Hackberry						
Haltom City	Yes	Okay	Okay	Okay		
Haslet	Yes	Okay	Okay	Okay		
Heath	Yes	Okay	Okay			Plan to purchase directly from (rather than from Rockwall) NTMWD starting this year.
Hebron						
Hickory Creek						
Hickory Creek SUD	Yes	See Comment	Okay	Okay		Demand is too high early, too high late.
High Point WSC						
Highland Park	Yes	Okay	Okay	See Comment	Yes	Didn't see proposed water management strategies. City had called CPYI to get more information on the survey. City plans to continue using Dallas County Park Cities MUD.
Highland Village	Yes	Okay	Okay	Okay		
Honey Grove	Yes	Okay	See Comment	See Comment		Supply should be 653 acre-feet per year.
Howe	Yes	See Comment	Okay	See Comment		Hard to tell, but growth seems to be higher than the projections. Part of water supply coalition with Van Alstyne, Anna, and Melissa.
Hudson Oaks						
Hurst						
Hutchins						
Irving	Yes	Okay		See Comment	Yes	Potential strategies include reuse, Lake Ralph Hall, Marvin Nichols I, Wright Patman, and Oklahoma water.
Italy	Yes	Okay	See Comment	See Comment		More surface water supplies needed in southern Ellis County.
Jacksboro						Indicated that they have no comments.
Johnson County Rural WSC						
Josephine						
Justin						
Kaufman	Yes	Okay	Okay	Okay		
Keller						
Kemp	Yes	Too Low	See Comment	See Comment	Yes	Plan $3.5 million in improvements to improve quality, provide additional supplies, and serve Becker-Jiba WSC. Kemp is updating their water treatment plant facilities (Table 1 in City's response is in progress). Becker-Jiba WSC has indicated that they would like to buy water from Kemp instead of Kaufman. If the WSC helps, then Kemp would do the projects listed in their response Table 4. Otherwise, Kemp will focus on the projects listed in their response tables 1, 2 and 3.
Kennedale						

Table S-1
Summary of Survey Responses by Water
User Groups on Current and Future Water Supplies

WUG/Name of Political Subdivision	Survey Returned	Demands	Sources	Proposed Strategies	Follow-Up?	Comments
Kerens	Yes	Okay	Okay	Okay		
Kiowa Homeowners WSC						
Krugerville						
Krum						
Ladonia	Yes		Okay	See Comment		Supports proposed Ralph Hall Lake.
Lake Dallas	Yes	See Comment	See Comment	See Comment		All water from Lake Cities MUD.
Lake Worth	Yes	Okay	See Comment	See Comment	Yes	Planned $2.0 million project to remove wells and add ground storage. The groundwater wells are not needed and are not cost effective to maintain. Lake Worth will probably increase its water supply from Fort Worth.
Lakeside						
Lancaster						
Lavon WSC	Yes	Too Low	See Comment		Yes	Questions the reduction in supply from NTMWD. Explained that the reduction is supply is due to sedimentation in the existing reservoirs.
Leonard	Yes	Okay	Okay	Okay		
Lewisville	Yes	Too High	See Comment	See Comment		Lewisville plans to get future supplies from Dallas, with UTRWD providing water around 2050 if needed.
Lincoln Park						
Lindsay	Yes	Too Low	See Comment			Current supply (from Trinity Aquifer) is adequate for foreseeable future.
Little Elm	Yes	Okay	Okay	Okay		
Log Cabin						
Lowry Crossing						
Lucas	Yes	Okay	Okay	Okay		
Luella WSC	Yes	Okay	Okay	Okay		
M E N WSC						
Mabank	Yes	Okay	Okay	Okay		
Mac Bee WSC						
Malakoff	Yes	Okay	See Comment	See Comment	Attempted	Not considering new wells. Will begin using Cedar Creek water in June 2004. Left message on June 24, 2004.
Mansfield	Yes	Too Low	Okay	See Comment	*	Population projections are too low, and per capita use will also increase. Water Plant expansion underway, and another one planned for 2010 time-frame.
Maypearl	Yes	Too Low	See Comment			Responded by telephone. Have Trinity and Woodbine wells. Population growth higher than projected.
McKinney	Yes	See Comment	Okay	Okay		Too low early, too high late. Project extremely rapid population growth through 2030, with build-out lower than 2060 projection.
McLendon-Chisholm						
Melissa	Yes	Okay	Okay			
Mesquite	Yes	Okay	Okay	Okay		
Midlothian	***** See Wholesale Water Provider survey results. *****					
Milford	Yes	Okay	Okay	Okay		

Table S-1
Summary of Survey Responses by Water
User Groups on Current and Future Water Supplies

WUG/Name of Political Subdivision	Survey Returned	Demands	Sources	Proposed Strategies	Follow-Up?	Comments
Milligan WSC	Yes	Too Low	Okay	Okay		
Mineral Wells	Yes	Okay	Okay	Okay		
Mountain Peak WSC						
Mt Zion WSC						
Muenster	Yes	Okay	Okay	Okay		
Murphy						
Mustang SUD	Yes	Too Low	Okay	Okay		
Navarro Mills WSC	Yes	Okay	Okay	Okay		
Nevada						
New Fairview						
New Hope						
Newark						
North Collin WSC	Yes	Okay	Okay	Okay		Population may grow faster than projected.
North Hunt WSC	Yes	Okay	See Comment	See Comment		Currently have wells, purchase from Commerce (negotiating amount), purchase from Ladonia. Not considering purchase from NTMWD. Considering drilling wells and regional system from Ralph Hall.
Northlake	Yes	Too Low	See Comment	See Comment		All water is currently from Fort Worth. Not planning to purchase from UTRWD. Planning to meet growth from Fort Worth.
North Richland Hills	***** See Wholesale Water Provider survey results. *****					
Oak Grove						
Oak Leaf	Yes	Too Low	See Comment			Currently get water from Glenn Heights, Rockett SUD, and Sardis-Lone Elm WSC.
Oak Point						
Ovilla	Yes		See Comment	See Comment	*	Responded by telephone. Ovilla buys water from Dallas and lets Dallas plan for the supply.
Palmer						
Pantego	Yes	Okay	Okay	Okay		Responded by telephone.
Parker						
Payne Springs						
Pecan Hill	Yes					Indicated that town is served by Rockett SUD and deferred to Rockett SUD for responses.
Pelican Bay	Yes	Okay	Okay	See Comment		Currently constructing 75 gpm well and 150,000 gallon ground storage tank. Have plans for six more.
Pilot Point	Yes	Okay	Okay			
Plano	Yes	Too High	Okay	Okay	*	Population projections are too high.
Ponder	Yes	Okay	Okay	Okay		Would like too use wells as long as possible and possibly even drill more.
Pottsboro	Yes	Okay	Okay	Okay		
Princeton	Yes	Okay	Okay	Okay		
Prosper	Yes	Okay	Okay	Okay		
R C H WSC	Yes	Okay	See Comment	Okay		RCH gets water from City of Rockwall, not from Mount Zion WSC.
Red Oak						

Table S-1
Summary of Survey Responses by Water
User Groups on Current and Future Water Supplies

WUG/Name of Political Subdivision	Survey Returned	Demands	Sources	Proposed Strategies	Follow-Up?	Comments
Reno						
Rhome	Yes	Okay	Okay	Okay		
Rice						
Rice WSC						
Richardson	Yes	See Comment				Commented on population, but their numbers almost exactly match Region C numbers.
Richland Hills	Yes	Okay	See Comment	Okay		Commented that they get water from the Paluxy as well as the Trinity. Groundwater is 30-40% of demand.
River Oaks	Yes	Okay	Okay	Okay		
Roanoke						
Rockett SUD						
Rockwall	***** See Wholesale Water Provider survey results. *****					
Rowlett	Yes	Okay	Okay	Okay		Said demands are okay but included population projections with build out lower than projections.
Royse City	Yes	Too Low	Okay	Okay		
Runaway Bay	Yes	Okay	Okay	Okay		
Sachse						
Saginaw						
Saint Paul	Yes	Okay	Okay			
Sanger						
Sansom Park						
Sardis-Lone Elm WSC	Yes	Too Low	Okay	Okay		Surface water needed ultimately.
Savoy	Yes	Okay	Okay	Okay		
Seagoville						
Seven Points						
Shady Shores						
Sherman	Yes	Too Low	See Comment	See Comment	*	Sherman provided considerable information. They want to pursue water from Lower Bois d'Arc Creek Lake or othe affordable supplies. They show a higher total supply from current sources than we do. They say that they are not currently purchasing water from GTUA.
South Grayson WSC						
Southlake						
Southmayd						
Southwest Fannin County SUD						
Springtown						
Sunnyvale						
Talty	Yes	See Comment	See Comment	See Comment		Service Is provided by Talty WSC and Gastonia-Scurry WSC.
Teague						
Terrell	***** See Wholesale Water Provider survey results. *****					
The Colony	Yes	Okay	Okay	Okay		
Tioga	Yes	Okay	Okay	Okay		

Table S-1
Summary of Survey Responses by Water User Groups on Current and Future Water Supplies

WUG/Name of Political Subdivision	Survey Returned	Demands	Sources	Proposed Strategies	Follow-Up?	Comments
Tom Bean	Yes	Maybe Too Low	Okay	New Well within 2 years		New well will be in the Trinity Aquifer.
Tool						
Trenton						
Trinidad						
Trophy Club						
Turlington WSC	Yes	Okay	Okay	Okay		
Two Way WSC	Yes	Okay	See Comment	Okay		Currently drilling another well in the Trinity Aquifer.
University Park						
Valley View	Yes					Supplied by Bolivar WSC.
Van Alstyne						
Virginia Hill WSC	Yes	Okay	Okay	Okay		
Walnut Creek SUD	Yes	Okay	Okay	Okay		
Watauga	Yes	Okay	Okay	Okay		
Waxahachie	***** See Wholesale Water Provider survey results. *****					
Weatherford	***** See Wholesale Water Provider survey results. *****					
West Cedar Creek MUD	Yes	Okay	Okay	Okay		
West Wise Rural WSC	Yes	Too Low	See Comment	See Comment		They have been growing 3.8% per year in recent years. West Wise Rural WSC has a contract with TRWD for 1,120 acre-feet per year. They buy 28 acre-feet per year from Walnut Creek SUD. They sell only 11 acre-feet per year to Chico. Between 2020 and 203
Weston	Yes	Too Low	Okay	See Comment		Weston is a participant in the GTUA/NTMWD pipeline project with Anna, Melissa, Howe, and Van Alstyne.
Westover Hills						
Westworth Village						
White Settlement	Yes	Okay	See Comment	Okay		Groundwater quantity is too low - the city produces 1.08 mgd.
Whitesboro	Yes	Okay	Okay	Okay		Response by telephone.
Whitewright						
Willow Park						Not planning to respond at this time.
Wilmer	Yes	Okay	Okay	Okay		
Woodbine WSC						
Wortham						
Wylie						

Table S-2
Summary of Survey Responses by Wholesale Water Providers on Current and Future Water Supplies

Name of Wholesale Water Provider	Survey Returned/Met	Demands	Sources	Proposed Strategies	Follow-Up?	Comments
Athens MWA	Yes	Okay	Okay	Okay		Based on Communication from City of Athens. Added local irrigation demands at Lake Athens.
Cedar Hill						WWP does not have time to return completed survey to us.
Corsicana	Yes	Okay	Okay	See Comments		Corsicana plans to develop supplies from Richland-Chambers Lake and to expand the Lake Halbert supply in conjunction with that.
Dallas	Yes	Okay	See Comments	See Comments		Currently plant capacities are Elm Fork - 310 mgd, Bachman - 120 mgd, and Eastside 440 mgd. Bachman will be increased to 150 mgd by 2006, Eastside to 540 mgd by 2009 and 700 mgd ultimately. New southeast plant at 100 mgd by 2015, up to 200 mgd ultimately. Sources of supply to consider include return flows above the lakes, Lake Fork connection, Lake Palestine connection, Marvin Nichols 1, reuse, treatment plant expansions, Toledo Bend, Lake Texoma, Cypress basin, Oklahoma, Wright Patman reallocation, Carrizo-Wilcox water, Lake Columbia, additional Lake Palestine, and Sam Rayburn. Contract with Rockett SUD, Red Oak, and Waxahachie has been approved. Ovilla and Combine (now indirect customers) may become direct customers. Other potential customers include Ennis, Ferris, North Texas MWD, Palmer, customers of Rockett SUD, Wilmer, Celina (through UTRWD), Bolivar WSC (through UTRWD), and Valley View (through UTRWD and Bolivar WSC).
Dallas County Park Cities MUD	Yes	Okay	Okay	No comment		
Denton						
Forney	Yes	Too Low	Okay	Okay		Forney sees more rapid growth than projected. Forney has been approached by High Point, Talty WSC, and Markout WSC for the purchase of water. However, they may buy directly from NTMWD. There are many MUDs and FWSDs forming in Kaufman County, and they may drive much more rapid growth than projected. (See meeting notes.)
Fort Worth	Yes	Too Low	Okay	See Comments		Fort Worth sees more rapid growth than projected. Aledo and Aquasource in southwest Denton County are possible future customers. Plans to expand treatment capacity from 370 mgd to 755 mgd by 2023. Would like to consider using BRA water.
Garland	Yes		Okay	Okay		Will sell additional reuse water if they find customers.
Greater Texoma Utility Authority	Yes	Okay	Okay	See Comments		Reviewed potential water supply strategies in detail. Plan to pursue water from Lake Texoma.
Lake Cities MUA	Yes	See Comments	See Comments	No comment		Expects demands to peak at 2,000 af/y in 2020 when customer cities reach buildout. Groundwater is used for peak needs and capacity is 500 gpm due to pump station limitations. Contract with UTRWD is 3.8 MGD. Lake Cities does not plan to drill new wells.
Midlothian	Yes	No comment	See Comments	No comment		City has secured a long term contract for additional water from TRWD (6.0 MGD). Minimum take or pay of 1.5 MGD beginning 9/2012. Minimum take or pay of 3.0 MGD beginning 9/2022.
Midlothian Water District						
North Richland Hills	Yes	See Comments	Okay	Okay		Projections appear accurate to 2020. However projected buildout is in that same time frame based on current data. Demand should level-off to an extent, with only slight increases beyond that.
North Texas MWD	Yes	Okay	Okay	See Comments		Current water treatment plant capacity is 630 mgd, with plans for 140 mgd more by 2007 and another 140 mgd by 2012. Currently planned sources include conservation, additional Wilson Creek reuse, additional Texoma water, Oklahoma water, Lower Bois d'Arc Creek lake, Marvin Nichols I, Toledo Bend/Lake Fork water, and East Fork reuse. Other options to investigate include more Texoma water, Mesa groundwater, treated water from Dallas, and others.
Parker County UD #1	Yes	Okay	Okay	Okay		None
Rockwall	Yes	Okay	Okay	Okay		Chuck Todd, City Engineer for the City of Rockwall, via phone call agrees with projections; agrees with current supplies; agrees with suggested future supplies; and has no comments on the regional water planning process.
Sabine River Authority	Yes	See Comments	Okay	See Comments		Region C is working with the SRA to determine demands for upper basin customers on SRA sources. Add strategy of moving water from Toledo Bend to supply upper basin customers.
Sulphur River Water District	Yes	Okay	Okay	Okay		None

Table S-2
Summary of Survey Responses by Wholesale Water Providers on Current and Future Water Supplies

Name of Wholesale Water Provider	Survey Returned/Met	Demands	Sources	Proposed Strategies	Follow-Up?	Comments
Tarrant Regional Water District	Yes	Okay				Potential customers include Johnson and Ellis Counties Other, Buena Vista-Bethel SUD, Italy, Maypearl, Annetta (through Weatherford), Hudson Oaks (Weatherford), Willow Park (Weatherford), Parker County Other (Weatherford), Kennedale (Fort Worth or Arlington), and Pantego (Fort Worth or Arlington). Potential sources of additional supply include Richland-Chambers high service (2005), West Fork connection (2008), Richland-Chambers reuse (by 2010), Cedar Creek reuse (by 2020), third east Texas pipeline (around 2018), Toledo Bend, Oklahoma water, Marvin Nichols. Other options include Lake Texoma and developing Lake Tehuacana.
Terrell	Yes	Okay	Okay	Okay		
Trinity River Authority	Yes	Okay	See Comments	See Comments		TRA is concerned with the way that existing TRWD supplies are divided.
Upper Neches Municipal Water Authority	Yes	Too Low - See Comment				Region I demands around Tyler are too low. UNRMWA has about 20,000 acre-feet per year of uncommitted supply, but they are not interested in selling the water at this time. Tyler has completed facilities to use Lake Palestine water. UNRMWA has a very good relationship with Dallas. Maintaining that good relationship is a priority.
Upper Trinity RWD	Yes	Too Low. See Comment	Okay	See Comments		Population and demands for Celina are too low, while they are too high for Lewisville and Flower Mound. Extensive comments on future supplies. (See meeting notes.)
Waxahachie	Yes	See Comments	See Comments	Okay	*	Waxahachie has a contract for 1.5 mgd sales to Rockett SUD, part of which passes through to Ferris, Pecan Hill and Red Oak. The three cities are not customers of Waxahachie. Waxahachie has a contract for 5,213 acre-feet per year with TRWD and will also take 1,772 acre-feet per year from TRWD to pass through for Rockett SUD. These should be counted as current supplies.
Weatherford	Yes	Okay	See Comments	See Comments		The recently-completed pipeline from Lake Benbrook will deliver 16 mgd with the current 4 pumps and up to 21 mgd with 5 pumps installed. Hudson Oaks currently has a contract for 90,909 acre-feet per day from Weatherford. An expansion of the water treatment plant is currently under design.
Wise County WSD						

Table S-3
Summary of Survey Response by County Judges on Current and Future Water Supplies

WUG/Name of Political Subdivision	Survey Returned	Demands	Sources	Proposed Strategies	Follow-Up?	Comments
Collin County	Yes	Too Low - See Comments				Population projected is lower than in the County Mobility Plan.
Cooke County	Yes					No comments.
Dallas County	No					
Denton County	No					
Ellis County	Yes					No comments.
Fannin County	Yes	Irrigation too High - See Comments				Expects irrigation demands to decline as fuel costs increase.
Freestone County	No					
Grayson County	Yes					No comments.
Henderson County	Yes	Too Low				Projected population of 730,000 and demand of 79,000 acre-feet per year by 2060.
Jack County	Yes					No comments.
Kaufman County	Yes					No comments.
Navarro County	No					
Parker County	No					
Rockwall County	No					
Tarrant County	No					Does not see fit to participate in survey. Does not intend to respond to the survey.
Wise County	Yes	See Comments				Concerned about rapid growth and possible contamination of groundwater from salt-water injection wells.

Table S-4
Summary of Survey Responses by Groundwater Conservation Districts on Current and Future Water Supplies

WUG/Name of Political Subdivision	Survey Returned	Demands	Sources	Proposed Strategies	Follow-Up?	Comments
Mid-East Texas Groundwater Conservation District	Yes					District had adopted a pumpage limit from Freestone County of 3,300 ac-ft/yr. District did not complete survey questions, but instead sent results of GAM results they requested from the TWDB.
Neches and Trinity Valleys Groundwater Conservation District	Yes	N/A	N/A	N/A		District is new and has no historical data. District has no comments.

Table S-5 - Potentially Feasible Water Management Strategies for Collin County

Water Management Strategies	Allen	Anna	Blue Ridge	Caddo Basin SUD	Celina	Culleoka WSC	Dallas	Danville WSC	East Fork SUD	Fairview	Farmersville	Frisco	Garland	Gunter Rural WSC	Hickory Creek SUD	Josephine	Lavon WSC	Lowry Crossing	Lucas	McKinney	Melissa	Milligan WSC	Murphy	Nevada	New Hope	North Collin WSC	Parker	Plano	Princeton	Prosper	Richardson	Royse City	Sachse	Saint Paul	South Grayson WSC	Weston	Wylie	County Other	Irrigation	Livestock	Manufacturing	Mining	Electric Steam Power
Conservation	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X		
Begin Purchasing from NTMWD			X		X																														X				X			X	
Continue/Increase Supplies from NTMWD	X			X					X	X	X	X				X	X		X	X		X	X	X		X	X	X	X		X	X	X	X			X				X		X
Continue/Increase Supplies from Frisco (NTMWD)																														X													
Continue/Increase Supplies from Princeton (NTMWD)						X																																					
Continue/Increase Supplies from McKinney (NTMWD)								X																																			
Continue/Increase Supplies from Milligan WSC (NTMWD)																		X																									
Continue/Increase Supplies fr N. Collin WSC (NTMWD)																									X																		
Continue/Increase Supplies from DWU							X																																				
Continue/Increase Supplies from UTRWD					X																																						
Begin Purchasing from UTRWD																														X													
Grayson County Water Supply Project					X									X																					X								
NTMWD/GTUA Supply System		X																			X														X	X							
Region D groundwater in Hunt County (Woodbine)															X																												
Supplemental Wells		X	X		X							X		X							X									X					X	X		X			X		X
New Well(s) in Trinity Aquifer		X												X																					X								
New Well(s) in Woodbine Aquifer		X	X																																X								X
Temporary Overdraft Trinity Aquifer		X												X																					X								
Temporary Overdraft Woodbine Aquifer		X	X																																X	X							

Table S-6 - Potentially Feasible Water Management Strategies for Cooke County

Water Management Strategies	Bolivar WSC	County Other	Gainesville	Kiowa Homeowners WSC	Lindsay	Muenster	Two Way SUD	Valley View	Woodbine WSC	Irrigation	Livestock	Manufacturing	Mining	Electric Steam Power
Conservation	X	X	X	X	X	X	X	X	X	X		X		
Begin Purchasing from UTRWD	X													
Purchase from Boliver WSC (UTRWD)								X						
Purchase from Gainesville	X	X		X	X			X	X	X		X		
Cooke County Water Supply Project			X											
Grayson County Water Supply Project							X							
Additional Yield from Moss Lake (Interbasin Transfer)			X											
Parallel Pipeline from Moss Lake (Interbasin Transfer)			X											
Construct Lake Muenster and Treatment Facilitities						X								
Purchase from Meunster												X		
New Well(s) in Trinity Aquifer		X								X			X	
Supplemental Wells	X	X		X	X	X	X	X	X	X	X	X	X	
Temporarily Overdraft Trinity Aquifer	X	X	X		X		X		X	X			X	
Use additional water from Trinity Aquifer with existing wells	X				X		X		X					
Negotiate Water Right Subordination Agreement with Dallas or Denton						X								
Purchase Water Distribution System from Bolivar WSC								X						
Use water from Other Aquifer													X	

Table S-7 - Potentially Feasible Water Management Strategies for Dallas County

Water Management Strategies	Addison	Balch Springs	Carrollton	Cedar Hill	Cockrell Hill	Combine	Combine WSC	Coppell	Dallas	Dallas Co WCID #6	De Soto	Duncanville	East Fork SUD	Farmers Branch	Garland	Glenn Heights	Grand Prairie	Highland Park	Hutchins	Irving	Lancaster	Lewisville	Mesquite	Ovilla	Richardson	Rockett SUD	Rowlett	Sachse	Sardis-Lone Elm WSC	Seagoville	Sunnyvale	University Park	Wilmer	Wylie	County Other	Irrigation	Livestock	Manufacturing	Mining	Electric Steam Power
Conservation	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		
Continue/Increase Supplies from NTMWD													X		X								X		X		X	X			X			X				X		
Begin Purchasing from DWU																								X		X							X						X	
Continue/Increase Supplies from DWU	X		X	X	X			X	X	X	X	X		X		X	X		X	X	X	X								X						X		X		
Continue/Increase Supplies fr Dallas Co WCID #6 (DWU)		X																																						
Continue/Increase Supplies from Combine WSC (DWU)						X																																		
Continue/Increase Supplies from Seagoville (DWU)							X																																	
Continue/Increase Supplies from Cedar Hill (DWU)																								X																
Continue/Increase Supplies from Irving																																						X		
TRA Ellis Co Water Supply Project																										X														
Additional Pipeline to DWU			X																			X		X						X										
Additional Pipeline to Seagoville							X																																	
Purchase from Mansfield																	X																							
Purchase from Midlothian																	X																							
Purchase from Rockett SUD																													X											
Water treatment plant expansions																						X																		
Reuse	X																																			X				X
Irving Indirect Reuse																				X																				
Recycling Current Water																																							X	
Develop groundwater in Woodbine Aquifer	X																																							
Supplemental Wells			X	X							X					X	X				X								X				X		X	X	X	X	X	X
Participate in Marvin Nichols Reservoir																				X																				

Table S-8 - Potentially Feasible Water Management Strategies for Denton County

Water Management Strategies	Argyle	Argyle WSC	Aubrey	Bartonville	Bartonville WSC	Bolivar WSC	Carrollton	Coppell	Copper Canyon	Corinth	County Other	Cross Roads	Dallas	Denton	Denton Co FWSD#1A	Double Oak	Flower Mound	Fort Worth	Frisco	Hackberry	Hebron	Hickory Creek	Highland Village	Justin	Krugerville	Krum	Lake Dallas	Lewisville	Lincoln Park	Little Elm	Mustang SUD	Northlake	Oak Point	Pilot Point	Plano	Ponder	Prosper	Roanoke	Sanger	Shady Shores	Southlake	The Colony	Trophy Club	Irrigation	Livestock	Manufacturing	Mining	Electric Steam Power
Conservation	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X		
Begin Purchasing from UTRWD						X																										X		X		X	X										X	
Continue/Increase Supplies from UTRWD		X	X		X					X	X				X		X				X		X	X		X			X		X								X							X		
Continue/Increase Supplies from Arglye WSC (UTRWD)	X																																															
Continue/Increase Supplies from Bartonville WSC (UTRWD)				X					X							X																																
Continue/Increase Supplies from Denton (UTRWD)																																														X		
Continue/Increase Supplies from Mustang SUD (UTRWD)												X													X								X															
Continue/Increase Supplies from Lake Cities MUA (UTRWD)																						X					X													X								
Continue/Increase Supplies from NTMWD																			X	X										X					X													
Continue/Increase Supplies from Plano (NTMWD)																																										X						
Continue/Increase Supplies from DWU							X	X					X	X														X														X				X		
Continue/Increase Supplies from Carrolton (DWU)																					X																											
Continue/Increase Supplies from TRWD																		X																														
Continue/Increase Supplies from Fort Worth (TRWD)											X																					X						X			X							
Cont/Incr Supplies from Trophy Club MUD #1 (Ft Worth, TRWD)																																											X					
Purchase water from NTMWD																																					X											
Expansion of Treatment and Delivery System														X				X										X																				
Emergency Connection to Dallas																		X																														
Purchase water from Gainesville						X																																										
Increase City of Denton indirect reuse														X																																		
Fort Worth Reuse for Tarrant Co Steam Electric																		X																														
Fort Worth Reuse for Parker Co Steam Electric																		X																														
Additional Pipeline to DWU							X																					X														X						
Additional Pipeline to Fort Worth																																X						X			X		X					
Aquifer Storage and Recovery (ASR)																																										X						
Temporary Overdraft Trinity Aquifer						X																																										
Temporary Overdraft Woodbine Aquifer																														X																		
Supplemental Wells		X	X		X	X	X			X	X									X			X	X		X			X	X	X	X	X	X		X		X	X			X		X	X	X	X	

Table S-9 - Potentially Feasible Water Management Strategies for Ellis County

Water Management Strategies	Bardwell	Brandon-Irene WSC	Buena Vista-Bethel SUD	Cedar Hill	Community Water Co.	County Other	Ennis	Ferris	Files Valley WSC	Glenn Heights	Grand Prairie	Italy	Johnson County SUD	Mansfield	Maypearl	Midlothian	Milford	Mountain Peak WSC	Oak Leaf	Ovilla	Palmer	Pecan Hill	Red Oak	Rice WSC	Rockett SUD	Sardis-Lone Elm WSC	Venus	Waxahachie	Irrigation	Livestock	Manufacturing	Mining	Electric Steam Power
Conservation	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X				
Begin Purchasing from DWU													X							X			X		X			X					
Continue/Increase Supplies from DWU										X	X																						
Continue/Increase Supplies from TRWD														X																			
Continue/Increase Supplies from Aquilla WSC		X							X																								
Continue/Increase Supplies from Files Valley WSC (Lake Aquilla)																	X																
Continue/Increase Supplies from TRA (Joe Pool)																X																	
Begin Purchasing from TRA (TRWD)							X																										
Begin Purchasing from TRA (Bardwell Lake)							X																										
Continue/Increase Supplies from Bardwell Lake (indirect reuse)																												X					
Reuse from TRA													X																				
Direct Reuse																													X				
TRA Ellis County Water Supply Project			X			X		X				X			X	X					X		X		X			X					
Continue/Increase Supplies from Corsicana					X																			X									
Continue/Increase Supplies from Ennis					X																			X									
Continue/Increase Supplies from Rockett SUD			X					X														X											
Continue/Increase Supplies from Midlothian Water District																		X															
Continue/Increase Supplies from Glenn Heights																			X														
Expansion of Treatment and Delivery System							X							X		X												X					
New water treatment facilities	X																																
Purchase water from Ennis																															X		
Purchase water from Mansfield											X																						
Purchase water from Midlothian											X																X				X		X
Purchase water from Rockett SUD																		X			X					X							
Purchase water from Waxahachie																															X		
Ennis Indirect Reuse							X																										
Use additional water from Trinity Aquifer with existing wells			X																														
Use additional water from Woodbine Aquifer with existing wells															X						X												
New Well(s) in Woodbine Aquifer	X				X	X						X			X														X		X		
New Well(s) in Trinity Aquifer						X			X									X								X							
Temporary Overdraft Trinity Aquifer									X																	X							
Supplemental Wells	X		X			X		X			X	X			X	X	X	X		X	X	X	X		X	X			X	X	X	X	

Table S-10 - Potentially Feasible Water Management Strategies for Fannin County

Water Management Strategies	Bonham	County Other	Ector	Hickory Creek SUD	Honey Grove	Ladonia	Leonard	North Hunt WSC	Savoy	SW Fannin Co SUD	Trenton	Whitewright	Irrigation	Livestock	Manufacturing	Minining	Steam Electric Power
Conservation	X	X	X	X	X	X	X	X	X	X	X	X					
Fannin County Water Supply Project (NTMWD)	X	X	X		X		X		X	X	X						
Grayson County Water Supply Project (GTUA)												X					
Bonham Lake	X	X													X		
Ralph Hall Lake						X											
Expansion of Treatment and Delivery System	X					X											
New Well(s) In Trinity or Woodbine Aquifer		X	X			X	X			X		X					
Temporarily Overdraft Woodbine Aquifer			X		X				X								
Drill Supplemental Wells		X	X	X	X	X	X		X	X	X	X	X	X	X		X

Hickory Creek SUD's WMS will be determined by Region D
North Hunt WSC WMS will be determined by Region D

Table S-11 - Potentially Feasible Water Management Strategies for Freestone County

Water Management Strategies	County Other	Fairfield	Flo Community WSC	Teague	Wortham	Irrigation	Livestock	Manufacturing	Mining	Steam Electric Power
Conservation		X	X	X	X					
Begin Purchasing from TRWD		X			X					X
Begin Purchasing from Winkler WSC					X					
Begin Purchasing from Corsicana					X					
Indirect Reuse from TRA										X
Construct Water Treatment Plant					X					
Drill Supplemental Wells	X	X	X	X		X	X		X	X
New Well(s) in Carrizo-Wilcox Aquifer		X		X						

Table S-12 - Potentially Feasible Water Management Strategies for Grayson County

Water Management Strategies	Bells	Collinsville	County-Other	Denison	Gunter	Gunter Rural WSC	Howe	Luella WSC	Pottsboro	Sherman	South Grayson WSC	Southmayd	SW Fannin Co SUD	Tioga	Tom Bean	Two Way SUD	Van Alstyne	Whitesboro	Whitewright	Woodbine WSC	Irrigation	Livestock	Manufacturing	Mining	Steam Electric Power
Conservation	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X		
Continue/Increase Supplies from Denison			X																				X		
Continue/Increase Supplies from Howe																							X		
Continue/Increase Supplies from Red River Authority			X																						
Continue/Increase Supplies from Lake Texoma				X																					
Grayson County Water Supply Project (GTUA)	X	X	X			X		X		X	X	X		X	X	X		X	X						
Begin Purchasing from Pottsboro			X																						
Begin Purchasing from Sherman						X																	X		
NTMWD/GTUA Supply System							X				X						X								
Expand water treatment capacity				X						X															
Obtain water right for Lake Texoma									X																
Purchase additional water treatment capacity from Denison									X																
New Well(s) In Trinity Aquifer			X											X	X	X	X	X					X		
New Well(s) In Woodbine Aquifer	X	X	X									X							X		X		X	X	
Use additional water from Trinity Aquifer with existing wells					X							X		X		X									
Use additional water from Woodbine Aquifer with existing wells							X	X		X	X				X										
Drill Supplemental Wells	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	
Temporary Overdraft Trinity Aquifer						X								X		X		X							
Temporary Overdraft Woodbine Aquifer						X																			

Table S-13 - Potentially Feasible Water Management Strategies for Henderson County

Water Management Strategies	Athens	Bethel-Ash WSC	County-Other	East Cedar Ck FWSD	Eustace	Gun Barrel City	Log Cabin	Mabank	Payne Springs	Seven Points	Tool	Trinidad	Virginia Hll WSC	West Cedar Ck MUD	Irrigation	Livestock	Manufacturing	Mining	Steam Electric Power
Conservation	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X		
Continue/Increase Supplies from Athens MWA	X																X		
Continue/Increase Supplies from TRWD				X				X						X					
Continue/Increase Supplies from East Cedar Ck FWDS (TRWD)						X			X										
Continue/Increase Supplies from West Cedar Ck MUD (TRWD)										X	X								
Water Treatment Plant Expansion				X										X					
Supplemental Wells in Carrizo-Wilcox Aquifer	X	X	X		X		X						X		X	X	X	X	X
New Well(s) in Carrizo-Wilcox Aquifer		X			X		X												

Region C/D will meet Bethel-Ash demands in the portions that are located in those regions.

Table S-14 - Potentially Feasible Water Management Strategies for Jack County

Water Management Strategies	Bryson	County-Other	Jacksboro	Irrigation	Livestock	Manufacturing	Mining	Steam Electric Power
Conservation	X	X	X					
Lake Jacksboro	X							
Renew Contract with TRWD								X
Purchase additional TRWD water and expand pipeline								X
Water Treatment Plant Expansion			X					
New wells in Other Aquifer	X	X						
Supplemental wells in Other Aquifer	X	X						
Supplemental wells				X	X		X	

Table S-15 - Potentially Feasible Water Management Strategies for Kaufman County

Water Management Strategies	Able Springs WSC	College Mound WSC	Combine	Combine WSC	County Other	Crandall	Dallas	Forney	Forney Lake WSC	Gastonia-Scurry WSC	High Point WSC	Kaufman	Kemp	Mabank	Mac Bee WSC	Mesquite	Oak Grove	Seagoville	Talty	Terrell	West Cedar Ck MUD	Irrigation	Livestock	Manufacturing	Mining	Steam Electric Power
Conservation	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		
Begin Purchasing reuse from NTMWD																						X				
Begin Purchasing raw water from NTMWD																										X
Continue/Increase Supplies from NTMWD		X			X			X	X	X		X				X				X				X		
Continue/Increase Supplies from Kaufman (NTMWD)						X											X									
Continue/Increase Supplies from Forney (NTMWD)											X								X							
Continue/Increase Supplies from TRWD					X								X	X							X	X				
Continue/Increase Supplies from SRA	X																									
Continue/Increase Supplies from Terrell					X																					
Continue/Increase Supplies from Combine WSC			X																							
Continue/Increase Supplies from DWU							X											X								
Continue/Increase Supplies from Seagoville (DWU)				X																						
Additional reuse water from Forney																										X
Purchase reuse from TRA																										X
Expansion of Treatment and Delivery System														X	X						X					
Additional pipeline to Seagoville				X																						
Additional pipeline to NTMWD						X																				
Additional pipeline to DWU																		X								
Toledo Bend Project	X																									
Assist with expansion of MacBee WSC water treatment plant	X																									
Supplemental Wells					X																	X	X			

Table S-16 - Potentially Feasible Water Management Strategies for Navarro County

Water Management Strategies	Blooming Grove	Brandon-Irene WSC	Chatfield WSC	Community Water Co.	Corsicana	County-Other	Dawson	Frost	Kerens	M E N WSC	Navarro Mills WSC	Rice	Rice WSC	Irrigation	Livestock	Manufacturing	Steam Electric Power
Conservation	X	X	X	X	X	X	X	X	X	X	X	X	X			X	
Continue/Increase Supplies from Corsicana	X		X	X		X	X	X	X	X	X		X			X	
Continue/Increase Supplies from Rice WSC (Corsicana, Ennis)												X					
Continue/Increase Supplies from TRWD																X	
Connection to Richland-Chambers					X												
Treatment Plant Expansion					X												
Supplemental Wells								X							X		

Table S-17 - Potentially Feasible Water Management Strategies for Parker County

Water Management Strategies	Aledo	Annetta	Annetta South	Azle	County-Other	Fort Worth	Hudson Oaks	Mineral Wells	Reno	Springtown	Walnut Creek SUD	Weatherford	Willow Park	Irrigation	Livestock	Manufacturing	Mining	Steam Electric Power
Conservation	X	X	X	X	X	X	X		X	X	X	X	X			X		
Continue/Increase Supplies from TRWD				X		X				X	X	X						
Begin Purchasing raw water from BRA																		X
Begin Purchasing from Ft Worth (TRWD)/Connect to Ft Worth	X				X													
Begin Purchasing from Parker Co UD (Weatherford)							X											
Begin Purchasing from Weatherford (TRWD)					X											X		
East Parker County System		X	X										X					
Continue/Increase Supplies from Walnut Creek SUD (TRWD)					X				X	X								
Continue/Increase Supplies from Springtown (TRWD)									X									
Continue/Increase Supplies from Mineral Wells (Region G)					X											X		
Parallel Pipeline from TRWD												X						
Expansion of Treatment and Delivery System				X		X					X	X						
Emergency Connection to Dallas						X												
Pipeline System Expansion (both raw and treated water)											X							
Reuse from Weatherford																		X
Fort Worth Reuse for Parker Co Steam Electric						X												
Supplemental Wells	X	X	X		X		X		X	X		X	X	X	X	X	X	
Temporary Overdraft Trinity Aquifer	X	X	X				X											

Table S-18 - Potentially Feasible Water Management Strategies for Rockwall County

Water Management Strategies	Blackland WSC	Cash SUD	County-Other	Dallas	East Fork SUD	Forney Lake WSC	Heath	High Point WSC	Lavon WSC	McLendon-Chisholm	Mt Zion WSC	R-C-H WSC	Rockwall	Rowlett	Royse City	Wylie	Irrigation	Livestock	Manufacturing	Mining	Steam Electric Power
Conservation	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X		
Continue/Increase Supplies from NTMWD		X	X		X	X	X		X				X	X	X	X					
Continue/Increase Supplies from Rockwall (NTMWD)	X										X								X		
Cont/Incr Supplies from Mt Zion WSC (NTMWD thru Rockwall)												X									
Continue/Increase Supplies from Forney (NTMWD)								X													
Continue/Increase Supplies from Terrell (NTMWD)								X													
Cont/Incr Supplies from Blackland WSC, RCH WSC & High Point WSC (NTMWD)										X											
Continue/Increase Supplies from DWU				X																	
Continue/Increase Supplies from SRA		X																			
Begin Purchasing from NTMWD reuse																	X				
Supplemental Wells			X															X			

Table S-19 - Potentially Feasible Water Management Strategies for Tarrant County

Water Management Strategies	Arlington	Azle	Bedford	Benbrook	Bethesda WSC	Blue Mound	Burleson	Colleyville	Community WSC	County-Other	Crowley	Dalworth. Gardens	Edgecliff	Euless	Everman	Forest Hill	Fort Worth	Grand Prairie	Grapevine	Haltom City	Haslet	Hurst	Johnson County SUD	Keller	Kennedale	Lake Worth	Lakeside	Mansfield	North Richland Hills	Pantego	Pelican Bay	Richland Hills	River Oaks	Saginaw	Sansom Park Village	Southlake	Watauga	Westover Hills	Westworth Village	White Settlement	Irrigation	Livestock	Manufacturing	Mining	Steam Electric ower
Conservation	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X	
Begin Purchasing from TRWD																																												X	
Continue/Increase Supplies from TRWD	X	X							X								X											X					X								X				X
Continue/Increase Supplies from TRA (TRWD)			X					X						X					X										X																
Begin Purchasing from Fort Worth (TRWD)																									X		X			X															
Continue/Increase Supplies from Fort Worth (TRWD)					X		X			X	X	X	X		X	X				X	X	X		X		X			X			X		X	X	X		X	X	X			X		
Begin Purchasing from Azle (Ft Worth)																											X				X														
Cont/Incr Supplies fr N Richland Hills (Ft Worth)																																					X						X		
Begin Purchasing from Arlington (TRWD)																									X					X													X		
Continue/Increase Supplies from Tecon (TRWD)						X																																							
Continue/Increase Supplies from Mansfield (TRWD)																																											X		
Continue/Increase Supplies from Benbrook WSA				X																																									
Begin Purchasing from DWU																							X																						
Continue/Increase Supplies from DWU																		X	X																										
Begin Purchasing from BRA																							X																						
Begin Purchasing from TRA																																													
Expansion of Treatment and Delivery System	X	X							X								X											X																	
Emergency Connection to Dallas																	X																												
Additional pipeline to Ft Worth					X		X				X													X					X							X	X								
Purchase Grand Prairie water																							X																						
Begin purchasing from Mansfield																		X																											
Begin purchasing from Midlothian																		X																											
Fort Worth Reuse																	X																								X				X
Purchase Reuse water from DCPCMUD (Lake Grapevine)																			X																										
Supplemental Wells			X		X	X		X		X	X	X		X	X			X			X	X	X		X	X	X		X	X	X	X			X					X	X	X			
Temporary Overdraft Trinity Aquifer																									X		X			X	X														
New Well(s) in Trinity Aquifer																															X														

Table S-20 - Potentially Feasible Water Management Strategies for Wise County

Water Management Strategies	Alvord	Aurora	Bolivar WSC	Boyd	Bridgeport	Chico	Community WSC	County-Other	Decatur	Fort Worth	New Fairview	Newark	Rhome	Runaway Bay	Walnut Creek SUD	West Wise SUD	Irrigation	Livestock	Manufacturing	Mining	Steam Electric Power
Conservation	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X		
Begin Purchasing from UTRWD			X																		
Continue/Increase Supplies from TRWD					X		X			X				X	X	X	X			X	X
Purchase from Rhome (Walnut Creek SUD from TRWD)		X									X	X				X					
Begin Purchasing from Walnut Creek SUD (TRWD)																					
Continue/Increase Supplies from Walnut Creek SUD (TRWD)				X				X					X								
Continue/Increase Supplies from West Wise SUD (TRWD)						X															
Continue/Increase Supplies from Wise County WSD (TRWD)									X												
Continue/Increase Supplies from Decatur (TRWD)																			X		
Expansion of Treatment and Delivery System							X		X	X				X	X	X					
New Water Treatment Plant																X					
Raw Water System Expansion					X				X						X						
Begin Purchasing from Chico (West Wise SUD)	X																				
Purchase from Gainesville			X																		
Purchase from Bridgeport						X													X		
Temporarily Overdraft Trinity Aquifer	X		X					X													
Drill Supplemental Wells	X	X	X	X	X	X		X			X	X	X				X	X	X	X	
Recycling Available water																				X	
Reuse from Bridgeport and Decatur																					X

Table S-21
Potentially Feasible Water Management Strategies for Wholesale Water Providers

Water Management Strategies	Regional												Local																						
	Tarrant Reg Water District	North TX Mun Water Dist	Trinity River Auth	Upper Trinity Reg Water Dist	Dallas Co. PC MUD	Greater Texoma Util Auth	Fort Worth	Dallas (DWU)	Corsicana	Sabine River Authority	Sulphur River Water Dist	Upper Neches MWD	Athens MWA	Cedar Hill	Denton	East Cedar Creek FWSD	Ennis	Forney	Garland	Gainesville	Lake Cities Mun Util Auth	Mansfield	Midlothian	Mustang SUD	North Richland Hills	Parker Co. Util Dist #1	Rockett SUD	Rockwall	Seagoville	Terrell	Walnut Creek SUD	Waxahachie	Weatherford	West Cedar Creek MUD	Wise Co. WSD
Conservation*	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X		X	X	X		X	X	X	X		X	X	X	X		X
Expansion of Existing Supplies:																																			
Continue/Increase Supplies from TRWD			X				X									X						X									X		X	X	X
Continue/Increase Supplies from DWU				X										X	X														X						
Continue/Increase Supplies from UTRWD																					X			X											
Continue/Increase Supplies from SRA																														X					
Continue/Increase Supplies from Fort Worth (TRWD)																									X										
Continue/Increase Supplies from TRA (TRWD)																									X										
Continue/Increase Supplies from NTMWD																		X	X									X							
System Operation	X							X																											
Temporary overdraft existing lake(s)								X																									X		
Midlothian Pipeline Expansion																							X												
Expansion of Treatment and Delivery System	X	X	X	X		X	X	X	X				X		X					X		X	X							X	X	X	X	X	X
Connect to Existing Supplies:																																			
Begin Purchasing from DWU													X																			X			
Begin Purchasing from NTMWD																														X					
Begin Purchasing from TRWD													X										X									X			
Begin Purchasing from Weatherford (TRWD)																										X									
Lake Fork Connection								X		X																									
Lake Palestine Connection								X					X																						
Toledo Bend project	X	X						X		X																									
Oklahoma	X	X		X				X																											
Purchase Existing developed water in Sulphur Basin																																			
Forest Grove Reservoir (potential TXU agreement)													X																						
Develop supplies from Joe Pool Lake (TRA)														X																					
Connection to Richland-Chambers									X																										
TRA Ellis County Water Supply Project			X														X						X				X					X			
Pipeline to Connect to NTMWD																														X					
Cypress Basin Supplies (Lake O' the Pines, Bob Sandlin)	X	X						X																											
Lake Wright Patman	X	X						X																											
Sam Rayburn/B.A. Steinhagen								X																											
Lake Livingston	X	X						X																											
Additional Supplies from Lake Palestine								X																											
Lake Texoma Not Yet Authorized - Blend w/ Elm Fork								X																											
Lake Texoma Not Yet Authorized - Desalination	X	X						X																											
Waxahachie/Rocket SUD/Red Oak from Dallas																											X					X			
Wilmer, Hutchins, Palmer, and Ferris Connect to DWU																																			

Table S-21

Potentially Feasible Water Management Strategies for Wholesale Water Providers

Regional (Tarrant Reg Water District through Upper Neches MWD) — Local (Athens MWA through Wise Co. WSD)

Water Management Strategies	Tarrant Reg Water District	North TX Mun Water Dist	Trinity River Auth	Upper Trinity Reg Water Dist	Dallas Co. PC MUD	Greater Texoma Util Auth	Fort Worth	Dallas (DWU)	Corsicana	Sabine River Authority	Sulphur River Water Dist	Upper Neches MWD	Athens MWA	Cedar Hill	Denton	East Cedar Creek FWSD	Ennis	Forney	Garland	Gainesville	Lake Cities Mun Util Auth	Mansfield	Midlothian	Mustang SUD	North Richland Hills	Parker Co. Util Dist #1	Rockett SUD	Rockwall	Seagoville	Terrell	Walnut Creek SUD	Waxahachie	Weatherford	West Cedar Creek MUD	Wise Co. WSD
Connect to Existing Supplies (Cont):																																			
Additional Richland Chambers/Cedar Creek Pipeline	X																																		
West Fork Connection	X																																		
Purchase from Brazos River Authority	X																																		
Connection to TRWD																							X									X			
Additional Yield from Lake Lavon		X																																	
Lake Bonham		X																																	
Interim Lake Fork Use (from Dallas)		X																																	
Interim GTUA Texoma Water		X																																	
Interim Treated Water Purchase from Dallas		X																																	
Lake Texoma Already Authorized	X	X				X																													
Collin-Grayson Municipal Alliance Project		X				X																													
Tarrant County Water System			X																																
Grayson County Water System						X																													
Cooke County Water System						X														X															
Fannin County Water System						X																													
East Parker County Water System																										X									
Gulf of Mexico - Desalination	X	X						X																											
Emergency Connection to Dallas							X																												
Connection to Red River																				X															
Subordination Agreement																				X															
Reuse:																																			
Return flows above Dallas lakes								X																											
Dallas Southside Reuse Project								X																											
Additional Dallas Indirect Reuse Projects								X																											
TRWD Richland-Chambers Reuse Project	X																																		
TRWD Cedar Creek Reuse Project	X																																		
NTMWD Additional Wilson Creek Reuse		X																																	
NTMWD East Fork Trinity River Reuse		X																																	
NTMWD Direct Reuse for Collin Co Steam Electric		X																																	
TRA Additional Las Colinas Reuse			X																																
TRA Dallas Co Steam Electric Reuse			X																																
TRA Ellis Co Steam Electric Reuse			X																																
TRA Tarrant Co Irrigation Reuse			X																																
TRA Denton Co Irrigation Reuse			X																																
TRA Lake Grapevine Reuse			X																																
TRA Joe Pool Lake Reuse			X																																
Additional TRA Indirect Reuse Projects			X																																
UTRWD Indirect Reuse of Chapman water				X																															

Table S-21

Potentially Feasible Water Management Strategies for Wholesale Water Providers

Water Management Strategies	Regional: Tarrant Reg Water District	North TX Mun Water Dist	Trinity River Auth	Upper Trinity Reg Water Dist	Dallas Co. PC MUD	Greater Texoma Util Auth	Fort Worth	Dallas (DWU)	Corsicana	Sabine River Authority	Sulphur River Water Dist	Upper Neches MWD	Local: Athens MWA	Cedar Hill	Denton	East Cedar Creek FWSD	Ennis	Forney	Garland	Gainesville	Lake Cities Mun Util Auth	Mansfield	Midlothian	Mustang SUD	North Richland Hills	Parker Co. Util Dist #1	Rockett SUD	Rockwall	Seagoville	Terrell	Walnut Creek SUD	Waxahachie	Weatherford	West Cedar Creek MUD	Wise Co. WSD
Reuse (Continued)																																			
UTRWD Indirect Reuse of Lake Ralph Hall				X																															
Additional UTRWD Indirect Reuse Projects				X																															
Athens Indirect Reuse													X																						
Fort Worth Reuse for Tarrant Co Steam Electric							X																												
Fort Worth Direct Reuse - Mary's Creek							X																												
Fort Worth Direct Reuse - Central Business District							X																												
Fort Worth Direct Reuse - Alliance Corridor							X																												
Weatherford Reuse for Parker Co Steam Electric																																	X		
Fort Worth Reuse for Parker Co Steam Electric							X																												
Increase purchase of treated effluent from Garland																		X																	
Increase Denton direct reuse															X																				
Increase Denton indirect reuse															X																				
Indirect Reuse to Moss Lake																				X															
Indirect Reuse to Lake Weatherford																																	X		
Reallocation of Reservoir Storage:																																			
Reallocation of Wright Patman	X	X		X				X																											
Reallocation of Texoma	X	X						X																											
New Surface Water Projects:																																			
Lower Bois d'Arc Reservoir		X																																	
Marvin Nichols Lake	X	X		X				X																											
Ralph Hall Reservoir				X																															
George Parkhouse North Lake								X																											
George Parkhouse South Lake		X		X																															
Lake Columbia								X																											
Lake Tehuacana	X																																		
New Surface Water Project w/ other entities															X																				
Lake Fastrill								X																											
New Groundwater:																																			
Roberts County groundwater	X	X						X																											
New Well(s) Near Eagle Mountain Lake	X																																		
Additional Wells for Suppliers Already Using GW						X														X	X			X									X		
Carrizo-Wilcox water from Region G	X	X						X																											

*Note: Specific Conservation Strategies are listed in a separate analysis

APPENDIX T

STRATEGY EVALUATION

Appendix T
Table 1
Summary of Evaluation of Water Management Strategies

Entity	County Used	Basin Used	Strategy	Quantity (Ac-Ft/Yr)	Reliability of Supply	Cost ($/Ac-Ft)	Impacts of Strategy on: Environmental Factors	Agricultural Resources/ Rural Areas	Other Natural Resources	PossibleThird Party	Key Water Quality Parameters	Implementation Issues	Comments
Name(s)	Name	Name	Name	#	High, medium, low	$	High, medium, low	High, medium, low	High, medium, low	High, medium, low	High, medium, low		
DWU	Multiple	Trinity	Lake Fork	119,900	High	$275	Low	Low	Low	Medium Low	Low[1]	Project is underway.	Significant change to historical water use. Highly renewable resource should minimize impacts.
DWU	Multiple	Trinity	Palestine	114,337	High	$343	Low	Low	Low	Medium Low	Low[1]	DWU has contract.	Significant change to historical water use. Highly renewable resource should minimize impacts.
DWU	Multiple	Trinity	Additional Palestine	133,400	High	$354	Low	Low	Low	Medium Low	Low[1]	UNMWA wants to retain water for in-basin use.	Significant change to historical water use. Highly renewable resource should minimize impacts.
Multiple	Multiple	Multiple	Toledo Bend	400,000	High	$469	Medium low	Low	Low	Medium Low	Low	Requires IBT and agreements with multiple users	Significant change to historical water use. Highly renewable resource should minimize impacts.
Multiple	Multiple	Multiple	Toledo Bend	700,000	High	$450	Medium low	Low	Low	Medium Low	Low	Requires IBT and agreements with multiple users	Significant change to historical water use. Highly renewable resource should minimize impacts.
Multiple	Multiple	Multiple	Toledo Bend	500,000	High	$498	Medium low	Low	Low	Medium Low	Low	Requires IBT and agreements with multiple users	Significant change to historical water use. Highly renewable resource should minimize impacts. Does not include DWU.
NTMWD	Multiple	Multiple	Oklahoma	50,000	High	$341	Low	Low	Low	Medium Low	Medium Low	Oklahoma has moritorium for export of water out of state. May require an IBT.	May require basin-wide study prior to agreement for export.
DWU	Multiple	Trinity	Oklahoma	50,000	High	$493	Low	Low	Low	Medium Low	Low[1]	Oklahoma has moritorium for export of water out of state. May require an IBT.	May require basin-wide study prior to agreement for export.
TRWD	Multiple	Trinity and Brazos	Oklahoma	50,000	High	$635	Low	Low	Low	Medium Low	Medium Low	Oklahoma has moritorium for export of water out of state. May require an IBT.	May require basin-wide study prior to agreement for export.
TRWD	Multiple	Trinity and Brazos	Third East Texas Pipeline and Reuse	188,765	High	$341	Low	Low	Low	Low	Medium	Reuse permit has been obtained.	Field scale project in progress.
DWU	Multiple	Trinity	Lake o' Pines	89,600	High	$488	Low	Low	Low	Medium Low	Low[1]	Requires IBT and contract with NETMWD.	Significant change to historical water use. Highly renewable resource should minimize impacts.
NTMWD	Multiple	Multiple	Lake o' Pines	87,900	High	$408	Low	Low	Low	Medium Low	Medium Low	Requires IBT and contract with NETMWD.	Significant change to historical water use. Highly renewable resource should minimize impacts.
TRWD	Multiple	Trinity and Brazos	Lake o' Pines	87,900	High	$641	Low	Low	Low	Medium Low	Medium Low	Requires IBT and contract with NETMWD.	Significant change to historical water use. Highly renewable resource should minimize impacts.
DWU	Multiple	Trinity	Wright Patman - Texarkana	100,000	High	$556	Low	Low	Low	Medium Low	Medium Low	Requires agreement with Texarkana and IBT.	Significant change to historical water use. Highly renewable resource should minimize impacts.

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Table 1
Summary of Evaluation of Water Management Strategies

Entity	County Used	Basin Used	Strategy	Quantity (Ac-Ft/Yr)	Reliability of Supply	Cost ($/Ac-Ft)	Impacts of Strategy on:					Implementation Issues	Comments
							Environmental Factors	Agricultural Resources/ Rural Areas	Other Natural Resources	PossibleThird Party	Key Water Quality Parameters		
NTMWD	Multiple	Multiple	Wright Patman - Texarkana	100,000	High	$554	Low	Low	Low	Medium Low	Medium Low	Requires agreement with Texarkana and IBT.	Significant change to historical water use. Highly renewable resource should minimize impacts.
TRWD	Multiple	Trinity and Brazos	Wright Patman - Texarkana	100,000	High	$772	Low	Low	Low	Medium Low	Medium Low	Requires agreement with Texarkana and IBT.	Significant change to historical water use. Highly renewable resource should minimize impacts.
DWU	Multiple	Trinity	Wright Patman - Raise Pool	112,100	High	$489	Medium	Low	Medium Low	Medium Low	Medium Low	Requires IBT, contract with USACE and new or amended water right permit.	Requires NEPA evaluation
NTMWD	Multiple	Multiple	Wright Patman - Raise Pool	180,000	High	$461	Medium	Low	Medium Low	Medium Low	Medium Low	Requires IBT, contract with USACE and new or amended water right permit.	Requires NEPA evaluation
TRWD	Multiple	Trinity and Brazos	Wright Patman - Raise Pool	180,000	High	$595	Medium	Low	Medium Low	Medium Low	Medium Low	Requires IBT, contract with USACE and new or amended water right permit.	Requires NEPA evaluation
Multiple	Multiple	Multiple	Wright Patman - System	390,000	High	$542	Medium	Low	Medium	Medium	Medium Low	Requires IBT, contract with USACE and new or amended water right permit.	Requires NEPA evaluation. Will increase water level fluctuations in Jim Chapman Lake.
DWU	Multiple	Trinity	Sam Rayburn/Steinhagen	200,000	High	$665	Low	Low	Low	Medium Low	Low[1]	Requires IBT and contract with LNVA.	Other competing users of this water
NTMWD	Multiple	Multiple	Sam Rayburn/Steinhagen	200,000	High	$738	Low	Low	Low	Medium Low	Low	Requires IBT and contract with LNVA.	Other competing users of this water
TRWD	Multiple	Trinity and Brazos	Sam Rayburn/Steinhagen	200,000	High	$788	Low	Low	Low	Medium Low	Low	Requires IBT and contract with LNVA.	Other competing users of this water
DWU	Multiple	Trinity	Livingston	200,000	High	$648	Low	Low	Low	Medium Low	Low[1]	Requires contract with TRA.	Other competing users of this water
NTMWD	Multiple	Multiple	Livingston	200,000	High	$722	Low	Low	Low	Medium Low	Low[1]	Requires contract with TRA.	Other competing users of this water
TRWD	Multiple	Trinity and Brazos	Livingston	200,000	High	$734	Low	Low	Low	Medium Low	Low[1]	Requires contract with TRA.	Other competing users of this water
DWU	Multiple	Trinity	Lake Texoma not Yet Authorized - Blend with Elm Fork	20,000	High	$203	Low	Low	Medium Low	Low	Medium	Requires IBT, Congressional authorization, state water right and contract with USACE.	
Multiple	Multiple	Multiple	Lake Texoma not Yet Authorized - Blend with Other Sources	113,000	High	$348	Medium low	Low	Medium Low	Medium Low	Medium	Requires IBT, Congressional authorization, state water right and contract with USACE.	Impacts to water quality will vary with other sources used for blending.
Multiple	Multiple	Multiple	Lake Texoma not Yet Authorized - Desalinate	105,000	High	$707	Medium	Low	Medium	Medium Low	Medium	Requires IBT, Congressional authorization, state water right, contract with USACE and brine discharge permit (deep well injection).	Treated water. Impacts to water quality parameters will depend on disposal of brine
NTMWD	Multiple	Multiple	Lake Texoma Authorized - Blend	113,000	High	$189	Medium low	Low	Medium Low	Medium Low	Medium	Requires IBT, state water right and contract with USACE.	Impacts to water quality will vary with other sources used for blending.

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Entity	County Used	Basin Used	Strategy	Quantity (Ac-Ft/Yr)	Reliability of Supply	Cost ($/Ac-Ft)	Impacts of Strategy on: Environmental Factors	Agricultural Resources/ Rural Areas	Other Natural Resources	PossibleThird Party	Key Water Quality Parameters	Implementation Issues	Comments
NTMWD	Multiple	Multiple	Lake Texoma Authorized - Desal	105,000	High	$639	Medium	Low	Medium	Medium Low	Medium	Requires IBT, state water right, contract with USACE and brine discharge permit (deep well injection).	Treated water. Impacts to water quality parameters will depend on disposal of brine
Multiple	Multiple	Multiple	Gulf of Mexico	200,000	Medium	$1,816	Medium	Low	Medium Low	Low	Low	Technology is still developing for this application at this scale. May require state water right permit and IBT.	Treated water. Possible localized impacts at intake and discharge of reject brine.
DWU	Multiple	Trinity	Dallas Southside Reuse	67,253	High	$283	Low	Low	Medium Low	Low	Medium	Requires wastewater discharge permit and water right.	Will have positive environmental impacts
DWU	Multiple	Trinity	Dallas Lewisville Reuse	67,253	High	$256	Low	Low	Medium Low	Low	Medium	Requires wastewater discharge permit.	
DWU	Multiple	Trinity	Dallas Direct Reuse	20,456	High	$297	Low	Low	Medium Low	Low	Low	Supply is limited to specific uses.	
NTMWD	Multiple	Multiple	NTMWD Additional Wilson Creek	35,941	High	$2	Low	Low	Medium Low	Low	Medium	Requires wastewater discharge permit and water right.	
NTMWD	Multiple	Multiple	NTMWD East Fork Reuse	102,000	High	$300	Low	Low	Low	Low	Medium	Requires water right.	Will have positive environmental impacts
NTMWD	Multiple	Multiple	Lower Bois d'Arc	123,000	High	$283	Medium high	High	Medium	Medium	Low[1]	Requires new water rights permit and IBT.	Stream has been channelized such that significant hydrologic changes from natural conditions.
Multiple	Multiple	Multiple	Marvin Nichols	495,300	High	$432	High	High	Medium high	High	Medium	Requires new water rights permit and IBT. Known public opposition.	This strategy assumes participation of DWU, Irving, NTMWD, TRWD and UTRWD.
Multiple	Multiple	Multiple	Marvin Nichols	489,840	High	$449	High	High	Medium high	High	Medium	Requires new water rights permit and IBT. Known public opposition.	This strategy includes TRWD, NTMWD, and UTRWD
UTRWD	Multiple	Trinity	Ralph Hall and reuse	50,740	High	$357	Medium high	Medium	Medium	Medium	Medium	Requires new water rights permit, reuse permit and IBT.	Stream has been altered such that significant hydrologic changes from natural conditions.
DWU	Multiple	Neches	Fastrill Lake	112,100	High	$456	High	Medium	Medium high	Medium	Medium	Requires new water rights permit and IBT.	Conflicts with proposed wildlife refuge.
DWU	Multiple	Trinity	George Parkhouse North	112,000	High	$326	Medium high	Medium high	Medium	Medium	Low[1]	Requires new water rights permit and IBT.	90% of acreage is crop or pasture land. No priority bottomland hardwoods.
NTMWD and/or UTRWD	Multiple	Multiple	George Parkhouse North	118,960	High	$296	Medium high	Medium high	Medium	Medium	Low	Requires new water rights permit and IBT.	90% of acreage is crop or pasture land. No priority bottomland hardwoods.
NTMWD and/or UTRWD	Multiple	Multiple	George Parkhouse South	108,480	High	$405	Medium high	Medium High	Medium	Medium	Low	Requires new water rights permit and IBT.	78% of acreage is crop or pasture land. No priority bottomland hardwoods.

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Entity	County Used	Basin Used	Strategy	Quantity (Ac-Ft/Yr)	Reliability of Supply	Cost ($/Ac-Ft)	Impacts of Strategy on: Environmental Factors	Agricultural Resources/ Rural Areas	Other Natural Resources	PossibleThird Party	Key Water Quality Parameters	Implementation Issues	Comments
DWU	Multiple	Trinity	Columbia	35,800	High	$548	Medium high	Medium	Medium	Medium	Medium	Requires contract with ANRA and IBT.	ANRA has water rights permit.
TRWD	Multiple	Trinity and Brazos	Tehuacana	56,800	High	$767	Medium high	Medium high	Medium	Medium	Low	Requires new water rights permit.	Planned to operate as system with Richland Chambers Reservoir.
DWU	Multiple	Trinity	Roberts County Groundwater	200,000	High	$832	Medium low	Medium	Medium	Medium Low	Medium	Require groundwater permit and additional water rights.	Assumes 400,000 acres of water rights. Current permitted or contracted for 150,000 acres.
NTMWD	Multiple	Multiple	Roberts County Groundwater	200,000	High	$924	Medium low	Medium	Medium	Medium Low	Medium	Require groundwater permit and additional water rights.	Assumes 400,000 acres of water rights. Current permitted or contracted for 150,000 acres.
TRWD	Multiple	Trinity and Brazos	Roberts County Groundwater	200,000	High	$784	Medium low	Medium	Medium	Medium Low	Medium	Requires groundwater permit and additional water rights.	Assumes 400,000 acres of water rights. Current permitted or contracted for 150,000 acres.
DWU	Multiple	Trinity	Carrizo-Wilcox Groundwater	100,000	High	$865	Medium	Medium	Medium high	Medium	Low	Requires coordination with local groundwater districts.	Requires 100,000 ac-ft/yr of water rights. Competing uses for water.
NTMWD	Multiple	Multiple	Carrizo-Wilcox Groundwater	100,000	High	$942	Medium	Medium	Medium high	Medium	Low	Requires coordination with local groundwater districts.	Requires 100,000 ac-ft/yr of water rights. Competing uses for water.
TRWD	Multiple	Trinity and Brazos	Carrizo-Wilcox Groundwater	50,000	High	$917	Medium low	Medium	Medium	Medium	Low	Requires coordination with local groundwater districts.	Requires 50,000 ac-ft/yr of water rights. Competing uses for water.
NTMWD/ Fannin County	Fannin	Red	Fannin County Water Supply System	8,602	High	$640	Low	Low	Low	Low	Low[2]		Treated water system using water from Lower Bois d'Arc Creek Reservoir. To be developed by NTMWD and Fannin County entities. No new supply for NTMWD.
Waxahachie, Rockett SUD, Red Oak	Ellis	Trinity	Ellis County DWU Supply Project	17,828	High	$364	Low	Low	Low	Low	Low[2]	Transmission system would be shared with Waxahachie, Rockett SUD and Red Oak.	
Multiple	Multiple	Multiple	New water treatment plant	varies	High	varies	Low	Low	Low	Low	Low[2]		Assumes supplies no new raw water supply.
Multiple	Multiple	Multiple	Water treatment plant expansion	varies	High	varies	Low	Low	Low	Low	Low[2]		Assumes supplies no new raw water supply.
Multiple	Multiple	Multiple	Overdraft Trinity aquifer in 2010 (new wells)	varies	Medium	varies	Low	Low	Medium low	Medium	Medium Low		Temporary measure until other strategies are implemented.
Multiple	Multiple	Multiple	Overdraft Trinity aquifer in 2010 (existing wells)	varies	Medium	varies	Low	Low	Medium low	Medium	Medium Low		Temporary measure until other strategies are implemented.
Multiple	Multiple	Multiple	Overdraft Woodbine aquifer in 2010 (new wells)	varies	Medium	varies	Low	Medium low	Medium low	Medium	Medium Low		Temporary measure until other strategies are implemented.
Multiple	Multiple	Multiple	Overdraft Woodbine aquifer in 2010 (existing wells)	varies	Medium	varies	Low	Medium low	Medium low	Medium	Medium Low		Temporary measure until other strategies are implemented.
Multiple	Multiple	Multiple	Expanded use of Trinity Aquifer	varies	High	varies	Low	Medium low	Low	Medium low	Low		

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Entity	County Used	Basin Used	Strategy	Quantity (Ac-Ft/Yr)	Reliability of Supply	Cost ($/Ac-Ft)	Impacts of Strategy on: Environmental Factors	Agricultural Resources/ Rural Areas	Other Natural Resources	PossibleThird Party	Key Water Quality Parameters	Implementation Issues	Comments
Multiple	Multiple	Multiple	Expanded use of Woodbine Aquifer	varies	High	varies	Low	Medium low	Low	Medium low	Low		
Multiple	Multiple	Multiple	Expanded use of Carrizo-Wilcox Aquifer	varies	High	varies	Low	Medium low	Low	Medium low	Low		
Multiple	Multiple	Multiple	Supplemental wells	0	High	N/A	Low	Low	Low	Medium low	Low		Assumes no new supplies.
Multiple	Multiple	Multiple	Basic Conservation Package	varies	Medium	varies	Low	Low	Low	Low	Low[2]	Hard to enforce	Assumes that people will change their water use habits. Reduces return flows.
Multiple	Multiple	Multiple	Expanded Conservation Package	varies	Medium	varies	Low	Low	Low	Low	Low[2]	Hard to enforce	Assumes that people will change their water use habits. Reduces return flows.
Corsicana	Navarro	Trinity	Connection to Cedar Creek/Richland-Chambers System	13,650	High	$89	Low	Low	Low	Low	Low[2]		Corsicana already has water right.
Weatherford	Parker	Trinity	Parallel pipeline to Lake Benbrook	0	High	NA	Low	Low	Low	Low	Low[2]		
Walnut Creek SUD	Parker/Wise	Trinity	Parallel pipeline to Lake Bridgeport	6,700	High	$134	Low	Low	Low	Low	Low[2]		
Walnut Creek SUD	Wise	Trinity	Second pipeline to Boyd/Rhome	3,900	High	$361	Low	Low	Low	Low	Low[2]		Treated water delivered
Multiple	Multiple	Multiple	Additional supply from water provider	varies	High	varies	Low	Low	Low	Low	Low[2]		See wholesale provider strategies for costs and impacts for water.
Fort Worth	Tarrant	Trinity	Parallel pipeline to Eagle Mountain	0	High	NA	Low	Low	Low	Low	Low[2]		See TRWD strategies for raw water supplies.
Fort Worth	Tarrant	Trinity	Pipeline to new Southwest WTP	0	High	NA	Low	Low	Low	Low	Low[2]		See TRWD strategies for raw water supplies.
TRA/ TRWD	Tarrant	Trinity	Tarrant County Water Supply Project Plant	14,946	High	$533	Low	Low	Low	Low	Low[2]		Delivers treated water. Cost includes $0.68/ kgal for raw water purchase.
TRA/ TRWD	Ellis	Trinity	Ellis County Project (Mid-County Section)	9,842	High	$837	Low	Low	Low	Low	Low[2]		Delivers treated water. Cost includes $0.68/kgal for raw water purchase.
TRA/ TRWD	Ellis	Trinity	Ellis County Project (Midlothian Section)	12,213	High	$56	Low	Low	Low	Low	Low[2]		Not including water treatment. Cost includes $0.68/ kgal for raw water purchase.
TRA/ TRWD	Ellis	Trinity	Ellis County Project (Ennis Section)	3,988	High	$663	Low	Low	Low	Low	Low[2]		Delivers treated water. Cost includes $0.68/ kgal for raw water purchase.
TRA/ Dallas County Irrigation	Dallas	Trinity	Las Colinas Reuse	7,000	High	$212	Low	Low	Low	Low	Low	TRA is currently seeking reuse permits.	Assumed cost of water for reuse is $0.25 per 1,000 gallons.
TRA/ Dallas Co. SEP	Dallas	Trinity	Mountain Creek Lake Reuse (stand alone)	3,000	High	$217	Low	Low	Low	Low	Medium	TRA is currently seeking reuse permits.	Reuse for steam electric power at Mountain Creek Lake.
Ennis	Ellis	Trinity	Flood Storage Reallocation at Lake Bardwell	1,760	High	$1,264	Medium low	Low	Medium Low	Low	Low[2]	Requires new water right and contract with the Corps	Costs were updated from 1988 Study.

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Entity	County Used	Basin Used	Strategy	Quantity (Ac-Ft/Yr)	Reliability of Supply	Cost ($/Ac-Ft)	Impacts of Strategy on: Environmental Factors	Agricultural Resources/ Rural Areas	Other Natural Resources	PossibleThird Party	Key Water Quality Parameters	Implementation Issues	Comments
TRA	Ellis	Trinity	Ellis County Steam Electric Reuse	40,000	High	$273	Low	Low	Low	Low	Low	TRA is currently seeking reuse permits.	Distance is assumed. Assumed cost of water for reuse is $0.25 per 1,000 gallons.
TRA	Freestone	Trinity	Freestone County Steam Electric Reuse	20,000	High	$226	Low	Low	Low	Low	Low	TRA is currently seeking reuse permits.	Distance is assumed. Assumed cost of water for reuse is $0.25 per 1,000 gallons.
TRA	Kaufman	Trinity	Kaufman County Steam Electric Reuse	15,000	High	$176	Low	Low	Low	Low	Low	TRA is currently seeking reuse permits.	Distance is assumed. Assumed cost of water for reuse is $0.25 per 1,000 gallons.
TRA	Tarrant/ Denton	Trinity	Tarrant and Denton County Irrigation	7,500	High	$172	Low	Low	Low	Low	Low	TRA is currently seeking reuse permits.	Distance is assumed. Assumed cost of water for reuse is $0.25 per 1,000 gallons.
TRA	Tarrant	Trinity	Tarrant County Municipal	7,500	High	$172	Low	Low	Low	Low	Low	TRA is currently seeking reuse permits.	Assumed cost of reuse water is $0.25 per 1,000 gallons.
TRA	Johnson	Brazos	Joe Pool Lake Reuse from Central WWTP for Johnson County SUD	20,000	High	$183	Low	Low	Low	Low	Medium	Requires IBT to Brazos Basin. TRA is currently seeking reuse permits.	Assumed cost of reuse water is $0.25 per 1,000 gallons. Supplies treated water.
TRA	Dallas	Trinity	Mountain Creek Lake Reuse, using delivery infrastructure for Joe Pool Lake Reuse	3,000	High	$141	Low	Low	Low	Low	Medium	TRA is currently seeking reuse permits.	Assumed cost of reuse water is $0.25 per 1,000 gallons.
TRA	Multiple	Trinity	Joe Pool Lake Reuse from New WWTP	3,500	High	$81	Low	Low	Low	Low	Medium	TRA is currently seeking reuse permits.	Assumed cost of reuse water is $0.25 per 1,000 gallons.
TRA	Dallas/ Ellis	Trinity	Dallas and Ellis County Irrigation	250	High	$192	Low	Low	Low	Low	Low	TRA is currently seeking reuse permits.	Assumed cost of reuse water is $0.25 per 1,000 gallons.
GTUA	Multiple	Multiple	Change Permitted Lake Texoma Use to Municipal or Industrial	0	High	NA	Low	Low	Low	Low	Medium	Would require amendment to existing Lake Texoma water right	Would make more water available for sale to the NTMWD for an interim supply. The Authority's water right amendment application is administratively complete and at a recent public hearing there was no opposition to the amendment.
NTMWD/ GTUA	Multiple	Multiple	Additional Lake Texoma (Interim NTMWD Raw Water Supply)	20,000	High	$28	Low	Low	Low	Low	Medium	Would require an interbasin transfer authorization for the existing water right anda new water right in Lake Texoma (with an interbasin transfer authorization).	GTUA has signed contract with NTMWD to provide up to 25,000 ac-ft/yr of raw water and applied for an interbasin authorization for the existing water right in Lake Texoma. U.S. Army Corps of Engineers reallocation study must be completed before the Authority can apply for a new water right in Lake Texoma.

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Entity	County Used	Basin Used	Strategy	Quantity (Ac-Ft/Yr)	Reliability of Supply	Cost ($/Ac-Ft)	Impacts of Strategy on: Environmental Factors	Agricultural Resources/ Rural Areas	Other Natural Resources	PossibleThird Party	Key Water Quality Parameters	Implementation Issues	Comments
NTMWD/ GTUA	Collin/ Grayson	Trinity/ Red	Collin-Grayson Municipal Alliance Pipeline Project	16,813	High	$479	Low	Low	Low	Low	Low[2]	GTUA would purchase water from NTMWD to supply this project. Project would require a treated water transmission system from McKinney to the participants.	
GTUA	Grayson	Multiple	Additional Lake Texoma - Grayson County Water Supply Project (Phase 1)	14,572	High	$1,481	Low	Low	Low	Low	Medium	Requires expanded treatment and transmission system. Would require the new water right in Lake Texoma (discussed above).	
GTUA	Grayson	Multiple	Additional Lake Texoma - Grayson County Water Supply Project (Phase 2)	11,443	High	$729	Low	Low	Low	Low	Medium	Would require a 20 MGD expansion to the Sherman water treatment plant. Relies on the new water right in Lake Texoma (discussed above).	
Athens MWA	Henderson	Multiple	Indirect Reuse	2,677	High	$156	Low	Low	Low	Low	Medium	Reuse permit has been obtained.	
Athens MWA	Henderson	Multiple	Forest Grove (all to Lake)	4,500	High	$134	Medium low	Low	Low	Positive	Low	Requires change in permitted use and agreement with TXU	Will improve property values around lake.
Athens MWA	Henderson	Multiple	Forest Grove (split to Lake and City)	4,500	High	$124	Medium low	Low	Low	Positive	Low	Requires change in permitted use and agreement with TXU	Will improve property values around lake.
Athens MWA	Henderson	Multiple	Connect to Lake Palestine	4,000	High	$260	Low	Low	Low	Low	Low[2]	Requires contract with UNRMWA	
Athens MWA	Henderson	Multiple	Purchase water from DWU	4,000	High	$162	Low	Low	Low	Medium low	Low[2]	Requires contract with DWU	
Gainesville/ Cooke County Entities	Cooke	Multiple	Cooke County Water Supply Project	3,689	High	$1,209	Low	Low	Low	Low	Low[2]	Requires water treatment plant expansions. Requires new water right permit and IBT.	Total annual available supply from Moss Lake would become 5,371 acre-feet per year. This supply would be available to the City and its customers.
Gainesville	Cooke	Multiple	Indirect Reuse - Moss Lake	561	High	$1,380	Low	Low	Low	Low	Medium	Requires new discharge permit. May require new water right permit and IBT. Requires water treatment plant expansion.	Involves new pipeline to transport reclaimed water to Moss Lake. Uses Cooke County Water Supply Project pipeline for water supply.
Fairfield	Freestone	Trinity	Connection to TRWD	400	High	$1,380	Low	Low	Low	Low	Low[2]		
Wortham	Freestone	Trinity	Purchase treated water from Winkler WSC	140	High	$2,279	Low	Low	Low	Low	Low[2]		
Bryson	Jack	Brazos	Connect Bryson to Jacksboro	250	High	$1,112	Low	Low	Low	Low	Low[2]		
Jack County-Other	Jack	Trinity	Jack County-Other Transmission System	300	High	$1,325	Low	Low	Low	Low	Low[2]		

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							Environmental Factors	Agricultural Resources/ Rural Areas	Other Natural Resources	PossibleThird Party	Key Water Quality Parameters		
Blue Ridge	Collin	Trinity	Blue Ridge Connection to NTMWD	3,200	High	$509	Low	Low	Low	Low	Low[2]		

[1] Assumes that source water is transferred directly to a water treatment plant and there is no impact on water quality.

[2] Strategy does not involve discharge of water from one source into another source; therefore, there is no impact on water quality.

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Table 2
Summary of Evaluation of Environmental Factors

Entity	County	Basin	Strategy	Environmental Factors: Acres Impacted	Wetland Acres	Envir Water Needs	Habitat	Threat and Endanger Species	Cultural Resources	Bays & Estuaries	Envir Water Quality	Other	Overall Environmental Impacts	Comments
Name(s)	Name	Name	Name	#	#	High, medium, low	High, medium, low	# in county	High, medium, low	High, medium, low	High, medium, low	High, medium, low	High, medium, low	
DWU	Multiple	Trinity	Lake Fork	296	NA	Medium	Low	10	Low	Medium low	Low	Low	Low	
DWU	Multiple	Trinity	Palestine	431	NA	Medium	Low	7	Low	Medium low	Low	Low	Low	
DWU	Multiple	Trinity	Palestine with Additional	431	NA	Medium	Low	7	Low	Medium low	Low	Low	Low	
Multiple	Multiple	Multiple	Toledo Bend (400,000)	1,870	NA	Medium	Medium low	12	Low	Medium low	Low	Low	Medium low	
Multiple	Multiple	Multiple	Toledo Bend (700,000)	1,870	NA	Medium	Medium low	13	Low	Medium	Low	Low	Medium low	
Multiple	Multiple	Multiple	Toledo Bend (500,000)	2,099	NA	Medium	Medium low	14	Low	Medium low	Low	Low	Medium low	
NTMWD	Multiple	Multiple	Oklahoma	189	NA	Medium low	Low	Unknown	Low	Low	Low	Low	Low	
DWU	Multiple	Trinity	Oklahoma	413	NA	Medium low	Low	Unknown	Low	Low	Low	Low	Low	
TRWD	Multiple	Trinity and Brazos	Oklahoma	551	NA	Medium low	Low	Unknown	Low	Low	Low	Low	Low	
TRWD	Multiple	Trinity and Brazos	Third East Texas Pipeline and Reuse	0	NA	Medium low	Low	9	Low	Medium low	Medium low	Low	Low	Possible lower return flows.
DWU	Multiple	Trinity	Lake o' Pines	422	NA	Medium	Low	11	Low	Low	Low	Low	Low	
NTMWD	Multiple	Multiple	Lake o' Pines	319	NA	Medium	Low	11	Low	Low	Low	Low	Low	
TRWD	Multiple	Trinity and Brazos	Lake o' Pines	599	NA	Medium	Low	11	Low	Low	Low	Low	Low	
DWU	Multiple	Trinity	Wright Patman - Texarkana	720	NA	Medium low	Low	13	Low	Low	Low	Low	Low	
NTMWD	Multiple	Multiple	Wright Patman - Texarkana	612	NA	Medium low	Low	13	Low	Low	Low	Low	Low	
TRWD	Multiple	Trinity and Brazos	Wright Patman - Texarkana	950	NA	Medium low	Low	13	Low	Low	Low	Low	Low	
DWU	Multiple	Trinity	Wright Patman - Raise Pool	4,260	unknown	Medium low	Medium high	13	Medium	Low	Low	Low	Medium	Requires NEPA and 404 permit
NTMWD	Multiple	Multiple	Wright Patman - Raise Pool	3,430	unknown	Medium low	Medium high	13	Medium	Low	Low	Low	Medium	Requires NEPA and 404 permit
TRWD	Multiple	Trinity and Brazos	Wright Patman - Raise Pool	3,768	unknown	Medium low	Medium high	13	Medium	Low	Low	Low	Medium	Requires NEPA and 404 permit
Multiple	Multiple	Multiple	Wright Patman - System	4,479	unknown	Medium	Medium high	13	Medium	Low	Low	Medium	Medium	Will increase lake fluctuation at Jim Chapman. Requires NEPA and 404 permit
DWU	Multiple	Trinity	Sam Rayburn/Steinhagen	1,997	NA	Medium low	Low	13	Low	Medium low	Low	Low	Low	
NTMWD	Multiple	Multiple	Sam Rayburn/Steinhagen	2,104	NA	Medium low	Low	13	Low	Medium low	Low	Low	Low	
TRWD	Multiple	Trinity and Brazos	Sam Rayburn/Steinhagen	2,287	NA	Medium low	Low	13	Low	Medium low	Low	Low	Low	
DWU	Multiple	Trinity	Livingston	1,749	NA	Medium low	Low	10	Low	Medium low	Low	Low	Low	
NTMWD	Multiple	Multiple	Livingston	1,943	NA	Medium low	Low	10	Low	Medium low	Low	Low	Low	
TRWD	Multiple	Trinity and Brazos	Livingston	964	NA	Medium low	Low	10	Low	Medium low	Low	Low	Low	

Appendix T
Table 2
Summary of Evaluation of Environmental Factors

Entity	County	Basin	Strategy	Environmental Factors: Acres Impacted	Wetland Acres	Envir Water Needs	Habitat	Threat and Endanger Species	Cultural Resources	Bays & Estuaries	Envir Water Quality	Other	Overall Environmental Impacts	Comments
DWU	Multiple	Trinity	Lake Texoma not Yet Authorized - Blend with Elm Fork	172	NA	Low	Low	13	Low	Low	Medium	Low	Low	Possible water quality concerns for receiving waters. Requires NEPA.
Multiple	Multiple	Multiple	Lake Texoma not Yet Authorized - Blend with Other Sources	306	NA	Medium low	Low	13	Low	Low	Low to Medium*	Low	Medium low	* Impacts will vary depending on how water is blended. Requires NEPA.
Multiple	Multiple	Multiple	Lake Texoma not Yet Authorized - Desalinate	306	NA	Medium low	Low	13	Low	Low	Medium	Medium high	Medium	Impacts to environmental water quality will vary depending on disposal of reject. Requires NEPA.
NTMWD	Multiple	Multiple	Lake Texoma Authorized - Blend	252	NA	Medium low	Low	13	Low	Low	Low to Medium*	Low	Medium low	Requires new water to blend. *Impacts will vary depending on how water is blended.
NTMWD	Multiple	Multiple	Lake Texoma Authorized - Desal	252	NA	Medium low	Low	13	Low	Low	Medium	Medium high	Medium	Impacts to environmental water quality will vary depending on disposal of reject.
Multiple	Multiple	Multiple	Gulf of Mexico	2,813	NA	Low	Medium low	NA	Low	Medium	Medium	Medium	Medium	Potential impacts to receiving waters of reject brine. Potential impacts to aquatic life at intake.
DWU	Multiple	Trinity	Dallas Southside Reuse	781	NA	Medium low	Positive	6	Low	Medium low	Medium low	Low	Low	Possible lower return flows. Option for 1,200 acres of constructed wetlands.
DWU	Multiple	Trinity	Dallas Lewisville Reuse	192	NA	Medium low	Low	6	Low	Medium low	Medium low	Low	Low	Possible lower return flows.
DWU	Multiple	Trinity	Dallas Direct Reuse	116	NA	Low	Low	Not applicable	Low	Medium low	Low	Low	Low	Possible lower return flows.
NTMWD	Multiple	Multiple	NTMWD Additional Wilson Creek	0	NA	Medium low	Low	6	Low	Low	Medium low	Low	Low	Possible lower return flows.
NTMWD	Multiple	Multiple	NTMWD East Fork Reuse	2,703	144	Medium low	Positive	8	Low	Medium low	Medium low	Low	Low	Will construct 1,840 of new wetlands. Will have positive impacts to environment. Possible lower return flows.
NTMWD	Multiple	Multiple	Lower Bois d'Arc	16,558	6,788	Medium	Medium high	15	Medium high	Low	Medium	Medium	Medium high	Proposed reservoir is upstream of the Caddo National Grasslands. Will require a NEPA and 404 permit.
Multiple	Multiple	Multiple	Marvin Nichols	68,854	14,422	Medium high	High	19	High	Low	Medium	Medium	High	Priority 1 bottomland hardwoods. Will require a NEPA and 404 permit. 33,000 acres of forested land will be impacted.
Multiple	Multiple	Multiple	Marvin Nichols	68,854	14,422	Medium high	High	20	High	Low	Medium	Medium	High	Priority 1 bottomland hardwoods. Will require a NEPA and 404 permit. 33,000 acres of forested land will be impacted.

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Table 2
Summary of Evaluation of Environmental Factors

Entity	County	Basin	Strategy	Environmental Factors										Comments
				Acres Impacted	Wetland Acres	Envir Water Needs	Habitat	Threat and Endanger Species	Cultural Resources	Bays & Estuaries	Envir Water Quality	Other	Overall Environmental Impacts	
UTRWD	Multiple	Trinity	Ralph Hall	7,714	TBD	Medium	Medium high	16	Medium	Low	Medium	Medium low	Medium high	Will require a NEPA and 404 permit.
DWU	Multiple	Neches	Fastrill Lake	25,197	N/A	Medium-High	High	21	High	Low	Medium	Medium	High	Priority 1 bottomland hardwoods. Will require a NEPA and 404 permit.
DWU	Multiple	Trinity	George Parkbouse North	14,644	1590[3]	Medium	Medium high	16	Medium high	Low	Medium	Medium low	Medium high	No designated priority bottomland hardwoods located within or adjacent to site. 90% of land impacted is cropland or pasture. Will require a NEPA and 404 permit.
NTMWD and/or UTRWD	Multiple	Multiple	George Parkbouse North	14,636	1590[3]	Medium	Medium high	16	Medium high	Low	Medium	Medium low	Medium high	
NTMWD and/or UTRWD	Multiple	Multiple	George Parkbouse South	33,500	NA	Medium	Medium high	13	Medium high	Low	Medium	Medium low	Medium high	No designated priority bottomland hardwoods located within or adjacent to site. 78% of land is pasture or cropland.
DWU	Multiple	Trinity	Columbia	11,551	5,746	Medium	Medium high	15	Medium high	Low	Medium	Medium low	Medium high	Category 2 habitat for bottomland hardwoods. Will require a NEPA and 404 permit.
TRWD	Multiple	Trinity and Brazos	Tehuacana	14,938	7,000	Medium	Medium high	13	Medium high	Medium low	Medium	Medium low	Medium high	No priority bottomland hardwoods Will require a 404 permit, and possible NEPA.
DWU	Multiple	Trinity	Roberts County Groundwater	1,319	NA	Medium low	Low	not applicable	Low	Low	Low	Medium high	Medium low	Potential impacts to stream flows and Arkansas river shiner. Limited resource.
NTMWD	Multiple	Multiple	Roberts County Groundwater	1,566	NA	Medium low	Low	not applicable	Low	Low	Low	Medium high	Medium low	Potential impacts to stream flows and Arkansas river shiner. Limited resource.
TRWD	Multiple	Trinity and Brazos	Roberts County Groundwater	1,190	NA	Medium low	Low	not applicable	Low	Low	Low	Medium high	Medium low	Potential impacts to stream flows and Arkansas river shiner. Limited resource.
DWU	Multiple	Trinity	Carrizo-Wilcox Groundwater	703	NA	Medium low	Low	not applicable	Low	Low	Low	Medium high	Medium	Potential impacts to stream flows.
NTMWD	Multiple	Multiple	Carrizo-Wilcox Groundwater	803	NA	Medium low	Low	not applicable	Low	Low	Low	Medium high	Medium	Potential impacts to stream flows.
TRWD	Multiple	Trinity and Brazos	Carrizo-Wilcox Groundwater	937	NA	Medium low	Low	not applicable	Low	Low	Low	Medium	Medium low	Potential impacts to stream flows.
NTMWD/ Fannin County	Fannin	Red	Fannin County Water Supply System	109	NA	Low	Low	10	Low	Low	Low	Low	Low	
Waxahachie, Rockett SUD, Red Oak	Ellis	Trinity	Ellis County DWU Supply Project	47	NA	Low	Low	6	Low	Low	Low	Low	Low	
Multiple	Multiple	Multiple	New water treatment plant	Varies	NA	Low	Low	not applicable	Low	Low	Low	Low	Low	

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Table 2
Summary of Evaluation of Environmental Factors

Entity	County	Basin	Strategy	Environmental Factors										Comments
				Acres Impacted	Wetland Acres	Envir Water Needs	Habitat	Threat and Endanger Species	Cultural Resources	Bays & Estuaries	Envir Water Quality	Other	Overall Environmental Impacts	
Multiple	Multiple	Multiple	Water treatment plant expansion	0	NA	Low	Low	not applicable	Low	Low	Low	Low	Low	
Multiple	Multiple	Multiple	Overdraft Trinity aquifer in 2010 (new wells)	Varies	NA	Low	Low	not applicable	Low	Low	Low	Low	Low	
Multiple	Multiple	Multiple	Overdraft Trinity aquifer in 2010 (existing wells)	0	NA	Low	Low	not applicable	Low	Low	Low	Low	Low	
Multiple	Multiple	Multiple	Overdraft Woodbine aquifer in 2010 (new wells)	Varies	NA	Low	Low	not applicable	Low	Low	Low	Low	Low	
Multiple	Multiple	Multiple	Overdraft Woodbine aquifer in 2010 (existing wells)	0	NA	Low	Low	not applicable	Low	Low	Low	Low	Low	
Multiple	Multiple	Multiple	Expanded use of Trinity Aquifer	Varies	NA	Low	Low	not applicable	Low	Low	Low	Low	Low	
Multiple	Multiple	Multiple	Expanded use of Woodbine Aquifer	Varies	NA	Low	Low	not applicable	Low	Low	Low	Low	Low	
Multiple	Multiple	Multiple	Expanded use of Carrizo-Wilcox Aquifer	Varies	NA	Low	Low	not applicable	Low	Low	Low	Low	Low	
Multiple	Multiple	Multiple	Supplemental wells	Varies	NA	Low	Low	not applicable	Low	Low	Low	Low	Low	
Multiple	Multiple	Multiple	Basic Conservation Package	0	NA	Low	Low	not applicable	Low	Low	Low	Low	Low	Reduces demand on resources. Also reduces return flows.
Multiple	Multiple	Multiple	Expanded Conservation Package	0	NA	Low	Low	not applicable	Low	Low	Low	Low	Low	Reduces demand on resources. Also reduces return flows.
Corsicana	Navarro	Trinity	Connection to Cedar Creek/Richland-Chambers System	36	NA	Low	Low	7	Low	Low	Low	Low	Low	
Weatherford	Parker	Trinity	Increase pumping capacity of TRWD pipeline	0	NA	Low	Low	5	Low	Low	Low	Low	Low	
Walnut Creek SUD	Parker/Wise	Trinity	Parallel pipeline to Lake Bridgeport	24	NA	Low	Low	9	Low	Low	Low	Low	Low	
Walnut Creek SUD	Wise	Trinity	Second pipeline to Boyd/Rhome	39	NA	Low	Low	4	Low	Low	Low	Low	Low	
Multiple	Multiple	Multiple	Additional supply from water provider	NA	NA	Low	Low	varies	Low	Low	Low	Low	Low	
Fort Worth	Tarrant	Trinity	Parallel pipeline to Eagle Mountain	0	NA	Low	Low	4	Low	Low	Low	Low	Low	
Fort Worth	Tarrant	Trinity	Pipeline to new Southwest WTP	TBD	NA	Low	Low	4	Low	Low	Low	Low	Low	
TRA	Tarrant	Trinity	Tarrant County Water Supply Project Plant	NA	NA	Low	Low	4	Low	Low	Low	Low	Low	
TRA	Ellis	Trinity	Ellis County Project (Mid-County Section)	#REF!	NA	Low	Low	6	Low	Low	Low	Low	Low	

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Table 2
Summary of Evaluation of Environmental Factors

Entity	County	Basin	Strategy	Environmental Factors										Comments
				Acres Impacted	Wetland Acres	Envir Water Needs	Habitat	Threat and Endanger Species	Cultural Resources	Bays & Estuaries	Envir Water Quality	Other	Overall Environmental Impacts	
TRA	Ellis	Trinity	Ellis County Project (Midlothian Section)	12	NA	Low	Low	6	Low	Low	Low	Low	Low	
TRA	Ellis	Trinity	Ellis County Project (Ennis Section)	18	NA	Low	Low	6	Low	Low	Low	Low	Low	
TRA/ Dallas County Irrigation	Dallas	Trinity	Las Colinas Reuse	0	NA	Low	Low	5	Low	Medium low	Low	Low	Low	
TRA/ Dallas Co. SEP	Dallas	Trinity	Mountain Creek Lake Reuse (stand alone)	12	NA	Low	Low	5	Low	Medium low	Medium low	Low	Low	
Ennis	Ellis	Trinity	Flood Storage Reallocation at Lake Bardwell	TBD	NA	Medium low	Medium	6	Medium low	Medium low	Low	Low	Medium low	May require NEPA and 404 permit.
TRA	Ellis	Trinity	Ellis County Steam Electric Reuse	48.5	NA	Low	Low	6	Low	Medium low	Low	Low	Low	
TRA	Freestone	Trinity	Freestone County Steam Electric Reuse	36.4	NA	Low	Low	7	Low	Medium low	Low	Low	Low	
TRA	Kaufman	Trinity	Kaufman County Steam Electric Reuse	36.4	NA	Low	Low	6	Low	Medium low	Low	Low	Low	
TRA	Tarrant/ Denton	Trinity	Tarrant and Denton County Irrigation	16	NA	Low	Low	10	Low	Medium low	Low	Low	Low	
TRA	Tarrant	Trinity	Tarrant County Municipal	0	NA	Low	Low	4	Low	Medium low	Low	Low	Low	
TRA/ Johnson SUD	Johnson	Brazos	Joe Pool Lake Reuse from Central WWTP for Johnson County SUD	41	NA	Low	Low	5	Low	Medium low	Low	Low	Low	
TRA	Dallas	Trinity	Mountain Creek Lake Reuse, using delivery infrastructure for Joe Pool Lake Reuse	NA	NA	Low	Low	5	Low	Medium low	Low	Low	Low	
TRA	Multiple	Trinity	Joe Pool Lake Reuse from New WWTP	0	NA	Low	Low	5	Low	Medium low	Low	Low	Low	
TRA	Dallas/ Ellis	Trinity	Dallas and Ellis County Irrigation	12	NA	Low	Low	11	Low	Low	Low	Low	Low	
GTUA	Multiple	Multiple	Change Permitted Lake Texoma Use to Municipal or Industrial	0	NA	Low	Low	not applicable	Low	Low	Low	Low	Low	
NTMWD/ GTUA	Multiple	Multiple	Additional Lake Texoma (Interim NTMWD Raw Water Supply)	0	NA	Low	Low	13	Low	Low	Medium low	Low	Low	
NTMWD/ GTUA	Collin/ Grayson	Trinity/ Red	Collin-Grayson Municipal Alliance Pipeline Project	TBD	NA	Low	Low	18	Low	Low	Low	Low	Low	
GTUA	Grayson	Multiple	Additional Lake Texoma - Grayson County Water Supply Project (Phase 1)	324	NA	Low	Low	12	Low	Low	Low to Medium*	Low to Medium*	Low	* Impacts will vary depending on how water is blended or treated.

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Table 2
Summary of Evaluation of Environmental Factors

Entity	County	Basin	Strategy	Environmental Factors										Comments
				Acres Impacted	Wetland Acres	Envir Water Needs	Habitat	Threat and Endanger Species	Cultural Resources	Bays & Estuaries	Envir Water Quality	Other	Overall Environmental Impacts	
GTUA	Grayson	Multiple	Additional Lake Texoma - Grayson County Water Supply Project (Phase 2)	0	NA	Low	Low	12	Low	Low	Low to Medium*	Low to Medium*	Low	* Impacts will vary depending on how water is blended or treated.
Athens MWA	Henderson	Multiple	Indirect Reuse	10	NA	Low	Low	7	Low	Medium low	Medium low	Low	Low	
Athens MWA	Henderson	Multiple	Forest Grove (all to Lake)	30	NA	Medium low	Medium low	12	Medium low	Medium low	Low	Low	Medium low	
Athens MWA	Henderson	Multiple	Forest Grove (split to Lake and City)	33	NA	Medium low	Medium low	12	Medium low	Medium low	Low	Low	Medium low	
Athens MWA	Henderson	Multiple	Connect to Lake Palestine	55	NA	Low	Low	7	Low	Low	Low	Low	Low	
Athens MWA	Henderson	Multiple	Purchase water from DWU	1	NA	Low	Low	7	Low	Low	Low	Low	Low	
Gainesville/ Cooke County Entities	Cooke	Multiple	Cooke County Water Supply Project	112	NA	Low	Low	7	Low	Low	Low	Low	Low	
Gainesville	Cooke	Multiple	Indirect Reuse - Moss Lake	34	NA	Low	Low	7	Low	Low	Medium low	Low	Low	
Fairfield	Freestone	Trinity	Connection to TRWD	12	NA	Low	Low	7	Low	Low	Low	Low	Low	
Wortham	Freestone	Trinity	Purchase treated water from Winkler WSC	36	NA	Low	Low	7	Low	Low	Low	Low	Low	
Bryson	Jack	Brazos	Connect Bryson to Jacksboro	29	NA	Low	Low	5	Low	Low	Low	Low	Low	
Jack County-Other	Jack	Trinity	Jack County-Other Transmission System	24	NA	Low	Low	5	Low	Low	Low	Low	Low	
Blue Ridge	Collin	Trinity	Blue Ridge Connection to NTMWD	24	NA	Low	Low	6	Low	Low	Low	Low	Low	

Notes:
1. The number of endangered and threatened species is the total number of species listed for the counties where the project is located. It does not represent the number of species that may be located within the project site. For potential impacts to threatened and endangered species for strategies involving existing reservoirs, the number is limited to those that are riparian, wetland or estuary dependent.
2. Acreage of potential wetlands for reservoir sites is based on acreage of hydric soils. Lake Columbia is the only new reservoir site that has had an on-ground wetlands delineation survey.
3. Data for reservoir site was obtained from the North East Texas Regional Water Plan, Appendix B, Reservoir Site Assessment Study, January 2001.
4. NA - Not available. Impacted wetland acreage for transmission projects are expected to be minimal. Pipeline will be routed minimize potential impacts.
5. Impacts to environmental water needs were assessed assuming that there would be minimal new water imports. It is highly unlikely that will occur. Imported water to the basin of concern will increase return flows in the streams.

TBD = to be determined

APPENDIX U

COST ESTIMATES

APPENDIX U
COST ESTIMATES

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U-1 Introduction

The evaluation of water management strategies requires developing cost estimates. Guidance for cost estimates may be found in Section 4.2.9 of TWDB Exhibit B. Costs are to be reported in second quarter 2002 dollars. However, recent construction data indicates significant increases in material costs, primarily due to steel prices. To account for these increases (which are above normal inflation), the 2002 unit pipe costs for pipe greater than 36 inches were increased by about 20 percent.

Cost estimates are based on standard unit costs for installed pipe, pump stations and standard treatment facilities developed from experience with similar projects throughout the State of Texas. All unit costs include the contractors' mobilization, overhead and profit. The unit costs **do not** include engineering, contingency, financial and legal services, costs for land and rights-of-way, permits, environmental and archeological studies, or mitigation. These costs are included in estimates outside of the unit costs.

The cost estimates have two components:

- Initial capital costs, including engineering and construction costs
- Average annual costs, including annual operation and maintenance costs and debt service.

U-2 Assumptions for Capital Costs

Conveyance Systems

Standard pipeline costs used for these cost estimates are shown in Table U-1. Pump station costs are based on required Horsepower capacity and are listed in Table U-2. The power capacity is to be determined from the hydraulic analyses conducted from a planning level hydraulic grade line evaluation (or detailed analysis if available). Pipelines and pump stations are to be sized for peak pumping capacity.

- Pump efficiency is assumed to be 75 percent.
- Peaking factor of 2 times the average demand for strategies when the water is pumped directly to a water treatment plant. (or historical peaking factor, if available)
- Peaking factor of 1.2 to 1.5 is to be used if there are additional water sources and/or the water is transported to a terminal storage facility.

- Ground storage is to be provided at each booster pump station along the transmission line.
- Ground storage tanks should provide sufficient storage for 2.5 to 4 hours of pumping at peak capacity. Costs for ground storage are shown in Table U-3. Covered storage tanks are used for all strategies transporting treated water.

Water Treatment Plants

Water treatment plants are to be sized for peak day capacity (assume peaking factor of 2 if no specific data is available). Costs estimated for new conventional surface water treatment facilities and expansions of existing facilities are listed in Table U-4. Conventional treatment does not include advanced technologies, such as ozone or UV treatment. All treatment plants are to be sized for finished water capacity.

- For reverse osmosis plants for surface water, increase construction costs shown on Table U-4 by the amount shown on Table U-5 for the appropriate size plant that will be used for RO. If groundwater is the raw water source, use only the costs in Table U-5. These costs were based on actual cost estimates of similar facilities.
- The amount of reject water generated by reverse osmosis treatment is dependent upon the incoming quality of the raw water. Final treatment goals should be between 600 and 800 mg/l of TDS. (This provides a safety margin in meeting secondary treatment standards.) For reverse osmosis treatment of brackish water (1,000 – 3,000 mg/l of TDS), assume that 20 percent of the raw water treated with membranes is discharged as reject water, unless project-specific data is available. For brackish water with TDS concentrations between 3,000 and 10,000 mg/l, assume 30% reject water. Desalination of seawater or very high TDS water will have a higher percent of reject water (50 to 60%). Minimal losses are assumed for conventional treatment facilities.
- Costs for ion exchange facilities are shown on Table U-6. For these facilities it is assumed that 2 to 3 percent of the raw water would be discharged as reject water.

New Groundwater Wells

Costs for new water wells are based on a relationship developed by LBG Guyton that was adjusted for Region C as shown in Table U-7. Well depth will be estimated by county and aquifer.

For expansion of existing well fields for municipal water providers, an additional $100,000 per well for connection to the existing distribution system is assumed. Connection costs and conveyance systems for new well fields will be determined on a case-by-case basis.

New Reservoirs

Site-specific cost estimates will be made for reservoir sites. The elements required for reservoir sites are included in Table U-8. Lake intake structures for new reservoirs will be determined on a case-by-case basis. Generally, costs for construction of such facilities prior to filling of the reservoir will be less than shown on Table U-2 because they can be constructed on dry ground.

Other Costs

- Engineering, contingency, construction management, financial and legal costs are to be estimated at 30 percent of construction cost for pipelines and 35 percent of construction costs for pump stations, treatment facilities and reservoir projects as required by TWDB Exhibit B.
- Permitting and mitigation for transmission and treatment projects are to be estimated at 1 percent of the total construction costs. For reservoirs, mitigation and permitting costs are assumed equal to twice the land purchase cost for the conservation pool, unless site specific data are available.
- Right-of-way costs for transmission lines are estimated at $3,000 per acre of ROW for rural pipelines and $30,000 per acre of ROW for urban pipelines. If a small pipeline follows existing right-of-ways (such as highways), no additional right-of-way cost is assumed. Large pipelines will require ROW costs regardless of routing.
- The costs for property acquisition for reservoirs are to be based on previous cost estimates, if available. If no site specific data is available, the rural right of way cost of $3,000 per acre is assumed.

Interest during construction is the total of interest accrued at the end of the construction period using a 6 percent annual interest rate on total borrowed funds, less a 4 percent rate of return on investment of unspent funds. This is calculated assuming that the total estimated project cost (excluding interest during construction) would be drawn down at a constant rate per month during the construction period. Factors were determined for different lengths of time for project construction. These factors were used in cost estimating and are presented in Table U-9.

U-3 Assumptions for Annual Costs

Annual costs are to be estimated using the following assumptions:

- Debt service for all transmission and treatment facilities is to be annualized over 30 years, but not longer than the life of the project. Debt service for reservoirs is to be annualized over

30 years. State participation projects can be annualized over 35 years. (See TWDB Exhibit B, Section 4.2.9 for interest payments for State participation projects.)

- Annual interest rate for debt service is 6 percent.
- Water purchase costs are to be based on wholesale rates reported by the selling entity when possible. In lieu of known rates, a typical regional cost for treated water and raw water will be used.
- Operation and Maintenance costs are to be calculated based on the construction cost of the capital improvement. Engineering, permitting, etc. should not be included as a basis for this calculation. However, a 20% allowance for construction contingencies should be included for all O&M calculations. Per Exhibit B guidelines, O&M should be calculated at:
    - 1 percent of the construction costs for pipelines
    - 1.5 percent for dams
    - 2.5 percent of the construction costs for pump stations, storage tanks, meters and SCADA systems
    - Assume O&M costs for treatment facilities are included in the treatment cost
- Surface water treatment costs are estimated at $0.35 per 1,000 gallons for conventional plants and $0.75 per 1,000 gallons of finished water for surface water plants with reverse osmosis. Assume cost for treatment of groundwater by reverse osmosis is $0.45 per 1,000 gallons. If only a portion of the water will be treated with RO, apply costs proportionately. Treatment for nitrates is estimated at $0.25 per 1,000 gallons. Treatment for groundwater (assuming chlorination only) is estimated at $0.10 per 1,000 gallons. These costs include chemicals, labor and electricity and should be applied to amount of finished water receiving the treatment.
- Reject water disposal for treatment of brackish water is to be estimated on a case-by-case basis depending on disposal method. If no method is defined, assume a cost of $0.25 per 1,000 gallons of reject water. [This value represents a moderate cost estimate. If the water were returned to a brackish surface water source, the costs could be lower. If evaporation beds or deep well injection were used, the costs could be much higher.]
- Pumping costs are to be estimated using an electricity rate of $0.06 per Kilowatt Hour. If local data is available, this can be used.

U-4 Cost Estimates for Strategies

Tables U-10 through U-320 include cost estimates for individual strategies.

Table U-1
Pipeline Costs (Do Not Include ROW)

Diameter	**Base Installed Cost**	**Rural Cost with Appurtenances**	**Urban Cost with Appurtenances**	**Assumed ROW Width**	**Assumed Temporary Easement Width**
(Inches)	($/Foot)	($/Foot)	($/Foot)	(Feet)	(Feet)
6	14	15	23	15	50
8	18	20	30	15	50
10	22	24	36	20	60
12	25	28	42	20	60
14	29	32	48	20	60
16	34	37	56	20	60
18	38	42	63	20	60
20	46	51	77	20	60
24	60	66	99	20	60
30	78	86	129	20	60
36	99	114	171	20	60
42	129	142	202	30	70
48	160	176	246	30	70
54	191	210	294	30	70
60	224	246	344	30	70
66	256	282	395	30	70
72	292	321	449	30	70
78	331	364	510	40	80
84	372	409	573	40	80
90	417	459	643	40	80
96	464	510	714	40	80
102	514	565	791	40	80
108	575	633	886	40	80
114	643	707	990	50	100
120	728	801	1121	50	100
144	1040	1144	1602	50	100

Notes:
a. Costs are based on PVC class 150 pipe for the smaller long, rural pipelines.
b. Appurtenances assumed to be 10% of installed pipe costs.
c. For urban pipelines, costs were increased by 40% for cost with appurtenances. For pipes 42"and smaller, additional costs were added.

Table U-2
Pump Station Costs for Transmission Systems

Horsepower	Booster PS Costs	Lake PS with Intake Costs
25	$ 250,000	
50	$ 400,000	
100	$ 620,000	
200	$ 930,000	$ 1,300,000
300	$ 1,200,000	$ 1,600,000
400	$ 1,500,000	$ 2,000,000
500	$ 1,700,000	$ 2,300,000
600	$ 1,800,000	$ 2,500,000
700	$ 1,900,000	$ 2,600,000
800	$ 2,100,000	$ 2,800,000
900	$ 2,200,000	$ 3,000,000
1,000	$ 2,400,000	$ 3,200,000
2,000	$ 3,500,000	$ 4,700,000
3,000	$ 4,200,000	$ 5,600,000
4,000	$ 5,100,000	$ 6,900,000
5,000	$ 5,800,000	$ 7,800,000
6,000	$ 6,600,000	$ 8,900,000
7,000	$ 7,200,000	$ 9,700,000
8,000	$ 7,800,000	$ 10,500,000
9,000	$ 8,500,000	$ 11,500,000
10,000	$ 9,000,000	$ 12,200,000
20,000	$14,000,000	$ 18,800,000
30,000	$17,000,000	$ 23,000,000
40,000	$19,500,000	$ 26,300,000
50,000	$22,000,000	$ 29,700,000

Notes: a. Lake PS with intake costs include intake and pump station.
b. Adjust pump station costs upward if the pump station is designed to move large quantities of water at a low head (i.e. low horsepower). See Rusty Gibson for appropriate factor.

Table U-3
Costs for Ground Storage Tanks

Size	With Roof	Without Roof
0.10	$ 75,000	
0.25	$ 100,000	
0.50	$ 155,000	
1.00	$ 275,000	$ 220,000
1.50	$ 355,000	$ 280,000
2.00	$ 432,000	$ 335,000
2.50	$ 510,000	$ 385,000
3.00	$ 589,000	$ 435,000
3.50	$ 668,000	$ 485,000
4.00	$ 745,000	$ 535,000
5.00	$ 895,000	$ 630,000
6.00	$ 1,100,000	$ 750,000
8.00	$ 1,500,000	$ 1,100,000

Table U-4
Conventional Water Treatment Plant Costs

Plant Capacity (MGD)	New Conventional Plants	Conventional Plant Expansions
1	$ 4,000,000	$ 2,000,000
3	$ 7,300,000	$ 5,100,000
7	$ 12,100,000	$ 8,900,000
10	$ 15,400,000	$ 11,000,000
15	$ 20,100,000	$ 14,400,000
20	$ 24,400,000	$ 18,000,000
30	$ 32,800,000	$ 24,600,000
40	$ 41,300,000	$ 31,300,000
50	$ 50,000,000	$ 37,500,000
60	$ 58,500,000	$ 43,800,000
70	$ 66,600,000	$ 49,800,000
80	$ 74,400,000	$ 56,100,000
90	$ 81,600,000	$ 62,400,000
100	$ 89,700,000	$ 69,000,000

Note: Plant is sized for finished peak day capacity.

Table U-5
Additional Cost for Reverse Osmosis Treatment

Plant Capacity (MGD)	Reverse Osmosis Facilities Cost
0.5	$ 950,000
1	$ 1,200,000
3	$ 2,500,000
7	$ 5,500,000
10	$ 7,500,000
15	$ 10,900,000
20	$ 14,000,000
30	$ 19,500,000
40	$ 24,000,000
50	$ 28,000,000
60	$ 31,200,000

Note: Plant is sized for finished water capacity.

Table U-6
Groundwater Nitrate Treatment

Treatment Capacity (MGD)	Ion Exchange Plant Cost
0.25	$ 600,000
1.0	$ 1,300,000
3.0	$ 3,000,000

Note: Plant is sized for finished water capacity.

Table U-7
Cost Elements for Water Wells

Well Diameter (inches)	Typical Production Range (gpm)	Estimated Cost a=production rate (gpm), b= well depth (feet) c=1 for PWS/Industrial or 0.55 for Irrigation
6	25-150	10000 + 80a + 110bc
8	150-350	6000 + 65a + 135bc
10	350-500	6000 + 63a + 170bc
12	500-800	8000 + 60a + 210bc

Table U-8
Cost Elements for Reservoir Sites

Capital Costs	Studies and Permitting
Embankment	Environmental and archeological studies
Spillway	Permitting
Outlet works	Terrestrial mitigation tracts
Site work	Engineering and contingencies
Land	Construction management
Administrative facilities	
Supplemental pumping facilities	
Flood protection	

Table U-9
Factors for Interest during Construction

Construction Period	Factor
6 months	0.02167
12 months	0.04167
18 months	0.06167
24 months	0.08167
36 month construction	0.12167
48 month construction	0.16167

Table U-10
Supply and Costs by User Group for Basic Conservation Package

Water User Group	Total Annual Cost per Acre-Foot						Value of Total Supply from Basic Conservation (Acre-Feet)						Total Annual Cost					
	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
ABLE SPRINGS WSC	$0	$0	$0	$0	$0	$0	9	38	52	68	89	116	$0	$0	$0	$0	$0	$0
ADDISON	$216	$151	$121	$101	$87	$76	213	345	465	587	707	826	$45,978	$52,079	$56,335	$59,301	$61,368	$62,700
ALEDO	$507	$261	$231	$207	$187	$170	15	37	53	71	91	116	$7,388	$9,732	$12,326	$14,608	$17,060	$19,774
ALLEN	$195	$106	$87	$75	$66	$59	708	1,430	1,960	2,346	2,694	3,019	$138,000	$151,647	$169,646	$175,617	$178,145	$179,215
ALVORD	$0	$0	$0	$0	$0	$0	2	8	9	11	12	14	$0	$0	$0	$0	$0	$0
ANNA	$430	$228	$190	$165	$134	$107	43	141	243	366	543	936	$18,571	$32,167	$46,167	$60,167	$73,000	$100,000
ANNETTA	$0	$0	$0	$0	$0	$0	3	13	16	19	22	26	$0	$0	$0	$0	$0	$0
ANNETTA SOUTH	$0	$0	$0	$0	$0	$0	1	5	6	7	9	10	$0	$0	$0	$0	$0	$0
ARGYLE	$285	$172	$142	$123	$108	$96	69	187	275	347	433	528	$19,554	$32,015	$39,127	$42,783	$46,825	$50,833
ARGYLE WSC	$434	$216	$192	$174	$158	$144	26	52	58	64	71	78	$11,186	$11,199	$11,199	$11,199	$11,199	$11,199
ARLINGTON	$181	$100	$85	$75	$67	$61	2,252	4,627	5,714	6,662	7,596	8,507	$408,333	$461,380	$487,500	$500,000	$510,000	$515,000
ATHENS	$0	$269	$228	$199	$168	$141	25	157	220	299	403	540	$0	$42,300	$50,033	$59,334	$67,657	$76,306
AUBREY	$0	$288	$253	$0	$0	$0	8	52	95	88	126	181	$0	$14,910	$24,111	$0	$0	$0
AURORA	$0	$0	$0	$0	$0	$0	2	8	10	12	14	17	$0	$0	$0	$0	$0	$0
AZLE	$726	$0	$0	$0	$0	$0	97	96	146	209	279	350	$70,073	$0	$0	$0	$0	$0
BALCH SPRINGS	$0	$0	$0	$0	$0	$0	32	119	134	149	164	180	$0	$0	$0	$0	$0	$0
BARDWELL	$0	$0	$0	$0	$0	$0	2	7	9	11	13	16	$0	$0	$0	$0	$0	$0
BARTONVILLE	$408	$220	$185	$162	$145	$132	34	125	199	263	310	350	$13,889	$27,500	$36,833	$42,667	$45,000	$46,167
BARTONVILLE WSC	$0	$240	$210	$186	$167	$151	3	19	25	30	36	42	$0	$4,644	$5,140	$5,581	$5,978	$6,332
BEDFORD	$354	$194	$165	$145	$128	$114	283	529	632	734	841	953	$100,001	$102,395	$104,407	$106,098	$107,519	$108,713
BELLS	$0	$0	$0	$0	$0	$0	4	14	17	22	26	30	$0	$0	$0	$0	$0	$0
BENBROOK	$445	$218	$176	$146	$124	$106	119	287	398	540	722	950	$53,167	$62,500	$70,000	$79,000	$89,500	$101,000
BETHEL-ASH WSC	$0	$0	$0	$0	$0	$0	3	14	17	21	25	30	$0	$0	$0	$0	$0	$0
BETHESDA WSC	$0	$0	$0	$0	$0	$0	21	82	106	132	165	207	$0	$0	$0	$0	$0	$0
BLACKLAND WSC	$0	$0	$0	$0	$0	$0	8	33	43	55	69	87	$0	$0	$0	$0	$0	$0
BLOOMING GROVE	$0	$0	$0	$269	$240	$216	2	6	6	9	10	12	$0	$0	$0	$2,499	$2,499	$2,499
BLUE MOUND	$0	$0	$0	$0	$0	$0	4	15	16	17	18	19	$0	$0	$0	$0	$0	$0
BLUE RIDGE	$0	$0	$0	$0	$0	$0	5	25	48	80	125	150	$0	$0	$0	$0	$0	$0
BOLIVAR WSC	$0	$0	$0	$0	$0	$0	21	85	162	356	599	860	$0	$0	$0	$0	$0	$0
BONHAM	$566	$258	$229	$203	$178	$157	119	281	385	569	830	1,095	$67,338	$72,360	$88,057	$115,782	$147,363	$172,169
BOYD	$0	$0	$0	$0	$0	$0	3	12	14	15	16	17	$0	$0	$0	$0	$0	$0
BRANDON-IRENE WSC	$0	$0	$0	$0	$0	$0	1	2	2	3	3	3	$0	$0	$0	$0	$0	$0
BRIDGEPORT	$403	$232	$196	$170	$149	$133	47	99	164	221	288	382	$18,797	$23,014	$32,169	$37,524	$43,033	$50,684
BRYSON	$561	$283	$253	$229	$207	$189	3	6	7	7	8	9	$1,626	$1,677	$1,710	$1,710	$1,710	$1,710
BUENA VISTA-BETHEL SUD	$478	$256	$226	$201	$181	$165	17	40	49	62	79	100	$8,276	$10,132	$11,085	$12,563	$14,414	$16,559
BURLESON							0	0	0	0	0	0	$0	$0	$0	$0	$0	$0
CADDO BASIN SUD	$0	$0	$0	$0	$0	$0	13	42	55	70	87	106	$0	$0	$0	$0	$0	$0
CARROLLTON	$235	$131	$112	$98	$88	$79	729	1,332	1,595	1,843	2,094	2,346	$171,000	$174,000	$178,500	$181,320	$183,450	$184,800
CASH SUD	$0	$0	$0	$0	$0	$0	1	5	7	8	11	13	$0	$0	$0	$0	$0	$0
CEDAR HILL	$296	$108	$100	$95	$90	$86	694	2,258	2,753	3,183	3,610	4,004	$204,965	$244,680	$275,990	$302,272	$324,334	$342,856
CELINA	$445	$220	$154	$107	$83	$73	31	259	630	1,263	2,157	2,750	$13,889	$57,075	$97,000	$135,000	$180,000	$200,000
CHATFIELD WSC	$0	$0	$0	$0	$0	$0	10	39	51	65	82	104	$0	$0	$0	$0	$0	$0
CHICO	$554	$0	$0	$0	$0	$0	7	10	12	16	21	27	$3,817	$0	$0	$0	$0	$0
COCKRELL HILL	$0	$0	$0	$0	$0	$0	7	26	29	31	33	36	$0	$0	$0	$0	$0	$0
COLLEGE MOUND WSC	$0	$0	$0	$0	$0	$0	18	75	97	122	153	194	$0	$0	$0	$0	$0	$0
COLLEYVILLE	$265	$151	$127	$110	$98	$88	243	454	550	639	724	808	$64,275	$68,284	$69,921	$70,590	$70,863	$70,974
COLLINSVILLE	$530	$0	$0	$0	$0	$0	11	18	25	32	40	49	$5,818	$0	$0	$0	$0	$0
COMBINE	$0	$0	$0	$0	$0	$0	5	18	23	28	34	43	$0	$0	$0	$0	$0	$0
COMBINE WSC	$0	$0	$0	$0	$0	$0	8	34	45	58	76	98	$0	$0	$0	$0	$0	$0
COMMUNITY WATER COMPANY	$0	$0	$0	$0	$0	$0	4	16	21	27	34	43	$0	$0	$0	$0	$0	$0
COMMUNITY WSC	$0	$0	$0	$0	$0	$0	6	22	24	25	27	29	$0	$0	$0	$0	$0	$0

Table U-10, Continued

Water User Group	Total Annual Cost per Acre-Foot						Value of Total Supply from Basic Conservation (Acre-Feet)						Total Annual Cost					
	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
COPPELL	$299	$167	$144	$127	$113	$102	286	514	596	679	762	847	$85,623	$85,866	$86,073	$86,248	$86,398	$86,524
COPPER CANYON	$372	$206	$176	$154	$137	$123	11	28	48	81	106	126	$4,203	$5,722	$8,444	$12,392	$14,433	$15,522
CORINTH	$377	$205	$177	$150	$132	$117	116	263	348	445	531	615	$43,794	$53,911	$61,667	$67,000	$70,000	$72,250
CORSICANA	$0	$0	$0	$202	$172	$149	46	158	184	341	413	497	$0	$0	$0	$68,716	$71,017	$73,845
COUNTY-OTHER	$0	$0	$0	$0	$0	$0	422	1,524	1,717	1,898	2,065	2,242	$0	$0	$0	$0	$0	$0
Collin	$0	$0	$0	$0	$0	$0	14	42	42	41	39	37	$0	$0	$0	$0	$0	$0
Cooke	$0	$0	$0	$0	$0	$0	16	59	65	70	74	78	$0	$0	$0	$0	$0	$0
Dallas	$0	$0	$0	$0	$0	$0	2	7	6	5	4	3	$0	$0	$0	$0	$0	$0
Denton	$0	$0	$0	$0	$0	$0	94	336	439	548	668	800	$0	$0	$0	$0	$0	$0
Ellis	$0	$0	$0	$0	$0	$0	19	68	74	81	87	93	$0	$0	$0	$0	$0	$0
Fannin	$0	$0	$0	$0	$0	$0	19	68	72	74	75	76	$0	$0	$0	$0	$0	$0
Freestone	$0	$0	$0	$0	$0	$0	16	58	63	67	71	75	$0	$0	$0	$0	$0	$0
Grayson	$0	$0	$0	$0	$0	$0	43	159	167	168	164	155	$0	$0	$0	$0	$0	$0
Henderson	$0	$0	$0	$0	$0	$0	2	8	9	10	11	12	$0	$0	$0	$0	$0	$0
Jack	$0	$0	$0	$0	$0	$0	8	28	34	39	44	50	$0	$0	$0	$0	$0	$0
Kaufman	$0	$0	$0	$0	$0	$0	29	87	94	101	108	115	$0	$0	$0	$0	$0	$0
Navarro	$0	$0	$0	$0	$0	$0	3	11	11	12	13	13	$0	$0	$0	$0	$0	$0
Parker	$0	$0	$0	$0	$0	$0	55	222	243	261	262	261	$0	$0	$0	$0	$0	$0
Rockwall	$0	$0	$0	$0	$0	$0	4	11	13	14	15	17	$0	$0	$0	$0	$0	$0
Tarrant	$0	$0	$0	$0	$0	$0	41	150	161	171	182	192	$0	$0	$0	$0	$0	$0
Wise	$0	$0	$0	$0	$0	$0	57	209	223	236	250	264	$0	$0	$0	$0	$0	$0
CRANDALL	$502	$261	$231	$208	$184	$164	24	63	90	123	169	228	$12,182	$16,429	$20,795	$25,633	$31,035	$37,405
CROSS ROADS	$272	$186	$157	$134	$112	$98	16	58	112	216	380	530	$4,361	$10,892	$17,567	$28,886	$42,667	$52,233
CROWLEY	$0	$0	$0	$0	$0	$0	17	66	90	131	169	195	$0	$0	$0	$0	$0	$0
CULLEOKA WSC	$0	$0	$0	$0	$0	$0	21	80	102	126	154	185	$0	$0	$0	$0	$0	$0
DALLAS	$130	$80	$68	$59	$52	$46	10,128	18,043	22,483	27,246	34,206	44,826	$1,312,324	$1,451,878	$1,525,450	$1,598,223	$1,764,681	$2,058,767
DALLAS COUNTY WCID #6	$0	$0	$0	$0	$0	$0	10	38	47	56	69	86	$0	$0	$0	$0	$0	$0
DALWORTHINGTON GARDENS	$327	$187	$161	$141	$126	$113	21	40	49	57	65	73	$6,994	$7,492	$7,821	$8,036	$8,178	$8,268
DANVILLE WSC	$430	$229	$205	$184	$165	$148	30	76	106	141	182	231	$12,718	$17,469	$21,674	$25,986	$30,069	$34,185
DAWSON	$0	$0	$0	$259	$227	$202	2	6	7	13	15	19	$0	$0	$0	$3,289	$3,517	$3,798
DE SOTO	$312	$161	$131	$110	$94	$84	309	668	886	1,127	1,413	1,613	$96,474	$107,243	$115,849	$123,881	$132,923	$135,400
DECATUR	$400	$230	$194	$166	$144	$128	47	102	163	240	349	455	$18,800	$23,438	$31,555	$39,757	$50,252	$58,358
DENISON	$0	$0	$0	$0	$183	$159	49	176	209	237	399	469	$0	$0	$0	$0	$73,000	$74,500
DENTON	$230	$130	$104	$87	$74	$62	847	1,912	2,798	3,773	5,247	8,013	$195,000	$249,000	$291,667	$329,167	$386,322	$498,740
DENTON COUNTY FWSD	$286	$170	$145	$127	$113	$99	30	81	127	184	251	330	$8,695	$13,758	$18,519	$23,419	$28,265	$32,727
DOUBLE OAK	$400	$221	$192	$170	$152	$138	20	39	48	58	68	79	$7,900	$8,717	$9,261	$9,806	$10,350	$10,894
DUNCANVILLE	$356	$187	$163	$144	$129	$116	226	439	513	588	668	753	$80,650	$82,104	$83,482	$84,793	$86,038	$87,220
EAST CEDAR CREEK FWSD	$486	$248	$216	$193	$166	$142	74	178	241	313	407	531	$35,954	$44,057	$52,049	$60,246	$67,480	$75,595
EAST FORK SUD	$0	$0	$0	$0	$0	$0	12	43	54	66	80	95	$0	$0	$0	$0	$0	$0
ECTOR	$0	$0	$0	$0	$0	$0	1	5	5	6	6	7	$0	$0	$0	$0	$0	$0
EDGECLIFF	$520	$258	$230	$208	$190	$174	14	28	31	35	38	41	$7,219	$7,219	$7,219	$7,219	$7,219	$7,219
ENNIS	$475	$242	$196	$164	$137	$112	110	266	384	546	770	1,079	$52,091	$64,435	$75,483	$89,622	$105,148	$120,596
EULESS	$380	$205	$174	$152	$135	$121	272	539	655	761	862	963	$103,446	$110,416	$113,854	$115,550	$116,386	$116,798
EUSTACE	$547	$264	$237	$215	$196	$179	5	11	13	16	19	23	$2,643	$2,913	$3,163	$3,411	$3,713	$4,094
EVERMAN	$0	$0	$0	$0	$0	$0	11	41	47	53	60	65	$0	$0	$0	$0	$0	$0
FAIRFIELD	$410	$235	$205	$183	$164	$148	34	65	81	98	118	139	$13,889	$15,250	$16,611	$17,972	$19,333	$20,694
FAIRVIEW	$267	$163	$138	$117	$98	$76	48	105	160	275	520	1,017	$12,841	$17,145	$22,056	$32,167	$50,833	$77,500
FARMERS BRANCH	$240	$142	$118	$100	$87	$76	295	525	667	819	980	1,149	$70,705	$74,742	$78,412	$81,750	$84,783	$87,540
FARMERSVILLE	$0	$0	$0	$0	$0	$0	6	38	59	96	151	221	$0	$0	$0	$0	$0	$0
FERRIS	$0	$0	$0	$0	$0	$0	3	12	13	14	15	16	$0	$0	$0	$0	$0	$0
FILES VALLEY WSC	$0	$0	$0	$0	$0	$0	1	5	6	7	8	9	$0	$0	$0	$0	$0	$0
FLO COMMUNITY WSC	$0	$0	$0	$0	$0	$0	0	2	2	2	2	2	$0	$0	$0	$0	$0	$0
FLOWER MOUND	$233	$117	$95	$80	$70	$62	490	1,159	1,573	2,051	2,479	2,882	$114,000	$135,000	$150,000	$165,000	$174,000	$180,089
FLOWER MOUND																		
FOREST HILL	$0	$0	$0	$0	$0	$0	23	84	98	113	130	144	$0	$0	$0	$0	$0	$0

Table U-10, Continued

Water User Group	Total Annual Cost per Acre-Foot						Value of Total Supply from Basic Conservation (Acre-Feet)						Total Annual Cost					
	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
FORNEY	$483	$242	$200	$170	$149	$132	67	249	350	455	561	674	$32,167	$60,167	$70,000	$77,500	$83,500	$89,205
FORNEY LAKE WSC	$349	$213	$186	$165	$148	$132	134	260	311	365	422	484	$46,633	$55,500	$57,833	$60,167	$62,500	$64,000
FORT WORTH	$151	$87	$75	$66	$59	$53	4,193	9,047	12,724	17,713	25,091	34,887	$632,940	$786,306	$953,237	$1,168,901	$1,477,264	$1,848,759
FRISCO	$231	$106	$93	$84	$77	$71	2,009	5,993	7,983	9,542	11,086	12,294	$464,797	$637,022	$742,564	$802,532	$852,904	$876,891
FROST	$0	$0	$0	$0	$0	$0	1	5	5	6	7	8	$0	$0	$0	$0	$0	$0
GAINESVILLE	$428	$232	$201	$179	$158	$138	111	222	282	342	411	496	$47,569	$51,419	$56,667	$61,333	$64,750	$68,500
GARLAND	$223	$117	$101	$88	$79	$71	1,251	2,533	3,083	3,646	4,229	4,663	$279,183	$295,833	$310,000	$322,500	$333,333	$333,333
GASTONIA-SCURRY	$0	$0	$0	$0	$0	$0	16	59	73	93	120	155	$0	$0	$0	$0	$0	$0
GLENN HEIGHTS	$0	$0	$0	$0	$0	$0	20	77	98	120	143	169	$0	$0	$0	$0	$0	$0
GRAND PRAIRIE	$251	$131	$110	$94	$82	$72	900	1,994	2,661	3,503	4,520	5,705	$225,987	$260,777	$291,954	$328,448	$369,290	$411,453
GRAPEVINE	$270	$145	$119	$102	$89	$79	375	747	944	1,137	1,328	1,518	$101,352	$108,023	$112,812	$116,250	$118,718	$120,490
GUN BARREL CITY	$453	$244	$214	$190	$170	$151	37	82	106	135	171	218	$16,968	$19,881	$22,752	$25,698	$29,035	$32,923
GUNTER	$0	$0	$0	$0	$0	$0	6	26	34	42	51	62	$0	$0	$0	$0	$0	$0
GUNTER RURAL WSC	$0	$0	$0	$0	$0	$0	14	51	65	84	111	143	$0	$0	$0	$0	$0	$0
HACKBERRY	$0	$0	$0	$0	$0	$0	3	10	14	17	19	20	$0	$0	$0	$0	$0	$0
HALTOM CITY	$427	$0	$0	$0	$0	$0	216	265	306	340	371	401	$92,283	$0	$0	$0	$0	$0
HASLET	$436	$238	$207	$184	$166	$151	13	47	94	105	117	128	$5,722	$11,167	$19,333	$19,333	$19,333	$19,333
HEATH	$368	$208	$174	$149	$131	$116	52	131	190	263	358	478	$19,254	$27,111	$33,011	$39,302	$46,722	$55,425
HEBRON	$453	$240	$205	$178	$159	$144	6	18	35	78	130	155	$2,883	$4,361	$7,083	$13,889	$20,694	$22,328
HICKORY CREEK	$0	$0	$0	$0	$0	$0	8	33	44	58	82	112	$0	$0	$0	$0	$0	$0
HICKORY CREEK SUD	$542	$275	$245	$225	$204	$187	1	3	4	5	6	7	$732	$855	$957	$1,047	$1,140	$1,245
HIGH POINT WSC	$0	$0	$0	$0	$0	$0	10	39	50	63	80	102	$0	$0	$0	$0	$0	$0
HIGHLAND PARK	$0	$0	$0	$0	$0	$0	24	73	87	102	117	132	$0	$0	$0	$0	$0	$0
HIGHLAND VILLAGE	$389	$209	$182	$162	$146	$132	102	208	252	291	329	367	$39,512	$43,525	$45,845	$47,186	$47,961	$48,500
HONEY GROVE	$0	$0	$0	$824	$472	$424	4	12	15	37	66	75	$0	$0	$0	$30,719	$31,273	$31,857
HOWE	$0	$309	$270	$0	$0	$0	8	51	77	59	71	84	$0	$15,876	$20,836	$0	$0	$0
HUDSON OAKS	$0	$0	$0	$0	$0	$0	6	26	36	47	60	75	$0	$0	$0	$0	$0	$0
HURST	$389	$209	$181	$160	$143	$129	214	416	494	568	643	719	$83,244	$86,836	$89,262	$90,898	$92,004	$92,751
HUTCHINS	$379	$219	$179	$153	$124	$110	37	126	232	394	589	692	$13,889	$27,500	$41,500	$60,167	$73,000	$76,000
IRVING	$183	$111	$92	$79	$69	$61	1,452	2,563	3,229	3,900	4,577	5,263	$266,032	$283,416	$296,544	$306,459	$313,947	$319,601
ITALY	$0	$0	$0	$0	$0	$0	4	16	20	23	27	32	$0	$0	$0	$0	$0	$0
JACKSBORO	$0	$0	$0	$0	$0	$0	7	23	26	28	30	33	$0	$0	$0	$0	$0	$0
JOHNSON COUNTY SUD	$0	$0	$0	$0	$0	$0	5	20	27	35	45	57	$0	$0	$0	$0	$0	$0
JOSEPHINE	$0	$0	$0	$0	$0	$0	1	13	14	15	16	17	$0	$0	$0	$0	$0	$0
JUSTIN	$493	$258	$224	$194	$170	$152	16	48	89	165	224	272	$7,655	$12,473	$19,954	$31,882	$38,000	$41,500
KAUFMAN	$0	$303	$0	$0	$0	$0	15	97	82	100	120	155	$0	$29,516	$0	$0	$0	$0
KELLER	$307	$163	$142	$126	$113	$103	279	597	685	770	859	948	$85,428	$97,146	$97,146	$97,146	$97,146	$97,146
KEMP	$599	$288	$0	$0	$0	$0	6	12	8	8	9	9	$3,362	$3,362	$0	$0	$0	$0
KENNEDALE	$887	$377	$336	$307	$285	$265	57	151	181	209	233	256	$50,825	$56,760	$60,859	$64,140	$66,353	$67,846
KERENS	$0	$0	$0	$0	$0	$0	3	11	12	14	15	16	$0	$0	$0	$0	$0	$0
KIOWA HOMEOWNERS WSC	$0	$0	$0	$0	$0	$0	6	21	24	26	28	29	$0	$0	$0	$0	$0	$0
KRUGERVILLE	$0	$0	$0	$0	$0	$0	3	9	12	16	22	33	$0	$0	$0	$0	$0	$0
KRUM	$0	$292	$0	$0	$0	$0	7	40	36	52	71	97	$0	$11,744	$0	$0	$0	$0
LADONIA	$278	$171	$144	$126	$111	$99	16	27	40	50	64	85	$4,361	$4,633	$5,722	$6,267	$7,083	$8,444
LAKE DALLAS	$0	$305	$267	$236	$211	$191	15	82	102	122	140	158	$0	$25,055	$27,318	$28,683	$29,609	$30,251
LAKE WORTH	$488	$252	$223	$201	$181	$165	28	59	75	91	110	125	$13,491	$14,978	$16,611	$18,244	$19,878	$20,694
LAKESIDE	$1,373	$562	$469	$397	$337	$286	20	49	61	74	90	110	$26,945	$27,704	$28,483	$29,307	$30,296	$31,464
LANCASTER	$0	$0	$0	$0	$0	$0	100	429	583	756	921	1,059	$0	$0	$0	$0	$0	$0
LAVON WSC	$0	$0	$0	$0	$0	$0	16	68	99	172	262	363	$0	$0	$0	$0	$0	$0
LEONARD	$0	$0	$0	$0	$0	$0	4	15	22	37	58	77	$0	$0	$0	$0	$0	$0
LEWISVILLE	$259	$140	$116	$100	$89	$79	601	1,306	1,737	2,146	2,540	2,979	$155,690	$182,412	$202,002	$215,316	$225,002	$235,002
LINCOLN PARK	$0	$306	$0	$0	$0	$0	2	12	11	14	18	22	$0	$3,642	$0	$0	$0	$0
LINDSAY	$548	$276	$246	$223	$204	$187	5	10	12	13	14	16	$2,637	$2,829	$2,928	$2,943	$2,943	$2,943

Table U-10, Continued

Water User Group	Total Annual Cost per Acre-Foot						Value of Total Supply from Basic Conservation (Acre-Feet)						Total Annual Cost					
	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
LITTLE ELM	$349	$179	$150	$133	$119	$108	190	475	643	725	806	888	$66,400	$85,000	$96,216	$96,216	$96,216	$96,216
LOG CABIN	$0	$0	$0	$0	$0	$0	2	7	8	9	9	10	$0	$0	$0	$0	$0	$0
LOWRY CROSSING	$489	$261	$228	$203	$182	$158	10	23	31	40	51	214	$4,699	$5,948	$7,056	$8,191	$9,378	$33,648
LUCAS	$485	$0	$0	$0	$0	$0	37	64	84	116	175	254	$17,700	$0	$0	$0	$0	$0
LUELLA WSC	$0	$0	$0	$0	$0	$0	7	26	30	33	36	43	$0	$0	$0	$0	$0	$0
M E N WSC	$0	$0	$0	$0	$0	$0	7	22	26	30	34	39	$0	$0	$0	$0	$0	$0
MABANK	$777	$278	$244	$215	$190	$167	42	124	151	182	222	273	$32,502	$34,586	$36,723	$39,085	$42,009	$45,635
MAC BEE WSC	$0	$0	$0	$0	$0	$0	1	2	3	3	4	6	$0	$0	$0	$0	$0	$0
MALAKOFF	$0	$0	$0	$0	$0	$0	4	14	16	18	21	24	$0	$0	$0	$0	$0	$0
MANSFIELD	$249	$122	$96	$79	$68	$61	405	998	1,489	2,077	2,605	2,929	$101,086	$121,622	$142,365	$163,337	$176,634	$178,333
MAYPEARL	$518	$262	$232	$210	$191	$174	4	9	10	11	12	13	$2,238	$2,238	$2,238	$2,238	$2,238	$2,238
MCKINNEY	$370	$164	$139	$119	$106	$95	931	2,996	4,851	7,228	9,407	11,700	$344,288	$492,513	$673,285	$858,256	$993,247	$1,116,761
MCLENDON-CHISHOLM	$0	$0	$0	$0	$0	$0	3	11	14	17	22	27	$0	$0	$0	$0	$0	$0
MELISSA	$435	$212	$179	$147	$123	$105	87	240	357	497	693	956	$37,767	$50,833	$64,000	$73,000	$85,000	$100,000
MESQUITE	$242	$126	$106	$93	$83	$75	869	1,949	2,548	3,075	3,504	3,882	$210,002	$245,003	$270,837	$285,005	$290,840	$292,175
MIDLOTHIAN	$405	$221	$174	$145	$125	$110	89	248	421	577	747	910	$35,900	$54,800	$73,150	$83,695	$93,118	$100,163
MILFORD	$0	$0	$0	$0	$0	$0	1	4	4	5	5	5	$0	$0	$0	$0	$0	$0
MILLIGAN WSC	$0	$0	$0	$0	$0	$0	3	11	12	13	13	14	$0	$0	$0	$0	$0	$0
MINERAL WELLS							0	0	0	0	0	0	$0	$0	$0	$0	$0	$0
MOUNTAIN PEAK WSC	$322	$115	$110	$102	$94	$88	148	443	479	560	705	896	$47,703	$50,825	$52,562	$57,256	$66,363	$78,959
MT ZION WSC	$388	$218	$188	$166	$148	$134	13	33	42	53	64	73	$4,906	$7,083	$7,900	$8,717	$9,533	$9,806
MUENSTER	$476	$254	$222	$199	$179	$162	11	25	31	38	47	57	$5,450	$6,267	$6,893	$7,628	$8,444	$9,261
MURPHY	$405	$201	$176	$157	$141	$129	51	337	384	431	479	527	$20,694	$67,750	$67,750	$67,750	$67,750	$67,750
MUSTANG WSC	$0	$0	$0	$0	$0	$0	18	72	101	134	170	211	$0	$0	$0	$0	$0	$0
NAVARRO MILLS WSC	$0	$0	$0	$0	$0	$0	6	23	31	41	54	72	$0	$0	$0	$0	$0	$0
NEVADA	$307	$178	$150	$127	$111	$94	7	25	35	79	150	418	$2,070	$4,361	$5,178	$10,078	$16,611	$39,167
NEW FAIRVIEW	$0	$0	$0	$0	$0	$0	4	15	20	26	32	40	$0	$0	$0	$0	$0	$0
NEW HOPE	$331	$189	$158	$136	$119	$106	7	19	36	62	105	259	$2,478	$3,544	$5,722	$8,444	$12,528	$27,500
NEWARK	$0	$0	$0	$0	$0	$0	2	10	15	22	32	47	$0	$0	$0	$0	$0	$0
NORTH COLLIN WSC	$456	$236	$211	$192	$174	$157	31	76	102	131	166	206	$14,009	$17,999	$21,533	$25,153	$28,737	$32,195
NORTH HUNT WSC	$0	$0	$0	$0	$0	$0	1	3	3	3	4	4	$0	$0	$0	$0	$0	$0
NORTH RICHLAND HILLS	$314	$163	$138	$121	$108	$97	366	758	936	1,102	1,264	1,424	$114,861	$123,503	$129,341	$133,286	$135,951	$137,751
NORTHLAKE	$477	$271	$234	$200	$178	$162	29	59	128	212	281	332	$13,818	$15,939	$29,971	$42,349	$50,096	$53,622
OAK GROVE	$0	$0	$0	$0	$0	$0	2	7	9	12	15	19	$0	$0	$0	$0	$0	$0
OAK LEAF	$429	$229	$200	$177	$159	$144	10	22	29	37	47	58	$4,367	$5,107	$5,837	$6,582	$7,415	$8,336
OAK POINT	$0	$290	$253	$225	$202	$180	8	50	74	103	137	177	$0	$14,414	$18,786	$23,286	$27,803	$31,901
OVILLA	$426	$231	$203	$180	$161	$145	35	86	124	159	186	219	$14,844	$19,935	$25,175	$28,685	$29,950	$31,807
PALMER	$0	$0	$0	$0	$0	$0	3	13	14	16	18	20	$0	$0	$0	$0	$0	$0
PANTEGO	$370	$207	$179	$158	$141	$127	18	32	37	42	47	52	$6,588	$6,588	$6,588	$6,588	$6,588	$6,588
PARKER	$252	$159	$129	$106	$82	$67	55	186	322	604	1,000	1,530	$13,889	$29,600	$41,500	$64,000	$82,000	$102,000
PAYNE SPRINGS	$459	$247	$216	$193	$174	$157	5	10	12	14	16	20	$2,190	$2,343	$2,493	$2,646	$2,835	$3,065
PECAN HILL	$512	$277	$242	$213	$191	$172	5	10	13	17	21	26	$2,439	$2,829	$3,196	$3,553	$3,953	$4,394
PELICAN BAY	$0	$0	$0	$0	$0	$0	3	12	14	16	19	22	$0	$0	$0	$0	$0	$0
PILOT POINT	$0	$306	$262	$0	$0	$0	18	94	123	90	103	117	$0	$28,667	$32,167	$0	$0	$0
PLANO	$149	$86	$73	$63	$55	$49	1,979	3,541	4,300	5,109	5,958	6,869	$294,673	$304,110	$312,500	$320,833	$329,167	$337,500
PONDER	$289	$178	$149	$122	$106	$95	18	78	184	340	446	512	$5,178	$13,889	$27,500	$41,500	$47,333	$48,500
POTTSBORO	$499	$266	$235	$211	$189	$170	17	52	82	118	158	189	$8,444	$13,889	$19,333	$24,778	$29,833	$32,167
PRINCETON	$0	$0	$0	$0	$0	$0	9	55	108	194	350	563	$0	$0	$0	$0	$0	$0
PROSPER	$344	$160	$121	$97	$83	$73	80	483	851	1,190	1,439	1,710	$27,500	$77,500	$103,000	$115,000	$120,000	$125,000
R-C-H WSC	$529	$273	$241	$217	$197	$179	12	26	32	38	46	55	$6,585	$7,214	$7,758	$8,344	$9,035	$9,846
RED OAK	$484	$262	$229	$202	$178	$159	33	76	104	137	176	224	$16,157	$20,025	$23,839	$27,701	$31,439	$35,562
RENO	$0	$0	$0	$0	$0	$0	4	16	18	19	21	22	$0	$0	$0	$0	$0	$0
RHOME	$353	$209	$180	$159	$142	$125	19	60	99	144	192	254	$6,539	$12,580	$17,866	$22,772	$27,127	$31,758
RICE	$0	$0	$237	$204	$178	$158	2	8	16	21	28	36	$0	$0	$3,814	$4,334	$4,955	$5,717
RICE WSC	$0	$0	$0	$0	$0	$0	14	57	74	94	118	149	$0	$0	$0	$0	$0	$0
RICHARDSON	$177	$103	$87	$76	$67	$60	863	1,618	1,914	2,195	2,477	2,772	$152,880	$166,000	$166,000	$166,000	$166,000	$166,000
RICHLAND HILLS	$582	$0	$0	$0	$0	$0	40	49	57	65	73	79	$23,144	$0	$0	$0	$0	$0

Table U-10, Continued

Water User Group	Total Annual Cost per Acre-Foot						Value of Total Supply from Basic Conservation (Acre-Feet)						Total Annual Cost					
	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
RIVER OAKS	$0	$0	$0	$0	$0	$0	12	43	46	49	52	55	$0	$0	$0	$0	$0	$0
ROANOKE	$381	$211	$178	$150	$129	$115	34	91	168	261	393	527	$13,050	$19,331	$29,833	$39,167	$50,833	$60,386
ROCKETT SUD	$0	$0	$0	$0	$0	$0	63	239	280	338	411	500	$0	$0	$0	$0	$0	$0
ROCKWALL	$295	$143	$109	$91	$80	$72	247	737	1,106	1,422	1,643	1,827	$73,000	$105,000	$121,000	$130,000	$132,113	$132,113
ROWLETT	$290	$141	$118	$101	$89	$79	376	857	1,107	1,363	1,618	1,878	$109,271	$120,856	$130,178	$137,714	$143,811	$148,747
ROYSE CITY	$378	$207	$175	$141	$120	$107	92	307	387	571	781	908	$34,792	$63,651	$67,669	$80,776	$93,469	$97,219
RUNAWAY BAY	$463	$255	$221	$195	$174	$157	10	21	29	37	47	60	$4,448	$5,398	$6,324	$7,239	$8,273	$9,473
SACHSE	$400	$212	$183	$162	$143	$126	93	224	299	372	449	529	$37,190	$47,548	$54,683	$60,195	$63,973	$66,618
SAGINAW	$463	$238	$208	$185	$167	$149	90	207	265	321	375	428	$41,488	$49,403	$55,171	$59,373	$62,437	$63,895
SAINT PAUL	$490	$255	$220	$195	$176	$160	6	28	63	113	149	172	$3,000	$7,083	$13,889	$22,056	$26,139	$27,500
SANGER	$447	$242	$209	$184	$164	$149	75	162	220	294	366	419	$33,620	$39,286	$46,043	$54,100	$60,162	$62,500
SANSOM PARK VILLAGE	$0	$0	$0	$0	$0	$0	8	28	30	33	35	38	$0	$0	$0	$0	$0	$0
SARDIS-LONE ELM WSC	$437	$238	$208	$186	$165	$146	51	96	111	138	182	243	$22,233	$22,897	$23,044	$25,597	$30,060	$35,536
SAVOY	$0	$0	$0	$0	$0	$0	1	5	5	6	6	7	$0	$0	$0	$0	$0	$0
SEAGOVILLE	$0	$0	$0	$0	$0	$0	30	100	121	145	168	194	$0	$0	$0	$0	$0	$0
SEVEN POINTS	$0	$0	$0	$0	$0	$0	2	10	12	15	18	22	$0	$0	$0	$0	$0	$0
SHADY SHORES	$0	$298	$0	$0	$0	$0	4	26	23	29	36	44	$0	$7,797	$0	$0	$0	$0
SHERMAN	$571	$280	$240	$207	$179	$156	316	710	915	1,162	1,493	1,960	$180,319	$198,392	$219,976	$240,553	$267,507	$305,185
SOUTH GRAYSON WSC	$0	$0	$0	$0	$0	$0	7	25	31	39	48	60	$0	$0	$0	$0	$0	$0
SOUTHLAKE	$232	$131	$109	$93	$80	$72	337	690	894	1,085	1,291	1,457	$78,367	$90,315	$97,207	$100,993	$103,751	$104,445
SOUTHMAYD	$0	$0	$0	$0	$0	$0	3	18	24	30	36	42	$0	$0	$0	$0	$0	$0
SOUTHWEST FANNIN COUNTY SUD	$0	$0	$0	$0	$0	$0	11	41	50	59	68	78	$0	$0	$0	$0	$0	$0
SPRINGTOWN	$511	$267	$238	$213	$194	$177	17	42	58	78	100	125	$8,444	$11,167	$13,889	$16,611	$19,333	$22,056
SUNNYVALE	$276	$168	$143	$123	$106	$95	50	115	173	243	325	371	$13,889	$19,333	$24,778	$29,833	$34,500	$35,200
TALTY	$290	$182	$151	$130	$114	$100	24	59	96	145	213	304	$6,939	$10,709	$14,586	$18,881	$24,201	$30,326
TEAGUE	$0	$0	$0	$0	$0	$0	7	27	32	38	45	52	$0	$0	$0	$0	$0	$0
TERRELL	$394	$218	$187	$164	$145	$125	100	218	292	361	438	539	$39,624	$47,665	$54,716	$59,350	$63,399	$67,668
THE COLONY	$0	$0	$0	$0	$0	$0	90	341	407	444	482	511	$0	$0	$0	$0	$0	$0
TIOGA	$526	$267	$235	$211	$192	$175	6	27	42	53	64	73	$3,272	$7,083	$9,806	$11,167	$12,256	$12,800
TOM BEAN	$1,003	$355	$315	$295	$274	$256	27	79	91	99	107	116	$27,204	$27,891	$28,654	$29,036	$29,418	$29,799
TOOL	$0	$0	$0	$0	$0	$0	5	18	22	26	31	38	$0	$0	$0	$0	$0	$0
TRENTON	$1,161	$318	$214	$156	$123	$105	22	88	148	240	368	503	$25,983	$27,891	$31,708	$37,433	$45,066	$52,699
TRINIDAD	$0	$0	$0	$0	$0	$0	2	7	8	9	10	11	$0	$0	$0	$0	$0	$0
TROPHY CLUB	$291	$171	$146	$126	$111	$98	74	142	182	225	274	328	$21,527	$24,242	$26,569	$28,433	$30,300	$32,167
TWO WAY SUD	$0	$0	$0	$0	$0	$0	10	40	52	65	80	96	$0	$0	$0	$0	$0	$0
UNIVERSITY PARK	$0	$0	$0	$0	$0	$0	49	154	180	206	232	259	$0	$0	$0	$0	$0	$0
VALLEY VIEW	$0	$0	$0	$0	$0	$0	3	17	31	46	83	110	$0	$0	$0	$0	$0	$0
VAN ALSTYNE	$451	$235	$198	$173	$154	$139	31	127	198	254	308	353	$13,927	$29,833	$39,167	$43,833	$47,333	$48,967
VENUS							0	0	0	0	0	0	$0	$0	$0	$0	$0	$0
VIRGINIA HILL WSC	$0	$0	$0	$0	$0	$0	5	19	20	21	22	24	$0	$0	$0	$0	$0	$0
WALNUT CREEK SUD	$0	$0	$0	$0	$0	$0	37	140	177	214	256	305	$0	$0	$0	$0	$0	$0
WATAUGA	$0	$0	$0	$0	$0	$0	42	154	171	187	203	220	$0	$0	$0	$0	$0	$0
WAXAHACHIE	$616	$292	$249	$212	$182	$158	229	580	823	1,155	1,612	2,241	$141,271	$169,341	$205,274	$245,254	$293,409	$355,052
WEATHERFORD	$405	$206	$170	$146	$127	$110	156	355	484	617	771	955	$63,118	$73,242	$82,548	$90,084	$98,160	$104,799
WEST CEDAR CREEK MUD	$0	$0	$0	$0	$0	$0	41	171	227	292	375	483	$0	$0	$0	$0	$0	$0
WEST WISE SUD	$0	$0	$0	$0	$0	$0	6	23	27	32	36	42	$0	$0	$0	$0	$0	$0
WESTON	$0	$273	$210	$170	$133	$99	5	41	92	299	584	1,108	$0	$11,167	$19,333	$50,833	$77,500	$110,000
WESTOVER HILLS	$273	$162	$137	$119	$106	$94	7	12	14	17	19	21	$1,974	$1,974	$1,974	$1,974	$1,974	$1,974
WESTWORTH VILLAGE	$0	$0	$0	$0	$0	$0	4	15	17	19	21	24	$0	$0	$0	$0	$0	$0
WHITE SETTLEMENT	$615	$0	$0	$0	$0	$0	142	87	103	115	134	154	$87,133	$0	$0	$0	$0	$0
WHITESBORO	$496	$270	$238	$215	$195	$178	34	77	98	118	137	155	$16,611	$20,694	$23,417	$25,458	$26,819	$27,500
WHITEWRIGHT	$431	$241	$209	$186	$167	$150	17	41	60	83	108	138	$7,143	$9,882	$12,615	$15,345	$18,076	$20,806
WILLOW PARK	$522	$269	$0	$0	$0	$0	20	49	40	50	60	73	$10,709	$13,246	$0	$0	$0	$0
WILMER	$0	$0	$0	$0	$0	$0	10	39	49	62	88	147	$0	$0	$0	$0	$0	$0
WOODBINE WSC	$0	$0	$0	$0	$0	$0	9	34	40	46	52	59	$0	$0	$0	$0	$0	$0
WORTHAM	$476	$255	$223	$199	$179	$162	7	14	16	18	20	22	$3,357	$3,495	$3,569	$3,591	$3,591	$3,591

Table U-10, Continued

Water User Group	Total Annual Cost per Acre-Foot						Value of Total Supply from Basic Conservation (Acre-Feet)						Total Annual Cost					
	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
WYLIE	$566	$240	$204	$173	$158	$144	291	911	1,244	1,880	2,142	2,517	$165,081	$218,237	$254,213	$325,345	$338,639	$363,150
TOTAL	$221	$118	$101	$89	$79	$70	42,659	94,252	123,878	157,303	197,208	245,806	$9,421,958	$11,127,166	$12,541,043	$14,016,548	$15,569,263	$17,231,622

Note: There are no capital costs for the Basic Conservation Package.

Table U-11
Supply and Costs by User Group for Expanded Conservation Package

Water User Group Name	Capital Costs						Total Annual Cost per Acre-Foot						Value of Total Supply from Expanded Conservation (Acre-Feet)						Total Annual Cost					
	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
ADDISON	$0	$0	$0	$0	$0	$0	$0	$267	$185	$190	$178	$178	0	1	13	13	15	15	$0	$267	$2,406	$2,473	$2,673	$2,673
ALEDO	$0	$0	$0	$0	$0	$0	$0	$371	$280	$297	$307	$296	0	4	7	8	9	11	$218	$1,485	$1,958	$2,377	$2,767	$3,256
ALLEN	$0	$8,711	$0	$0	$0	$0	$373	$302	$226	$247	$248	$249	20	236	517	594	613	620	$7,458	$71,292	$117,045	$146,646	$152,311	$154,415
ANNA	$0	$0	$0	$0	$0	$0	$581	$822	$602	$597	$583	$597	1	6	16	24	33	48	$581	$4,934	$9,635	$14,338	$19,234	$28,654
ARGYLE	$0	$0	$0	$0	$0	$0	$0	$0	$134	$134	$134	$134	0	0	2	2	2	2	$0	$33	$267	$267	$267	$267
ARGYLE WSC	$0	$0	$0	$0	$0	$0	$460	$460	$460	$460	$460	$460	1	5	5	5	5	5	$460	$2,300	$2,300	$2,300	$2,300	$2,300
ARLINGTON	$0	$0	$0	$0	$0	$0	$700	$613	$372	$353	$354	$355	53	368	1,083	1,401	1,429	1,447	$37,097	$225,762	$402,670	$494,731	$506,423	$513,255
ATHENS	$0	$27,960	$0	$0	$0	$0	$0	$235	$215	$214	$212	$210	0	39	137	182	221	268	$0	$9,183	$29,388	$38,916	$46,781	$56,220
AUBREY	$0	$0	$0	$0	$0	$0	$0	$565	$786	$919	$1,271	$854	0	1	6	1	1	2	$0	$565	$4,718	$919	$1,271	$1,708
AZLE	$0	$0	$0	$0	$0	$0	$606	$0	$0	$0	$0	$0	2	1	0	0	0	0	$1,211	$0	$0	$0	$0	$0
BARTONVILLE	$0	$0	$0	$0	$0	$0	$0	$0	$174	$134	$134	$134	0	0	1	2	2	2	$0	$0	$174	$267	$267	$267
BARTONVILLE WSC	$0	$0	$0	$0	$0	$0	$0	$0	$485	$533	$396	$436	0	0	2	2	3	3	$0	$194	$969	$1,065	$1,187	$1,308
BEDFORD	$0	$0	$0	$0	$0	$0	$493	$501	$448	$454	$460	$463	11	57	72	73	74	75	$5,424	$28,553	$32,264	$33,160	$34,008	$34,762
BENBROOK	$0	$5,000	$0	$0	$0	$0	$446	$419	$284	$270	$264	$259	5	47	86	107	131	158	$2,228	$19,702	$24,454	$28,910	$34,519	$40,894
BLOOMING GROVE	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$484	$484	0	0	0	0	1	1	$0	$0	$0	$484	$484	$484
BONHAM	$0	$0	$0	$0	$0	$0	$944	$732	$328	$308	$311	$307	1	8	51	88	118	154	$944	$5,852	$16,706	$27,104	$36,691	$47,335
BRIDGEPORT	$0	$0	$0	$0	$0	$0	$581	$545	$411	$402	$408	$403	1	7	23	36	42	51	$581	$3,815	$9,454	$14,487	$17,135	$20,538
BRYSON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	0	0	0	0	0	0	$73	$363	$363	$363	$363	$363
BUENA VISTA - BETHEL SUD	$0	$0	$0	$0	$0	$0	$0	$718	$633	$593	$697	$631	0	2	3	4	4	5	$242	$1,435	$1,899	$2,370	$2,788	$3,155
CARROLLTON	$0	$10,000	$0	$0	$0	$0	$417	$477	$349	$348	$347	$345	26	184	271	276	281	286	$10,848	$87,712	$94,570	$95,949	$97,523	$98,772
CEDAR HILL	$31,256	$0	$0	$0	$0	$0	$102	$147	$138	$142	$143	$144	65	182	233	264	291	313	$6,599	$26,834	$32,269	$37,581	$41,607	$44,973
CELINA	$0	$0	$0	$0	$0	$0	$0	$191	$254	$261	$262	$268	0	2	24	56	93	124	$0	$382	$6,092	$14,639	$24,390	$33,234
COLLEYVILLE	$24,497	$0	$0	$0	$0	$0	$33	$15	$2	$2	$2	$2	65	142	148	150	150	151	$2,136	$2,169	$267	$267	$267	$267
COPPELL	$0	$7,192	$0	$0	$0	$0	$379	$302	$205	$201	$202	$203	9	96	193	216	215	215	$3,414	$29,036	$39,637	$43,494	$43,523	$43,543
CORINTH	$0	$0	$0	$0	$0	$0	$375	$403	$348	$352	$349	$350	4	24	51	68	75	80	$1,501	$9,664	$17,771	$23,915	$26,182	$28,021
CORSICANA	$0	$0	$0	$34,486	$0	$0	$0	$0	$0	$386	$174	$154	0	0	0	62	148	157	$0	$0	$0	$23,953	$25,740	$24,125
CRANDALL	$14,942	$0	$0	$0	$0	$0	$278	$191	$127	$132	$130	$132	6	19	25	31	40	49	$1,666	$3,625	$3,178	$4,078	$5,186	$6,458
CROSS ROADS	$0	$0	$0	$0	$0	$0	$0	$565	$727	$685	$693	$652	0	3	4	7	11	15	$145	$1,695	$2,906	$4,794	$7,628	$9,783
DALLAS	$0	$0	$0	$0	$0	$0	$17	$124	$271	$276	$279	$286	7,472	6,955	9,241	12,146	12,783	13,249	$129,402	$861,377	$2,503,124	$3,357,767	$3,561,155	$3,783,590
DALWORTHINGTON GARDENS	$0	$0	$0	$0	$0	$0	$218	$227	$284	$291	$294	$296	1	5	6	7	7	7	$218	$1,135	$1,701	$2,040	$2,060	$2,074
DANVILLE WSC	$0	$0	$0	$0	$0	$0	$678	$732	$601	$602	$646	$647	1	6	10	12	13	15	$678	$4,392	$6,010	$7,218	$8,404	$9,712
DAWSON	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$702	$726	0	0	0	0	1	1	$0	$0	$0	$605	$702	$726
DE SOTO	$0	$0	$0	$0	$0	$0	$482	$459	$397	$398	$401	$398	9	57	101	127	141	151	$4,334	$26,139	$40,096	$50,518	$56,524	$60,076
DECATUR	$0	$5,000	$0	$0	$0	$0	$630	$673	$412	$400	$407	$407	1	10	35	55	70	85	$630	$6,732	$14,426	$21,996	$28,480	$34,587
DENISON	$0	$0	$0	$0	$31,200	$0	$0	$0	$0	$0	$129	$198	0	0	0	0	59	181	$0	$0	$0	$0	$7,598	$35,765
DENTON	$0	$10,000	$0	$0	$0	$0	$1,021	$568	$305	$299	$297	$294	14	277	1,151	1,673	2,047	2,719	$14,287	$157,275	$351,162	$500,818	$608,255	$799,418
DENTON COUNTY FWSD	$0	$0	$0	$0	$0	$0	$363	$260	$250	$252	$243	$243	1	10	15	19	25	30	$363	$2,598	$3,743	$4,795	$6,071	$7,292
DUNCANVILLE	$0	$0	$0	$0	$0	$0	$659	$595	$436	$418	$425	$424	5	29	49	55	55	56	$3,293	$17,265	$21,377	$22,967	$23,393	$23,728
EAST CEDAR CREEK FWSD	$0	$0	$0	$0	$0	$0	$1,671	$1,119	$919	$919	$920	$907	1	9	14	17	20	24	$1,671	$10,070	$12,859	$15,620	$18,397	$21,761
EDGECLIFF	$0	$0	$0	$0	$0	$0	$0	$411	$362	$385	$384	$384	0	3	4	4	4	4	$242	$1,232	$1,447	$1,541	$1,536	$1,534
ENNIS	$22,821	$5,000	$0	$0	$0	$0	$133	$226	$196	$200	$198	$196	28	92	184	262	337	436	$3,733	$20,770	$36,050	$52,371	$66,784	$85,415
EULESS	$39,603	$9,201	$0	$0	$0	$0	$112	$221	$206	$215	$217	$217	81	236	322	346	349	351	$9,095	$52,128	$66,178	$74,476	$75,726	$76,332
EUSTACE	$13,559	$0	$0	$0	$0	$0	$1,279	$588	$208	$211	$183	$214	1	3	3	3	4	4	$1,279	$1,765	$625	$633	$732	$856
FAIRFIELD	$0	$0	$0	$0	$0	$0	$557	$993	$1,106	$1,195	$957	$1,041	1	3	3	3	4	4	$557	$2,978	$3,317	$3,584	$3,826	$4,165
FAIRVIEW	$0	$5,000	$0	$0	$0	$0	$182	$169	$106	$97	$94	$93	2	26	54	83	141	248	$363	$4,397	$5,747	$8,066	$13,291	$23,103
FARMERS BRANCH	$0	$5,502	$0	$0	$0	$0	$547	$448	$251	$239	$237	$235	5	60	254	352	375	396	$2,736	$26,863	$63,815	$83,955	$88,691	$93,073
FLOWER MOUND	$42,253	$0	$0	$0	$0	$0	$62	$87	$101	$108	$110	$110	142	441	616	753	821	867	$8,866	$38,345	$62,177	$81,479	$89,908	$95,593
FORNEY	$0	$0	$0	$0	$0	$0	$509	$563	$421	$387	$392	$391	2	17	38	52	58	64	$1,017	$9,573	$16,001	$20,136	$22,712	$25,031
FORNEY LAKE WSC	$0	$0	$0	$0	$0	$0	$375	$354	$343	$348	$350	$344	4	25	30	32	33	35	$1,501	$8,858	$10,300	$11,123	$11,549	$12,050
FORT WORTH	$0	$0	$0	$0	$0	$0	$786	$643	$358	$341	$343	$343	77	624	2,555	3,913	4,835	6,054	$60,536	$401,354	$914,463	$1,334,257	$1,659,248	$2,079,325
FRISCO	$32,228	$6,743	$0	$0	$0	$0	$42	$84	$72	$75	$76	$76	391	1,762	2,759	3,076	3,321	3,442	$16,297	$147,560	$199,869	$232,057	$251,727	$262,517
GAINESVILLE	$0	$0	$0	$0	$0	$0	$622	$719	$643	$662	$677	$673	3	14	18	19	20	22	$1,865	$10,067	$11,576	$12,569	$13,538	$14,797
GARLAND	$71,051	$10,000	$0	$0	$0	$0	$74	$191	$183	$190	$191	$191	352	972	1,528	1,774	1,852	1,871	$26,050	$185,741	$279,993	$337,230	$352,859	$358,189

Table U-11, Continued

Water User Group Name	Capital Costs						Total Annual Cost per Acre-Foot						Value of Total Supply from Expanded Conservation (Acre-Feet)						Total Annual Cost					
	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
GRAND PRAIRIE	$0	$10,000	$0	$0	$0	$0	$737	$706	$431	$412	$405	$397	21	207	434	538	640	750	$15,473	$146,116	$187,064	$221,796	$258,930	$297,754
GRAPEVINE	$37,235	$8,412	$0	$0	$0	$0	$73	$140	$143	$152	$153	$153	112	343	521	597	622	640	$8,138	$48,026	$74,268	$90,983	$95,100	$97,890
HALTOM CITY	$35,411	$0	$0	$0	$0	$0	$162	$175	$493	$488	$502	$509	57	4	16	30	30	30	$9,218	$698	$7,884	$14,647	$15,060	$15,267
HEATH	$0	$0	$0	$0	$0	$0	$0	$0	$174	$134	$134	$134	0	0	1	2	2	2	$0	$0	$174	$267	$267	$267
HICKORY CREEK SUD	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	0	0	0	0	0	0	$24	$121	$218	$242	$242	$242
HIGHLAND VILLAGE	$0	$5,000	$0	$0	$0	$0	$404	$257	$173	$177	$178	$177	3	45	86	92	93	95	$1,211	$11,552	$14,842	$16,246	$16,577	$16,820
HONEY GROVE	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,311	$489	$466	0	0	0	1	5	7	$0	$0	$0	$1,311	$2,446	$3,260
HOWE	$0	$0	$0	$0	$0	$0	$0	$557	$712	$0	$0	$0	0	1	5	1	0	0	$0	$557	$3,560	$0	$0	$0
HURST	$33,764	$0	$0	$0	$0	$0	$107	$155	$174	$193	$194	$195	63	161	235	268	270	273	$6,770	$24,877	$40,893	$51,602	$52,473	$53,123
HUTCHINS	$0	$0	$0	$0	$0	$0	$0	$915	$492	$471	$465	$455	0	5	26	48	68	82	$460	$4,573	$12,791	$22,595	$31,621	$37,337
IRVING	$0	$10,000	$0	$0	$0	$0	$586	$529	$312	$303	$303	$302	38	368	1,116	1,427	1,482	1,527	$22,253	$194,809	$348,147	$433,088	$449,205	$461,648
JUSTIN	$14,324	$0	$0	$0	$0	$0	$373	$190	$116	$118	$120	$123	4	16	26	43	54	60	$1,491	$3,041	$3,003	$5,089	$6,466	$7,399
KAUFMAN	$0	$22,543	$0	$0	$0	$0	$0	$217	$1,059	$839	$957	$915	0	16	2	5	5	6	$0	$3,475	$2,118	$4,196	$4,786	$5,492
KELLER	$0	$0	$0	$0	$0	$0	$363	$379	$324	$317	$316	$316	9	52	85	98	98	98	$3,269	$19,699	$27,532	$31,018	$30,972	$30,967
KENNEDALE	$0	$0	$0	$0	$0	$0	$702	$631	$466	$439	$435	$434	1	7	18	26	28	29	$702	$4,417	$8,387	$11,413	$12,171	$12,585
LADONIA	$0	$0	$0	$0	$0	$0	$0	$496	$433	$384	$425	$380	0	2	4	6	6	8	$170	$991	$1,732	$2,305	$2,552	$3,037
LAKE WORTH	$0	$0	$0	$0	$0	$0	$436	$657	$473	$470	$483	$486	1	4	12	17	18	19	$436	$2,629	$5,674	$7,989	$8,692	$9,240
LAKESIDE	$13,728	$5,000	$0	$0	$0	$0	$330	$225	$113	$81	$82	$77	4	12	15	18	20	24	$1,318	$2,700	$1,698	$1,450	$1,641	$1,845
LEWISVILLE	$51,985	$10,000	$0	$0	$0	$0	$89	$192	$184	$195	$196	$195	169	563	1,028	1,253	1,335	1,416	$14,969	$108,018	$189,431	$243,801	$261,035	$276,231
LINDSAY	$0	$0	$0	$0	$0	$0	$0	$363	$460	$484	$484	$484	0	1	1	1	1	1	$73	$363	$460	$484	$484	$484
LITTLE ELM	$0	$5,000	$0	$0	$0	$0	$593	$418	$277	$279	$280	$280	4	64	124	128	128	128	$2,373	$26,772	$34,363	$35,760	$35,834	$35,834
MABANK	$0	$0	$0	$0	$0	$0	$0	$811	$630	$743	$648	$763	0	2	3	3	4	4	$266	$1,622	$1,889	$2,228	$2,591	$3,051
MANSFIELD	$28,819	$0	$0	$0	$0	$0	$59	$84	$106	$114	$116	$118	114	390	651	874	997	1,037	$6,677	$32,693	$68,945	$99,596	$115,712	$122,862
MAYPEARL	$0	$0	$0	$0	$0	$0	$0	$363	$363	$363	$363	$363	0	1	1	1	1	1	$73	$363	$363	$363	$363	$363
MCKINNEY	$53,573	$0	$0	$0	$0	$0	$57	$105	$92	$94	$95	$96	207	977	1,853	2,569	3,098	3,572	$11,886	$102,750	$170,177	$241,414	$295,180	$341,815
MELISSA	$0	$0	$0	$0	$0	$0	$1,211	$724	$519	$504	$506	$510	1	12	37	58	72	89	$1,211	$8,692	$19,219	$29,246	$36,437	$45,394
MESQUITE	$62,452	$0	$0	$0	$0	$0	$87	$155	$173	$181	$183	$184	229	634	1,113	1,382	1,436	1,455	$19,877	$98,453	$192,242	$250,376	$262,820	$267,237
MIDLOTHIAN	$18,236	$5,000	$0	$0	$0	$0	$76	$97	$116	$128	$129	$130	21	94	268	390	463	521	$1,590	$9,134	$31,070	$49,758	$59,532	$67,513
MOUNTAIN PEAK WSC	$0	$0	$0	$0	$0	$0	$557	$791	$533	$533	$532	$508	1	4	8	10	12	16	$557	$3,165	$4,265	$5,328	$6,379	$8,129
MT ZION WSC	$0	$0	$0	$0	$0	$0	$0	$299	$266	$297	$303	$327	0	3	4	4	4	4	$121	$896	$1,065	$1,187	$1,211	$1,308
MUENSTER	$0	$0	$0	$0	$0	$0	$0	$589	$412	$377	$373	$372	0	2	6	9	10	11	$194	$1,177	$2,471	$3,396	$3,731	$4,092
MURPHY	$0	$0	$0	$0	$0	$0	$327	$336	$338	$346	$346	$346	2	32	41	42	42	42	$654	$10,765	$13,857	$14,525	$14,523	$14,522
NEVADA	$0	$0	$0	$0	$0	$0	$0	$533	$351	$468	$408	$443	0	1	2	3	6	13	$48	$533	$702	$1,404	$2,446	$5,763
NEW HOPE	$0	$0	$0	$0	$0	$0	$0	$230	$388	$309	$303	$331	0	2	2	4	6	12	$73	$460	$775	$1,235	$1,816	$3,971
NORTH COLLIN WSC	$0	$0	$0	$0	$0	$0	$751	$912	$742	$700	$733	$763	1	5	8	10	11	12	$751	$4,562	$5,938	$7,000	$8,065	$9,155
NORTH RICHLAND HILLS	$44,029	$10,000	$0	$0	$0	$0	$92	$184	$163	$163	$162	$162	108	313	407	440	455	466	$9,916	$57,557	$66,540	$71,562	$73,887	$75,498
OAK POINT	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$174	$134	0	0	0	0	1	2	$0	$0	$0	$0	$174	$267
OVILLA	$0	$0	$0	$0	$0	$0	$460	$482	$483	$505	$458	$458	1	6	8	9	11	12	$460	$2,894	$3,860	$4,541	$5,041	$5,496
PANTEGO	$0	$5,000	$0	$0	$0	$0	$218	$526	$421	$334	$334	$334	1	4	5	5	5	5	$218	$2,105	$2,105	$1,669	$1,669	$1,669
PARKER	$0	$0	$0	$0	$0	$0	$230	$191	$194	$195	$197	$196	2	24	44	72	107	150	$460	$4,572	$8,520	$14,066	$21,082	$29,423
PAYNE SPRINGS	$0	$0	$0	$0	$0	$0	$0	$581	$605	$605	$702	$726	0	1	1	1	1	1	$97	$581	$605	$605	$702	$726
PLANO	$0	$0	$0	$0	$0	$0	$305	$304	$293	$294	$295	$295	78	409	471	487	502	519	$23,827	$124,503	$137,909	$143,039	$148,121	$153,284
PONDER	$0	$0	$0	$0	$0	$0	$0	$378	$356	$360	$362	$368	0	6	16	28	35	37	$170	$2,267	$5,696	$10,078	$12,676	$13,625
POTTSBORO	$0	$0	$0	$0	$0	$0	$0	$571	$434	$440	$419	$401	0	4	9	12	16	19	$291	$2,282	$3,903	$5,276	$6,697	$7,621
PROSPER	$0	$0	$0	$0	$0	$0	$283	$262	$253	$253	$253	$254	3	49	86	109	120	128	$848	$12,828	$21,796	$27,563	$30,320	$32,475
R-C-H WSC	$0	$0	$0	$0	$0	$0	$0	$472	$485	$355	$396	$436	0	2	2	3	3	3	$170	$944	$969	$1,065	$1,187	$1,308
RED OAK	$0	$0	$0	$0	$0	$0	$509	$521	$447	$463	$484	$445	1	6	9	10	11	14	$509	$3,124	$4,021	$4,626	$5,328	$6,228
RICHARDSON	$0	$10,000	$0	$0	$0	$0	$259	$307	$242	$241	$243	$243	38	276	371	368	365	365	$9,855	$84,719	$89,721	$88,849	$88,849	$88,849
RICHLAND HILLS	$0	$0	$0	$0	$0	$0	$0	$0	$579	$728	$773	$803	0	0	2	3	3	3	$0	$102	$1,157	$2,185	$2,320	$2,410
ROANOKE	$0	$0	$0	$0	$0	$0	$605	$420	$384	$390	$388	$389	1	11	33	55	75	94	$605	$4,625	$12,657	$21,446	$29,107	$36,598
ROCKWALL	$0	$0	$0	$0	$0	$0	$342	$325	$314	$314	$312	$314	9	75	109	127	133	133	$3,075	$24,357	$34,273	$39,820	$41,561	$41,754
ROWLETT	$0	$0	$0	$0	$0	$0	$427	$401	$386	$387	$389	$390	11	68	83	91	97	102	$4,698	$27,269	$32,067	$35,236	$37,754	$39,788
ROYSE CITY	$0	$0	$0	$0	$0	$0	$594	$581	$494	$492	$493	$492	2	19	38	55	68	76	$1,187	$11,047	$18,755	$27,044	$33,539	$37,418
SACHSE	$19,826	$0	$0	$0	$0	$0	$111	$116	$110	$118	$118	$118	26	80	102	116	126	135	$2,891	$9,308	$11,187	$13,666	$14,912	$15,985
SAGINAW	$0	$0	$0	$0	$0	$0	$678	$545	$482	$491	$487	$491	2	15	24	28	30	31	$1,356	$8,174	$11,560	$13,734	$14,618	$15,216

Table U-11, Continued

Water User Group Name	Capital Costs						Total Annual Cost per Acre-Foot						Value of Total Supply from Expanded Conservation (Acre-Feet)						Total Annual Cost					
	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
SANGER	$0	$0	$0	$0	$0	$0	$0	$0	$134	$151	$178	$178	0	0	2	2	3	3	$0	$33	$267	$301	$535	$535
SARDIS-LONE ELM WSC	$0	$0	$0	$0	$0	$0	$654	$566	$530	$538	$560	$480	1	6	7	8	9	13	$654	$3,395	$3,708	$4,301	$5,041	$6,245
SHERMAN	$33,049	$0	$0	$0	$0	$0	$88	$134	$166	$178	$178	$177	79	217	422	559	641	757	$6,925	$29,089	$70,093	$99,717	$114,382	$134,335
SOUTHLAKE	$0	$0	$0	$0	$0	$0	$0	$0	$134	$134	$134	$134	0	0	4	4	4	4	$0	$67	$535	$535	$535	$535
SPRINGTOWN	$14,443	$0	$0	$0	$0	$0	$315	$132	$47	$60	$61	$60	4	10	16	20	23	27	$1,259	$1,321	$750	$1,191	$1,404	$1,620
SUNNYVALE	$0	$0	$0	$0	$0	$0	$206	$210	$211	$219	$210	$211	2	13	17	21	26	27	$412	$2,736	$3,584	$4,605	$5,449	$5,691
TALTY	$0	$0	$0	$0	$0	$0	$170	$247	$215	$220	$222	$232	1	5	8	10	13	16	$170	$1,235	$1,719	$2,204	$2,882	$3,705
TERRELL	$21,683	$0	$0	$0	$0	$0	$116	$145	$167	$184	$186	$185	28	77	142	181	195	214	$3,246	$11,164	$23,754	$33,303	$36,177	$39,630
TIOGA	$13,528	$0	$0	$0	$0	$0	$650	$291	$182	$204	$206	$210	2	8	13	16	18	19	$1,300	$2,328	$2,367	$3,270	$3,713	$3,990
TOM BEAN	$0	$0	$0	$0	$0	$0	$0	$702	$823	$424	$472	$485	0	1	1	2	2	2	$121	$702	$823	$848	$944	$969
TRENTON	$0	$0	$0	$0	$0	$0	$0	$805	$713	$772	$711	$684	0	1	2	3	5	7	$121	$805	$1,425	$2,317	$3,555	$4,789
TROPHY CLUB	$0	$0	$0	$0	$0	$0	$363	$349	$257	$239	$241	$238	2	13	41	58	63	69	$726	$4,543	$10,529	$13,884	$15,189	$16,401
VAN ALSTYNE	$0	$0	$0	$0	$0	$0	$484	$738	$455	$436	$428	$427	1	7	27	40	46	49	$484	$5,169	$12,284	$17,454	$19,706	$20,919
WAXAHACHIE	$0	$0	$0	$0	$0	$0	$839	$672	$332	$312	$314	$314	3	26	135	220	279	357	$2,518	$17,462	$44,826	$68,642	$87,521	$111,925
WEATHERFORD	$0	$5,000	$0	$0	$0	$0	$896	$666	$353	$342	$339	$336	3	40	147	205	233	264	$2,688	$26,622	$51,854	$70,010	$78,983	$88,741
WESTON	$0	$0	$0	$0	$0	$0	$0	$412	$474	$435	$432	$438	0	1	7	21	39	66	$0	$412	$3,317	$9,133	$16,834	$28,894
WESTOVER HILLS	$13,461	$0	$0	$0	$0	$0	$587	$294	$0	$0	$0	$0	2	4	4	4	4	4	$1,174	$1,174	$0	$0	$0	$0
WHITE SETTLEMENT	$0	$0	$0	$0	$0	$0	$775	$0	$0	$0	$0	$0	2	1	0	0	0	0	$1,550	$0	$0	$0	$0	$0
WHITESBORO	$0	$0	$0	$0	$0	$0	$630	$661	$507	$494	$485	$484	1	6	14	19	21	22	$630	$3,964	$7,103	$9,390	$10,179	$10,651
WHITEWRIGHT	$0	$0	$0	$0	$0	$0	$0	$848	$1,102	$1,344	$1,057	$1,219	0	2	2	2	3	3	$242	$1,695	$2,204	$2,688	$3,172	$3,656
WILLOW PARK	$0	$0	$0	$0	$0	$0	$0	$993	$0	$0	$0	$0	0	2	0	0	0	0	$339	$1,986	$0	$0	$0	$0
WYLIE	$0	$5,000	$0	$0	$0	$0	$591	$421	$272	$261	$264	$261	5	78	156	222	238	261	$2,954	$32,844	$42,380	$57,852	$62,724	$68,168
TOTAL	$801,756	$231,264	$0	$34,486	$31,200	$0	$57	$208	$236	$241	$242	$246	10,345	18,986	32,702	42,049	46,478	51,036	$592,311	$3,946,169	$7,707,456	$10,128,721	$11,242,510	$12,530,673

Table U-12
Supply and Costs by User Group for Non-Municipal Water Conservation Package

Water User Group Name	Total Annual Cost per Acre-Foot						Value of Total Supply from Non-Municipal Conservation (Acre-Feet)						Total Annual Cost					
	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
COLLIN COUNTY-IRRIGATION	$211	$211	$211	$211	$211	$211	6	99	190	238	283	328	$1,266	$20,895	$40,207	$50,338	$59,836	$69,334
COOKE COUNTY-IRRIGATION	$211	$211	$211	$211	$211	$211	0	6	11	15	18	22	$69	$1,179	$2,355	$3,089	$3,832	$4,549
DALLAS COUNTY-IRRIGATION	$211	$211	$211	$211	$211	$211	26	429	825	1,032	1,227	1,422	$5,491	$90,606	$174,348	$218,278	$259,463	$300,647
ELLIS COUNTY-IRRIGATION	$211	$211	$211	$211	$211	$211	1	15	29	37	44	51	$196	$3,230	$6,216	$7,782	$9,250	$10,718
KAUFMAN COUNTY-IRRIGATION	$211	$211	$211	$211	$211	$211	4	72	140	177	212	247	$920	$15,281	$29,591	$37,359	$44,776	$52,131
ROCKWALL COUNTY-IRRIGATION	$211	$211	$211	$211	$211	$211	2	37	71	89	106	123	$476	$7,849	$15,103	$18,908	$22,476	$26,044
TARRANT COUNTY-IRRIGATION	$211	$211	$211	$211	$211	$211	17	274	527	660	785	910	$3,512	$57,948	$111,506	$139,603	$165,943	$192,283
WISE COUNTY-IRRIGATION	$211	$211	$211	$211	$211	$211	0	5	10	13	15	18	$68	$1,123	$2,161	$2,706	$3,217	$3,727
COLLIN COUNTY-MANUFACTURING	$0	$211	$211	$211	$211	$211	0	6	72	108	119	130	$0	$1,311	$15,320	$22,855	$25,216	$27,466
COOKE COUNTY-MANUFACTURING	$0	$211	$211	$211	$211	$211	0	1	7	10	11	12	$0	$126	$1,457	$2,131	$2,301	$2,474
DALLAS COUNTY-MANUFACTURING	$0	$211	$211	$211	$211	$211	0	68	781	1,135	1,212	1,258	$0	$14,371	$165,106	$239,855	$256,248	$266,045
DENTON COUNTY-MANUFACTURING	$0	$211	$211	$211	$211	$211	0	2	29	44	49	53	$0	$524	$6,156	$9,256	$10,296	$11,261
GRAYSON COUNTY-MANUFACTURING	$0	$211	$211	$211	$211	$211	0	15	175	255	272	291	$0	$3,232	$37,089	$53,841	$57,580	$61,606
HENDERSON COUNTY-MANUFACTURING	$0	$211	$211	$211	$211	$211	0	0	3	4	5	5	$0	$50	$584	$879	$999	$1,136
KAUFMAN COUNTY-MANUFACTURING	$0	$211	$211	$211	$211	$211	0	1	15	22	23	25	$0	$282	$3,213	$4,620	$4,938	$5,280
NAVARRO COUNTY-MANUFACTURING	$0	$211	$211	$211	$211	$211	0	1	16	23	25	27	$0	$286	$3,316	$4,883	$5,314	$5,738
PARKER COUNTY-MANUFACTURING	$0	$211	$211	$211	$211	$211	0	1	6	9	9	10	$0	$107	$1,245	$1,836	$2,000	$2,163
ROCKWALL COUNTY-MANUFACTURING	$0	$211	$211	$211	$211	$211	0	0	1	1	1	1	$0	$10	$114	$171	$190	$209
TARRANT COUNTY-MANUFACTURING	$0	$211	$211	$211	$211	$211	0	35	413	630	711	784	$0	$7,367	$87,348	$133,102	$150,274	$165,665
WISE COUNTY-MANUFACTURING	$0	$211	$211	$211	$211	$211	0	1	12	18	19	21	$0	$216	$2,521	$3,739	$4,088	$4,436
TOTAL							57	1,069	3,334	4,518	5,147	5,737	$11,999	$225,995	$704,956	$955,232	$1,088,236	$1,212,911

Table U-13
Costs Estimates for Supplemental Wells to Maintain Current Groundwater Production Capacity

Water User Group	County	Aquifer	# Wells in 2005	Well Capacity (gpm)	Well Depth (ft)	Installation Schedule						Construction Costs (including engineering, contingencies, and permitting)					
						2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
Anna	Collin	Woodbine	1	150	1,559	1						$467,146					
Anna	Collin	Trinity (Paluxy)	1	150	2,359			1						$586,826			
Blue Ridge	Collin	Woodbine	2	200	1,925	1		1				$583,270		$583,270			
Celina	Collin	Trinity (Paluxy)	2	90	1,100	1					1	$391,952					$391,952
Celina	Collin	Trinity (Travis Peak)	1	220	2,184		1						$632,590				
Celina	Collin	Trinity (Twin Mountains)	1	340	2,398				1						$750,489		
Frisco	Collin	Trinity	2	200	1,925	1			1			$583,270			$583,270		
Gunter Rural WSC	Collin	Trinity (Twin Mountains)	3	243	2,340	1		1		1		$663,265		$663,265		$663,265	
Gunter Rural WSC	Collin	Trinity (Antlers)	2	249	2,260		1		1				$649,108		$649,108		
Melissa	Collin	Woodbine	2	200	1,512	1			1			$507,443			$507,443		
Prosper	Collin	Woodbine	6	250	1,900	1	1	1	1	1	1	$583,100	$583,100	$583,100	$583,100	$583,100	$583,100
South Grayson WSC	Collin	Trinity	2	150	2359	1			1			$431,490	$0	$0	$431,490	$0	$0
South Grayson WSC	Collin	Woodbine	2	200	1925	1			1			$428,875	$0	$0	$428,875	$0	$0
Weston	Collin	Woodbine	2	250	1,152	1		1				$445,767		$445,767			
Collin County-Other	Collin	Trinity & Woodbine	1	250	1,200	1						$454,580					
Collin County Manufacturing	Collin	Woodbine	1	250	1,200	1						$386,580					
Collin County Steam Electric	Collin	Woodbine	1	250	1,200	1						$386,580					
Bolivar WSC	Cooke	Trinity (Antlers)	18	157	952	3	3	3	3	3	3	$1,202,478	$1,202,478	$1,202,478	$1,202,478	$1,202,478	$1,202,478
Gainesville	Cooke	Trinity (Antlers)	8	404	969	2	1	1	2	1	1	$1,077,615	$538,808	$538,808	$1,077,615	$538,808	$538,808
Kiowa Homeowners WSC	Cooke	Trinity (Antlers)	2	875	1,362	1			1			$743,267			$743,267		
Lindsay	Cooke	Trinity (Antlers)	3	136	792	1		1		1		$350,880		$350,880		$350,880	
Muenster	Cooke	Trinity (Antlers)	5	138	639	1	1	1	1	1		$328,209	$328,209	$328,209	$328,209	$328,209	
Woodbine WSC	Cooke	Trinity (Antlers)	6	207	1,416	1	1	1	1	1	1	$490,436	$490,436	$490,436	$490,436	$490,436	$490,436
Cooke County-Other	Cooke	Trinity	10	404	969	2	1	2	1	2	1	$1,077,615	$538,808	$1,077,615	$538,808	$1,077,615	$538,808
Cooke County Irrigation	Cooke	Trinity	8	404	969	2	1	1	2	1	1	$533,615	$266,808	$266,808	$533,615	$266,808	$266,808
Cooke County Livestock	Cooke	Trinity	22	404	969	4	4	3	4	4	3	$1,067,230	$1,067,230	$800,423	$1,067,230	$1,067,230	$800,423
Cooke County Manufacturing	Cooke	Trinity	3	404	969	1		1		1		$402,808		$402,808		$402,808	
Cooke County Mining	Cooke	Trinity	2	404	969	1			1			$266,808			$266,808		
Carrollton	Dallas	Trinity (Travis Peak)	1 emergency	500	2,475	1						$895,220					
Cedar Hill	Dallas	Woodbine	1	85	892	1						$360,291					
Cedar Hill	Dallas	Trinity (Travis Peak)	2	393	2,499			1		1				$891,601		$891,601	
Desoto	Dallas	Trinity	1 emergency	600	2,800	1						$1,131,520					
Glenn Heights	Dallas	Woodbine	3	162	1,066	1		1		1		$422,198		$422,198		$422,198	
Grand Prairie	Dallas	Trinity (Travis Peak)	7	604	2,042	2	1	1	1	1	1	$1,830,723	$915,362	$915,362	$915,362	$915,362	$915,362
Grand Prairie	Dallas	Trinity (Twin Mountains)	3	700	2,064		1		1	1			$929,478		$929,478	$929,478	
Lancaster	Dallas	Trinity (Twin Mountains)	1 emergency	500	3,200	1						$1,062,840					
Wilmer	Dallas	Trinity (Twin Mountains)	1	400	3,661	1						$1,160,855					
Wilmer	Dallas	Trinity (Travis Peak)	1	400	3,448			1						$1,111,610			
Dallas County-Other	Dallas	Other	1	300	2,000	1						$605,880					
Denton County-Other	Dallas	Other	1	300	2,000	1						$440,640					
Dallas County Irrigation	Dallas	Other	1	300	2000	1						$295,500	$0	$0	$0	$0	$0
Dallas County Livestock	Dallas	Woodbine	1	300	2,000	1						$236,640					
Dallas County Manufacturing	Dallas	Trinity	1	300	2,000	1						$537,880					
Dallas County Manufacturing	Dallas	Woodbine	1	300	2,000	1						$537,880					
Dallas County Mining	Dallas	Trinity	1	300	2,000	1						$401,880					
Dallas County Steam Electric	Dallas	Trinity	1	300	2,000	1						$537,880					
Argyle WSC	Denton	Trinity (Twin Mountains)	4	314	1,269	1		1		1	1	$540,906		$540,906		$540,906	$540,906
Aubrey	Denton	Trinity (Twin Mountains)	3	142	1,492	1		1		1		$456,253		$456,253		$456,253	
Bartonville WSC	Denton	Trinity (Travis Peak)	1	165	1,332	1						$471,301					
Bartonville WSC	Denton	Trinity (Paluxy)	4	181	1,068	1	1		1		1	$424,245	$424,245		$424,245		$424,245

Table U-13, Continued

Water User Group	County	Aquifer	# Wells in 2005	Well Capacity (gpm)	Well Depth (ft)	Installation Schedule						Construction Costs (including engineering, contingencies, and permitting`					
						2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
Bartonville WSC	Denton	Trinity (Twin Mountains)	5	174	1,402		1	1	1	1	1		$484,949	$484,949	$484,949	$484,949	$484,949
Bolivar WSC	Denton	Trinity	2	100	250	1			1			$195,500	$0	$0	$195,500	$0	$0
Corinth	Denton	Trinity	1 emergency	150	1,200	1						$413,440					
Hackberry	Denton	Trinity	1	26	380	1						$277,277					
Hackberry	Denton	Trinity	1	170	1,240				1						$454,852		
Hickory Creek SUD	Denton	Woodbine	3	267	2,024	1		1		1		$607,369		$607,369		$607,369	
Highland Village	Denton	Trinity (Travis Peak)	3	375	1,765	1		1		1		$720,358		$720,358		$720,358	
Highland Village	Denton	Trinity (Twin Mountains)	2	838	1,658		1		1				$824,786		$824,786		
Justin	Denton	Trinity (Travis Peak)	4	212	1,018	1		1		1	1	$417,806		$417,806		$417,806	$417,806
Krum	Denton	Trinity (Paluxy)	2	121	487	1				1		$303,620				$303,620	
Krum	Denton	Trinity (Travis Peak)	1	47	981			1						$369,471			
Krum	Denton	Trinity (Twin Mountains)	2	130	966		1		1				$376,258		$376,258		
Lake Cities MUA	Denton	Trinity	2	150	1,500		1		1				$458,320		$458,320		
Lake Cities MUA	Denton	Woodbine	3	300	300		1		1		1		$293,760		$293,760		$293,760
Lincoln Park	Denton	Trinity	1	130	1,000	1						$381,344					
Little Elm	Denton	Woodbine	5	95	521	1	1	1	1	1		$305,878	$305,878	$305,878	$305,878	$305,878	
Mustang SUD	Denton	Trinity (Twin Mountains)	5	184	1,559	1	1	1	1	1		$514,658	$514,658	$514,658	$514,658	$514,658	
Mustang SUD	Denton	Trinity (Travis Peak)	2	63	1,240			1			1			$409,958			$409,958
Northlake	Denton	Woodbine	1	130	1,000	1						$381,344					
Oak Point	Denton	Trinity	1	130	1,000	1						$381,344					
Pilot Point	Denton	Trinity (Antlers)	6	185	1,527	1	1	1	1	1	1	$508,871	$508,871	$508,871	$508,871	$508,871	$508,871
Ponder	Denton	Trinity (Twin Mountains)	3	108	992		1		1		1		$377,754		$377,754		$377,754
Ponder	Denton	Trinity (Paluxy)	1	45	640	1						$318,240					
Roanoke	Denton	Trinity (Paluxy)	4	58	603	1		1		1	1	$314,119		$314,119		$314,119	$314,119
Roanoke	Denton	Trinity (Travis Peak)	1	105	1,125		1						$397,324				
Sanger	Denton	Trinity (Antlers)	6	268	1,044	1	1	1	1	1	1	$427,530	$427,530	$427,530	$427,530	$427,530	$427,530
The Colony	Denton	Trinity (Travis Peak)	2	1,220	2,367	1				1		$1,058,447				$1,058,447	
The Colony	Denton	Trinity (Twin Mountains)	1	1,540	2,429			1						$1,102,266			
Trophy Club Mud #1	Denton	Trinity (Travis Peak)	1	435	1,424	1						$646,660					
Trophy Club Mud #1	Denton	Trinity (Paluxy)	3	97	741		1		1		1		$339,007		$339,007		$339,007
Denton County-Other	Denton	Trinity	1	100	1,500	1						$452,880					
Denton County Irrigation	Denton	Trinity	1	100	1,500	1						$147,900					
Denton County Livestock	Denton	Trinity	1	100	1,500	1						$147,900					
Denton County Manufacturing	Denton	Trinity	1	100	1,500	1						$384,880					
Denton County Mining	Denton	Trinity	1	100	1,500	1						$248,880					
Denton County Mining	Denton	Woodbine	0	300	300			1						$166,000			
Bardwell	Ellis	Woodbine	1	85	1,450	1						$443,768					
Buena Vista - Bethel SUD	Ellis	Trinity (Travis Peak)	4	289	2,585	1	1		1		1	$712,314	$712,314		$712,314		$712,314
Ferris	Ellis	Woodbine	2	215	1,442	1			1			$495,917			$495,917		
Grand Prairie	Ellis	Trinity	1	700	2064	1						$683,440	$0	$0	$0	$0	$0
Italy	Ellis	Trinity (Travis Peak)	2	188	2,807	1			1			$744,144			$744,144		
Italy	Ellis	Woodbine	1	110	935	1						$369,444					
Maypearl	Ellis	Woodbine	2	58	436	1			1			$289,136			$289,136		
Maypearl	Ellis	Trinity (Twin Mountains)	1	230	2,064	1						$611,442					
Midlothian	Ellis	Trinity (Travis Peak)	1 emergency	500	2,412	1						$880,654					
Milford	Ellis	Woodbine	2	133	865	1			1			$361,474			$361,474		
Mountain Peak WSC	Ellis	Trinity (Travis Peak)	2	243	2,391	1			1			$672,629			$672,629		
Mountain Peak WSC	Ellis	Trinity (Twin Mountains)	2	273	2,239		1			1			$647,374			$647,374	
Ovilla	Ellis	Woodbine	1 emergency	35	900	1						$356,048					
Palmer	Ellis	Woodbine	2	114	1,404	1			1			$440,042			$440,042		
Pecan Hill	Ellis	Other	1	20	25	1						$223,516					
Red Oak	Ellis	Woodbine	3	247	1,151	1		1		1		$445,318		$445,318		$445,318	
Rockett SUD	Ellis	Trinity	1 emergency	277	3,150	1						$814,987					

Table U-13, Continued

Water User Group	County	Aquifer	# Wells in 2005	Well Capacity (gpm)	Well Depth (ft)	Installation Schedule						Construction Costs (including engineering, contingencies, and permitting)					
						2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
Sardis Lone Elm WSC	Ellis	Trinity (Travis Peak)	4	474	2,695	1		1		1	1	$943,856		$943,856		$943,856	$943,856
Sardis Lone Elm WSC	Ellis	Trinity (Twin Mountains)	2	360	2,508		1		1				$890,854		$890,854		
Ellis County-Other	Ellis	Woodbine	4	85	1,500	1	1		1		1	$451,248	$451,248		$451,248		$451,248
Ellis County-Other	Ellis	Trinity	7	217	2,579	1	1	2	1	1	1	$704,847	$704,847	$1,409,694	$704,847	$704,847	$704,847
Ellis County Irrigation	Ellis	Trinity	1	217	2,579	1						$500,847					
Ellis County Livestock	Ellis	Woodbine	2	85	1,500	1			1			$247,248			$247,248		
Ellis County Manufacturing	Ellis	Trinity	13	217	2,579	3	2	2	2	2	2	$1,910,542	$1,273,694	$1,273,694	$1,273,694	$1,273,694	$1,273,694
Ellis County Manufacturing	Ellis	Woodbine	5	85	1,500	1	1	1	1	1		$383,248	$383,248	$383,248	$383,248	$383,248	
Ellis County Mining	Ellis	Woodbine	2	85	1,500	1			1			$247,248			$247,248		
Fannin County-Other	Fannin	Woodbine	11	494	1,255	2	2	2	2	1	2	$1,225,284	$1,225,284	$1,225,284	$1,225,284	$612,642	$1,225,284
Fannin County-Other	Fannin	Trinity	5	90	3,247	1	1	1	1	1		$713,143	$713,143	$713,143	$713,143	$713,143	
Ector	Fannin	Woodbine	3	112	730	1		1		1		$338,994		$338,994		$338,994	
Fannin County Irrigation	Fannin	Other	65	50	543	11	11	11	11	11	10	$1,103,001	$1,103,001	$1,103,001	$1,103,001	$1,103,001	$1,002,728
Honey Grove	Fannin	Woodbine	2	375	1,695	1			1			$704,174			$704,174		
Ladonia	Fannin	Trinity	2	393,900	468,025	1			1			$840,514			$840,514		
Leonard	Fannin	Woodbine	3	347	1,691	1		1		1		$621,302		$621,302		$621,302	
Fannin County Livestock	Fannin	Woodbine	4	494	1,255	1		1		1	1	$340,642		$340,642		$340,642	$340,642
Fannin County Livestock	Fannin	Trinity	1	90	3,247		1						$509,143				
Savoy	Fannin	Woodbine	3	81,860	92,400	1		1		1		$315,330		$315,330		$315,330	
Southwest Fannin County SUD	Fannin	Woodbine	7	90,060	101,800	2	1	1	1	1	1	$652,963	$326,482	$326,482	$326,482	$326,482	$326,482
Trenton	Fannin	Woodbine	2	192,720	225,635	1			1			$466,099			$466,099		
Fannin County Manufacturing	Fannin	Woodbine	1	156,050	181,925	1						$416,228					
Fannin County SEP	Fannin	Woodbine	3	83,640	84,630	1		1		1		$405,745		$405,745		$405,745	
Fairfield	Freestone	Carrizo-Wilcox	4	450	730	1		1		1	1	$487,492		$487,492		$487,492	$487,492
Flo Community WSC	Freestone	Carrizo-Wilcox	4	181	675	1		1		1	1	$352,090		$352,090		$352,090	$352,090
Teague	Freestone	Carrizo-Wilcox	3	330	677	1		1		1		$433,629		$433,629		$433,629	
Freestone County-Other	Freestone	Carrizo-Wilcox	1	250	650	1						$353,600					
Freestone County Irrigation	Freestone	Carrizo-Wilcox	1	250	650	1						$95,897					
Freestone County Livestock	Freestone	Carrizo-Wilcox & Queen	1	250	650	1						$95,897					
Freestone County Mining	Freestone	Carrizo-Wilcox	1	250	650	1						$149,600					
Freestone County Steam	Freestone	Carrizo-Wilcox	1	250	650	1						$285,600					
Bells	Grayson	Trnity (Antlers)	2	194	2,075	1				1		$610,280				$610,280	
Bells	Grayson	Woodbine	1	75	709			1						$331,826			
Collinsville	Grayson	Trnity (Antlers)	5	147	1,488	1	1	1	1	1		$456,198	$456,198	$456,198	$456,198	$456,198	
Grayson County-Other	Grayson	Trnity	15	450	2,357	3	3	2	3	2	2	$2,590,963	$2,590,963	$1,727,309	$2,590,963	$1,727,309	$1,727,309
Grayson County-Other	Grayson	Woodbine	21	373	953	4	3	4	3	4	3	$2,129,809	$1,597,357	$2,129,809	$1,597,357	$2,129,809	$1,597,357
Denison	Grayson	Trnity (Antlers)	1	180	1,570	1						$516,324					
Denison	Grayson	Woodbine	4	79	709		1	1	1	1			$332,262	$332,262	$332,262	$332,262	
Gunter	Grayson	Woodbine	3	213	2,173	1		1		1		$629,952		$629,952		$629,952	
Howe	Grayson	Woodbine	3	358	1,173	1		1		1		$582,031		$582,031		$582,031	
Grayson County Irrigation	Grayson	Woodbine	49	373	953	9	8	8	8	8	8	$2,344,070	$2,083,618	$2,083,618	$2,083,618	$2,083,618	$2,083,618
Grayson County Livestock	Grayson	Woodbine	5	373	953	1	1	1	1	1		$260,452	$260,452	$260,452	$260,452	$260,452	
Luella WSC	Grayson	Woodbine	7	184	1,258	2	1	1	1	1	1	$918,789	$459,394	$459,394	$459,394	$459,394	$459,394
Grayson County Manufacturing	Grayson	Woodbine	25	373	953	5	4	4	4	4	4	$1,982,261	$1,585,809	$1,585,809	$1,585,809	$1,585,809	$1,585,809
Grayson County Mining	Grayson	Trinity	4	450	2,357	1		1		1	1	$591,654		$591,654		$591,654	$591,654
Grayson County Mining	Grayson	Woodbine	5	373	953	1	1	1	1	1		$260,452	$260,452	$260,452	$260,452	$260,452	
Gunter Rural WSC	Grayson	Trinity	5	282,200	332,465	1	1	1	1	1		$656,152	$656,152	$656,152	$656,152	$656,152	
Pottsboro	Grayson	Woodbine	3	62	413	1		1		1		$286,130		$286,130		$286,130	
Sherman	Grayson	Trinity	17	450	2,357	3	3	3	3	3	2	$2,590,963	$2,590,963	$2,590,963	$2,590,963	$2,590,963	$1,727,309
Sherman	Grayson	Woodbine	21	373	953	4	3	4	3	4	3	$2,129,809	$1,597,357	$2,129,809	$1,597,357	$2,129,809	$1,597,357
South Grayson WSC	Grayson	Trinity	5	280	2,324	1	1	1	1	1		$663,598	$663,598	$663,598	$663,598	$663,598	
South Grayson WSC	Grayson	Woodbine	5	151	1,459	1	1	1	1		1	$493,381	$493,381	$493,381	$493,381		$493,381
Southmayd	Grayson	Trinity	1	290	1,810			1						$570,112			

Table U-13, Continued

Water User Group	County	Aquifer	# Wells in 2005	Well Capacity (gpm)	Well Depth (ft)	Installation Schedule						Construction Costs (including engineering, contingencies, and permitting)					
						2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
Southmayd	Grayson	Woodbine	2	40	486	1				1		$294,658				$294,658	
Southwest Fannin County SUD	Grayson	Woodbine	7	155	1,125	2	1	1	1	1	1	$864,824	$432,412	$432,412	$432,412	$432,412	$432,412
Tioga	Grayson	Trnity (Antlers)	3	167	1,302	1		1		1		$465,970		$465,970		$465,970	
Tom Bean	Grayson	Woodbine	2	135	1,498	1			1			$456,389			$456,389		
Two Way SUD	Grayson	Trnity (Antlers)	5	265	1,555	1	1	1	1	1		$521,084	$521,084	$521,084	$521,084	$521,084	
Van Alstyne	Grayson	Trnity (Antlers)	4	317	2,316	1	1		1		1	$733,400	$733,400		$733,400		$733,400
Van Alstyne	Grayson	Woodbine	1	130	1,400			1						$441,184			
Whitesboro	Grayson	Trnity (Antlers)	4	294	1,517	1	1		1		1	$516,671	$516,671		$516,671		$516,671
Whitewright	Grayson	Woodbine	4	79	1,249	1	1		1		1	$413,046	$413,046		$413,046		$413,046
Athens	Henderson	Carrizo-Wilcox	3	400	795	1		1		1		$498,236		$498,236		$498,236	
Bethel-Ash WSC	Henderson	Carrizo-Wilcox	8	159	697	2	1	2	1	1	1	$708,370	$354,185	$708,370	$354,185	$354,185	$354,185
Eustace	Henderson	Carrizo-Wilcox	3	61	264	1		1		1		$263,731		$263,731		$263,731	
Log Cabin	Henderson	Carrizo-Wilcox	4	80	274	1		1		1	1	$267,294		$267,294		$267,294	$267,294
Malakoff	Henderson	Carrizo-Wilcox	4	115	389	1		1		1	1	$288,306		$288,306		$288,306	$288,306
Virginia Hill WSC	Henderson	Carrizo-Wilcox	6	159	915	1	1	1	1	1	1	$394,210	$394,210	$394,210	$394,210	$394,210	$394,210
Henderson County-Other	Henderson	Carrizo-Wilcox	1	150	500	1						$308,720					
Henderson County Irrigation	Henderson	Carrizo-Wilcox	1	150	500	1						$71,060					
Henderson County Livestock	Henderson	Carrizo-Wilcox, Queen City	1	150	500	1						$71,060					
Henderson County	Henderson	Carrizo-Wilcox	1	150	500	1						$240,720					
Henderson County Mining	Henderson	Carrizo-Wilcox	1	150	500	1						$104,720					
Henderson County Steam	Henderson	Carrizo-Wilcox	1	150	500	1						$240,720					
Bryson	Jack	Other (Cisco formation)	1	90	380	1						$284,240					
Jack County-Other	Jack	Other	1	90	380	1						$284,240					
Jack County Irrigation	Jack	Other	1	90	380	1						$54,658					
Jack County Livestock	Jack	Other	1	90	380	1						$54,658					
Jack County Mining	Jack	Other	1	90	380	1						$80,240					
Kaufman County-Other	Kaufman	Nacatoch	1	150	500	1						$308,720					
Kaufman County Irrigation	Kaufman	Nacatoch	1	150	500	1						$71,060					
Kaufman County Livestock	Kaufman	Nacatoch	1	150	500	1						$71,060					
Frost	Navarro	Woodbine	1 emergency	125	1,300	1						$425,680					
Navarro County-Other	Navarro	Trinity & Woodbine	1	125	1,300	1						$425,680					
Navarro County Livestock	Navarro	Carrizo-Wilcox	1	125	1,300	1						$134,164					
Navarro County Mining	Navarro	Carrizo-Wilcox & Nacatoch	1	125	1,300	1						$221,680					
Aledo	Parker	Trinity (Paluxy)	6	76	389	1	1	1	1	1	1	$284,063	$284,063	$284,063	$284,063	$284,063	$284,063
Annetta	Parker		10	50	350	2	2	2	1	2	1	$550,800	$550,800	$550,800	$275,400	$550,800	$275,400
Annetta South	Parker		10	50	350	2	2	2	1	2	1	$550,800	$550,800	$550,800	$275,400	$550,800	$275,400
Hudson Oaks	Parker	Trinity (Paluxy)	21	40	343	4	3	4	3	4	3	$1,093,059	$819,794	$1,093,059	$819,794	$1,093,059	$819,794
Reno	Parker	Trinity (Paluxy)	6	39	486	1	1	1	1	1	1	$294,549	$294,549	$294,549	$294,549	$294,549	$294,549
Springtown	Parker	Trinity (Paluxy)	2	398	391	1				1		$404,660				$404,660	
Springtown	Parker	Trinity (Travis Peak)	1	33	364			1						$275,645			
Willow Park	Parker	Trinity (Paluxy)	17	50	200	3	3	3	3	3	2	$758,880	$758,880	$758,880	$758,880	$758,880	$505,920
Weatherford	Parker	Trinity (Paluxy)	1	50	200		1						$252,960				
Parker County-Other	Parker	Trinity & Other	1	50	200	1						$252,960					
Parker County Irrigation	Parker	Trinity	1	50	200	1						$35,496					
Parker County Livestock	Parker	Trinity	1	50	200	1						$35,496					
Parker County Manufacturing	Parker	Trinity	1	50	200	1						$184,960					
Parker County Mining	Parker	Trinity	1	50	200	1						$48,960					
Rockwall County-Other	Rockwall	Other	1	50	200	1						$252,960					
Rockwall County Livestock	Rockwall	Other	1	50	200	1						$35,496					
Bedford	Tarrant	Trinity	2	750	1,550	1			1			$786,760			$786,760		
Benbrook	Tarrant	Trinity (Paluxy)	14	35	300	3	3	2	2	2	2	$798,864	$798,864	$532,576	$532,576	$532,576	$532,576
Bethesda WSC	Tarrant	Trinity (Paluxy)	24	100	700	4	4	4	4	4	4	$1,332,800	$1,332,800	$1,332,800	$1,332,800	$1,332,800	$1,332,800
Blue Mound	Tarrant	Trinity	2	200	1,925	1			1			$583,270			$583,270		

Table U-13, Continued

Water User Group	County	Aquifer	# Wells in 2005	Well Capacity (gpm)	Well Depth (ft)	Installation Schedule						Construction Costs (including engineering, contingencies, and permitting)					
						2010	2020	2030	2040	2050	2060	2010	2020	2030	2040	2050	2060
Colleyville	Tarrant	Trinity (Paluxy)	5	85	799	1	1	1	1	1		$346,378	$346,378	$346,378	$346,378	$346,378	
Crowley	Tarrant	Trinity (Travis Peak)	6	72	1,213	1	1	1	1	1	1	$406,898	$406,898	$406,898	$406,898	$406,898	$406,898
Crowley	Tarrant	Trinity (Paluxy)	2	93	560	1			1			$311,494			$311,494		
Dalworthington Gardens	Tarrant	Trinity (Travis Peak)	1	260	1,650	1						$538,084					
Dalworthington Gardens	Tarrant	Trinity (Paluxy)	1	125	800				1						$350,880		
Euless	Tarrant	Trinity (Travis Peak)	2	762	1,800	1			1			$859,139			$859,139		
Everman	Tarrant	Trinity (Paluxy)	4	95	589	1		1		1	1	$316,050		$316,050		$316,050	$316,050
Everman	Tarrant	Trinity (Twin Mountains)	2	260	1,321		1		1				$477,680		$477,680		
Everman	Tarrant	Trinity (Travis Peak)	1	230	1,296		1						$470,438				
Haslet	Tarrant	Trinity (Paluxy)	3	58	698	1			1		1	$328,331			$328,331		$328,331
Haslet	Tarrant	Trinity (Travis Peak)	1	160	1,190			1						$444,788			
Hurst	Tarrant	Trinity (Travis Peak)	6	653	1,478	1	1	1	1	1	1	$758,282	$758,282	$758,282	$758,282	$758,282	$758,282
Johnson County SUD	Tarrant	Trinity (Twin Mountains)	8	170	1,274	2	1	1	2	1	1	$922,189	$461,094	$461,094	$922,189	$461,094	$461,094
Johnson County SUD	Tarrant	Trinity (Paluxy)	6	94	771	1	1	1	1	1	1	$343,169	$343,169	$343,169	$343,169	$343,169	$343,169
Johnson County SUD	Tarrant	Trinity (Travis Peak)	6	188	1,496	1	1	1	1	1	1	$503,445	$503,445	$503,445	$503,445	$503,445	$503,445
Kennedale	Tarrant	Trinity (Twin Mountains)	3	393	1,490	1		1		1		$658,320		$658,320		$658,320	
Kennedale	Tarrant	Trinity (Paluxy)	3	93	689		1		1		1		$330,793		$330,793		$330,793
Kennedale	Tarrant	Trinity (Travis Peak)	1	365	1,450	1						$646,673					
Lake Worth	Tarrant	Trinity (Paluxy)	4	125	331	1		1		1	1	$280,718		$280,718		$280,718	$280,718
Lake Worth	Tarrant	Trinity (Travis Peak)	1	77	934		1						$365,704				
Lakeside	Tarrant	Trinity	5	75	600	1	1	1	1	1		$315,520	$315,520	$315,520	$315,520	$315,520	
North Richland Hills	Tarrant	Trinity (Travis Peak)	1	150	1,000	1						$383,520					
Pantego	Tarrant	Trinity (Travis Peak)	5	204	1,290	1		1	1	1	1	$467,038		$467,038	$467,038	$467,038	$467,038
Pantego	Tarrant	Trinity (Paluxy)	1	53	803		1						$343,495				
Pelican Bay	Tarrant	Trinity (Travis Peak)	3	34	573	1		1		1		$307,020		$307,020		$307,020	
Pelican Bay	Tarrant	Trinity (Paluxy)	6	21	245	1	1	1	1	1	1	$256,537	$256,537	$256,537	$256,537	$256,537	$256,537
Pelican Bay	Tarrant	Trinity (Twin Mountains)	2	21	362		1		1				$274,040		$274,040		
Richland Hills	Tarrant	Trinity (Travis Peak)	3	348	1,282	1		1		1		$546,298		$546,298		$546,298	
Richland Hills	Tarrant	Trinity (Paluxy)	3	75	588		1		1		1		$313,725		$313,725		$313,725
Sansom Park Village	Tarrant	Trinity (Paluxy)	9	92	438	2	1	2	1	2	1	$586,269	$293,134	$586,269	$293,134	$586,269	$293,134
White Settlement	Tarrant	Trinity (Paluxy)	6	70	275	1	1	1	1	1	1	$266,356	$266,356	$266,356	$266,356	$266,356	$266,356
White Settlement	Tarrant	Trinity (Twin Mountains)	3	76	841	1		1		1		$351,682		$351,682		$351,682	
White Settlement	Tarrant	Trinity (Travis Peak)	1	150	946		1						$375,442				
Tarrant County-Other	Tarrant	Trinity	1	150	800	1						$353,600					
Tarrant County Irrigation	Tarrant	Trinity	1	150	800	1						$95,744					
Tarrant County Livestock	Tarrant	Trinity	1	150	800	1						$95,744					
Alvord	Wise	Trinity (Paleozoic Erathem)	4	100	394	1		1		1	1	$287,422		$287,422		$287,422	$287,422
Aurora	Wise		4	100	400	1	1		1		1	$288,320	$288,320		$288,320		$288,320
Bolivar WSC	Wise	Trinity	2	100	250	1			1			$195,500			$195,500		
Boyd	Wise	Trinity (Paleozoic Erathem)	2	123	397	1			1			$290,374			$290,374		
Chico	Wise	Trinity (Antlers)	7	71	125	2	1	1	1	1	1	$488,050	$244,025	$244,025	$244,025	$244,025	$244,025
New Fairview	Wise		4	75	200	1	1		1		1	$255,680	$255,680		$255,680		$255,680
Newark	Wise	Trinity (Paluxy)	6	36	543	1	1	1	1	1	1	$302,750	$302,750	$302,750	$302,750	$302,750	$302,750
Rhome	Wise	Trinity (Paluxy)	3	79	497	1		1		1		$300,546		$300,546		$300,546	
Wise County-Other	Wise	Trinity	1	100	250	1						$265,880					
Wise County Irrigation	Wise	Trinity	1	100	250	1						$45,050					
Wise County Livestock	Wise	Trinity	1	100	250	1						$45,050					
Wise County Manufacturing	Wise	Other	1	100	250	1						$197,880					
Wise County Mining	Wise	Trinity	1	100	250	1						$61,880					

Table U-14
Cost Estimates for New Water Treatment Plants

Water User Group	Water Management Strategy	County	Construction Time (Months)	Capital Costs (including engineering, contingencies & interest)					
				2010	2020	2030	2040	2050	2060
Denton	New WTP of 20 MGD	Denton	24		$34,848,000				
Lewisville	New WTP of 10 MGD	Denton	18				$21,740,000		
Midlothian	New WTP of 8 MGD	Ellis	18			$18,634,000			
East Cedar Creek FWSD	New WTP of 2 MGD	Henderson	18			$7,976,000			
Walnut Creek SUD	New WTP of 2 MGD	Parker	18				$7,976,000		
Weatherford	New WTP of 8 MGD	Parker	18			$18,634,000			
Azle	New WTP of 3 MGD	Tarrant	18				$10,305,000		
Fort Worth*	New Northwest WTP 35 MGD	Tarrant	24		$57,915,000				
Fort Worth*	New Southwest WTP 25 MGD	Tarrant	24		$42,702,000				
Mansfield	New WTP of 20 MGD	Tarrant	24		$34,848,000				
Bridgeport	New WTP of 2 MGD	Wise	18		$7,976,000				
West Wise SUD	New WTP of 0.5 MGD	Wise	12			$2,783,000			
Wise County WSD (Decatur)	New WTP of 2 MGD	Wise	18			$7,976,000			

Note: * Denotes costs provided by the City of Fort Worth.

Table U-15
Water Treatment Plant Expansions

Water User Group	Water Management Strategy	County	Construction Time (Months)	Capital Costs (including engineering, contingencies & interest)					
				2010	2020	2030	2040	2050	2060
Denton	Ray Roberts WTP Exp. of 30 MGD	Denton	24	$35,134,000					
Denton	New WTP Exp. of 30 MGD (total of 50 MGD)	Denton	24				$35,134,000		
Denton	New WTP Exp. of 30 MGD (total of 80 MGD)	Denton	24					$35,134,000	
Denton	New WTP Exp. of 30 MGD (total of 110 MGD)	Denton	24						$35,134,000
Lewisville	WTP Expansion of 8 MGD	Denton	18	$13,552,000					
Lewisville	WTP Expansion of 8 MGD	Denton	18		$13,552,000				
Lewisville	New WTP Expansion	Denton	18						$9,882,000
Midlothian	New WTP Expansion of 4 MGD	Ellis	18					$8,541,000	
Bonham	WTP Expansion of 1 MGD	Fannin	12	$2,838,000					
Wortham	Water treatment plant expansion (0.25 MGD)	Freestone	12	$1,392,000					
Corsicana	Water treatment plant expansion (5 MGD)	Henderson	18		$9,882,000				
Corsicana	Water treatment plant expansion (10 MGD)	Henderson	18					$15,528,000	
East Cedar Creek FWSD	WTP Expansion of 4 MGD	Henderson	18	$8,541,000					
East Cedar Creek FWSD	New WTP Expansion of 2 MGD	Henderson	18				$5,011,000		
East Cedar Creek FWSD	New WTP Expansion of 2 MGD	Henderson	18					$5,011,000	
East Cedar Creek FWSD	New WTP Expansion of 2 MGD	Henderson	18						$5,011,000
Jacksboro	Water treatment plant expansion (0.5 MGD)	Jack	12	$2,088,000					
Mabank	Water treatment plant expansion (2.3 MGD)	Kaufman	18	$5,668,000					
MacBee WSC	Water treatment plant expansion (2 MGD)	Kaufman	18	$5,011,000					
West Cedar Creek MUD	Water treatment plant expansion (5 MGD)	Kaufman	18		$9,882,000				
West Cedar Creek MUD	Water treatment plant expansion (5 MGD)	Kaufman	18				$9,882,000		
Walnut Creek SUD	WTP expansion of 2 MGD	Parker	18	$5,011,000					
Walnut Creek SUD	WTP expansion of 2 MGD	Parker	18		$5,011,000				
Walnut Creek SUD	WTP expansion of 3 MGD	Parker	18			$7,200,000			
Walnut Creek SUD	WTP expansion of 2 MGD	Parker	18					$5,011,000	
Walnut Creek SUD	WTP expansion of 2 MGD	Parker	18						$5,011,000
Weatherford	WTP Expansion of 4 MGD (12 MGD total)	Parker	18	$8,541,000					
Weatherford	WTP Expansion of 6 MGD (18 MGD total)	Parker	18		$11,223,000				

Table U-15, Continued

Water User Group	Water Management Strategy	County	Construction Time (Months)	Capital Costs (including engineering, contingencies & interest)					
				2010	2020	2030	2040	2050	2060
Arlington [1]	WTP Expansion of 32.5 MGD	Tarrant	24	$28,300,000					
Arlington [1]	WTP Expansion of 32.5 MGD	Tarrant	24		$30,000,000				
Azle	WTP expansion of 3 MGD	Tarrant	18			$7,200,000			
Azle	New WTP Expansion of 3 MGD	Tarrant	18					$7,200,000	
Community WSC	Water treatment plant expansion (0.5 MGD)	Tarrant	12		$2,088,000				
Fort Worth [2]	Eagle Mountain WTP Exp. of 35 MGD (total of 105 MGD)	Tarrant	24	$44,464,680					
Fort Worth [2]	Rolling Hills WTP Exp. of 40 MGD (total of 200 MGD)	Tarrant	24	$16,288,800					
Fort Worth [2]	Holly WTP Exp. of 40 MGD (total of 200 MGD)	Tarrant	24	$25,833,600					
Fort Worth [2]	Eagle Mountain WTP Exp. of 35 MGD (total of 140 MGD)	Tarrant	24		$56,160,000				
Fort Worth [2]	Rolling Hills WTP Exp. of 50 MGD (total of 250 MGD)	Tarrant	24		$73,850,400				
Fort Worth [2]	New Northwest WTP Exp. of 35 MGD (total of 70 MGD)	Tarrant	24			$51,246,000			
Fort Worth [2]	Eagle Mountain WTP Exp. of 70 MGD (total of 210 MGD)	Tarrant	24			$109,512,000			
Fort Worth	New Northwest WTP Exp. of 35 MGD (total of 105 MGD)	Tarrant	24					$39,918,000	
Fort Worth	New Southwest WTP Exp. of 25 MGD (total of 50 MGD)	Tarrant	24					$30,421,000	
Fort Worth	New Northwest WTP Exp. of 70 MGD (total of 175 MGD)	Tarrant	24						$71,124,000
Fort Worth	New Southwest WTP Exp. of 50 MGD (total of 100 MGD)	Tarrant	24						$53,557,000
Mansfield	WTP Expansion of 15 MGD	Tarrant	18	$20,328,000					
Mansfield	New WTP Expansion of 10 MGD	Tarrant	18				$15,528,000		
Mansfield	New WTP Expansion of 10 MGD	Tarrant	18					$15,528,000	
Bridgeport	WTP Expansion (0.9 MGD)	Wise	12	$2,644,000					
Bridgeport	New WTP Expansion of 2 MGD	Wise	18				$5,011,000		
Bridgeport	New WTP Expansion of 2 MGD	Wise	18						$5,011,000
Runaway Bay	WTP Expansion of 0.5 MGD	Wise	12			$2,088,000			
West Wise SUD	WTP Expansion of 0.5 MGD	Wise	12						$2,088,000
Wise County WSD (Decatur)	WTP Expansion of 2 MGD	Wise	18	$5,011,000					
Wise County WSD (Decatur)	New WTP Expansion of 2 MGD	Wise	18				$5,011,000		
Wise County WSD (Decatur)	New WTP Expansion of 2 MGD	Wise	18					$5,011,000	

Notes: 1. Costs provided by the City of Arlington.
2. Costs provided by the City of Fort Worth.

Table U-16
Toledo Bend to SRA Upper Basin, DWU, NTMWD, and TRWD (400,000 Acre-Feet)

Owners:	SRA, DWU, NTMWD, and TRWD	
Amount - Toledo Bend (total):	400,000	Ac-Ft/Yr
Amount - TB (each)	100,000	Ac-Ft/Yr

		Ownership				**Flow (Ac-Ft)**
Segments:		**SRA**	**DWU**	**NTMWD**	**TRWD**	
Toledo Bend to Longview	TB1	25%	25%	25%	25%	400,000
Longview to Lake Fork	TB2	14.29%	28.57%	28.57%	28.57%	350,000
Lake Fork to Tawakoni	A1	0%	50.0%	0%	50.0%	200,000
Tawakoni to DWU Balancing reservoir	A2	0%	100%	0%	0%	100,000
Balancing reservoir to DWU treatment plant	A3	0%	100%	0%	0%	100,000
Lake Fork to Cooper	A4	0%	0%	100%	0%	100,000
Cooper to Lake Lavon	A5	0%	0%	100%	0%	100,000
Tawakoni to Cedar Creek	B1	0%	0%	0%	100%	100,000
Cedar Creek to Ennis*	B2	0%	0%	0%	100%	312,500
Ennis to TRWD Balancing reservoir*	B3	0%	0%	0%	100%	570,500
TRWD Balancing reservoir to Fort Worth*	B4	0%	0%	0%	100%	570,500

* Quantities for B2 include 212,500 acre-feet from Cedar Creek and reuse. Quantities for B3 and B4 include 470,500 acre-feet from Cedar Creek, Richalnd-Chambers, and reuse

Table U-16, Continued
CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline - TB1	2-102 in.	366,400	LF	$ 565.00	$414,032,000
Pipeline - TB2	2-96 in.	240,800	LF	$ 510.00	$245,616,000
Pipeline - A1	96 in.	142,040	LF	$ 510.00	$72,440,000
Pipeline - A2	78 in.	82,900	LF	$ 364.00	$30,176,000
Pipeline - A3 (rural)	78 in.	81,320	LF	$ 364.00	$29,600,000
Pipeline - A3 (urban)	78 in.	7,920	LF	$ 510.00	$4,039,000
Pipeline - A4	78 in.	186,400	LF	$ 364.00	$67,850,000
Pipeline - A5 (rural)	78 in.	95,450	LF	$ 364.00	$34,744,000
Pipeline - A5 (urban)	78 in.	14,000	LF	$ 510.00	$7,140,000
Pipeline - B1	78 in.	97,680	LF	$ 364.00	$35,556,000
Pipeline - B2	108 in.	134,500	LF	$ 633.00	$85,139,000
Pipeline - B3 (rural)	120 in.	158,680	LF	$ 801.00	$127,103,000
Pipeline - B3 (urban)	120 in.	65,320	LF	$ 1,121.00	$73,224,000
Pipeline - B4 (urban)	138 in.	31,000	LF	$ 1,482.00	$45,942,000
Right of Way Easements (rural)		1,853	Acre	$3,000	$5,559,000
Right of Way Easements (urban)		17	Acre	$30,000	$510,000
Less Cost of B2 without TB water (Table R-__)					-$61,736,000
Less Cost of B3 without TB water (Table R-__)					-$158,318,000
Less Cost of B4 without TB water (Table R-__)					-$38,471,000
Permitting & Mitigation			LS		$12,169,000
Engineering and Contingencies (30%)					$306,044,000
Note - No easement needed for B2, B3, and B4.					
Subtotal of Pipeline					**$1,338,358,000**

Pump Station(s)			**Cost**
Intake and Pump Station - TB1	32,600	HP	$23,858,000
Booster Pump Station - TB1	32,600	HP	$17,650,000
Booster Pump Station - TB2	12,800	HP	$10,400,000
Intake and Pump Station - A1	14,800	HP	$15,368,000
Booster Pump Station - A2	3,900	HP	$4,920,000
Intake and Pump Station - A4	9,500	HP	$11,850,000
Intake and Pump Station - A5	7,300	HP	$9,940,000
Pump Station - B1	2,200	HP	$3,640,000
Intake and Pump Station - B2	14,700	HP	$15,300,000
Ennis Booster Pump Station - B3	22,300	HP	$14,690,000
Waxahachie Booster Pump Station - B3	22,300	HP	$14,690,000
Less Cost of B2 without TB water (Table R-__)			-$14,378,000
Less Cost of Boosters without TB water (Table R-__)			-$29,160,000
Permitting and mitigation			$1,185,000
Engineering and Contingencies (35%)			$34,569,000
Subtotal of Pump Station(s)			**$134,522,000**

Table U-16, Continued

Storage Tanks	Size	Quantity	Unit	Unit Price	Cost
Storage - TB1	10 MG	6	Ea	$1,400,000	$8,400,000
Storage - TB2	10 MG	4	Ea	$1,400,000	$5,600,000
Storage - A2	6 MG	4	Ea	$750,000	$3,000,000
Earthen Storage - A3	50 MG	1	Ea	$2,000,000	$2,000,000
Storage - A5	7 MG	2	Ea	$925,000	$1,850,000
Storage - B1	10 MG	3	Ea	$1,400,000	$4,200,000
Storage - B3	10 MG	4	Ea	$1,400,000	$5,600,000
Permitting and mitigation					$267,000
Engineering and Contingencies (35%)					$7,788,000
Subtotal of Storage Tanks					**$38,705,000**
CONSTRUCTION TOTAL					**$1,511,585,000**
Interest During Construction			**(36 months)**		**$183,915,000**
TOTAL COST					**$1,695,500,000**
TOTAL COST BY USER					
SRA					**$226,675,000**
DWU					**$457,737,000**
NTMWD					**$481,141,000**
TRWD					**$529,944,000**
ANNUAL COSTS Pre-Amortization					
Debt Service (6% for 30 years)					**$123,176,000**
SRA					$16,468,000
DWU					$33,254,000
NTMWD					$34,954,000
TRWD					$38,500,000
Raw Water and Operating Costs					
Total					**$64,448,000**
SRA					$7,237,000
DWU					$16,361,000
NTMWD					$18,543,000
TRWD					$22,307,000
Total Annual Costs					**$187,624,000**
SRA					$23,705,000
DWU					$49,615,000
NTMWD					$53,497,000
TRWD					$60,807,000

Table U-16, Continued

UNIT COSTS - Pre Amortization	
Per Acre-Foot	
SRA	$237
DWU	$496
NTMWD	$535
TRWD	$608
Overall	**$469**
Per 1,000 Gallons	
SRA	$0.73
DWU	$1.52
NTMWD	$1.64
TRWD	$1.87
Overall	**$1.44**
Annual Costs After Amortization	
Total	$64,448,000
SRA	$7,237,000
DWU	$16,361,000
NTMWD	$18,543,000
TRWD	$22,307,000
UNIT COSTS - After Amortization	
Per Acre-Foot	
SRA	$72
DWU	$164
NTMWD	$185
TRWD	$223
Overall	**$161**
Per 1,000 Gallons	
SRA	$0.22
DWU	$0.50
NTMWD	$0.57
TRWD	$0.68
Overall	**$0.49**

Table U-17
Toledo Bend to SRA Upper Basin, DWU, NTMWD, and TRWD

Owners:	SRA, DWU, NTMWD, and TRWD	
Amount - Toledo Bend (total):	700,000	Ac-Ft/Yr
Amount - TB (each Metroplex supplier)	200,000	Ac-Ft/Yr

		Ownership				Flow (Ac-Ft)
Segments:		**SRA**	**DWU**	**NTMWD**	**TRWD**	
Toledo Bend to Longview	TB1	14.29%	28.57%	28.57%	28.57%	700,000
Longview to Lake Fork	TB2	7.69%	30.77%	30.77%	30.77%	650,000
Lake Fork to Tawakoni	A1	0%	50.00%	0.00%	50.00%	400,000
Tawakoni to DWU Balancing reservoir	A2	0%	100%	0%	0%	200,000
Balancing reservoir to DWU treatment plant	A3	0%	100%	0%	0%	200,000
Lake Fork to Cooper	A4	0%	0%	100%	0%	200,000
Cooper to Lake Lavon	A5	0%	0%	100%	0%	200,000
Tawakoni to Cedar Creek	B1	0%	0%	0%	100%	200,000
Cedar Creek to Ennis*	B2	0%	0%	0%	100%	412,500
Ennis to TRWD Balancing reservoir*	B3	0%	0%	0%	100%	670,500
TRWD Balancing reservoir to Fort Worth*	B4	0%	0%	0%	100%	670,500

* Quantities for B2 include 212,500 acre-feet from Cedar Creek and reuse. Quantities for B3 and B4 include 470,500 acre-feet from Cedar Creek, Richalnd-Chambers, and reuse

Table U-17, Continued
CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline - TB1	2-120 in.	366,400	LF	$ 801.00	$586,973,000
Pipeline - TB2	2-120 in.	240,800	LF	$ 801.00	$385,762,000
Pipeline - A1	2-96 in.	142,040	LF	$ 510.00	$144,881,000
Pipeline - A2	96 in.	82,900	LF	$ 510.00	$42,279,000
Pipeline - A3 (rural)	96 in.	81,320	LF	$ 510.00	$41,473,000
Pipeline - A3 (urban)	96 in.	7,920	LF	$ 714.00	$5,655,000
Pipeline - A4	96 in.	186,400	LF	$ 510.00	$95,064,000
Pipeline - A5 (rural)	96 in.	95,450	LF	$ 510.00	$48,680,000
Pipeline - A5 (urban)	96 in.	14,000	LF	$ 714.00	$9,996,000
Pipeline - B1	96 in.	97,680	LF	$ 510.00	$49,817,000
Pipeline - B2	120 in.	134,500	LF	$ 801.00	$107,735,000
Pipeline - B3 (rural)	132 in.	158,680	LF	$ 973.00	$154,396,000
Pipeline - B3 (urban)	132 in.	65,320	LF	$ 1,362.00	$88,966,000
Pipeline - B4 (urban)	144 in.	31,000	LF	$ 1,602.00	$49,662,000
Right of Way Easements (rural)		1,853	Acre	$3,000	$5,559,000
Right of Way Easements (urban)		17	Acre	$30,000	$510,000
Less Cost of B2 without TB water (Table R-__)					-$61,736,000
Less Cost of B3 without TB water (Table R-__)					-$158,318,000
Less Cost of B4 without TB water (Table R-__)					-$38,471,000
Permitting & Mitigation			LS		$18,634,000
Engineering and Contingencies (30%)					$467,665,000
Note - No easement needed for B2, B3, and B4.					
Subtotal of Pipeline					**$2,045,182,000**

Pump Station(s)			**Cost**
Intake and Pump Station - TB1	66,000	HP	$35,140,000
Booster Pump Station - TB1	66,000	HP	$26,000,000
Booster Pump Station - TB2	35,000	HP	$18,250,000
Intake and Pump Station - A1	29,600	HP	$25,136,000
Booster Pump Station - A2	9,100	HP	$8,550,000
Intake and Pump Station - A4	21,500	HP	$19,430,000
Intake and Pump Station - A5	16,200	HP	$13,520,000
Pump Station - B1	5,200	HP	$8,020,000
Intake and Pump Station - B2	23,000	HP	$20,060,000
Ennis Booster Pump Station - B3	28,300	HP	$16,490,000
Waxahachie Booster Pump Station - B3	28,300	HP	$16,490,000
Less Cost of B2 without TB water (Table R-__)			-$14,378,000
Less Cost of Boosters without TB water (Table R-__)			-$29,160,000
Permitting and mitigation			$1,963,000
Engineering and Contingencies (35%)			$57,242,000
Subtotal of Pump Station(s)			**$222,753,000**

Table U-17, Continued

Storage Tanks	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Storage - TB1	10 MG	10	Ea	$1,400,000	$14,000,000
Storage - TB2	9 MG	10	Ea	$1,100,000	$11,000,000
Storage - A2	10 MG	3	Ea	$1,400,000	$4,200,000
Earthen Storage - A3	50 MG	1	Ea	$2,000,000	$2,000,000
Storage - A5	10 MG	3	Ea	$1,400,000	$4,200,000
Storage - B1	10 MG	3	Ea	$1,400,000	$4,200,000
Storage - B3	9 MG	10	Ea	$1,100,000	$11,000,000
Permitting and mitigation					$439,000
Engineering and Contingencies (35%)					$12,810,000
Subtotal of Storage Tanks					**$63,849,000**
CONSTRUCTION TOTAL					**$2,331,784,000**
Interest During Construction			**(36 months)**		**$283,708,000**
TOTAL COST					**$2,615,492,000**
TOTAL COST BY USER					
SRA					**$186,705,800**
DWU					**$749,289,400**
NTMWD					**$752,287,400**
TRWD					**$927,212,400**
ANNUAL COSTS Pre-Amortization					
Debt Service (6% for 30 years)					**$190,013,000**
SRA					$13,564,000
DWU					$54,435,000
NTMWD					$54,653,000
TRWD					$67,360,000
Raw Water and Operating Costs					
Total					$125,334,000
SRA					$7,670,000
DWU					$33,484,000
NTMWD					$38,132,000
TRWD					$46,048,000
Total Annual Costs					**$315,346,000**
SRA					$21,234,000
DWU					$87,919,000
NTMWD					$92,785,000
TRWD					$113,408,000

Table U-17, Continued

UNIT COSTS - Pre Amortization

Per Acre-Foot	
SRA	$212
DWU	$440
NTMWD	$464
TRWD	$567
Overall	**$450**
Per 1,000 Gallons	
SRA	$0.65
DWU	$1.35
NTMWD	$1.42
TRWD	$1.74
Overall	**$1.38**

Annual Costs After Amortization

Total	$125,334,000
SRA	$7,670,000
DWU	$33,484,000
NTMWD	$38,132,000
TRWD	$46,048,000

UNIT COSTS - After Amortization

Per Acre-Foot	
SRA	$77
DWU	$167
NTMWD	$191
TRWD	$230
Overall	**$179**
Per 1,000 Gallons	
SRA	$0.24
DWU	$0.51
NTMWD	$0.59
TRWD	$0.71
Overall	**$0.55**

Table U-18
Toledo Bend to SRA Upper Basin, NTMWD, and TRWD

Owners:	SRA, DWU, NTMWD, and TRWD	
Amount - Toledo Bend (total):	500,000	Ac-Ft/Yr
- SRA	100,000	Ac-Ft/Yr
- NTMWD	200,000	Ac-Ft/Yr
- TRWD	200,000	Ac-Ft/Yr

			Ownership		**Flow (Ac-Ft)**	**Peak (MGD)**
Segments:		**SRA**	**NTMWD**	**TRWD**		
Toledo Bend to Longview	TB1	20%	40%	40%	500,000	558
Longview to Lake Fork	TB2	11.10%	44.45%	44.45%	450,000	502
Lake Fork to Tawakoni	A1	0%	0%	100.0%	200,000	223
Lake Fork to Cooper	A4	0%	100%	0%	200,000	223
Cooper to Lake Lavon	A5	0%	100%	0%	200,000	223
Tawakoni to Cedar Creek	B1	0%	0%	100%	200,000	223
Cedar Creek to Ennis*	B2	0%	0%	100%	412,500	460
Ennis to TRWD Balancing reservoir*	B3	0%	0%	100%	670,500	748
TRWD Balancing reservoir to Fort Worth*	B4	0%	0%	100%	670,500	748

* Quantities for B2 include 212,500 acre-feet from Cedar Creek and reuse. Quantities for B3 and B4 include 470,500 acre-feet from Cedar Creek, Richalnd-Chambers, and reuse

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline - TB1	2-108 in.	366,400	LF	$ 633.00	$463,862,000
Pipeline - TB2	2-102 in.	240,800	LF	$ 565.00	$272,104,000
Pipeline - A1	2-78 in.	142,040	LF	$ 364.00	$103,405,000
Pipeline - A4	2-78 in.	186,400	LF	$ 364.00	$135,699,000
Pipeline - A5 (rural)	2-78 in.	95,450	LF	$ 364.00	$69,488,000
Pipeline - A5 (urban)	2-78 in.	14,000	LF	$ 510.00	$14,280,000
Pipeline - B1	2-78 in.	97,680	LF	$ 364.00	$71,111,000
Pipeline - B2	120 in.	134,500	LF	$ 801.00	$107,735,000
Pipeline - B3 (rural)	132 in.	158,680	LF	$ 973.00	$154,396,000
Pipeline - B3 (urban)	132 in.	65,320	LF	$ 1,362.00	$88,966,000
Pipeline - B4 (urban)	144 in.	31,000	LF	$ 1,602.00	$49,662,000
Right of Way Easements (rural)		2,073	Acre	$3,000	$6,219,000
Right of Way Easements (urban)		26	Acre	$30,000	$780,000
Less Cost of B2 without TB water (Table R-__)					-$61,736,000
Less Cost of B3 without TB water (Table R-__)					-$158,318,000
Less Cost of B4 without TB water (Table R-__)					-$38,471,000

Table U-18, Continued

Permitting & Mitigation			LS		$15,266,000
Engineering and Contingencies (30%)					$383,755,000
Note - No easement needed for B2, B3, and B4.					
Subtotal of Pipeline					**$1,678,203,000**
Pipeline Phase 1					**$943,737,000**
Pipeline Phase 2					**$734,466,000**
Pump Station(s)					**Cost**
Intake and Pump Station - TB1		44,000	HP		$27,660,000
Booster Pump Station - TB1		44,000	HP		$20,500,000
Booster Pump Station - TB2		20,000	HP		$14,000,000
Intake and Pump Station - A1		12,600	HP		$13,916,000
Intake and Pump Station - A4		19,000	HP		$18,140,000
Intake and Pump Station - A5		14,600	HP		$15,300,000
Pump Station - B1		4,300	HP		$5,310,000
Intake and Pump Station - B2		23,000	HP		$20,060,000
Ennis Booster Pump Station - B3		28,000	HP		$16,400,000
Waxahachie Booster Pump Station - B3		28,000	HP		$16,400,000
Less Cost of B2 without TB water (Table R-__)					-$14,378,000
Less Cost of Boosters without TB water (Table R-__)					-$29,160,000
Permitting and mitigation					$1,490,000
Engineering and Contingencies (35%)					$43,452,000
Subtotal of Pump Station(s)					**$169,090,000**
Pump Station Phase 1					**$102,048,000**
Pump Station Phase 2					**$67,042,000**
Storage Tanks	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Storage - TB1	10 MG	7	Ea	$1,400,000	$9,800,000
Storage - TB2	10 MG	6	Ea	$1,400,000	$8,400,000
Storage - A5	10 MG	3	Ea	$1,400,000	$4,200,000
Storage - B1	10 MG	4	Ea	$1,400,000	$5,600,000
Storage - B3	10 MG	6	Ea	$1,400,000	$8,400,000
Permitting and mitigation					$319,000
Engineering and Contingencies (35%)					$9,310,000
Subtotal of Storage Tanks					**$46,029,000**
Storage Tanks Phase 1					**$24,818,000**
Storage Tanks Phase 2					**$21,211,000**
CONSTRUCTION TOTAL					**$1,893,322,000**
Construction Phase 1					**$1,070,603,000**
Construction Phase 2					**$822,719,000**

Table U-18, Continued

Interest During Construction	**(36 months)**	**$230,360,000**
Interest Phase 1		**$130,261,000**
Interest Phase 2		**$100,100,000**
TOTAL COST		**$2,123,682,000**
Total Phase 1		**$1,200,864,000**
Total Phase 2		**$922,819,000**
TOTAL COST BY USER		
SRA		**$202,490,000**
NTMWD		**$886,002,000**
TRWD		**$1,035,188,000**
PHASE 1 COST BY USER		
SRA		**$104,406,000**
NTMWD		**$460,007,000**
TRWD		**$636,451,000**
PHASE 2 COST BY USER		
SRA		**$98,084,000**
NTMWD		**$425,995,000**
TRWD		**$398,737,000**
ANNUAL COSTS Pre-Amortization		
Debt Service (6% for 30 years)		**$154,283,000**
SRA		$14,711,000
NTMWD		$64,367,000
TRWD		$75,204,000
Raw Water and Operating Costs		
Total		**$94,650,000**
SRA		$7,421,000
NTMWD		$37,255,000
TRWD		$49,974,000
Total Annual Costs		**$248,932,000**
SRA		$22,132,000
NTMWD		$101,622,000
TRWD		$125,178,000
UNIT COSTS - Pre Amortization		
Per Acre-Foot		
SRA		$221
NTMWD		$508
TRWD		$626
Overall		**$498**

Table U-18, Continued

Per 1,000 Gallons	
SRA	$0.68
NTMWD	$1.56
TRWD	$1.92
Overall	**$1.53**
Annual Costs After Amortization	
Total	$94,650,000
SRA	$7,421,000
NTMWD	$37,255,000
TRWD	$49,974,000
UNIT COSTS - After Amortization	
Per Acre-Foot	
SRA	$74
NTMWD	$186
TRWD	$250
Overall	**$189**
Per 1,000 Gallons	
SRA	$0.23
NTMWD	$0.57
TRWD	$0.77
Overall	**$0.58**
PHASE 1 ANNUAL COSTS (Pre Amortization)	
Debt Service (6% for 30 years)	**$87,241,000**
SRA	$7,585,000
NTMWD	$33,419,000
TRWD	$46,237,000
Raw Water and Operating Costs	
Total	**$48,592,000**
SRA	$3,747,000
NTMWD	$18,834,000
TRWD	$26,011,000
Total Annual Costs	**$135,833,000**
SRA	$11,332,000
NTMWD	$52,253,000
TRWD	$72,248,000

Table U-18, Continued

PHASE 1 UNIT COSTS - Pre Amortization	
Per Acre-Foot	
SRA	$227
NTMWD	$523
TRWD	$722
Overall	**$543**
Per 1,000 Gallons	
SRA	$0.70
NTMWD	$1.60
TRWD	$2.22
Overall	**$1.67**
PHASE 2 ANNUAL COSTS (Pre Amortization)	
Debt Service (6% for 30 years)	**$67,042,000**
SRA	$7,126,000
NTMWD	$30,948,000
TRWD	$28,968,000
Raw Water and Operating Costs	
Total	**$46,058,000**
SRA	$3,674,000
NTMWD	$18,421,000
TRWD	$23,963,000
Total Annual Costs	**$113,100,000**
SRA	$10,800,000
NTMWD	$49,369,000
TRWD	$52,931,000
PHASE 2 UNIT COSTS - Pre Amortization	
Per Acre-Foot	
SRA	$216
NTMWD	$494
TRWD	$529
Overall	**$452**
Per 1,000 Gallons	
SRA	$0.66
NTMWD	$1.52
TRWD	$1.62
Overall	**$1.39**

Table U-18
Toledo Bend to SRA Upper Basin, NTMWD, and TRWD

Owners:	SRA, DWU, NTMWD, and TRWD	
Amount - Toledo Bend (total):	500,000	Ac-Ft/Yr
- SRA	100,000	Ac-Ft/Yr
- NTMWD	200,000	Ac-Ft/Yr
- TRWD	200,000	Ac-Ft/Yr

			Ownership		**Flow (Ac-Ft)**	**Peak (MGD)**
Segments:		**SRA**	**NTMWD**	**TRWD**		
Toledo Bend to Longview	TB1	20%	40%	40%	500,000	558
Longview to Lake Fork	TB2	11.10%	44.45%	44.45%	450,000	502
Lake Fork to Tawakoni	A1	0%	0%	100.0%	200,000	223
Lake Fork to Cooper	A4	0%	100%	0%	200,000	223
Cooper to Lake Lavon	A5	0%	100%	0%	200,000	223
Tawakoni to Cedar Creek	B1	0%	0%	100%	200,000	223
Cedar Creek to Ennis*	B2	0%	0%	100%	412,500	460
Ennis to TRWD Balancing reservoir*	B3	0%	0%	100%	670,500	748
TRWD Balancing reservoir to Fort Worth*	B4	0%	0%	100%	670,500	748

* Quantities for B2 include 212,500 acre-feet from Cedar Creek and reuse. Quantities for B3 and B4 include 470,500 acre-feet from Cedar Creek, Richalnd-Chambers, and reuse

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline - TB1	2-108 in.	366,400	LF	$ 633.00	$463,862,000
Pipeline - TB2	2-102 in.	240,800	LF	$ 565.00	$272,104,000
Pipeline - A1	2-78 in.	142,040	LF	$ 364.00	$103,405,000
Pipeline - A4	2-78 in.	186,400	LF	$ 364.00	$135,699,000
Pipeline - A5 (rural)	2-78 in.	95,450	LF	$ 364.00	$69,488,000
Pipeline - A5 (urban)	2-78 in.	14,000	LF	$ 510.00	$14,280,000
Pipeline - B1	2-78 in.	97,680	LF	$ 364.00	$71,111,000
Pipeline - B2	120 in.	134,500	LF	$ 801.00	$107,735,000
Pipeline - B3 (rural)	132 in.	158,680	LF	$ 973.00	$154,396,000
Pipeline - B3 (urban)	132 in.	65,320	LF	$ 1,362.00	$88,966,000
Pipeline - B4 (urban)	144 in.	31,000	LF	$ 1,602.00	$49,662,000
Right of Way Easements (rural)		2,073	Acre	$3,000	$6,219,000
Right of Way Easements (urban)		26	Acre	$30,000	$780,000
Less Cost of B2 without TB water (Table R-__)					-$61,736,000
Less Cost of B3 without TB water (Table R-__)					-$158,318,000
Less Cost of B4 without TB water (Table R-__)					-$38,471,000

Table U-18, Continued

Permitting & Mitigation			LS		$15,266,000
Engineering and Contingencies (30%)					$383,755,000
Note - No easement needed for B2, B3, and B4.					
Subtotal of Pipeline					**$1,678,203,000**
Pipeline Phase 1					**$943,737,000**
Pipeline Phase 2					**$734,466,000**
Pump Station(s)					**Cost**
Intake and Pump Station - TB1		44,000	HP		$27,660,000
Booster Pump Station - TB1		44,000	HP		$20,500,000
Booster Pump Station - TB2		20,000	HP		$14,000,000
Intake and Pump Station - A1		12,600	HP		$13,916,000
Intake and Pump Station - A4		19,000	HP		$18,140,000
Intake and Pump Station - A5		14,600	HP		$15,300,000
Pump Station - B1		4,300	HP		$5,310,000
Intake and Pump Station - B2		23,000	HP		$20,060,000
Ennis Booster Pump Station - B3		28,000	HP		$16,400,000
Waxahachie Booster Pump Station - B3		28,000	HP		$16,400,000
Less Cost of B2 without TB water (Table R-__)					-$14,378,000
Less Cost of Boosters without TB water (Table R-__)					-$29,160,000
Permitting and mitigation					$1,490,000
Engineering and Contingencies (35%)					$43,452,000
Subtotal of Pump Station(s)					**$169,090,000**
Pump Station Phase 1					**$102,048,000**
Pump Station Phase 2					**$67,042,000**
Storage Tanks	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Storage - TB1	10 MG	7	Ea	$1,400,000	$9,800,000
Storage - TB2	10 MG	6	Ea	$1,400,000	$8,400,000
Storage - A5	10 MG	3	Ea	$1,400,000	$4,200,000
Storage - B1	10 MG	4	Ea	$1,400,000	$5,600,000
Storage - B3	10 MG	6	Ea	$1,400,000	$8,400,000
Permitting and mitigation					$319,000
Engineering and Contingencies (35%)					$9,310,000
Subtotal of Storage Tanks					**$46,029,000**
Storage Tanks Phase 1					**$24,818,000**
Storage Tanks Phase 2					**$21,211,000**
CONSTRUCTION TOTAL					**$1,893,322,000**
Construction Phase 1					**$1,070,603,000**
Construction Phase 2					**$822,719,000**

Table U-18, Continued

Interest During Construction	**(36 months)**	**$230,360,000**
Interest Phase 1		**$130,261,000**
Interest Phase 2		**$100,100,000**
TOTAL COST		**$2,123,682,000**
Total Phase 1		**$1,200,864,000**
Total Phase 2		**$922,819,000**
TOTAL COST BY USER		
SRA		**$202,490,000**
NTMWD		**$886,002,000**
TRWD		**$1,035,188,000**
PHASE 1 COST BY USER		
SRA		**$104,406,000**
NTMWD		**$460,007,000**
TRWD		**$636,451,000**
PHASE 2 COST BY USER		
SRA		**$98,084,000**
NTMWD		**$425,995,000**
TRWD		**$398,737,000**
ANNUAL COSTS Pre-Amortization		
Debt Service (6% for 30 years)		**$154,283,000**
SRA		$14,711,000
NTMWD		$64,367,000
TRWD		$75,204,000
Raw Water and Operating Costs		
Total		**$94,650,000**
SRA		$7,421,000
NTMWD		$37,255,000
TRWD		$49,974,000
Total Annual Costs		**$248,932,000**
SRA		$22,132,000
NTMWD		$101,622,000
TRWD		$125,178,000
UNIT COSTS - Pre Amortization		
Per Acre-Foot		
SRA		$221
NTMWD		$508
TRWD		$626
Overall		**$498**

Table U-18, Continued

Per 1,000 Gallons	
SRA	$0.68
NTMWD	$1.56
TRWD	$1.92
Overall	**$1.53**
Annual Costs After Amortization	
Total	$94,650,000
SRA	$7,421,000
NTMWD	$37,255,000
TRWD	$49,974,000
UNIT COSTS - After Amortization	
Per Acre-Foot	
SRA	$74
NTMWD	$186
TRWD	$250
Overall	**$189**
Per 1,000 Gallons	
SRA	$0.23
NTMWD	$0.57
TRWD	$0.77
Overall	**$0.58**
PHASE 1 ANNUAL COSTS (Pre Amortization)	
Debt Service (6% for 30 years)	**$87,241,000**
SRA	$7,585,000
NTMWD	$33,419,000
TRWD	$46,237,000
Raw Water and Operating Costs	
Total	**$48,592,000**
SRA	$3,747,000
NTMWD	$18,834,000
TRWD	$26,011,000
Total Annual Costs	**$135,833,000**
SRA	$11,332,000
NTMWD	$52,253,000
TRWD	$72,248,000

Table U-18, Continued

PHASE 1 UNIT COSTS - Pre Amortization	
Per Acre-Foot	
SRA	$227
NTMWD	$523
TRWD	$722
Overall	**$543**
Per 1,000 Gallons	
SRA	$0.70
NTMWD	$1.60
TRWD	$2.22
Overall	**$1.67**
PHASE 2 ANNUAL COSTS (Pre Amortization)	
Debt Service (6% for 30 years)	**$67,042,000**
SRA	$7,126,000
NTMWD	$30,948,000
TRWD	$28,968,000
Raw Water and Operating Costs	
Total	**$46,058,000**
SRA	$3,674,000
NTMWD	$18,421,000
TRWD	$23,963,000
Total Annual Costs	**$113,100,000**
SRA	$10,800,000
NTMWD	$49,369,000
TRWD	$52,931,000
PHASE 2 UNIT COSTS - Pre Amortization	
Per Acre-Foot	
SRA	$216
NTMWD	$494
TRWD	$529
Overall	**$452**
Per 1,000 Gallons	
SRA	$0.66
NTMWD	$1.52
TRWD	$1.62
Overall	**$1.39**

Table U-19
Gulf of Mexico Water with Desalination

Probable Owner: Multiple
Amount: 200,000 Acre-Feet/Year

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural (2 pipelines)	78 in.	1,465,625	LF	$364	$1,066,975,000
Pipeline Urban (2 pipelines)	78 in.	65,625	LF	$510	$66,938,000
Right of Way Easements (Rural)	80 ft.	2,692	Acre	$3,000	$8,076,000
Right of Way Easements (Urban)	80 ft.	121	Acre	$30,000	$3,630,000
Engineering and Contingencies (30%)					$340,174,000
Subtotal of Pipeline					**$1,485,793,000**
Pump Station(s)					
Intake and Pump Station at Gulf	535 MGD	1	EA	$17,800,000	$17,800,000
Booster Pump Station	33400 HP	5	EA	$17,850,000	$89,250,000
Ground Storage Tanks (covered)	8 MG	20	EA	$1,500,000	$30,000,000
Engineering and Contingencies (35%)					$47,968,000
Subtotal of Pump Station(s)					**$185,018,000**
Terminal Storage in North Texas					
Ground Storage Tanks (covered)	10 MG	12	EA	$1,900,000	$22,800,000
Permitting and Mitigation		1	LS		$12,937,600

WATER TREATMENT FACILITIES

Additonal water treatment capacity in North Texas		110	MGD		$96,000,000
Treatment Plant with RO		250	MGD		$532,200,000
Engineering and Contingencies (35%)					$186,270,000
Subtotal of Water Treatment					**$814,470,000**
Permitting of treatment plant and reject stream					$7,538,400
CONSTRUCTION TOTAL					**$2,528,557,000**
Interest During Construction			**(36 months)**		**$307,650,000**
TOTAL CAPITAL COST					**$2,836,207,000**

U-19, Continued

ANNUAL COSTS	
Debt Service (6% for 30 years)	$206,047,351
Raw water purchase	NA
Electricity ($0.06 kWh)	$37,722,000
Facility Operation & Maintenance	$18,402,456
Water Treatment ($1.50/1,000 gal finished water)	$97,755,300
Reject water disposal ($0.05/1,000 gal)	$3,258,510
Total Annual Costs	**$363,185,617**
UNIT COSTS (Until Amortized)	
Per Acre-Foot of treated water	$1,816
Per 1,000 Gallons of treated water	$5.57
UNIT COSTS (After Amortization)	
Per Acre-Foot of treated water	$786
Per 1,000 Gallons of treated water	$2.41

Table U-20
Cost of Marvin Nichols I Reservoir and Transmission System

Probable Owner:	NTMWD	172,800	AF/Y	34.9%	170,895	
	TRWD	165,500	AF/Y	33.4%	163,676	
	Dallas	97,000	AF/Y	19.6%	95,931	
	Irving	25,000	AF/Y	5.0%	24,724	
	Upper Trinity RWD	35,000	AF/Y	7.1%	34,614	
	Total	495,300	AF/Y		489,840	80% of yield with Ralph Hall lake built

CONSTRUCTION COSTS

DAM & RESERVOIR	Size	Quantity	Unit	Unit Price	Cost
Land Purchase Costs		1	LS	$73,169,000	$73,169,000
Mobilization		1	LS	$6,500,000	$6,500,000
Spillway Construction					
Mass Concrete		87,300	CY	$125	$10,913,000
Reinforced Concrete		26,800	CY	$475	$12,730,000
Soil Cement		3,600	CY	$31.50	$113,000
Spillway Bridge		640	LF	$1,100	$704,000
Gates, Including Anchoring System		14,040	SF	$235	$3,299,000
Gate Hoist and Operating System		13	EA	$225,000	$2,925,000
Stop Gate and Lift Beam		640	LF	$1,600	$1,024,000
Instrumentation		640	LF	$700	$448,000
Excavation		2,894,000	CY	$3	$8,682,000
Structural Fill		121,000	CY	$12	$1,452,000
Subtotal of Spillway Construction					**$42,290,000**
Embankment Construction					
Random Fill		6,049,600	CY	$2.00	$12,099,000
Impervious Core		1,455,000	CY	$2.50	$3,638,000
Borrow		4,731,600	CY	$2.00	$9,463,000
Foundation Drain (Filter Material)		502,500	CY	$31.00	$15,578,000
Soil Cement		337,800	CY	$35.00	$11,823,000
Slurry Trench Cutoff		1,770,000	SF	$8.50	$15,045,000
Asphalt Paving on Embankment Crest		68,350	SY	$17.50	$1,196,000
Containment Levee		79,100	CY	$2.50	$198,000
Subtotal of Embankment Construction					**$69,040,000**
Other Items					
Barrier Warning System		640	LF	$90	$58,000
Electrical System		1	LS	$500,000	$500,000
Power Drop		1	LS	$200,000	$200,000
Spillway Low-Flow System		1	LS	$350,000	$350,000
Stop Gate Monorail System		640	LF	$800	$512,000
Grassing		100	AC	$13,500	$1,350,000
Clearing and Grubbing/ Site Preparation		27960	LF	$30	$839,000
Care of Water		640	LF	$1,250	$800,000
Reservoir Land Clearing		16800	AC	$750	$12,600,000
Subtotal of Other Items					**$17,209,000**

Table U-20, Continued

Conflicts		1	LS	$	52,688,000	$52,688,000
Engineering and Contingencies (35%)						$65,704,000
Permitting and Mitigation						$166,738,000
Total Dam and Reservoir						**$493,338,000**
Subtotal for Region C Part of Dam & Reservoir						**$493,338,000**
NTMWD Portion of Dam & Reservoir	*34.9%*					*$172,175,000*
Dallas Portion of Dam & Reservoir	*19.6%*					*$96,694,000*
TRWD Portion of Dam & Reservoir	*33.4%*					*$164,775,000*
Irving Portion of Dam & Reservoir	*5.0%*					*$24,667,000*
Upper Trinity RWD Portion Dam & Reservoir	*7.1%*					*$35,027,000*
Subtotal Check						*$493,338,000*

TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural (Reservoir to Lk. Lavon)	2-108 in	419,200	LF	$633	$530,707,000
Pipeline Urban (Reservoir to Lk. Lavon)	2-108 in	10,000	LF	$886	$17,720,000
Right of Way Easements Rural (ROW)		770	Acres	$3,000	$2,310,000
Right of Way Easements Urban (ROW)		18	Acres	$30,000	$540,000
Engineering and Contingencies (30%)					$164,528,000
Permitting & Mitigation					$6,581,000
Subtotal of Pipeline (Reservoir to Lake Lavon)					**$722,386,000**
Pipeline Rural (Lake Lavon to Lewisville)	2-96 in	69,000	LF	$510	$70,380,000
Pipeline Urban (Lake Lavon to Lewisville)	2-96 in	103,500	LF	$714	$147,798,000
Right of Way Easements Rural (ROW)		127	Acres	$3,000	$381,000
Right of Way Easements Urban (ROW)		190	Acres	$30,000	$5,700,000
Engineering and Contingencies (30%)					$65,453,000
Permitting & Mitigation					$2,618,000
Subtotal of Pipeline (Lake Lavon to Lake Lewisville)					**$292,330,000**

Table U-20, Continued

Pipeline Rural (Lake Lewisville to Eagle Mountain Lake)	2-72 in	136,290	LF	$321	$87,498,000
Pipeline Urban (Lake Lewisville to Eagle Mountain Lake)	2-72 in	58,410	LF	$449	$52,452,000
Right of Way Easements Rural (ROW)		250	Acres	$3,000	$750,000
Right of Way Easements Urban (ROW)		107	Acres	$30,000	$3,210,000
Engineering and Contingencies (30%)					$41,985,000
Permitting & Mitigation					$1,679,000
Subtotal of Pipeline (Lake Lewisville to Eagle Mountain Lake)					**$187,574,000**
Total Pipeline Cost					**$1,202,290,000**
NTMWD Portion of Pipeline	*34.9 (Res to Lavon)*				*$252,113,000*
Dallas Portion of Pipeline	*19.6% (Res to Lavon) & 30.1% (Lavon to Lewisville)*				*$229,521,000*
TRWD Portion of Pipeline	*33.4% (Res to Lavon) & 51.3% (Lavon to Lewisville) & 100% (Lewisville to Eagle Mountain)*				*$578,874,000*
Irving Portion of Pipeline	*5% (Res to Lavon) & 7.75% (Lavon to Lewisvville)*				*$58,775,000*
Upper Trinity RWD Portion of Pipeline	*7.1% (Res to Lavon) & 10.85% (Lavon to Lewisville)*				*$83,007,000*
Total Check					*$1,202,290,000*
Pump Station(s)	**Size (per PS)**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pump Stations (Reservoir to Lake Lavon)	56,900	2	LS	$21,225,000	$42,450,000
Intake Structure	552 MGD	1	LS	$18,375,000	$18,375,000
Ground Storage Tanks at booster station	10 MG	7	EA	$1,400,000	$9,800,000
Engineering and Contingencies (35%)					$24,719,000
Permitting & Mitigation					$848,000
Subtotal of Pump Station(s) (Reservoir to Lake Lavon)					**$96,192,000**
Pump Station (Lake Lavon to Lake Lewisville)	20,300	1	LS	$14,900,000	$14,900,000
Ground Storage Tanks	10 MG	4	EA	$1,400,000	$5,600,000
Engineering and Contingencies (35%)					$7,175,000
Permitting & Mitigation					$246,000
Subtotal of Pump Station(s) (Lake Lavon to Lake Lewisville)					**$27,921,000**
Pump Stations (Lewisville to Eagle Mountain Lake)	7,700	2	LS	$7,620,000	$15,240,000
Ground Storage Tanks	10 MG	4	EA	$1,400,000	$5,600,000
Engineering and Contingencies (35%)					$7,294,000
Permitting & Mitigation					$250,000
Subtotal of Pump Station(s) (Lake Lewisville to Eagle Mountain Lake)					**$28,384,000**
Total Pump Station Costs (Including Storage Tanks)					**$152,497,000**

Table U-20, Continued

NTMWD	*34.9 (Res to Lavon)*	*$33,571,000*
Dallas	*19.6% (Res to Lavon) & 30.1% (Lavon to Lewisville)*	*$27,252,000*
TRWD	*33.4% (Res to Lavon) & 51.3% (Lavon to Lewisville) & 100%*	*$74,842,000*
Irving	*5% (Res to Lavon) & 7.75% (Lavon to Lewisvville)*	*$6,973,000*
UTRWD	*7.1% (Res to Lavon) & 10.85% (Lavon to Lewisville)*	*$9,859,000*
Total Check		*$152,497,000*
CONSTRUCTION TOTAL		**$1,848,125,000**
Interest During Construction	**(36 months - pipeline) (48 months for reservoir)**	**$244,595,000**
TOTAL COST		**$2,092,720,000**
NTMWD		*$518,456,000*
Dallas		*$400,248,000*
TRWD		*$926,816,000*
Irving		*$102,381,000*
Upper Trinity RWD		*$144,819,000*
Total Check		*$2,092,720,000*
TOTAL COST ANALYSIS		
NTMWD		**Cost**
Debt Service (6% for 30 years)		$37,665,000
Electricity ($0.06 kWh)		$11,318,000
Operation & Maintenance		$3,843,000
Total Annual Costs (NTMWD)		**$52,826,000**
Dallas		
Debt Service (6% for 30 years)		$29,078,000
Electricity ($0.06 kWh)		$8,140,000
Operation & Maintenance		$3,130,000
Total Annual Costs (Dallas)		**$40,348,000**
TRWD		
Debt Service (6% for 30 years)		$67,332,000
Electricity ($0.06 kWh)		$18,692,000
Operation & Maintenance		$7,642,000
Total Annual Costs (TRWD)		**$93,666,000**
Irving		
Debt Service (6% for 30 years)		$7,438,000
Electricity ($0.06 kWh)		$2,098,000
Operation & Maintenance		$802,000
Total Annual Costs (Irving)		**$10,338,000**
Upper Trinity RWD		
Debt Service (6% for 30 years)		$10,521,000
Electricity ($0.06 kWh)		$2,937,000
Operation & Maintenance		$1,132,000
Total Annual Costs (Upper Trinity RWD)		**$14,590,000**

Table U-20, Continued

TOTAL ANNUAL	
Debt Service (6% for 30 years)	$152,034,000
Electricity ($0.06 kWh)	$43,185,000
Operation & Maintenance	$16,549,000
Total Annual Costs (All Users)	**$211,768,000**
UNIT COSTS (Before Amortization)	
NTMWD	
Per Acre-Foot	$309
Per 1,000 Gallons	$0.95
Dallas	
Per Acre-Foot	$421
Per 1,000 Gallons	$1.29
TRWD	
Per Acre-Foot	$572
Per 1,000 Gallons	$1.76
Irving	
Per Acre-Foot	$418
Per 1,000 Gallons	$1.28
Upper Trinity RWD	
Per Acre-Foot	$422
Per 1,000 Gallons	$1.29
TOTAL ALL USERS	
Per Acre-Foot	$432
Per 1,000 Gallons	$1.33
ANNUAL COSTS (After Amortization)	
NTMWD	**Cost**
Electricity ($0.06 kWh)	$11,318,000
Operation & Maintenance	$3,843,000
Total Annual Costs (NTMWD)	**$15,161,000**
Dallas	
Electricity ($0.06 kWh)	$8,140,000
Operation & Maintenance	$3,130,000
Total Annual Costs (Dallas)	**$11,270,000**
TRWD	
Electricity ($0.06 kWh)	$18,692,000
Operation & Maintenance	$7,642,000
Total Annual Costs (TRWD)	**$26,334,000**
Irving	
Electricity ($0.06 kWh)	$2,098,000
Operation & Maintenance	$802,000
Total Annual Costs (Irving)	**$2,900,000**

Table U-20, Continued	
Upper Trinity RWD	
Electricity ($0.06 kWh)	$2,937,000
Operation & Maintenance	$1,132,000
Total Annual Costs (Upper Trinity RWD)	**$4,069,000**
TOTAL ALL USERS	
Electricity ($0.06 kWh)	$43,185,000
Operation & Maintenance	$16,549,000
Total Annual Costs	**$59,734,000**
UNIT COSTS (After Amortization)	
NTMWD	
Per Acre-Foot	$89
Per 1,000 Gallons	$0.27
Dallas	
Per Acre-Foot	$117
Per 1,000 Gallons	$0.36
TRWD	
Per Acre-Foot	$161
Per 1,000 Gallons	$0.49
Irving	
Per Acre-Foot	$117
Per 1,000 Gallons	$0.36
Upper Trinity RWD	
Per Acre-Foot	$118
Per 1,000 Gallons	$0.36
TOTAL ALL USERS	
Per Acre-Foot	$122
Per 1,000 Gallons	$0.37

Table U-21
Cost of Marvin Nichols I Reservoir and Transmission System
North Texas MWD, Tarrant Regional WD, and Upper Trinity RWD

Total Yield =	612,300	acre-feet per year (with Ralph Hall senior, system operation with Wright Patman)				
		Region D	122,460		20.0%	Portion of Region C
		NTMWD	174,840	AF/Y	28.6%	35.8%
		TRWD	280,000	AF/Y	45.7%	57.1%
		Upper Trinity RWD	35,000	AF/Y	5.7%	7.1%
		Total	612,300	AF/Y		

CONSTRUCTION COSTS

DAM & RESERVOIR	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Land Purchase Costs		1	LS	$73,169,000	$73,169,000
Mobilization		1	LS	$6,500,000	$6,500,000
Spillway Construction					
Mass Concrete		87,300	CY	$125	$10,913,000
Reinforced Concrete		26,800	CY	$475	$12,730,000
Soil Cement		3,600	CY	$31.50	$113,000
Spillway Bridge		640	LF	$1,100	$704,000
Gates, Including Anchoring System		14,040	SF	$235	$3,299,000
Gate Hoist and Operating System		13	EA	$225,000	$2,925,000
Stop Gate and Lift Beam		640	LF	$1,600	$1,024,000
Instrumentation		640	LF	$700	$448,000
Excavation		2,894,000	CY	$3	$8,682,000
Structural Fill		121,000	CY	$12	$1,452,000
Subtotal of Spillway Construction					**$42,290,000**
Embankment Construction					
Random Fill		6,049,600	CY	$2.00	$12,099,000
Impervious Core		1,455,000	CY	$2.50	$3,638,000
Borrow		4,731,600	CY	$2.00	$9,463,000
Foundation Drain (Filter Material)		502,500	CY	$31.00	$15,578,000
Soil Cement		337,800	CY	$35.00	$11,823,000
Slurry Trench Cutoff		1,770,000	SF	$8.50	$15,045,000
Asphalt Paving on Embankment Crest		68,350	SY	$17.50	$1,196,000
Containment Levee		79,100	CY	$2.50	$198,000
Subtotal of Embankment Construction					**$69,040,000**
Other Items					
Barrier Warning System		640	LF	$90	$58,000
Electrical System		1	LS	$500,000	$500,000
Power Drop		1	LS	$200,000	$200,000
Spillway Low-Flow System		1	LS	$350,000	$350,000
Stop Gate Monorail System		640	LF	$800	$512,000
Grassing		100	AC	$13,500	$1,350,000
Clearing and Grubbing/ Site Preparation		27960	LF	$30	$839,000
Care of Water		640	LF	$1,250	$800,000
Reservoir Land Clearing		16800	AC	$750	$12,600,000
Subtotal of Other Items					**$17,209,000**

Table U-21, Continued

Conflicts		1	LS	$ 52,688,000	**$52,688,000**
Engineering and Contingencies (35%)					$65,704,000
Permitting and Mitigation					$166,738,000
Total Dam and Reservoir					**$493,338,000**
Subtotal for Region C Part of Dam & Reservoir					**$493,338,000**
NTMWD Portion of Dam & Reservoir	*35.8%*				*$176,615,000*
TRWD Portion of Dam & Reservoir	*57.1%*				*$281,696,000*
Upper Trinity RWD Portion Dam & Reservoir	*7.1%*				*$35,027,000*
Subtotal Check					*$493,338,000*
TRANSMISSION FACILITIES					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural (Reservoir to Lk. Lavon)	2-108 in	419,200	LF	$633	$530,707,000
Pipeline Urban (Reservoir to Lk. Lavon)	2-108 in	10,000	LF	$886	$17,720,000
Right of Way Easements Rural (ROW)		770	Acres	$3,000	$2,310,000
Right of Way Easements Urban (ROW)		18	Acres	$30,000	$540,000
Engineering and Contingencies (30%)					$164,528,000
Permitting & Mitigation					$6,581,000
Subtotal of Pipeline (Reservoir to Lake Lavon)					**$722,386,000**
Pipeline Rural (Lake Lavon to Lewisville)	2-90 in	69,000	LF	$459	$63,342,000
Pipeline Urban (Lake Lavon to Lewisville)	2-90 in	103,500	LF	$643	$133,101,000
Right of Way Easements Rural (ROW)		127	Acres	$3,000	$381,000
Right of Way Easements Urban (ROW)		190	Acres	$30,000	$5,700,000
Engineering and Contingencies (30%)					$58,933,000
Permitting & Mitigation					$2,357,000
Subtotal of Pipeline (Lake Lavon to Lake Lewisville)					**$263,814,000**
Pipeline Rural (Lake Lewisville to Eagle	2-90 in	136,290	LF	$459	$125,114,000
Pipeline Urban (Lake Lewisville to Eagle	2-90 in	58,410	LF	$643	$75,115,000
Right of Way Easements Rural (ROW)		250	Acres	$3,000	$750,000
Right of Way Easements Urban (ROW)		107	Acres	$30,000	$3,210,000
Engineering and Contingencies (30%)					$60,069,000
Permitting & Mitigation					$2,403,000
Subtotal of Pipeline (Lake Lewisville to Eagle Mountain Lake)					**$266,661,000**
Total Pipeline Cost					**$1,252,861,000**
NTMWD Portion of Pipeline	*35.8% (Res to Lavon)*				*$258,614,000*
TRWD Portion of Pipeline	*57.1% (Res to Lavon) & 88.9% (Lavon to Lewisville) & 100% (Lewisville to Eagle Mountain)*				*$913,674,000*
Upper Trinity RWD Portion of Pipeline	*7.1% (Res to Lavon) & 11.1% (Lavon to Lewisville)*				*$80,573,000*
Total Check					*$1,252,861,000*
Pump Station(s)	**Size (per PS)**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pump Stations (Reservoir to Lake Lavon)	55,800	2	LS	$23,450,000	$46,900,000
Intake Structure	552 MGD	1	LS	$18,375,000	$18,375,000
Ground Storage Tanks at booster station	10 MG	7	EA	$1,400,000	$9,800,000
Engineering and Contingencies (35%)					$26,276,000
Permitting & Mitigation					$901,000
Subtotal of Pump Station(s) (Reservoir to Lake Lavon)					**$102,252,000**

Table U-21, Continued

Pump Station (Lake Lavon to Lake Lewisville)	24,200	1	LS	$15,260,000	$15,260,000
Ground Storage Tanks	9 MG	5	EA	$1,250,000	$6,250,000
Engineering and Contingencies (35%)					$7,529,000
Permitting & Mitigation					$258,000
Subtotal of Pump Station(s) (Lake Lavon to Lake Lewisville)					**$29,297,000**
Pump Stations (Lewisville to Eagle Mountain	26,900	1	LS	$16,070,000	$16,070,000
Ground Storage Tanks	10 MG	4	EA	$1,400,000	$5,600,000
Engineering and Contingencies (35%)					$7,585,000
Permitting & Mitigation					$260,000
Subtotal of Pump Station(s) (Lake Lewisville to Eagle Mountain Lake)					**$29,515,000**
Total Pump Station Costs (Including Storage Tanks)					**$161,064,000**
NTMWD	*35.8% (Res to Lavon)*				*$36,606,000*
TRWD	*57.1% (Res to Lavon) & 88.9% (Lavon to Lewisville) & 100%*				*$113,946,000*
UTRWD	*7.1% (Res to Lavon) & 11.1% (Lavon to Lewisville)*				*$10,512,000*
Total Check					*$161,064,000*
CONSTRUCTION TOTAL					**$1,907,263,000**
Interest During Construction	**(36 months - pipeline)** **(48 months for reservoir)**				**$251,790,000**
TOTAL COST					**$2,159,053,000**
NTMWD					*$534,125,000*
TRWD					*$1,482,167,000*
Upper Trinity RWD					*$142,761,000*
Total Check					*$2,159,053,000*
TOTAL COST ANALYSIS					
NTMWD					**Cost**
Debt Service (6% for 30 years)					$38,804,000
Electricity ($0.06 kWh)					$11,451,000
Operation & Maintenance					$3,231,000
Total Annual Costs (NTMWD)					**$53,486,000**
TRWD					
Debt Service (6% for 30 years)					$107,678,000
Electricity ($0.06 kWh)					$32,062,000
Operation & Maintenance					$12,087,000
Total Annual Costs (TRWD)					**$151,827,000**
Upper Trinity RWD					
Debt Service (6% for 30 years)					$10,371,000
Electricity ($0.06 kWh)					$3,016,000
Operation & Maintenance					$1,125,000
Total Annual Costs (Upper Trinity RWD)					**$14,512,000**

Table U-21, Continued

TOTAL ANNUAL	
Debt Service (6% for 30 years)	$156,853,000
Electricity ($0.06 kWh)	$46,529,000
Operation & Maintenance	$16,443,000
Total Annual Costs (All Users)	**$219,825,000**
UNIT COSTS (During Amortization)	
NTMWD	
Per Acre-Foot	$306
Per 1,000 Gallons	$0.94
TRWD	
Per Acre-Foot	$542
Per 1,000 Gallons	$1.66
Upper Trinity RWD	
Per Acre-Foot	$415
Per 1,000 Gallons	$1.27
Total All Users	
Per Acre-Foot	$449
Per 1,000 Gallons	$1.38
ANNUAL COSTS (After Amortization)	
NTMWD	**Cost**
Electricity ($0.06 kWh)	$11,451,000
Operation & Maintenance	$3,231,000
Total Annual Costs (NTMWD)	**$14,682,000**
TRWD	
Electricity ($0.06 kWh)	$32,062,000
Operation & Maintenance	$12,087,000
Total Annual Costs (TRWD)	**$44,149,000**
Upper Trinity RWD	
Electricity ($0.06 kWh)	$3,016,000
Operation & Maintenance	$1,125,000
Total Annual Costs (Upper Trinity RWD)	**$4,141,000**
Total All Users	
Electricity ($0.06 kWh)	$46,529,000
Operation & Maintenance	$16,443,000
Total Annual Costs (All Users)	**$62,972,000**
UNIT COSTS (After Amortization)	
NTMWD	
Per Acre-Foot	$84
Per 1,000 Gallons	$0.26
TRWD	
Per Acre-Foot	$158
Per 1,000 Gallons	$0.48

Table U-21, Continued

Upper Trinity RWD	
Per Acre-Foot	$118
Per 1,000 Gallons	$0.36
All Users	
Per Acre-Foot	$129
Per 1,000 Gallons	$0.39
COST ANALYSIS FOR PHASE I	
TOTAL COST	
NTMWD	*$375,685,167*
TRWD	*$942,182,075*
Upper Trinity RWD	*$94,696,758*
Total	***$1,412,564,000***
NTMWD	
Debt Service (6% for 30 years)	$27,293,000
Electricity ($0.06 kWh)	$5,725,500
Operation & Maintenance	$1,954,000
Total Annual Costs (NTMWD)	**$34,972,500**
TRWD	
Debt Service (6% for 30 years)	$68,449,000
Electricity ($0.06 kWh)	$16,031,000
Operation & Maintenance	$7,059,000
Total Annual Costs (TRWD)	**$91,539,000**
Upper Trinity	
Debt Service (6% for 30 years)	$6,880,000
Electricity ($0.06 kWh)	$1,508,000
Operation & Maintenance	$682,000
Total Annual Costs (Upper Trinity)	**$9,070,000**
Total, All Users	
Debt Service (6% for 30 years)	$102,622,000
Electricity ($0.06 kWh)	$23,264,500
Operation & Maintenance	$9,695,000
Total Annual Costs (All Users)	**$135,581,500**
PHASE I UNIT COSTS (During Amortization)	
NTMWD	
Per Acre-Foot	$400
Per 1,000 Gallons	$1.23
TRWD	
Per Acre-Foot	$654
Per 1,000 Gallons	$2.01
Upper Trinity	
Per Acre-Foot	$518
Per 1,000 Gallons	$1.59

Table U-21, Continued

All Users	
Per Acre-Foot	$554
Per 1,000 Gallons	$1.70
COST ANALYSIS FOR Phase II	
TOTAL COST	
NTMWD	*$158,441,792*
TRWD	*$539,983,113*
Upper Trinity RWD	*$48,064,095*
Total	***$746,490,300***
NTMWD	**Cost**
Debt Service (6% for 30 years)	$11,511,000
Electricity ($0.06 kWh)	$5,725,500
Operation & Maintenance	$1,277,000
Total Annual Costs (NTMWD)	**$18,513,500**
TRWD	
Debt Service (6% for 30 years)	$39,229,000
Electricity ($0.06 kWh)	$16,031,000
Operation & Maintenance	$5,028,000
Total Annual Costs (TRWD)	**$60,288,000**
Upper Trinity	
Debt Service (6% for 30 years)	$3,492,000
Electricity ($0.06 kWh)	$1,508,000
Operation & Maintenance	$443,000
Total Annual Costs (Upper Trinity)	**$5,443,000**
All Users	
Debt Service (6% for 30 years)	$54,232,000
Electricity ($0.06 kWh)	$23,264,500
Operation & Maintenance	$6,748,000
Total Annual Costs (All Users)	**$84,244,500**
UNIT COSTS FOR PHASE II (During Amortization)	
NTMWD	
Per Acre-Foot	$212
Per 1,000 Gallons	$0.65
TRWD	
Per Acre-Foot	$431
Per 1,000 Gallons	$1.32
Upper Trinity	
Per Acre-Foot	$311
Per 1,000 Gallons	$0.96
Total All Users	
Per Acre-Foot	$344
Per 1,000 Gallons	$1.06

Table U-22
Wright Patman to Dallas Water Utilities
Purchase 100,000 Acre-Feet per Year from Texarkana

Probable Owner:	DWU	100,000	Acre-Feet per Year
Peak Delivery:		112	MGD (1.25 Peaking Factor)

Note: Pipeline straight to East Side WTP.

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline (Rural)	78 in.	777,000	LF	$364	$282,828,000
Pipeline (Urban)	78 in.	8,000	LF	$510	$4,080,000
ROW Easements (Rural)		713	Acres	$3,000	$2,139,000
ROW Easements (Urban)		7	Acres	$30,000	$210,000
Engineering and Contingencies (30%)					$86,072,000
Subtotal of Pipeline					**$375,329,000**
Pump Station(s)	**Size (per PS)**	**Quantity**	**Unit**		**Cost**
Lake Wright Patman Pump Station	8,700 HP	1	LS	$11,200,000	$11,200,000
Booster Pump Stations	8,700 HP	2	Ea	$8,290,000	$16,580,000
Ground Storage Tanks	8 MG	4	Ea	$1,100,000	$4,400,000
Engineering and Contingencies (35%)					$11,263,000
Subtotal of Pump Stations					**$43,443,000**
CONSTRUCTION TOTAL					**$418,772,000**
Permitting and Mitigation		**1**	**LS**		**$3,829,000**
Interest During Construction	**(36 months)**				**$50,952,000**
TOTAL COST					**$473,553,000**

ANNUAL COSTS

Debt Service (6% for 30 years)	$34,403,000
Raw Water (31 cents per 1,000 gallons)	$10,101,000
Electricity ($0.06 kWh)	$6,706,000
Operation & Maintenance	$4,408,000
Total Annual Costs	**$55,618,000**

UNIT COSTS (Until Amortized)

Per Acre-Foot	$556
Per 1,000 Gallons	$1.71

UNIT COSTS (After Amortization))

Per Acre-Foot	$212
Per 1,000 Gallons	$0.65

Table U-23
Wright Patman to North Texas Municipal Water District
Purchase 100,000 Acre-Feet per Year from Texarkana

Probable Owner:	NTMWD	100,000	Acre-Feet per Year
Peak Delivery:		112	MGD (1.25 Peaking Factor)

Note: Pipeline straight to Lake Lavon.

CONSTRUCTION COSTS					
TRANSMISSION FACILITIES					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline (Rural)	78 in.	647,000	LF	$364	$235,508,000
Pipeline (Urban)	78 in.	20,000	LF	$510	$10,200,000
ROW Easements (Rural)		594	Acres	$3,000	$1,782,000
ROW Easements (Urban)		18	Acres	$30,000	$540,000
Engineering and Contingencies (30%)					$73,712,000
Subtotal of Pipeline					**$321,742,000**
Pump Station(s)	**Size (per PS)**	**Quantity**	**Unit**		**Cost**
Lake Wright Patman Pump Station	9,700 HP	1	LS	$12,000,000	$12,000,000
Booster Pump Stations	9,700 HP	2	Ea	$9,350,000	$18,700,000
Lavon Raw Water Pump Station	4,900 HP	1	LS	$7,710,000	$7,710,000
Ground Storage Tanks	8 MG	4	Ea	$1,100,000	$4,400,000
Engineering and Contingencies (35%)					$14,984,000
Subtotal of Pump Stations					**$57,794,000**
CONSTRUCTION TOTAL					**$379,536,000**
Permitting and Mitigation		**1**	**LS**		**$3,462,000**
Interest During Construction	**(36 months)**				**$46,178,000**
TOTAL COST					**$429,176,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$31,179,000
Raw Water (31 cents per 1,000 gallons)					$10,101,000
Electricity ($0.06 kWh)					$9,854,000
Operation & Maintenance					$4,233,000
Total Annual Costs					**$55,367,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot					$554
Per 1,000 Gallons					$1.70
UNIT COSTS (After Amortization)					
Per Acre-Foot					$242
Per 1,000 Gallons					$0.74

Table U-24
Wright Patman to Tarrant Regional Water District
Purchase 100,000 Acre-Feet per Year from Texarkana

Probable Owner:	TRWD	100,000	Acre-Feet per Year
Peak Delivery:		112	MGD (1.25 Peaking Factor)

Note: Pipeline straight to East Side WTP.

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline (Rural)	78 in.	864,200	LF	$364	$314,568,800
Pipeline (Urban)	78 in.	170,000	LF	$510	$86,700,000
ROW Easements (Rural)		794	Acres	$3,000	$2,382,000
ROW Easements (Urban)		156	Acres	$30,000	$4,680,000
Engineering and Contingencies (30%)					$120,381,000
Subtotal of Pipeline					**$528,711,800**
Pump Station(s)	**Size (per PS)**	**Quantity**	**Unit**		**Cost**
Lake Wright Patman Pump Station	10,900 HP	1	LS	$12,800,000	$12,800,000
Booster Pump Stations	10,900 HP	3	Ea	$9,450,000	$28,350,000
Ground Storage Tanks	8 MG	6	Ea	$1,100,000	$6,600,000
Engineering and Contingencies (35%)					$16,713,000
Subtotal of Pump Stations					**$64,463,000**
CONSTRUCTION TOTAL					**$593,174,800**
Permitting and Mitigation		**1**	**LS**		**$5,388,000**
Interest During Construction	**(36 months)**				**$72,172,000**
TOTAL COST					**$670,734,800**

ANNUAL COSTS	
Debt Service (6% for 30 years)	$48,728,000
Raw Water (31 cents per 1,000 gallons)	$10,101,000
Electricity ($0.06 kWh)	$12,078,000
Operation & Maintenance	$6,248,000
Total Annual Costs	**$77,155,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot	$772
Per 1,000 Gallons	$2.37
UNIT COSTS (After Amortization))	
Per Acre-Foot	$284
Per 1,000 Gallons	$0.87

Table U-25
Wright Patman to Dallas Water Utilities
Develop 112,100 Acre-Feet per Year from Lake Wright Patman

Probable Owner:	DWU	112,100	Acre-Feet per Year
Peak Delivery:		125	MGD (1.25 Peaking Factor)

Note: Pipeline straight to East Side WTP

CONSTRUCTION COSTS

RAW WATER IMPROVEMENTS

	Size	Quantity	Unit	Unit Price	Cost
Storage Purchase from COE			L.S.	$11,000,000	$11,000,000
Real Estate Purchase from COE			L.S.	$10,000,000	$10,000,000
Relocation Cost (facilities)			L.S.	$13,000,000	$13,000,000
Mitigation			L.S.	$20,000,000	$20,000,000
NEPA Evaluation			L.S.	$1,875,000	$1,875,000
Engineering, Acquisition and Contingencies at 35%			L.S.	$19,556,000	$19,556,000
Subtotal of Raw Water Improvements					**$75,431,000**

TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline (Rural)	78 in.	777,000	LF	$364	$282,828,000
Pipeline (Urban)	78 in.	8,000	LF	$510	$4,080,000
ROW Easements (Rural)		713	Acres	$3,000	$2,139,000
ROW Easements (Urban)		7	Acres	$30,000	$210,000
Engineering and Contingencies (30%)					$86,072,000
Subtotal of Pipeline					**$375,329,000**

Pump Station(s)	**Size (per PS)**	**Quantity**	**Unit**		**Cost**
New Pump Station for Texarkana	2,200 HP	1	LS	$4,880,000	$4,880,000
Lake Wright Patman Pump Station	11,500 HP	1	LS	$13,190,000	$13,190,000
Booster Pump Stations	11,500 HP	2	Ea	$9,750,000	$19,500,000
Ground Storage Tanks	7 MG	4	Ea	$925,000	$3,700,000
Engineering and Contingencies (35%)					$14,445,000
Subtotal of Pump Stations					**$55,715,000**

CONSTRUCTION TOTAL		**$506,475,000**
Permitting and Mitigation for Pipelines and Pump Stations		**$3,938,000**
Interest During Construction	**(36 months)**	**$61,623,000**
TOTAL COST		**$572,036,000**

Table U-25, Continued

ANNUAL COSTS	
Debt Service (6% for 30 years)	$41,558,000
Electricity ($0.06 kWh)	$8,706,000
Operation & Maintenance	$4,535,000
Total Annual Costs	**$54,799,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot	$489
Per 1,000 Gallons	$1.50
UNIT COSTS (After Amortization))	
Per Acre-Foot	$118
Per 1,000 Gallons	$0.36

Table U-26
Wright Patman to Dallas Water Utilities
Develop 180,000 Acre-Feet per Year from Lake Wright Patman

Probable Owner:	DWU	180,000	Acre-Feet per Year
Peak Delivery:		201	MGD (1.25 Peaking Factor)

Note: Pipeline straight to East Side WTP

CONSTRUCTION COSTS

RAW WATER IMPROVEMENTS

	Size	Quantity	Unit	Unit Price	Cost
Storage Purchase from COE			L.S.	$11,000,000	$11,000,000
Real Estate Purchase from COE			L.S.	$10,000,000	$10,000,000
Relocation Cost (facilities)			L.S.	$13,000,000	$13,000,000
Mitigation			L.S.	$20,000,000	$20,000,000
NEPA Evaluation			L.S.	$1,875,000	$1,875,000
Engineering, Acquisition and Contingencies at 35%			L.S.	$19,556,000	$19,556,000
Subtotal of Raw Water Improvements					**$75,431,000**

TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline (Rural)	2 - 72 in.	777,000	LF	$321 ea.	$498,834,000
Pipeline (Urban)	2 - 72 in.	8,000	LF	$449 ea.	$7,184,000
ROW Easements (Rural)		1,427	Acres	$3,000	$4,281,000
ROW Easements (Urban)		15	Acres	$30,000	$450,000
Engineering and Contingencies (30%)					$151,805,000
Subtotal of Pipeline					**$662,554,000**

Pump Station(s)	**Size (per PS)**	**Quantity**	**Unit**		**Cost**
New Pump Station for Texarkana	2,200 HP	1	LS	$4,880,000	$4,880,000
Lake Wright Patman Pump Station	18,200 HP	1	LS	$17,612,000	$17,612,000
Booster Pump Stations	18,200 HP	2	Ea	$13,100,000	$26,200,000
Ground Storage Tanks	8 MG	6	Ea	$1,100,000	$6,600,000
Engineering and Contingencies (35%)					$19,352,000
Subtotal of Pump Stations					**$74,644,000**

CONSTRUCTION TOTAL		**$812,629,000**
Permitting and Mitigation for Pipelines and Pump Stations		**$6,736,000**
Interest During Construction	**(36 months)**	**$98,873,000**
TOTAL COST		**$918,238,000**

Table U-26, Continued

ANNUAL COSTS	
Debt Service (6% for 30 years)	$66,709,000
Electricity ($0.06 kWh)	$13,826,000
Operation & Maintenance	$7,585,000
Total Annual Costs	**$88,120,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot	$490
Per 1,000 Gallons	$1.50
UNIT COSTS (After Amortization))	
Per Acre-Foot	$21,411,000
Per 1,000 Gallons	$0.37

Table U-27
Wright Patman to North Texas Municipal Water District
Develop 180,000 Acre-Feet per Year from Lake Wright Patman

Probable Owner:	NTMWD	180,000	Acre-Feet per Year
Peak Delivery:		201	MGD (1.25 Peaking Factor)

Note: Pipeline straight to Lake Lavon.

CONSTRUCTION COSTS

RAW WATER IMPROVEMENTS	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Storage Purchase from COE			L.S.	$11,000,000	$11,000,000
Real Estate Purchase from COE			L.S.	$10,000,000	$10,000,000
Relocation Cost (facilities)			L.S.	$13,000,000	$13,000,000
Mitigation			L.S.	$20,000,000	$20,000,000
NEPA Evaluation			L.S.	$1,875,000	$1,875,000
Engineering, Acquisition and Contingencies at 35%			L.S.	$19,556,000	$19,556,000
Subtotal of Raw Water Improvements					**$75,431,000**

TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline (Rural)	2 - 72 in.	647,000	LF	$321 ea.	$415,374,000
Pipeline (Urban)	2 - 72 in.	20,000	LF	$449 ea.	$17,960,000
ROW Easements (Rural)		594	Acres	$3,000	$1,782,000
ROW Easements (Urban)		18	Acres	$30,000	$540,000
Engineering and Contingencies (30%)					$130,000,000
Subtotal of Pipeline					**$565,656,000**

Pump Station(s)	**Size (per PS)**	**Quantity**	**Unit**		**Cost**
New Pump Station for Texarkana	2,200 HP	1	LS	$4,880,000	$4,880,000
Lake Wright Patman Pump Station	19,400 HP	1	LS	$18,804,000	$18,804,000
Booster Pump Stations	19,400 HP	2	Ea	$13,700,000	$27,400,000
Lavon Raw Water Pump Station	8,800 HP	1	LS	$8,360,000	$8,360,000
Ground Storage Tanks	8 MG	6	Ea	$1,100,000	$6,600,000
Engineering and Contingencies (35%)					$23,115,000
Subtotal of Pump Stations					**$89,159,000**

CONSTRUCTION TOTAL		**$730,246,000**
Permitting and Mitigation for Pipelines and Pump Stations		**$5,993,000**
Interest During Construction	**(36 months)**	**$88,849,000**
TOTAL COST		**$825,088,000**

Table U-27, Continued

ANNUAL COSTS	
Debt Service (6% for 30 years)	$59,942,000
Electricity ($0.06 kWh)	$16,059,000
Operation & Maintenance	$7,035,000
Total Annual Costs	**$83,036,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot	$461
Per 1,000 Gallons	$1.42
UNIT COSTS (After Amortization))	
Per Acre-Foot	$23,094,000
Per 1,000 Gallons	$0.39

Table U-28
Wright Patman to Tarrant Regional Water District
Develop 180,000 Acre-Feet per Year from Lake Wright Patman

Probable Owner:	TRWD	180,000	Acre-Feet per Year
Peak Delivery:		201	MGD (1.25 Peaking Factor)

Note: Pipeline straight to Eagle Mountain Lake

CONSTRUCTION COSTS

RAW WATER IMPROVEMENTS

	Size	**Quantity**	**Unit**	**Unit Price**	**Cost**
Storage Purchase from COE			L.S.	$11,000,000	$11,000,000
Real Estate Purchase from COE			L.S.	$10,000,000	$10,000,000
Relocation Cost (facilities)			L.S.	$13,000,000	$13,000,000
Mitigation			L.S.	$20,000,000	$20,000,000
NEPA Evaluation			L.S.	$1,875,000	$1,875,000
Engineering, Acquisition and Contingencies at 35%			L.S.	$19,556,000	$19,556,000
Subtotal of Raw Water Improvements					**$75,431,000**

TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline (Rural)	96 in.	864,200	LF	$510	$440,742,000
Pipeline (Urban)	96 in.	170,000	LF	$714	$121,380,000
ROW Easements (Rural)		794	Acres	$3,000	$2,382,000
ROW Easements (Urban)		156	Acres	$30,000	$4,680,000
Engineering and Contingencies (30%)					$168,637,000
Subtotal of Pipeline					**$737,821,000**

Pump Station(s)	**Size (per PS)**	**Quantity**	**Unit**		**Cost**
New Pump Station for Texarkana	2,200 HP	1	LS	$4,880,000	$4,880,000
Lake Wright Patman Pump Station	22.000 HP	1	LS	$19,640,000	$19,640,000
Booster Pump Stations	22,000 HP	3	Ea	$14,600,000	$43,800,000
Ground Storage Tanks	8 MG	9	Ea	$1,100,000	$9,900,000
Engineering and Contingencies (35%)					$27,377,000
Subtotal of Pump Stations					**$105,597,000**
CONSTRUCTION TOTAL					**$918,849,000**
Permitting and Mitigation for Pipelines and Pump Stations					**$7,684,000**
Interest During Construction	**(36 months)**				**$111,796,000**
TOTAL COST					**$1,038,329,000**

Table U-28, Continued

ANNUAL COSTS	
Debt Service (6% for 30 years)	$75,433,000
Electricity ($0.06 kWh)	$22,679,000
Operation & Maintenance	$8,946,000
Total Annual Costs	**$107,058,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot	$595
Per 1,000 Gallons	$1.83
UNIT COSTS (After Amortization))	
Per Acre-Foot	$31,625,000
Per 1,000 Gallons	$0.54

Table U-29
Wright Patman to DWU, NTMWD, and TRWD
Develop 390,000 Acre-Feet per Year from Lake Wright Patman

Probable Owner:	Multiple	390,000	Acre-Feet per Year
Peak Delivery:		435	MGD (1.25 Peaking Factor)

Note: Water includes 100,000 acre-feet per year purchased from Texarkana, 182,000 acre-feet per year new supply, and 108,000 acre-feet per year system operation. Pipeline to Lake Lavon, Lake Lewisville, and Eagle Mountain Lake.

CONSTRUCTION COSTS

RAW WATER IMPROVEMENTS (all Phase 1)

	Size	Quantity	Unit	Unit Price	Cost
Storage Purchase from COE			L.S.	$11,000,000	$11,000,000
Real Estate Purchase from COE			L.S.	$10,000,000	$10,000,000
Relocation Cost (facilities)			L.S.	$13,000,000	$13,000,000
Mitigation			L.S.	$20,000,000	$20,000,000
NEPA Evaluation			L.S.	$1,875,000	$1,875,000
Engineering, Acquisition and Contingencies at 35%			L.S.	$19,556,000	$19,556,000
Subtotal of Raw Water Improvements					**$75,431,000**
- NTMWD					$25,144,000
- DWU					$25,143,000
- TRWD					$25,144,000

TRANSMISSION FACILITIES

Pipeline Phase 1	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Segment 1 (WP to Chapman - Total Capacity = 614 mgd, Phase 1 capacity = 307 mgd)					
Pipeline	108 in.	426,149	L.F.	$633	$269,752,000
ROW Easements (80 Ft.)		783	Acres	$3,000	$2,349,000
Engineering and Contingencies (30%)					$80,926,000
Segment 1 Subtotal					$353,027,000
Segment 2 (Chapman to Lavon - Total Capacity = 435 mgd, Phase 1 capacity = 218 mgd)					
Pipeline (rural)	96 in.	188,450	L.F.	$510	$96,110,000
Pipeline (urban)	96 in.	20,000	L.F.	$714	$14,280,000
ROW Easements (80 Ft., rural)		346	Acres	$3,000	$1,038,000
ROW Easements (80 Ft., urban)		37	Acres	$30,000	$1,110,000
Engineering and Contingencies (30%)					$33,117,000
Segment 2 Subtotal					$145,655,000

Table U-29, Continued

	Size	Quantity	Unit	Unit Price	Cost
Segment 3 (Lavon to Lewisville - Capacity = 290 mgd, phase 1 capacity = 145 mgd)					
Pipeline (rural)	84 in.	69,000	L.F.	$409	$28,221,000
Pipeline (urban)	84 in.	103,500	L.F.	$573	$59,306,000
ROW Easements (80 Ft., rural)		127	Acres	$3,000	$381,000
ROW Easements (80 Ft., urban)		190	Acres	$30,000	$5,700,000
Engineering and Contingencies (30%)					$26,258,000
Segment 3 Subtotal					$119,866,000
Segment 4 (Lewisville to EM - Capacity = 145 mgd)					
Pipeline (rural)	84 in.	136,290	L.F.	$409	$55,743,000
Pipeline (urban)	84 in.	58,410	L.F.	$573	$33,469,000
ROW Easements (40 Ft., rural)		125	Acres	$3,000	$375,000
ROW Easements (40 Ft., urban)		54	Acres	$30,000	$1,620,000
Engineering and Contingencies (30%)					$26,764,000
Segment 4 Subtotal					$117,971,000
Phase 1 Pipeline Total					**$736,519,000**
- NTMWD					$166,227,000
- DWU					$226,160,000
- TRWD					$344,132,000
Pipeline Phase 2	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Segment 1 (WP to Chapman - Total Capacity = 614 mgd)					
Pipeline	108 in.	426,149	L.F.	$633	$269,752,000
Engineering and Contingencies (30%)					$80,926,000
Segment 1 Subtotal					$350,678,000
Segment 2 (Chapman to Lavon - Total Capacity = 435 mgd)					
Pipeline (rural)	96 in.	198,450	L.F.	$510	$101,210,000
Pipeline (urban)	96 in.	10,000	L.F.	$714	$7,140,000
Engineering and Contingencies (30%)					$32,505,000
Segment 2 Subtotal					$140,855,000
Segment 3 (Lavon to Lewisville - Total Capacity = 290 mgd)					
Pipeline (rural)	84 in.	69,000	L.F.	$409	$28,221,000
Pipeline (urban)	84 in.	103,500	L.F.	$573	$59,306,000
Engineering and Contingencies (30%)					$26,258,000
Segment 3 Subtotal					$113,785,000
Phase 2 Pipeline Total					**$605,318,000**
- NTMWD					$163,844,000
- DWU					$220,737,000
- TRWD					$220,737,000
PIPELINE TOTAL					**$1,341,837,000**
- NTMWD					$330,071,000
- DWU					$446,897,000
- TRWD					$564,869,000

Table U-29, Continued

Pump Station Phase 1	**Size**	**Quantity**	**Unit**		**Cost**
Segment 1 (WP to Chapman - Capacity = 614 mgd)					
New Pump Station for Texarkana	2,200 HP	1	LS	$4,880,000	$4,880,000
Lake Wright Patman Pump Station	28,000 HP	1	LS	$22,200,000	$22,200,000
Booster Pump Station 1	32,500 HP	1	Ea	$17,600,000	$17,600,000
Booster 1 Ground Storage Tanks	8 MG	5	Ea	$1,100,000	$5,500,000
Engineering and Contingencies (35%)					$17,563,000
Segment 1 Total					$67,743,000
Segment 2 (Chapman to Lavon - Capacity = 435 mgd)					
Lake Chapman Pump Station	28,300 HP	1	LS	$22,300,000	$22,300,000
Engineering and Contingencies (35%)					$7,805,000
Segment 2 Total					$30,105,000
Segment 3 (Lavon to Lewisville - Capacity = 290 mgd)					
Lake Lavon Pump Station	13,000 HP	1	LS	$14,180,000	$14,180,000
Engineering and Contingencies (35%)					$4,963,000
Segment 3 Total					$19,143,000
Segment 4 (Lewisville to EM - Capacity = 145 mgd)					
Lake Lewisville Pump Station	13,000 HP	1	LS	$14,180,000	$14,180,000
Engineering and Contingencies (35%)					$4,963,000
Segment 4 Total					$19,143,000
Phase 1 Pump Station Total					**$136,134,000**
- NTMWD					$32,616,000
- DWU					$42,188,000
- TRWD					$61,330,000

Pump Station Phase 2	**Size**	**Quantity**	**Unit**		**Cost**
Segment 1 (WP to Chapman - Capacity = 614 mgd)					
Lake Wright Patman Pump Station	28,000 HP	1	LS	$22,200,000	$22,200,000
Booster Pump Station 1	32,500 HP	1	Ea	$17,600,000	$17,600,000
Booster 1 Ground Storage Tanks	8 MG	5	Ea	$1,100,000	$5,500,000
Engineering and Contingencies (35%)					$15,855,000
Segment 1 Total					$61,155,000
Segment 2 (Chapman to Lavon - Capacity = 435 mgd)					
Lake Chapman Pump Station	28,300 HP	1	LS	$22,300,000	$22,300,000
Engineering and Contingencies (35%)					$7,805,000
Segment 2 Total					$30,105,000
Segment 3 (Lavon to Lewisville - Capacity = 290 mgd)					
Lake Lavon Pump Station	13,000 HP	1	LS	$14,180,000	$14,180,000
Engineering and Contingencies (35%)					$4,963,000
Segment 3 Total					$19,143,000

Table U-29, Continued

Segment 4 (Lewisville to EM - Capacity = 145 mgd)						
Lake Lewisville Pump Station	5,300	HP	1	LS	$8,130,000	$8,130,000
Engineering and Contingencies (35%)						$2,846,000
Segment 4 Total						$10,976,000
Phase 2 Pump Station Total						**$121,379,000**
- NTMWD						$30,420,000
- DWU						$39,992,000
- TRWD						$50,967,000
PUMP STATION TOTAL						**$257,513,000**
- NTMWD						$63,036,000
- DWU						$82,180,000
- TRWD						$112,297,000
CONSTRUCTION TOTAL						
Phase 1						**$948,084,000**
- NTMWD						$223,987,000
- DWU						$293,491,000
-TRWD						$430,606,000
Phase 2						**$726,697,000**
- NTMWD						$194,264,000
- DWU						$260,729,000
-TRWD						$271,704,000
TOTAL						**$1,674,781,000**
- NTMWD						$418,251,000
- DWU						$554,220,000
-TRWD						$702,310,000
Permitting and Mitigation (All Phase 1)						**$14,559,000**
- NTMWD						$4,853,000
- DWU						$4,853,000
-TRWD						$4,853,000
Interest During Construction (36 months)						
Phase 1						**$115,353,000**
- NTMWD						$27,252,000
- DWU						$35,709,000
-TRWD						$52,392,000
Phase 2						**$86,329,000**
- NTMWD						$23,078,000
- DWU						$30,974,000
-TRWD						$32,277,000
TOTAL						**$201,682,000**
- NTMWD						$50,330,000
- DWU						$66,683,000
-TRWD						$84,669,000

Table U-29, Continued

TOTAL COST	
Phase 1	**$1,077,996,000**
- NTMWD	$256,092,000
- DWU	$334,053,000
-TRWD	$487,851,000
Phase 2	**$813,026,000**
- NTMWD	$217,342,000
- DWU	$291,703,000
-TRWD	$303,981,000
TOTAL	**$1,891,022,000**
- NTMWD	$473,434,000
- DWU	$625,756,000
-TRWD	$791,832,000
ANNUAL COSTS - PHASE 1	
Debt Service (6% for 30 years)	**$78,315,000**
- NTMWD	$18,605,000
- DWU	$24,269,000
-TRWD	$35,442,000
Raw Water (100,000 Acre-Feet at $0.31 per 1,000 gallons)	**$10,101,000**
- NTMWD	$3,367,000
- DWU	$3,367,000
-TRWD	$3,367,000
Electricity ($0.06 kWh)	**$22,001,000**
- NTMWD	$5,513,000
- DWU	$7,246,000
-TRWD	$9,242,000
Operation & Maintenance	**$10,594,000**
- NTMWD	$2,542,000
- DWU	$3,277,000
-TRWD	$4,775,000
Total Annual Costs	**$121,011,000**
- NTMWD	$30,027,000
- DWU	$38,159,000
-TRWD	$52,826,000

Table U-29, Continued

ANNUAL COSTS - PHASE 2	
Debt Service (6% for 30 years)	**$59,065,000**
- NTMWD	$15,790,000
- DWU	$21,192,000
-TRWD	$22,084,000
Raw Water (100,000 Acre-Feet at $0.31 per 1,000 gallons)	**$0**
- NTMWD	$0
- DWU	$0
-TRWD	$0
Electricity ($0.06 kWh)	**$23,196,000**
- NTMWD	$5,513,000
- DWU	$7,246,000
-TRWD	$10,437,000
Operation & Maintenance	**$8,149,000**
- NTMWD	$2,144,000
- DWU	$2,882,000
-TRWD	$3,123,000
Total Annual Costs	**$90,410,000**
- NTMWD	$23,447,000
- DWU	$31,320,000
-TRWD	$35,644,000
ANNUAL COSTS - PHASES 1 & 2	
Debt Service (6% for 30 years)	**$137,380,000**
- NTMWD	$34,395,000
- DWU	$45,461,000
-TRWD	$57,526,000
Raw Water (100,000 Acre-Feet at $0.31 per 1,000 gallons)	**$10,101,000**
- NTMWD	$3,367,000
- DWU	$3,367,000
-TRWD	$3,367,000
Electricity ($0.06 kWh)	**$45,197,000**
- NTMWD	$11,026,000
- DWU	$14,492,000
-TRWD	$19,679,000
Operation & Maintenance	**$18,743,000**
- NTMWD	$4,686,000
- DWU	$6,159,000
-TRWD	$7,898,000
Total Annual Costs	**$211,421,000**
- NTMWD	$53,474,000
- DWU	$69,479,000
-TRWD	$88,470,000

Table U-29, Continued

UNIT COSTS (Phase 1)	
Per Acre-Foot	
Overall	**$621**
- NTMWD	$462
- DWU	$587
- TRWD	$813
Per 1,000 Gallons	
Overall	**$1.90**
- NTMWD	$1.42
- DWU	$1.80
- TRWD	$2.49
UNIT COSTS (Phase 2)	
Per Acre-Foot	
Overall	**$464**
- NTMWD	$361
- DWU	$482
- TRWD	$548
Per 1,000 Gallons	
Overall	**$1.42**
- NTMWD	$1.11
- DWU	$1.48
- TRWD	$1.68
UNIT COSTS (Phases 1 & 2)	
Per Acre-Foot	
Overall	**$542**
- NTMWD	$411
- DWU	$534
- TRWD	$681
Per 1,000 Gallons	
Overall	**$1.66**
- NTMWD	$1.26
- DWU	$1.64
- TRWD	$2.09

Table U-29, Continued

UNIT COSTS AFTER AMORTIZATION (Phases 1 & 2)

Per Acre-Foot	
Overall	**$190**
- NTMWD	$147
- DWU	$185
- TRWD	$238
Per 1,000 Gallons	
Overall	**$0.58**
- NTMWD	$0.45
- DWU	$0.57
- TRWD	$0.73

Table U-30
Lake Texoma Already Authorized with Blending
WTP at Farmersville

Probable Owner: North Texas MWD
Amount: 113,000 Acre-Feet/Year

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline (Rural)	90 in.	274,791	LF	$459	$126,129,000
Right of Way Easements (ROW)	40 ft.	252	Acre	$3,000	$756,000
Engineering and Contingencies (30%)					$37,839,000
Subtotal of Pipeline					**$164,724,000**
Pump Station(s)					
Add 2 Pumps to existing Facility	100 MGD	2	EA	$1,250,000	$2,500,000
Engineering and Contingencies (35%)					$875,000
Subtotal of Pump Station(s)					**$3,375,000**
Two Day Terminal Storage (400 MG)					
Compacted Fill		1,147,844	CY	$5.00	$5,739,000
12" Soil Cement		80,424	CY	$50.00	$4,021,000
HDPE Liner		241,272	SY	$3.15	$760,000
Roads		11,336	SY	$15.00	$170,000
Grassing		20	AC	$3,000.00	$60,000
Control structures		4	EA	$250,000.00	$1,000,000
Fencing		6,996	LF	$15.00	$105,000
Mobilization		1	LS	5.00%	$593,000
Engineering and Contingencies (35%)					$4,357,000
Subtotal Terminal Storage					**$16,805,000**
Permitting and Mitigation		**1**	**LS**		**$1,686,000**
CONSTRUCTION TOTAL					**$186,590,000**
Interest During Construction			**(24 months)**		**$15,239,000**
TOTAL CAPITAL COST					**$201,829,000**

Table U-30, Continued

ANNUAL COSTS	
Debt Service (6% for 30 years)	$14,663,000
Raw water purchase	$2,300,000
Electricity ($0.06 kWh)	$2,560,000
Facility Operation & Maintenance	$1,802,000
Total Annual Costs	**$21,325,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot of raw water	$189
Per 1,000 Gallons of raw water	$0.58
UNIT COSTS (After Amortization)	
Per Acre-Foot of raw water	$59
Per 1,000 Gallons of raw water	$0.18

Table U-31
NTMWD Substantial Additional Lake Texoma Supply with Desalination

Probable Owner: North Texas MWD
Amount: 113,000 Acre-Feet/Year pumped. 105,000 ac-ft/yr delivered after desalination.

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline	90 in.	274,791	LF	$459	$126,129,100
Right of Way Easements (ROW)	40 ft.	252	Acre	$3,000	$756,000
Engineering and Contingencies (30%)					$38,066,000
Subtotal of Pipeline					**$164,951,100**
Pump Station(s)					
Add 2 Pumps to existing Facility	100 MGD	2	EA	$1,250,000	$2,500,000
Engineering and Contingencies (35%)					$875,000
Subtotal of Pump Station(s)					**$3,375,000**
Two Day Terminal Storage (400 MG)					
Compacted Fill		1,147,844	CY	$5.00	$5,739,000
12" Soil Cement		80,424	CY	$50.00	$4,021,000
HDPE Liner		241,272	SY	$3.15	$760,000
Roads		11,336	SY	$15.00	$170,000
Grassing		20	AC	$3,000.00	$60,000
Control structures		4	EA	$250,000.00	$1,000,000
Fencing		6,996	LF	$15.00	$105,000
Mobilization		1	LS	5.00%	$593,000
Engineering and Contingencies (35%)					$4,357,000
Subtotal Terminal Storage					**$16,805,000**
Permitting and Mitigation		**1**	**LS**		**$1,685,800**

WATER TREATMENT FACILITIES

Desalination					
Treatment Plant with RO (70 MGD)		200	MGD		$197,400,000
Brine disposal wells	200 gpm	30	EA	$900,000	$27,000,000
Disposal conveyance system		1	LS	$4,050,000	$4,050,000
Engineering and Contingencies (35%)					$79,958,000
Subtotal of Desalination					**$308,408,000**
Permitting of treatment plant and reject stream					**$2,741,400**

Table U-31, Continued

CONSTRUCTION TOTAL		**$497,966,300**
Interest During Construction	**(24 months)**	**$40,669,000**
TOTAL CAPITAL COST		**$538,635,300**
ANNUAL COSTS		
Debt Service (6% for 30 years)		$39,131,000
Raw water purchase		$2,300,000
Raw Water Electricity ($0.06 kWh)		$2,560,000
Facility Operation & Maintenance		$2,660,000
Water Treatment		$17,189,000
Reject water disposal		$3,259,000
Total Annual Costs		**$67,099,000**
UNIT COSTS (During Amortization)		
Per Acre-Foot of treated water		$639
Per 1,000 Gallons of treated water		$1.96
UNIT COSTS (During Amortization)		
Per Acre-Foot of treated water		$266
Per 1,000 Gallons of treated water		$0.82

Table U-31
NTMWD Substantial Additional Lake Texoma Supply with Desalination

Probable Owner: North Texas MWD
Amount: 113,000 Acre-Feet/Year pumped. 105,000 ac-ft/yr delivered after desalination.

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline	90 in.	274,791	LF	$459	$126,129,100
Right of Way Easements (ROW)	40 ft.	252	Acre	$3,000	$756,000
Engineering and Contingencies (30%)					$38,066,000
Subtotal of Pipeline					**$164,951,100**
Pump Station(s)					
Add 2 Pumps to existing Facility	100 MGD	2	EA	$1,250,000	$2,500,000
Engineering and Contingencies (35%)					$875,000
Subtotal of Pump Station(s)					**$3,375,000**
Two Day Terminal Storage (400 MG)					
Compacted Fill		1,147,844	CY	$5.00	$5,739,000
12" Soil Cement		80,424	CY	$50.00	$4,021,000
HDPE Liner		241,272	SY	$3.15	$760,000
Roads		11,336	SY	$15.00	$170,000
Grassing		20	AC	$3,000.00	$60,000
Control structures		4	EA	$250,000.00	$1,000,000
Fencing		6,996	LF	$15.00	$105,000
Mobilization		1	LS	5.00%	$593,000
Engineering and Contingencies (35%)					$4,357,000
Subtotal Terminal Storage					**$16,805,000**
Permitting and Mitigation		**1**	**LS**		**$1,685,800**

WATER TREATMENT FACILITIES

Desalination					
Treatment Plant with RO (70 MGD)		200	MGD		$197,400,000
Brine disposal wells	200 gpm	30	EA	$900,000	$27,000,000
Disposal conveyance system		1	LS	$4,050,000	$4,050,000
Engineering and Contingencies (35%)					$79,958,000
Subtotal of Desalination					**$308,408,000**
Permitting of treatment plant and reject stream					**$2,741,400**

Table U-31, Continued

CONSTRUCTION TOTAL		**$497,966,300**
Interest During Construction	**(24 months)**	**$40,669,000**
TOTAL CAPITAL COST		**$538,635,300**
ANNUAL COSTS		
Debt Service (6% for 30 years)		$39,131,000
Raw water purchase		$2,300,000
Raw Water Electricity ($0.06 kWh)		$2,560,000
Facility Operation & Maintenance		$2,660,000
Water Treatment		$17,189,000
Reject water disposal		$3,259,000
Total Annual Costs		**$67,099,000**
UNIT COSTS (During Amortization)		
Per Acre-Foot of treated water		$639
Per 1,000 Gallons of treated water		$1.96
UNIT COSTS (During Amortization)		
Per Acre-Foot of treated water		$266
Per 1,000 Gallons of treated water		$0.82

Table U-32
Additional Lake Texoma Supply with Blending

Probable Owner: Multiple
Amount: 50,000 Acre-Feet/Year
Peak Delivery 89.2 MGD

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline (rural)	66 in.	223,959	LF	$282	$63,156,400
Pipeline (urban)	66 in.	109,375	LF	$395	$43,203,100
Right of Way Easements (Rural)	30 ft.	206	Acre	$3,000	$618,000
Right of Way Easements (Urban)	30 ft.	100	Acre	$30,000	$3,000,000
Engineering and Contingencies (30%)					$31,908,000
Subtotal of Pipeline					**$141,885,500**
Pump Station(s)					
Lakeside Pump Station	7,540 HP	1	EA	$11,500,000	$9,132,000
Engineering and Contingencies (35%)					$3,196,000
Subtotal of Pump Station(s)					**$12,328,000**
Two Day Terminal Storage (9000 MG)					
Compacted Fill		1,120,000	CY	$5.00	$5,600,000
12" Soil Cement		75,000	CY	$50.00	$3,750,000
HDPE Liner		250,000	SY	$3.15	$788,000
Roads		10,500	SY	$15.00	$158,000
Grassing		19	AC	$3,000.00	$57,000
Control structures		4	EA	$250,000.00	$1,000,000
Fencing		6,800	LF	$15.00	$102,000
Mobilization		1	LS	5.00%	$573,000
Engineering and Contingencies (35%)					$4,210,000
Subtotal Terminal Storage					**$16,238,000**
Permitting and Mitigation		**1**	**LS**		**$1,530,200**
CONSTRUCTION TOTAL					**$171,981,700**
Interest During Construction			**(18 months)**		**$10,606,000**
TOTAL CAPITAL COST					**$182,587,700**

Table U-32, Continued

ANNUAL COSTS	
Debt Service (6% for 30 years)	$13,265,000
Raw water purchase	$1,150,000
Electricity ($0.06 kWh)	$1,235,000
Facility Operation & Maintenance	$1,756,000
Total Annual Costs	**$17,406,000**
UNIT COSTS (During Amortization)	
Per Acre-Foot of raw water	$348
Per 1,000 Gallons of raw water	$1.07
UNIT COSTS (After Amortization)	
Per Acre-Foot of treated water	$83
Per 1,000 Gallons of treated water	$0.25

Table U-33
Substantial Additional Lake Texoma Supply with Desalination

Probable Owner: Multiple
Amount: 113,000 Acre-Feet/Year pumped.
Amount: 105,000 ac-ft/yr delivered after desalination.

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline (rural)	90 in.	223,959	LF	$459	$102,797,200
Pipeline (urban)	90 in.	109,375	LF	$643	$70,328,100
Right of Way Easements (Rural)	40 ft.	206	Acre	$3,000	$618,000
Right of Way Easements (Urban)	40 ft.	100	Acre	$30,000	$3,000,000
Engineering and Contingencies (30%)					$51,938,000
Subtotal of Pipeline					**$228,681,300**
Pump Station(s)					
Lakeside Pump Station	9,000 HP	1	EA	$11,500,000	$11,500,000
Engineering and Contingencies (35%)					$4,025,000
Subtotal of Pump Station(s)					**$15,525,000**
Permitting and Mitigation		**1**	**LS**		**$2,364,900**
Two Day Terminal Storage (400 MG)					
Compacted Fill		1,147,844	CY	$5.00	$5,739,000
12" Soil Cement		80,424	CY	$50.00	$4,021,000
HDPE Liner		241,272	SY	$3.15	$760,000
Roads		11,336	SY	$15.00	$170,000
Grassing		20	AC	$3,000.00	$60,000
Control structures		4	EA	$250,000.00	$1,000,000
Fencing		6,996	LF	$15.00	$105,000
Mobilization		1	LS	5.00%	$593,000
Engineering and Contingencies (35%)					$4,357,000
Subtotal Terminal Storage					**$16,805,000**

Table U-33, Continued

WATER TREATMENT FACILITIES

Desalination					
Treatment Plant with RO (70 MGD)		200	MGD		$197,400,000
Brine disposal wells	200 gpm	30	EA	$900,000	$27,000,000
Disposal conveyance system		1	LS	$4,050,000	$4,050,000
Engineering and Contingencies (35%)					$79,958,000
Subtotal of Desalination					**$308,408,000**
Permitting of treatment plant and reject stream					**$2,741,400**
CONSTRUCTION TOTAL					**$574,525,600**
Interest During Construction			**(24 months)**		**$46,922,000**
TOTAL CAPITAL COST					**$621,447,600**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$45,147,000
Raw water purchase					$2,300,000
Raw Water Electricity ($0.06 kWh)					$2,801,000
Facility Operation & Maintenance					$3,494,000
Water Treatment					$17,189,000
Reject water disposal					$3,259,000
Total Annual Costs					**$74,190,000**
UNIT COSTS (During Amortization)					
Per Acre-Foot of treated water					$707
Per 1,000 Gallons of treated water					$2.17
UNIT COSTS (After Amortization)					
Per Acre-Foot of treated water					$277
Per 1,000 Gallons of treated water					$0.85

Table U-34
Lake Livingston to Dallas Water Utilities

Probable Owner:	Dallas	200,000	Acre-Feet per Year
Peak Delivery:		223	MGD (1.25 Peaking Factor)

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline (Rural)	2 - 78 in.	919,000	LF	$364 ea.	$669,032,000
Pipeline (Urban)	2 - 78 in.	33,000	LF	$510 ea.	$33,660,000
ROW Easements (Rural)		1,688	Acres	$3,000	$5,064,000
ROW Easements (Urban)		61	Acres	$30,000	$1,830,000
Engineering and Contingencies (30%)					$210,808,000
Subtotal of Pipeline					**$920,394,000**
Pump Station(s)	**Size (per PS)**	**Quantity**	**Unit**		**Cost**
Lake Pump Station	17,000 HP	1	LS	$16,800,000	$16,800,000
Booster Pump Stations	17,000 HP	3	Ea	$12,500,000	$37,500,000
Ground Storage Tanks	10 MG	9	Ea	$1,400,000	$12,600,000
Engineering and Contingencies (35%)					$23,415,000
Subtotal of Pump Stations					**$90,315,000**
CONSTRUCTION TOTAL					**$1,010,709,000**
Permitting and mitigation		1	LS		$9,235,000
Interest During Construction	**(36 months)**				**$122,973,000**
TOTAL COST					**$1,142,917,000**

ANNUAL COSTS	
Debt Service (6% for 30 years)	$83,032,000
Raw Water ($95 per acre-foot)	$19,000,000
Electricity ($0.06 kWh)	$17,227,000
Operation & Maintenance	$10,439,000
Total Annual Costs	**$129,698,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot	$648
Per 1,000 Gallons	$1.99
UNIT COSTS (After Amortization))	
Per Acre-Foot	$233
Per 1,000 Gallons	$0.72

Table U-35
Lake Livingston to North Texas Municipal Water District

Probable Owner:	NTMWD	200,000	Acre-Feet per Year
Peak Delivery:		223	MGD (1.25 Peaking Factor)

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline (Rural)	2 - 78 in.	938,000	LF	$364 ea.	$682,864,000
Pipeline (Urban)	2 - 78 in.	120,000	LF	$510 ea.	$122,400,000
ROW Easements (Rural)		1,723	Acres	$3,000	$5,169,000
ROW Easements (Urban)		220	Acres	$30,000	$6,600,000
Engineering and Contingencies (30%)					$241,579,000
Subtotal of Pipeline					**$1,058,612,000**
Pump Station(s)	**Size (per PS)**	**Quantity**	**Unit**		**Cost**
Lake Pump Station	19,000 HP	1	LS	$16,800,000	$16,800,000
Booster Pump Stations	19,000 HP	3	Ea	$12,500,000	$37,500,000
Ground Storage Tanks	10 MG	9	Ea	$1,400,000	$12,600,000
Engineering and Contingencies (35%)					$23,415,000
Subtotal of Pump Stations					**$90,315,000**
Permitting and mitigation		1	LS		$10,466,000
CONSTRUCTION TOTAL					**$1,148,927,000**
Interest During Construction	**(36 months)**				**$139,790,000**
TOTAL COST					**$1,299,183,000**

ANNUAL COSTS	
Debt Service (6% for 30 years)	$94,384,000
Raw Water ($95 per acre-foot)	$19,000,000
Electricity ($0.06 kWh)	$19,297,000
Operation & Maintenance	$11,670,000
Total Annual Costs	**$144,351,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot	$722
Per 1,000 Gallons	$2.21
UNIT COSTS (After Amortization))	
Per Acre-Foot	$250
Per 1,000 Gallons	$0.77

Table U-36
Lake Livingston to Tarrant Regional Water District

Probable Owner:	TRWD	200,000	Acre-Feet per Year
Peak Delivery:		223	MGD (1.25 Peaking Factor)

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline (Rural)	2 - 78 in.	973,000	LF	$364 ea.	$708,344,000
Pipeline (Urban)	2 - 78 in.	77,000	LF	$510 ea.	$78,540,000
ROW Easements (Rural)		893	Acres	$3,000	$2,679,000
ROW Easements (Urban)		71	Acres	$30,000	$2,130,000
Engineering and Contingencies (30%)					$236,065,000
Subtotal of Pipeline					**$1,027,758,000**
Pump Station(s)	**Size (per PS)**	**Quantity**	**Unit**		**Cost**
Lake Pump Station	22,000 HP	1	LS	$19,640,000	$19,640,000
Booster Pump Stations	22,000 HP	3	Ea	$14,600,000	$43,800,000
Ground Storage Tanks	10 MG	9	Ea	$1,400,000	$12,600,000
Engineering and Contingencies (35%)					$26,614,000
Subtotal of Pump Stations					**$102,654,000**
Permitting and mitigation		1	LS		$10,355,000
CONSTRUCTION TOTAL					**$1,140,767,000**
Interest During Construction	**(36 months)**				**$138,797,000**
TOTAL COST					**$1,279,564,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$92,959,000
Raw Water ($95 per acre-foot)					$19,000,000
Electricity ($0.06 kWh)					$23,146,000
Operation & Maintenance					$11,724,000
Total Annual Costs					**$146,829,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot					$734
Per 1,000 Gallons					$2.25
UNIT COSTS (After Amortization))					
Per Acre-Foot					$269
Per 1,000 Gallons					$0.83

Table U-37
Sam Rayburn/Steinhagen to Dallas Water Utilities

Probable Owner:	Dallas	200,000	Acre-Feet per Year
Peak Delivery:		223	MGD (1.25 Peaking Factor)

Note: Delivery taken from B.A. Steinhagen to allow hydropower generation from Sam Rayburn (per LNVA).

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline (Rural)	2 - 78 in.	1,054,000	LF	$364 ea.	$767,312,000
Pipeline (Urban)	2 - 78 in.	33,000	LF	$510 ea.	$33,660,000
ROW Easements (Rural)		1,936	Acres	$3,000	$5,808,000
ROW Easements (Urban)		61	Acres	$30,000	$1,830,000
Engineering and Contingencies (30%)					$240,292,000
Subtotal of Pipeline					**$1,048,902,000**
Pump Station(s)	**Size (per PS)**	**Quantity**	**Unit**		**Cost**
Lake Pump Station	15,100 HP	1	LS	$15,566,000	$15,566,000
Booster Pump Stations	15,100 HP	4	Ea	$11,550,000	$46,200,000
Ground Storage Tanks	10 MG	12	Ea	$1,400,000	$16,800,000
Engineering and Contingencies (35%)					$27,498,000
Subtotal of Pump Stations					**$106,064,000**
CONSTRUCTION TOTAL					**$1,154,966,000**
Permitting and mitigation		**1**	**LS**		**$10,554,000**
Interest During Construction	**(36 months)**				**$140,525,000**
TOTAL COST					**$1,306,045,000**

ANNUAL COSTS

Debt Service (6% for 30 years)	$94,883,000
Raw Water (10 cents per 1,000 gallons)	$6,517,000
Electricity ($0.06 kWh)	$19,725,000
Operation & Maintenance	$11,969,000
Total Annual Costs	**$133,094,000**

UNIT COSTS (Until Amortized)

Per Acre-Foot	$665
Per 1,000 Gallons	$2.04

UNIT COSTS (After Amortization))

Per Acre-Foot	$191
Per 1,000 Gallons	$0.59

Table U-38
Sam Rayburn/Steinhagen to North Texas Municipal Water District

Probable Owner:	NTMWD	200,000	Acre-Feet per Year
Peak Delivery:		223	MGD (1.25 Peaking Factor)

Note: Delivery taken from B.A. Steinhagen to allow hydropower generation from Sam Rayburn (per LNVA).

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline (Rural)	2 - 78 in.	1,026,000	LF	$364 ea.	$746,928,000
Pipeline (Urban)	2 - 78 in.	120,000	LF	$510 ea.	$122,400,000
ROW Easements (Rural)		1,884	Acres	$3,000	$5,652,000
ROW Easements (Urban)		220	Acres	$30,000	$6,600,000
Engineering and Contingencies (30%)					$260,798,000
Subtotal of Pipeline					**$1,142,378,000**
Pump Station(s)	**Size (per PS)**	**Quantity**	**Unit**		**Cost**
Lake Pump Station	16,200 HP	1	LS	$16,292,000	$16,292,000
Booster Pump Stations	16,200 HP	4	Ea	$12,100,000	$48,400,000
Ground Storage Tanks	10 MG	12	Ea	$1,400,000	$16,800,000
Engineering and Contingencies (35%)					$28,522,000
Subtotal of Pump Stations					**$110,014,000**
CONSTRUCTION TOTAL					**$1,252,392,000**
Permitting and mitigation		**1**	**LS**		**$11,410,000**
Interest During Construction	**(36 months)**				**$152,379,000**
TOTAL COST					**$1,416,181,000**

ANNUAL COSTS	
Debt Service (6% for 30 years)	$102,884,000
Raw Water (10 cents per 1,000 gallons)	$6,517,000
Electricity ($0.06 kWh)	$25,387,000
Operation & Maintenance	$12,877,000
Total Annual Costs	**$147,665,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot	$738
Per 1,000 Gallons	$2.27
UNIT COSTS (After Amortization))	
Per Acre-Foot	$224
Per 1,000 Gallons	$0.69

Table U-39
Sam Rayburn/Steinhagen to Tarrant Regional Water District

Probable Owner:	TRWD	200,000	Acre-Feet per Year
Peak Delivery:		223	MGD (1.25 Peaking Factor)

Note: Delivery taken from B.A. Steinhagen to allow hydropower generation from Sam Rayburn (per LNVA).

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline (Rural)	2 - 78 in.	1,152,400	LF	$364 ea.	$838,947,000
Pipeline (Urban)	2 - 78 in.	93,000	LF	$510 ea.	$94,860,000
ROW Easements (Rural)		2,116	Acres	$3,000	$6,348,000
ROW Easements (Urban)		171	Acres	$30,000	$5,130,000
Engineering and Contingencies (30%)					$280,142,000
Subtotal of Pipeline					**$1,225,427,000**
Pump Station(s)	**Size (per PS)**	**Quantity**	**Unit**		**Cost**
Lake Pump Station	19,500 HP	1	LS	$18,470,000	$18,470,000
Booster Pump Stations	19,500 HP	4	Ea	$13,750,000	$55,000,000
Ground Storage Tanks	10 MG	12	Ea	$1,400,000	$16,800,000
Engineering and Contingencies (35%)					$31,595,000
Subtotal of Pump Stations					**$121,865,000**
Permitting and mitigation		1	LS		$12,289,000
CONSTRUCTION TOTAL					**$1,359,581,000**
Interest During Construction	**(36 months)**				**$165,420,000**
TOTAL COST					**$1,525,001,000**

ANNUAL COSTS	
Debt Service (6% for 30 years)	$110,790,000
Raw Water (10 cents per 1,000 gallons)	$6,517,000
Electricity ($0.06 kWh)	$26,328,000
Operation & Maintenance	$13,914,000
Total Annual Costs	**$157,549,000**

UNIT COSTS (Until Amortized)	
Per Acre-Foot	$788
Per 1,000 Gallons	$2.42

UNIT COSTS (After Amortization)	
Per Acre-Foot	$234
Per 1,000 Gallons	$0.72

Table U-40
Roberts County Water Supply Project
Preliminary Cost Estimate - 30-Year Amortization @ 6% ($0.06/KW-hr Power Cost)
200,000 AFY Water Supply to DWU - Scenario 2B
Ogallala Groundwater to Lake Ray Roberts
Panhandle Water Project
February 3, 2005

Item	Size		Quantity	Unit	Unit Price	Cost
Groundwater Costs						
Groundwater Rights			400,000	Acre	$500	$200,000,000
Subtotal						**$200,000,000**
Capital Costs						
Roberts & Hemphill Counties Well Field						
Test Holes [1]			500	EA	$3,600	$1,800,000
Groundwater Wells [2]	240	HP (Avg)	136	EA	$300,000	$40,800,000
69 KV Transmission System [15]	22.5	miles	1	LS	$3,375,000	$3,375,000
Power to Wells [15]			200	MI	$40,000	$8,015,000
Wellfield Collection Lines to Wellfield Pump Sta. or Transmission System[3]	20	inch (Avg)	539,000	FT	$51	$27,489,000
Transmission from Wellfield Pump or Booster Sta. to Main Line Pump Sta. [3]	42	inch (Avg)	519,000	FT	$142	$73,698,000
Pump Station 1 (Peak - 500 HP) [4]	400	HP	1	EA	$1,700,000	$1,700,000
Pump Station 2 (Peak - 2,700 HP) [4]	2,200	HP	1	EA	$4,000,000	$4,000,000
Booster Pump Station 1 (Peak - 4,900 HP) [4]	4,000	HP	1	EA	$5,750,000	$5,750,000
Booster Pump Station 2 (Peak 3,600 HP) [4]	2,900	HP	1	EA	$4,750,000	$4,750,000
Booster Pump Station 3 (Peak - 5,400 HP) [4]	4,400	HP	1	EA	$6,150,000	$6,150,000
Pump Station 3 (Peak - 2,200 HP) [4]	1,800	HP	1	EA	$3,650,000	$3,650,000
Pump Station 4 (Peak 1,200 HP) [4]	1,000	HP	1	EA	$2,650,000	$2,650,000
Booster Pump Station 4 (Peak - 9,800 HP) [4]	7,900	HP	1	EA	$8,900,000	$8,900,000
Pump Station 1 Storage Tank	1.0	MG	1	EA	$220,000	$220,000
Pump Station 2 Storage Tank	4.0	MG	1	EA	$535,000	$535,000
Booster Pump Station 1 Storage Tank [7]	8.0	MG	1	EA	$1,100,000	$1,100,000
Booster Pump Station 2 Storage Tank [7]	8.0	MG	1	EA	$1,100,000	$1,100,000
Booster Pump Station 3 Storage Tank	5.0	MG	2	EA	$630,000	$1,260,000
Pump Station 3 Storage Tank	2.5	MG	1	EA	$385,000	$385,000
Pump Station 4 Storage Tank	2.0	MG	1	EA	$335,000	$335,000
Booster Pump Station 4 Storage Tank	6.0	MG	2	EA	$750,000	$1,500,000
Unpaved Access Roads to Wells (3,000 ft/well)	15	feet	408,000	FT	$8.50	$3,468,000
Environmental Studies, Permitting & Mitigation			1	LS	$1,784,000	$1,784,000
Subtotal						**$204,414,000**

Table U-40, Continued						
Panhandle Water Transmission System to Lake Ray Roberts						
Pipeline - Roberts County to Lake Ray Roberts - Rural, Soil [5]	90	inch	1,372,000	FT	$459	$629,748,000
Pipeline - Roberts County to Lake Ray Roberts - Rural, Soil/Rock [5]	90	inch	64,000	FT	$574	$36,720,000
Pump Station No. 1 - Roberts County to Lake	1,500	HP	1	EA	$4,650,000	$4,650,000
Pump Station No. 2 - Roberts County to Lake	10,000	HP	1	EA	$15,500,000	$15,500,000
Storage Tanks (10.8% of Peak Daily Flow) [7] - Three - 8 MG Tanks Per Station	24	MG (Per Sta.)	6	EA	$1,100,000	$6,600,000
Pressure Reducing Station [8]			2	EA	$250,000	$500,000
Discharge Structure			1	EA	$100,000	$100,000
Easement - Rural [9]	80'/40'		1,319	AC	$3,000	$3,956,000
Environmental Studies, Permitting & Mitigation			1	LS	$8,325,000.00	$8,325,000
Subtotal						**$706,099,000**
Engineering and Contingencies (35% for pump stations, 30% for other items)						$258,027,000
Total Capital Cost						**$1,168,540,000**
Interest During Construction [10]	3	YR				$142,176,000
Total Construction Cost						**$1,310,716,000**
Development Costs						
Preliminary Expenses			1	LS	$25,000,000	$25,000,000
Development Fee	15	%	1	LS	$230,357,000	$230,357,000
Subtotal						**$255,357,000**
Total Project Cost						**$1,766,073,000**
Pre-Amortization Annual Cost						
Debt Service (6 percent for 30 years) [11]						$128,303,000
Well Field and Transmission System Operation and Maintenance [12]						$11,774,000
Well Field and Transmission System Energy Costs [13]						$24,383,000
Electric Substation Lease [14]						$828,000
Supplemental Wells & Infrastructure (0.5% of Initial Wellfield Capital Cos			1	EA	$1,030,000	$1,030,000
Total Annual Cost						**$166,318,000**
Available Project Yield (ac-ft/yr)						**200,000**
Water Cost ($ per ac-ft)						**$832**
Water Cost ($ per 1,000 gallons)						**$2.55**
Post Amortization Annual Cost						
Well Field and Transmission System Operation and Maintenance [12]						$11,774,000
Well Field and Transmission System Energy Costs [13]						$24,383,000
Electric Substation Lease [14]						$828,000
Supplemental Wells & Infrastructure (0.5% of Initial Wellfield Capital Cost)						$1,030,000
Total Annual Cost						**$38,015,000**
Water Cost ($ per ac-ft)						**$190**
Water Cost ($ per 1,000 gallons)						**$0.58**

Table U-41
Roberts County Water Supply Project
Preliminary Cost Estimate - 30-Year Amortization @ 6% ($0.06/KW-hr Power Cost)
200,000 AFY Water Supply to NTMWD - Scenario 5B
Ogallala Groundwater to Lake Lavon Near Princeton, Texas
Panhandle Water Project
February 3, 2005

Item	Size		Quantity	Unit	Unit Price	Cost
Groundwater Costs						
Groundwater Rights			400,000	Acre	$500	$200,000,000
Subtotal						**$200,000,000**
Capital Costs						
Roberts and Hemphill Counties Well Field						
Test Holes [1]			500	EA	$3,600	$1,800,000
Groundwater Wells [2]	230	HP (Avg)	136	EA	$300,000	$40,800,000
69 KV Transmission System [15]	22.5	miles	1	LS	$3,375,000	$3,375,000
Power to Wells (collection and transmission line lengths) [15]			200	MI	$40,000	$8,015,000
Wellfield Collection Lines to Wellfield Pump Sta. or Transmission System[3]	20	inch (Avg)	539,000	FT	$51	$27,489,000
Transmission from Wellfield Pump or Booster Sta. to Main Line Pump Sta. [3]	42	inch (Avg)	519,000	FT	$142	$73,698,000
Pump Station 1 (Peak - 500 HP) [4]	400	HP	1	EA	$1,700,000	$1,700,000
Pump Station 2 (Peak - 2,700 HP) [4]	2,200	HP	1	EA	$4,000,000	$4,000,000
Booster Pump Station 1 (Peak - 4,900 HP) [4]	4,000	HP	1	EA	$5,750,000	$5,750,000
Booster Pump Station 2 (Peak 3,600 HP) [4]	2,900	HP	1	EA	$4,750,000	$4,750,000
Booster Pump Station 3 (Peak - 5,400 HP) [4]	4,400	HP	1	EA	$6,150,000	$6,150,000
Pump Station 3 (Peak - 2,200 HP) [4]	1,800	HP	1	EA	$3,650,000	$3,650,000
Pump Station 4 (Peak 1,200 HP) [4]	1,000	HP	1	EA	$2,650,000	$2,650,000
Booster Pump Station 4 (Peak - 9,800 HP) [4]	7,900	HP	1	EA	$8,900,000	$8,900,000
Pump Station 1 Storage Tank	1.0	MG	1	EA	$220,000	$220,000
Pump Station 2 Storage Tank	4.0	MG	1	EA	$535,000	$535,000
Booster Pump Station 1 Storage Tank [7]	8.0	MG	1	EA	$1,100,000	$1,100,000
Booster Pump Station 2 Storage Tank [7]	8.0	MG	1	EA	$1,100,000	$1,100,000
Booster Pump Station 3 Storage Tank	5.0	MG	2	EA	$630,000	$1,260,000
Pump Station 3 Storage Tank	2.5	MG	1	EA	$385,000	$385,000
Pump Station 4 Storage Tank	2.0	MG	1	EA	$335,000	$335,000
Booster Pump Station 4 Storage Tank	6.0	MG	2	EA	$750,000	$1,500,000
Unpaved Access Roads to Wells (3,000 ft/well)	15	feet	408,000	FT	$8.50	$3,468,000
Environmental Studies, Permitting & Mitigation			1	LS	$1,784,000	$1,784,000
Subtotal						**$204,414,000**

Table U-41, Continued						
Panhandle Water Transmission System to Lake Lavon						
Pipeline - Roberts County to Lake Lavon - Rural, Soil [5]	90	inch	1,627,000	FT	$459	$746,793,000
Pipeline - Roberts County to Lake Lavon - Rural, Rock [5]	90	inch	53,000	FT	$574	$30,409,000
Pipeline - Roberts County to Lake Lavon - Urban, Soil [5]	90	inch	25,000	FT	$643	$16,075,000
Pump Station No. 1 - Roberts County to Lake	1,500	HP	1	EA	$4,650,000	$4,650,000
Pump Station No. 2 - Roberts County to Lake	11,500	HP	1	EA	$15,800,000	$15,800,000
Pump Station No. 3 - Roberts County to Lake	0	HP	1	EA	$3,500,000	$3,500,000
Storage Tanks (10.8% of Peak Daily Flow) [7] - Three - 8 MG Tanks Per Station	24	MG (Per Sta.)	9	EA	$1,100,000	$9,900,000
Pressure Reducing Station [8]			2	EA	$250,000	$500,000
Discharge Structure			1	EA	$100,000	$100,000
Easement - Rural [9]	80'/40'		1,543	AC	$3,000	$4,628,000
Easement - Urban [9]	80'/40'		23	AC	$30,000	$689,000
Environmental Studies, Permitting & Mitigation			1	LS	9,932,000	$9,932,000
Subtotal						**$842,976,000**
Engineering and Contingencies (35% for pump stations, 30% for other items)						$298,390,000
Total Capital Cost						**$1,345,780,000**
Interest During Construction [10]	3	YR				$163,741,000
Total Construction Cost						**$1,509,521,000**
Development Costs						
Preliminary Expenses			1	LS	$25,000,000	$25,000,000
Development Fee	15	%	1	LS	$260,178,000	$260,178,000
Subtotal						**$285,178,000**
Total Project Cost						**$1,994,699,000**
Pre-Amortization Annual Cost						
Debt Service (6 percent for 30 years) [11]						$144,913,000
Well Field and Transmission System Operation and Maintenance[12]						$13,409,000
Well Field and Transmission System Energy Costs[13]						$24,545,000
Electric Substation Lease [14]						$828,000
Supplemental Wells & Infrastructure (0.5% of Initial Wellfield Capital Cos			1	EA	$1,030,000	$1,030,000
Total Annual Cost						**$184,725,000**
Available Project Yield (ac-ft/yr)						**200,000**
Water Cost ($ per ac-ft)						**$924**
Water Cost ($ per 1,000 gallons)						**$2.83**
Post Amortization Annual Cost						
Well Field and Transmission System Operation and Maintenance[12]						$13,409,000
Well Field and Transmission System Energy Costs[13]						$24,545,000
Electric Substation Lease [14]						$828,000
Supplemental Wells & Infrastructure (0.5% of Initial Wellfield Capital Cost)						$1,030,000
Total Annual Cost						**$39,812,000**
Water Cost ($ per ac-ft)						**$199**
Water Cost ($ per 1,000 gallons)						**$0.61**

Table U-42
Roberts County Water Supply Project
Preliminary Cost Estimate - 30-Year Amortization @ 6% ($0.06/KW-hr Power Cost)
200,000 AFY Water Supply to TRWD - Scenario 6B
Ogallala Groundwater to Eagle Mountain Lake Via Lake Bridgeport
February 3, 2005

Item	Size		Quantity	Unit	Unit Price	Cost
Groundwater Costs						
Groundwater Rights			400,000	Acre	$500	$200,000,000
Subtotal						**$200,000,000**
Capital Costs						
Roberts & Hemphill Counties Well Field						
Test Holes [1]			500	EA	$3,600	$1,800,000
Groundwater Wells [2]	230	HP (Avg)	136	EA	$300,000	$40,800,000
69 KV Transmission System [15]	22.5	miles	1	LS	$3,375,000	$3,375,000
Power to Wells [15]			200	MI	$40,000	$8,015,000
Wellfield Collection Lines to Wellfield Pump Sta. or Transmission System[3]	20	inch (Avg)	539,000	FT	$51	$27,489,000
Transmission from Wellfield Pump or Booster Sta. to Main Line Pump Sta. [3]	42	inch (Avg)	519,000	FT	$142	$73,698,000
Pump Station 1 (Peak - 500 HP) [4]	400	HP	1	EA	$1,700,000	$1,700,000
Pump Station 2 (Peak - 2,700 HP) [4]	2,200	HP	1	EA	$4,000,000	$4,000,000
Booster Pump Station 1 (Peak - 4,900 HP) [4]	4,000	HP	1	EA	$5,750,000	$5,750,000
Booster Pump Station 2 (Peak 3,600 HP) [4]	2,900	HP	1	EA	$4,750,000	$4,750,000
Booster Pump Station 3 (Peak - 5,400 HP) [4]	4,400	HP	1	EA	$6,150,000	$6,150,000
Pump Station 3 (Peak - 2,200 HP) [4]	1,800	HP	1	EA	$3,650,000	$3,650,000
Pump Station 4 (Peak 1,200 HP) [4]	1,000	HP	1	EA	$2,650,000	$2,650,000
Booster Pump Station 4 (Peak - 9,800 HP) [4]	7,900	HP	1	EA	$8,900,000	$8,900,000
Pump Station 1 Storage Tank	1.0	MG	1	EA	$220,000	$220,000
Pump Station 2 Storage Tank	4.0	MG	1	EA	$535,000	$535,000
Booster Pump Station 1 Storage Tank [7]	8.0	MG	1	EA	$1,100,000	$1,100,000
Booster Pump Station 2 Storage Tank [7]	8.0	MG	1	EA	$1,100,000	$1,100,000
Booster Pump Station 3 Storage Tank	5.0	MG	2	EA	$630,000	$1,260,000
Pump Station 3 Storage Tank	2.5	MG	1	EA	$385,000	$385,000
Pump Station 4 Storage Tank	2.0	MG	1	EA	$335,000	$335,000
Booster Pump Station 4 Storage Tank	6.0	MG	2	EA	$750,000	$1,500,000
Unpaved Access Roads to Wells (3,000 ft/well)	15	feet	408,000	FT	$8.50	$3,468,000
Environmental Studies, Permitting & Mitigation			1	LS	$1,784,000	$1,784,000
Subtotal						**$204,414,000**
Panhandle Water Transmission System to Lake Bridgeport						
Pipeline - Roberts County to Lake Bridgeport - Rural, Soil [5]	90	inch	1,235,000	FT	$459	$566,865,000
Pipeline - Roberts County to Lake Bridgeport - Rural, Soil/Rock [5]	90	inch	61,000	FT	$574	$34,999,000
Pump Station No. 1 - Roberts County to Lake Bridgeport (Peak - 3,000 HP) [6]	700	HP	1	EA	$4,200,000	$4,200,000
Pump Station No. 2 - Roberts County to Lake	7,000	HP	1	EA	$12,750,000	$12,750,000
Storage Tanks (10.8% of Peak Daily Flow) [7] -	24	MG (Per Sta.)	6	EA	$1,100,000	$6,600,000
Pressure Reducing Station [8]			2	EA	$250,000	$500,000
Discharge Structure			1	EA	$100,000	$100,000
Easement - Rural [9]	80'/40'		1,190	AC	$3,000	$3,570,000
Environmental Studies, Permitting & Mitigation			1	LS	$7,511,000	$7,511,000
Subtotal						**$637,095,000**

Table U-42, Continued						
Engineering and Contingencies (35% for pump stations, 30% for other items)						$237,526,000
Total Capital Cost						**$1,079,035,000**
Interest During Construction [10]	3	YR				$131,286,000
Total Construction Cost						**$1,210,321,000**
Development Costs						
Preliminary Expenses			1	LS	$25,000,000	$25,000,000
Development Fee	15	%	1	LS	$215,298,000	$215,298,000
Subtotal						**$240,298,000**
Total Project Cost						**$1,650,619,000**
Pre-Amortization Annual Cost						
Debt Service (6 percent for 30 years) [11]						$119,916,000
Well Field and Transmission System Operation and Maintenance [12]						$10,903,000
Well Field and Transmission System Energy Costs [13]						$22,468,000
Electric Substation Lease [14]						$828,000
Supplemental Wells & Infrastructure (0.5% of Initial Wellfield Capital Cost)			1	EA	$1,030,000	$1,030,000
Total Annual Cost						**$155,145,000**
Available Project Yield (ac-ft/yr)						**198,000**
Annual Cost of Water ($ per ac-ft)						**$784**
Annual Cost of Water ($ per 1,000 gallons)						**$2.40**
Post Amortization Annual Cost						
Well Field and Transmission System Operation and Maintenance [12]						$10,903,000
Well Field and Transmission System Energy Costs [13]						$22,468,000
Electric Substation Lease [14]						$828,000
Supplemental Wells & Infrastructure (0.5% of Initial Wellfield Capital Cost)						$1,030,000
Total Annual Cost						**$35,229,000**
Annual Cost of Water ($ per ac-ft)						**$178**
Annual Cost of Water ($ per 1,000 gallons)						**$0.55**

Table U-43
TRWD East Texas Third Pipeline and Reuse

Owner:	TRWD		
Quantity:	188,765	AF/Y	(115,500 ac-ft/yr reuse + 88,000 ac-ft/yr increased safe yield.)

Transmission System from Richland Chambers Reservoir to Ennis

Item	Size		Quantity	Unit	Unit Price	Cost
Pipeline - Rural (not parallelled - other lines)	84	inch	157,800	LF	$409	$64,540,000
Pump Station at Richland-Chambers	12,200	HP	1	LS	$13,650,000	$13,650,000
Engineering and Contingencies (30% for pipelines, 35% for other items)						$24,140,000
Subtotal						**$102,330,000**

Transmission System from Cedar Creek Lake to Ennis

Item	Size		Quantity	Unit	Unit Price	Cost
Pipeline - Rural (not parallelled - other lines)	90	inch	134,500	LF	$459	$61,736,000
Pump Station at Cedar Creek	13,300	HP	1	LS	$14,378,000	$14,378,000
Engineering and Contingencies (30% for pipelines, 35% for other items)						$23,553,000
Subtotal						**$99,667,000**

Transmission System from Ennis to Balancing Reservoir

Item	Size		Quantity	Unit	Unit Price	Cost
Pipeline - Rural (not parallelled - other lines)	108	inch	158,680	LF	$633	$100,444,000
Pipeline - Urban (not parallelled - other lines)	108	inch	65,320	LF	$886	$57,874,000
Ennis Booster Pump Station	24,700	HP	1	LS	$15,410,000	$15,410,000
Waxahachie Booster Pump Station	19,500	HP	1	LS	$13,750,000	$13,750,000
Ground Storage Tanks	9	MG	8	Ea.	$1,250,000	$10,000,000
Engineering and Contingencies (30% for pipelines, 35% for other items)						$61,201,000
Subtotal						**$258,679,000**

Transmission System from Balancing Reservoir to Rolling Hills

Item	Size		Quantity	Unit	Unit Price	Cost
Pipeline - Urban (not parallelled - other lines)	126	inch	31,000	LF	$1,241	$38,471,000
Engineering and Contingencies (30% for pipelines, 35% for other items)						$11,541,000
Subtotal						**$50,012,000**

TRWD Richland-Chambers Wetlands

Item	Size	Quantity	Unit	Unit Price	Cost
Wetlands Construction		1	LS	$12,000,000	$12,000,000
Engineering and Contingencies (35%)					$4,200,000
Subtotal					**$16,200,000**

TRWD Cedar Creek Wetlands

Item	Size	Quantity	Unit	Unit Price	Cost
Wetlands Construction		1	LS	$20,000,000	$20,000,000
Engineering and Contingencies (35%)					$7,000,000
Subtotal					**$27,000,000**

Table U-43, Continued

TOTAL CONSTRUCTION COST		**$553,888,000**
Interest During Construction	**(36 months)**	**$67,392,000**
Permitting and Mitigation		**$5,067,000**
TOTAL CAPITAL COST		**$626,347,000**
Annual Costs		
Debt Service (6 percent for 30 years)		$45,503,000
Electricity - Pumping from River to Wetlands		$760,000
Electricity - Pumping from Reservoir to Rolling Hills WTP		$11,254,000
Operation and Maintenance		$6,853,000
Total Annual Cost		**$64,370,000**
Available Project Yield (ac-ft/yr)		**188,765**
UNIT COSTS (Until Amortized)		
Water Cost ($ per ac-ft)		**$341**
Water Cost ($ per 1,000 gallons)		**$1.05**
UNIT COSTS (After Amortization)		
Water Cost ($ per ac-ft)		**$100**
Water Cost ($ per 1,000 gallons)		**$0.31**

Table U-44
DWU Oklahoma Water
From Hugo to Lake Lewisville

Probable Owner: Dallas
Quantity: 50,000 AF/Y

CONSTRUCTION COSTS					
TRANSMISSION FACILITIES					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline	60 in.	600,000	LF	$246	$147,600,000
30-ft Right of Way Easements (ROW)		413	ACRE	$3,000	$1,240,000
Red River Tunnel		1,000	LF	$755	$755,000
Engineering and Contingencies (30%)					$44,507,000
Subtotal of Pipeline					**$194,102,000**
Pump Station(s)					
Lake Hugo Pump Station	5,700 HP	1	LS	$8,570,000	$8,570,000
Booster 1	5,700 HP	1	LS	$6,360,000	$6,360,000
Engineering and Contingencies (35%)					$5,226,000
Subtotal of Pump Station(s)					**$20,156,000**
CONSTRUCTION TOTAL					**$214,258,000**
Permitting and Mitigation					**$1,959,000**
Interest During Construction			**(24 months)**		**$17,498,000**
TOTAL COST					**$233,715,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$16,979,000
Electricity ($0.06 kWh)					$2,989,000
Operation & Maintenance					$2,228,000
Raw Water Purchase					$2,444,000
Total Annual Costs					**$24,640,000**
UNIT COSTS (During Amortization)					
Per Acre-Foot					$493
Per 1,000 Gallons					$1.51
UNIT COSTS (After Amortization)					
Per Acre-Foot					$153
Per 1,000 Gallons					$0.47

Table U-45
NTMWD Oklahoma Water
From Hugo to Lake Chapman

Probable Owner: NTMWD
Quantity: 50,000 AF/Y

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	60 in.	274,560	LF	$246	$67,542,000
30-ft Right of Way Easements (ROW)		189	ACRE	$3,000	$567,000
Red River Tunnel		1,000	LF	$755	$755,000
Engineering and Contingencies (30%)					$20,659,000
Subtotal of Pipeline					**$89,523,000**
Pump Station(s)					
Pumps with intake & building	6,800 HP	1	LS	$9,540,000	$9,540,000
Chapman Pump Station Expansion					$539,000
Booster on Chapman-Lavon Line					$6,471,000
Engineering and Contingencies (35%)					$5,792,500
Subtotal of Pump Station(s)					**$22,342,500**
CONSTRUCTION TOTAL					**$111,865,500**
Permitting and Mitigation					**$1,012,000**
Interest During Construction			**(12 months)**		**$4,661,000**
TOTAL COST					**$117,538,500**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$8,539,000
Electricity ($0.06 kWh)					$4,765,000
Operation & Maintenance					$1,317,000
Raw Water Purchase					$2,444,000
Total Annual Costs					**$17,065,000**
UNIT COSTS (Before Amortization)					
Per Acre-Foot					$341
Per 1,000 Gallons					$1.05
UNIT COSTS (After Amortization)					
Per Acre-Foot					$171
Per 1,000 Gallons					$0.52

Note: Cost for buying raw water is assumed to be $0.15 per 1,000 gallons

Table U-46
TRWD Oklahoma Water
From Hugo to Eagle Mountain

Probable Owner: TRWD
Quantity: 50,000 AF/Y

CONSTRUCTION COSTS					
TRANSMISSION FACILITIES					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline	60 in.	800,000	LF	$246	$196,800,000
30-ft Right of Way Easements (ROW)		551	ACRE	$3,000	$1,653,000
Red River Tunnel		1,000	LF	$755	$755,000
Engineering and Contingencies (30%)					$59,267,000
Subtotal of Pipeline					**$258,475,000**
Pump Station(s)					
Lake Hugo Pump Station	5000 HP	1	LS	$7,800,000	$7,800,000
Booster 1	5000 HP	1	LS	$5,800,000	$5,800,000
Booster 2	5000 HP	1	LS	$5,800,000	$5,800,000
Engineering and Contingencies (35%)					$6,790,000
Subtotal of Pump Station(s)					**$26,190,000**
CONSTRUCTION TOTAL					**$284,665,000**
Permitting and Mitigation					**$2,603,000**
Interest During Construction			**(24 months)**		**$23,248,000**
TOTAL COST					**$310,516,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$22,559,000
Electricity ($0.06 kWh)					$3,773,000
Operation & Maintenance					$2,953,000
Raw Water Purchase					$2,444,000
Total Annual Costs					**$31,729,000**
UNIT COSTS (During Amortization)					
Per Acre-Foot					$635
Per 1,000 Gallons					$1.95
UNIT COSTS (After Amortization)					
Per Acre-Foot					$183
Per 1,000 Gallons					$0.56

Table U-47
UTRWD and Irving Oklahoma Water
From Hugo to Lake Chapman to Lavon

Probable Owner: UTRWD and Irving
Quantity: 50,000 AF/Y

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	60 in.	274,560	LF	$246	$67,542,000
30-ft Right of Way Easements (ROW)		189	ACRE	$3,000	$567,000
Red River Tunnel		1,000	LF	$755	$755,000
Engineering and Contingencies (30%)					$20,489,000
Subtotal of Pipeline					**$89,353,000**
Pump Station(s)					
Pumps with intake & building	6,100 HP	1	LS	$8,980,000	$8,980,000
Chapman Pump Station Expansion					$539,000
Booster on Chapman-Lavon Line					$6,471,000
Engineering and Contingencies (35%)					$5,596,500
Subtotal of Pump Station(s)					**$21,586,500**
CONSTRUCTION TOTAL					**$110,939,500**
Permitting and Mitigation					**$1,011,000**
Interest During Construction			**(18 months)**		**$6,841,000**
TOTAL COST					**$118,791,500**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$8,630,000
Electricity ($0.06 kWh)					$4,765,000
Operation & Maintenance					$1,300,000
Raw Water Purchase					$2,444,000
Total Annual Costs					**$17,139,000**
UNIT COSTS (During Amortization)					
Per Acre-Foot					$343
Per 1,000 Gallons					$1.05
UNIT COSTS (After Amortization)					
Per Acre-Foot					$170
Per 1,000 Gallons					$0.52

Table U-48
Oklahoma Water for NTMWD, TRWD, and UTRWD

Probable Owners:	NTMWD	50,000 AF/Y
	TRWD	50,000 AF/Y
	UTRWD	15,000 AF/Y

CONSTRUCTION COSTS
TRANSMISSION FACILITIES
Pipelines

	Size	Quantity	Unit	Unit Price	Cost
Hugo to Lavon	84 in.	470,300	LF	$409	$192,353,000
Lavon to Lewisville (Rural)	66 in.	69,000	LF	$282	$19,458,000
Lavon to Lewisville (Urban)	66 in.	103,500	LF	$395	$40,883,000
Lewisville to Eagle Mountain Lake (Rura	60 in.	136,290	LF	$246	$33,527,000
Lewisville to Eagle Mountain Lake (Urba	60 in.	58,410	LF	$344	$20,093,000
Right of Way Easements (Rural)		573	ACRE	$3,000	$1,719,000
Right of Way Easements (Urban)		112	ACRE	$30,000	$3,360,000
Red River Tunnel		1,000	LF	$1,000	$1,000,000
Engineering and Contingencies (30%)					$93,718,000
Subtotal of Pipeline					**$406,111,000**
Pump Station(s)					
Lake Hugo Pump Station	10,300 HP	1	LS	$12,398,000	$12,398,000
Booster (Hugo-Lavon)	10,300 HP	1	LS	$9,150,000	$9,150,000
Storage Tanks (Hugo-Lavon Booster)	8 MG	2	Ea.	$1,100,000	$2,200,000
Booster (Lavon)	3,000 HP	1	LS	$4,200,000	$4,200,000
Storage Tanks (Lavon Booster)	10 MG	1	Ea.	$1,400,000	$1,400,000
Booster (Lewisville)	4,400 HP	1	LS	$5,380,000	$5,380,000
Storage Tanks (Lewisville Booster)	7 MG	1	Ea.	$875,000	$875,000
Engineering and Contingencies (35%)					$12,461,000
Subtotal of Pump Station(s)					**$48,064,000**
CONSTRUCTION TOTAL					**$454,175,000**
Permitting and Mitigation					**$4,115,000**
Interest During Construction			**(12 months)**		**$18,924,000**
TOTAL COST					**$477,214,000**
ANNUAL COSTS (Pre-Amortization)					
Debt Service (6% for 30 years)					
NTMWD					$9,364,000
TRWD					$20,876,000
UTRWD					$4,429,000
Total					**$34,669,000**

Table U-48, Continued

Electricity ($0.06 kWh)	
NTMWD	$2,350,000
TRWD	$4,131,000
UTRWD	$869,000
Total	**$7,350,000**
Operation & Maintenance	
NTMWD	$1,319,000
TRWD	$2,835,000
UTRWD	$602,000
Total	**$4,756,000**
Raw Water Purchase	
NTMWD	$2,444,000
TRWD	$2,444,000
UTRWD	$733,000
Total	**$5,621,000**
Total Annual Costs	
NTMWD	$15,477,000
TRWD	$30,286,000
UTRWD	$6,633,000
Total	**$52,396,000**
UNIT COSTS (Before Amortization)	
Per Acre-Foot	
NTMWD	$310
TRWD	$606
UTRWD	$442
Total	$456
Per 1,000 Gallons	
NTMWD	$0.95
TRWD	$1.86
UTRWD	$1.36
Total	**$1.40**
UNIT COSTS (After Amortization)	
Per Acre-Foot	
NTMWD	$122
TRWD	$188
UTRWD	$147
Total	$154

Table U-48, Continued

Per 1,000 Gallons	
NTMWD	$0.37
TRWD	$0.58
UTRWD	$0.45
Total	**$0.47**

Note: Cost for buying raw water is assumed to be $0.15 per 1,000 gallons

Table U-49
Cost of Lower Bois d'Arc Creek Reservoir Site

Probable Owner: NTMWD
Quantity 123,000 AF/Y

CONSTRUCTION COSTS

Dam & Reservoir	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Mobilization		1	LS	$1,993,295	$1,993,000
Clearing and Grubbing		85	Ac	$5,000	$425,000
Care of Water During Construction		1	LS	$350,000	$350,000
Required Excavation		3,026,902	CY	$2.00	$6,054,000
Borrow Excavation		833,419	CY	$1.50	$1,250,000
Random Compacted Fill		3,225,521	CY	$2.00	$6,451,000
Core Compacted Fill		634,799	CY	$2.00	$1,270,000
Soil Bentonite Slurry Trench		480,300	SF	$12.00	$5,764,000
Soil Cement		105,308	CY	$45.00	$4,739,000
Flex Base Roadway		6,695	CY	$25.00	$167,000
Sand Filter Drain		193,975	CY	$30.00	$5,819,000
Grassing		43	AC	$4,000	$172,000
Outlet Works Tower and Conduit		1	LS	$500,000	$500,000
Spillway Structure and Reinforced Con		18,101	CY	$275	$4,978,000
Roller Compacted Concrete		14,653	CY	$65.00	$952,000
Bridge		3,000	SF	$125	$375,000
Instrumentation		1	LS	$350,000	$350,000
Misc. Internal Drainage		1	LS	$250,000	$250,000
Engineering and Contingencies (35%)					$14,651,000
Subtotal for Dam & Reservoir					**$56,510,000**
Conflicts					**$18,318,000**

TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline to Farmersville WT	96 in.	217,536	LF	$510	$110,943,000
Right of Way Easements (ROW)		200	AC	$3,000	$599,000
Engineering and Contingencies (30%)					$33,463,000
Subtotal of Pipeline					**$145,005,000**

Table U-49, Continued

Intake Pump Station				
Intake Pump Station	1	LS	$23,400,000	$23,400,000
Engineering and Contingencies (35%)				$8,190,000
Subtotal of Pump Station				**$31,590,000**
Two Day Terminal Storage (460 MG)				
Compacted Fill	1,320,020	CY	$5.00	$6,600,000
12" Soil Cement	92,488	CY	$50.00	$4,624,000
HDPE Liner	277,463	SY	$3.15	$874,000
Roads	13,036	SY	$15.00	$196,000
Grassing	20	AC	$3,000.00	$60,000
Control structures	4	EA	$250,000.00	$1,000,000
Fencing	8,045	LF	$15.00	$121,000
Mobilization	1	LS	5.00%	$674,000
Engineering and Contingencies (35%)				$4,952,000
Subtotal Terminal Storage				**$19,101,000**
Permitting and Mitigation for Conveyance System				**$1,612,000**
CONSTRUCTION TOTAL				**$272,136,000**
Land Acquisition - Conservation Pool				**$24,292,000**
Land Acquisition - Flood Pool				**$10,475,000**
Land Acquisition - Terminal Storage				**$134,000**
Permitting and Mitigation of reservoir and terminal storage				**$48,852,000**
Interest During Construction (36 months)				**$43,301,000**
TOTAL COST				**$399,190,000**
ANNUAL COSTS				**Cost**
Debt Service (6% for 30 years)				$29,001,000
Electricity ($0.06 kWh)				$2,721,000
Operation & Maintenance				$3,029,000
Total Annual Costs				**$34,751,000**
UNIT COSTS (Before Amortization)				
Per Acre-Foot				$283
Per 1,000 Gallons				$0.87
UNIT COSTS (After Amortization)				
Per Acre-Foot				$47
Per 1,000 Gallons				$0.14

Table U-50
Lake Fork to Dallas Water Utilities

Owner:	**DWU**
Yield (mgd):	107
Yield (Ac-Ft/Yr):	119,900
Peak (mgd):	214

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipeline	Size	Quantity	Unit	Unit Price	Cost
Pipeline (Rural)	108"	235,100	LF	$633	$148,818,000
Pipeline (Urban)	108"	87,200	LF	$886	$77,259,000
ROW Easements (Rural)	40	216	Acres	$3,000	$648,000
ROW Easements (Urban)	40	80	Acres	$30,000	$2,400,000
Engineering & Contingencies (30%)					$67,823,000
Subtotal of Pipeline					**$296,948,000**
Pump Station(s)	Size (per PS)	Quantity	Unit	Unit Price	Cost
Lake Fork Pump Station	11,200 HP	1	LS	$12,992,000	$12,992,000
Booster Pump Station (Iron Bridge	10,200 HP	1	LS	$9,100,000	$9,100,000
Ground Storage Tanks	8 MG	4	Ea	$1,100,000	$4,400,000
Engineering & Contingencies (35%)					$9,272,000
Subtotal of Pump Stations					**$35,764,000**
CONSTRUCTION TOTAL					**$332,712,000**
Permitting & Mitigation					$3,031,000
Interest During Construction			24	months	$27,173,000
TOTAL COST					**$362,916,000**

ANNUAL COSTS

Debt Service (6% for 30 years)		$26,365,000
Raw Water	$0.00	$0
Electricity ($0.06 per kWh)		$3,056,000
Operation & Maintenance (pipeline & pump stations)		$3,508,000
Total Annual Costs		**$32,929,000**

UNIT COSTS (Until Amortized)

Per Acre-Foot	$274.64
Per 1,000 Gallons	$0.84

UNIT COSTS (After Amortization)

Per Acre-Foot	$54.75
Per 1,000 Gallons	$0.17

Table U-51
Cost of George Parkhouse North Reservoir for Dallas Water Utilities

Probable Owner: DWU   Total yield = 148,700 AF/Y
Quantity: 112,000 AF/Y

CONSTRUCTION COSTS

Dam & Reservoir	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Excavation					
Approach Channel		107,400	CY	$2	$215,000
Discharge Channel		114,600	CY	$2	$229,000
Spillway		472,200	CY	$2	$944,000
Fill					
Random Compacted Fill		4,790,900	CY	$2	$9,582,000
Impervious Fill		1,107,200	CY	$3	$2,768,000
Filter		558,600	CY	$30	$16,758,000
Bridge		390	LF	$1,100	$429,000
Roadway		96,067	SY	$18	$1,729,000
Slurry Trench		1,092,500	SF	$12	$13,110,000
Soil Cement		324,340	CY	$65	$21,082,000
Elevator		1	LS	$100,000	$100,000
Barrier Warning System		936	LF	$90	$84,000
Gates					
Gate & Anchor		4,480	SF	$235	$1,053,000
Stop Gate & Lift		160	LF	$1,600	$256,000
Hoist		8	Ea	$225,000	$1,800,000
Electrical		1	LS	$500,000	$500,000
Power Drop		1	LS	$200,000	$200,000
Spillway Low-Flow System		1	LS	$350,000	$350,000
Stop Gate Monorail System		390	LF	$800	$312,000
Embankment Internal Drainage		39,300	LF	$53	$2,097,000
Guardrail		780	LF	$25	$20,000
Grassing		28	Ac	$4,000	$112,000
Concrete (mass)		97,000	CY	$125	$12,125,000
Concrete (walls)		7,000	CY	$475	$3,325,000
Mobilization (5% of subtotal)					$4,459,000
Clearing/Grubbing, care of water (6% of subtotal)					$5,351,000
Land Clearing		950	Ac	$750	$713,000
Engineering and Contingencies (35%)					$34,896,000
Subtotal for Dam & Reservoir					**$134,599,000**

Table U-51, Continued

Conflicts	**$6,989,000**
Engineering and Contingencies (35%)	$2,446,000
Subtotal of Conflicts	**$9,435,000**
Land Acquisition	$20,790,000
Permitting and Mitigation of Reservoir	$41,580,000
Total Reservoir Construction Cost	**$206,404,000**
Interest during construction (36 months)	$25,113,000
Amount Attributed to DWU (75%)	**$173,638,000**

TRANSMISSION FACILITIES
Pump from George Parkhouse Reservoir to Lake Ray Hubbard.
DWU would use existing infrastructure to convey water from Lake Ray Hubbard to East Side WTP

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline (Rural)	84	279,900	LF	$409	$114,479,000
ROW Easements (Rural)	40'	257	Acre	$3,000	$771,000
Engineering and Contingencies (30%)					$34,344,000
Subtotal of Pipeline					**$149,594,000**
Intake Pump Station					
George Parkhouse Pump Statio	5,800 HP	1	LS	$7,500,000	$7,500,000
Booster Pump Station (Fairline	5,800 HP	1	LS	$6,440,000	$6,440,000
Lake Ray Hubbard Pump Stati	900 HP	1	LS	$3,000,000	$3,000,000
Ground Storage Tanks	8 MG	2	Ea	$1,100,000	$2,200,000
Engineering and Contingencies (35%)					$6,699,000
Subtotal of Pump Station					**$25,839,000**
CONSTRUCTION TOTAL					**$175,433,000**
Permitting and Mitigation - Conveyance System					**$1,603,000**
Interest During Construction (24 months)					**$14,328,000**
TOTAL COST (DWU)					**$365,002,000**

Table U-51, Continued

ANNUAL COSTS	Cost
Debt Service (6% for 30 years)	$26,517,000
Electricity ($0.06 kWh)	$3,637,000
Operation & Maintenance	$6,349,000
Total Annual Costs	**$36,503,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot	$326
Per 1,000 Gallons	$1.00
UNIT COSTS (After Amortization)	
Per Acre-Foot	$89
Per 1,000 Gallons	$0.27

Table U-52
Cost of George Parkhouse North Reservoir for North Texas Municipal Water District

Probable Owner: NTMWD   Total yield = 148,700 AF/Y
Quantity: 118,960 AF/Y

CONSTRUCTION COSTS

Dam & Reservoir	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Excavation					
Approach Channel		107,400	CY	$2	$215,000
Discharge Channel		114,600	CY	$2	$229,000
Spillway		472,200	CY	$2	$944,000
Fill					
Random Compacted Fill		4,790,900	CY	$2	$9,582,000
Impervious Fill		1,107,200	CY	$3	$2,768,000
Filter		558,600	CY	$30	$16,758,000
Bridge		390	LF	$1,100	$429,000
Roadway		96,067	SY	$18	$1,729,000
Slurry Trench		1,092,500	SF	$12	$13,110,000
Soil Cement		324,340	CY	$65	$21,082,000
Elevator		1	LS	$100,000	$100,000
Barrier Warning System		936	LF	$90	$84,000
Gates					
Gate & Anchor		4,480	SF	$235	$1,053,000
Stop Gate & Lift		160	LF	$1,600	$256,000
Hoist		8	Ea	$225,000	$1,800,000
Electrical		1	LS	$500,000	$500,000
Power Drop		1	LS	$200,000	$200,000
Spillway Low-Flow System		1	LS	$350,000	$350,000
Stop Gate Monorail System		390	LF	$800	$312,000
Embankment Internal Drainage		39,300	LF	$53	$2,097,000
Guardrail		780	LF	$25	$20,000
Grassing		28	Ac	$4,000	$112,000
Concrete (mass)		97,000	CY	$125	$12,125,000
Concrete (walls)		7,000	CY	$475	$3,325,000
Mobilization (5% of subtotal)					$4,459,000
Clearing/Grubbing, care of water (6% of subtotal)					$5,351,000
Land Clearing		950	Ac	$750	$713,000
Engineering and Contingencies (35%)					$34,896,000
Subtotal for Dam & Reservoir					**$134,599,000**

Table U-52, continued

Conflicts					**$6,989,000**
Engineering and Contingencies (35%)					$2,446,000
Subtotal of Conflicts					**$9,435,000**
Land Acquisition					$20,790,000
Permitting and Mitigation of Reservoir					$41,580,000
Total Reservoir Construction Cost					**$206,404,000**
Interest during construction (36 months)					$25,113,000
Amount Attributed to NTMWD (80%)					**$185,214,000**
TRANSMISSION FACILITIES					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline to Lake Lavon (by way of Lake Chapman)	84 in.	271,000	LF	$409	$110,839,000
Right of Way Easements (ROW)		249	Ac	$3,000	$747,000
Engineering and Contingencies (30%)					$33,252,000
Subtotal of Pipeline					**$144,838,000**
Intake Pump Station					
Intake Pump Station (at Parkhouse)		1	LS	$9,500,000	$9,500,000
Pump Station Expansion at Chapman		1	LS	$3,503,000	$3,503,000
Engineering and Contingencies (35%)					$4,551,000
Subtotal of Pump Station					**$17,554,000**
CONSTRUCTION TOTAL					**$162,392,000**
Permitting and Mitigation - Conveyance System					**$1,453,000**
Interest During Construction (24 months)					**$13,263,000**
TOTAL COST (NTMWD)					**$362,322,000**

Table U-52, continued

ANNUAL COSTS	Cost
Debt Service (6% for 30 years)	$26,322,000
Electricity ($0.06 kWh)	$5,825,000
Operation & Maintenance	$3,051,000
Total Annual Costs	**$35,198,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot	$296
Per 1,000 Gallons	$0.91
UNIT COSTS (After Amortization)	
Per Acre-Foot	$75
Per 1,000 Gallons	$0.23

Table U-53
Lake Palestine to Dallas Water Utilities

Owner:	DWU
Yield (mgd):	99
Yield (Ac-Ft/Yr):	111,460
Peak (mgd):	204

Pipeline upsized for water from Palestine and Fastrill (204 MGD Palestine, 120 MGD Fastrill)

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipeline	Size	Quantity	Unit	Unit Price	Cost
Pipeline (Rural)	96"	382,600	LF	$510	$195,126,000
Pipeline (Urban)	96"	87,200	LF	$714	$62,261,000
ROW Easements (Rural)	40	351	Acres	$3,000	$1,053,000
ROW Easements (Urban)	40	80	Acres	$30,000	$2,400,000
Engineering & Contingencies (30%)					$77,216,000
Subtotal of Pipeline					**$338,056,000**

Pump Station(s)	Size (per PS)	Quantity	Unit	Unit Price	Cost
Lake Palestine Pump Station	9,800 HP	1	LS	$15,236,000	$15,236,000
Booster Pump Station (Murchison)	9,800 HP	1	LS	$11,400,000	$11,400,000
Ground Storage Tanks	8 MG	4	Ea	$1,100,000	$4,400,000
Engineering & Contingencies (35%)					$10,863,000
Subtotal of Pump Stations					**$41,899,000**

CONSTRUCTION TOTAL			**$379,955,000**
Permitting & Mitigation			$3,461,000
Interest During Construction	24	months	**$31,031,000**
TOTAL COST			**$414,447,000**

Table U-53, Continued

ANNUAL COSTS	
Debt Service (6% for 30 years)	$30,109,000
Electricity ($0.06 per kWh)	$4,672,000
Operation & Maintenance (pipeline & pump stations)	$4,020,000
Operation & Maintenance (reservoir)	$403,000
Total Annual Costs	**$39,204,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot	$352
Per 1,000 Gallons	$1.08
UNIT COSTS (After Amortization)	
Per Acre-Foot	$82
Per 1,000 Gallons	$0.25

Table U-54
Lake Palestine to Dallas Water Utilities
With additional purchase of 17 mgd from Lake Palestine

Owner:	**DWU**
Yield (mgd):	119
Yield (Ac-Ft/Yr):	133,400
Peak (mgd):	221

Pipeline upsized to carry Fastrill supply (221 Palestine, 120 Fastrill)

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipeline	Size	Quantity	Unit	Unit Price	Cost
Pipeline (Rural)	108"	382,600	LF	$633	$242,186,000
Pipeline (Urban)	108"	87,200	LF	$886	$77,259,000
ROW Easements (Rural)	40	351	Acres	$3,000	$1,053,000
ROW Easements (Urban)	40	80	Acres	$30,000	$2,400,000
Engineering & Contingencies (30%)					$95,834,000
Subtotal of Pipeline					**$418,732,000**

Pump Station(s)	Size (per PS)	Quantity	Unit	Unit Price	Cost
Lake Palestine Pump Station	11,800 HP	1	LS	$13,388,000	$13,388,000
Booster Pump Station	11,800 HP	1	LS	$9,900,000	$9,900,000
Ground Storage Tanks	8 MG	4	Ea	$1,100,000	$4,400,000
Engineering & Contingencies (35%)					$9,691,000
Subtotal of Pump Stations					**$37,379,000**
CONSTRUCTION TOTAL					**$456,111,000**
Permitting & Mitigation					$4,166,000
Interest During Construction			24	months	**$37,251,000**
TOTAL COST					**$497,528,000**

Table U-54, Continued

ANNUAL COSTS				
Debt Service (6% for 30 years)				$36,145,000
Raw Water ($0.10 per 1000 gallons on 17 mgd)	17 MGD	$/1000 ga	$0.10	$621,000
Electricity ($0.06 per kWh)				$5,451,000
Operation & Maintenance (pipeline & pump stations)				$4,664,000
Operation & Maintenance (reservoir)				$403,000
Total Annual Costs				**$47,284,000**
UNIT COSTS (Until Amortized)				
Per Acre-Foot				$354
Per 1,000 Gallons				$1.09
UNIT COSTS (After Amortization)				
Per Acre-Foot				$84
Per 1,000 Gallons				$0.26

Table U-55
Cost of Lake Fastrill for Dallas Water Utilities

Probable Owner: DWU
Quantity: 112,100 AF/Y — Operated as a system with Lake Palestine. Firm Yield of 148,780 acre-feet per year (operated as a system with Lake Palestine). 36,680 for local use.
120 MGD peak flow - 1.2 peak

CONSTRUCTION COSTS

	Size	Quantity	Unit	Unit Price	Cost
Dam and Reservoir					
Dam and Reservoir Construction (from HDR)		1	LS	$108,297,000	$108,297,000
Engineering and Contingencies (35%)					$37,904,000
Land Acquisition and Mitigation		1	LS	$119,760,000	$119,760,000
Total Dam and Reservoir					**$265,961,000**
DWU Share of Dam and Reservoir (DWU pays for 100%)					**$265,961,000**
Transmission System					
Intake and Pump Station	11,200 HP	1	LS	$11,850,000	$11,850,000
Transmission Pipeline (Rural)	78 in.	269,400	LF	$364	$98,062,000
Upsize Palestine Pipeline (Rural	96" to 108"	382,600	LF	$123	$47,060,000
Upsize Palestine Pipeline (Urbar	96" to 108"	87,200	LF	$172	$14,998,000
Upgrade Palestine Intake Pump Station		1	LS	$5,000,000	$5,000,000
Booster Pump Station at Lake Palestine	15,000 HP	1	LS	$8,750,000	$8,750,000
Enlarge Booster on Palestine Pipeline	from 9,800 HP to 15,000 HP	1	LS	$6,720,000	$6,720,000
Storage Tanks	8 MG	4	Ea.	$1,100,000	$4,400,000
ROW Easements (Rural)	40'	247	Acre	$3,000	$742,000
					$197,582,000
Engineering and Contingencies (30% for pipelines, 35% for other)					$42,271,000
Permitting & Mitigation - Conveyance System					$1,617,000
DWU Share of Construction					**$507,431,000**
Interest During Construction (36 months)					**$61,739,000**
TOTAL CAPITAL COST					**$569,170,000**

ANNUAL COSTS	**Cost**
Debt Service (6% for 30 years)	$41,350,000
Electricity ($0.06 kWh)	$5,291,000
Operation & Maintenance	$4,491,000
Total Annual Costs	**$51,132,000**

Table U-55, Continued

UNIT COSTS (Before Amortization)	
Per Acre-Foot	$456
Per 1,000 Gallons	$1.40
UNIT COSTS (After Amortization)	
Per Acre-Foot	$87
Per 1,000 Gallons	$0.27

Table U-56
Cost of George Parkhouse South Reservoir for North Texas Municipal Water District

Probable Owner:	NTMWD		Total yield = 135,600 AF/Y
Quantity:	108,480	AF/Y	
Peak:	121.0	MGD	

CONSTRUCTION COSTS

Dam & Reservoir	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Excavation					
Approach Channel		140,200	CY	$2	$280,000
Discharge Channel		123,000	CY	$2	$246,000
Spillway		289,300	CY	$2	$579,000
Emergency Spillway		434,300	CY	$2	$869,000
Fill					
Random Compacted Fill		7,169,400	CY	$2	$14,339,000
Impervious Fill		1,567,800	CY	$3	$3,920,000
Filter		668,200	CY	$30	$20,046,000
Bridge		190	LF	$1,100	$209,000
Roadway		63,067	SY	$18	$1,135,000
Slurry Trench		800,000	SF	$12	$9,600,000
Soil Cement		394,130	CY	$65	$25,618,000
Elevator		1	LS	$100,000	$100,000
Barrier Warning System		456	LF	$90	$41,000
Gates					
Gate & Anchor		2,240	SF	$300	$672,000
Stop Gate & Lift		160	LF	$1,600	$256,000
Hoist		8	Ea	$225,000	$1,800,000
Electrical		1	LS	$500,000	$500,000
Power Drop		1	LS	$200,000	$200,000
Spillway Low-Flow System		1	LS	$350,000	$350,000
Stop Gate Monorail System		390	LF	$800	$312,000
Embankment Internal Drainage		39,300	LF	$53	$2,097,000
Guardrail		780	LF	$25	$20,000
Grassing		28	Ac	$4,000	$112,000
Concrete (mass)		52,000	CY	$125	$6,500,000
Concrete (walls)		5,600	CY	$475	$2,660,000
Mobilization (5% of subtotal)					$4,623,000
Clearing/Grubbing, care of water (6% of subtotal)					$5,548,000
Land Clearing		950	Ac	$750	$713,000
Engineering and Contingencies (35%)					$36,171,000
Subtotal for Dam & Reservoir					**$139,516,000**

Table U-56, Continued

Conflicts					**$27,128,000**
Engineering and Contingencies (35%)					$9,495,000
Subtotal of Conflicts					**$36,623,000**
Land Acquisition					$50,473,029
Permitting and Mitigation of Reservoir					$100,946,000
Total Reservoir Construction Cost					**$327,558,029**
Interest during construction (36 months)					$39,854,000
Amount Attributed to NTMWD (80%)					**$293,930,000**
TRANSMISSION FACILITIES					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline to Lake Lavon (by way of Lake Chapman)	78 in.	317,000	LF	$364	$115,388,000
Right of Way Easements (ROW)		291	Ac	$3,000	$873,000
Engineering and Contingencies (30%)					$34,616,000
Subtotal of Pipeline					**$150,877,000**
Intake Pump Station					
Intake Pump Station (at Parkhouse)		1	LS	$11,180,000	$11,180,000
Pump Station Expansion at Chapman		1	LS	$3,503,000	$3,503,000
Engineering and Contingencies (35%)					$5,139,000
Subtotal of Pump Station					**$19,822,000**
CONSTRUCTION TOTAL					**$170,699,000**
Permitting and Mitigation - Conveyance System					**$1,529,000**
Interest During Construction (24 months)					**$13,941,000**
TOTAL COST (NTMWD)					**$480,099,000**

Table U-56, Continued

ANNUAL COSTS	Cost
Debt Service (6% for 30 years)	$34,879,000
Electricity ($0.06 kWh)	$5,709,000
Operation & Maintenance	$3,313,000
Total Annual Costs	**$43,901,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot	$405
Per 1,000 Gallons	$1.24
UNIT COSTS (After Amortization)	
Per Acre-Foot	$83
Per 1,000 Gallons	$0.25

Table U-57
North Texas Municipal Water District
East Fork Reuse Project

Owner	North Texas Municipal Water District	
Amount	102,000	Ac-Ft/Yr

CONSTRUCTION COSTS

WETLANDS FACILITIES					
Wetlands					$35,743,000
Engineering & Contingencies					$12,510,000
Subtotal Wetlands					**$48,253,000**
TRANSMISSION FACILITIES					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline - Urban	84	235,000	LF	$ 573	$134,655,000
Right of Way Easements	40	216	Acre	$ 30,000	$6,474,000
Engineering & Contingencies					$40,397,000
Subtotal Pipeline					**$181,526,000**
Pump Stations					
Pump Stations					$27,788,000
Engineering & Contingencies					$9,726,000
Subtotal Pump Stations					**$37,514,000**
OTHER FACILITIES					
Electrical Power					$1,764,000
Visitors Center					$1,500,000
Engineering & Contingencies					$1,142,000
Subtotal Other					**$4,406,000**
ENVIRONMENTAL AND ARCHAEOLOGICAL STUDIES					**$400,000**
CONSTRUCTION TOTAL					**$272,099,000**
Interest During Construction	18 Months				$16,780,000
TOTAL COST					**$288,879,000**

Table U-57, Continued

ANNUAL COSTS (1st 30 years)	
Debt Service (6%, 30 years)	$20,987,000
Electricity ($0.06/kWh)	$3,960,000
Operation and Maintenance	$3,037,000
Total Annual Costs	**$27,984,000**
UNIT COSTS (Average over 1st 30 years)	
Per Acre-Foot	$300
Per 1,000 Gallons	$0.92
UNIT COSTS (after 30 years)	
Per Acre-Foot	$69
Per 1,000 Gallons	$0.21

Table U-58
Groundwater from the Carrizo-Wilcox from Brazos County for Dallas Water Utilities

Owner:	DWU	
Quantity:	100,000	AF/Y
Peak Flow:	111.5	MGD

Item	Size		Quantity	Unit	Unit Price	Cost
Capital Costs						
Wellfield and Treatment						
Wells	500	gpm	168	Ea.	$100,000	$16,800,000
Connection to Pump Station			168	Ea.	$90,000	$15,120,000
Chlorination			1	LS	$17,600,000	$17,600,000
Storage Tank (Closed)	8	MG	2	Ea.	$1,100,000	$2,200,000
Engineering and Contingencies (35% for pump stations, 30% for other items)						$18,102,000
Subtotal for Wellfield and Treatment						**$69,822,000**
Transmission System						
Pipeline Mesquite to Wylie - Rural	78	inch	740,425	LF	$364	$269,515,000
Pipeline Mesquite to Wylie - Urban	78	inch	25,200	LF	$510	$12,852,000
Pump Station	12,900	HP	1	LS	$10,045,000	$10,045,000
Booster Pump Station	12,900	HP	1	LS	$10,045,000	$10,045,000
Storage Tanks (Closed - South and Booster)	8	MG	2	Ea.	$1,100,000	$2,200,000
Easement - Rural	40	Feet	680	AC	$3,000	$2,040,000
Easement - Rural	40	Feet	23	AC	$30,000	$694,000
Engineering and Contingencies (30% for pipleines, 35% for other items)						$92,512,000
Subtotal for Transmission						**$399,903,000**
TOTAL CONSTRUCTION COST						**$469,725,000**
Interest During Construction				**(24 months)**		**$32,660,000**
Permitting and Mitigation						**$4,277,000**
TOTAL CAPITAL COST						**$506,662,000**
Annual Costs						
Debt Service (6 percent for 30 years)						$36,808,000
Coverage for Debt Service (Represents profit for developer)						$9,202,000
Electricity (Transmission)						$6,737,000
Electricity (Wells)						$5,451,000
Chemicals						$700,000
Operation and Maintenance						$5,608,000
Groundwater Rights						$16,300,000
Groundwater District Fees						$5,700,000
Total Annual Cost						**$86,506,000**
UNIT COSTS (Until Amortized)						
Water Cost ($ per ac-ft)						**$865**
Water Cost ($ per 1,000 gallons)						**$2.65**
UNIT COSTS (After Amortization)						
Water Cost ($ per ac-ft)						**$405**
Water Cost ($ per 1,000 gallons)						**$1.24**

Table U-56
Cost of George Parkhouse South Reservoir for North Texas Municipal Water District

Probable Owner:	NTMWD		Total yield = 135,600 AF/Y
Quantity:	108,480	AF/Y	
Peak:	121.0	MGD	

CONSTRUCTION COSTS

Dam & Reservoir	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Excavation					
Approach Channel		140,200	CY	$2	$280,000
Discharge Channel		123,000	CY	$2	$246,000
Spillway		289,300	CY	$2	$579,000
Emergency Spillway		434,300	CY	$2	$869,000
Fill					
Random Compacted Fill		7,169,400	CY	$2	$14,339,000
Impervious Fill		1,567,800	CY	$3	$3,920,000
Filter		668,200	CY	$30	$20,046,000
Bridge		190	LF	$1,100	$209,000
Roadway		63,067	SY	$18	$1,135,000
Slurry Trench		800,000	SF	$12	$9,600,000
Soil Cement		394,130	CY	$65	$25,618,000
Elevator		1	LS	$100,000	$100,000
Barrier Warning System		456	LF	$90	$41,000
Gates					
Gate & Anchor		2,240	SF	$300	$672,000
Stop Gate & Lift		160	LF	$1,600	$256,000
Hoist		8	Ea	$225,000	$1,800,000
Electrical		1	LS	$500,000	$500,000
Power Drop		1	LS	$200,000	$200,000
Spillway Low-Flow System		1	LS	$350,000	$350,000
Stop Gate Monorail System		390	LF	$800	$312,000
Embankment Internal Drainage		39,300	LF	$53	$2,097,000
Guardrail		780	LF	$25	$20,000
Grassing		28	Ac	$4,000	$112,000
Concrete (mass)		52,000	CY	$125	$6,500,000
Concrete (walls)		5,600	CY	$475	$2,660,000
Mobilization (5% of subtotal)					$4,623,000
Clearing/Grubbing, care of water (6% of subtotal)					$5,548,000
Land Clearing		950	Ac	$750	$713,000
Engineering and Contingencies (35%)					$36,171,000
Subtotal for Dam & Reservoir					**$139,516,000**

Table U-56, Continued

Conflicts					**$27,128,000**
Engineering and Contingencies (35%)					$9,495,000
Subtotal of Conflicts					**$36,623,000**
Land Acquisition					$50,473,029
Permitting and Mitigation of Reservoir					$100,946,000
Total Reservoir Construction Cost					**$327,558,029**
Interest during construction (36 months)					$39,854,000
Amount Attributed to NTMWD (80%)					**$293,930,000**
TRANSMISSION FACILITIES					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline to Lake Lavon (by way of Lake Chapman)	78 in.	317,000	LF	$364	$115,388,000
Right of Way Easements (ROW)		291	Ac	$3,000	$873,000
Engineering and Contingencies (30%)					$34,616,000
Subtotal of Pipeline					**$150,877,000**
Intake Pump Station					
Intake Pump Station (at Parkhouse)		1	LS	$11,180,000	$11,180,000
Pump Station Expansion at Chapman		1	LS	$3,503,000	$3,503,000
Engineering and Contingencies (35%)					$5,139,000
Subtotal of Pump Station					**$19,822,000**
CONSTRUCTION TOTAL					**$170,699,000**
Permitting and Mitigation - Conveyance System					**$1,529,000**
Interest During Construction (24 months)					**$13,941,000**
TOTAL COST (NTMWD)					**$480,099,000**

Table U-56, Continued

ANNUAL COSTS	Cost
Debt Service (6% for 30 years)	$34,879,000
Electricity ($0.06 kWh)	$5,709,000
Operation & Maintenance	$3,313,000
Total Annual Costs	**$43,901,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot	$405
Per 1,000 Gallons	$1.24
UNIT COSTS (After Amortization)	
Per Acre-Foot	$83
Per 1,000 Gallons	$0.25

Table U-57
North Texas Municipal Water District
East Fork Reuse Project

Owner	North Texas Municipal Water District					
Amount	102,000 Ac-Ft/Yr					
CONSTRUCTION COSTS						
WETLANDS FACILITIES						
Wetlands						$35,743,000
Engineering & Contingencies						$12,510,000
Subtotal Wetlands						**$48,253,000**
TRANSMISSION FACILITIES						
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
Pipeline - Urban	84	235,000	LF	$	573	$134,655,000
Right of Way Easements	40	216	Acre	$	30,000	$6,474,000
Engineering & Contingencies						$40,397,000
Subtotal Pipeline						**$181,526,000**
Pump Stations						
Pump Stations						$27,788,000
Engineering & Contingencies						$9,726,000
Subtotal Pump Stations						**$37,514,000**
OTHER FACILITIES						
Electrical Power						$1,764,000
Visitors Center						$1,500,000
Engineering & Contingencies						$1,142,000
Subtotal Other						**$4,406,000**
ENVIRONMENTAL AND ARCHAEOLOGICAL STUDIES						**$400,000**
CONSTRUCTION TOTAL						**$272,099,000**
Interest During Construction	18 Months					$16,780,000
TOTAL COST						**$288,879,000**

Table U-57, Continued

ANNUAL COSTS (1st 30 years)	
Debt Service (6%, 30 years)	$20,987,000
Electricity ($0.06/kWh)	$3,960,000
Operation and Maintenance	$3,037,000
Total Annual Costs	**$27,984,000**
UNIT COSTS (Average over 1st 30 years)	
Per Acre-Foot	$300
Per 1,000 Gallons	$0.92
UNIT COSTS (after 30 years)	
Per Acre-Foot	$69
Per 1,000 Gallons	$0.21

Table U-58
Groundwater from the Carrizo-Wilcox from Brazos County for Dallas Water Utilities

Owner:	DWU	
Quantity:	100,000	AF/Y
Peak Flow:	111.5	MGD

Item	Size		Quantity	Unit	Unit Price	Cost
Capital Costs						
Wellfield and Treatment						
Wells	500	gpm	168	Ea.	$100,000	$16,800,000
Connection to Pump Station			168	Ea.	$90,000	$15,120,000
Chlorination			1	LS	$17,600,000	$17,600,000
Storage Tank (Closed)	8	MG	2	Ea.	$1,100,000	$2,200,000
Engineering and Contingencies (35% for pump stations, 30% for other items)						$18,102,000
Subtotal for Wellfield and Treatment						**$69,822,000**
Transmission System						
Pipeline Mesquite to Wylie - Rural	78	inch	740,425	LF	$364	$269,515,000
Pipeline Mesquite to Wylie - Urban	78	inch	25,200	LF	$510	$12,852,000
Pump Station	12,900	HP	1	LS	$10,045,000	$10,045,000
Booster Pump Station	12,900	HP	1	LS	$10,045,000	$10,045,000
Storage Tanks (Closed - South and Booster)	8	MG	2	Ea.	$1,100,000	$2,200,000
Easement - Rural	40	Feet	680	AC	$3,000	$2,040,000
Easement - Rural	40	Feet	23	AC	$30,000	$694,000
Engineering and Contingencies (30% for pipleines, 35% for other items)						$92,512,000
Subtotal for Transmission						**$399,903,000**
TOTAL CONSTRUCTION COST						**$469,725,000**
Interest During Construction				**(24 months)**		**$32,660,000**
Permitting and Mitigation						**$4,277,000**
TOTAL CAPITAL COST						**$506,662,000**
Annual Costs						
Debt Service (6 percent for 30 years)						$36,808,000
Coverage for Debt Service (Represents profit for developer)						$9,202,000
Electricity (Transmission)						$6,737,000
Electricity (Wells)						$5,451,000
Chemicals						$700,000
Operation and Maintenance						$5,608,000
Groundwater Rights						$16,300,000
Groundwater District Fees						$5,700,000
Total Annual Cost						**$86,506,000**
UNIT COSTS (Until Amortized)						
Water Cost ($ per ac-ft)						**$865**
Water Cost ($ per 1,000 gallons)						**$2.65**
UNIT COSTS (After Amortization)						
Water Cost ($ per ac-ft)						**$405**
Water Cost ($ per 1,000 gallons)						**$1.24**

Table U-59
Groundwater from the Carrizo-Wilcox from Brazos County for North Texas MWD

Owner:	NTMWD	
Quantity:	100,000	AF/Y
Peak Flow:	111.5	MGD

Item	Size		Quantity	Unit	Unit Price	Cost
Capital Costs						
Wellfield and Treatment						
Wells	500	gpm	168	Ea.	$100,000	$16,800,000
Connection to Pump Station			168	Ea.	$90,000	$15,120,000
Chlorination			1	LS	$17,600,000	$17,600,000
Storage Tank (Closed)	8	MG	2	Ea.	$1,100,000	$2,200,000
Engineering and Contingencies (35% for pump stations, 30% for other items)						$18,102,000
Subtotal for Wellfield and Treatment						**$69,822,000**
Transmission System						
Pipeline to Wylie - Rural	78	inch	804,000	LF	$364	$292,656,000
Pipeline to Wylie - Urban	78	inch	71,000	LF	$510	$36,210,000
Pump Station	14,300	HP	1	LS	$11,150,000	$11,150,000
Booster Pump Station	14,300	HP	1	LS	$11,150,000	$11,150,000
Storage Tanks (Closed - South and Booster)	8	MG	2	Ea.	$1,100,000	$2,200,000
Easement - Rural	40	Feet	738	AC	$3,000	$2,215,000
Easement - Rural	40	Feet	65	AC	$30,000	$1,956,000
Engineering and Contingencies (30% for pipleines, 35% for other items)						$107,235,000
Subtotal for Transmission						**$464,772,000**
TOTAL CONSTRUCTION COST						**$534,594,000**
Interest During Construction				**(24 months)**		**$37,958,000**
Permitting and Mitigation						**$4,861,000**
TOTAL CAPITAL COST						**$577,413,000**
Annual Costs						
Debt Service (6 percent for 30 years)						$41,948,000
Coverage for Debt Service (Represents profit for developer)						$10,487,000
Electricity (Transmission)						$7,370,000
Electricity (Wells)						$5,451,000
Chemicals						$700,000
Operation and Maintenance						$6,233,000
Groundwater Rights						$16,300,000
Groundwater District Fees						$5,700,000
Total Annual Cost						**$94,189,000**
UNIT COSTS (Until Amortized)						
Water Cost ($ per ac-ft)						**$942**
Water Cost ($ per 1,000 gallons)						**$2.89**
UNIT COSTS (After Amortization)						
Water Cost ($ per ac-ft)						**$418**
Water Cost ($ per 1,000 gallons)						**$1.28**

Table U-60
Carrizo-Wilcox Groundwater from the Brazos County Area
Preliminary Cost Estimate - 30-Year Amortization @ 6% ($0.06/KW-hr Power Cost)
50,000 AFY Water Supply to TRWD
Carrizo-Wilcox Groundwater in Brazos, Burleson, Milam, and Robertson Counties to Richland-Chambers Reservoir

Item	Size		Quantity	Unit	Unit Price	Cost
Capital Costs						
Transmission System to Richland Chambers Reservoir						
Pipeline - Rural (parallel pipelines)	60	inch	510,400	LF	$246	$125,558,000
Pump Station #1 from Well Field to Booster	4,600	HP	1	EA	$7,440,000	$7,440,000
Pump Station #2 - from Booster PS to Richland-Chambers Reservoir	4,600	HP	1	EA	$5,520,000	$5,520,000
Storage Tanks - no roof	8	MG	1	EA	$1,100,000	$1,100,000
Discharge Structure			1	EA	$100,000	$100,000
Easement - Rural	30		937	AC	$3,000	$2,812,000
Engineering and Contingencies (30% for pipleines, 35% for other items)						$42,623,000
Subtotal						**$185,153,000**
Transmission System from Richland Chambers Reservoir to Tarrant County						
Pipeline - Rural (not parallelled - other lines)	60	inch	321,150	LF	$246	$79,003,000
Pipeline - Urban (not parallelled - other lines)	60	inch	93,000	LF	$344	$31,992,000
Pump Station at R-C	4,200	HP	1	LS	$7,080,000	$7,080,000
Booster Pump Station at Ennis	3,800	HP	1	LS	$4,920,000	$4,920,000
Booster Pump Station at Waxahachie	2,700	HP	1	LS	$3,990,000	$3,990,000
Storage Tanks at Boosters	8	MG	2	EA	$1,100,000	$2,200,000
Easement - Rural	30		590	AC	$3,000	$1,769,000
Easement - Rural	30		171	AC	$30,000	$5,124,000
Engineering and Contingencies (35% for pump stations, 30% for other items)						$39,665,000
Subtotal						**$175,743,000**
TOTAL CONSTRUCTION COST						**$360,896,000**
Interest During Construction				**(24 months)**		**$15,121,000**
Permitting and Mitigation						**$3,227,000**
TOTAL CAPITAL COST						**$379,244,000**
Annual Costs						
Debt Service (6 percent for 30 years)						$27,552,000
Purchase Water (includes all well field costs)			50,000	Ac-ft	$162.93	$8,146,000
Royalties to Land Owners (10% of sales)						$814,600
Transmission System Operation and Maintenance						$3,807,000
Transmission System Energy Costs						$5,512,000
Total Annual Cost						**$45,831,600**
Available Project Yield (ac-ft/yr)						**50,000**
UNIT COSTS (Until Amortized)						
Water Cost ($ per ac-ft)						**$917**
Water Cost ($ per 1,000 gallons)						**$2.81**
UNIT COSTS (After Amortization)						
Water Cost ($ per ac-ft)						**$366**
Water Cost ($ per 1,000 gallons)						**$1.12**

Table U-61
DWU Lake of the Pines
Pump from Lake of the Pines to Lake Fork to TBR and gravity flow to East Side WTP

Probable Owner:	DWU	
Quantity:	89,600	AF/Y

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	72"	525,600	LF	$321	$168,718,000
Pipeline Urban	72"	87,200	LF	$449	$39,153,000
Right of Way Easements (Rural)	30	362	ACRE	$3,000	$1,086,000
Right of Way Easements (Urban)	30	60	ACRE	$30,000	$1,800,000
Engineering and Contingencies (30%)					$62,361,000
Subtotal of Pipeline					**$273,118,000**
Pump Station(s)					
Lake of the Pines Pump Station	9,100 HP	1	LS	$11,570,000	$11,570,000
Booster Pump Station	9,000 HP	1	LS	$8,500,000	$8,500,000
Booster Pump Station	9,000 HP	1	LS	$8,500,000	$8,500,000
Ground Storage Tanks	6 MGD	4	Ea	$750,000	$3,000,000
Engineering and Contingencies (35%)					$11,049,500
Subtotal of Pump Station(s)					**$42,619,500**
CONSTRUCTION TOTAL					**$315,737,500**
Permitting and Mitigation					**$2,873,000**
Interest During Construction			**(24 months)**		**$25,786,000**
TOTAL COST					**$344,396,500**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$25,020,000
Raw Water Purchase		80 MGD	$/1000 gal	$0.30	$8,752,000
Electricity ($0.06 kWh)					$6,547,000
Operation & Maintenance					$3,441,000
Total Annual Costs					**$43,760,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot					$488
Per 1,000 Gallons					$1.50
UNIT COSTS (After Amortization)					
Per Acre-Foot					$209
Per 1,000 Gallons					$0.64

Table U-62
NTMWD Lake of the Pines
From Lake of the Pines to New WTP at Farmersville

Probable Owner:	NTMWD	
Quantity:	87,900	AF/Y

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural (from LOTP to Chapman	72 in.	451,700	LF	$321	$144,996,000
Pipeline Rural (end of existing					
Chapman line to new WTP at	72 in.	11,000	LF	$321	$3,531,000
30-ft Right of Way Easements (ROW)		319	ACRE	$3,000	$956,000
Engineering and Contingencies (30%)					$44,558,000
Subtotal of Pipeline					**$194,041,000**
Pump Station(s)					
Pump at LOTP with intake & building	7,500 HP	1	LS	$10,100,000	$10,100,000
Booster Pump Station	5,000 HP	1	LS	$5,800,000	$5,800,000
Pump Station at Lake Chapman	12,000 HP	1	LS	$13,520,000	$13,520,000
Engineering and Contingencies (35%)					$10,297,000
Subtotal of Pump Station(s)					**$39,717,000**
Ground Storage					
Ground Storage Tanks at Booster	6 MG	2	LS	$750,000	$1,500,000
Engineering and Contingencies (35%)					$525,000
Subtotal of Ground Storage					**$2,025,000**
CONSTRUCTION TOTAL					**$235,783,000**
Permitting and Mitigation					**$2,153,000**
Interest During Construction			**(24 months)**		**$19,256,000**
TOTAL COST					**$257,192,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$18,685,000
Electricity ($0.06 kWh)					$5,832,000
Operation & Maintenance					$2,710,000
Raw Water Purchase					$8,593,000
Total Annual Costs					**$35,820,000**

Table U-62, Continued

UNIT COSTS (Until Amortized)	
Per Acre-Foot of Raw water	$408
Per 1,000 Gallons	$1.25
UNIT COSTS (After Amortization)	
Per Acre-Foot	$195
Per 1,000 Gallons	$0.60

Table U-63
TRWD Lake of the Pines
From Lake of the Pines to Rolling Hills WTP

Probable Owner: TRWD
Quantity: 87,900 AF/Y

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural (from LOTP to WTP)	72 in.	869,778	LF	$321	$279,199,000
30-ft Right of Way Easements (ROW)		599	ACRE	$3,000	$1,797,000
Engineering and Contingencies (30%)					$83,760,000
Subtotal of Pipeline					**$364,756,000**
Pump Station(s)					
Pump at LOTP with intake & building	12,500 HP	1	LS	$13,850,000	$13,850,000
Booster Pump Station #1	12,500 HP	1	LS	$10,250,000	$10,250,000
Booster Pump Station #2	12,500 HP	1	LS	$10,250,000	$10,250,000
Engineering and Contingencies (35%)					$12,022,500
Subtotal of Pump Station(s)					**$46,372,500**
Ground Storage					
Ground Storage Tanks at Pump Stations	6 MG	4	LS	$750,000	$3,000,000
Engineering and Contingencies (35%)					$1,050,000
Subtotal of Ground Storage					**$4,050,000**
CONSTRUCTION TOTAL					**$415,178,500**
Permitting and Mitigation					**$3,799,000**
Interest During Construction			**(36 months)**		**$50,515,000**
TOTAL COST					**$469,492,500**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$34,108,000
Electricity ($0.06 kWh)					$9,186,000
Operation & Maintenance					$4,471,000
Raw Water Purchase					$8,593,000
Total Annual Costs					**$56,358,000**

Table U-63, Continued

UNIT COSTS (Until Amortized)	
Per Acre-Foot	$641
Per 1,000 Gallons	$1.97
UNIT COSTS (After Amortization)	
Per Acre-Foot	$253
Per 1,000 Gallons	$0.78

Table U-64
Dallas Water Utilities
Lake Ray Hubbard Indirect Reuse Project

Owner	Dallas Water Utilities				
Amount	67,253 Ac-Ft/Yr				
CONSTRUCTION COSTS					
		Quantity	**Unit**	**Unit Price**	**Cost**
FILTERS AND WETLANDS FACILITIES					
Filter		1	L.S.	$6,230,000	$6,230,000
Wetlands		1	L.S.	$14,384,000	$14,384,000
Engineering & Contingencies					$7,215,000
Subtotal Filters and Wetlands					**$27,829,000**
TRANSMISSION FACILITIES					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
78" Pipeline - Urban	78	197,400	LF	$ 510	$100,674,000
Right of Way Easements - Urban	40	181	Acre	$ 30,000	$5,438,000
Engineering & Contingencies					$30,202,000
Subtotal Pipeline					**$136,314,000**
Pump Stations					
Pump Station 1	8,472 HP	1	L.S.	$10,972,000	$10,972,000
Pump Station 2	1,150 HP	1	L.S.		$3,425,000
Engineering & Contingencies					$5,039,000
Subtotal Pump Stations					**$19,436,000**
ENVIRONMENTAL AND ARCHAEOLOGICAL STUDIES					**$1,628,000**
CONSTRUCTION TOTAL					**$185,207,000**
Interest During Construction		24 Months			$15,126,000
TOTAL COST					**$200,333,000**
ANNUAL COSTS (1st 30 years)					
Debt Service (6%, 30 years)					$14,554,000
Electricity ($0.06/kWh)					$2,420,000
Operation and Maintenance					$2,086,000
Total Annual Costs					**$19,060,000**
UNIT COSTS (Average over 1st 30 years)					
Per Acre-Foot					$283
Per 1,000 Gallons					$0.87
UNIT COSTS (after 30 years)					
Per Acre-Foot					$67
Per 1,000 Gallons					$0.21

Table U-65
Dallas Water Utilities
Lake Lewisville Indirect Reuse Project

Owner	Dallas Water Utilities				
Amount	67,253 Ac-Ft/Yr				
CONSTRUCTION COSTS					
		Quantity	**Unit**	**Unit Price**	**Cost**
Additional Wastewater Treatment					
Filtration and Phosphorous Removal		1	L.S.	$12,758,000	$12,758,000
Engineering & Contingencies					$4,465,000
Subtotal Filters and Wetlands					**$17,223,000**
TRANSMISSION FACILITIES					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
78" Pipeline - Urban	78	209,200	LF	$ 510	$106,692,000
Right of Way Easements - Urban	40	192	Acre	$ 30,000	$5,763,000
Engineering & Contingencies					$32,008,000
Subtotal Pipeline					**$144,463,000**
Pump Station					
Pump Station 1	7,600 HP	1	L.S.	$10,180,000	$10,180,000
Engineering & Contingencies					$3,563,000
Subtotal Pump Stations					**$13,743,000**
ENVIRONMENTAL AND ARCHAEOLOGICAL STUDIES					**$1,556,000**
CONSTRUCTION TOTAL					**$176,985,000**
Interest During Construction		24 Months			$14,454,000
TOTAL COST					**$191,439,000**
ANNUAL COSTS (1st 30 years)					
Debt Service (6%, 30 years)					$13,908,000
Electricity ($0.06/kWh)					$1,317,000
Operation and Maintenance					$1,968,000
Total Annual Costs					**$17,193,000**
UNIT COSTS (Average over 1st 30 years)					
Per Acre-Foot					$256
Per 1,000 Gallons					$0.78
UNIT COSTS (after 30 years)					
Per Acre-Foot					$49
Per 1,000 Gallons					$0.15

Table U-66
Tarrant Regional Water District Lake Tehuacana

Owner: TRWD
Amount: 56,800 Ac-Ft/Yr
Peak 63 MGD

CONSTRUCTION COSTS

DAM & RESERVOIR	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Excavation					
Channel		2,250,000	C.Y.	$2.00	$4,500,000
Core trench & borrow		1,764,000	C.Y.	$2.00	$3,528,000
Fill Material					
Embankment		3,488,000	C.Y.	$2.50	$8,720,000
Waste Material		80,000	C.Y.	$2.00	$160,000
Filter, 1 & 2 (foundation drainage)		181,800	C.Y.	$30.00	$5,454,000
Stabilized base roadway		59,555	S.Y.	$18.00	$1,072,000
Cutoff slurry trench		514,800	S.F.	$12.00	$6,178,000
Soil cement including cement		137,800	C.Y.	$65.00	$8,957,000
Guard posts		1,680	each	$25.27	$42,000
Grassing		34	acres	$4,000	$136,000
Subtotal of Dam and Reservoir					**$38,747,000**
Conflicts					**$49,647,000**
Engineering and Contingencies (35%)					**$30,938,000**
CONSTRUCTION TOTAL					**$119,332,000**
LAND AND LIGNITE ACQUISITION		**1**	**L.S.**	**$83,340,000**	**$83,340,000**
Interest During Construction			**(36 months)**		**$14,519,000**
Permitting and Mitigation of Reservoir					**$101,018,000**
TOTAL RESERVOIR COST					**$318,209,000**

Transmission System from Richland Chambers Reservoir to Ennis

Item	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline - Rural	60 inch	157,800	LF	$246	$38,819,000
Pump Station at Richland-Chambers	5200 HP	1	LS	$8,020,000	$8,020,000
Engineering and Contingencies (30% for pipelines, 35% for other items)					$14,453,000
Subtotal					**$61,292,000**

Table U-66, Continued

Transmission System from Ennis to Balancing Reservoir

Item	Size	Quantity	Unit	Unit Price	Cost
Pipeline - Rural	60 inch	158,680	LF	$246	$39,035,000
Pipeline - Urban	60 inch	65,320	LF	$344	$22,470,000
Ennis Booster Pump Station	4600 HP	1	LS	$5,520,000	$5,520,000
Waxahachie Booster Pump	3400 HP	1	LS	$4,560,000	$4,560,000
Ground Storage Tanks	7	2	Ea.	$925,000	$1,850,000
Engineering and Contingencies (30% for pipelines, 35% for other items)					$22,627,000
Subtotal					**$96,062,000**

Transmission System from Balancing Reservoir to Rolling Hills

Item	Size	Quantity	Unit	Unit Price	Cost
Pipeline - Urban	60 inch	31,000	LF	$344	$10,664,000
Engineering and Contingencies (30% for pipelines, 35% for other items)					$3,199,000
Subtotal					**$13,863,000**

Interest During Construction	**(36 months)**	**$20,832,000**
Permitting and Mitigation of Transmission		**$1,571,000**
TOTAL TRANSMISSION COST		**$193,620,000**
TOTAL CAPITAL COST		**$511,829,000**

ANNUAL COSTS

Debt Service (6% for 30 years)	$37,183,820
Operation & Maintenance - Reservoir	$697,000
Operation & Maintenance - Transmission	$1,931,000
Electricity	$3,758,000
Total Annual Costs	**$43,569,820**

UNIT COSTS (During Amortization)

Per Acre-Foot	$767
Per 1,000 Gallons	$2.35

UNIT COSTS (After Amortization)

Per Acre-Foot	$112
Per 1,000 Gallons	$0.35

Table U-67
Lake Ralph Hall and Reuse for UTRWD

Probable Owner:	UTRWD	
Quantity:	32,940	Ac-Ft/Yr from Ralph Hall
	17,800	Ac-Ft/Yr from Reuse (60% return flows on 29,600 ac-ft/yr delivered)
Peak:	36.7	MGD (1.25:1 peak)

CONSTRUCTION COSTS

Dam, Reservoir and Conflicts

	Size	Quantity	Unit	Unit Price	Cost
Mobilization and Demobilization		1	LS	$5,100,000	$5,100,000
Stormwater Prevention		1	LS	$912,900	$913,000
Clearing & Grubbing		450	AC	$2,100	$945,000
Roadways		23,800	LF	$215	$5,117,000
Bridges		13,080	LF	$1,435	$18,770,000
Utility Relocations		53,500	LF	$80	$4,280,000
Embankment Random Fill		2,447,520	CY	$3.00	$7,343,000
Embankment Core		1,928,515	CY	$4.00	$7,714,000
Principal Spillway Reinf. Conc.		36,835	CY	$275	$10,130,000
Emergency Spillway Reinf. Conc.		38,170	CY	$275	$10,497,000
Rock Riprap		215,000	SY	$100	$21,500,000
Miscellaneous Relocations		1	LS	$2,000,000	$2,000,000
Care of Water		1	LS	$201,000	$201,000
Engineering and Contingencies (35%)					$33,079,000
Subtotal for Dam, Reservoir and Conflicts					**$127,589,000**

TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline to Balancing	48 in.	158,400	LF	$176	$27,878,000
Right of Way Easements	30 ft.	109	Ac	$3,000	$327,000
Engineering and Contingencies (30%)					$8,363,000
Subtotal of Pipeline					**$36,568,000**

Intake Pump Station					
Pump Station	2400 HP	1	LS	$5,060,000	$5,060,000
Engineering and Contingencies (35%)					$1,771,000
Subtotal of Pump Station					**$6,831,000**

CONSTRUCTION TOTAL **$170,988,000**

Table U-67, continued

Land Acquisition and Mitigation	**$22,781,000**
Interest During Construction (30 months)	**$17,384,000**
TOTAL COST	**$211,153,000**
ANNUAL COSTS	**Cost**
Debt Service (6% for 30 years)	$15,340,000
Electricity ($0.06 kWh)	$1,234,000
Operation & Maintenance	$1,556,000
Total Annual Costs	**$18,130,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot (Ralph Hall and Reuse)	$357
Per 1,000 Gallons	$1.10
UNIT COSTS (After Amortization)	
Per Acre-Foot (Ralph Hall and Reuse)	$55
Per 1,000 Gallons	$0.17

Table U-68
DWU Lake Columbia (formerly Lake Eastex)

Probably Owner:	DWU	
Quantity:	35,800	AF/Y
Quantity:	40	MGD peak

Construction Costs

Dam and Spillway	**Size**	**Amount**	**Unit**	**Unit Cost**	**Cost**
Mobilization		1	LS	$1,500,700	$1,501,000
Care of Water During Construction		1	LS	$874,200	$874,000
Clearing and Grubbing		78	Ac	$3,000	$235,000
Foundation Preparation		1	LS	$215,200	$215,000
Excavation		3,679,202	CY	$2.00	$7,358,000
Embankment, Select Fill		1,131,894	CY	$2.50	$2,830,000
Embankment, Random		1,872,136	CY	$2.00	$3,744,000
Berm Fill		475,623	CY	$2.00	$951,000
Soil Bentonite Slurry Trench		200,125	SF	$12.00	$2,402,000
Drains					
Sand		98	CY	$15.00	$1,000
Gravel		1,150	CY	$45	$52,000
Toe Drains					
Gravel		4,029	CY	$45	$181,000
Pipe		6,800	LF	$20	$136,000
Outlets		5	EA	$15,000	$75,000
Soil Cement		47,888	CY	$55	$2,634,000
Seeding for Erosion Control		163	Ac	$2,500	$408,000
Topsoil 6 inches		34,285	CY	$7.00	$240,000
Flex Base Roadway 8 inch		18,133	SY	$10.00	$181,000
Service Spillway		1	LS	$4,021,200	$4,021,000
Spillway Bridge		1	LS	$360,000	$360,000
Outlet Works two 48-inch pipes		1	LS	$902,800	$903,000
Erosion and Sediment Control		1	LS	$75,000	$75,000
Clearing		5,000	Ac	$250	$1,250,000
Instrumentation		1	LS	$368,000	$368,000
Office Building		1	LS	$300,000	$300,000
Boat Ramp		1	LS	$200,000	$200,000
Bouy System		1	LS	$20,000	$20,000
Engineering and Contingencies (35%)					$11,030,000
Subtotal for Dam & Reservoir					**$42,545,000**
Conflicts					$72,609,000
Engineering and Contingencies (35%)					$25,413,000
Subtotal for Conflicts					**$98,022,000**
Total Reservoir Construction					**$140,567,000**
DWU portion of dam (50%)					**$70,284,000**

Table U-68, Continued

Transmission Facilities (DWU)					
Pump from Lake Columbia to Lake Palestine and increase pipe from Palestine to TBR					
Pipeline					
Pipeline Columbia to Palestine (Rural)	48"	74,000	LF	$246	$18,204,000
Upgrade Pipeline Palestine to WTP (Rural) (from 108" to 114")	114"	382,600	LF	$74	$28,312,000
Upgrade Pipeline Palestine to WTP (Urban) (from 108" to 114")	114"	87,200	LF	$104	$9,069,000
ROW Easements (Rural)	30'	51	Acre	$3,000	$153,000
ROW Easements (Urban)	30'	0	Acre	$30,000	$0
Engineering and Contingencies (30%)					$16,676,000
Subtotal of Pipeline					**$72,414,000**
Pump Station					
Lake Columbia Pump Station	1,700 HP	1	LS	$4,250,000	$4,250,000
Lake Palestine Pump Station Upgrade		1	LS	$3,984,000	$3,984,000
Booster Pump Station Upgrade		1	LS	$2,975,000	$2,975,000
Booster Pump Station Upgrade		1	LS	$5,150,000	$5,150,000
Ground Storage Tanks	5 MG	1	Ea	$630,000	$630,000
Engineering and Contingencies (35%)					$5,946,000
Subtotal of Pump Station					**$22,935,000**
CONSTRUCTION TOTAL					**$235,916,000**
CONSTRUCTION TOTAL (DWU Portion)					**$165,633,000**
Permitting and Mitigation Transmission					**$269,000**
(assume no additional costs for transmission from Palestine to WTP)					
Interest During Construction			**(36 months)**		**$28,704,000**
Interest During Construction (DWU Portion)			**(36 months)**		**$20,153,000**
Land Acquisition					**$25,100,000**
DWU Portion of Land Acquisition					**$12,550,000**
Permitting and Mitigation Reservoir (DWU Portion)					**$25,100,000**
TOTAL COST					**$315,089,000**
TOTAL COST (DWU Portion)					**$223,705,000**
DWU Annual Costs					
Debt Service (6% for 30 years)					$16,251,920
Electricity ($0.06 kWh)					$1,716,000
Operation & Maintenance					$1,461,000
Total Annual Costs					**$19,428,920**

Table U-68, Continued

UNIT COSTS (Until Amortized)	
Per Acre-Foot	**$543**
Per 1,000 Gallons	**$1.67**
UNIT COSTS (After Amortization)	
Per Acre-Foot	**$89**
Per 1,000 Gallons	**$0.27**

Table U-69
Dallas Direct Reuse Projects

Owner: Dallas
Amount: 20,456 Ac-Ft/Yr

Item No. & Description	Qty.	Units		Unit Cost		Total Cost
Construction Costs						
PIPELINE						
McCommas Bluff						
16" Reclaimed Water Line	10,700	FT	$	180	$	1,929,000
Cedar Crest						
20" Reclaimed Water Line	15,100	FT	$	203	$	3,063,000
12" Reclaimed Water Line	1,700	FT	$	158	$	269,000
White Rock Alternate						
42" Reclaimed Water Line	52,800	FT	$	270	$	14,280,000
36" Reclaimed Water Line	58,200	FT	$	248	$	14,429,000
24" Reclaimed Water Line	10,200	FT	$	225	$	2,299,000
16" Reclaimed Water Line	7,600	FT	$	180	$	1,370,000
12" Reclaimed Water Line	12,600	FT	$	158	$	1,988,000
Subtotal Piping					**$**	**39,627,000**
PUMP STATIONS						
McCommas Bluff	62	hp			$	1,082,000
Cedar Crest	181	hp			$	1,172,000
White Rock Alternate	2,478	hp			$	4,057,000
Subtotal Pump Station					**$**	**6,311,000**
Permitting and Mitigation	1%				$	551,000
Engineering, Contingency, Construction Management, Financial and Legal Costs						
Pipeline	30%				$	11,888,000
Pump Station	35%				$	2,209,000
Capital Cost Subtotal					**$**	**60,586,000**
Interest During Construction		(12 months)			$	2,524,000
Total Capital Costs					**$**	**63,110,000**

Table U-69, Continued

Annual Costs			
Debt Service			$4,585,000
Operation and Maintenance Costs			
Pipeline	1.00%	$	476,000
Pump Station	2.50%	$	189,000
Estimated Annual Power Cost	$0.06/kWh	$	817,000
Total Annual Costs		**$**	**6,067,000**
UNIT COSTS (First 30 Years)			
Per Acre-Foot		$	297
Per 1,000 Gallons		$	0.91
UNIT COSTS (After 30 Years)			
Per Acre-Foot		$	72
Per 1,000 Gallons		$	0.22

Table U-70
Lake Texoma Supply with Blending in Elm Fork

Probable Owner: DWU
Amount: 20,000 Acre-Feet/Year

CONSTRUCTION COSTS					
TRANSMISSION FACILITIES					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline (rural)	36 in.	187,501	LF	$114	$21,375,100
Pipeline (urban)	36 in.	0	LF	$171	$0
Right of Way Easements (Rural)	30 ft.	172	Acre	$3,000	$516,000
Right of Way Easements (Urban)	30 ft.	0	Acre	$30,000	$0
Engineering and Contingencies (30%)					$6,413,000
Subtotal of Pipeline					**$28,304,100**
Pump Station(s)					
Lakeside Pump Station	2,200 HP	1	EA	$4,880,000	$4,880,000
Engineering and Contingencies (35%)					$1,708,000
Subtotal of Pump Station(s)					**$6,588,000**
Permitting and Mitigation		**1**	**LS**		**$315,100**
CONSTRUCTION TOTAL					**$35,207,200**
Interest During Construction			**(12 months)**		**$1,467,000**
TOTAL CAPITAL COST					**$36,674,200**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$2,664,341
Raw water purchase					$391,021
Electricity ($0.06 kWh)					$597,870
Facility Operation & Maintenance					$402,901
Total Annual Costs					**$4,056,133**
UNIT COSTS (During Amortization)					
Per Acre-Foot of raw water					$203
Per 1,000 Gallons of raw water					$0.62
UNIT COSTS (After Amortization)					
Per Acre-Foot of treated water					$70
Per 1,000 Gallons of treated water					$0.21

Table U-71
DWU Water Treatment Plant Construction and Expansion

OWNER:	Dallas Water Utilities	
	Size	**Cost**
2010 Eastside Expansion		
Construction Costs		
Eastside WTP Expansion (2010)	50 MGD	$37,500,000
Engineering and Contingencies (35%)		$13,125,000
Total Construction Cost		**$50,625,000**
Interest during Construction (24 months)		$4,135,000
Total Capital Costs		**$54,760,000**
Annual Costs		
Debt Service (30 years at 6%)		$3,978,000
Operation and Maintenance (@ $0.25/1000 gal)	9,125,000	$2,281,000
Total Annual Costs		**$6,259,000**
Annual Cost ($ per acre-foot)		**$224**
Annual Cost ($ per 1000 gallons)		**$0.69**
Annual Cost after Amortization ($ per acre-foot)		**$81**
Annual Cost after Amortization ($ per 1000 gallons)		**$0.25**
2012 Eastside Expansion		
Construction Costs		
Eastside WTP Expansion (2012)	110 MGD	$76,600,000
Engineering and Contingencies (35%)		$26,810,000
Total Construction Cost		**$103,410,000**
Interest during Construction (24 months)		$8,445,000
Total Capital Costs		**$111,855,000**
Annual Costs		
Debt Service (30 years at 6%)		$8,126,000
Operation and Maintenance (@ $0.25/1000 gal)	20,075,000	$5,019,000
Total Annual Costs		**$13,145,000**

Table U-71, Continued

Annual Cost ($ per acre-foot)		**$213**
Annual Cost ($ per 1000 gallons)		**$0.65**
Annual Cost after Amortization ($ per acre-foot)		**$81**
Annual Cost after Amortization ($ per 1000 gallons)		**$0.25**
2022 New Water Plant		
Construction Costs		
New WTP (2022)	50 MGD	$50,000,000
Engineering and Contingencies (35%)		$17,500,000
Total Construction Cost		**$67,500,000**
Interest during Construction (24 months)		$5,513,000
Total Capital Costs		**$73,013,000**
Annual Costs		
Debt Service (30 years at 6%)		$5,304,000
Operation and Maintenance (@ $0.25/1000 gal)	9,125,000	$2,281,000
Total Annual Costs		**$7,585,000**
Annual Cost ($ per acre-foot)		**$271**
Annual Cost ($ per 1000 gallons)		**$0.83**
Annual Cost after Amortization ($ per acre-foot)		**$81**
Annual Cost after Amortization ($ per 1000 gallons)		**$0.25**
2035 New Water Plant		
Construction Costs		
New WTP (2035)	110 MGD	$97,800,000
Engineering and Contingencies (35%)		$34,230,000
Total Construction Cost		**$132,030,000**
Interest during Construction (24 months)		$10,783,000
Total Capital Costs		**$142,813,000**

Table U-71, Continued

Annual Costs		
Debt Service (30 years at 6%)		$10,375,000
Operation and Maintenance (@ $0.25/1000 gal)	20,075,000	$5,019,000
Total Annual Costs		**$15,394,000**
Annual Cost ($ per acre-foot)		**$250**
Annual Cost ($ per 1000 gallons)		**$0.77**
Annual Cost after Amortization ($ per acre-foot)		**$81**
Annual Cost after Amortization ($ per 1000 gallons)		**$0.25**
OVERALL TOTAL CAPITAL		**$382,441,000**

Table U-72
Tarrant Regional Water District Eagle Mountain Connection Project
Summary of Opinion of Probable Construction Costs

Pipeline - Benbrook to E.M.L.:		2005 Dollars
Pipeline Construction Cost	$	58,034,000
Balancing Reservoir Cost	$	5,692,000
Eng. / Survey / Legal / Admin.(10%)	$	6,373,000
SUBTOTAL	$	70,099,000
Real Estate Cost (2003)	$	3,970,000
Total Pipeline Project Cost	**$**	**74,069,000**
Benbrook Booster Pump Station:		
Pump Station Construction Cost	$	15,073,000
Distribution Powerline Cost	$	400,000
Upgrade to four 3,750 kVA transformers*	$	200,000
Real Estate Cost (2002)	$	30,000
Eng. / Survey / Legal / Admin.(15%)	$	2,325,000
SUBTOTAL	$	18,028,000
Rolling Hills Booster Pump Station:		
Pump Station Construction Cost	$	16,636,000
Substation Cost	$	2,028,000
Eng. / Survey / Legal / Admin.(15%)	$	2,800,000
SUBTOTAL	$	21,464,000
Subtotal PL / EMBPS / BBPS	**$**	**113,561,000**
15% Contingency	$	17,034,000
Grand Total PL / EMBPS / BBPS	**$**	**130,595,000**

* In lieu of two 7,500 kVA transformers, which the $400,000 distribution powerline cost includes.

Note: Since Final Design is now underway, this cost estimate is based on more detailed analysis than standard regional water planning estimates. The estimate is from *Tarrant Regional Water District Eagle Mountain Connection Draft Pipeline Preliminary Design Report* and *Tarrant Regional Water District Eagle Mountain Connection Draft Pump Stations Preliminary Design Report*, November 2004, developed by Freese and Nichols for Tarrant Regional Water District.

Table U-73
North Texas Municipal Water District Interim Purchase from DWU

Owner:	North Texas Municipal Water District	
Amount:	11,210 Ac-Ft/Yr	(20 years only)

Construction Cost for Meter	$1,000,000
Engineering and Contingencies	$350,000
	$1,350,000
Annual Costs	
Debt Service (6% for 20 years)	$118,000
Treated Water Purchase ($0.7082 per 1000 gallons)	$2,587,000
Operation and Maintenance	$30,000
	$2,735,000
UNIT COSTS (during Amortization)	
Per Acre-Foot	$244
Per 1,000 gallons	$0.75
UNIT COSTS (after Amortization)	
Per Acre-Foot	$233
Per 1,000 gallons	$0.72

Table U-74
North Texas Municipal Water District Additional Wilson Creek Reuse

Owner: North Texas Municipal Water District
Amount: 35,941 Ac-Ft/Yr

Cost of Permitting	$1,150,000
Annual Cost (6% for 30 years)	$84,000
UNIT COSTS (during Amortization)	
Per Acre-Foot	$2.34
Per 1,000 gallons	$0.0072
UNIT COSTS (after Amortization)	
Per Acre-Foot	$0
Per 1,000 gallons	$0.00

Table U-75
North Texas Municipal Water District Additional Yield from Lake Lavon

Owner:	North Texas Municipal Water District		
Amount:	11,000	Ac-Ft/Yr	(decreasing to 6,000 ac-ft/yr by 2060)

Cost of Permitting (Including contingencies)	$270,000
Annual Cost (6% for 30 years)	$20,000
UNIT COSTS (during Amortization)	
Per Acre-Foot	$1.82
Per 1,000 gallons	$0.0056
UNIT COSTS (after Amortization)	
Per Acre-Foot	$0
Per 1,000 gallons	$0.00

Table U-76
North Texas Municipal Water District Water District Lake Texoma (Interim GTUA)

Owner:	North Texas Municipal Water District (interim purchase from GTUA)	
Amount:	25,000 Ac-Ft/Yr	
Uses existing facilities		
Permitting		**$100,000**
CONSTRUCTION TOTAL		**$100,000**
Interest During Construction	**(12 months)**	**$4,000**
TOTAL CAPITAL COST		**$104,000**
ANNUAL COSTS		
Debt Service (6% for 30 years)		$8,000
Electricity ($0.06 kWh)		$390,000
Raw Water		$305,000
Total Annual Costs		**$703,000**
UNIT COSTS (Before Amortization)		
Per Acre-Foot		$28
Per 1,000 Gallons		$0.09
UNIT COSTS (After Amortization)		
Per Acre-Foot		$28
Per 1,000 Gallons		$0.09

Table U-77
North Texas Municipal Water District
Upper Sabine Basin Supply

Owner	North Texas Municipal Water District					
Amount	50,000 Ac-Ft/Yr					
CONSTRUCTION COSTS						
TRANSMISSION FACILITIES						
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
Pipeline - Rural	54	165,000	LF	$	210	$34,650,000
Pipeline - Urban	54	20,000	LF	$	294	$5,880,000
Right of Way Easements - Rural	30	113.6	Acre	$	3,000	$341,000
Right of Way Easements - Urban	30	13.8	Acre	$	30,000	$414,000
Engineering & Contingencies						$12,159,000
Subtotal Pipeline						**$53,444,000**
Pump Stations						
Intake Pump Station Improvements						$553,000
Booster Pump Station						$2,305,000
Engineering & Contingencies						$1,000,000
Subtotal Pump Stations						**$3,858,000**
ENVIRONMENTAL AND ARCHAEOLOGICAL STUDIES						**$521,000**
CONSTRUCTION TOTAL						**$57,823,000**
Interest During Construction	12 Months					$2,409,000
TOTAL COST						**$60,232,000**
ANNUAL COSTS (1st 30 years)						
Debt Service (6%, 30 years)						$4,376,000
Raw Water Purchase ($0.125 per thousand gallons)						$2,037,000
Electricity ($0.06/kWh)						$1,413,000
Operation and Maintenance						$572,000
Total Annual Costs						**$8,398,000**
UNIT COSTS (Pre-Amortization)						
Per Acre-Foot						$168
Per 1,000 Gallons						$0.52
UNIT COSTS (After Amortization)						
Per Acre-Foot						$80
Per 1,000 Gallons						$0.25

Table U-78
NTMWD Water Treatment Plant and
Treated Water Distribution System Improvements

OWNER: NTMWD

Construction Costs (Including Engineering and Contingencies)	Period	Cost
2005-2010		
Water Distribution System Improvements - Pipelines		$150,260,000
Water Distribution System Improvements - Pump Stations		$21,275,000
WTP Construction and Expansion (280 MGD)		$118,519,000
		$290,054,000
Interest during Construction (12 months)		$12,087,000
Total 2005-2010 Cost		**$302,141,000**
Annual Costs (2005-2010 Improvements)		
Debt Service (30 years at 6%)		$21,950,000
Facility Operation and Maintenance		$1,729,000
WTP Operation and Maintenance (@ $0.35/1000 gal - 2.25 Peak)		$15,898,000
Total Pre-Amortization		**$39,577,000**
Total After Amortization		**$17,627,000**
2010-2020		
Water Distribution System Improvements - Pipelines		$17,030,000
Water Distribution System Improvements - Pump Stations		$3,850,000
WTP Construction and Expansion (210 MGD)		$87,964,000
		$108,844,000
Interest during Construction (12 months)		$4,536,000
Total 2010-2020 Cost		**$113,380,000**
Annual Costs (2010-2020 Improvements)		
Debt Service (30 years at 6%)		$8,237,000
Facility Operation and Maintenance		$227,000
WTP Operation and Maintenance (@ $0.35/1000 gal - 2.25 Peak)		$11,923,000
Total Pre-Amortization		**$20,387,000**
Total After Amortization		**$12,150,000**
2020-2030		
Water Distribution System Improvements - Pipelines		$70,000,000
Water Distribution System Improvements - Pump Stations		$15,000,000
WTP Construction and Expansion (210 MGD)		$150,000,000
Subtotal		**$235,000,000**

Table U-78, Continued

Interest during Construction (12 months)	$9,792,000
Total 2020-2030 Cost	**$244,792,000**
Annual Costs (2020-2030 Improvements)	
Debt Service (30 years at 6%)	$17,784,000
Facility Operation and Maintenance	$914,000
WTP Operation and Maintenance (@ $0.35/1000 gal - 2.25 Peak)	$11,923,000
Total Pre-Amortization	**$30,621,000**
Total After Amortization	**$12,837,000**
2030-2040	
Water Distribution System Improvements - Pipelines	$70,000,000
Water Distribution System Improvements - Pump Stations	$15,000,000
WTP Construction and Expansion (140 MGD)	$100,000,000
	$185,000,000
Interest during Construction (12 months)	$7,709,000
Total 2030-2040 Cost	**$192,709,000**
Annual Costs (2030-2040 Improvements)	
Debt Service (30 years at 6%)	$14,000,000
Facility Operation and Maintenance	$914,000
WTP Operation and Maintenance (@ $0.35/1000 gal - 2.25 Peak)	$7,949,000
Total Pre-Amortization	**$22,863,000**
Total After Amortization	**$8,863,000**
2040-2050	
Water Distribution System Improvements - Pipelines	$70,000,000
Water Distribution System Improvements - Pump Stations	$15,000,000
WTP Construction and Expansion (210 MGD)	$150,000,000
	$235,000,000
Interest during Construction (12 months)	$9,792,000
Total 2040-2050 Cost	**$244,792,000**
Annual Costs (2040-2050 Improvements)	
Debt Service (30 years at 6%)	$17,784,000
Facility Operation and Maintenance	$914,000
WTP Operation and Maintenance (@ $0.35/1000 gal - 2.25 Peak)	$11,923,000
Total Pre-Amortization	**$30,621,000**
Total After Amortization	**$12,837,000**

Table U-78, Continued

2050-2060	
Water Distribution System Improvements - Pipelines	$70,000,000
Water Distribution System Improvements - Pump Stations	$15,000,000
WTP Construction and Expansion (140 MGD)	$100,000,000
	$185,000,000
Interest during Construction (12 months)	$7,709,000
Total 2020-2030 Cost	**$192,709,000**
Annual Costs (2020-2030 Improvements)	
Debt Service (30 years at 6%)	$14,000,000
Facility Operation and Maintenance	$914,000
WTP Operation and Maintenance (@ $0.35/1000 gal - 2.25 Peak)	$7,949,000
	$22,863,000
Total Capital Costs	**$1,290,523,000**

Table U-79
Fannin County Water Supply Project

Owner:	NTMWD			
Amount:	8,602	ac-ft/yr		

Item No. & Description	**Qty.**	**Units**	**Unit Cost**	**Total Cost**
Construction Costs				
PIPELINE				
36" Water Line				
Pipe	32,560	FT	$ 114	$ 3,712,000
ROW	15	AC	$ 3,000	$ 45,000
36" Water Line				
Pipe	8,450	FT	$ 171	$ 1,445,000
ROW	4	AC	$ 30,000	$ 116,000
24" Water Line				
Pipe	50,908	FT	$ 66	$ 3,360,000
ROW	23	AC	$ 3,000	$ 70,000
24" Water Line				
Pipe	5,850	FT	$ 99	$ 579,000
ROW	3	AC	$ 30,000	$ 81,000
18" Water Line				
Pipe	16,404	FT	$ 42	$ 689,000
ROW	8	AC	$ 3,000	$ 23,000
16" Water Line				
Pipe	33,464	FT	$ 37	$ 1,238,000
ROW	15	AC	$ 3,000	$ 46,000
8" Water Line				
Pipe	82,438	FT	$ 20	$ 1,649,000
ROW	38	AC	$ 3,000	$ 114,000
8" Water Line				
Pipe	6,800	FT	$ 30	$ 204,000
ROW	3	AC	$ 30,000	$ 94,000
Subtotal Piping				**$ 13,465,000**

Table U-79, continued

PUMP STATION						
Station 1						
Pump, building, & appurtances	700	hp			$	1,900,000
Storage Tank	2,560,000	gal			$	519,000
Station 2						
Pump, building, & appurtances	389	hp			$	1,467,000
Storage Tank	970,000	gal			$	268,000
Subtotal Pump Station					**$**	**4,154,000**
Water Treatment Plant	16.00	MGD			**$**	**20,960,000**
Permitting and Mitigation	1%				$	204,000
Engineering, Contingency, Construction Management, Financial and Legal Costs						
Pipeline	30%				$	3,863,000
Pump Station	35%				$	1,454,000
Plant Expansion	35%				$	7,336,000
Capital Cost Subtotal					**$**	**51,436,000**
Interest During Construction		(24 months)				$4,022,000
Total Capital Costs					**$**	**55,458,000**
Annual Costs						
Debt Service					$	4,029,000
Operation and Maintenance Costs						
Pipeline	1%				$	155,000
Pump Station	2.50%				$	125,000
Estimated Annual Power Cost	$0.06/kWh				$	213,000
WTP Operation	2,802,812	1000 gal	$	0.35	$	981,000
Total Annual Costs					**$**	**5,503,000**
UNIT COSTS (First 30 Years)						
Per Acre-Foot					$	640
Per 1,000 Gallons					$	1.96
UNIT COSTS (After 30 Years)						
Per Acre-Foot					$	171
Per 1,000 Gallons					$	0.52

Table U-80
Ellis County Water Supply Project
Waxahachie Section

Owner:	TRA	
Amount:	9,842	Ac-Ft/Yr

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipeline(s)	**Qty.**	**Units**	**Unit Cost**	**Total Cost**
Tap Fee	1	EA	$ 60,000	$ 60,000
36" Water Line				
Pipe	34,550	FT	$ 114	$ 3,939,000
ROW	16	AC	$ 3,000	$ 48,000
36" Water Line				
Pipe	10,000	FT	$ 171	$ 1,710,000
ROW	5	AC	$ 30,000	$ 138,000
30" Water Line				
Pipe	2,800	FT	$ 86	$ 241,000
ROW	1	AC	$ 3,000	$ 4,000
20" Water Line				
Pipe	1,000	FT	$ 51	$ 51,000
ROW	0	AC	$ 3,000	$ 1,000
18" Water Line				
Pipe	19,400	FT	$ 42	$ 815,000
ROW	9	AC	$ 3,000	$ 27,000
14" Water Line				
Pipe	82,300	FT	$ 32	$ 2,634,000
ROW	38	AC	$ 3,000	$ 113,000
12" Water Line				
Pipe	63,700	FT	$ 28	$ 1,784,000
ROW	29	AC	$ 3,000	$ 88,000
10" Water Line				
Pipe	18,500	FT	$ 24	$ 444,000
ROW	8	AC	$ 3,000	$ 25,000
8" Water Line				
Pipe	51,200	FT	$ 20	$ 1,024,000
ROW	18	AC	$ 3,000	$ 53,000
Engineering and Contingencies	30%			$ 3,793,000
Subtotal of Pipeline(s)				**$ 16,992,000**

Table U-80, Continued

Pump Station(s)				
Station 1				
Pump, building, & appurtances	717	hp	$	1,933,000
Storage Tank	2,930,000	gal	$	578,000
Station 2				
Pump, building, & appurtances	501	hp	$	1,701,000
Storage Tank	2,280,000	gal	$	476,000
Station 3				
Pump, building, & appurtances	45	hp	$	372,000
Storage Tank	140,000	gal	$	82,000
Station 4				
Pump, building, & appurtances	50	hp	$	401,000
Storage Tank	640,000	gal	$	189,000
Station 5				
Pump, building, & appurtances	1	hp	$	13,000
Storage Tank	10,000	gal	$	8,000
Engineering and Contingencies	35%		$	2,014,000
Subtotal of Pump Station(s)			**$**	**7,767,000**
WATER TREATMENT FACILITIES				
Water Treatment Plant	18.00	MGD	$	22,680,000
Engineering and Contingencies	35%		$	7,938,000
Subtotal of Water Treatment Plant			**$**	**30,618,000**
PERMITTING AND MITIGATION	1%		**$**	**221,000**
CONSTRUCTION TOTAL			**$**	**55,598,000**
Interest During Construction		(24 months)	**$**	**4,347,000**
TOTAL CAPITAL COST			**$**	**59,945,000**

Table U-80, Continued

ANNUAL COSTS						
Debt Service					$	4,355,000
Operation and Maintenance Costs						
Pipeline	1%				$	152,000
Pump Station	2.50%				$	173,000
Estimated Annual Power Cost	$0.06/kWh				$	258,000
WTP Operation	3,207,160	1000 gal	$	0.35	$	1,123,000
Raw Water Cost	3,207,160	1000 gal	$	0.68	$	2,181,000
Total Annual Costs					**$**	**8,242,000**
UNIT COSTS (First 30 Years)						
Per Acre-Foot					$	837
Per 1,000 Gallons					$	2.57
UNIT COSTS (After 30 Years)						
Per Acre-Foot					$	395
Per 1,000 Gallons					$	1.21

Note: Raw water is assumed to cost $0.68 per 1,000 gallons.

Table U-81
Ellis County Water Supply Project

Midlothian Section Phase 1

Owner:	Midlothian				
Amount:	6,725	Ac-Ft/Yr			
CONSTRUCTION COSTS					
TRANSMISSION FACILITIES					
Pipeline(s)	**Qty.**	**Units**	**Unit Cost**		**Total Cost**
Tap Fee	1	EA	$ 60,000	$	60,000
30" Water Line					
Pipe	17,700	FT	$ 86	$	1,522,000
ROW	8	AC	$ 3,000	$	24,000
Engineering and Contingencies	30%			$	457,000
Subtotal of Pipeline(s)				**$**	**2,063,000**
Pump Station(s)					
Station 1					
Pump, building, & appurtances		hp		$	1,660,600
Storage Tank		gal		$	-
Engineering and Contingencies	35%			$	581,000
Subtotal of Pump Station(s)				**$**	**2,241,600**
WATER TREATMENT FACILITIES					
Water Treatment Plant	9.00	MGD		$	10,300,000
Engineering and Contingencies	35%			$	3,605,000
Subtotal of Water Treatment Plant				**$**	**13,905,000**
PERMITTING AND MITIGATION	1%			**$**	**38,000**
CONSTRUCTION TOTAL				**$**	**18,247,600**
Interest During Construction		(18 months)		**$**	**1,051,000**
TOTAL CAPITAL COST				**$**	**19,298,600**

Table U-81, Continued

ANNUAL COSTS						
Debt Service					$	1,402,000
Operation and Maintenance Costs						
Pipeline	1%				$	18,000
Pump Station	2.50%				$	50,000
Estimated Annual Power Cost	$0.06/kWh				$	63,000
WTP Operation	2,191,451	1000 gal	$	0.35	$	767,000
Raw Water Cost	2,191,451	1000 gal	$	0.68	$	1,490,000
Total Annual Costs					**$**	**3,790,000**
UNIT COSTS (First 30 Years)						
Per Acre-Foot					$	564
Per 1,000 Gallons					$	1.73
UNIT COSTS (After 30 Years)						
Per Acre-Foot					$	355
Per 1,000 Gallons					$	1.09

Notes:
Raw water is assumed to cost $0.68 per 1,000 gallons.
Based on pump station costs provided by Jones & Carter, Inc.

Table U-81, Continued

Midlothian Section Phase 2

Owner:	Midlothian				
Amount:	5,488	Ac-Ft/Yr			
CONSTRUCTION COSTS					
TRANSMISSION FACILITIES					
Pipeline(s)	**Qty.**	**Units**	**Unit Cost**		**Total Cost**
Tap Fee	1	EA	$ 60,000	$	60,000
30" Water Line					
Pipe	17,700	FT	$ 86	$	1,522,000
ROW	8	AC	$ 3,000	$	24,000
Engineering and Contingencies	30%			$	457,000
Subtotal of Pipeline(s)				**$**	**2,063,000**
Pump Station(s)					
Station 1					
Pump, building, & appurtances		hp		$	1,660,600
Storage Tank		gal		$	-
Engineering and Contingencies	35%			$	581,000
Subtotal of Pump Station(s)				**$**	**2,241,600**
WATER TREATMENT FACILITIES					
Water Treatment Plant Expansion	6.00	MGD		$	7,950,000
Engineering and Contingencies	35%			$	2,783,000
Subtotal of Water Treatment Plant				**$**	**10,733,000**
PERMITTING AND MITIGATION	1%			**$**	**38,000**
CONSTRUCTION TOTAL				**$**	**15,075,600**
Interest During Construction		(18 months)		**$**	**868,000**
TOTAL CAPITAL COST				**$**	**15,943,600**

Table U-81, Continued

ANNUAL COSTS						
Debt Service					$	1,158,000
Operation and Maintenance Costs						
Pipeline	1%				$	18,000
Pump Station	2.50%				$	50,000
Estimated Annual Power Cost	$0.06/kWh				$	69,000
WTP Operation	1,788,162	1000 gal	$	0.35	$	626,000
Raw Water Cost	1,788,162	1000 gal	$	0.68	$	1,216,000
Total Annual Costs					**$**	**3,137,000**
UNIT COSTS (First 30 Years)						
Per Acre-Foot					$	572
Per 1,000 Gallons					$	1.75
UNIT COSTS (After 30 Years)						
Per Acre-Foot					$	361
Per 1,000 Gallons					$	1.11
TOTAL UNIT COST FOR PHASE 1 AND 2						
UNIT COSTS (First 30 Years)						
Per Acre-Foot					$	567
Per 1,000 Gallons					$	1.74
UNIT COSTS (After 30 Years)						
Per Acre-Foot					$	358
Per 1,000 Gallons					$	1.10

Notes:
Raw water is assumed to cost $0.68 per 1,000 gallons.
Based on pump station costs provided by Jones & Carter, Inc.

Table U-82
Ellis County Water Supply Project
Ennis Section

Owner:	Ennis				
Amount:	4,446	Ac-Ft/Yr			
CONSTRUCTION COSTS					
TRANSMISSION FACILITIES					
Pipeline(s)	**Qty.**	**Units**	**Unit Cost**		**Total Cost**
Tap Fee	1	EA	$ 60,000	$	60,000
24" Water Line					
Pipe	44,700	FT	$ 90	$	4,026,000
ROW		AC		$	-
Engineering and Contingencies	30%			$	1,208,000
Subtotal of Pipeline(s)				**$**	**5,294,000**
WATER TREATMENT FACILITIES					
Water Treatment Plant Expansion	8.00	MGD		$	9,600,000
Engineering and Contingencies	35%			$	3,360,000
Subtotal of Water Treatment Plant				**$**	**12,960,000**
PERMITTING AND MITIGATION	1%			**$**	**48,000**
CONSTRUCTION TOTAL				**$**	**18,302,000**
Interest During Construction		(18 months)		**$**	**1,054,000**
TOTAL CAPITAL COST				**$**	**19,356,000**
ANNUAL COSTS					
Debt Service				$	1,406,000
Operation and Maintenance Costs					
Pipeline	1%			$	48,000
WTP Operation	1,448,734	1000 gal	$ 0.35	$	507,000
Raw Water Cost	1,448,734	1000 gal	$ 0.68	$	985,000
Total Annual Costs				**$**	**2,946,000**

Table U-82, Continued

UNIT COSTS (First 30 Years)		
Per Acre-Foot	$	663
Per 1,000 Gallons	$	2.03
UNIT COSTS (After 30 Years)		
Per Acre-Foot	$	346
Per 1,000 Gallons	$	1.06

Notes:
Raw water is assumed to cost $0.68 per 1,000 gallons.
Based on pipeline construction bid of $4.026 million (obtained from Black & Veatch).

Table U-83
Trinity River Authority Las Colinas Reuse (Dallas County Irrigation)

Owner: Trinity River Authority
Amount: 7,000 Ac-Ft/Yr

	Size	Quantity	Unit	Unit Price	Cost
CAPITAL COSTS					
Cost of Additional Pipeline	24-inch	44,500	LF	$99	$4,406,000
Engineering & Contingencie (30%)					$1,322,000
Total Pipeline Cost					**$5,728,000**
Cost of Pump Station	770 HP	1	LS	$2,040,000	$2,040,000
Engineering & Contingencie (35%)					$714,000
Total Pump Station Cost					**$2,754,000**
TOTAL CAPITAL COST					**$8,482,000**
Permitting and Mitigation					**$77,000**
Interest during Construction (24 months)					**$663,000**
TOTAL COST					**$9,222,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$669,968
Electricity ($0.06 kWh)					$132,945
Operation & Maintenance					$114,072
Purchase of Treated Wastewater for Reuse			$81.46/ac-ft		$570,220
Total Annual Costs					**$1,487,205**
UNIT COSTS (Pre-Amortization)					
Per Acre-Foot					$212
Per 1,000 gallons					$0.65
UNIT COSTS (After Amortization)					
Per Acre-Foot					$117
Per 1,000 gallons					$0.36

Note: Cost to purchase reuse water is assumed to be $81.46 per acre-foot.

Table U-84
Trinity River Authority Dallas County Reuse for Steam Electric Power

Owner: Trinity River Authority
Amount: 3,000 Ac-Ft/Yr

CAPITAL COSTS	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Cost of Pipeline	20-inch	26,400	LF	$77	$2,033,000
Right of Way Easements (ROW)	20 ft.	12	Acre	$30,000	$364,000
Engineering & Contingencies (30%)					$610,000
Total Pipeline Cost					**$3,007,000**
Cost of Pump Station	180 HP	1	LS	$868,000	$868,000
Engineering & Contingencies (35%)					$304,000
Total Pump Station Cost					**$1,172,000**
TOTAL CAPITAL COST					**$4,179,000**
Permitting and Mitigation					**$35,000**
Interest during Construction (12 months)					**$174,000**
Total Raw Water Delivery Capital Cost					**$4,388,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$318,783
Electricity ($0.06 kWh)					$38,085
Operation & Maintenance					$50,000
Purchase of Reuse Water					$244,380
Total Annual Costs					**$651,248**
UNIT COSTS (Joe Pool) (During Amortization)					
Per Acre-Foot					$217
Per 1,000 gallons					$0.67
UNIT COSTS (Joe Pool) (After Amortization)					
Per Acre-Foot					$111
Per 1,000 gallons					$0.34

Note: Cost to purchase reuse water is assumed to be $81.46 per acre-foot.

Table U-85
Trinity River Authority Ellis County Reuse for Steam Electric Power

Trinity River Authority
40,000 ac-ft/yr
Assume 4 10,000 acre-feet per year projects, each with 20 miles of pipeline (5 miles urban, 15 rural)

CAPITAL COSTS

Phase 1

	Size	Quantity	Units	Unit Price	Cost
Transmission Facilities					
Pipeline (Rural)	36	79,200	LF	$ 114	$ 9,029,000
Pipeline (Urban)	36	26,400	LF	$ 171	$ 4,514,000
Right of Way Easements (Rural)		36.4	Ac	$ 3,000	$ 109,000
Right of Way Easements (Urban)		12.1	Ac	$ 30,000	$ 363,000
Pipeline Eng &Contingencies (30%)					$ 4,063,000
Pipeline Subtotal					**$ 18,078,000**
Pump Station	600 HP	1	LS	$ 1,800,000	$ 1,800,000
Engineering and Contingencies (35%)					$ 630,000
Pump Station Subtotal					**$ 2,430,000**
Permitting and Mitigation					**$ 184,000**
Interest During Construction			**(12 months)**		**$ 862,000**
TOTAL CAPITAL COST					**$ 21,554,000**

Phase 1 ANNUAL COSTS

	Size	Quantity	Units	Unit Price	Cost
Debt Service (6%, 30 years)					$ 1,566,000
Pipeline O&M (1%)					$ 163,000
Pump O&M (2.5%)					$ 54,000
Electricity					$ 130,000
Purchase of Reuse Water					$ 815,000
TOTAL ANNUAL COST					**$ 2,728,000**

Phase 1 Unit Costs (Pre-Amortization)

Cost per acre-ft	$ 273
Cost per 1000 gallons	$ 0.84

Phase 1 Unit Costs (After Amortization)

Cost per acre-ft	$ 116
Cost per 1000 gallons	$ 0.36

Table U-85, Continued

Phase 2

	Size	Quantity	Units	Unit Price		Cost	
Transmission Facilities							
Pipeline (Rural)	36	79,200	LF	$	114	$	9,029,000
Pipeline (Urban)	36	26,400	LF	$	171	$	4,514,000
Right of Way Easements (Rural)		36.4	Ac	$	3,000	$	109,000
Right of Way Easements (Urban)		12.1	Ac	$	30,000	$	363,000
Pipeline Eng &Contingencies (30%)						$	4,063,000
Pipeline Subtotal						**$**	**18,078,000**
Pump Station	600 HP	1	LS	$	1,800,000	$	1,800,000
Engineering and Contingencies (35%)						$	630,000
Pump Station Subtotal						**$**	**2,430,000**
Permitting and Mitigation						**$**	**184,000**
Interest During Construction			**(12 months)**			**$**	**862,000**
Phase 2 TOTAL CAPITAL COST						**$**	**21,554,000**

Phase 2 ANNUAL COSTS

	Size	Quantity	Units	Unit Price	Cost	
Debt Service (6%, 30 years)					$	1,566,000
Pipeline O&M (1%)					$	163,000
Pump O&M (2.5%)					$	54,000
Electricity					$	130,000
Purchase of Reuse Water					$	815,000
TOTAL ANNUAL COST					**$**	**2,728,000**
Phase 2 Unit Costs (Pre-Amortization)						
Cost per acre-ft					$	273
Cost per 1000 gallons					$	0.84
Phase 2 Unit Costs (After Amortization)						
Cost per acre-ft					$	116
Cost per 1000 gallons					$	0.36

Table U-85, Continued

Phase 3

	Size	Quantity	Units	Unit Price	Cost
Transmission Facilities					
Pipeline (Rural)	36	79,200	LF	$ 114	$ 9,029,000
Pipeline (Urban)	36	26,400	LF	$ 171	$ 4,514,000
Right of Way Easements (Rural)		36.4	Ac	$ 3,000	$ 109,000
Right of Way Easements (Urban)		12.1	Ac	$ 30,000	$ 363,000
Pipeline Eng &Contingencies (30%)					$ 4,063,000
Pipeline Subtotal					**$ 18,078,000**
Pump Station	600 HP	1	LS	$ 1,800,000	$ 1,800,000
Pump Station Subtotal					**$ 2,430,000**
Permitting and Mitigation					**$ 184,000**
Interest During Construction			**(12 months)**		**$ 862,000**
Phase 3 TOTAL CAPITAL COST					**$ 21,554,000**

Phase 3 ANNUAL COSTS

	Size	Quantity	Units	Unit Price	Cost
Debt Service (6%, 30 years)					$ 1,566,000
Pipeline O&M (1%)					$ 163,000
Pump O&M (2.5%)					$ 54,000
Electricity					$ 130,000
Purchase of Reuse Water					$ 815,000
TOTAL ANNUAL COST					**$ 2,728,000**

Phase 3 Unit Costs (Pre-Amortization)

Cost per acre-ft	$ 273
Cost per 1000 gallons	$ 0.84

Phase 3 Unit Costs (After Amortization)

Cost per acre-ft	$ 116
Cost per 1000 gallons	$ 0.36

Table U-85, Continued

Phase 4

	Size	Quantity	Units	Unit Price		Cost	
Transmission Facilities							
Pipeline (Rural)	36	79,200	LF	$	114	$	9,029,000
Pipeline (Urban)	36	26,400	LF	$	171	$	4,514,000
Right of Way Easements (Rural)		36.4	Ac	$	3,000	$	109,000
Right of Way Easements (Urban)		12.1	Ac	$	30,000	$	363,000
Pipeline Eng &Contingencies (30%)						$	4,063,000
Pipeline Subtotal						**$**	**18,078,000**
Pump Station	600 HP	1	LS	$	1,800,000	$	1,800,000
Engineering and Contingencies (35%)						$	630,000
Pump Station Subtotal						**$**	**2,430,000**
Permitting and Mitigation						**$**	**184,000**
Interest During Construction			**(12 months)**			**$**	**862,000**
Phase 4 TOTAL CAPITAL COST						**$**	**21,554,000**

Table A-6, Continued

Phase 4 ANNUAL COSTS

	Size	Quantity	Units	Unit Price	Cost	
Debt Service (6%, 30 years)					$	1,566,000
Pipeline O&M (1%)					$	163,000
Pump O&M (2.5%)					$	54,000
Electricity					$	130,000
Purchase of Reuse Water					$	815,000
TOTAL ANNUAL COST					**$**	**2,728,000**
Phase 4 Unit Costs (Pre-Amortization)						
Cost per acre-ft					$	273
Cost per 1000 gallons					$	0.84
Phase 4 Unit Costs (After Amortization)						
Cost per acre-ft					$	116
Cost per 1000 gallons					$	0.36

Table U-86
Trinity River Authority Freestone County Reuse for Steam Electric Power

Trinity River Authority
20,000 ac-ft/yr
Assume 2 10,000 acre-feet per year projects, each with 15 miles of pipeline.

CAPITAL COSTS

Phase 1

	Size	Quantity	Units	Unit Price	Cost
Transmission Facilities					
Pipeline (Rural)	36	79,200	LF	$ 114	$ 9,029,000
Right of Way Easements (Rural)		36.4	Ac	$ 3,000	$ 109,000
Pipeline Eng &Contingencies (30%)					$ 2,709,000
Pipeline Subtotal					**$ 11,847,000**
Pump Station	525	1	LS	$ 2,350,000	$ 2,350,000
Engineering and Contingencies (35%)					$ 823,000
Pump Station Subtotal					**$ 3,173,000**
Permitting and Mitigation					**$ 137,000**
Interest During Construction			**(12 months)**		**$ 632,000**
TOTAL CAPITAL COST					**$ 15,789,000**

Phase 1 ANNUAL COSTS

	Size	Quantity	Units	Unit Price	Cost
Debt Service (6%, 30 years)					$ 1,147,000
Pipeline O&M (1%)					$ 108,000
Pump O&M (2.5%)					$ 71,000
Electricity					$ 121,000
Purchase of Reuse Water					$ 815,000
TOTAL ANNUAL COST					**$ 2,262,000**

Phase 1 Unit Costs (Pre-Amortization)

Cost per acre-ft	$ 226
Cost per 1000 gallons	$ 0.69

Phase 1 Unit Costs (After Amortization)

Cost per acre-ft	$ 112
Cost per 1000 gallons	$ 0.34

Table U-86, Continued

Phase 2

	Size	Quantity	Units	Unit Price	Cost
Transmission Facilities					
Pipeline (Rural)	36	79,200	LF	$ 114	$ 9,029,000
Right of Way Easements (Rural)		36.4	Ac	$ 3,000	$ 109,000
Pipeline Eng &Contingencies (30%)					$ 2,709,000
Pipeline Subtotal					**$ 11,847,000**
Pump Station	525 HP	1	LS	$ 2,150,000	$ 2,350,000
Engineering and Contingencies (35%)					$ 823,000
Pump Station Subtotal					**$ 3,173,000**
Permitting and Mitigation					**$ 137,000**
Interest During Construction			**(12 months)**		**$ 632,000**
TOTAL CAPITAL COST					**$ 15,789,000**

Phase 2 ANNUAL COSTS

	Size	Quantity	Units	Unit Price	Cost
Debt Service (6%, 30 years)					$ 1,147,000
Pipeline O&M (1%)					$ 108,000
Pump O&M (2.5%)					$ 71,000
Electricity					$ 121,000
Purchase of Reuse Water					$ 815,000
TOTAL ANNUAL COST					**$ 2,262,000**

Phase 2 Unit Costs (Pre-Amortization)

Cost per acre-ft	$ 226
Cost per 1000 gallons	$ 0.69

Phase 2 Unit Costs (After Amortization)

Cost per acre-ft	$ 112
Cost per 1000 gallons	$ 0.34

Table U-87
Trinity River Authority Kaufman County Reuse for Steam Electric Power

Trinity River Authority
15,000 ac-ft/yr
Assume 2 7,500 acre-feet per year projects, each with 15 miles of pipeline.

CAPITAL COSTS

Phase 1

	Size	Quantity	Units	Unit Price		Cost	
Transmission Facilities							
Pipeline (Rural)	30	79,200	LF	$	86	$	6,811,000
Right of Way Easements (Rural)		36.4	Ac	$	3,000	$	109,000
Pipeline Eng &Contingencies (30%)						$	2,043,000
Pipeline Subtotal						**$**	**8,963,000**
Pump Station	450 HP	1	LS	$	2,150,000	$	2,150,000
Engineering and Contingencies (35%)						$	753,000
Pump Station Subtotal						**$**	**2,903,000**
Permitting and Mitigation						**$**	**108,000**
Interest During Construction			**(12 months)**			**$**	**499,000**
TOTAL CAPITAL COST						**$**	**12,473,000**

Phase 1 ANNUAL COSTS

	Size	Quantity	Units	Unit Price	Cost	
Debt Service (6%, 30 years)					$	906,000
Pipeline O&M (1%)					$	82,000
Pump O&M (2.5%)					$	65,000
Electricity					$	100,000
Purchase of Reuse Water					$	611,000
TOTAL ANNUAL COST					**$**	**1,764,000**

Phase 1 Unit Costs (Pre-Amortization)

Cost per acre-ft	$	176
Cost per 1000 gallons	$	0.54

Phase 1 Unit Costs (After Amortization)

Cost per acre-ft	$	86
Cost per 1000 gallons	$	0.26

Table U-87, Continued

Phase 2

	Size	Quantity	Units	Unit Price	Cost
Transmission Facilities					
Pipeline (Rural)	30	79,200	LF	$ 86	$ 6,811,000
Right of Way Easements (Rural)		36.4	Ac	$ 3,000	$ 109,000
Pipeline Eng &Contingencies (30%)					$ 2,043,000
Pipeline Subtotal					**$ 8,963,000**
Pump Station	450 HP	1	LS	$ 2,150,000	$ 2,150,000
Engineering and Contingencies (35%)					$ 753,000
Pump Station Subtotal					**$ 2,903,000**
Permitting and Mitigation					**$ 108,000**
Interest During Construction			**(12 months)**		**$ 499,000**
TOTAL CAPITAL COST					**$ 12,473,000**

Phase 2 ANNUAL COSTS

	Size	Quantity	Units	Unit Price	Cost
Debt Service (6%, 30 years)					$ 906,000
Pipeline O&M (1%)					$ 82,000
Pump O&M (2.5%)					$ 65,000
Electricity					$ 100,000
Purchase of Reuse Water					$ 611,000
TOTAL ANNUAL COST					**$ 1,764,000**

Phase 2 Unit Costs (Pre-Amortization)

Cost per acre-ft	$ 176
Cost per 1000 gallons	$ 0.54

Phase 2 Unit Costs (After Amortization)

Cost per acre-ft	$ 86
Cost per 1000 gallons	$ 0.26

Table U-88
Trinity River Authority - Tarrant County Water Supply Project Expansions

Owner:	Trinity River Authority		
Supply:	7,473	Ac-Ft/Yr	

WATER TREATMENT PLANT EXPANSION # 1 (2008)	**Quantity**	**Unit**	**Cost**
Cost of WTP Expansion	15	MGD	$14,400,000
Engineering & Contingencies (35%)			$5,040,000
Subtotal			**$19,440,000**
Interest During Construction	**(18 months)**		**$888,000**
TOTAL COST FOR EXPANSION #1			**$20,328,000**
ANNUAL COSTS FOR EXPANSION #1			
Debt Service (6% for 30 years)			$1,476,807
Raw Water Purchase ($0.68/1,000 gallons)			$1,655,000
Operation & Maintenance ($0.35/1,000 gallons)	2,433,333	1,000 gal.	$851,667
Total Annual Costs			**$3,983,474**
UNIT COSTS (Pre-Amortization)			
Per Acre-Foot			$533
Per 1,000 Gallons			$1.64
UNIT COSTS (After Amortization)			
Per Acre-Foot			$335
Per 1,000 Gallons			$1.03
WATER TREATMENT PLANT EXPANSION # 2 (2017)	**Quantity**	**Unit**	**Cost**
Cost of WTP Expansion	15	MGD	$14,400,000
Engineering & Contingencies (35%)			$5,040,000
Subtotal			**$19,440,000**
Interest During Construction	**(18 months)**		**$888,000**
TOTAL COST FOR EXPANSION #2			**$20,328,000**

Table U-88, Continued

ANNUAL COSTS FOR EXPANSION #2			
Debt Service (6% for 30 years)			$1,477,000
Raw Water Purchase ($0.68/1,000 gallons)			$1,655,000
Operation & Maintenance ($0.35/1,000 gallons)	2,433,333	1,000 gal.	$852,000
Total Annual Costs			**$3,984,000**
UNIT COSTS (Pre-Amortization)			
Per Acre-Foot			$533
Per 1,000 Gallons			$1.64
UNIT COSTS (After Amortization)			
Per Acre-Foot			$335
Per 1,000 Gallons			$1.03

Table U-89
Trinity River Authority Reuse from Denton Creek Wastewater Treatment Plant

Owner:	Trinity River Authority		
Amount:	15,000	Ac-Ft/Yr	
Irrigation	7,500	Ac-Ft/Yr	Denton and Tarrant Counties
Municipal	7,500	Ac-Ft/Yr	Tarrant County

IRRIGATION FOR DENTON AND TARRANT COUNTIES

	Size	Quantity	Unit	Unit Price	1998 Cost*	2002 Cost
Cost of Additional Pipeline						
Main Pipeline	24-inch	18,000	LF	$99		$1,782,000
Distribution Pipeline	8-inch	17,500	LF	$30		$525,000
Right of Way Easements (Urban)		16	AC	$30,000		$489,000
Engineering & Contingenices (30%)						$692,000
Total Pipeline Cost						**$3,488,000**
Pump Station					$550,000	$606,000
Chlorine Bleach Facility					$100,000	$110,000
3 - 7 MG Storage Ponds					$394,000	$434,000
Potable Water Supply Backup Water		6	EA	$10,000	$60,000	$66,000
Engineering and Contingencies (35%)						$426,000
Total Pump Station & Facilities Cost						**$1,642,000**
Cost of Permitting						**$500,000**
Interest During Construction			**(24 months)**			**$460,000**
Total Capital Cost						**$6,090,000**
Denton County Capital Cost						**$4,060,000**
Tarrant County Capital Cost						**$2,030,000**
ANNUAL COSTS (Denton County)						
Debt Service (6% for 30 years)						$295,000
Electricity					$58,747	$65,000
Chlorine Cost					$52,000	$57,000
Operation & Maintenance						$38,000
Purchase of Reuse Water						$407,000
Total Annual Costs						**$862,000**

Table U-89, continued

UNIT COSTS - Denton County (With Debt Service)		
Per Acre-Foot		$172
Per 1,000 gallons		$0.53
UNIT COSTS - Denton County (Without Debt Service)		
Per Acre-Foot		$113
Per 1,000 gallons		$0.35
ANNUAL COSTS (Tarrant County)		
Debt Service (6% for 30 years)		$147,000
Electricity	$29,373	$32,000
Chlorine Cost	$26,000	$29,000
Operation & Maintenance		$19,000
Purchase of Reuse Water		$204,000
Total Annual Costs		**$431,000**
UNIT COSTS - Tarrant County (With Debt Service)		
Per Acre-Foot		$172
Per 1,000 gallons		$0.53
UNIT COSTS - Tarrant County (Without Debt Service)		
Per Acre-Foot		$114
Per 1,000 gallons		$0.35

MUNICIPAL REUSE TO LAKE GRAPEVINE

Assume no Capital Costs	$0.00
ANNUAL COSTS (Tarrant County)	
Purchase of Reuse Water	$611,000
UNIT COSTS - Tarrant County	
Per Acre-Foot	$81
Per 1,000 gallons	$0.25

Note: Cost to purchase reuse water is assumed to be $81.46 per acre-foot.
1998 Cost information is based on Freese and Nichols 1998 Study.

Table U-90
Freestone County S. E. Power by TRA from Tarrant Regional Water District

Owner: Unknown
Amount: 1,000 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	14 in.	26,400	LF	$32	$845,000
Right of Way Easements (ROW)	20 ft.	12	Acre	$3,000	$36,000
Engineering and Contingencies (30%)					$264,000
Subtotal of Pipeline					**$1,145,000**
Pump Station(s)					
Booster Pump Station	45 HP	1	LS	$370,000	$370,000
Engineering and Contingencies (35%)					$130,000
Subtotal of Pump Station(s)					**$500,000**
Permitting and Mitigation					**$15,000**
CONSTRUCTION TOTAL					**$1,660,000**
Interest During Construction			**(12 months)**		**$69,000**
TOTAL COST					**$1,729,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$126,000
Electricity ($0.06 kWh)					$9,000
Raw Water ($0.68 per 1,000 gallons)					$222,000
Operation & Maintenance					$21,000
Total Annual Costs					**$378,000**
UNIT COSTS (during amortization)					
Per Acre-Foot					$378
Per 1,000 Gallons					$1.16

Table U-91
Trinity River Authority Dallas and Johnson Counties Reuse for Steam Electric Power

Owner:	Trinity River Authority			
Amount:	23,000	Ac-Ft/Yr		
Dallas County	3,000	Ac-Ft/Yr	13%	Mountain Creek Lake
Johnson County	20,000	Ac-Ft/Yr	87%	Joe Pool Lake

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Total Cost	Mtn Crk	Joe Pool
Pipeline	42-inch	60,200	LF	$202	$12,160,000	$648,200	$11,511,800
Right of Way Easements (ROW)	30 ft.	41	Acre	$30,000	$1,244,000	$66,300	$1,177,700
Engineering & Contingencies (30%)					$3,648,000	$194,000	$3,454,000
Total Pipeline Cost					**$17,052,000**	**$908,500**	**$16,143,500**
Cost of Pump Station	1300 HP	1	LS	$2,730,000	$2,730,000	$356,100	$2,373,900
Engineering & Contingencies (35%)					$956,000	$125,000	$831,000
Total Pump Station Cost					**$3,686,000**	**$481,100**	**$3,204,900**
TOTAL CAPITAL COST					**$20,738,000**	**$1,389,600**	**$19,348,400**
Permitting and Mitigation					**$179,000**	**$12,000**	**$167,000**
Interest during Construction (12 months)					**$864,000**	**$58,000**	**$806,000**
Total Raw Water Delivery Capital Cost					**$21,781,000**	**$1,459,600**	**$20,321,400**
ANNUAL COSTS							
Debt Service (6% for 30 years)					$1,582,400	$106,000	$1,476,300
Electricity ($0.06 kWh)					$405,500	$52,900	$352,600
Operation & Maintenance					$227,800	$18,500	$209,400
Purchase of Reuse Water					$1,873,600	$244,400	$1,629,200
Total Annual Costs					**$4,089,300**	**$421,800**	**$3,667,500**
UNIT COSTS (Mountain Creek) (During Amortization)							
Per Acre-Foot						$141	
Per 1,000 gallons						$0.43	
UNIT COSTS (Mountain Creek) (After Amortization)							
Per Acre-Foot						$105	
Per 1,000 gallons						$0.32	
UNIT COSTS (Joe Pool) (During Amortization)							
Per Acre-Foot							$183
Per 1,000 gallons							$0.56
UNIT COSTS (Joe Pool) (After Amortization)							
Per Acre-Foot							$110
Per 1,000 gallons							$0.34

Note: Cost to purchase reuse water is assumed to be $81.46 per acre-foot.

Table U-92
Trinity River Authority Treated Water to Johnson County SUD

It is assumed that this cost will be developed by Region G.

Table U-93
Trinity River Authority Reuse for Dallas and Ellis County Irrigation from 10-Mile Creek Project

Owner: Trinity River Authority
Amount: 250 Ac-Ft/Yr

	Size	Quantity	Unit	Unit Price	Cost
Cost of Additional Pipeline					
Pipeline	8-inch	3,000	LF	$30	$90,000
Right of Way Easements (Urban)		1	AC	$30,000	$30,000
Engineering & Contingenices (30%)					$27,000
Total Pipeline Cost					**$147,000**
Pump Station					$100,000
Engineering and Contingencies (35%)					$35,000
Total Pump Station & Facilities Cost					**$135,000**
Cost of Permitting					**$2,000**
Interest During Construction			**(6 months)**		**$6,000**
Total Capital Cost					**$290,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$21,000
Electricity					$3,000
Operation & Maintenance					$4,000
Purchase of Reuse Water					$20,000
Total Annual Costs					**$48,000**
UNIT COSTS - (With Debt Service)					
Per Acre-Foot					$192
Per 1,000 gallons					$0.59
UNIT COSTS - (Without Debt Service)					
Per Acre-Foot					$108
Per 1,000 gallons					$0.33

Note: Cost to purchase reuse water is assumed to be $81.46 per acre-foot.

Table U-94
UTRWD Water Treatment Plant and
Treated Water Distribution System Water Management Strategies

OWNER: UTRWD

Project	Date	Capital Budget (Including E&C and Interest)
2005-2010 Projects		
Harpool WTP Phases 1&2 (40 MGD)	2006	$43,236,000
42" Raw Water Pipeline to Harpool WTP	2006	$9,024,000
Northeast Finished Water Line East (Phase 2)	2006	$6,486,000
Activate Western Portion of Southwest Piping	2007	$650,000
Northeast Finished Water Line West (Phase 2)	2008	$4,658,000
Southwest Pipeline Phase 2	2009	$9,139,000
Land for Alternative Raw Water Intake for Harpool WTP	2009	$250,000
Total, 2005-2010		**$73,443,000**
Annual Costs for 2005-2010 Projects		
Debt Service (6% interest, 30 year bonds)		$5,336,000
Power (Estimated)		$1,629,000
Water Treatment Plant Operation (7,300,000 gallons at $0.35 per 1,000 gallons)		$2,555,000
Operation and Maintenance		$300,000
Total Pre-Amortization		**$9,820,000**
Total After Amortization		**$4,484,000**
2010-2020 Projects		
Miscellaneous Capital Improvements	2012	$2,077,000
Southwest Pipeline Phase 3	2013	$1,376,000
Southwest Pump Station and Ground Storage	2013	$3,815,000
West Loop, Northlake	2013	$1,559,000
West Loop, Ponder	2013	$2,211,000
West Loop, Ponder-Krum	2013	$5,839,000
Parallel Pipeline RWTP to Stonehill PS	2014	$12,652,000
North Pipeline (PH 3)	2016	$3,818,000
Total, 2010-2020		**$33,347,000**

Table U-94, Continued

Annual Costs for 2005-2010 Projects		
Debt Service (6% interest, 30 year bonds)		$2,423,000
Power (Estimated)		$2,003,000
Operation and Maintenance		$292,000
Total Pre-Amortization		**$4,718,000**
Total After Amortization		**$2,295,000**
2020-2030 Projects		
Northwest Loop - Sanger Pipeline/Ray Roberts Extension	2022	$2,182,000
Pilot Point Pipeline Extension	2022	$2,928,000
Subtotal		**$5,110,000**
Water Treatment Plant Expansion (40 MGD)		$31,300,000
Other Pipeline Projects (estimated)		$16,000,000
Other Pump Station Projects (estimated)		$5,000,000
Engineering and Contingencies (30% for Pipelines, 35% for others)		$17,505,000
Interest during Contruction (18 months)		$4,305,000
		$79,220,000
Annual Costs for 2020-2030 Projects		
Debt Service (6% interest, 30 year bonds)		$5,755,000
Power (Estimated)		$2,000,000
Water Treatment Plant Operation (7,300,000 gallons at $0.35 per 1,000 gallons)		$2,555,000
Operation and Maintenance		$393,000
Total Pre-Amortization		**$10,703,000**
Total After Amortization		**$4,948,000**
2030-2040 Projects		
Water Treatment Plant Expansion (60 MGD)		$43,800,000
Other Pipeline Projects (estimated)		$20,000,000
Other Pump Station Projects (estimated)		$5,000,000
Engineering and Contingencies (30% for Pipelines, 35% for others)		$23,080,000
Interest during Contruction (18 months)		$5,666,000
		$97,546,000

Table U-94, Continued

Annual Costs for 2030-2040 Projects	
Debt Service (6% interest, 30 year bonds)	$7,087,000
Power (Estimated)	$2,326,000
Water Treatment Plant Operation (10,950,000 gallons at $0.35 per 1,000 gallons)	$3,833,000
Operation and Maintenance	$390,000
Total Pre-Amortization	**$13,636,000**
Total After Amortization	**$6,549,000**
2040-2050 Projects	
Water Treatment Plant Expansion (40 MGD)	$31,300,000
Other Pipeline Projects (estimated)	$20,000,000
Other Pump Station Projects (estimated)	$5,000,000
Engineering and Contingencies (30% for Pipelines, 35% for others)	$18,705,000
Interest during Contruction (18 months)	$4,626,000
	$79,631,000
Annual Costs for 2040-2050 Projects	
Debt Service (6% interest, 30 year bonds)	$5,785,000
Power (Estimated)	$2,238,000
Water Treatment Plant Operation (7,300,000 gallons at $0.35 per 1,000 gallons)	$2,555,000
Operation and Maintenance	$390,000
Total Pre-Amortization	**$10,968,000**
Total After Amortization	**$5,183,000**
2050-2060 Projects	
Water Treatment Plant Expansion (40 MGD)	$31,300,000
Other Pipeline Projects (estimated)	$20,000,000
Other Pump Station Projects (estimated)	$5,000,000
Engineering and Contingencies (30% for Pipelines, 35% for others)	$18,705,000
Interest during Contruction (18 months)	$4,626,000
	$79,631,000

Table U-94, Continued

Annual Costs for 2050-2060 Projects	
Debt Service (6% interest, 30 year bonds)	$5,785,000
Power (Estimated)	$1,540,000
Water Treatment Plant Operation (7,300,000 gallons at $0.35 per 1,000 gallons)	$2,555,000
Operation and Maintenance	$390,000
Total Pre-Amortization	**$10,270,000**
Total After Amortization	**$4,485,000**
TOTAL CAPITAL COST	**$442,818,000**

Table U-95
Upper Trinity Regional Water District Alternative Strategy Costs

Capital Costs

Strategy		**Basis for Cost**		**UTRWD Cost**	
	User	**Amount**	**Capital Cost**	**Amount**	**Capital Cost**
Toledo Bend	NTMWD	200,000	$886,002,000	48,000	$212,640,000
Wright Patman - System	DWU	130,000	$625,756,000	38,000	$182,913,000
Wright Patman - Raise Flood Pool	DWU	112,100	$572,036,000	38,000	$193,911,000
Wright Patman - Texarkana	DWU	100,000	$473,553,000	38,000	$179,950,000
Texoma - Blend	All	113,000	$182,587,700	25,000	$40,396,000
George Parkhouse North	NTMWD	118,960	$362,322,000	35,000	$106,601,000
George Parkhouse South	NTMWD	108,480	$480,099,000	35,000	$154,899,000
Additional Reuse	Permitting	N/A	N/A	15,000	$1,000,000

Annual Costs

Strategy		**Basis for Cost**		
	User	**Amount**	**Pre-Am**	**Post-Am**
Toledo Bend	NTMWD	200,000	$101,622,000	$37,255,000
Wright Patman - System	DWU	130,000	$69,479,000	$24,018,000
Wright Patman - Raise Flood Pool	DWU	112,100	$54,799,000	$13,241,000
Wright Patman - Texarkana	DWU	100,000	$55,618,000	$21,215,000
Texoma - Blend	All	113,000	$17,406,000	$4,141,000
George Parkhouse North	NTMWD	118,960	$35,198,000	$8,876,000
George Parkhouse South	NTMWD	108,480	$43,901,000	$9,022,000
Additional Reuse	Permitting	N/A		

Strategy		**Basis for Cost**		
	UTRWD Amount	**Pre-Am**	**Post-Am**	**Comments**
Toledo Bend	48,000	$25,953,000	$10,505,000	Add $0.10 per thousand gal to pump to Lewisville
Wright Patman - System	38,000	$20,309,000	$7,021,000	DWU delivered to Lewisville
Wright Patman - Raise Flood Pool	38,000	$18,576,000	$4,488,000	
Wright Patman - Texarkana	38,000	$21,135,000	$8,062,000	
Texoma - Blend	25,000	$3,851,000	$916,000	
George Parkhouse North	35,000	$11,496,000	$3,752,000	Add $0.10 per thousand gal to pump to Lewisville
George Parkhouse South	35,000	$15,305,000	$4,051,000	
Additional Reuse	15,000	$72,649	$0.00	No annual costs

Table U-95, Continued

Unit Costs

	UTRWD Amount	Pre-Am	Post-Am
Toledo Bend	48,000	$1.66	$0.67
Wright Patman - System	38,000	$1.64	$0.57
Wright Patman - Raise Flood Pool	38,000	$1.50	$0.36
Wright Patman - Texarkana	38,000	$1.71	$0.65
Texoma - Blend	25,000	$0.47	$0.11
George Parkhouse North	35,000	$1.01	$0.33
George Parkhouse South	35,000	$1.34	$0.36
Additional Reuse	15,000	$0.01	$0.00

TableU-96
Grayson County Water Supply Project

Owner: Grayson County
2060 Amount: 26,129 Ac-Ft/Yr

CONSTRUCTION COSTS

TRANSMISSION FACILITIES				**2020**	**2040**
Pipeline(s)	**Qty.**	**Units**	**Unit Cost**	**Phase I Cost**	**Phase II Cost**
54" Water Line					
Pipe	60,327	FT	$ 210	$ 12,669,000	$ -
ROW	42	AC	$ 3,000	$ 125,000	$ -
36" Water Line					
Pipe	106,321	FT	$ 114	$ 12,121,000	$ -
ROW	49	AC	$ 3,000	$ 146,000	$ -
30" Water Line					
Pipe	50,268	FT	$ 86	$ 4,323,000	$ -
ROW	23	AC	$ 3,000	$ 69,000	$ -
24" Water Line					
Pipe	35,961	FT	$ 99	$ 3,560,000	$ -
ROW	17	AC	$ 30,000	$ 495,000	$ -
24" Water Line					
Pipe	73,825	FT	$ 66	$ 4,872,000	$ -
ROW	34	AC	$ 3,000	$ 102,000	$ -
20" Water Line					
Pipe	58,677	FT	$ 51	$ 2,993,000	$ -
ROW	27	AC	$ 3,000	$ 81,000	$ -
18" Water Line					
Pipe	35,400	FT	$ 42	$ 1,487,000	$ -
ROW	16	AC	$ 3,000	$ 49,000	$ -
16" Water Line					
Pipe	53,667	FT	$ 37	$ 1,986,000	$ -
ROW	25	AC	$ 3,000	$ 74,000	$ -
14" Water Line					
Pipe	33,979	FT	$ 32	$ 1,087,000	$ -
ROW	16	AC	$ 3,000	$ 47,000	$ -
12" Water Line					
Pipe	159,726	FT	$ 28	$ 4,472,000	$ -
ROW	73	AC	$ 3,000	$ 220,000	$ -
10" Water Line					
Pipe	7,431	FT	$ 24	$ 178,000	$ -
ROW	3	AC	$ 3,000	$ 10,000	$ -
8" Water Line					
Pipe	31,496	FT	$ 20	$ 630,000	$ -
ROW	11	AC	$ 3,000	$ 33,000	$ -
Engineering and Contingencies	30%			$ 15,113,000	$ -
Subtotal of Pipeline(s)				**$ 66,942,000**	**$ -**

Table U-96, continued

Pump Station(s)						
Station 1						
Pump, building, & appurtances	2,546	hp	$	5,191,000	$	-
Storage Tank	0	gal	$	-	$	-
Station 2						
Pump, building, & appurtances	2,517	hp	$	3,862,000	$	-
Storage Tank	7,620,000	gal	$	1,424,000	$	-
Station 4						
Pump, building, & appurtances	142	hp	$	751,000	$	-
Storage Tank	550,000	gal	$	167,000	$	-
Station 5						
Pump, building, & appurtances	312	hp	$	1,237,000	$	-
Storage Tank	2,260,000	gal	$	473,000	$	-
Station 6						
Pump, building, & appurtances	111	hp	$	654,000	$	-
Storage Tank	460,000	gal	$	146,000	$	-
Station 7						
Pump, building, & appurtances	142	hp	$	750,000	$	-
Storage Tank	290,000	gal	$	109,000	$	-
Station 8						
Pump, building, & appurtances	49	hp	$	391,000	$	-
Storage Tank	160,000	gal	$	85,000	$	-
Engineering and Contingencies	35%		$	5,334,000	$	-
Subtotal of Pump Station(s)			**$**	**20,574,000**	**$**	**-**
WATER TREATMENT FACILITIES						
Water Treatment Plant Expansion						
Phase 1	25.00	MGD	$	45,350,000		$0
Phase 2 Expansion	20.00	MGD	$	-		$32,000,000
Northwestern Grayson Plant	1.00	MGD	$	5,200,000		$0
Engineering and Contingencies	35%		$	17,693,000	$	11,200,000
Subtotal of Water Treatment Plant			**$**	**68,243,000**	**$**	**43,200,000**
PERMITTING AND MITIGATION	1%		**$**	**787,000**	**$**	**-**
CONSTRUCTION TOTAL			**$**	**156,546,000**	**$**	**43,200,000**
Interest During Construction		(24 months)	**$**	**12,241,000**	**$**	**3,378,000**
TOTAL CAPITAL COST			**$**	**168,787,000**	**$**	**46,578,000**

Table U-96, continued

ANNUAL COSTS INCURRED BEGINNING IN 2020						
Debt Service					$	12,262,000
Operation and Maintenance Costs						
Pipeline	1%				$	605,000
Pump Station	2.50%				$	457,000
Estimated Annual Power Cost	$0.06/kWh				$	1,141,000
WTP Operation	4,745,000	1000 gal	$	0.75	$	3,559,000
WTP Brine Disposal	4,745,000	1000 gal	$	0.25	$	1,186,000
Raw Water Cost			$	163	$	2,375,000
Subtotal Annual Costs					**$**	**21,585,000**
ANNUAL COSTS INCURRED BEGINNING IN 2040						
Debt Service					$	3,384,000
Operation and Maintenance Costs						
WTP Operation	3,769,304	1000 gal	$	0.75	$	2,827,000
WTP Brine Disposal	3,769,304	1000 gal	$	0.25	$	942,000
Raw Water Cost			$	163	$	1,884,000
Subtotal Annual Costs					**$**	**9,037,000**

Annual and Unit Cost Summary

	Annual Costs	Unit Cost ($/ac-ft)	Unit Cost ($/kgal)
2010	$ 21,585,000	$ 1,481	$ 4.55
2020	$ 21,585,000	$ 1,481	$ 4.55
2030	$ 21,585,000	$ 1,481	$ 4.55
2040	$ 18,360,000	$ 703	$ 2.16
2050	$ 18,360,000	$ 703	$ 2.16
2060	$ 18,360,000	$ 703	$ 2.16

Table U-97
GTUA Collin-Grayson Municipal Alliance Water Transmission System

Owner:	GTUA (water from NTMWD)					
2060 Amount:	16,813	Ac-Ft/Yr				

Capital Cost Estimate by Freeman-Millican Engineers, 8/6/2004

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Transmission Facilities	**Qty.**	**Units**	**Unit Cost**		**Total Cost**	
McKinney to Bloomdale PS Pipeline					$	1,102,260
Bloomdale Pump Station and Ground Storage					$	1,525,000
McKinney to Melissa Pipeline					$	1,932,375
Melissa to Anna Pipeline					$	1,677,570
Anna to Van Alstyne Pipeline					$	1,727,030
Van Alstyne to Howe Pipeline					$	2,410,066
Engineering and Contingencies					$	3,214,393
Subtotal of Transmission Facilities					**$**	**13,588,694**
PURCHASE OF EASEMENTS					**$**	**1,027,753**
INFLATION	(1 year at 5%)				**$**	**725,822**
TOTAL CAPITAL COST					**$**	**15,342,269**
ANNUAL COSTS						
Debt Service					$	1,115,000
Operation and Maintenance Costs						
Pipeline	1%				$	106,000
Pump Station	2.50%				$	46,000
Estimated Annual Power Cost	$0.06/kWh				$	245,000
Pumping and Service Fee (McKinney)	5,478,533	1000 gal	$	0.23	$	1,276,000
Treated Water Cost	5,478,533	1000 gal	$	0.97	$	5,314,000
Total Annual Cost					**$**	**8,102,000**
UNIT COSTS (First 30 Years)						
Cost per ac-ft						$482
Cost per 1000 gallons						$1.48
UNIT COSTS (After 30 Years)						
Cost per ac-ft						$416
Cost per 1000 gallons						$1.28

Table U-98
GTUA Collin-Grayson Municipal Alliance Water Transmission System - Phase 2

Probable Owner: GTUA (water from NTMWD)
Quantity: 24,200 AF/Y

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline		**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
McKinney to Melissa Pipeline	Urban	42 in.	18,000	LF	$202	$3,636,000
McKinney to Melissa Pipeline	Rural	42 in.	15,000	LF	$142	$2,130,000
Melissa to Anna Pipeline	Rural	36 in.	23,000	LF	$114	$2,622,000
Anna to Weston Pipeline	Rural	30 in.	37,000	LF	$86	$3,182,000
Right of Way Easements Rural (ROW)			51.7	ACRE	$3,000	$155,000
Right of Way Easements Urban (ROW)			12.4	ACRE	$30,000	$372,000
Engineering and Contingencies (30%)						$3,471,000
Subtotal of Pipeline						**$15,568,000**
Pump Station(s)						
McKinney Pump Station		2200 HP	1	LS	$3,640,000	$3,640,000
Melissa Booster Pump Station		1800 HP	1	LS	$3,280,000	$3,280,000
Anna Booster Pump Station		1400 HP	2	LS	$2,840,000	$5,680,000
Engineering and Contingencies (35%)						$4,410,000
Subtotal of Pump Station(s)						**$17,010,000**
Ground Storage						
Ground Storage Tank at Melissa		5 MG	1	LS	$589,000	$589,000
Ground Storage Tank at Anna		3 MG	1	LS	$895,000	$895,000
Engineering and Contingencies (35%)						$519,400
Subtotal of Ground Storage						**$2,003,400**
CONSTRUCTION TOTAL						**$34,581,400**
Permitting and Mitigation						**$90,000**
Interest During Construction				**(12 months)**		**$1,441,000**
TOTAL COST						**$36,112,400**
ANNUAL COSTS						
Debt Service (6% for 30 years)						$2,624,000
Electricity ($0.06 kWh)						$706,000
Operation & Maintenance						$562,000
Treated Water Purchase			7,889,200	1000 gal	$ 0.97	$7,653,000
Total Annual Costs						**$11,545,000**

Table U-98, continued

UNIT COSTS (Until Amortized)	
Per Acre-Foot of treated water	$477
Per 1,000 Gallons	$1.46
UNIT COSTS (After Amortization)	
Per Acre-Foot	$369
Per 1,000 Gallons	$1.13

Table U-99
Athens MWA Reuse

Probable Owner: Athens MWA
Amount: 2,677 Acre-Feet/Year 2.4 MGD design

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Urban	12 in.	19,000	LF	$42	$798,000
Pipeline Urban	10 in.	23,800	LF	$36	$856,800
Right of Way Easements (Rural)	0 ft.	0	Acre	$3,000	$0
Right of Way Easements (Urban)	20 ft.	10	Acre	$30,000	$300,000
Engineering and Contingencies (30%)					$496,000
Subtotal of Pipeline					**$2,450,800**
Pump Station(s)					
Pump Station at West WWTP	50 HP	1	EA	$400,000	$400,000
Pump Station at North WWTP	100 HP	2	EA	$620,000	$1,240,000
Engineering and Contingencies (35%)					$574,000
Subtotal of Pump Station(s)					**$974,000**
Permitting and Mitigation		1	LS		$32,900
CONSTRUCTION TOTAL					**$3,457,700**
Interest During Construction			**(12 months)**		**$144,000**
TOTAL CAPITAL COST					**$3,601,700**

Table U-99, Continued

ANNUAL COSTS -RAW WATER	
Debt Service (6% for 30 years)	$261,660
Raw water purchase	NA
Electricity ($0.06 kWh)	$88,000
Facility Operation & Maintenance	$69,058
Total Annual Costs	**$418,718**
UNIT COSTS (During Amortization)	
Per Acre-Foot of raw water	$156
Per 1,000 Gallons of raw water	$0.48
UNIT COSTS (After Amortization)	
Per Acre-Foot of raw water	$59
Per 1,000 Gallons of raw water	$0.18

Table U-100
Obtain Water from Forest Grove Reservoir and Transport All to Lake Athens

Probable Owner: Athens MWA
Amount: 4,500 Acre-Feet/Year 5 MGD design

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	24 in.	41,560	LF	$66	$2,743,000
Pipeline Urban	24 in.	2,000	LF	$99	$198,000
Right of Way Easements (Rural)	30 ft.	29	Acre	$3,000	$87,000
Right of Way Easements (Urban)	30 ft.	1	Acre	$30,000	$30,000
Engineering and Contingencies (30%)					$882,000
Subtotal of Pipeline					**$3,940,000**
Pump Station(s)					
Intake and Pump Station - FG	290 HP	1	EA	$1,200,000	$1,200,000
Engineering and Contingencies (35%)					$420,000
Subtotal of Pump Station(s)					**$1,620,000**
Permitting and Mitigation		1	LS		$49,700
CONSTRUCTION TOTAL					**$5,609,700**
Interest During Construction			**(18 months)**		**$346,000**
Permitting associated with Water Rights Transfer					$150,000
TOTAL CAPITAL COST					**$6,105,700**

Table U-100, Continued

ANNUAL COSTS RAW WATER	
Debt Service (6% for 30 years)	$443,572
Raw water purchase	$0
Electricity ($0.06 kWh)	$90,000
Facility Operation & Maintenance	$71,300
Total Annual Costs	**$604,872**
UNIT COSTS (During Amortization)	
Per Acre-Foot of raw water	$134
Per 1,000 Gallons of raw water	$0.41
UNIT COSTS (After Amortization)	
Per Acre-Foot of raw water	$36
Per 1,000 Gallons of raw water	$0.11

Table U-101

Obtain Water from Forest Grove Reservoir and Transport Portion to Lake Athens/ Transport Portion to New WTP Near Athens

Probable Owner:	Athens MWA			
Amount:	4,500	Acre-Feet/Year	5.8	MGD design
Raw water to Lake Athens	2500	ac-ft/yr	2.79	MGD design
Raw water to City	2000	ac-ft/yr	3.57	MGD design

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	24 in.	13,500	LF	$66	$891,000
Pipeline Rural	18 in.	29,500	LF	$42	$1,239,000
Pipeline Urban	18 in.	4,400	LF	$63	$277,200
Right of Way Easements (Rural)	30 ft.	30	Acre	$3,000	$90,000
Right of Way Easements (Urban)	30 ft.	3	Acre	$30,000	$90,000
Engineering and Contingencies (30%)					$722,000
Subtotal of Pipeline					**$3,309,200**
Pump Station(s)					
Intake and Pump Station	360 HP	1	EA	$1,400,000	$1,400,000
Engineering and Contingencies (35%)					$490,000
Subtotal of Pump Station(s)					**$1,890,000**
Permitting and Mitigation		1	LS		$25,700
CONSTRUCTION TOTAL					**$5,224,900**
Interest During Construction			**(18 months)**		**$322,000**
Permitting associated with Water Rights Transfer					$150,000
TOTAL CAPITAL COST					**$5,696,900**
ANNUAL COSTS RAW WATER					
Debt Service (6% for 30 years)					$413,900
Raw water purchase					$0
Electricity ($0.06 kWh)					$78,000
Facility Operation & Maintenance					$67,600
Total Annual Costs					**$559,500**

Table U-101, Continued

UNIT COSTS - (During Amortization)	
Per Acre-Foot of raw water	$124
Per 1,000 Gallons of raw water	$0.38
UNIT COSTS - (After Amortization)	
Per Acre-Foot of raw water	$32
Per 1,000 Gallons of raw water	$0.10

Table U-102
1.5 MGD Water Treatment Plant Expansion at Lake Athens

Probable Owner: Athens MWA
Amount: 840 Acre-Feet/Year
Expansion at Lake Athens 840 ac-ft/yr 1.5 MGD design

CONSTRUCTION COSTS

Pump Station(s)

Expand intake at Athens by 1.5 MGD	1	LS	$150,000	$150,000
Engineering and Contingencies (35%)				$53,000
Subtotal of Pump Station(s)				**$203,000**
Permitting and Mitigation	1	LS		$1,800
WATER TREATMENT FACILITIES				
Additional Treatment Capacity at Lake	1.5	MGD		$2,775,000
Engineering and Contingencies (35%)				$971,000
Subtotal of Treatment				**$3,746,000**
Permitting of treatment plant				$33,300
CONSTRUCTION TOTAL				**$3,984,100**
Interest During Construction		**(12 months)**		**$166,000**
TOTAL CAPITAL COST				**$4,150,100**

Table U-102, Continued

ANNUAL COSTS TREATED WATER			
Debt Service (6% for 30 years)			$301,500
Electricity ($0.06 kWh)			$9,900
Facility Operation & Maintenance			$4,500
Water Treatment ($.35/1,000 gal finished water)	840	af/y	$95,800
Total Annual Costs			**$411,700**
UNIT COSTS (During Amortization)			
Per Acre-Foot of treated water			$490
Per 1,000 Gallons of treated water			$1.50
UNIT COSTS (After Amortization)			
Per Acre-Foot of treated water			$131
Per 1,000 Gallons of treated water			$0.40

Table U-103
Water Treatment Plant Expansion at Lake Athens - Forest Grove Option B (3.5 MGD)

Probable Owner: Athens MWA
Amount: 1,960 Acre-Feet/Year
New WTP at City 1,960 ac-ft/yr 3.5 MGD design

CONSTRUCTION COSTS

WATER TREATMENT FACILITIES

New Treatment Plant at City	3.5	MGD	$7,900,000
Engineering and Contingencies (35%)			$2,765,000
Subtotal of Treatment			**$10,665,000**
Permitting of treatment plant			$94,800
CONSTRUCTION TOTAL			**$10,759,800**
Interest During Construction		**(18 months)**	**$664,000**
TOTAL CAPITAL COST			**$11,423,800**

Table U-103, Continued

ANNUAL COSTS TREATED WATER			
Debt Service (6% for 30 years)			$829,900
Electricity ($0.06 kWh)			$0
Facility Operation & Maintenance			$0
Water Treatment ($.35/1,000 gal finished water)	1960	af/y	$223,500
Total Annual Costs			**$1,053,400**
UNIT COSTS (During Amortization)			
Per Acre-Foot of treated water			$537
Per 1,000 Gallons of treated water			$1.65
UNIT COSTS (After Amortization)			
Per Acre-Foot of treated water			$114
Per 1,000 Gallons of treated water			$0.35

Table U-104
Water Treatment Plant Expansion at Lake Athens - Forest Grove Option B (5 MGD)

Probable Owner:	Athens MWA					
Amount:	2,800 Acre-Feet/Year					
New WTP at Lake		2,800	ac-ft/yr	5	MGD design	
CONSTRUCTION COSTS						
TRANSMISSION FACILITIES						
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**	
Parallel Pipeline to Athens	18 in.	27,000	LF	$42	$1,134,000	
Engineering and Contingencies (30%)					$340,000	
Subtotal of Pipeline					**$1,474,000**	
Pump Station(s)						
5 MGD Intake and Pump Station - Athens	40 HP	1	EA	$550,000	$550,000	
Pump Station Upgrades to City	140 HP	1	EA	$744,000	$744,000	
Engineering and Contingencies (35%)					$453,000	
Subtotal of Pump Station(s)					**$1,747,000**	
Permitting and Mitigation		1	LS		$29,100	
WATER TREATMENT FACILITIES						
Construct New WTP at Lake Athens		5	MGD		$9,700,000	
Engineering and Contingencies (35%)					$3,395,000	
Subtotal of Treatment					**$13,095,000**	
Permitting of treatment plant					$116,400	
CONSTRUCTION TOTAL					**$16,461,500**	
Interest During Construction			**(18 months)**		**$1,015,000**	
TOTAL CAPITAL COST					**$17,476,500**	

Table U-104, Continued

ANNUAL COSTS TREATED WATER			
Debt Service (6% for 30 years)			$1,269,600
Electricity ($0.06 kWh)			$33,000
Facility Operation & Maintenance			$52,400
Water Treatment ($.35/1,000 gal finished water)	2800	af/y	$319,300
Total Annual Costs			**$1,674,300**
UNIT COSTS (During Amortization)			
Per Acre-Foot of treated water			$598
Per 1,000 Gallons of treated water			$1.84
UNIT COSTS (After Amortization)			
Per Acre-Foot of treated water			$144.54
Per 1,000 Gallons of treated water			$0.44

Table U-105
Purchase water from Lake Palestine for Athens MWA

Probable Owner: Athens MWA
Amount: 4,000 Acre-Feet/Year 4.46 MGD design

CONSTRUCTION COSTS

TRANSMISSION FACILITIES					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	24 in.	80,000	LF	$66	$5,280,000
Pipeline Urban	24 in.	0	LF	$99	$0
Right of Way Easements (Rural)	30 ft.	55	Acre	$3,000	$165,000
Right of Way Easements (Urban)	30 ft.	0	Acre	$30,000	$0
Engineering and Contingencies (30%)					$1,584,000
Subtotal of Pipeline					**$7,029,000**
Pump Station(s)					
Intake and Pump Station at Lake Palestine	210 HP	1	EA	$1,330,000	$1,330,000
Engineering and Contingencies (35%)					$466,000
Subtotal of Pump Station(s)					**$1,796,000**
Permitting and Mitigation		1	LS		$66,100
CONSTRUCTION TOTAL					**$8,891,100**
Interest During Construction			**(12 months)**		**$370,000**
UNRMWA Buy-in Cost					$100,000
TOTAL CAPITAL COST					**$9,361,100**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$680,074
Raw water purchase					$195,511
Electricity ($0.06 kWh)					$61,000
Facility Operation & Maintenance					$103,260
Total Annual Costs					**$1,039,845**
UNIT COSTS (During Amortization)					
Per Acre-Foot of raw water					$260
Per 1,000 Gallons of raw water					$0.80
UNIT COSTS (After Amortization)					
Per Acre-Foot of raw water					$90
Per 1,000 Gallons of raw water					$0.28

Table U-106
Purchase Water from DWU for Athens MWA

Probable Owner: Athens MWA
Amount: 4,000 Acre-Feet/Year 4.46 MGD design

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	24 in.	2,000	LF	$66	$132,000
Pipeline Urban	24 in.	0	LF	$99	$0
Incremental cost for DWU pipeline					$1,115,125
Right of Way Easements (Rural)	30 ft.	1	Acre	$3,000	$3,000
Right of Way Easements (Urban)	30 ft.	0	Acre	$30,000	$0
Engineering and Contingencies (30%)					$40,000
Subtotal of Pipeline					**$1,290,125**
Pump Station(s)					
Assume sufficient head at junction to reach Lake Athens					$0
Engineering and Contingencies (35%)					$0
Subtotal of Pump Station(s)					**$0**
Permitting and Mitigation		1	LS		$15,000
CONSTRUCTION TOTAL					**$1,305,125**
Interest During Construction			**(6 months)**		**$28,000**
TOTAL CAPITAL COST					**$1,333,125**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$96,900
Raw water purchase					$536,700
Electricity ($0.06 kWh)					$0
Facility Operation & Maintenance					$15,000
Total Annual Costs					**$648,600**
UNIT COSTS (During Amortization)					
Per Acre-Foot of raw water					$162
Per 1,000 Gallons of raw water					$0.50
UNIT COSTS (After Amortization)					
Per Acre-Foot of raw water					$138
Per 1,000 Gallons of raw water					$0.42

Table U-107
Corsicana WTP Expansion at Navarro Mills Lake by 2020

Owner: Corsicana

WATER TREATMENT PLANT EXPANSION	**Quantity**	**Unit**	**Cost**
Cost of WTP Expansion	5	MGD	$7,000,000
Engineering & Contingencies (35%)			$2,450,000
Subtotal			**$9,450,000**
Interest During Construction	**(18 months)**		**$432,000**
TOTAL COST FOR 2020 EXPANSION			**$9,882,000**
ANNUAL COSTS FOR YEAR 2010 EXPANSION			
Debt Service (6% for 30 years)			$718,000
Operation & Maintenance ($0.35/1,000 gallons)	912,500	1,000 gal.	$319,000
Total Annual Costs			**$1,037,000**
UNIT COSTS (2020-2040)			
Per Acre-Foot			$370
Per 1,000 Gallons			$1.14
UNIT COSTS (2050-2060)			
Per Acre-Foot			$114
Per 1,000 Gallons			$0.35

Table U-108
Corsicana WTP Expansion at Lake Halbert by 2050

Owner: Corsicana

WATER TREATMENT PLANT EXPANSION	**Quantity**	**Unit**	**Cost**
Cost of WTP Expansion	10	MGD	$11,000,000
Engineering & Contingencies (35%)			$3,850,000
Subtotal			**$14,850,000**
Interest During Construction	**(18 months)**		**$678,000**
TOTAL COST FOR 2010 EXPANSION			**$15,528,000**
ANNUAL COSTS FOR YEAR 2050 EXPANSION			
Debt Service (6% for 30 years)			$1,128,000
Operation & Maintenance ($0.35/1,000 gallons)	1,825,000	1,000 gal.	$639,000
Total Annual Costs			**$1,767,000**
UNIT COSTS			
Per Acre-Foot			$315
Per 1,000 Gallons			$0.97
UNIT COSTS			
Per Acre-Foot			$114
Per 1,000 Gallons			$0.35

Table U-109
Corsicana Connection to Richland-Chambers Lake

Probable Owner: Corsicana
Quantity: 13,650 AF/Y

CONSTRUCTION COSTS					
TRANSMISSION FACILITIES					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline	42 in.	52,000	LF	$142	$7,384,000
30-ft Right of Way Easements (ROW)		36	ACRE	$3,000	$107,000
Engineering and Contingencies (30%)					$2,247,000
Subtotal of Pipeline					**$9,738,000**
Pump Station(s)					
Pump Station*	500 HP	1	LS	$1,700,000	$1,700,000
Engineering and Contingencies (35%)					$595,000
Subtotal of Pump Station(s)					**$2,295,000**
CONSTRUCTION TOTAL					**$12,033,000**
Permitting and Mitigation					**$109,000**
Interest During Construction			**(12 months)**		**$501,000**
TOTAL COST					**$12,643,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$919,000
Electricity ($0.06 kWh)					$149,000
Operation & Maintenance					$140,000
Total Annual Costs					**$1,208,000**
UNIT COSTS					
Per Acre-Foot					$89
Per 1,000 Gallons					$0.27
UNIT COSTS					
Per Acre-Foot					$21
Per 1,000 Gallons					$0.06

* Note: The intake structure is already in place.

Table U-110
Gainesville Additional Moss Lake

Probable Owner:	Gainesville			
Quantity:	560	AF/Y		
CONSTRUCTION COSTS				
WATER TREATMENT FACILITIES				
Water Treatment Plant Expansion				
Plant Expansion	1.00	MGD		$2,000,000
Engineering and Contingencies	35%			$700,000
Subtotal of Water Treatment Facilities				**$2,700,000**
PERMITTING AND MITIGATION	1%			**$24,000**
CONSTRUCTION TOTAL				**$2,724,000**
Interest During Construction		(6 months)		**$59,000**
TOTAL CAPITAL COST				**$2,783,000**
ANNUAL COSTS				
Debt Service				$202,000
Operation and Maintenance Costs				
Estimated Annual Power Cost	$0.06/kWh			$13,000
WTP	182,477	1000 gal	$0.35	$64,000
Raw Water Cost				$0
Total Annual Costs				**$279,000**
UNIT COSTS (First 30 Years)				
Per Acre-Foot	$ 498			
Per 1,000 Gallons	$ 1.53			
UNIT COSTS (After 30 Years)				
Per Acre-Foot	$ 138			
Per 1,000 Gallons	$ 0.42			

Note: Raw water costs not included because these are incurred even if this strategy is not implemented.

Table U-111
Cooke County Water Supply Project

Probable Owner:	Cooke County			
Quantity:	2,763	AF/Y	2020	
	3,690	AF/Y	2040	

CONSTRUCTION COSTS

TRANSMISSION FACILITIES				**2020**	**2040**
Pipeline(s)	**Qty.**	**Units**	**Unit Cost**	**Phase I Cost**	**Phase II Cost**
30" Water Line					
Pipe	62,657	FT	$86	$5,388,000	$0
ROW	29	AC	$3,000	$86,000	$0
14" Water Line					
Pipe	6,900	FT	$48	$331,000	$0
ROW	3	AC	$30,000	$95,000	$0
14" Water Line					
Pipe	79,490	FT	$32	$2,544,000	$0
ROW	36	AC	$3,000	$109,000	$0
12" Water Line					
Pipe	28,730	FT	$28	$804,000	$0
ROW	13	AC	$3,000	$40,000	$0
10" Water Line					
Pipe	11,831	FT	$24	$284,000	$0
ROW	5	AC	$0	$0	$0
8" Water Line					
Pipe	71,398	FT	$20	$1,428,000	$0
ROW	25	AC	$3,000	$74,000	$0
Engineering and Contingencies	30%			$3,234,000	$0
Subtotal of Pipeline(s)				**$14,417,000**	**$0**
Pump Station(s)					
Station 1					
Pump, bldg, & appurtenances	470	hp		$1,640,000	$0
Storage Tank		gal		$0	$0
Station 2					
Pump, bldg, & appurtenances	136	hp		$722,000	$0
Storage Tank	1,260,000	gal		$317,000	$0
Station 3					
Pump, bldg, & appurtenances	40	hp		$340,000	$0
Storage Tank	190,000	gal		$90,000	$0
Station 4					
Pump, bldg, & appurtenances	6	hp		$60,000	$0
Storage Tank	40,000	gal		$30,000	$0
Engineering and Contingencies	35%			$1,120,000	$0
Subtotal of Pump Station(s)				**$4,319,000**	**$0**

Table U-111, continued

WATER TREATMENT FACILITIES					
Water Treatment Plant					
Phase 1 Plant Expansion	5.00	MGD		$7,000,000	$0
Phase 2 Plant Expansion	2.00	MGD		$0	$3,550,000
Engineering and Contingencies	35%			$2,450,000	$1,243,000
Subtotal of Water Treatment Plant				**$9,450,000**	**$4,793,000**
PERMITTING AND MITIGATION	1%			**$181,000**	**$0**
CONSTRUCTION TOTAL				**$28,367,000**	**$4,793,000**
Interest During Construction					
Phase 1		(24 months)		**$2,218,000**	**$0**
Phase 2		(6 months)		**$0**	**$104,000**
TOTAL CAPITAL COST				**$30,585,000**	**$4,897,000**
ANNUAL COSTS					
Debt Service				$2,222,000	$356,000
Operation and Maintenance Costs					
Pipeline	1%			$129,000	$0
Pump Station	2.50%			$96,000	$0
Estimated Annual Power Cost	$0.06/kWh			$128,000	$0
WTP					
Phase 1	900,326	1000 gal	$0.35	$315,000	$0
Phase 2	302,184	1000 gal	$0.35	$0	$106,000
Raw Water Cost				$450,000	$151,000
Total Annual Costs				**$3,340,000**	**$613,000**

UNIT COSTS

	With Raw Water		Gainesville - Without Raw Water	
	Per Acre-Foot	Per 1,000 Gallons	Per Acre-Foot	Per 1,000 Gallons
2010	$0	$0.00	$0	$0.00
2020	$1,209	$3.71	$1,046	$3.21
2030	$1,209	$3.71	$1,046	$3.21
2040	$1,071	$3.29	$908	$2.79
2050	$469	$1.44	$306	$0.94
2060	$469	$1.44	$306	$0.94

Note: Raw water is assumed to cost $163 per acre-foot.

Table U-112
Gainesville Indirect Reuse

Probable Owner: Gainesville
Quantity: 561 AF/Y

CONSTRUCTION COSTS

	Qty.	Units	Unit Cost	Cost
TRANSMISSION FACILITIES				
Pipeline(s)				
12" Reclaimed Water Line				
Pipe	73,818	FT	$28	$2,067,000
ROW	34	AC	$3,000	$102,000
Engineering and Contingencies	30%			$620,000
Subtotal of Pipeline(s)				**$2,789,000**
Pump Station(s)				
Station 1				
Pump, bldg, & appurtenances	86	hp		$558,000
Storage Tank		gal		$0
Station 2				
Pump, bldg, & appurtenances	70	hp		$488,000
Storage Tank		gal		$0
Engineering and Contingencies	35%			$366,000
Subtotal of Pump Station(s)				**$1,412,000**
WASTEWATER TREATMENT FACILITIES				
Wastewater Treatment Plant				
RO Treatment Capacity	0.50	MGD		$950,000
Engineering and Contingencies	35%			$333,000
Subtotal of Water Treatment Plant				**$1,283,000**
WATER TREATMENT FACILITIES				
Water Treatment Plant	1.00	MGD		$2,000,000
Engineering and Contingencies	35%			$700,000
Subtotal of Water Treatment Plant				**$2,700,000**
PERMITTING AND MITIGATION	1%			**$42,000**
CONSTRUCTION TOTAL				**$8,226,000**
Interest During Construction		(12 months)		**$343,000**

Table U-112, continued

TOTAL CAPITAL COST				**$8,569,000**
ANNUAL COSTS				
Debt Service				$623,000
Operation and Maintenance Costs				
Pipeline	1%			$25,000
Pump Station	2.50%			$31,000
Estimated Annual Power Cost	$0.06/kWh			$31,000
WTP	182,802	1000 gal	$0.35	$64,000
Total Annual Costs				**$774,000**

Table R-70, continued

UNIT COSTS (First 30 Years)	
Cost per ac-ft	$1,380
Cost per 1000 gallons	$4.23
UNIT COSTS (After 30 Years)	
Cost per ac-ft	$269
Cost per 1000 gallons	$0.83

Table U-113
City of Fort Worth Parallel Pipeline to Eagle Mountain Lake
with Raw Water Pump Station Expansion

Owner: Fort Worth
Amount: 0 Ac-Ft/Yr
Zero additional supply is provided by this strategy.

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	72 in.	19,100	LF	$335	$6,398,500
Contingencies (20%)					$1,279,700
Subtotal of Pipeline					**$7,678,200**
Pump Station(s)					
Pumps Station Expansion	35 MGD	1	LS	$8,840,000	$8,840,000
Contingencies (20%)					$1,768,000
Subtotal of Pump Station(s)					**$10,608,000**
Subtotal					**$18,286,200**
Engineering (10%)					**$1,828,620**
TOTAL COST					**$20,114,820**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$1,461,000
Electricity ($0.06 kWh)					$0
Operation & Maintenance					$342,000
Total Annual Costs					**$1,803,000**

Costs provided by City of Fort Worth - CIP Master Plan

Table U-114
City of Fort Worth Pipeline to New Southwest Water Treatment Plant

Owner: Fort Worth
Amount: 0 Ac-Ft/Yr
Zero additional supply provided by this strategy.

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	42 in.	53,000	LF	$142	$7,526,000
Right of Way Easements (ROW)	30 ft.	37	Acre	$3,000	$110,000
Engineering and Contingencies (30%)					$2,291,000
Subtotal of Pipeline					**$9,927,000**
Pump Station(s)					
Booster Pump Station	3,500 HP	1	LS	$4,650,000	$4,650,000
Engineering and Contingencies (35%)					$1,628,000
Subtotal of Pump Station(s)					**$6,278,000**
Permitting and Mitigation					**$146,000**
CONSTRUCTION TOTAL					**$16,351,000**
Interest During Construction			**(12 months)**		**$681,000**
TOTAL COST					**$17,032,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$1,237,000
Electricity ($0.06 kWh)					$365,000
Operation & Maintenance					$230,000
Total Annual Costs					**$1,832,000**

Table U-115
Fort Worth Direct Reuse
Central Business District

Owner:	Fort Worth					
Amount:	3,360	Ac-Ft/Yr				
CONSTRUCTION COSTS						
TRANSMISSION FACILITIES						
Pipeline(s)	**Qty.**	**Units**	**Unit Cost**			**Total Cost**
30" Water Line						
Pipe	26,400	FT	$	129	$	3,406,000
ROW	12	AC	$	30,000	$	364,000
Engineering and Contingencies	30%				$	1,022,000
Subtotal of Pipeline(s)					**$**	**4,792,000**
Pump Station(s)						
Station 1						
Pump, building, & appurtances	293	hp			$	1,181,000
Storage Tank	1,250,000	gal			$	315,000
Engineering and Contingencies	35%				$	524,000
Subtotal of Pump Station(s)					**$**	**2,020,000**
WASTEWATER TREATMENT FACILITIES						
Satellite Wastewater Treatment Plant	8.00	MGD			$	12,800,000
Engineering and Contingencies	35%				$	4,480,000
Subtotal of Wastewater Treatment Plant					**$**	**17,280,000**
PERMITTING AND LAND PURCHASE					**$**	**3,300,000**
CONSTRUCTION TOTAL					**$**	**27,392,000**
Interest During Construction		(18 months)			**$**	**1,578,000**
TOTAL CAPITAL COST					**$**	**28,970,000**

Table 115, continued

ANNUAL COSTS						
Debt Service					$	2,105,000
Operation and Maintenance Costs						
Pipeline	1%				$	41,000
Pump Station	2.50%				$	45,000
Estimated Annual Power Cost	$0.06/kWh				$	57,000
WWTP Operation	1,094,859	1000 gal	$	0.35	$	383,000
Total Annual Costs					**$**	**2,631,000**
UNIT COSTS (First 30 Years)						
Per Acre-Foot					$	783
Per 1,000 Gallons					$	2.40
UNIT COSTS (After 30 Years)						
Per Acre-Foot					$	157
Per 1,000 Gallons					$	0.48

Table U-116
Fort Worth Direct Reuse
Mary's Creek

Owner:	Fort Worth			
Amount:	1,570	Ac-Ft/Yr		
CONSTRUCTION COSTS				
TRANSMISSION FACILITIES				
Pipeline(s)	**Qty.**	**Units**	**Unit Cost**	**Total Cost**
24" Water Line				
Pipe	26,400	FT	$ 66	$ 1,742,000
ROW	12	AC	$ 3,000	$ 36,000
Engineering and Contingencies	30%			$ 523,000
Subtotal of Pipeline(s)				**$ 2,301,000**
Pump Station(s)				
Station 1				
Pump, building, & appurtances	278	hp		$ 1,141,000
Storage Tank	580,000	gal		$ 174,000
Engineering and Contingencies	35%			$ 460,000
Subtotal of Pump Station(s)				**$ 1,775,000**
WASTEWATER TREATMENT FACILITIES				
Satellite Wastewater Treatment Plant	4.00	MGD		$ 6,400,000
Engineering and Contingencies	35%			$ 2,240,000
Subtotal of Wastewater Treatment Plant				**$ 8,640,000**
PERMITTING AND LAND PURCHASE				**$ 1,100,000**
CONSTRUCTION TOTAL				**$ 13,816,000**
Interest During Construction		(18 months)		**$ 796,000**
TOTAL CAPITAL COST				**$ 14,612,000**

Table 116, continued

ANNUAL COSTS						
Debt Service					$	1,062,000
Operation and Maintenance Costs						
Pipeline	1%				$	21,000
Pump Station	2.50%				$	39,000
Estimated Annual Power Cost	$0.06/kWh				$	55,000
WWTP Operation	511,586	1000 gal	$	0.35	$	179,000
Total Annual Costs					**$**	**1,356,000**
UNIT COSTS (First 30 Years)						
Per Acre-Foot					$	864
Per 1,000 Gallons					$	2.65
UNIT COSTS (After 30 Years)						
Per Acre-Foot					$	187
Per 1,000 Gallons					$	0.57

Table U-117
Fort Worth Direct Reuse
Alliance Corridor

Owner: Fort Worth
Amount: 3,360 Ac-Ft/Yr

CONSTRUCTION COSTS

TRANSMISSION FACILITIES						
Pipeline(s)	**Qty.**	**Units**	**Unit Cost**			**Total Cost**
30" Water Line						
Pipe	26,400	FT	$	86	$	2,270,000
ROW	12	AC	$	3,000	$	36,000
Engineering and Contingencies	30%				$	681,000
Subtotal of Pipeline(s)					**$**	**2,987,000**
Pump Station(s)						
Station 1						
Pump, building, & appurtances	482	hp			$	1,665,000
Storage Tank	1,250,000	gal			$	315,000
Engineering and Contingencies	35%				$	693,000
Subtotal of Pump Station(s)					**$**	**2,673,000**
WASTEWATER TREATMENT FACILITIES						
Satellite Wastewater Treatment Plant	8.00	MGD			$	12,800,000
Engineering and Contingencies	35%				$	4,480,000
Subtotal of Wastewater Treatment Plant					**$**	**17,280,000**
PERMITTING AND LAND PURCHASE					**$**	**1,100,000**
CONSTRUCTION TOTAL					**$**	**24,040,000**
Interest During Construction		(18 months)			**$**	**1,385,000**
TOTAL CAPITAL COST					**$**	**25,425,000**

Table U-117, continued

ANNUAL COSTS						
Debt Service					$	1,847,000
Operation and Maintenance Costs						
Pipeline	1%				$	27,000
Pump Station	2.50%				$	59,000
Estimated Annual Power Cost	$0.06/kWh				$	95,000
WWTP Operation	1,094,859	1000 gal	$	0.35	$	383,000
Total Annual Costs					**$**	**2,411,000**
UNIT COSTS (First 30 Years)						
Per Acre-Foot					$	718
Per 1,000 Gallons					$	2.20
UNIT COSTS (After 30 Years)						
Per Acre-Foot					$	168
Per 1,000 Gallons					$	0.52

Table U-118
Fort Worth Direct Reuse
Village Creek

Owner:	Fort Worth				
Amount:	2,600	Ac-Ft/Yr			
CONSTRUCTION COSTS					
TRANSMISSION FACILITIES					
Pipeline(s)	**Qty.**	**Units**	**Unit Cost**		**Total Cost**
24" Water Line					
Pipe	26,400	FT	$ 66	$	1,742,000
ROW	12	AC	$ 3,000	$	36,000
Engineering and Contingencies	30%			$	523,000
Subtotal of Pipeline(s)				**$**	**2,301,000**
Pump Station(s)					
Station 1					
Pump, building, & appurtances	205	hp		$	944,000
Storage Tank	970,000	gal		$	268,000
Engineering and Contingencies	35%			$	424,000
Subtotal of Pump Station(s)				**$**	**1,636,000**
WASTEWATER TREATMENT FACILITIES					
Satellite Wastewater Treatment Plant	0.00	MGD		$	-
Engineering and Contingencies	35%			$	-
Subtotal of Wastewater Treatment Plant				**$**	**-**
PERMITTING AND MITIGATION	1%			**$**	**21,000**
CONSTRUCTION TOTAL				**$**	**3,958,000**
Interest During Construction		(12 months)		**$**	**165,000**
TOTAL CAPITAL COST				**$**	**4,123,000**

Table U-118, continued

ANNUAL COSTS					
Debt Service				$	300,000
Operation and Maintenance Costs					
Pipeline	1%			$	21,000
Pump Station	2.50%			$	36,000
Estimated Annual Power Cost	$0.06/kWh			$	40,000
WWTP Operation	0	1000 gal	$ 0.35	$	-
Total Annual Costs				**$**	**397,000**
UNIT COSTS (First 30 Years)					
Per Acre-Foot				$	153
Per 1,000 Gallons				$	0.47
UNIT COSTS (After 30 Years)					
Per Acre-Foot				$	37
Per 1,000 Gallons				$	0.11

Table U-119
Walnut Creek SUD Parallel Pipeline to Lake Bridgeport

Probable Owner: Walnut Creek SUD
Quantity: 6,700 AF/Y

CONSTRUCTION COSTS					
TRANSMISSION FACILITIES					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline	18 in.	52,000	LF	$42	$2,184,000
20-ft Right of Way Easements (ROW)		24	ACRE	$3,000	$72,000
Engineering and Contingencies (30%)					$677,000
Subtotal of Pipeline					**$2,933,000**
Pump Station(s)					
Pump Station with Intake Structure	950 HP	1	LS	$3,100,000	$3,100,000
Engineering and Contingencies (35%)					$1,085,000
Subtotal of Pump Station(s)					**$4,185,000**
CONSTRUCTION TOTAL					**$7,118,000**
Permitting and Mitigation					**$63,000**
Interest During Construction			**(12 months)**		**$297,000**
TOTAL COST					**$7,478,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$543,000
Electricity ($0.06 kWh)					$233,000
Operation & Maintenance					$119,000
Total Annual Costs					**$895,000**
UNIT COSTS - (With Debt Service)					
Per Acre-Foot					$134
Per 1,000 gallons					$0.41

Table U-120
Walnut Creek SUD Pipeline to Boyd and Rhome

Owner: Walnut Creek SUD
Amount: 3,900 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	24 in.	156,000	LF	$66	$10,296,000
Right of Way Easements (ROW)	20 ft.	72	Acre	$3,000	$215,000
Engineering and Contingencies (30%)					$3,153,000
Subtotal of Pipeline					**$13,664,000**
Pump Station(s)					
Booster Pump Station	350 HP	1	LS	$1,350,000	$1,350,000
Ground Storage at Boyd	0.01 MG	1	LS	$9,000	$9,000
Ground Storage at Rhome	.75 MG	1	LS	$215,000	$215,000
Engineering and Contingencies (35%)					$551,000
Subtotal of Pump Station(s)					**$2,125,000**
Permitting and Mitigation					**$142,000**
U120					
CONSTRUCTION TOTAL					**$15,789,000**
Interest During Construction			**(12 months)**		**$658,000**
TOTAL COST					**$16,447,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$1,195,000
Electricity ($0.06 kWh)					$47,000
Operation & Maintenance					$165,000
Total Annual Costs					**$1,407,000**
UNIT COSTS (Pre-Amort.)					
Per Acre-Foot					$361
Per 1,000 Gallons					$1.11
UNIT COSTS (Post-Amort.)					
Per Acre-Foot					$54
Per 1,000 Gallons					$0.17

Table U-121
Dallas Supply to Ellis County Customers - Rockett SUD, Red Oak, and Waxahachie

Owners:	Rockett SUD, Red Oak, Waxahachie	**Cost Distribution (%)**		
Total Amount:	19,186 Ac-Ft/Yr	61.6%	19.6%	18.8%
		Projected Supply Distribution (Ac-Ft/Yr)		
		11,301	1,159	6,726

CONSTRUCTION COSTS

TRANSMISSION FACILITIES	**Qty.**	**Units**	**2Q 2002 Unit Cost**	**2Q 2002 Total Cost**	**Rockett SUD Total Cost**	**Red Oak Total Cost**	**Waxahachie Total Cost**
System Pipeline							
60" Water Line							
Pipe	35,000	FT	$ 327	$ 11,434,000			
ROW	16	AC	$ 30,000	$ 482,000			
54" Water Line							
Pipe	8,200	FT	$ 199	$ 1,635,000			
ROW	4	AC	$ 3,000	$ 11,000			
48" Water Line							
Pipe	32,700	FT	$ 167	$ 5,466,000			
ROW	15	AC	$ 3,000	$ 45,000			
Engineering and Contingencies	30%			$ 5,561,000	$ 3,425,000	$ 1,091,000	$ 1,045,000
Subtotal of System Pipeline				**$ 24,634,000**	**$ 15,172,000**	**$ 4,833,000**	**$ 4,629,000**
Waxahachie Pipeline							
36" Water Line							
Pipe	26,200	FT	$ 101	$ 2,648,000			
ROW	12	AC	$ 3,000	$ 36,000			
Engineering and Contingencies	30%			$ 794,000			$ 794,000
Subtotal of Waxahachie Pipeline				**$ 3,478,000**			**$ 3,478,000**
PERMITTING AND MITIGATION							
System Pipeline	1%			**$ 222,000**	**$ 137,000**	**$ 44,000**	**$ 42,000**
Waxahachie Pipeline	1%			**$ 32,000**			**$ 32,000**
CONSTRUCTION TOTAL				**$ 28,366,000**	**$ 15,309,000**	**$ 4,877,000**	**$ 8,181,000**
Interest During Construction		(18 months)		**$ 1,634,000**	**$ 882,000**	**$ 281,000**	**$ 471,000**
TOTAL CAPITAL COST				**$ 30,000,000**	**$ 16,191,000**	**$ 5,158,000**	**$ 8,652,000**
ANNUAL COSTS							
Debt Service				$ 2,179,000	$ 1,176,000	$ 375,000	$ 629,000
Operation and Maintenance Costs							
System Pipeline	1%			$ 222,000	$ 137,000	$ 44,000	$ 42,000
Waxahachie Pipeline	1%			$ 32,000			$ 32,000
Estimated Annual Power Cost	$0.06/kWh			$ -	$ -	$ -	$ -
Treated Water Demand Charge	26	MGD	$ 123,190	$ 3,203,000	$ 1,973,000	$ 628,000	$ 602,000
Treated Water Volume Charge	6,251,796	1000 gal	$ 0.36	$ 2,235,000	$ 1,377,000	$ 439,000	$ 420,000
Total Annual Costs				**$ 7,871,000**	**$ 4,663,000**	**$ 1,486,000**	**$ 1,725,000**
UNIT COSTS (First 30 Years)							
Per Acre-Foot				$ 410	$ 395	$ 395	$ 478
Per 1,000 Gallons				$ 1.26	$ 1.21	$ 1.21	$ 1.47
UNIT COSTS (After 30 Years)							
Per Acre-Foot				$ 297	$ 295	$ 295	$ 304
Per 1,000 Gallons				$ 0.91	$ 0.91	$ 0.91	$ 0.93

Table U-122
Waxahachie Additional TRA/Waxahachie Indirect Reuse

Owner:	TRA					
Amount:	3,112	Ac-Ft/Yr				
CONSTRUCTION COSTS						
TRANSMISSION FACILITIES						
Pipeline(s)	**Qty.**	**Units**	**Unit Cost**			**Total Cost**
20" Water Line						
Pipe	15,420	FT	$	51	$	786,000
ROW	7	AC	$	3,000	$	21,000
Engineering and Contingencies	30%				$	236,000
Subtotal Piping					**$**	**1,043,000**
Pump Station(s)						
Station 1						
Pump, building, & appurtances	107	hp			$	640,000
Storage Tank	0	gal			$	-
Engineering and Contingencies	35%				$	224,000
Subtotal of Pump Station(s)					**$**	**864,000**
WATER TREATMENT FACILITIES						
Water Treatment Plant Expansion	12.00	MGD			$	12,360,000
Plant Expansion	35%				$	4,326,000
Subtotal of Water Treatment Plant					**$**	**16,686,000**
PERMITTING AND MITIGATION	1%				**$**	**17,000**
CONSTRUCTION TOTAL					**$**	**18,610,000**
Interest During Construction		(18 months)			**$**	**1,072,000**
TOTAL CAPITAL COST					**$**	**19,682,000**

Table U-122, continued

ANNUAL COSTS						
Debt Service					$	1,430,000
Operation and Maintenance Costs						
Pipeline	1%				$	9,000
Pump Station	2.50%				$	19,000
Estimated Annual Power Cost	$0.06/kWh				$	37,000
WTP Operation	1,013,940	1000 gal	$	0.35	$	355,000
Raw Water Cost	3,112	ac-ft		$0	$	-
Total Annual Costs					**$**	**1,850,000**
UNIT COSTS (First 30 Years)						
Per Acre-Foot					$	595
Per 1,000 Gallons					$	1.82
UNIT COSTS (After 30 Years)						
Per Acre-Foot					$	126
Per 1,000 Gallons					$	0.39

Note: Assumes no raw water cost.

Table U-123
Weatherford Increase Pump Station Capacity by 7 MGD

Probable Owner:	Weatherford	
Quantity:	6,278	AF/Y

Existing Infrastructure		
Pipeline	36	in.
Distance	100,000	LF
Pump Capacity	15	MGD
Pump Station Can Accommodate	22	MGD

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pump Station(s)	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Add Pump to Existing Pump Station		1	LS	$300,000	$300,000
Engineering and Contingencies (35%)					$105,000
Subtotal of Pump Station(s)					**$405,000**
CONSTRUCTION TOTAL					**$405,000**
Permitting and Mitigation					**$0**
Interest During Construction			**(6 months)**		**$9,000**
TOTAL COST					**$414,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$30,000
Electricity ($0.06 kWh)					$44,000
Raw water purchase ($0.68/ kgal)					$1,391,000
Operation & Maintenance					$9,000
Total Annual Costs					**$1,474,000**
UNIT COSTS - (With Debt Service)					
Per Acre-Foot					$235
Per 1,000 gallons					$0.72
UNIT COSTS - (After Debt Service)					
Per Acre-Foot					$230
Per 1,000 gallons					$0.71

Table U-124
Anna - Overdraft Woodbine Aquifer with Existing Wells in 2010
Collin County, Woodbine Aquifer

Need	172	Af/Y	107	gpm
Depth to Water	366			
Well Depth	1559			
Well Yield	150	gpm	242	ac-ft (peak)
			121	ac-ft (average)

Annual Costs	
Annual Cost of Pumping Existing Wells	$5,835
Annual Chemical Costs	$3,943
Total Annual Cost	**$9,778**
UNIT COSTS	
Per Acre-Foot	$81
Per 1,000 Gallons	$0.25

Table U-125

New Groundwater Well in Woodbine Aquifer for the City of Anna - Overdrafting 2010

Collin County, Woodbine Aquifer

Need	250	AF/Y	155	gpm
Depth to Water	366	ft		
Well Depth	1506	ft		
Well Yield	150	gpm	241.5	ac-ft (peak)
Well Size	8	in	121	ac-ft (average)
Wells Needed	1		121	

Construction Costs					
Water Well(s)	1			$219,060	$219,000
Connection to Transmission System	1			$100,000	$100,000
Storage Tank	1	.1	MG	$75,000	$75,000
Subtotal					$394,000
Engineering and Contingencies					$118,000
Mitigation and Permitting					$10,000
Subtotal					$522,000
Interest During Construction					$11,000
Total Capital					**$533,000**
Annual Costs					
Debt Service (30 years at 6%)					$38,722
Operation and Maintenance					
Transmission					$3,450
Well(s)					$6,570
Add Chemicals etc.					$3,943
Pumping Costs					$5,835
Total Annual Cost					**$58,519**
UNIT COSTS (2000-2020)					
Per Acre-Foot					$484
Per 1,000 Gallons					$1.48
UNIT COSTS (2030-2050)					
Per Acre-Foot					$164
Per 1,000 Gallons					$0.50

Table U-126
New Groundwater Well in Trinity Aquifer for the City of Anna - Overdrafting 2010
Collin County, Trinity Aquifer

Need	600 AF/Y	372	gpm
Depth to Water	366 ft		
Well Depth	2425 ft		
Well Yield	365 gpm	587.65	ac-ft (peak)
Well Size	10 in	294	ac-ft (average)
Wells Needed	1	294	

Construction Costs			
Water Well(s)	1	$441,245	$441,000
Connection to Transmission System	1	$100,000	$100,000
Storage Tank	1	$75,000	$75,000
Subtotal			$616,000
Engineering and Contingencies			$185,000
Mitigation and Permitting			$10,000
Subtotal			$811,000
Interest During Construction			$18,000
Total Capital			**$829,000**
Annual Costs			
Debt Service (30 years at 6%)			$60,226
Operation and Maintenance			
Transmission			$3,450
Well(s)			$13,230
Add Chemicals etc.			$9,580
Pumping Costs			$14,177
Total Annual Cost			**$100,663**
UNIT COSTS (2000-2020)			
Per Acre-Foot			$342
Per 1,000 Gallons			$1.05
UNIT COSTS (2030-2050)			
Per Acre-Foot			$138
Per 1,000 Gallons			$0.42

Table U-127
New Groundwater Well for the City of Blue Ridge - Overdrafting 2010
Collin County, Woodbine Aquifer

Need	130	AF/Y	81	gpm
Depth to Water	366	ft		
Well Depth	1900	ft		
Well Yield	235	gpm	378.35	ac-ft (peak)
Well Size	8	in	189	ac-ft (average)
Wells Needed	1		189	

Construction Costs			
Water Well(s)	1	$277,775	$278,000
Connection to Transmission System	1	$100,000	$100,000
Storage tank	1	$50,000	$50,000
Subtotal			$428,000
Engineering and Contingencies			$128,000
Mitigation and Permitting			$10,000
Subtotal			$566,000
Interest During Construction			$12,000
Total Capital			**$578,000**
Annual Costs			
Debt Service (30 years at 6%)			$41,991
Operation and Maintenance			
Transmission			$2,700
Well(s)			$8,340
Add Chemicals etc.			$6,159
Pumping Costs			$9,114
Total Annual Cost			**$68,304**
UNIT COSTS (2010-2030)			
Per Acre-Foot			$361
Per 1,000 Gallons			$1.11
UNIT COSTS (2040-2060)			
Per Acre-Foot			$139
Per 1,000 Gallons			$0.43

Table U-128
Blue Ridge Connection to NTMWD

Owner: NTMWD
Amount: 3,200 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline from Farmersville to Blue Ridge	24 in.	52,000	LF	$66	$3,432,000
Right of Way Easements (ROW)	20 ft.	24	Acre	$3,000	$72,000
Engineering and Contingencies (30%)					$1,051,000
Subtotal of Pipeline					**$4,555,000**
Pump Station(s)					
Booster Pump Station	150 HP	1	LS	$775,000	$775,000
Ground Storage with Roof	1 MG	1	LS	$275,000	$275,000
Engineering and Contingencies (35%)					$368,000
Subtotal of Pump Station(s)					**$1,418,000**
Permitting and Mitigation					**$54,000**
CONSTRUCTION TOTAL					**$6,027,000**
Interest During Construction			**(12 months)**		**$251,000**
TOTAL COST					**$6,278,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$456,000
Electricity ($0.06 kWh)					$14,700
Treated Water ($1.05 per 1,000 gallons)					$1,095,000
Operation & Maintenance					$64,000
Total Annual Costs					**$1,629,700**
UNIT COSTS (2010-2030)					
Per Acre-Foot					$509
Per 1,000 Gallons					$1.56
UNIT COSTS (2040-2060)					
Per Acre-Foot					$367
Per 1,000 Gallons					$1.13

Table U-129

Gunter Rural WSC - Overdraft Trinity Aquifer with Existing Wells in 2010

Collin County, Trinity Aquifer

Need	180	Af/Y	112	gpm
Depth to Water	366			
Well Depth	1559			
Well Yield	225	gpm	362	ac-ft (peak)
			181	ac-ft (average)

Annual Costs	
Annual Cost of Pumping Existing Wells	$6,932
Annual Chemical Costs	$5,898
Total Annual Cost	**$12,830**
UNIT COSTS	
Per Acre-Foot	$71
Per 1,000 Gallons	$0.22

Table U-130
City of Prosper Purchase Treated Water from North Texas MWD

Owner: Prosper
Amount: 12,800 Ac-Ft/Yr

CAPITAL COSTS	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline					
Pipeline	42 in.	26,000	LF	$202	$5,252,000
Right of Way Easements (ROW)	30 ft.	18	Acre	$3,000	$54,000
Engineering and Contingencies (30%)					$1,592,000
Subtotal of Pipeline					**$6,898,000**
Pump Station(s)					
Pump station	950 HP	1	LS	$2,300,000	$2,300,000
Ground Storage with Roof	4 MG	1	LS	$745,000	$745,000
Engineering and Contingencies (35%)					$1,066,000
Subtotal of Pump Station(s)					**$4,111,000**
Permitting and Mitigation					**$100,000**
CONSTRUCTION TOTAL					**$11,109,000**
Interest During Construction			**(12 months)**		**$463,000**
TOTAL COST					**$11,572,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$841,000
Electricity ($0.06 kWh)					$183,000
Operation & Maintenance					$132,000
Total Annual Costs					**$1,156,000**
UNIT COSTS (2010-2030)					
Per Acre-Foot					$90
Per 1,000 Gallons					$0.28
UNIT COSTS (2040-2060)					
Per Acre-Foot					$25
Per 1,000 Gallons					$0.08

Table U-131
Weston - Overdraft Woodbine Aquifer with Existing Wells in 2010
Collin County, Woodbine Aquifer

Need	187	Af/Y	116	gpm
Depth to Water	366			
Well Depth	1559			
Well Yield	150	gpm	242	ac-ft (peak)
			121	ac-ft (average)

Annual Costs	
Annual Cost of Pumping Existing Wells	$4,634
Annual Chemical Costs	$3,943
Total Annual Cost	**$8,577**
UNIT COSTS	
Per Acre-Foot	$71
Per 1,000 Gallons	$0.22

Table U-132
Collin County Irrigation - Pipeline with Reuse Purchase

Owner: Unknown
Amount: 360 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	8 in.	15,840	LF	$20	$317,000
Right of Way Easements (ROW)	15 ft.	5	Acre	$3,000	$16,000
Engineering and Contingencies (30%)					$100,000
Subtotal of Pipeline					**$433,000**
Pump Station(s)					
Booster Pump Station			LS	$260,000	$260,000
Engineering and Contingencies (35%)					$91,000
Subtotal of Pump Station(s)					**$351,000**
Permitting and Mitigation					**$7,000**
CONSTRUCTION TOTAL					**$791,000**
Interest During Construction					**$33,000**
TOTAL COST					**$824,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$60,000
Electricity ($0.06 kWh)					$4,000
Reuse Water ($0.25 per 1,000 gallons)					$29,000
Operation & Maintenance					$12,000
Total Annual Costs					**$105,000**
UNIT COSTS					
Per Acre-Foot					$292
Per 1,000 Gallons					$0.90

Table U-132
Collin County Irrigation - Pipeline with Reuse Purchase

Owner: Unknown
Amount: 360 Ac-Ft/Yr

CAPITAL COSTS	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline					
Pipeline	8 in.	15,840	LF	$20	$317,000
Right of Way Easements (ROW)	15 ft.	5	Acre	$3,000	$16,000
Engineering and Contingencies (30%)					$100,000
Subtotal of Pipeline					**$433,000**
Pump Station(s)					
Booster Pump Station			LS	$260,000	$260,000
Engineering and Contingencies (35%)					$91,000
Subtotal of Pump Station(s)					**$351,000**
Permitting and Mitigation					**$7,000**
CONSTRUCTION TOTAL					**$791,000**
Interest During Construction					**$33,000**
TOTAL COST					**$824,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$60,000
Electricity ($0.06 kWh)					$4,000
Reuse Water ($0.25 per 1,000 gallons)					$29,000
Operation & Maintenance					$12,000
Total Annual Costs					**$105,000**
UNIT COSTS					
Per Acre-Foot					$292
Per 1,000 Gallons					$0.90

Table U-133
Collin County Mining - Pipeline to NTMWD with Pump Station

Owner: Unknown
Amount: 146 Ac-Ft/Yr

CAPITAL COSTS	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline					
Pipeline	6 in.	15,840	LF	$15	$238,000
Right of Way Easements (ROW)	15 ft.	5	Acre	$3,000	$16,000
Engineering and Contingencies (30%)					$76,000
Subtotal of Pipeline					**$330,000**
Pump Station(s)					
Booster Pump Station					$100,000
Engineering and Contingencies (35%)					$35,000
Subtotal of Pump Station(s)					**$135,000**
Permitting and Mitigation					**$4,000**
CONSTRUCTION TOTAL					**$469,000**
Interest During Construction					**$20,000**
TOTAL COST					**$489,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$36,000
Electricity ($0.06 kWh)					$2,000
Raw Water ($0.68 per 1,000 gallons)					$32,000
Operation & Maintenance					$6,000
Total Annual Costs					**$76,000**
UNIT COSTS					
Per Acre-Foot					$521
Per 1,000 Gallons					$1.60

Table U-134
Collin County Steam Electric Power - Pipeline

Owner: Unknown
Amount: 1,467 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	12 in.	26,400	LF	$28	$739,000
Right of Way Easements (ROW)	20 ft.	12	Acre	$3,000	$36,000
Engineering and Contingencies (30%)					$233,000
Subtotal of Pipeline					**$1,008,000**
Pump Station(s)					
Booster Pump Station	50	1	LS	$652,000	$652,000
Engineering and Contingencies (35%)					$228,000
Subtotal of Pump Station(s)					**$880,000**
Permitting and Mitigation					**$17,000**
CONSTRUCTION TOTAL					**$1,905,000**
Interest During Construction					**$79,000**
TOTAL COST					**$1,984,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$144,000
Electricity ($0.06 kWh)					$22,000
Raw Water ($0.68 per 1,000 gallons)					$325,000
Operation & Maintenance					$29,000
Total Annual Costs					**$520,000**
UNIT COSTS					
Per Acre-Foot					$354
Per 1,000 Gallons					$1.09

Table U-135
Bolivar WSC - Overdraft the Trinity Aquifer with Existing Wells in 2010
Cooke County, Trinity Aquifer

Need	140	ac-ft/yr		
Water Depth	278	ft		
Well Depth	962	ft		
Well Yield	159	gpm	256	ac-ft (peak)
Well Size	8	in	128	ac-ft (average)
Wells Needed	0			

WELLS						
Well(s)	**Number**			**Unit Cost**		
Water Wells	0		$	136,554	$	-
Connection to Transmission System	0		$	100,000	$	-
Engineering and Contingencies					$	-
Subtotal of Well(s)					**$**	**-**
PERMITTING AND MITIGATION	1%				**$**	**-**
CONSTRUCTION TOTAL					**$**	**-**
Interest During Construction		(6 months)			**$**	**-**
TOTAL CAPITAL COST					**$**	**-**
ANNUAL COSTS						
Debt Service - Total Capital					$	-
O&M						
Transmission	1%				$	-
Well(s)	2.5%				$	-
Add Chemicals, Etc.	45,619	1000 gal	$	0.10	$	4,600
Pumping Costs					$	3,800
Total Annual Cost					**$**	**8,400**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	60
Cost per 1000 gallons					$	0.18
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	60
Cost per 1000 gallons					$	0.18

Table U-136
Lindsay - Overdraft Trinity Aquifer with Existing Wells in 2010
Cooke County, Trinity Aquifer

Need	24	ac-ft/yr		
Water Depth	348	ft		
Well Depth	783	ft		
Well Yield	375	gpm	604	ac-ft (peak)
Well Size	10	in	302	ac-ft (average)
Wells Needed	0			

WELLS						
Well(s)	**Number**			**Unit Cost**		
Water Wells	0		$	162,735	$	-
Connection to Transmission System	0		$	100,000	$	-
Engineering and Contingencies					$	-
Subtotal of Well(s)					**$**	**-**
PERMITTING AND MITIGATION	1%				**$**	**-**
CONSTRUCTION TOTAL					**$**	**-**
Interest During Construction		(6 months)			**$**	**-**
TOTAL CAPITAL COST					**$**	**-**
ANNUAL COSTS						
Debt Service - Total Capital					$	-
O&M						
Transmission	1%				$	-
Well(s)	2.5%				$	-
Add Chemicals, Etc.	7,703	1000 gal	$	0.10	$	800
Pumping Costs					$	800
Total Annual Cost					**$**	**1,600**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	68
Cost per 1000 gallons					$	0.21
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	68
Cost per 1000 gallons					$	0.21

Table U-137
Muenster Lake

Owner:	City of Muenster
Amount *:	500 ac-ft/yr

Additional Funds Needed (Capital Costs)	**1998 Dollars (Second Quarter)**	**2002 Dollars (Second Quarter)**
Construction Costs*	$ 1,375,710	$ 1,524,000
Construction Administration Costs*	$ 269,628	$ 299,000
Initial Equipment Purchase to Maintain Dam*	$ 68,237	$ 76,000
Bond Legal Fees*	$ 15,000	$ 17,000
Bond Fiscal Agent Fees*	$ 8,100	$ 9,000
Administratvie & Printing Bonds*	$ 6,000	$ 7,000
TNRCC Bond Issuance Fee*	$ 4,375	$ 5,000
Bond Application Report Costs*	$ 2,950	$ 3,000
404 Permit	n/a	$ 500,000
Mitigation	n/a	$ 666,000
Water Treatment Plant (1.6 MGD)	n/a	$ 4,690,000
Subtotal of Expenses Already Incurred*	$ 2,330,593	$ 2,582,000
SUBTOTAL		**$ 10,378,000**
Interest During Construction (2 years)		$ 811,000
TOTAL		**$ 11,189,000**

ANNUAL COSTS	**2002 Dollars (Second Quarter)**
Debt Service (6% for 30 years)	$ 813,000
Power ($0.06 kWh)	$ 12,000
Operation & Maintenance	$ 132,000
Water Treatment ($0.35 per 1,000 gallons)	$ 57,000
TOTAL	**$ 1,014,000**
UNIT COSTS (First 30 Years)	
Cost per Acre-Foot of Municipal Supply	$ 2,028
Cost per 1,000 Gallons	$ 6.22
UNIT COSTS (After 30 Years)	
Cost per Acre-Foot of Municipal Supply	$ 402
Cost per 1,000 Gallons	$ 1.23

(*) Information provided by Muenster Water District

Table U-138
Valley View - Purchase Water Distribution System

Probable Owner:	Valley View			
Quantity:	0 AF/Y			

PURCHASE COSTS

TRANSMISSION FACILITIES

Water Distribution System	**Qty.**	**Units**	**Unit Cost**	**Cost**
Water Distribution System	1	EA	$ 400,000	$ 400,000
Repairs	1	EA	$ 350,000	$ 350,000
Engineering and Contingencies	10%			$ 75,000
Subtotal of Water Distribution System				**$ 825,000**
PURCHASE TOTAL				**$ 825,000**
TOTAL CAPITAL COST				**$ 825,000**
ANNUAL COSTS				
Debt Service				$ 60,000
Operation and Maintenance Costs				
Pipeline	1%			$ 4,800
Raw Water Cost				$ -
Total Annual Costs				**$ 64,800**

Table U-139
Woodbine WSC - Overdraft the Trinity Aquifer with Existing Wells in 2010
Cooke County, Trinity Aquifer

Need	140	ac-ft/yr	
Water Depth	413	ft	
Well Depth	1320	ft	
Well Yield	140	gpm	225 ac-ft (peak)
Well Size	6	in	112.5 ac-ft (average)
Wells Needed	0		

WELLS						
Well(s)	**Number**			**Unit Cost**		
Water Wells	0		$	166,400	$	-
Connection to Transmission System	0		$	100,000	$	-
Engineering and Contingencies					$	-
Subtotal of Well(s)					**$**	**-**
PERMITTING AND MITIGATION	1%				**$**	**-**
CONSTRUCTION TOTAL					**$**	**-**
Interest During Construction		(6 months)			**$**	**-**
TOTAL CAPITAL COST					**$**	**-**
ANNUAL COSTS						
Debt Service - Total Capital					$	-
O&M						
Transmission	1%				$	-
Well(s)	2.5%				$	-
Add Chemicals, Etc.	45,619	1000 gal	$	0.10	$	4,600
Pumping Costs					$	5,400
Total Annual Cost					**$**	**10,000**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	71
Cost per 1000 gallons					$	0.22
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	71
Cost per 1000 gallons					$	0.22

Table U-140
Cooke County-Other - Overdraft Trinity Aquifer in Red Basin with New Wells in 2010
Cooke County, Trinity Aquifer, Red Basin

Need	105	ac-ft/yr		
Water Depth	413	ft		
Well Depth	969	ft		
Well Yield	100	gpm	161	ac-ft (peak)
Well Size	6	in	80.5	ac-ft (average)
Wells Needed	2			

WELLS						
Well(s)	**Number**			**Unit Cost**		
Water Wells	2		$	124,632	$	249,000
Connection to Transmission System	2		$	100,000	$	200,000
Engineering and Contingencies					$	135,000
Subtotal of Well(s)					**$**	**584,000**
PERMITTING AND MITIGATION	1%				**$**	**5,000**
CONSTRUCTION TOTAL					**$**	**589,000**
Interest During Construction		(6 months)			**$**	**13,000**
TOTAL CAPITAL COST					**$**	**602,000**
ANNUAL COSTS						
Debt Service - Total Capital					$	44,000
O&M						
Transmission	1%				$	2,400
Well(s)	2.5%				$	7,470
Add Chemicals, Etc.	34,220	1000 gal	$	0.10	$	3,400
Pumping Costs					$	4,000
Total Annual Cost					**$**	**61,270**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	583
Cost per 1000 gallons					$	1.79
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	164
Cost per 1000 gallons					$	0.50

Table U-141

Cooke County-Other - Overdraft the Trinity Aquifer in Trinity Basin with New Wells in 2010

Cooke County, Trinity Aquifer, Trinity Basin

Need	262	ac-ft/yr		
Water Depth	413	ft		
Well Depth	969	ft		
Well Yield	100	gpm	161	ac-ft (peak)
Well Size	6	in	80.5	ac-ft (average)
Wells Needed	4			

WELLS							
Well(s)	**Number**			**Unit Cost**			
Water Wells	4		$	124,632	$	499,000
Connection to Transmission System	4		$	100,000	$	400,000
Engineering and Contingencies					$	270,000
Subtotal of Well(s)					**$**	**1,169,000**
PERMITTING AND MITIGATION	1%				**$**	**11,000**
CONSTRUCTION TOTAL					**$**	**1,180,000**
Interest During Construction		(6 months)			**$**	**26,000**
TOTAL CAPITAL COST					**$**	**1,206,000**
ANNUAL COSTS						
Debt Service - Total Capital					$	88,000
O&M						
Transmission	1%				$	4,800
Well(s)	2.5%				$	14,970
Add Chemicals, Etc.	85,247	1000 gal	$	0.10	$	8,500
Pumping Costs					$	10,000
Total Annual Cost					**$**	**126,270**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	483
Cost per 1000 gallons					$	1.48
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	146
Cost per 1000 gallons					$	0.45

Table U-142
Cooke Irrigation - Overdraft Trinity Aquifer in Red Basin with New Wells in 2010
Cooke County, Trinity Aquifer, Red Basin

Need	89	ac-ft/yr		
Water Depth	413	ft		
Well Depth	969	ft		
Well Yield	100	gpm	161	ac-ft (peak)
Well Size	6	in	80.5	ac-ft (average)
Wells Needed	2			

WELLS						
Well(s)	**Number**			**Unit Cost**		
Water Wells	2		$	76,648	$	153,000
Connection to Transmission System	0		$	100,000	$	-
Engineering and Contingencies					$	46,000
Subtotal of Well(s)					**$**	**199,000**
PERMITTING AND MITIGATION	1%				**$**	**2,000**
CONSTRUCTION TOTAL					**$**	**201,000**
Interest During Construction		(6 months)			**$**	**4,000**
TOTAL CAPITAL COST					**$**	**205,000**
ANNUAL COSTS						
Debt Service - Total Capital					$	15,000
O&M						
Transmission	1%				$	-
Well(s)	2.5%				$	4,590
Add Chemicals, Etc.	28,860	1000 gal	$	-	$	-
Pumping Costs					$	3,400
Total Annual Cost					**$**	**22,990**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	260
Cost per 1000 gallons					$	0.80
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	90
Cost per 1000 gallons					$	0.28

Table U-142
Cooke Irrigation - Overdraft Trinity Aquifer in Red Basin with New Wells in 2010
Cooke County, Trinity Aquifer, Red Basin

Need	89	ac-ft/yr		
Water Depth	413	ft		
Well Depth	969	ft		
Well Yield	100	gpm	161	ac-ft (peak)
Well Size	6	in	80.5	ac-ft (average)
Wells Needed	2			

WELLS						
Well(s)	**Number**			**Unit Cost**		
Water Wells	2		$	76,648	$	153,000
Connection to Transmission System	0		$	100,000	$	-
Engineering and Contingencies					$	46,000
Subtotal of Well(s)					**$**	**199,000**
PERMITTING AND MITIGATION	1%				**$**	**2,000**
CONSTRUCTION TOTAL					**$**	**201,000**
Interest During Construction		(6 months)			**$**	**4,000**
TOTAL CAPITAL COST					**$**	**205,000**
ANNUAL COSTS						
Debt Service - Total Capital					$	15,000
O&M						
Transmission	1%				$	-
Well(s)	2.5%				$	4,590
Add Chemicals, Etc.	28,860	1000 gal	$	-	$	-
Pumping Costs					$	3,400
Total Annual Cost					**$**	**22,990**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	260
Cost per 1000 gallons					$	0.80
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	90
Cost per 1000 gallons					$	0.28

Table U-143
Cooke Irrigation - Overdraft Trinity Aquifer in Trinity Basin with New Wells in 2010
Cooke County, Trinity Aquifer, Trinity Basin

Need	51	ac-ft/yr		
Water Depth	413	ft		
Well Depth	969	ft		
Well Yield	100	gpm	161	ac-ft (peak)
Well Size	6	in	80.5	ac-ft (average)
Wells Needed	1			

WELLS						
Well(s)	**Number**			**Unit Cost**		
Water Wells	1		$	76,648	$	77,000
Connection to Transmission System	0		$	100,000	$	-
Engineering and Contingencies					$	23,000
Subtotal of Well(s)					**$**	**100,000**
PERMITTING AND MITIGATION	1%				**$**	**1,000**
CONSTRUCTION TOTAL					**$**	**101,000**
Interest During Construction		(6 months)			**$**	**2,000**
TOTAL CAPITAL COST					**$**	**103,000**
ANNUAL COSTS						
Debt Service - Total Capital					$	7,000
O&M						
Transmission	1%				$	-
Well(s)	2.5%				$	2,310
Add Chemicals, Etc.	16,759	1000 gal	$	-	$	-
Pumping Costs					$	2,000
Total Annual Cost					**$**	**11,310**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	220
Cost per 1000 gallons					$	0.67
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	84
Cost per 1000 gallons					$	0.26

Table U-144
Cooke County Mining - Overdraft Trinity Aquifer with New Wells in 2010
Cooke County, Trinity Aquifer

Need	47	ac-ft/yr		
Water Depth	413	ft		
Well Depth	969	ft		
Well Yield	100	gpm	161	ac-ft (peak)
Well Size	6	in	80.5	ac-ft (average)
Wells Needed	1			

WELLS						
Well(s)	**Number**			**Unit Cost**		
Water Wells	1		$	76,648	$	77,000
Connection to Transmission System	0		$	100,000	$	-
Engineering and Contingencies					$	23,000
Subtotal of Well(s)					**$**	**100,000**
PERMITTING AND MITIGATION	1%				**$**	**1,000**
CONSTRUCTION TOTAL					**$**	**101,000**
Interest During Construction		(6 months)			**$**	**2,000**
TOTAL CAPITAL COST					**$**	**103,000**
ANNUAL COSTS						
Debt Service - Total Capital					$	7,000
O&M						
Transmission	1%				$	-
Well(s)	2.5%				$	2,310
Add Chemicals, Etc.	15,315	1000 gal	$	-	$	-
Pumping Costs					$	1,800
Total Annual Cost					**$**	**11,110**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	236
Cost per 1000 gallons					$	0.73
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	87
Cost per 1000 gallons					$	0.27

Table U-145
Addison - Aquifer Storage and Recovery

Owner: Addison
Amount: 0 AF/Y

No.	Description	Quantity	Units	Unit Price	Amount
1	Mobilization & Demobilization	1	Ls	$50,000	$50,000
2	Drill 30-Inch Borehole	50	Ft	$175	$8,750
3	Drill 22-Inch Borehole	2050	Ft	$150	$307,500
4	Drill 15-Inch Borehole	300	Ft	$325	$97,500
5	24-Inch Steel Casing	50	Ft	$175	$8,750
6	16-Inch SS304L Casing 0.5" Wall Thickness	2100	Ft	$250	$525,000
7	Neat Cement	2100	Ft	$31	$65,100
8	Pilot Hole to 2100 ft	1	Ls	$9,000	$9,000
9	Reamed Borehole to 2100 ft	1	Ls	$10,000	$10,000
10	Cemented Casing to 2100 ft	1	Ls	$3,000	$3,000
11	15" Hole to 2400 ft	1	Ls	$9,000	$9,000
12	Well Screen	1	Ls	$2,000	$2,000
13	Screen Assembly Complete	200	Ft	$325	$65,000
14	Well Development	80	Hours	$875	$70,000
15	Pump Setup	1	Ls	$25,000	$25,000
16	Pumping test	48	Hours	$200	$9,600
17	Disinfection	1	Ls	$15,000	$15,000
18	Standby Time	16	Hours	$250	$4,000
19	Set/Pull 200 GPM Pump	1	Ls	$9,800	$9,800
20	Rent Interim Pump	4	Months	$3,000	$12,000
21	2000 GPM Vertical Turbine Pump	1	Ls	$219,300	$219,300
22	Piping, Valves & Flowmeter	1	Ls	$114,800	$114,800
23	Chlorine & Ammonia System	1	Ls	$91,400	$91,400
24	Chlorine, Ammonia & Electrical Building	1	Ls	$43,900	$43,900
25	Electrical	1	Ls	$116,800	$116,800
26	Instrumentation & Control	1	Ls	$64,300	$64,300
27	Painting & Misc.	1	Ls	$8,500	$8,500
28	Allowance	1	Ls	$50,000	$50,000
	Total				**$2,015,000**

Note: Item No. 8 thru 12 is for Geophysical Logging
Costs provided by The Colony.

Table U-146
Dallas/Denton Counties - Pipeline from DWU to Carrollton, Lewisville and The Colony

Owner:	Various				
Amount:	22,420	Ac-Ft/Yr	Carrollton1	32%	
	7,735	Ac-Ft/Yr	Carrollton 2	11%	16%
	6,280	Ac-Ft/Yr	Carrollton 3	9%	13%
	16,815	Ac-Ft/Yr	Lewisville	24%	35%
	16,815	Ac-Ft/Yr	The Colony	24%	35%
	70,065	Ac-Ft/Yr	Total		

CAPITAL COSTS	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline					
Pipeline (everyone)	54 in.	1,000	LF	$210	$210,000
Right of Way Easements (ROW)	30 ft.	1	Acre	$3,000	$2,000
Engineering and Contingencies (30%)					$64,000
Permitting and Mitigation					$3,000
Subtotal of Pipeline (everyone)					**$279,000**
Pipeline (20MGD Carrollton)	36 in.	15,840	LF	$114	$1,806,000
Right of Way Easements (ROW)	20 ft.	7	Acre	$3,000	$22,000
Engineering and Contingencies (30%)					$548,000
Permitting and Mitigation					$22,000
Subtotal of Pipeline (20MGD to Carrolton)					**$2,398,000**
Pipeline (junction to Lewisville)	48 in.	20,000	LF	$190	$3,800,000
Right of Way Easements (ROW)	30 ft.	14	Acre	$8,400	$116,000
Engineering and Contingencies (30%)					$1,175,000
Permitting and Mitigation					$46,000
Subtotal of Pipeline (junction to Lewisville)					**$5,137,000**
Pipeline (Hebron Pkwy)	42 in.	10,000	LF	$154	$1,540,000
Right of Way Easements (ROW)	30 ft.	7	Acre	$8,400	$58,000
Engineering and Contingencies (30%)					$479,000
Permitting and Mitigation					$18,000
Subtotal of Pipeline (Hebron Pkwy)					**$2,095,000**
Pipeline (Josey Ln)	36 in.	7,500	LF	$125	$941,000
Right of Way Easements (ROW)	20 ft.	3	Acre	$8,400	$29,000
Engineering and Contingencies (30%)					$291,000
Permitting and Mitigation					$11,000
Subtotal of Pipeline (Josey Ln)					**$1,272,000**

Table U-146, Continued

Pipeline (Lewisville)	30 in.	21,850	LF	$95	$2,067,000
Right of Way Easements (ROW)	20 ft.	10	Acre	$8,400	$84,000
Engineering and Contingencies (30%)					$645,000
Permitting and Mitigation					$25,000
Subtotal of Pipeline (Lewisville)					**$2,821,000**
Pipeline (The Colony)	36 in.	15,400	LF	$125	$1,931,000
Right of Way Easements (ROW)	20 ft.	7	Acre	$8,400	$59,000
Engineering and Contingencies (30%)					$597,000
Permitting and Mitigation					$23,000
Subtotal of Pipeline (The Colony)					**$2,610,000**
Total of Pipeline Cost					**$16,612,000**
Carrolton portion of pipelines	*52% of 54 in,100% 36 in, 30% of 48 in, 45% of 42 in, 27% of 36 in*				*$5,370,370*
Lewisville portion of pipelines	*24% of 52in, 35% of 48in,100% of 30in*				*$4,685,910*
The Colony portion of pipelines	*24% of 52in, 35% of 48in,55% of 42in,73% of 36in and 100% of 36in*				*$6,555,720*
					$16,612,000
Pump Stations					
Booster Pump Station 1	4300	1	LS	$5,310,000	$5,310,000
Engineering and Contingencies (35%)					$1,859,000
Permitting and Mitigation					$64,000
Subtotal of Pump Station 1					**$7,233,000**
Booster Pump Station 2	650	1	LS	$1,850,000	$1,850,000
Engineering and Contingencies (35%)					$648,000
Permitting and Mitigation					$22,000
Subtotal of Pump Station 2					**$2,520,000**
Booster Pump Station 3	350	1	LS	$1,350,000	$1,350,000
Engineering and Contingencies (35%)					$473,000
Permitting and Mitigation					$16,000
Subtotal of Pump Station 3					**$1,839,000**
Total of Pump Stations					**$11,592,000**

Table U-146, Continued

Carrolton portion of P.S	*52% of P.S 1*	*$3,761,160*
Lewisville portion of P.S	*24% of P.S 1, 100% of P.S2*	*$4,255,920*
The Colony portion of P.S	*24% of P.S 1, 100% of P.S 3*	*$3,574,920*
		$11,592,000
CONSTRUCTION TOTAL		**$28,204,000**
Interest During Construction		**$1,175,000**
TOTAL COST		**$29,379,000**
Carrolton		*$9,512,000*
Lewisville		*$9,314,000*
The Colony		*$10,553,000*
		$29,379,000

ANNUAL COSTS

Carrolton	
Debt Service (6% for 30 years)	$691,000
Electricity ($0.06 kWh)	$419,000
Operation & Maintenance	$81,000
Total Annual Costs	**$1,191,000**
Lewisville	
Debt Service (6% for 30 years)	$677,000
Electricity ($0.06 kWh)	$320,000
Operation & Maintenance	$78,000
Total Annual Costs	**$1,075,000**
The Colony	
Debt Service (6% for 30 years)	$767,000
Electricity ($0.06 kWh)	$441,000
Operation & Maintenance	$89,000
Total Annual Costs	**$1,297,000**

Table U-146, Continued

TOTAL ANNUAL COSTS

Debt Service (6% for 30 years)	$2,134,000
Electricity ($0.06 kWh)	$1,181,000
Operation & Maintenance	$248,000
Total Annual Costs	**$3,563,000**

UNIT COSTS

Carrollton	
Per Acre-Foot	$33
Per 1,000 Gallons	$0.10
Lewisville	
Per Acre-Foot	$64
Per 1,000 Gallons	$0.20
The Colony	
Per Acre-Foot	$77
Per 1,000 Gallons	$0.24

Table U-147
Dallas/Kaufman County Combine WSC - Parallel Pipeline to Seagoville

Owner: Combine WSC
Amount: 912 Ac-Ft/Yr

CAPITAL COSTS	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline					
Pipeline	10 in.	2,640	LF	$36	$95,000
Right of Way Easements (ROW)	15 ft.	1	Acre	$3,000	$3,000
Engineering and Contingencies (30%)					$29,000
Subtotal of Pipeline					**$127,000**
Pump Station(s)					
Booster Pump Station	50 HP	1	LS	$400,000	$400,000
Engineering and Contingencies (35%)					$140,000
Subtotal of Pump Station(s)					**$540,000**
Permitting and Mitigation					**$6,000**
CONSTRUCTION TOTAL					**$673,000**
Interest During Construction					**$28,000**
TOTAL COST					**$701,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$51,000
Electricity ($0.06 kWh)					$9,000
Operation & Maintenance					$13,000
Total Annual Costs					**$73,000**
UNIT COSTS					
Per Acre-Foot					$80
Per 1,000 Gallons					$0.25

Table U-148
Dallas/Ellis/Tarrant Counties Grand Prairie - Pipeline from Mansfield

Owner: Grand Prairie
Amount: 2,242 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	18 in.	20,000	LF	$63	$1,260,000
Right of Way Easements (ROW)	20 ft.	9	Acre	$3,000	$28,000
Engineering and Contingencies (30%)					$386,000
Subtotal of Pipeline					**$1,674,000**
Pump Station(s)					
Booster Pump Station	60 HP	1	LS	$444,000	$444,000
Engineering and Contingencies (35%)					$155,000
Subtotal of Pump Station(s)					**$599,000**
Permitting and Mitigation					**$20,000**
CONSTRUCTION TOTAL					**$2,293,000**
Interest During Construction					**$96,000**
TOTAL COST					**$2,389,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$174,000
Electricity ($0.06 kWh)					$5,000
Treated Water ($2 per 1,000 gallons)					$1,461,000
Operation & Maintenance					$28,000
Total Annual Costs					**$1,668,000**
UNIT COSTS					
Per Acre-Foot					$744
Per 1,000 Gallons					$2.28

Table U-149
Dallas/Ellis/Tarrant Counties Grand Prairie - Pipeline from Midlothian

Owner: Grand Prairie
Amount: 2,242 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	18 in.	25,000	LF	$63	$1,575,000
Right of Way Easements (ROW)	20 ft.	11	Acre	$3,000	$34,000
Engineering and Contingencies (30%)					$483,000
Subtotal of Pipeline					**$2,092,000**
Pump Station(s)					
Booster Pump Station	112 HP	1	LS	$655,000	$655,000
Engineering and Contingencies (35%)					$229,000
Subtotal of Pump Station(s)					**$884,000**
Permitting and Mitigation					**$27,000**
CONSTRUCTION TOTAL					**$3,003,000**
Interest During Construction					**$125,000**
TOTAL COST					**$3,128,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$227,000
Electricity ($0.06 kWh)					$15,000
Treated Water ($2 per 1,000 gallons)					$1,461,000
Operation & Maintenance					$39,000
Total Annual Costs					**$1,742,000**
UNIT COSTS					
Per Acre-Foot					$777
Per 1,000 Gallons					$2.38

Table U-150
Dallas County Irving - Indirect Reuse from Trinity River Authority

Owner: Irving
Amount: 26,000 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Transmission from WWTP to confluence of Elm Fork River and Denton Creek					
Pipeline					
Pipeline	54 in.	88,000	LF	$294	$25,872,000
Right of Way Easements (ROW)	30 ft.	61	Acre	$30,000	$1,818,000
Engineering and Contingencies (30%)					$8,307,000
Subtotal of Pipeline from WWTP					**$35,997,000**
Pump Station(s)					
Booster Pump Station	2000 HP	1	LS	$3,500,000	$3,500,000
Pump Station to WTP	2150 HP	1	LS	$5,795,000	$5,795,000
Engineering and Contingencies (35%)					$3,253,000
Subtotal of Pump Station(s)					**$12,548,000**
Water treatment plant at loop 12 and Elm Fork River					
Water Treatment Plant	46.0 MGD	1	LS	$46,500,000	$46,500,000
Engineering and Contingencies (35%)					$16,275,000
Subtotal of Water Treatment Plants					**$62,775,000**
Transmission from WTP to Irving					
Pipeline					
Pipeline	54 in.	26,200	LF	$294	$7,703,000
Right of Way Easements (ROW)	30 ft.	18	Acre	$30,000	$541,000
Engineering and Contingencies (30%)					$2,473,000
Subtotal of Pipeline from WTP to Irving					**$10,717,000**
Pump Station(s)					
Booster Pump Station	1400 HP	1	LS	$2,840,000	$2,840,000
Engineering and Contingencies (35%)					$994,000
Subtotal of Pump Station(s)					**$3,834,000**

Table U-150, Continued

Permitting and Mitigation	**$1,037,000**
CONSTRUCTION TOTAL	**$126,908,000**
Interest During Construction	**$5,288,000**
TOTAL COST	**$132,196,000**
ANNUAL COSTS	
Debt Service (6% for 30 years)	$9,604,000
Electricity ($0.06 kWh)	$494,000
Reuse water ($0.25 per 1,000 gallons)	$2,118,000
Water treatment ($0.45 per 1,000 gallons)	$3,812,000
Operation & Maintenance	$767,000
Total Annual Costs	**$16,795,000**
UNIT COSTS	
Per Acre-Foot	$646
Per 1,000 Gallons	$1.98

Table U-151
Irving Oklahoma Water
From Hugo to Lake Lewisville

Probable Owner: Irving
Quantity: 50,000 AF/Y

CONSTRUCTION COSTS					
TRANSMISSION FACILITIES					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline	60 in.	600,000	LF	$246	$147,600,000
30-ft Right of Way Easements (ROW)		413	ACRE	$3,000	$1,240,000
Red River Tunnel		1,000	LF	$755	$755,000
Engineering and Contingencies (30%)					$44,879,000
Subtotal of Pipeline					**$194,474,000**
Pump Station(s)					
Lake Hugo Pump Station	9600 HP	1	LS	$11,920,000	$11,920,000
Booster 1	9600 HP	1	LS	$8,800,000	$8,800,000
Engineering and Contingencies (35%)					$7,252,000
Subtotal of Pump Station(s)					**$27,972,000**
CONSTRUCTION TOTAL					**$222,446,000**
Permitting and Mitigation					**$2,029,000**
Interest During Construction			**(12 months)**		**$9,269,000**
TOTAL COST					**$233,744,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$16,981,000
Electricity ($0.06 kWh)					$4,774,000
Operation & Maintenance					$2,402,000
Raw Water Purchase					$2,444,000
Total Annual Costs					**$26,601,000**
UNIT COSTS (2020-2040)					
Per Acre-Foot					$532
Per 1,000 Gallons					$1.63
UNIT COSTS (2050-2060)					
Per Acre-Foot					$192
Per 1,000 Gallons					$0.59

Note: Cost for buying raw water is assumed to be $0.15 per 1,000 gallons

Table U-152
Ovilla Additional Water from Dallas

Owner:	Ovilla					
Amount:	1,055	Ac-Ft/Yr				
CONSTRUCTION COSTS						
TRANSMISSION FACILITIES						
Pipeline(s)	**Qty.**	**Units**	**Unit Cost**			**Total Cost**
16" Water Line						
Pipe	45,778	FT	$	37	$	1,694,000
ROW	21	AC	$	3,000	$	63,000
Engineering and Contingencies	30%				$	508,000
Subtotal of Pipeline(s)					**$**	**2,265,000**
Pump Station(s)						
Station 1						
Pump, building, & appurtances	14	hp			$	136,000
Storage Tank	310,000	gal			$	113,000
Engineering and Contingencies	35%				$	87,000
Subtotal of Pump Station(s)					**$**	**336,000**
PERMITTING AND MITIGATION	1%				**$**	**23,000**
CONSTRUCTION TOTAL					**$**	**2,624,000**
Interest During Construction		(12 months)			**$**	**109,000**
TOTAL CAPITAL COST					**$**	**2,733,000**
ANNUAL COSTS						
Debt Service					$	199,000
Operation and Maintenance Costs						
Pipeline	1%				$	20,000
Pump Station	2.50%				$	7,000
Estimated Annual Power Cost	$0.06/kWh				$	3,000
Treated Water Demand Charge	2	MGD	$	123,190	$	246,000
Treated Water Volume Charge	343,773	1000 gal	$	0.36	$	123,000
Total Annual Costs					**$**	**598,000**

Table U-152, Continued

UNIT COSTS (First 30 Years)		
Per Acre-Foot	$	567
Per 1,000 Gallons	$	1.74
UNIT COSTS (After 30 Years)		
Per Acre-Foot	$	262
Per 1,000 Gallons	$	0.80

Table U-153
Sardis-Lone Elm WSC Purchase Water from Rockett SUD

Owner:	Sardis-Lone Elm WSC					
Amount:	1,809	Ac-Ft/Yr				
CONSTRUCTION COSTS						
TRANSMISSION FACILITIES						
Pipeline(s)	**Qty.**	**Units**		**Unit Cost**		**Total Cost**
20" Water Line						
Pipe	48,200	FT	$	51	$	2,458,000
ROW	22	AC	$	3,000	$	66,000
Engineering and Contingencies	30%				$	737,000
Subtotal of Pipeline(s)					**$**	**3,261,000**
Pump Station(s)						
Station 1						
Pump, building, & appurtances	202	hp			$	937,000
Storage Tank	540,000	gal			$	165,000
Engineering and Contingencies	35%				$	386,000
Subtotal of Pump Station(s)					**$**	**1,488,000**
PERMITTING AND MITIGATION	1%				**$**	**43,000**
CONSTRUCTION TOTAL					**$**	**4,792,000**
Interest During Construction		(12 months)			**$**	**200,000**
TOTAL CAPITAL COST					**$**	**4,992,000**
ANNUAL COSTS						
Debt Service					$	363,000
Operation and Maintenance Costs						
Pipeline	1%				$	29,000
Pump Station	2.50%				$	33,000
Estimated Annual Power Cost	$0.06/kWh				$	40,000
Treated Water Cost	589,464	1000 gal	$	1.21	$	714,000
Total Annual Costs					**$**	**1,179,000**

Table U-153, Continued

UNIT COSTS (First 30 Years)		
Per Acre-Foot	$	652
Per 1,000 Gallons	$	2.00
UNIT COSTS (After 30 Years)		
Per Acre-Foot	$	451
Per 1,000 Gallons	$	1.38

Table U-153
Sardis-Lone Elm WSC Purchase Water from Rockett SUD

Owner:	Sardis-Lone Elm WSC					
Amount:	1,809	Ac-Ft/Yr				
CONSTRUCTION COSTS						
TRANSMISSION FACILITIES						
Pipeline(s)	**Qty.**	**Units**	**Unit Cost**			**Total Cost**
20" Water Line						
Pipe	48,200	FT	$	51	$	2,458,000
ROW	22	AC	$	3,000	$	66,000
Engineering and Contingencies	30%				$	737,000
Subtotal of Pipeline(s)					**$**	**3,261,000**
Pump Station(s)						
Station 1						
Pump, building, & appurtances	202	hp			$	937,000
Storage Tank	540,000	gal			$	165,000
Engineering and Contingencies	35%				$	386,000
Subtotal of Pump Station(s)					**$**	**1,488,000**
PERMITTING AND MITIGATION	1%				**$**	**43,000**
CONSTRUCTION TOTAL					**$**	**4,792,000**
Interest During Construction		(12 months)			**$**	**200,000**
TOTAL CAPITAL COST					**$**	**4,992,000**
ANNUAL COSTS						
Debt Service					$	363,000
Operation and Maintenance Costs						
Pipeline	1%				$	29,000
Pump Station	2.50%				$	33,000
Estimated Annual Power Cost	$0.06/kWh				$	40,000
Treated Water Cost	589,464	1000 gal	$	1.21	$	714,000
Total Annual Costs					**$**	**1,179,000**

Table U-153, Continued

UNIT COSTS (First 30 Years)		
Per Acre-Foot	$	652
Per 1,000 Gallons	$	2.00
UNIT COSTS (After 30 Years)		
Per Acre-Foot	$	451
Per 1,000 Gallons	$	1.38

Table U-154
Wilmer - Cost of Overdrafting with Existing Wells until 2010
Dallas County, Trinity Aquifer

Need	319	Af/Y	198	gpm
Depth to Water	1135			
Well Depth	3500			
Well Yield	400	gpm	644	ac-ft (peak)
			322	ac-ft (average)

ANNUAL COSTS		
Pumping Costs		$36,902
Add Chemicals etc.	0.1	$10,492
Total Annual Cost		**$47,394**
UNIT COSTS		
Cost per ac-ft		$147
Cost per 1000 gallons		$0.45

Table U-155
Dallas County Irrigation - Pipeline for Reuse

Owner: Unknown
Amount: 2,700 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	16 in.	15,840	LF	$56	$887,000
Right of Way Easements (ROW)	20 ft.	7	Acre	$30,000	$218,000
Engineering and Contingencies (30%)					$332,000
Subtotal of Pipeline					**$1,437,000**
Pump Station(s)					
Booster Pump Station	230 HP	1	LS	$981,000	$981,000
Engineering and Contingencies (35%)					$343,000
Subtotal of Pump Station(s)					**$1,324,000**
Permitting and Mitigation					**$22,000**
CONSTRUCTION TOTAL					**$2,783,000**
Interest During Construction					**$116,000**
TOTAL COST					**$2,899,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$211,000
Electricity ($0.06 kWh)					$32,000
Reuse Water ($.25 per 1,000 gallons)					$220,000
Operation & Maintenance					$40,000
Total Annual Costs					**$503,000**
UNIT COSTS					
Per Acre-Foot					$186
Per 1,000 Gallons					$0.57

Table U-156
Dallas County Mining - Pipeline

Owner: Unknown
Amount: 300 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	8 in.	15,840	LF	$30	$475,000
Right of Way Easements (ROW)	15 ft.	5	Acre	$30,000	$164,000
Engineering and Contingencies (30%)					$192,000
Subtotal of Pipeline					**$831,000**
Pump Station(s)					
Booster Pump Station	12 HP	1	LS	$200,000	$200,000
Engineering and Contingencies (35%)					$70,000
Subtotal of Pump Station(s)					**$270,000**
Permitting and Mitigation					**$8,000**
CONSTRUCTION TOTAL					**$1,109,000**
Interest During Construction					**$46,000**
TOTAL COST					**$1,155,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$84,000
Electricity ($0.06 kWh)					$3,000
Raw Water ($.45 per 1,000 gallons for DWU)					$44,000
Operation & Maintenance					$12,000
Total Annual Costs					**$143,000**
UNIT COSTS					
Per Acre-Foot					$477
Per 1,000 Gallons					$1.46

Table U-157
Dallas County S. E. Power - Direct Reuse

Owner: Unknown
Amount: 4,600 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	24 in.	52,800	LF	$66	$3,485,000
Right of Way Easements (ROW)	20 ft	24	Acre	$3,000	$73,000
Engineering and Contingencies (30%)					$1,067,000
Subtotal of Pipeline					**$4,625,000**
Pump Station(s)					
Booster Pump Station	250	1	LS	$1,065,000	$1,065,000
Engineering and Contingencies (35%)					$373,000
Subtotal of Pump Station(s)					**$1,438,000**
Permitting and Mitigation					**$55,000**
CONSTRUCTION TOTAL					**$6,118,000**
Interest During Construction			**(12 months)**		**$255,000**
TOTAL COST					**$6,373,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$463,000
Electricity ($0.06 kWh)					$58,000
Reuse Water ($0.25 per 1,000 gallons)					$375,000
Operation & Maintenance					$74,000
Total Annual Costs					**$970,000**
UNIT COSTS (Pre-Amortization)					
Per Acre-Foot					$211
Per 1,000 Gallons					$0.65
UNIT COSTS (Post Amortization)					
Per Acre-Foot					$110
Per 1,000 Gallons					$0.34

Table U-158
Bartonville - Cost of Overdrafting Trinity Aquifer with Existing Wells in 2010
Denton County, Trinity Aquifer

Need	50	AF/Y			
Depth to Water	444				
Well Depth	900				
Well Yield	56	gpm		90	ac-ft (peak)
				45	ac-ft (average)

ANNUAL COSTS		
Add Chemicals etc.	0.1	$1,466
Pumping Costs		$2,072
Total Annual Cost		**$3,538**
UNIT COSTS		
Cost per ac-ft		$79
Cost per 1000 gallons		$0.24

Table U-158
Bartonville - Cost of Overdrafting Trinity Aquifer with Existing Wells in 2010
Denton County, Trinity Aquifer

Need	50	AF/Y			
Depth to Water	444				
Well Depth	900				
Well Yield	56	gpm		90	ac-ft (peak)
				45	ac-ft (average)

ANNUAL COSTS		
Add Chemicals etc.	0.1	$1,466
Pumping Costs		$2,072
Total Annual Cost		**$3,538**
UNIT COSTS		
Cost per ac-ft		$79
Cost per 1000 gallons		$0.24

Table U-159
New Groundwater Well for Bartonville WSC - Overdrafting 2010
Denton County, Trinity Aquifer

Need	50	AF/Y	31	gpm
Depth to Water	444	ft		
Well Depth	900	ft		
Well Yield	56	gpm	90.16	ac-ft (peak)
Well Size	8	in	45	ac-ft (average)
Wells Needed	1		45	

Construction Costs			
Water Well(s)	1	$131,140	$131,000
Connection to Transmission System	1	$100,000	$100,000
Storage tank	1	$50,000	$50,000
Subtotal			$281,000
Engineering and Contingencies			$84,000
Mitigation and Permitting			$10,000
Subtotal			$375,000
Interest During Construction			$8,000
Total Capital			**$383,000**
Annual Costs			
Debt Service (30 years at 6%)			$27,825
Operation and Maintenance			
Transmission			$2,700
Well(s)			$3,930
Add Chemicals etc.			$1,466
Pumping Costs			$2,518
Total Annual Cost			**$38,439**
UNIT COSTS (2010-2030)			
Per Acre-Foot			$854
Per 1,000 Gallons			$2.62
UNIT COSTS (2040-2060)			
Per Acre-Foot			$236
Per 1,000 Gallons			$0.72

Table U-160
Bolivar WSC - Cost of Overdrafting Trinity Aquifer with Existing Wells in 2010
Denton County, Trinity Aquifer

Need	90	AF/Y			
Depth to Water	444				
Well Depth	900				
Well Yield	56	gpm		90	ac-ft (peak)
				45	ac-ft (average)

ANNUAL COSTS		
Add Chemicals etc.	0.1	$1,466
Pumping Costs		$2,072
Total Annual Cost		**$3,538**
UNIT COSTS		
Cost per ac-ft		$79
Cost per 1000 gallons		$0.24

Table U-161
City of Hackberry Purchase Treated Water from North Texas MWD

Owner: Hackberry
Amount: 270 Ac-Ft/Yr

CAPITAL COSTS	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline					
Pipeline	10 in.	26,000	LF	$36	$936,000
Right of Way Easements (ROW)	15 ft.	9	Acre	$3,000	$27,000
Engineering and Contingencies (30%)					$289,000
Subtotal of Pipeline					**$1,252,000**
Pump Station(s)					
Pump station	25 HP	1	LS	$250,000	$250,000
Ground Storage with Roof	1 MG	1	LS	$275,000	$275,000
Engineering and Contingencies (35%)					$184,000
Subtotal of Pump Station(s)					**$709,000**
Permitting and Mitigation					**$18,000**
CONSTRUCTION TOTAL					**$1,979,000**
Interest During Construction			**(12 months)**		**$82,000**
TOTAL COST					**$2,061,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$150,000
Electricity ($0.06 kWh)					$4,000
Operation & Maintenance					$19,000
Total Annual Costs					**$173,000**
UNIT COSTS (2010-2030)					
Per Acre-Foot					$641
Per 1,000 Gallons					$1.97
UNIT COSTS (2040-2060)					
Per Acre-Foot					$85
Per 1,000 Gallons					$0.26

Table U-162
Krum - Cost of Overdrafting Trinity Aquifer with Existing Wells in 2010
Denton County, Trinity Aquifer

Need	11				
Depth to Water	444				
Well Depth	900				
Well Yield	15	gpm		24	ac-ft (peak)
				12	ac-ft (average)

ANNUAL COSTS		
Add Chemicals etc.	0.1	$391
Pumping Costs		$552
Total Annual Cost		**$943**
UNIT COSTS		
Cost per ac-ft		$79
Cost per 1000 gallons		$0.24

Table U-163
Little Elm - Cost of Overdrafting Trinity Aquifer with Existing Wells in 2010
Denton County, Trinity Aquifer

Need	1407				
Depth to Water	444				
Well Depth	900				
Well Yield	1750	gpm		2818	ac-ft (peak)
				1409	ac-ft (average)

ANNUAL COSTS		
Add Chemicals etc.	0.1	$45,912
Pumping Costs		$64,869
Total Annual Cost		**$110,781**
UNIT COSTS		
Cost per ac-ft		$79
Cost per 1000 gallons		$0.24

Table U-164
Pilot Point - Cost of Overdrafting Trinity Aquifer with Existing Wells
Denton County, Trinity Aquifer

Need	623			
Depth to Water	444			
Well Depth	521			
Well Yield	775 gpm		1248	ac-ft (peak)
			624	ac-ft (average)

ANNUAL COSTS		
Pumping Costs		$28,728
Add Chemicals etc.	0.1	$20,333
Total Annual Cost		**$49,061**
UNIT COSTS		
Cost per ac-ft		$79
Cost per 1000 gallons		$0.24

Table U-165
Northlake, Roanoke, and Trophy Club to Fort Worth (Share of Cost to connect to Fort Worth)

Probable Owner: Northlake/Roanoke/Trophy Club/Fort Worth
Amount:

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipelines*	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline (24 in.)	24 in.	5,000	LF	$120	$600,000
Pipeline (36 in.)	36 in.	30,000	LF	$180	$5,400,000
ROW Easements		16	Acres	$30,000	$480,000
48" Boring and casing		200	LF	$480	$96,000
Engineering and Contingencies (30%)					$1,973,000
Subtotal of Pipelines					**$8,549,000**
Permitting and mitigation					$72,000
CONSTRUCTION TOTAL					**$8,549,000**
Interest During Construction	**(18 months)**				**$527,000**
TOTAL COST					**$9,148,000**
Fort Worth's Share (50%)					**$4,574,000**
Northlake's Share (30%)					**$2,744,000**
Roanoke's Share (10%)					**$915,000**
Trophy Club (10%)					**$915,000**

ANNUAL COSTS FOR NORTHLAKE	
Debt Service (6% for 30 years)	$199,000
Electricity ($0.06 kWh)	$0
Operation & Maintenance	$72,000
Total Annual Costs	**$271,000**

ANNUAL COSTS FOR ROANOKE	
Debt Service (6% for 30 years)	$66,000
Electricity ($0.06 kWh)	$0
Operation & Maintenance	$72,000
Total Annual Costs	**$138,000**

ANNUAL COSTS FOR TROPHY CLUB	
Debt Service (6% for 30 years)	$66,000
Electricity ($0.06 kWh)	$0
Operation & Maintenance	$72,000
Total Annual Costs	**$138,000**

Notes:
* Pipeline and storage tank information and costs based on information provided in Fort Worth Master Plan.

Table U-166
Southlake to Fort Worth (Share of Cost to Connect to Fort Worth)

Probable Owner: Southlake/Fort Worth

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipelines*	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline (16 in.)	16 in.	5,500	LF	$80	$440,000
Pipeline (42 in.)	42 in.	46,000	LF	$210	$9,660,000
ROW Easements		35	Acres	$3,000	$105,000
54" Boring and casing		200	LF	$540	$108,000
Miscellaneous Improvements		1	LS	$700,000	$700,000
Engineering and Contingencies (30%)					$3,304,000
Subtotal of Pipelines					**$14,317,000**
Permitting and mitigation					$121,000
CONSTRUCTION TOTAL					**$14,317,000**
Interest During Construction	**(18 months)**				**$883,000**
TOTAL COST					**$15,321,000**
Fort Worth's Share (85%)					**$10,725,000**
Southlake's Share (15%)					**$4,596,000**
ANNUAL COSTS FOR SOUTHLAKE					
Debt Service (6% for 30 years)					$334,000
Electricity ($0.06 kWh)					$0
Operation & Maintenance					$121,000
Total Annual Costs					**$455,000**

Notes:
* Pipeline and storage tank information and costs based on information provided in Fort Worth Master Plan.

Table U-167
The Colony - Aquifer Storage and Recovery

Owner: The Colony
Amount: 0 AF/Y

No.	Description	Quantity	Units	Unit Price	Amount
1	Mobilization & Demobilization	1	Ls	$50,000	$50,000
2	Drill 30-Inch Borehole	50	Ft	$175	$8,750
3	Drill 22-Inch Borehole	2050	Ft	$150	$307,500
4	Drill 15-Inch Borehole	300	Ft	$325	$97,500
5	24-Inch Steel Casing	50	Ft	$175	$8,750
6	16-Inch SS304L Casing 0.5" Wall Thickness	2100	Ft	$250	$525,000
7	Neat Cement	2100	Ft	$31	$65,100
8	Pilot Hole to 2100 ft	1	Ls	$9,000	$9,000
9	Reamed Borehole to 2100 ft	1	Ls	$10,000	$10,000
10	Cemented Casing to 2100 ft	1	Ls	$3,000	$3,000
11	15" Hole to 2400 ft	1	Ls	$9,000	$9,000
12	Well Screen	1	Ls	$2,000	$2,000
13	Screen Assembly Complete	200	Ft	$325	$65,000
14	Well Development	80	Hours	$875	$70,000
15	Pump Setup	1	Ls	$25,000	$25,000
16	Pumping test	48	Hours	$200	$9,600
17	Disinfection	1	Ls	$15,000	$15,000
18	Standby Time	16	Hours	$250	$4,000
19	Set/Pull 200 GPM Pump	1	Ls	$9,800	$9,800
20	Rent Interim Pump	4	Months	$3,000	$12,000
21	2000 GPM Vertical Turbine Pump	1	Ls	$219,300	$219,300
22	Piping, Valves & Flowmeter	1	Ls	$114,800	$114,800
23	Chlorine & Ammonia System	1	Ls	$91,400	$91,400
24	Chlorine, Ammonia & Electrical Building	1	Ls	$43,900	$43,900
25	Electrical	1	Ls	$116,800	$116,800
26	Instrumentation & Control	1	Ls	$64,300	$64,300
27	Painting & Misc.	1	Ls	$8,500	$8,500
28	Allowance	1	Ls	$50,000	$50,000
	Total				**$2,015,000**

Note: Item No. 8 thru 12 is for Geophysical Logging
Costs provided by The Colony.

Table U-168
Denton County Mining - New Wells in Woodbine Aquifer
Denton County, Woodbine Aquifer

Need	202	Ac-ft/yr	125	gpm
Depth to Water	104			
Well Depth	300			
Well Yield	300	gpm	483	ac-ft (peak)
Well Size	8	in	241.5	ac-ft (average)
Wells Needed	2			

Construction Costs

Water Wells (1)	2	$66,000	$132,000
Connection to Transmission System	2	$100,000	$200,000
Storage tank	1	$75,000	$75,000
Subtotal			$407,000
Engineering and Contingencies			$122,000
Mitigation and Permitting			$10,000
Subtotal			$539,000
Interest During Construction			$12,000
	Total Capital		**$551,000**
Debt Service - Total Capital			$40,030
O&M			
Transmission			$4,650
Well(s)			$3,960
Add Chemicals etc.		0.1	$15,739
Pumping Costs			$10,735
	Total Annual Cost		**$75,113**

UNIT COSTS

Cost per ac-ft	$156
Cost per 1000 gallons	$0.48

Table U-169
Bardwell - New Wells
Ellis County, Woodbine Aquifer

Need	170	ac-ft/yr			
Water Depth	481	ft			
Well Depth	1484	ft			
Well Yield	43	gpm		69	ac-ft (peak)
Well Size	6	in		34.5	ac-ft (average)
Wells Needed	5				

WELLS						
Well(s)	**Number**			**Unit Cost**		
Water Wells	5		$	176,625	$	883,000
Connection to Transmission System	5		$	100,000	$	500,000
Engineering and Contingencies					$	415,000
Subtotal of Well(s)					**$**	**1,798,000**
WATER TREATMENT FACILITIES						
Water Treatment Plant Expansion	0.30	MGD			$	1,791,000
Engineering and Contingencies	35%				$	627,000
Subtotal of Water Treatment Plant					**$**	**2,418,000**
PERMITTING AND MITIGATION	1%				**$**	**17,000**
CONSTRUCTION TOTAL					**$**	**4,233,000**
Interest During Construction		(6 months)			**$**	**92,000**
TOTAL CAPITAL COST					**$**	**4,325,000**
ANNUAL COSTS						
Debt Service - Total Capital					$	314,000
O&M						
Transmission	1%				$	6,000
Well(s)	2.5%				$	26,490
Add Chemicals, Etc.	55,395	1000 gal	$	0.10	$	5,500
Pumping Costs					$	7,500
Total Annual Cost					**$**	**359,490**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	2,115
Cost per 1000 gallons					$	6.49
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	268
Cost per 1000 gallons					$	0.82

Table U-170
Buena Vista - Bethel WSC - Existing Wells
Ellis County, Trinity Aquifer

Need	56	ac-ft/yr		
Water Depth	839	ft		
Well Depth	2579	ft		
Well Yield	217	gpm	349	ac-ft (peak)
Well Size	8	in	174.5	ac-ft (average)
Wells Needed	0			

WELLS				
Well(s)	**Number**		**Unit Cost**	
Water Wells	0		$ 342,438	$ -
Connection to Transmission System	0		$ 100,000	$ -
Engineering and Contingencies				$ -
Subtotal of Well(s)				**$ -**
PERMITTING AND MITIGATION	1%			**$ -**
CONSTRUCTION TOTAL				**$ -**
Interest During Construction		(6 months)		**$ -**
TOTAL CAPITAL COST				**$ -**
ANNUAL COSTS				
Debt Service - Total Capital				$ -
O&M				
Transmission	1%			$ -
Well(s)	2.5%			$ -
Add Chemicals, Etc.	18,277	1000 gal	$ 0.10	$ 1,800
Pumping Costs				$ 4,100
Total Annual Cost				**$ 5,900**
UNIT COSTS (First 30 Years)				
Cost per ac-ft				$ 105
Cost per 1000 gallons				$ 0.32
UNIT COSTS (After 30 Years)				
Cost per ac-ft				$ 105
Cost per 1000 gallons				$ 0.32

Table U-171
Buena Vista - Bethel SUD Purchase Water from Rockett SUD

Owner:	Buena Vista - Bethel SUD					
Amount:	658	Ac-Ft/Yr				
CONSTRUCTION COSTS						
TRANSMISSION FACILITIES						
Pipeline(s)	**Qty.**	**Units**	**Unit Cost**			**Total Cost**
14" Water Line						
Pipe	96,860	FT	$	32	$	3,100,000
ROW	44	AC	$	3,000	$	133,000
Engineering and Contingencies	30%				$	930,000
Subtotal of Pipeline(s)					**$**	**4,163,000**
Pump Station(s)						
Station 1						
Pump, building, & appurtances	61	hp			$	450,000
Storage Tank	200,000	gal			$	92,000
Engineering and Contingencies	35%				$	190,000
Subtotal of Pump Station(s)					**$**	**732,000**
PERMITTING AND MITIGATION	1%				**$**	**44,000**
CONSTRUCTION TOTAL					**$**	**4,939,000**
Interest During Construction		(18 months)			**$**	**284,000**
TOTAL CAPITAL COST					**$**	**5,223,000**
ANNUAL COSTS						
Debt Service					$	379,000
Operation and Maintenance Costs						
Pipeline	1%				$	37,000
Pump Station	2.50%				$	16,000
Estimated Annual Power Cost	$0.06/kWh				$	12,000
Treated Water Cost	214,472	1000 gal	$	1.21	$	260,000
Total Annual Costs					**$**	**704,000**

Table U-171, Continued

UNIT COSTS (First 30 Years)		
Per Acre-Foot	$	1,070
Per 1,000 Gallons	$	3.28
UNIT COSTS (After 30 Years)		
Per Acre-Foot	$	494
Per 1,000 Gallons	$	1.52

Table U-172
Community Water Co. Additional Water from Ennis

Owner: Community Water Co.
Amount: 188 Ac-Ft/Yr

Item No. & Description	Qty.	Units	Unit Cost		Total Cost
TOTAL CAPITAL COST				**$**	**-**
ANNUAL COSTS					
Debt Service				$	-
Operation and Maintenance Costs					
Pipeline	1%			$	-
Pump Station	2.50%			$	-
Estimated Annual Power Cost	$0.06/kWh			$	-
Treated Water Cost	61,260	1000 gal	$ 2.67	$	164,000
Total Annual Costs				**$**	**164,000**
UNIT COSTS (First 30 Years)					
Per Acre-Foot				$	872
Per 1,000 Gallons				$	2.68
UNIT COSTS (After 30 Years)					
Per Acre-Foot				$	872
Per 1,000 Gallons				$	2.68

Table U-173
Community Water Company - New Wells
Ellis County, Woodbine Aquifer

Need	18	ac-ft/yr		
Water Depth	426	ft		
Well Depth	1478	ft		
Well Yield	120	gpm	193	ac-ft (peak)
Well Size	6	in	96.5	ac-ft (average)
Wells Needed	1			

WELLS						
Well(s)	**Number**			**Unit Cost**		
Water Wells	1		$	182,180	$	182,000
Connection to Transmission System	1		$	100,000	$	100,000
Engineering and Contingencies					$	85,000
Subtotal of Well(s)					**$**	**367,000**
PERMITTING AND MITIGATION	1%				**$**	**3,000**
CONSTRUCTION TOTAL					**$**	**370,000**
Interest During Construction		(6 months)			**$**	**8,000**
TOTAL CAPITAL COST					**$**	**378,000**
ANNUAL COSTS						
Debt Service - Total Capital					$	27,000
O&M						
Transmission	1%				$	1,200
Well(s)	2.5%				$	5,460
Add Chemicals, Etc.	5,865	1000 gal	$	0.10	$	600
Pumping Costs					$	700
Total Annual Cost					**$**	**34,960**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	1,942
Cost per 1000 gallons					$	5.96
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	442
Cost per 1000 gallons					$	1.36

Table U-174
Ennis WWTP Indirect Reuse

Owner:	Ennis				
Indirect Reuse Amount:	3,696	Ac-Ft/Yr			

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipeline(s)	**Qty.**	**Units**	**Unit Cost**		**Total Cost**
20" Reclaimed Water Line					
Pipe	32,855	FT	$ 51	$	1,676,000
ROW	15	AC	$ 3,000	$	45,000
20" Raw Water Line					
Pipe	4,752	FT	$ 51	$	242,000
ROW	2	AC	$ 3,000	$	7,000
Engineering and Contingencies	30%			$	575,000
Subtotal of Pipeline(s)				**$**	**2,545,000**
Pump Station(s)					
Station 1					
Pump, building, & appurtances	65	hp		$	467,000
Storage Tank	0	gal		$	-
Station 2					
Pump, building, & appurtances	188	hp		$	1,265,000
Storage Tank	0	gal		$	-
Engineering and Contingencies	35%			$	606,000
Subtotal of Pump Station(s)				**$**	**2,338,000**

WATER TREATMENT FACILITIES

Wastewater Treatment Plant Expansion					
Advanced Wastewater Treatment	4.00	MGD		$	3,250,000
Engineering and Contingencies	35%			$	1,138,000
Subtotal of Wastewater Treatment Plant				**$**	**4,388,000**
Water Treatment Plant Expansion					
Water Treatment Plant Expansion	6.00	MGD		$	12,100,000
Engineering and Contingencies	35%			$	4,235,000
Subtotal of Water Treatment Plant				**$**	**16,335,000**

Table U-174, Continued

PERMITTING AND MITIGATION	1%				**$**	**44,000**
CONSTRUCTION TOTAL					**$**	**25,650,000**
Interest During Construction		(18 months)			**$**	**1,477,000**
TOTAL CAPITAL COST					**$**	**27,127,000**
ANNUAL COSTS						
Debt Service					$	1,971,000
Operation and Maintenance Costs						
Pipeline	1%				$	23,000
Pump Station	2.50%				$	52,000
RO Operation	1,204,345	1000 gal	$	0.48	$	578,000
WTP Operation	1,204,345	1000 gal	$	0.35	$	422,000
Estimated Annual Power Cost	$0.06/kWh				$	50,000
Raw Water Cost	3,696	ac-ft	$	-	$	-
Total Annual Costs					**$**	**3,096,000**
UNIT COSTS (First 30 Years)						
Per Acre-Foot					$	838
Per 1,000 Gallons					$	2.57
UNIT COSTS (After 30 Years)						
Per Acre-Foot					$	304
Per 1,000 Gallons					$	0.93

Assume no raw water cost.

Table U-175
Ennis from TRA (Reallocation of Flood Storage at Bardwell)

Owner:	Ennis								
Amount:	1,760	Ac-Ft/Yr							
CONSTRUCTION COSTS									
SITE WORK									
Relocation(s)	**Qty.**	**Units**	**Unit Cost**		**Dec 1988 Orig Est**		**Dec 1988 Total Cost**		**Apr 2002 Total Cost**
Recreational Facilities				$	1,502,200	$	1,502,200	$	2,125,000
Brazos Electric Power Lines				$	650,000	$	650,000	$	920,000
Navarro County Electric Power Lines				$	9,000	$	9,000	$	13,000
Engineering and Contingencies	35%			$	367,000	$	756,000	$	1,070,000
Subtotal of Relocation(s)				**$**	**2,528,200**	**$**	**2,917,200**	**$**	**4,128,000**
Modification(s)									
Outlet Works				$	27,000	$	27,000	$	38,000
Engineering and Contingencies	35%			$	5,000	$	9,000	$	13,000
Subtotal of Modification(s)				**$**	**32,000**	**$**	**36,000**	**$**	**51,000**
UPDATED STORAGE COST	(Based on 10 Percent Discount)			**$**	**5,966,100**	**$**	**5,966,100**	**$**	**13,507,000**
WATER TREATMENT FACILITIES									
Water Treatment Plant Expansion	4.00	MGD		$	-	$	4,276,080	$	6,050,000
Engineering and Contingencies	35%			$	-	$	1,497,000	$	2,118,000
Subtotal of Water Treatment Plant				**$**	**-**	**$**	**5,773,080**	**$**	**8,168,000**
PERMITTING AND MITIGATION				**$**	**45,000**	**$**	**45,000**	**$**	**64,000**
CONSTRUCTION TOTAL				**$**	**8,571,300**	**$**	**14,737,380**	**$**	**25,918,000**
Interest During Construction	(6 months)			**$**	**-**	**$**	**319,000**	**$**	**562,000**
TOTAL CAPITAL COST				**$**	**8,571,300**	**$**	**15,056,380**	**$**	**26,480,000**
ANNUAL COSTS									
Debt Service				$	853,000	$	1,094,000	$	1,924,000
Operation and Maintenance Costs									
Project				$	60,000	$	60,000	$	85,000
Mitigation				$	10,000	$	10,000	$	14,000
WTP Operation	573,498	1000 gal	$ 0.35	$	-	$	142,065	$	201,000
Total Annual Costs				**$**	**923,000**	**$**	**1,306,065**	**$**	**2,224,000**
UNIT COSTS (First 30 Years)									
Per Acre-Foot				$	284	$	742	$	1,264
Per 1,000 Gallons				$	0.87	$	2.28	$	3.88
UNIT COSTS (After 30 Years)									
Per Acre-Foot				$	40	$	120	$	170
Per 1,000 Gallons				$	0.12	$	0.37	$	0.52

NOTES:
(1) With the exception of the storage costs, the ENR Construction Cost Index was used to update the project costs from December 1988 to April
(2) Original (1965) total storage costs were $9,540,000. Estimated updated total storage cost in December 1988 was approximately $41,913,000, for an average increase of 6.36 percent per year.

Table U-176
Ferris Purchase Water from Rockett SUD

Owner:	Ferris			
Amount:	79	Ac-Ft/Yr		

Item No. & Description	Qty.	Units	Unit Cost	Total Cost
TOTAL CAPITAL COST				**$ -**
ANNUAL COSTS				
Debt Service				$ -
Operation and Maintenance Costs				
Pipeline	1%			$ -
Pump Station	2.50%			$ -
Estimated Annual Power Cost	$0.06/kWh			$ 1,000
Treated Water Cost	25,742	1000 gal	$ 1.21	$ 31,000
Total Annual Costs				**$ 32,000**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$ 405
Per 1,000 Gallons				$ 1.24
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$ 405
Per 1,000 Gallons				$ 1.24

Table U-177
Files Valley - Temporary Overdraft of Trinity Aquifer Using New Wells
Ellis County, Trinity Aquifer

Need	50	ac-ft/yr		
Water Depth	736	ft		
Well Depth	2100	ft		
Well Yield	250	gpm	403	ac-ft (peak)
Well Size	8	in	201.5	ac-ft (average)
Wells Needed	1			

WELLS						
Well(s)	**Number**			**Unit Cost**		
Water Wells	1		$	284,750	$	285,000
Connection to Transmission System	1		$	100,000	$	100,000
Engineering and Contingencies					$	116,000
Subtotal of Well(s)					**$**	**501,000**
PERMITTING AND MITIGATION	1%				**$**	**5,000**
CONSTRUCTION TOTAL					**$**	**506,000**
Interest During Construction		(6 months)			**$**	**11,000**
TOTAL CAPITAL COST					**$**	**517,000**
ANNUAL COSTS						
Debt Service - Total Capital					$	38,000
O&M						
Transmission	1%				$	1,200
Well(s)	2.5%				$	8,550
Add Chemicals, Etc.	16,293	1000 gal	$	0.10	$	1,600
Pumping Costs					$	3,200
Total Annual Cost					**$**	**52,550**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	1,051
Cost per 1000 gallons					$	3.23
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	291
Cost per 1000 gallons					$	0.89

Table U-178
Glenn Heights Additional Water from Dallas

Owner: Glenn Heights
Amount: 1,161 Ac-Ft/Yr

Item No. & Description	Qty.	Units	Unit Cost		Total Cost
TOTAL CAPITAL COST				**$**	**-**
ANNUAL COSTS					
Debt Service				$	-
Operation and Maintenance Costs					
Pipeline	1%			$	-
Pump Station	2.50%			$	-
Estimated Annual Power Cost	$0.06/kWh			$	-
Treated Water Demand Charge	2	MGD	$ 123,190	$	246,000
Treated Water Volume Charge	378,218	1000 gal	$ 0.36	$	135,000
Total Annual Costs				**$**	**381,000**
UNIT COSTS (First 30 Years)					
Per Acre-Foot				$	328
Per 1,000 Gallons				$	1.01
UNIT COSTS (After 30 Years)					
Per Acre-Foot				$	328
Per 1,000 Gallons				$	1.01

Table U-179
Italy - New Wells
Ellis County, Woodbine Aquifer

Need	249	ac-ft/yr		
Water Depth	317	ft		
Well Depth	908	ft		
Well Yield	201	gpm	324	ac-ft (peak)
Well Size	8	in	162	ac-ft (average)
Wells Needed	2			

WELLS					
Well(s)	**Number**		**Unit Cost**		
Water Wells	2		$ 132,565	$	265,000
Connection to Transmission System	2		$ 100,000	$	200,000
Engineering and Contingencies				$	140,000
Subtotal of Well(s)				**$**	**605,000**
PERMITTING AND MITIGATION	1%			**$**	**6,000**
CONSTRUCTION TOTAL				**$**	**611,000**
Interest During Construction		(6 months)		**$**	**13,000**
TOTAL CAPITAL COST				**$**	**624,000**
ANNUAL COSTS					
Debt Service - Total Capital				$	45,000
O&M					
Transmission	1%			$	2,400
Well(s)	2.5%			$	7,950
Add Chemicals, Etc.	81,058	1000 gal	$ 0.10	$	8,100
Pumping Costs				$	7,600
Total Annual Cost				**$**	**71,050**
UNIT COSTS (First 30 Years)					
Cost per ac-ft				$	286
Cost per 1000 gallons				$	0.88
UNIT COSTS (After 30 Years)					
Cost per ac-ft				$	105
Cost per 1000 gallons				$	0.32

Table U-180
Johnson County SUD Purchase Water from Dallas

Owner:	Johnson County SUD				
Amount:	106	Ac-Ft/Yr			
CONSTRUCTION COSTS					
TRANSMISSION FACILITIES					
Pipeline(s)	**Qty.**	**Units**	**Unit Cost**		**Total Cost**
36" Water Line					
Pipe	0	FT	$ 114	$	-
ROW	0	AC	$ 3,000	$	-
Engineering and Contingencies	30%			$	-
Subtotal of Pipeline(s)				**$**	**-**
Pump Station(s)					
Station 1					
Pump, building, & appurtances	0	hp		$	-
Storage Tank	0	gal		$	-
Engineering and Contingencies	35%			$	-
Subtotal of Pump Station(s)				**$**	**-**
PERMITTING AND MITIGATION	1%			**$**	**-**
CONSTRUCTION TOTAL				**$**	**-**
Interest During Construction		(24 months)		**$**	**-**
TOTAL CAPITAL COST				**$**	**-**
ANNUAL COSTS					
Debt Service				$	-
Operation and Maintenance Costs					
Pipeline	1%			$	-
Pump Station	2.50%			$	-
Estimated Annual Power Cost	$0.06/kWh			$	-
Treated Water Cost	34,540	1000 gal	$ 3.29	$	114,000
Total Annual Costs				**$**	**114,000**

Table U-180, Continued

UNIT COSTS (First 30 Years)		
Per Acre-Foot	$	1,075
Per 1,000 Gallons	$	3.30
UNIT COSTS (After 30 Years)		
Per Acre-Foot	$	1,075
Per 1,000 Gallons	$	3.30

Table U-181
Maypearl - Existing Wells
Ellis County, Woodbine Aquifer

Need	44	ac-ft/yr		
Water Depth	105	ft		
Well Depth	460	ft		
Well Yield	45	gpm	72	ac-ft (peak)
Well Size	6	in	36	ac-ft (average)
Wells Needed	0			

WELLS						
Well(s)	**Number**			**Unit Cost**		
Water Wells	0		$	64,163	$	-
Connection to Transmission System	0		$	100,000	$	-
Engineering and Contingencies					$	-
Subtotal of Well(s)					**$**	**-**
PERMITTING AND MITIGATION	1%				**$**	**-**
CONSTRUCTION TOTAL					**$**	**-**
Interest During Construction		(6 months)			**$**	**-**
TOTAL CAPITAL COST					**$**	**-**
ANNUAL COSTS						
Debt Service - Total Capital					$	-
O&M						
Transmission	1%				$	-
Well(s)	2.5%				$	-
Add Chemicals, Etc.	14,337	1000 gal	$	0.10	$	1,400
Pumping Costs					$	600
Total Annual Cost					**$**	**2,000**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	45
Cost per 1000 gallons					$	0.14
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	45
Cost per 1000 gallons					$	0.14

Table U-182
Maypearl - New Wells
Ellis County, Woodbine Aquifer

Need	11	ac-ft/yr		
Water Depth	105	ft		
Well Depth	460	ft		
Well Yield	45	gpm	72	ac-ft (peak)
Well Size	6	in	36	ac-ft (average)
Wells Needed	1			

WELLS						
Well(s)	**Number**			**Unit Cost**		
Water Wells	1		$	64,163	$	64,000
Connection to Transmission System	1		$	100,000	$	100,000
Engineering and Contingencies					$	49,000
Subtotal of Well(s)					**$**	**213,000**
PERMITTING AND MITIGATION	1%				**$**	**2,000**
CONSTRUCTION TOTAL					**$**	**215,000**
Interest During Construction		(6 months)			**$**	**5,000**
TOTAL CAPITAL COST					**$**	**220,000**
ANNUAL COSTS						
Debt Service - Total Capital					$	16,000
O&M						
Transmission	1%				$	1,200
Well(s)	2.5%				$	1,920
Add Chemicals, Etc.	3,740	1000 gal	$	0.10	$	400
Pumping Costs					$	200
Total Annual Cost					**$**	**19,720**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	1,718
Cost per 1000 gallons					$	5.27
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	324
Cost per 1000 gallons					$	0.99

Table U-183
Midlothian Additional Joe Pool Lake

Owner:	Midlothian				
Amount:	362	Ac-Ft/Yr			
CONSTRUCTION COSTS					
TRANSMISSION FACILITIES					
Pump Station(s)	**Qty.**	**Units**	**Unit Cost**		**Total Cost**
Station 1					
Pump, building, & appurtances	42	hp		$	352,000
Storage Tank	0	gal		$	-
Engineering and Contingencies	35%			$	123,000
Subtotal of Pump Station(s)				**$**	**475,000**
PERMITTING AND MITIGATION	1%			**$**	**4,000**
CONSTRUCTION TOTAL				**$**	**479,000**
Interest During Construction		(6 months)		**$**	**10,000**
TOTAL CAPITAL COST				**$**	**489,000**
ANNUAL COSTS					
Debt Service				$	36,000
Operation and Maintenance Costs					
Pump Station	2.50%			$	11,000
Estimated Annual Power Cost	$0.06/kWh			$	8,000
WTP Operation	117,964	1000 gal	$ 0.35	$	41,000
Raw Water Cost	117,964	1000 gal	$ 0.68	$	80,000
Total Annual Costs				**$**	**176,000**
UNIT COSTS (First 30 Years)					
Per Acre-Foot				$	486
Per 1,000 Gallons				$	1.49
UNIT COSTS (After 30 Years)					
Per Acre-Foot				$	387
Per 1,000 Gallons				$	1.19

Note: Raw water is assumed to cost $0.68 per acre-foot (from survey response).

Table U-184
Mountain Peak WSC Purchase Additional Water from Midlothian

Owner:	Mountain Peak WSC					
Amount:	401	Ac-Ft/Yr				
Item No. & Description	**Qty.**	**Units**		**Unit Cost**		**Total Cost**
TOTAL CAPITAL COST					**$**	**-**
ANNUAL COSTS						
Debt Service					$	-
Operation and Maintenance Costs						
Pipeline	1%				$	-
Pump Station	2.50%				$	-
Estimated Annual Power Cost	$0.06/kWh				$	-
Treated Water Cost	130,647	1000 gal	$	3.29	$	430,000
Total Annual Costs					**$**	**430,000**
UNIT COSTS (First 30 Years)						
Per Acre-Foot					$	1,072
Per 1,000 Gallons					$	3.29
UNIT COSTS (After 30 Years)						
Per Acre-Foot					$	1,072
Per 1,000 Gallons					$	3.29

Table U-185
Mountain Peak WSC Purchase Water from Rockett SUD

Owner:	Mountain Peak WSC			
Amount:	2,041	Ac-Ft/Yr		

CONSTRUCTION COSTS

TRANSMISSION FACILITIES				
Pipeline(s)	**Qty.**	**Units**	**Unit Cost**	**Total Cost**
18" Water Line				
Pipe	100,000	FT	$ 42	$ 4,200,000
ROW	46	AC	$ 3,000	$ 138,000
Engineering and Contingencies	30%			$ 1,260,000
Subtotal of Pipeline(s)				**$ 5,598,000**
Pump Station(s)				
Station 1				
Pump, building, & appurtances	286	hp		$ 1,162,000
Storage Tank	610,000	gal		$ 181,000
Engineering and Contingencies	35%			$ 470,000
Subtotal of Pump Station(s)				**$ 1,813,000**
PERMITTING AND MITIGATION	1%			**$ 72,000**
CONSTRUCTION TOTAL				**$ 7,483,000**
Interest During Construction		(18 months)		**$ 431,000**
TOTAL CAPITAL COST				**$ 7,914,000**

ANNUAL COSTS

Debt Service				$ 575,000
Operation and Maintenance Costs				
Pipeline	1%			$ 50,000
Pump Station	2.50%			$ 40,000
Estimated Annual Power Cost	$0.06/kWh			$ 56,000
Treated Water Cost	665,062	1000 gal	$ 1.21	$ 805,000
Total Annual Costs				**$ 1,526,000**

Table U-185, Continued

UNIT COSTS (First 30 Years)		
Per Acre-Foot	$	748
Per 1,000 Gallons	$	2.29
UNIT COSTS (After 30 Years)		
Per Acre-Foot	$	466
Per 1,000 Gallons	$	1.43

Table U-186
Mountain Peak WSC - New Wells
Ellis County, Trinity Aquifer

Need	354	ac-ft/yr			
Water Depth	1123	ft			
Well Depth	2360	ft			
Well Yield	325	gpm		523	ac-ft (peak)
Well Size	8	in		261.5	ac-ft (average)
Wells Needed	2				

WELLS				
Well(s)	**Number**		**Unit Cost**	
Water Wells	2		$ 322,094	$ 644,000
Connection to Transmission System	2		$ 100,000	$ 200,000
Engineering and Contingencies				$ 253,000
Subtotal of Well(s)				**$ 1,097,000**
PERMITTING AND MITIGATION	1%			**$ 10,000**
CONSTRUCTION TOTAL				**$ 1,107,000**
Interest During Construction		(6 months)		**$ 24,000**
TOTAL CAPITAL COST				**$ 1,131,000**
ANNUAL COSTS				
Debt Service - Total Capital				$ 82,000
O&M				
Transmission	1%			$ 2,400
Well(s)	2.5%			$ 19,320
Add Chemicals, Etc.	115,454	1000 gal	$ 0.10	$ 11,500
Pumping Costs				$ 34,200
Total Annual Cost				**$ 149,420**
UNIT COSTS (First 30 Years)				
Cost per ac-ft				$ 422
Cost per 1000 gallons				$ 1.29
UNIT COSTS (After 30 Years)				
Cost per ac-ft				$ 190
Cost per 1000 gallons				$ 0.58

Table U-187
Oak Leaf Additional Water from Glenn Heights

Owner:	Oak Leaf				
Amount:	640	Ac-Ft/Yr			

Item No. & Description	**Qty.**	**Units**	**Unit Cost**		**Total Cost**
TOTAL CAPITAL COST				**$**	**-**
ANNUAL COSTS					
Debt Service				$	-
Operation and Maintenance Costs					
Pipeline	1%			$	-
Pump Station	2.50%			$	-
Estimated Annual Power Cost	$0.06/kWh			$	-
Treated Water Cost	208,545	1000 gal	$ 3.25	$	678,000
Total Annual Costs				**$**	**678,000**
UNIT COSTS (First 30 Years)					
Per Acre-Foot				$	1,059
Per 1,000 Gallons				$	3.25
UNIT COSTS (After 30 Years)					
Per Acre-Foot				$	1,059
Per 1,000 Gallons				$	3.25

Table U-188
Palmer Purchase Water from Rockett SUD

Owner:	Palmer					
Amount:	30	Ac-Ft/Yr				
CONSTRUCTION COSTS						
TRANSMISSION FACILITIES						
Pipeline(s)	**Qty.**	**Units**	**Unit Cost**			**Total Cost**
8" Water Line						
Pipe	61,700	FT	$	20	$	1,234,000
ROW	21	AC	$	3,000	$	64,000
Engineering and Contingencies	30%				$	370,000
Subtotal of Pipeline(s)					**$**	**1,668,000**
Pump Station(s)						
Station 1						
Pump, building, & appurtances	0	hp			$	-
Storage Tank	10,000	gal			$	8,000
Engineering and Contingencies	35%				$	3,000
Subtotal of Pump Station(s)					**$**	**11,000**
PERMITTING AND MITIGATION	1%				**$**	**15,000**
CONSTRUCTION TOTAL					**$**	**1,694,000**
Interest During Construction		(12 months)			**$**	**71,000**
TOTAL CAPITAL COST					**$**	**1,765,000**
ANNUAL COSTS						
Debt Service					$	128,000
Operation and Maintenance Costs						
Pipeline	1%				$	15,000
Pump Station	2.50%				$	-
Estimated Annual Power Cost	$0.06/kWh				$	-
Treated Water Cost	9,776	1000 gal	$	1.21	$	12,000
Total Annual Costs					**$**	**155,000**

Table U-188, Continued

UNIT COSTS (First 30 Years)		
Per Acre-Foot	$	5,167
Per 1,000 Gallons	$	15.86
UNIT COSTS (After 30 Years)		
Per Acre-Foot	$	900
Per 1,000 Gallons	$	2.76

Table U-189
Palmer - Existing Wells
Ellis County, Woodbine Aquifer

Need	17	ac-ft/yr		
Water Depth	426	ft		
Well Depth	1478	ft		
Well Yield	120	gpm	193	ac-ft (peak)
Well Size	6	in	96.5	ac-ft (average)
Wells Needed	0			

WELLS						
Well(s)	**Number**		**Unit Cost**			
Water Wells	0		$	182,180	$	-
Connection to Transmission System	0		$	100,000	$	-
Engineering and Contingencies					$	-
Subtotal of Well(s)					**$**	**-**
PERMITTING AND MITIGATION	1%				**$**	**-**
CONSTRUCTION TOTAL					**$**	**-**
Interest During Construction		(6 months)			**$**	**-**
TOTAL CAPITAL COST					**$**	**-**
ANNUAL COSTS						
Debt Service - Total Capital					$	-
O&M						
Transmission	1%				$	-
Well(s)	2.5%				$	-
Add Chemicals, Etc.	5,400	1000 gal	$	0.10	$	500
Pumping Costs					$	700
Total Annual Cost					**$**	**1,200**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	72
Cost per 1000 gallons					$	0.22
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	72
Cost per 1000 gallons					$	0.22

Table U-190
Pecan Hill Additional Water from Rockett SUD

Owner:	Pecan Hill					
Amount:	212	Ac-Ft/Yr				
Item No. & Description	**Qty.**	**Units**		**Unit Cost**		**Total Cost**
TOTAL CAPITAL COST					**$**	**-**
ANNUAL COSTS						
Operation and Maintenance Costs						
Debt Service					$	-
Pipeline	1%				$	-
Pump Station	2.50%				$	-
Estimated Annual Power Cost	$0.06/kWh				$	-
Treated Water Cost	69,080	1000 gal	$	1.21	$	84,000
Total Annual Costs					**$**	**84,000**
UNIT COSTS (First 30 Years)						
Per Acre-Foot					$	396
Per 1,000 Gallons					$	1.22
UNIT COSTS (After 30 Years)						
Per Acre-Foot					$	396
Per 1,000 Gallons					$	1.22

Table U-191
Rice WSC Additional Water from Ennis

Owner:	Rice WSC				
Amount:	71	Ac-Ft/Yr			

Item No. & Description	**Qty.**	**Units**	**Unit Cost**		**Total Cost**
TOTAL CAPITAL COST				**$**	**-**
ANNUAL COSTS					
Operation and Maintenance Costs					
Debt Service				$	-
Pipeline	1%			$	-
Pump Station	2.50%			$	-
Estimated Annual Power Cost	$0.06/kWh			$	-
Treated Water Cost	23,135	1000 gal	$ 2.67	$	62,000
Total Annual Costs				**$**	**62,000**
UNIT COSTS (First 30 Years)					
Per Acre-Foot				$	873
Per 1,000 Gallons				$	2.68
UNIT COSTS (After 30 Years)					
Per Acre-Foot				$	873
Per 1,000 Gallons				$	2.68

Table U-192
Sardis Lone Elm - Temporary Overdraft of Trinity Aquifer Using New Wells
Ellis County, Trinity Aquifer

Need	531	ac-ft/yr	329	gpm
Water Depth	736	ft		
Well Depth	2100	ft		
Well Yield	250	gpm	403	ac-ft (peak)
Well Size	8	in	201.5	ac-ft (average)
Wells Needed	3			

WELLS						
Well(s)	**Number**			**Unit Cost**		
Water Wells	3		$	284,750	$	854,000
Connection to Transmission System	3		$	100,000	$	300,000
Engineering and Contingencies					$	346,000
Subtotal of Well(s)					**$**	**1,500,000**
PERMITTING AND MITIGATION	1%				**$**	**14,000**
CONSTRUCTION TOTAL					**$**	**1,514,000**
Interest During Construction		(6 months)			**$**	**11,000**
TOTAL CAPITAL COST					**$**	**1,525,000**
ANNUAL COSTS						
Debt Service - Total Capital					$	111,000
O&M						
Transmission	1%				$	3,600
Well(s)	2.5%				$	25,620
Add Chemicals, Etc.	173,027	1000 gal	$	0.10	$	17,300
Pumping Costs					$	34,400
Total Annual Cost					**$**	**191,920**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	361
Cost per 1000 gallons					$	1.11
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	152
Cost per 1000 gallons					$	0.47

Table U-193
Ellis County-Other - New Wells Trinity Aquifer
Ellis County, Trinity Aquifer

Need	201	ac-ft/yr		
Water Depth	839	ft		
Well Depth	2579	ft		
Well Yield	100	gpm	161	ac-ft (peak)
Well Size	6	in	80.5	ac-ft (average)
Wells Needed	3			

WELLS						
Well(s)	**Number**		**Unit Cost**			
Water Wells	3		$	301,653	$	905,000
Connection to Transmission System	3		$	100,000	$	300,000
Engineering and Contingencies					$	362,000
Subtotal of Well(s)					**$**	**1,567,000**
PERMITTING AND MITIGATION	1%				**$**	**14,000**
CONSTRUCTION TOTAL					**$**	**1,581,000**
Interest During Construction		(6 months)			**$**	**34,000**
TOTAL CAPITAL COST					**$**	**1,615,000**
ANNUAL COSTS						
Debt Service - Total Capital					$	117,000
O&M						
Transmission	1%				$	3,600
Well(s)	2.5%				$	27,150
Add Chemicals, Etc.	65,553	1000 gal	$	0.10	$	6,600
Pumping Costs					$	14,700
Total Annual Cost					**$**	**169,050**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	840
Cost per 1000 gallons					$	2.58
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	259
Cost per 1000 gallons					$	0.79

Table U-194
Ellis County-Other - New Wells Woodbine Aquifer
Ellis County, Woodbine Aquifer

Need	919	ac-ft/yr		
Water Depth	481	ft		
Well Depth	1484	ft		
Well Yield	100	gpm	161	ac-ft (peak)
Well Size	6	in	80.5	ac-ft (average)
Wells Needed	12			

WELLS						
Well(s)	**Number**			**Unit Cost**		
Water Wells	12		$	181,185	$	2,174,000
Connection to Transmission System	12		$	100,000	$	1,200,000
Engineering and Contingencies					$	1,012,000
Subtotal of Well(s)					**$**	**4,386,000**
PERMITTING AND MITIGATION	1%				**$**	**40,000**
CONSTRUCTION TOTAL					**$**	**4,426,000**
Interest During Construction		(6 months)			**$**	**96,000**
TOTAL CAPITAL COST					**$**	**4,522,000**
ANNUAL COSTS						
Debt Service - Total Capital					$	329,000
O&M						
Transmission	1%				$	14,400
Well(s)	2.5%				$	65,220
Add Chemicals, Etc.	299,580	1000 gal	$	0.10	$	30,000
Pumping Costs					$	40,400
Total Annual Cost					**$**	**479,020**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	521
Cost per 1000 gallons					$	1.60
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	163
Cost per 1000 gallons					$	0.50

Table U-195
Ellis Irrigation - New Wells
Ellis County, Woodbine Aquifer

Need	563	ac-ft/yr		
Water Depth	481	ft		
Well Depth	1484	ft		
Well Yield	100	gpm	161	ac-ft (peak)
Well Size	6	in	80.5	ac-ft (average)
Wells Needed	7			

WELLS						
Well(s)	**Number**		**Unit Cost**			
Water Wells	7		$	181,185	$	1,268,000
Connection to Transmission System	0		$	100,000	$	-
Engineering and Contingencies					$	380,000
Subtotal of Well(s)					**$**	**1,648,000**
PERMITTING AND MITIGATION	1%				**$**	**15,000**
CONSTRUCTION TOTAL					**$**	**1,663,000**
Interest During Construction		(6 months)			**$**	**36,000**
TOTAL CAPITAL COST					**$**	**1,699,000**
ANNUAL COSTS						
Debt Service - Total Capital					$	123,000
O&M						
Transmission	1%				$	-
Well(s)	2.5%				$	38,040
Add Chemicals, Etc.	183,454	1000 gal	$	-	$	-
Pumping Costs					$	24,700
Total Annual Cost					**$**	**185,740**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	330
Cost per 1000 gallons					$	1.01
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	111
Cost per 1000 gallons					$	0.34

Table U-196
Ellis Manufacturing Additional Water from Waxahachie

Owner:	Manufacturing				
Amount:	685	Ac-Ft/Yr			

Item No. & Description	**Qty.**	**Units**	**Unit Cost**		**Total Cost**
TOTAL CAPITAL COST				**$**	**-**
ANNUAL COSTS					
Debt Service				$	-
Operation and Maintenance Costs					
Pipeline	1%			$	-
Pump Station	2.50%			$	-
Estimated Annual Power Cost	$0.06/kWh			$	-
Treated Water Cost	223,325	1000 gal	$ 3.49	$	779,000
Total Annual Costs				**$**	**779,000**
UNIT COSTS (First 30 Years)					
Per Acre-Foot				$	1,137
Per 1,000 Gallons				$	3.49
UNIT COSTS (After 30 Years)					
Per Acre-Foot				$	1,137
Per 1,000 Gallons				$	3.49

Table U-197
Ellis Manufacturing Additional Water from Midlothian

Owner:	Manufacturing	
Amount:	1,940	Ac-Ft/Yr

Item No. & Description	Qty.	Units	Unit Cost		Total Cost
TOTAL CAPITAL COST				**$**	**-**
ANNUAL COSTS					
Debt Service				$	-
Operation and Maintenance Costs					
Pipeline	1%			$	-
Pump Station	2.50%			$	-
Estimated Annual Power Cost	$0.06/kWh			$	-
Treated Water Cost	632,151	1000 gal	$ 3.05	$	1,928,000
Total Annual Costs				**$**	**1,928,000**
UNIT COSTS (First 30 Years)					
Per Acre-Foot				$	994
Per 1,000 Gallons				$	3.05
UNIT COSTS (After 30 Years)					
Per Acre-Foot				$	994
Per 1,000 Gallons				$	3.05

Table U-198
Ellis Manufacturing Additional Water from Ennis

Owner: Manufacturing
Amount: 274 Ac-Ft/Yr

Item No. & Description	Qty.	Units	Unit Cost			Total Cost
TOTAL CAPITAL COST					**$**	**-**
ANNUAL COSTS						
Debt Service					$	-
Operation and Maintenance Costs						
Pipeline	1%				$	-
Pump Station	2.50%				$	-
Estimated Annual Power Cost	$0.06/kWh				$	-
Treated Water Cost	89,283	1000 gal	$	2.67	$	238,000
Total Annual Costs					**$**	**238,000**
UNIT COSTS (First 30 Years)						
Per Acre-Foot					$	869
Per 1,000 Gallons					$	2.67
UNIT COSTS (After 30 Years)						
Per Acre-Foot					$	869
Per 1,000 Gallons					$	2.67

Table U-199
Ellis Manufacturing - New Wells
Ellis County, Woodbine Aquifer

Need	101	ac-ft/yr		
Water Depth	481	ft		
Well Depth	1484	ft		
Well Yield	100	gpm	161	ac-ft (peak)
Well Size	6	in	80.5	ac-ft (average)
Wells Needed	2			

WELLS					
Well(s)	**Number**		**Unit Cost**		
Water Wells	2		$ 181,185	$	362,000
Connection to Transmission System	0		$ 100,000	$	-
Engineering and Contingencies				$	109,000
Subtotal of Well(s)				**$**	**471,000**
PERMITTING AND MITIGATION	1%			**$**	**4,000**
CONSTRUCTION TOTAL				**$**	**475,000**
Interest During Construction		(6 months)		**$**	**10,000**
TOTAL CAPITAL COST				**$**	**485,000**
ANNUAL COSTS					
Debt Service - Total Capital				$	35,000
O&M					
Transmission	1%			$	-
Well(s)	2.5%			$	10,860
Add Chemicals, Etc.	32,917	1000 gal	$ 0.10	$	3,300
Pumping Costs				$	4,400
Total Annual Cost				**$**	**53,560**
UNIT COSTS (First 30 Years)					
Cost per ac-ft				$	530
Cost per 1000 gallons				$	1.63
UNIT COSTS (After 30 Years)					
Cost per ac-ft				$	184
Cost per 1000 gallons				$	0.56

Table U-200
Ellis Steam Electric Power Additional Water from Midlothian

Owner:	Ellis County-Steam Electric Power				
Amount:	160	Ac-Ft/Yr			

Item No. & Description	**Qty.**	**Units**	**Unit Cost**		**Total Cost**
TOTAL CAPITAL COST				**$**	**-**
ANNUAL COSTS					
Debt Service				$	-
Operation and Maintenance Costs					
Pipeline	1%			$	-
Pump Station	2.50%			$	-
Estimated Annual Power Cost	$0.06/kWh			$	-
Treated Water Cost	52,259	1000 gal	$ 4.52	$	236,000
Total Annual Costs				**$**	**236,000**
UNIT COSTS (First 30 Years)					
Per Acre-Foot				$	1,472
Per 1,000 Gallons				$	4.52
UNIT COSTS (After 30 Years)					
Per Acre-Foot				$	1,472
Per 1,000 Gallons				$	4.52

Table U-201
City of Irving Alternative Strategy Costs

Capital Costs

Strategy		Basis for Cost		UTRWD Cost	
	User	Amount	Capital Cost	Amount	Capital Cost
Marvin Nichols Reservoir	UTRWD	35,000	$142,761,000	50,000	$203,944,000
Wright Patman - System	DWU	130,000	$625,756,000	50,000	$240,675,000
Wright Patman - Raise Flood Pool	DWU	112,100	$572,036,000	50,000	$255,145,000
Wright Patman - Texarkana	DWU	100,000	$473,553,000	50,000	$236,777,000

Annual Costs

Strategy		Basis for Cost		
	User	Amount	Pre-Am	Post-Am
Marvin Nichols Reservoir	UTRWD	35,000	$14,513,000	$4,141,000
Wright Patman - System	DWU	130,000	$69,479,000	$24,018,000
Wright Patman - Raise Flood Pool	DWU	112,100	$54,799,000	$13,241,000
Wright Patman - Texarkana	DWU	100,000	$55,618,000	$21,215,000

Strategy		Basis for Cost	
	UTRWD Amount	Pre-Am	Post-Am
Marvin Nichols Reservoir	50,000	$20,733,000	$5,916,000
Wright Patman - System	50,000	$26,723,000	$9,238,000
Wright Patman - Raise Flood Pool	50,000	$24,442,000	$5,906,000
Wright Patman - Texarkana	50,000	$27,809,000	$10,608,000

Unit Costs

	UTRWD Amount	Pre-Am	Post-Am
Marvin Nichols Reservoir	50,000	$1.27	$0.36
Wright Patman - System	50,000	$1.64	$0.57
Wright Patman - Raise Flood Pool	50,000	$1.50	$0.36
Wright Patman - Texarkana	50,000	$1.71	$0.65

* Costs for Oklahoma water are in Table U-47 and U-151.

Table U-202
Ector - Temporary Overdraft Using Existing Wells
Fannin County, Woodbine Aquifer

Need	4	ac-ft/yr	2	gpm
Water Depth	307	ft		
Well Depth	674	ft		
Well Yield	2	gpm		
Well Size	6	in		
Wells Needed	0		4	ac-ft (peak)
			2	ac-ft (average)

Annual Cost			
Pumping Costs			$4
Chemical Costs		0.1	$65
Total Annual Cost			**$70**
UNIT COSTS			
Cost per ac-ft			$35
Cost per 1000 gallons			$0.11
Interest During Construction	(months)	**$**	**-**

Table U-203
Ector - New Wells
Fannin County, Trinity Aquifer

Need	10	ac-ft/yr		
Water Depth	270	ft		
Well Depth	1783	ft		
Well Yield	130	gpm	209	ac-ft (peak)
Well Size	6	in	104.5	ac-ft (average)
Wells Needed	1			

WELLS				
Well(s)	**Number**		**Unit Cost**	
Water Wells	1		$ 216,567	$ 217,000
Connection to Transmission System	1		$ 100,000	$ 100,000
Engineering and Contingencies				$ 95,000
Subtotal of Well(s)				**$ 412,000**
PERMITTING AND MITIGATION	1%			**$ 4,000**
CONSTRUCTION TOTAL				**$ 416,000**
Interest During Construction		(6 months)		**$ 9,000**
TOTAL CAPITAL COST				**$ 425,000**
ANNUAL COSTS				
Debt Service - Total Capital				$ 31,000
O&M				
Transmission	1%			$ 1,200
Well(s)	2.5%			$ 6,510
Add Chemicals, Etc.	3,259	1000 gal	$ 0.10	$ 300
Pumping Costs				$ 300
Total Annual Cost				**$ 39,310**
UNIT COSTS (First 30 Years)				
Cost per ac-ft				$ 3,931
Cost per 1000 gallons				$ 12.06
UNIT COSTS (After 30 Years)				
Cost per ac-ft				$ 831
Cost per 1000 gallons				$ 2.55

Table U-204
Hickory Creek - Additional Groundwater Using Existing Wells
Fannin County, Woodbine Aquifer

Need	30	ac-ft/yr	19	gpm
Water Depth	307	ft		
Well Depth	674	ft		
Well Yield	19	gpm		
Well Size	6	in		
Wells Needed	0		30	ac-ft (peak)
			15	ac-ft (average)

Annual Cost		
Pumping Costs		$57
Chemical Costs	0.1	$489
Total Annual Cost		**$546**
UNIT COSTS		
Cost per ac-ft		$36
Cost per 1000 gallons		$0.11
Interest During Construction (months)	**$**	**-**

Table U-205
Honey Grove - Temporary Overdraft Using Existing Wells
Fannin County, Woodbine Aquifer

Need	18	ac-ft/yr		11	gpm
Water Depth	307	ft			
Well Depth	674	ft			
Well Yield	11	gpm			
Well Size	6	in			
Wells Needed	0			18	ac-ft (peak)
				9	ac-ft (average)

Annual Cost			
Pumping Costs			$28
Chemical Costs		0.1	$293
Total Annual Cost			**$321**
UNIT COSTS			
Cost per ac-ft			$36
Cost per 1000 gallons			$0.11
Interest During Construction	(months)	**$**	**-**

Table U-206
Ladonia from UTRWD Ralph Hall Reservoir Project

Owner:	Ladonia/UTRWD				
Amount:	1,700	ac-ft/yr			
CONSTRUCTION COSTS					
TRANSMISSION FACILITIES					
Pipeline(s)	**Qty.**	**Units**	**Unit Cost**		**Total Cost**
20" Water Line					
Pipe	4,265	FT	$ 51	$	218,000
ROW	2	AC	$ 3,000	$	6,000
Engineering and Contingencies	30%			$	65,000
Subtotal of Pipeline(s)				**$**	**289,000**
Pump Station(s)					
Station 1					
Pump, building, & appurtances	89	hp		$	572,000
Storage Tank	510,000	gal		$	157,000
Engineering and Contingencies	35%			$	255,000
Subtotal of Pump Station(s)				**$**	**984,000**
WATER TREATMENT FACILITIES					
Water Treatment Plant	4.00	MGD		$	8,500,000
Plant Expansion	35%			$	2,975,000
Subtotal of Water Treatment Plant				**$**	**11,475,000**
PERMITTING AND MITIGATION	1%			**$**	**113,000**
CONSTRUCTION TOTAL				**$**	**12,861,000**
Interest During Construction		(18 months)		**$**	**741,000**
TOTAL CAPITAL COST				**$**	**13,602,000**

Table U-206, Continued

ANNUAL COSTS						
Debt Service					$	988,000
Operation and Maintenance Costs						
Pipeline	1%				$	3,000
Pump Station	2.50%				$	22,000
Estimated Annual Power Cost	$0.06/kWh				$	17,000
WTP Operation	553,947	1000 gal	$	0.35	$	194,000
Raw Water Cost		ac-ft	$	163	$	277,100
Total Annual Costs					**$**	**1,501,100**
UNIT COSTS (First 30 Years)						
Per Acre-Foot					$	883
Per 1,000 Gallons					$	2.71
UNIT COSTS (After 30 Years)						
Per Acre-Foot					$	302
Per 1,000 Gallons					$	0.93

NOTE: Assume raw water costs $163 per acre-foot.

Table U-207
Ladonia - New Wells
Fannin County, Trinity Aquifer

Need	254	ac-ft/yr		
Water Depth	360	ft		
Well Depth	3290	ft		
Well Yield	275	gpm	443	ac-ft (peak)
Well Size	8	in	221.5	ac-ft (average)
Wells Needed	2			

WELLS						
Well(s)	**Number**			**Unit Cost**		
Water Wells	2		$	435,125	$	870,000
Connection to Transmission System	2		$	100,000	$	200,000
Engineering and Contingencies					$	321,000
Subtotal of Well(s)					**$**	**1,391,000**
PERMITTING AND MITIGATION	1%				**$**	**13,000**
CONSTRUCTION TOTAL					**$**	**1,404,000**
Interest During Construction		(6 months)			**$**	**30,000**
TOTAL CAPITAL COST					**$**	**1,434,000**
ANNUAL COSTS						
Debt Service - Total Capital					$	104,000
O&M						
Transmission	1%				$	2,400
Well(s)	2.5%				$	26,100
Add Chemicals, Etc.	82,766	1000 gal	$	0.10	$	8,300
Pumping Costs					$	8,600
Total Annual Cost					**$**	**149,400**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	588
Cost per 1000 gallons					$	1.81
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	179
Cost per 1000 gallons					$	0.55

Table U-208
Leonard - Temporary Overdraft Using Existing Wells
Fannin County, Woodbine Aquifer

Need	30	ac-ft/yr	19	gpm
Water Depth	307	ft		
Well Depth	674	ft		
Well Yield	19	gpm		
Well Size	6	in		
Wells Needed	0		30	ac-ft (peak)
			15	ac-ft (average)

Annual Cost			
Pumping Costs			$57
Chemical Costs		0.1	$489
Total Annual Cost			**$546**
UNIT COSTS			
Cost per ac-ft			$36
Cost per 1000 gallons			$0.11
Interest During Construction	(months)	**$**	**-**

Table U-209
Savoy - Temporary Overdraft Using Existing Wells
Fannin County, Woodbine Aquifer

Need	4	ac-ft/yr	2	gpm
Water Depth	307	ft		
Well Depth	674	ft		
Well Yield	2	gpm		
Well Size	6	in		
Wells Needed	0		4	ac-ft (peak)
			2	ac-ft (average)

Annual Cost			
Pumping Costs			$4
Chemical Costs		0.1	$65
Total Annual Cost			**$70**
UNIT COSTS			
Cost per ac-ft			$35
Cost per 1000 gallons			$0.11
Interest During Construction	(months)	**$**	**-**

Table U-210
Southwest Fannin County SUD - Temporary Overdraft Using Existing Wells
Fannin County, Woodbine Aquifer

Need	33	ac-ft/yr		
Water Depth	307	ft		
Well Depth	674	ft		
Well Yield	74	gpm	118	ac-ft (peak)
Well Size	6	in	59	ac-ft (average)
Wells Needed	0			

WELLS				
Well(s)	**Number**		**Unit Cost**	
Water Wells	0		$ 89,983	$ -
Connection to Transmission System	0		$ 100,000	$ -
Engineering and Contingencies				$ -
Subtotal of Well(s)				**$ -**
PERMITTING AND MITIGATION	1%			**$ -**
CONSTRUCTION TOTAL				**$ -**
Interest During Construction		(6 months)		**$ -**
TOTAL CAPITAL COST				**$ -**
ANNUAL COSTS				
Debt Service - Total Capital				$ -
O&M				
Transmission	1%			$ -
Well(s)	2.5%			$ -
Add Chemicals, Etc.	10,753	1000 gal	$ 0.10	$ 1,100
Pumping Costs				$ 1,000
Total Annual Cost				**$ 2,100**
UNIT COSTS (First 30 Years)				
Cost per ac-ft				$ 64
Cost per 1000 gallons				$ 0.20
UNIT COSTS (After 30 Years)				
Cost per ac-ft				$ 64
Cost per 1000 gallons				$ 0.20

Table U-211
Southwest Fannin County SUD - Temporary Overdraft Using New Wells
Fannin County, Woodbine Aquifer

Need	50	ac-ft/yr		
Water Depth	307	ft		
Well Depth	674	ft		
Well Yield	74	gpm	118	ac-ft (peak)
Well Size	6	in	59	ac-ft (average)
Wells Needed	1			

WELLS						
Well(s)	**Number**			**Unit Cost**		
Water Wells	1		$	89,983	$	90,000
Connection to Transmission System	1		$	100,000	$	100,000
Engineering and Contingencies					$	57,000
Subtotal of Well(s)					**$**	**247,000**
PERMITTING AND MITIGATION	1%				**$**	**2,000**
CONSTRUCTION TOTAL					**$**	**249,000**
Interest During Construction		(6 months)			**$**	**5,000**
TOTAL CAPITAL COST					**$**	**254,000**
ANNUAL COSTS						
Debt Service - Total Capital					$	18,000
O&M						
Transmission	1%				$	1,200
Well(s)	2.5%				$	2,700
Add Chemicals, Etc.	16,293	1000 gal	$	0.10	$	1,600
Pumping Costs					$	1,500
Total Annual Cost					**$**	**25,000**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	500
Cost per 1000 gallons					$	1.53
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	140
Cost per 1000 gallons					$	0.43

Table U-212
Fannin County-Other Additional Water from Bonham

Owner:	Bonham			
Amount:	238	ac-ft/yr		

Item No. & Description	Qty.	Units	Unit Cost	Total Cost
TOTAL CAPITAL COST				**$ -**
ANNUAL COSTS				
Debt Service				$ -
Treated Water Cost	77,644	1000 gal	$ 2.41	$ 187,100
Total Annual Costs				**$ 187,100**
UNIT COSTS (First 30 Years)				
Per Acre-Foot				$ 785
Per 1,000 Gallons				$ 2.41
UNIT COSTS (After 30 Years)				
Per Acre-Foot				$ 785
Per 1,000 Gallons				$ 2.41

Table U-213
Fannin County-Other - New Wells
Fannin County, Woodbine Aquifer

Need	276	ac-ft/yr		
Water Depth	300	ft		
Well Depth	1255	ft		
Well Yield	100	gpm	161	ac-ft (peak)
Well Size	6	in	80.5	ac-ft (average)
Wells Needed	4			

WELLS							
Well(s)	**Number**			**Unit Cost**			
Water Wells	4		$	156,050	$	624,000
Connection to Transmission System	4		$	100,000	$	400,000
Engineering and Contingencies					$	307,000
Subtotal of Well(s)					**$**	**1,331,000**
PERMITTING AND MITIGATION	1%				**$**	**12,000**
CONSTRUCTION TOTAL					**$**	**1,343,000**
Interest During Construction		(6 months)			**$**	**29,000**
TOTAL CAPITAL COST					**$**	**1,372,000**
ANNUAL COSTS						
Debt Service - Total Capital					$	100,000
O&M						
Transmission	1%				$	4,800
Well(s)	2.5%				$	18,720
Add Chemicals, Etc.	89,935	1000 gal	$	0.10	$	9,000
Pumping Costs					$	8,000
Total Annual Cost					**$**	**140,520**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	509
Cost per 1000 gallons					$	1.56
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	147
Cost per 1000 gallons					$	0.45

Table U-214
Fannin Manufacturing Additional Water from Bonham

Owner: Bonham
Amount: 11 ac-ft/yr

Item No. & Description	Qty.	Units	Unit Cost		Total Cost
TOTAL CAPITAL COST				**$**	**-**
ANNUAL COSTS					
Debt Service				$	-
Treated Water Cost	3,584	1000 gal	$ 2.68	$	9,606
Total Annual Costs				**$**	**9,606**
UNIT COSTS (First 30 Years)					
Per Acre-Foot				$	873
Per 1,000 Gallons				$	2.68
UNIT COSTS (After 30 Years)					
Per Acre-Foot				$	873
Per 1,000 Gallons				$	2.68

Table U-215
Fairfield - New Wells in Carrizo-Wilcox Aquifer
Freestone County, Carrizo-Wilcox Aquifer

Need	251	Ac-ft/yr	156	gpm
Depth to Water	100			
Well Depth	730			
Well Yield	350	gpm	564	ac-ft (peak)
Well Size	8	in	282	ac-ft (average)
Wells Needed	1			

Construction Costs			
Water Wells (1)	1	$127,300	$127,300
Connection to Transmission System	1	$100,000	$100,000
Storage tank	1	$75,000	$75,000
Subtotal			$302,300
Engineering and Contingencies			$91,000
Mitigation and Permitting			$10,000
Subtotal			$403,300
Interest During Construction			$9,000
	Total Capital		**$412,300**
Debt Service - Total Capital			$29,953
O&M			
Transmission			$3,450
Well(s)			$3,819
Add Chemicals etc.		0.1	$9,189
Pumping Costs			$6,156
	Total Annual Cost		**$52,567**
UNIT COSTS			
Cost per ac-ft			$186
Cost per 1000 gallons			$0.57

Table U-216
City of Fairfield Connection to Tarrant Regional Water District (Richland-Chambers)

Owner: Fairfield
Amount: 400 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	10 in.	26,400	LF	$24	$634,000
Right of Way Easements (ROW)	20 ft.	12	Acre	$3,000	$36,000
Engineering and Contingencies (30%)					$201,000
Subtotal of Pipeline					**$871,000**
Pump Station(s)					
Booster Pump Station	20 HP	1	LS	$250,000	$250,000
Engineering and Contingencies (35%)					$88,000
Subtotal of Pump Station(s)					**$338,000**
Water Treatment Plant					
Water Treatment Plant	0.7 MGD	1	LS	$3,000,000	$3,000,000
Engineering and Contingencies (35%)					$1,050,000
Subtotal of Water Treatment Plant					**$4,050,000**
Permitting and Mitigation					**$11,000**
CONSTRUCTION TOTAL					**$5,259,000**
Interest During Construction			**(12 months)**		**$219,000**
TOTAL COST					**$5,478,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$398,000
Electricity ($0.06 kWh)					$3,000
Raw Water ($0.68 per 1,000 gallons)					$89,000
WTP O&M ($0.35 per 1,000 gallons)					$46,000
Operation & Maintenance					$16,000
Total Annual Costs					**$552,000**

Table U-221, Continued

UNIT COSTS (2020-2040)	
Per Acre-Foot	$1,380
Per 1,000 Gallons	$4.24
UNIT COSTS (2050-2060)	
Per Acre-Foot	$385
Per 1,000 Gallons	$1.18

Table U-217
Teague - New Wells in Carrizo-Wilcox Aquifer
Freestone County, Carrizo-Wilcox Aquifer

Need	271	Ac-ft/yr	168	gpm
Depth to Water	100			
Well Depth	677			
Well Yield	200	gpm	322	ac-ft (peak)
Well Size	8	in	161	ac-ft (average)
Wells Needed	2			

Construction Costs			
Water Wells (1)	2	$110,395	$220,790
Connection to Transmission System	2	$100,000	$200,000
Storage tank	1	$75,000	$75,000
Subtotal			$495,790
Engineering and Contingencies			$149,000
Mitigation and Permitting			$10,000
Subtotal			$654,790
Interest During Construction			$14,000
	Total Capital		**$668,790**
Debt Service - Total Capital			$48,587
O&M			
Transmission			$4,650
Well(s)			$6,624
Add Chemicals etc.		0.1	$10,492
Pumping Costs			$7,029
	Total Annual Cost		**$77,382**
UNIT COSTS			
Cost per ac-ft			$240
Cost per 1000 gallons			$0.74

Table U-218
City of Wortham Purchase Raw Water from Tarrant Regional Water District

Owner: Wortham
Amount: 140 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	6 in.	104,000	LF	$15	$1,560,000
Right of Way Easements (ROW)	15 ft.	36	Acre	$3,000	$107,000
Engineering and Contingencies (30%)					$500,000
Subtotal of Pipeline					**$2,167,000**
Pump Station(s)					
Pumps with intake & building	30 HP	1	LS	$364,000	$364,000
Engineering and Contingencies (35%)					$127,000
Subtotal of Pump Station(s)					**$491,000**
Permitting and Mitigation					**$23,000**
CONSTRUCTION TOTAL					**$2,681,000**
Interest During Construction			**(12 months)**		**$112,000**
TOTAL COST					**$2,793,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$203,000
Electricity ($0.06 kWh)					$3,000
Raw Water ($0.68 per 1,000 gallons)					$31,000
Operation & Maintenance					$30,000
Total Annual Costs					**$267,000**
UNIT COSTS (2010-2030)					
Per Acre-Foot					$1,907
Per 1,000 Gallons					$5.85
UNIT COSTS (2040-2060)					
Per Acre-Foot					$457
Per 1,000 Gallons					$1.40

Table U-219
City of Wortham Purchase Treated Water from Winkler WSC (Corsicana)

Owner: Wortham
Amount: 300 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	8 in.	104,000	LF	$20	$2,080,000
Right of Way Easements (ROW)	15 ft.	36	Acre	$3,000	$107,000
Engineering and Contingencies (30%)					$656,000
Subtotal of Pipeline					**$2,843,000**
Pump Station(s)					
Pump station	50 HP	1	LS	$400,000	$400,000
Ground Storage with Roof	0.1 MG	1	LS	$75,000	$75,000
Engineering and Contingencies (35%)					$166,000
Subtotal of Pump Station(s)					**$641,000**
Permitting and Mitigation					**$31,000**
CONSTRUCTION TOTAL					**$3,515,000**
Interest During Construction			**(12 months)**		**$146,000**
TOTAL COST					**$3,661,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$266,000
Electricity ($0.06 kWh)					$7,000
Treated Water ($2.00 per 1,000 gallons)					$196,000
Operation & Maintenance					$37,000
Total Annual Costs					**$506,000**
UNIT COSTS (2010-2030)					
Per Acre-Foot					$1,687
Per 1,000 Gallons					$5.18
UNIT COSTS (2040-2060)					
Per Acre-Foot					$800
Per 1,000 Gallons					$2.46

Table U-220
Freestone County S. E. Power from Tarrant Regional Water District

Owner: Unknown
Amount: 1,000 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	14 in.	26,400	LF	$32	$845,000
Right of Way Easements (ROW)	20 ft.	12	Acre	$3,000	$36,000
Engineering and Contingencies (30%)					$264,000
Subtotal of Pipeline					**$1,145,000**
Pump Station(s)					
Booster Pump Station	45 HP	1	LS	$370,000	$370,000
Engineering and Contingencies (35%)					$130,000
Subtotal of Pump Station(s)					**$500,000**
Permitting and Mitigation					**$15,000**
CONSTRUCTION TOTAL					**$1,660,000**
Interest During Construction			**(12 months)**		**$69,000**
TOTAL COST					**$1,729,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$126,000
Electricity ($0.06 kWh)					$9,000
Raw Water ($0.68 per 1,000 gallons)					$222,000
Operation & Maintenance					$21,000
Total Annual Costs					**$378,000**
UNIT COSTS (during amortization)					
Per Acre-Foot					$378
Per 1,000 Gallons					$1.16

Table U-221
Bells - New Wells
Grayson County, Woodbine Aquifer

Need	63	ac-ft/yr		
Water Depth	438	ft		
Well Depth	1155	ft		
Well Yield	150	gpm	242	ac-ft (peak)
Well Size	8	in	121	ac-ft (average)
Wells Needed	1			

WELLS						
Well(s)	**Number**			**Unit Cost**		
Water Wells	1		$	160,063	$	160,000
Connection to Transmission System	1		$	100,000	$	100,000
Engineering and Contingencies					$	78,000
Subtotal of Well(s)					**$**	**338,000**
PERMITTING AND MITIGATION	1%				**$**	**3,000**
CONSTRUCTION TOTAL					**$**	**341,000**
Interest During Construction		(6 months)			**$**	**7,000**
TOTAL CAPITAL COST					**$**	**348,000**
ANNUAL COSTS						
Debt Service - Total Capital					$	25,000
O&M						
Transmission	1%				$	1,200
Well(s)	2.5%				$	4,800
Add Chemicals, Etc.	20,517	1000 gal	$	0.10	$	2,100
Pumping Costs					$	2,500
Total Annual Cost					**$**	**35,600**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	565
Cost per 1000 gallons					$	1.74
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	168
Cost per 1000 gallons					$	0.52

Table U-222
Collinsville - Temporaty Overdraft Using Existing Wells
Grayson County, Trinity Aquifer

Need	41	ac-ft/yr		
Water Depth	351	ft		
Well Depth	1487	ft		
Well Yield	108	gpm	174	ac-ft (peak)
Well Size	6	in	87	ac-ft (average)
Wells Needed	0			

WELLS						
Well(s)	**Number**			**Unit Cost**		
Water Wells	0		$	182,193	$	-
Connection to Transmission System	0		$	100,000	$	-
Engineering and Contingencies					$	-
Subtotal of Well(s)					**$**	**-**
PERMITTING AND MITIGATION	1%				**$**	**-**
CONSTRUCTION TOTAL					**$**	**-**
Interest During Construction		(6 months)			**$**	**-**
TOTAL CAPITAL COST					**$**	**-**
ANNUAL COSTS						
Debt Service - Total Capital					$	-
O&M						
Transmission	1%				$	-
Well(s)	2.5%				$	-
Add Chemicals, Etc.	13,307	1000 gal	$	0.10	$	1,300
Pumping Costs					$	1,400
Total Annual Cost					**$**	**2,700**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	66
Cost per 1000 gallons					$	0.20
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	66
Cost per 1000 gallons					$	0.20

Table U-223
Gunter - Temporary Overdraft Using Existing Wells
Grayson County, Trinity Aquifer

Need	113	ac-ft/yr		
Water Depth	483	ft		
Well Depth	1916	ft		
Well Yield	220	gpm	354	ac-ft (peak)
Well Size	8	in	177	ac-ft (average)
Wells Needed	0			

WELLS					
Well(s)	**Number**		**Unit Cost**		
Water Wells	0		$ 259,738	$	-
Connection to Transmission System	0		$ 100,000	$	-
Engineering and Contingencies				$	-
Subtotal of Well(s)				**$**	**-**
PERMITTING AND MITIGATION	1%			**$**	**-**
CONSTRUCTION TOTAL				**$**	**-**
Interest During Construction		(6 months)		**$**	**-**
TOTAL CAPITAL COST				**$**	**-**
ANNUAL COSTS					
Debt Service - Total Capital				$	-
O&M					
Transmission	1%			$	-
Well(s)	2.5%			$	-
Add Chemicals, Etc.	36,821	1000 gal	$ 0.10	$	3,700
Pumping Costs				$	5,000
Total Annual Cost				**$**	**8,700**
UNIT COSTS (First 30 Years)					
Cost per ac-ft				$	77
Cost per 1000 gallons				$	0.24
UNIT COSTS (After 30 Years)					
Cost per ac-ft				$	77
Cost per 1000 gallons				$	0.24

Table U-224
Gunter - Existing Wells
Grayson County, Trinity Aquifer

Need	193	ac-ft/yr		
Water Depth	483	ft		
Well Depth	1916	ft		
Well Yield	220	gpm	354	ac-ft (peak)
Well Size	8	in	177	ac-ft (average)
Wells Needed	0			

WELLS						
Well(s)	**Number**		**Unit Cost**			
Water Wells	0		$	259,738	$	-
Connection to Transmission System	0		$	100,000	$	-
Engineering and Contingencies					$	-
Subtotal of Well(s)					**$**	**-**
PERMITTING AND MITIGATION	1%				**$**	**-**
CONSTRUCTION TOTAL					**$**	**-**
Interest During Construction		(6 months)			**$**	**-**
TOTAL CAPITAL COST					**$**	**-**
ANNUAL COSTS						
Debt Service - Total Capital					$	-
O&M						
Transmission	1%				$	-
Well(s)	2.5%				$	-
Add Chemicals, Etc.	62,804	1000 gal	$	0.10	$	6,300
Pumping Costs					$	8,500
Total Annual Cost					**$**	**14,800**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	77
Cost per 1000 gallons					$	0.24
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	77
Cost per 1000 gallons					$	0.24

Table U-225
Gunter Rural WSC from Sherman

Owner:	Gunter Rural WSC			
Amount:	280	Ac-Ft/Yr		
CONSTRUCTION COSTS				
TRANSMISSION FACILITIES				
Pipeline(s)	**Qty.**	**Units**	**Unit Cost**	**2Q 2002 Total Cost**
12" Water Line				
Pipe	36,342	FT	$ 15	$ 500,000
ROW	17	AC	$ 3,000	$ 44,000
8" Water Line				
Pipe	16,919	FT	$ 11	$ 161,000
ROW	8	AC	$ 3,000	$ 20,000
Engineering and Contingencies	30%			$ 198,000
Subtotal of Pipeline(s)				**$ 923,000**
Pump Station(s)				
Station 1				
Pump, building, & appurtances				$ 266,000
Storage Tank	300,000	gal		$ 333,000
Engineering and Contingencies	35%			$ 210,000
Subtotal of Pump Station(s)				**$ 809,000**
PERMITTING AND MITIGATION	1%			**$ 15,000**
CONSTRUCTION TOTAL				**$ 1,747,000**
Interest During Construction		(12 months)		**$ 73,000**
TOTAL CAPITAL COST				**$ 1,820,000**
ANNUAL COSTS				
Debt Service				$ 132,000
Operation and Maintenance Costs				
Pipeline	1%			$ 8,000
Pump Station	2.50%			$ 18,000
Estimated Annual Power Cost	$0.06/kWh			$ 4,000
Treated Water Cost	91,238	1000 gal	$ 2.38	$ 193,000
Total Annual Costs				**$ 355,000**

Table U-225, Continued

UNIT COSTS (First 30 Years)		
Per Acre-Foot	$	1,268
Per 1,000 Gallons	$	3.89
UNIT COSTS (After 30 Years)		
Per Acre-Foot	$	796
Per 1,000 Gallons	$	2.44

Notes:
Raw water is assumed to cost $163 per acre-foot.
Capital costs based on estimate provided by Gunter Rural WSC.

Table U-226
Gunter Rural WSC - Overdraft New Wells
Grayson and Collin Counties, Trinity Aquifer

Need	50	ac-ft/yr		
Water Depth	418	ft		
Well Depth	2308	ft		
Well Yield	229	gpm	369	ac-ft (peak)
Well Size	8	in	184.5	ac-ft (average)
Wells Needed	1			

WELLS						
Well(s)	**Number**			**Unit Cost**		
Water Wells	1		$	309,349	$	309,000
Connection to Transmission System	1		$	100,000	$	100,000
Engineering and Contingencies					$	123,000
Subtotal of Well(s)					**$**	**532,000**
PERMITTING AND MITIGATION	1%				**$**	**5,000**
CONSTRUCTION TOTAL					**$**	**537,000**
Interest During Construction		(6 months)			**$**	**12,000**
TOTAL CAPITAL COST					**$**	**549,000**
ANNUAL COSTS						
Debt Service - Total Capital					$	40,000
O&M						
Transmission	1%				$	1,200
Well(s)	2.5%				$	9,270
Add Chemicals, Etc.	16,293	1000 gal	$	0.10	$	1,600
Pumping Costs					$	1,900
Total Annual Cost					**$**	**53,970**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	1,079
Cost per 1000 gallons					$	3.31
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	279
Cost per 1000 gallons					$	0.86

Table U-227
Howe - Existing Wells
Grayson County, Woodbine Aquifer

Need	389	ac-ft/yr		
Water Depth	417	ft		
Well Depth	1138	ft		
Well Yield	208	gpm	335	ac-ft (peak)
Well Size	8	in	167.5	ac-ft (average)
Wells Needed	0			

WELLS						
Well(s)	**Number**			**Unit Cost**		
Water Wells	0		$	161,739	$	-
Connection to Transmission System	0		$	100,000	$	-
Engineering and Contingencies					$	-
Subtotal of Well(s)					**$**	**-**
PERMITTING AND MITIGATION	1%				**$**	**-**
CONSTRUCTION TOTAL					**$**	**-**
Interest During Construction		(6 months)			**$**	**-**
TOTAL CAPITAL COST					**$**	**-**
ANNUAL COSTS						
Debt Service - Total Capital					$	-
O&M						
Transmission	1%				$	-
Well(s)	2.5%				$	-
Add Chemicals, Etc.	126,759	1000 gal	$	0.10	$	12,700
Pumping Costs					$	15,100
Total Annual Cost					**$**	**27,800**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	71
Cost per 1000 gallons					$	0.22
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	71
Cost per 1000 gallons					$	0.22

Table U-228
Luella WSC - Existing Wells
Grayson County, Woodbine Aquifer

Need	81	ac-ft/yr		
Water Depth	571	ft		
Well Depth	1268	ft		
Well Yield	109	gpm	176	ac-ft (peak)
Well Size	6	in	88	ac-ft (average)
Wells Needed	0			

WELLS						
Well(s)	**Number**			**Unit Cost**		
Water Wells	0		$	158,271	$	-
Connection to Transmission System	0		$	100,000	$	-
Engineering and Contingencies					$	-
Subtotal of Well(s)					**$**	**-**
PERMITTING AND MITIGATION	1%				**$**	**-**
CONSTRUCTION TOTAL					**$**	**-**
Interest During Construction		(6 months)			**$**	**-**
TOTAL CAPITAL COST					**$**	**-**
ANNUAL COSTS						
Debt Service - Total Capital					$	-
O&M						
Transmission	1%				$	-
Well(s)	2.5%				$	-
Add Chemicals, Etc.	26,394	1000 gal	$	0.10	$	2,600
Pumping Costs					$	4,200
Total Annual Cost					**$**	**6,800**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	84
Cost per 1000 gallons					$	0.26
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	84
Cost per 1000 gallons					$	0.26

Table U-229
Pottsboro - Existing Pipeline from Denison

Owner:	Pottsboro					
Amount:	631	Ac-Ft/Yr				
Item No. & Description	**Qty.**	**Units**	**Unit Cost**			**Total Cost**
TOTAL CAPITAL COST						
ANNUAL COSTS						
Debt Service					$	-
Operation and Maintenance Costs						
Pipeline	1%				$	-
Pump Station	2.50%				$	-
Estimated Annual Power Cost	$0.06/kWh				$	19,000
Treated Water Cost	205,612	1000 gal	$	2.07	$	426,000
Total Annual Costs					**$**	**445,000**
UNIT COSTS (First 30 Years)						
Per Acre-Foot					$	705
Per 1,000 Gallons					$	2.16
UNIT COSTS (After 30 Years)						
Per Acre-Foot					$	705
Per 1,000 Gallons					$	2.16

Note: Raw water is assumed to cost $163 per acre-foot.

Table U-230
Pottsboro - Parallel Pipeline from Denison

Owner:	Pottsboro				
Amount:	961	Ac-Ft/Yr			
CONSTRUCTION COSTS					
TRANSMISSION FACILITIES					
Pipeline(s)	**Qty.**	**Units**	**Unit Cost**		**Total Cost**
16" Water Line					
Pipe	14,545	FT	$ 56	$	815,000
ROW	7	AC	$ 30,000	$	200,000
16" Water Line					
Pipe	29,090	FT	$ 37	$	1,076,000
ROW	13	AC	$ 3,000	$	40,000
Engineering and Contingencies	30%			$	567,000
Subtotal of Pipeline(s)				**$**	**2,698,000**
Pump Station(s)					
Station 1					
Pump, building, & appurtances	142	hp		$	750,000
Storage Tank	290,000	gal		$	109,000
Engineering and Contingencies	35%			$	301,000
Subtotal of Pump Station(s)				**$**	**1,160,000**
PERMITTING AND MITIGATION	1%			**$**	**33,000**
CONSTRUCTION TOTAL				**$**	**3,891,000**
Interest During Construction		(6 months)		**$**	**84,000**
TOTAL CAPITAL COST				**$**	**3,975,000**
ANNUAL COSTS					
Debt Service				$	289,000
Operation and Maintenance Costs					
Pipeline	1%			$	23,000
Pump Station	2.50%			$	26,000
Estimated Annual Power Cost	$0.06/kWh			$	28,000
Treated Water Cost	313,143	1000 gal	$ 2.07	$	648,000
Total Annual Costs				**$**	**1,014,000**

Table U-230, Continued

UNIT COSTS (First 30 Years)		
Per Acre-Foot	$	1,055
Per 1,000 Gallons	$	3.24
UNIT COSTS (After 30 Years)		
Per Acre-Foot	$	754
Per 1,000 Gallons	$	2.31

Note: Raw water is assumed to cost $163 per acre-foot.

Table U-231
Sherman - Existing Wells
Grayson County, Woodbine Aquifer

Need	827	ac-ft/yr		
Water Depth	489	ft		
Well Depth	953	ft		
Well Yield	373	gpm	601	ac-ft (peak)
Well Size	10	in	300.5	ac-ft (average)
Wells Needed	0			

WELLS						
Well(s)	**Number**		**Unit Cost**			
Water Wells	0		$	191,528	$	-
Connection to Transmission System	0		$	100,000	$	-
Engineering and Contingencies					$	-
Subtotal of Well(s)					**$**	**-**
PERMITTING AND MITIGATION	1%				**$**	**-**
CONSTRUCTION TOTAL					**$**	**-**
Interest During Construction		(6 months)			**$**	**-**
TOTAL CAPITAL COST					**$**	**-**
ANNUAL COSTS						
Debt Service - Total Capital					$	-
O&M						
Transmission	1%				$	-
Well(s)	2.5%				$	-
Add Chemicals, Etc.	269,632	1000 gal	$	0.10	$	27,000
Pumping Costs					$	36,900
Total Annual Cost					**$**	**63,900**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	77
Cost per 1000 gallons					$	0.24
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	77
Cost per 1000 gallons					$	0.24

Table U-231
Sherman - Existing Wells
Grayson County, Woodbine Aquifer

Need	827	ac-ft/yr		
Water Depth	489	ft		
Well Depth	953	ft		
Well Yield	373	gpm	601	ac-ft (peak)
Well Size	10	in	300.5	ac-ft (average)
Wells Needed	0			

WELLS						
Well(s)	**Number**			**Unit Cost**		
Water Wells	0		$	191,528	$	-
Connection to Transmission System	0		$	100,000	$	-
Engineering and Contingencies					$	-
Subtotal of Well(s)					**$**	**-**
PERMITTING AND MITIGATION	1%				**$**	**-**
CONSTRUCTION TOTAL					**$**	**-**
Interest During Construction		(6 months)			**$**	**-**
TOTAL CAPITAL COST					**$**	**-**
ANNUAL COSTS						
Debt Service - Total Capital					$	-
O&M						
Transmission	1%				$	-
Well(s)	2.5%				$	-
Add Chemicals, Etc.	269,632	1000 gal	$	0.10	$	27,000
Pumping Costs					$	36,900
Total Annual Cost					**$**	**63,900**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	77
Cost per 1000 gallons					$	0.24
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	77
Cost per 1000 gallons					$	0.24

Table U-232
South Grayson WSC - Existing Wells
Grayson and Collin Counties, Woodbine Aquifer

Need	24	ac-ft/yr		
Water Depth	565	ft		
Well Depth	1453	ft		
Well Yield	135	gpm	218	ac-ft (peak)
Well Size	6	in	109	ac-ft (average)
Wells Needed	0			

WELLS					
Well(s)	**Number**		**Unit Cost**		
Water Wells	0		$ 180,668	$	-
Connection to Transmission System	0		$ 100,000	$	-
Engineering and Contingencies				$	-
Subtotal of Well(s)				**$**	**-**
PERMITTING AND MITIGATION	1%			**$**	**-**
CONSTRUCTION TOTAL				**$**	**-**
Interest During Construction		(6 months)		**$**	**-**
TOTAL CAPITAL COST				**$**	**-**
ANNUAL COSTS					
Debt Service - Total Capital				$	-
O&M					
Transmission	1%			$	-
Well(s)	2.5%			$	-
Add Chemicals, Etc.	7,710	1000 gal	$ 0.10	$	800
Pumping Costs				$	1,200
Total Annual Cost				**$**	**2,000**
UNIT COSTS (First 30 Years)					
Cost per ac-ft				$	85
Cost per 1000 gallons				$	0.26
UNIT COSTS (After 30 Years)					
Cost per ac-ft				$	85
Cost per 1000 gallons				$	0.26

Table U-233
Southmayd - Existing Wells
Grayson County, Trinity Aquifer

Need	34	ac-ft/yr		
Water Depth	648	ft		
Well Depth	1810	ft		
Well Yield	290	gpm	467	ac-ft (peak)
Well Size	8	in	233.5	ac-ft (average)
Wells Needed	0			

WELLS						
Well(s)	**Number**		**Unit Cost**			
Water Wells	0		$	251,100	$	-
Connection to Transmission System	0		$	100,000	$	-
Engineering and Contingencies					$	-
Subtotal of Well(s)					**$**	**-**
PERMITTING AND MITIGATION	1%				**$**	**-**
CONSTRUCTION TOTAL					**$**	**-**
Interest During Construction		(6 months)			**$**	**-**
TOTAL CAPITAL COST					**$**	**-**
ANNUAL COSTS						
Debt Service - Total Capital					$	-
O&M						
Transmission	1%				$	-
Well(s)	2.5%				$	-
Add Chemicals, Etc.	11,001	1000 gal	$	0.10	$	1,100
Pumping Costs					$	1,900
Total Annual Cost					**$**	**3,000**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	89
Cost per 1000 gallons					$	0.27
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	89
Cost per 1000 gallons					$	0.27

Table U-234
Southmayd - New or Purchased Wells
Grayson County, Woodbine Aquifer

Need	54	ac-ft/yr		
Water Depth	300	ft		
Well Depth	486	ft		
Well Yield	43	gpm	68	ac-ft (peak)
Well Size	6	in	34	ac-ft (average)
Wells Needed	2			

WELLS						
Well(s)	**Number**			**Unit Cost**		
Water Wells	2		$	66,860	$	134,000
Connection to Transmission System	2		$	100,000	$	200,000
Engineering and Contingencies					$	100,000
Subtotal of Well(s)					**$**	**434,000**
PERMITTING AND MITIGATION	1%				**$**	**4,000**
CONSTRUCTION TOTAL					**$**	**438,000**
Interest During Construction		(6 months)			**$**	**9,000**
TOTAL CAPITAL COST					**$**	**447,000**
ANNUAL COSTS						
Debt Service - Total Capital					$	32,000
O&M						
Transmission	1%				$	2,400
Well(s)	2.5%				$	4,020
Add Chemicals, Etc.	17,598	1000 gal	$	0.10	$	1,800
Pumping Costs					$	1,600
Total Annual Cost					**$**	**41,820**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	774
Cost per 1000 gallons					$	2.38
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	182
Cost per 1000 gallons					$	0.56

Table U-235
Tioga - Existing Wells
Grayson County, Trinity Aquifer

Need	119	ac-ft/yr		
Water Depth	314	ft		
Well Depth	1302	ft		
Well Yield	150	gpm	242	ac-ft (peak)
Well Size	8	in	121	ac-ft (average)
Wells Needed	0			

WELLS							
Well(s)	**Number**			**Unit Cost**			
Water Wells	0		$	178,458	$	-	
Connection to Transmission System	0		$	100,000	$	-	
Engineering and Contingencies					$	-	
Subtotal of Well(s)					**$**	**-**	
PERMITTING AND MITIGATION	1%				**$**	**-**	
CONSTRUCTION TOTAL					**$**	**-**	
Interest During Construction		(6 months)			**$**	**-**	
TOTAL CAPITAL COST					**$**	**-**	
ANNUAL COSTS							
Debt Service - Total Capital					$	-	
O&M							
Transmission	1%				$	-	
Well(s)	2.5%				$	-	
Add Chemicals, Etc.	38,764	1000 gal	$	0.10	$	3,900	
Pumping Costs					$	3,600	
Total Annual Cost					**$**	**7,500**	
UNIT COSTS (First 30 Years)							
Cost per ac-ft					$	63	
Cost per 1000 gallons					$	0.19	
UNIT COSTS (After 30 Years)							
Cost per ac-ft					$	63	
Cost per 1000 gallons					$	0.19	

Table U-236
Tioga - Overdraft New Wells
Grayson County, Trinity Aquifer

Need	50	ac-ft/yr		
Water Depth	314	ft		
Well Depth	1302	ft		
Well Yield	150	gpm	242	ac-ft (peak)
Well Size	8	in	121	ac-ft (average)
Wells Needed	1			

WELLS				
Well(s)	**Number**		**Unit Cost**	
Water Wells	1		$ 178,458	$ 178,000
Connection to Transmission System	1		$ 100,000	$ 100,000
Engineering and Contingencies				$ 83,000
Subtotal of Well(s)				**$ 361,000**
PERMITTING AND MITIGATION	1%			**$ 3,000**
CONSTRUCTION TOTAL				**$ 364,000**
Interest During Construction		(6 months)		**$ 8,000**
TOTAL CAPITAL COST				**$ 372,000**
ANNUAL COSTS				
Debt Service - Total Capital				$ 27,000
O&M				
Transmission	1%			$ 1,200
Well(s)	2.5%			$ 5,340
Add Chemicals, Etc.	16,293	1000 gal	$ 0.10	$ 1,600
Pumping Costs				$ 1,500
Total Annual Cost				**$ 36,640**
UNIT COSTS (First 30 Years)				
Cost per ac-ft				$ 733
Cost per 1000 gallons				$ 2.25
UNIT COSTS (After 30 Years)				
Cost per ac-ft				$ 193
Cost per 1000 gallons				$ 0.59

Table U-237
Tom Bean - New Wells in Trinity Aquifer
Grayson County, Trinity Aquifer

Need	74	ac-ft/yr		
Water Depth	700	ft		
Well Depth	2582	ft		
Well Yield	402	gpm	647	ac-ft (peak)
Well Size	10	in	323.5	ac-ft (average)
Wells Needed	1			

WELLS						
Well(s)	**Number**			**Unit Cost**		
Water Wells	1		$	470,266	$	470,000
Connection to Transmission System	1		$	100,000	$	100,000
Engineering and Contingencies					$	171,000
Subtotal of Well(s)					**$**	**741,000**
PERMITTING AND MITIGATION	1%				**$**	**7,000**
CONSTRUCTION TOTAL					**$**	**748,000**
Interest During Construction		(6 months)			**$**	**16,000**
TOTAL CAPITAL COST					**$**	**764,000**
ANNUAL COSTS						
Debt Service - Total Capital					$	56,000
O&M						
Transmission	1%				$	1,200
Well(s)	2.5%				$	14,100
Add Chemicals, Etc.	24,136	1000 gal	$	0.10	$	2,400
Pumping Costs					$	4,600
Total Annual Cost					**$**	**78,300**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	1,057
Cost per 1000 gallons					$	3.24
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	301
Cost per 1000 gallons					$	0.92

Table U-238
Tom Bean - New Wells in Woodbine Aquifer
Grayson County, Woodbine Aquifer

Need	29	ac-ft/yr		
Water Depth	658	ft		
Well Depth	1498	ft		
Well Yield	183	gpm	294	ac-ft (peak)
Well Size	8	in	147	ac-ft (average)
Wells Needed	1			

WELLS					
Well(s)	**Number**		**Unit Cost**		
Water Wells	1		$ 205,050	$	205,000
Connection to Transmission System	1		$ 100,000	$	100,000
Engineering and Contingencies				$	92,000
Subtotal of Well(s)				**$**	**397,000**
PERMITTING AND MITIGATION	1%			**$**	**4,000**
CONSTRUCTION TOTAL				**$**	**401,000**
Interest During Construction		(6 months)		**$**	**9,000**
TOTAL CAPITAL COST				**$**	**410,000**
ANNUAL COSTS					
Debt Service - Total Capital				$	30,000
O&M					
Transmission	1%			$	1,200
Well(s)	2.5%			$	6,150
Add Chemicals, Etc.	9,306	1000 gal	$ 0.10	$	900
Pumping Costs				$	1,700
Total Annual Cost				**$**	**39,950**
UNIT COSTS (First 30 Years)					
Cost per ac-ft				$	1,399
Cost per 1000 gallons				$	4.29
UNIT COSTS (After 30 Years)					
Cost per ac-ft				$	348
Cost per 1000 gallons				$	1.07

Table U-239
Two Way SUD - Existing Wells
Grayson County, Trinity Aquifer

Need	33	ac-ft/yr		
Water Depth	404	ft		
Well Depth	1526	ft		
Well Yield	251	gpm	403	ac-ft (peak)
Well Size	8	in	201.5	ac-ft (average)
Wells Needed	0			

WELLS				
Well(s)	**Number**		**Unit Cost**	
Water Wells	0		$ 213,033	$ -
Connection to Transmission System	0		$ 100,000	$ -
Engineering and Contingencies				$ -
Subtotal of Well(s)				**$ -**
PERMITTING AND MITIGATION	1%			**$ -**
CONSTRUCTION TOTAL				**$ -**
Interest During Construction		(6 months)		**$ -**
TOTAL CAPITAL COST				**$ -**
ANNUAL COSTS				
Debt Service - Total Capital				$ -
O&M				
Transmission	1%			$ -
Well(s)	2.5%			$ -
Add Chemicals, Etc.	10,664	1000 gal	$ 0.10	$ 1,100
Pumping Costs				$ 1,200
Total Annual Cost				**$ 2,300**
UNIT COSTS (First 30 Years)				
Cost per ac-ft				$ 70
Cost per 1000 gallons				$ 0.22
UNIT COSTS (After 30 Years)				
Cost per ac-ft				$ 70
Cost per 1000 gallons				$ 0.22

Table U-240
Two Way SUD - Overdraft New Wells
Grayson County, Trinity Aquifer

Need	100	ac-ft/yr		
Water Depth	404	ft		
Well Depth	1526	ft		
Well Yield	251	gpm	403	ac-ft (peak)
Well Size	8	in	201.5	ac-ft (average)
Wells Needed	2			

WELLS						
Well(s)	**Number**			**Unit Cost**		
Water Wells	2		$	213,033	$	426,000
Connection to Transmission System	2		$	100,000	$	200,000
Engineering and Contingencies					$	188,000
Subtotal of Well(s)					**$**	**814,000**
PERMITTING AND MITIGATION	1%				**$**	**8,000**
CONSTRUCTION TOTAL					**$**	**822,000**
Interest During Construction		(6 months)			**$**	**18,000**
TOTAL CAPITAL COST					**$**	**840,000**
ANNUAL COSTS						
Debt Service - Total Capital					$	61,000
O&M						
Transmission	1%				$	2,400
Well(s)	2.5%				$	12,780
Add Chemicals, Etc.	32,585	1000 gal	$	0.10	$	3,300
Pumping Costs					$	3,800
Total Annual Cost					**$**	**83,280**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	833
Cost per 1000 gallons					$	2.56
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	223
Cost per 1000 gallons					$	0.68

Table U-241
Van Alstyne - New Wells
Grayson County, Trinity Aquifer

Need	870	ac-ft/yr		
Water Depth	620	ft		
Well Depth	2314	ft		
Well Yield	300	gpm	483	ac-ft (peak)
Well Size	8	in	241.5	ac-ft (average)
Wells Needed	4			

WELLS						
Well(s)	**Number**		**Unit Cost**			
Water Wells	4		$	314,781	$	1,259,000
Connection to Transmission System	4		$	100,000	$	400,000
Engineering and Contingencies					$	498,000
Subtotal of Well(s)					**$**	**2,157,000**
PERMITTING AND MITIGATION	1%				**$**	**20,000**
CONSTRUCTION TOTAL					**$**	**2,177,000**
Interest During Construction		(6 months)			**$**	**47,000**
TOTAL CAPITAL COST					**$**	**2,224,000**
ANNUAL COSTS						
Debt Service - Total Capital					$	162,000
O&M						
Transmission	1%				$	4,800
Well(s)	2.5%				$	37,770
Add Chemicals, Etc.	283,339	1000 gal	$	0.10	$	28,300
Pumping Costs					$	48,100
Total Annual Cost					**$**	**280,970**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	323
Cost per 1000 gallons					$	0.99
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	137
Cost per 1000 gallons					$	0.42

Table U-242
Whitesboro - Temporary Overdraft Using Existing Wells
Grayson County, Trinity Aquifer

Need	190	ac-ft/yr		
Water Depth	387	ft		
Well Depth	1500	ft		
Well Yield	298	gpm	479	ac-ft (peak)
Well Size	8	in	239.5	ac-ft (average)
Wells Needed	0			

WELLS							
Well(s)	**Number**			**Unit Cost**			
Water Wells	0		$	212,775	$	-	
Connection to Transmission System	0		$	100,000	$	-	
Engineering and Contingencies					$	-	
Subtotal of Well(s)					**$**	**-**	
PERMITTING AND MITIGATION	1%				**$**	**-**	
CONSTRUCTION TOTAL					**$**	**-**	
Interest During Construction		(6 months)			**$**	**-**	
TOTAL CAPITAL COST					**$**	**-**	
ANNUAL COSTS							
Debt Service - Total Capital					$	-	
O&M							
Transmission	1%				$	-	
Well(s)	2.5%				$	-	
Add Chemicals, Etc.	61,912	1000 gal	$	0.10	$	6,200	
Pumping Costs					$	6,900	
Total Annual Cost					**$**	**13,100**	
UNIT COSTS (First 30 Years)							
Cost per ac-ft					$	69	
Cost per 1000 gallons					$	0.21	
UNIT COSTS (After 30 Years)							
Cost per ac-ft					$	69	
Cost per 1000 gallons					$	0.21	

Table U-243
Whitesboro - Temporary Overdraft Using New Wells
Grayson County, Trinity Aquifer

Need	100	ac-ft/yr		
Water Depth	387	ft		
Well Depth	1500	ft		
Well Yield	298	gpm	479	ac-ft (peak)
Well Size	8	in	239.5	ac-ft (average)
Wells Needed	1			

WELLS				
Well(s)	**Number**		**Unit Cost**	
Water Wells	1		$ 212,775	$ 213,000
Connection to Transmission System	1		$ 100,000	$ 100,000
Engineering and Contingencies				$ 94,000
Subtotal of Well(s)				**$ 407,000**
PERMITTING AND MITIGATION	1%			**$ 4,000**
CONSTRUCTION TOTAL				**$ 411,000**
Interest During Construction		(6 months)		**$ 9,000**
TOTAL CAPITAL COST				**$ 420,000**
ANNUAL COSTS				
Debt Service - Total Capital				$ 31,000
O&M				
Transmission	1%			$ 1,200
Well(s)	2.5%			$ 6,390
Add Chemicals, Etc.	32,585	1000 gal	$ 0.10	$ 3,300
Pumping Costs				$ 3,600
Total Annual Cost				**$ 45,490**
UNIT COSTS (First 30 Years)				
Cost per ac-ft				$ 455
Cost per 1000 gallons				$ 1.40
UNIT COSTS (After 30 Years)				
Cost per ac-ft				$ 145
Cost per 1000 gallons				$ 0.44

Table U-244
Whitewright - New Wells
Grayson County, Woodbine Aquifer

Need	224	ac-ft/yr		
Water Depth	452	ft		
Well Depth	1249	ft		
Well Yield	113	gpm	182	ac-ft (peak)
Well Size	6	in	91	ac-ft (average)
Wells Needed	3			

WELLS						
Well(s)	**Number**			**Unit Cost**		
Water Wells	3		$	156,402	$	469,000
Connection to Transmission System	3		$	100,000	$	300,000
Engineering and Contingencies					$	231,000
Subtotal of Well(s)					**$**	**1,000,000**
PERMITTING AND MITIGATION	1%				**$**	**9,000**
CONSTRUCTION TOTAL					**$**	**1,009,000**
Interest During Construction		(6 months)			**$**	**22,000**
TOTAL CAPITAL COST					**$**	**1,031,000**
ANNUAL COSTS						
Debt Service - Total Capital					$	75,000
O&M						
Transmission	1%				$	3,600
Well(s)	2.5%				$	14,070
Add Chemicals, Etc.	72,864	1000 gal	$	0.10	$	7,300
Pumping Costs					$	9,300
Total Annual Cost					**$**	**109,270**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	489
Cost per 1000 gallons					$	1.50
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	153
Cost per 1000 gallons					$	0.47

Table U-245
Grayson County-Other - Connect to Denison

Owner:	County-Other					
Amount:	175	Ac-Ft/Yr				
CONSTRUCTION COSTS						
TRANSMISSION FACILITIES						
Transmission Facilities	**Qty.**	**Units**	**Unit Cost**			**Total Cost**
Connect to Denison Water System					$	100,000
Engineering and Contingencies	30%				$	30,000
Transmission Facilities					**$**	**130,000**
PERMITTING AND MITIGATION	1%				**$**	**1,000**
CONSTRUCTION TOTAL					**$**	**131,000**
Interest During Construction		(6 months)			**$**	**3,000**
TOTAL CAPITAL COST					**$**	**134,000**
ANNUAL COSTS						
Debt Service					$	9,700
Operation and Maintenance Costs						
Pipeline	1%				$	1,200
Treated Water Cost	56,937	1000 gal	$	1.92	$	109,300
Total Annual Costs					**$**	**120,200**
UNIT COSTS (First 30 Years)						
Per Acre-Foot					$	688
Per 1,000 Gallons					$	2.11
UNIT COSTS (After 30 Years)						
Per Acre-Foot					$	632
Per 1,000 Gallons					$	1.94

Note: Raw water is assumed to cost $163 per acre-foot.

Table U-246
Grayson County-Other - Connect to Red River Authority

Owner: County-Other
Amount: 1,362 Ac-Ft/Yr

CONSTRUCTION COSTS

TRANSMISSION FACILITIES					
Transmission Facilities	**Qty.**	**Units**	**Unit Cost**		**Total Cost**
Connect to Red River Authority Water System				$	100,000
Engineering and Contingencies	30%			$	30,000
Transmission Facilities				**$**	**130,000**
PERMITTING AND MITIGATION	1%			**$**	**1,000**
CONSTRUCTION TOTAL				**$**	**131,000**
Interest During Construction		(6 months)		**$**	**3,000**
TOTAL CAPITAL COST				**$**	**134,000**
ANNUAL COSTS					
Debt Service				$	9,700
Operation and Maintenance Costs					
Pipeline	1%			$	1,200
Treated Water Cost	443,835	1000 gal	$ 2.07	$	918,700
Total Annual Costs				**$**	**929,600**
UNIT COSTS (First 30 Years)					
Per Acre-Foot				$	682
Per 1,000 Gallons				$	2.09
UNIT COSTS (After 30 Years)					
Per Acre-Foot				$	675
Per 1,000 Gallons				$	2.07

Note: Raw water is assumed to cost $163 per acre-foot.

Table U-247
Grayson County-Other - Supply from Pottsboro

Owner:	County-Other				
Amount:	300	Ac-Ft/Yr			
CONSTRUCTION COSTS					
TRANSMISSION FACILITIES					
Transmission Facilities	**Qty.**	**Units**	**Unit Cost**		**Total Cost**
Connect to Red River Authority Water System				$	100,000
Engineering and Contingencies	30%			$	30,000
Transmission Facilities				**$**	**130,000**
PERMITTING AND MITIGATION	1%			**$**	**1,000**
CONSTRUCTION TOTAL				**$**	**131,000**
Interest During Construction		(6 months)		**$**	**3,000**
TOTAL CAPITAL COST				**$**	**134,000**
ANNUAL COSTS					
Debt Service				$	9,700
Operation and Maintenance Costs					
Pipeline	1%			$	1,200
Treated Water Cost	97,755	1000 gal	$ 2.07	$	202,400
Total Annual Costs				**$**	**213,300**
UNIT COSTS (First 30 Years)					
Per Acre-Foot				$	711
Per 1,000 Gallons				$	2.18
UNIT COSTS (After 30 Years)					
Per Acre-Foot				$	679
Per 1,000 Gallons				$	2.08

Note: Raw water is assumed to cost $163 per acre-foot.

Table U-248
Grayson County-Other - New Wells Trinity Aquifer
Grayson County, Trinity Aquifer

Need	40	ac-ft/yr			
Water Depth	648	ft			
Well Depth	2357	ft			
Well Yield	100	gpm		161	ac-ft (peak)
Well Size	6	in		80.5	ac-ft (average)
Wells Needed	1				

WELLS					
Well(s)	**Number**		**Unit Cost**		
Water Wells	1		$ 277,283	$	277,000
Connection to Transmission System	1		$ 100,000	$	100,000
Engineering and Contingencies				$	113,000
Subtotal of Well(s)				**$**	**490,000**
PERMITTING AND MITIGATION	1%			**$**	**5,000**
CONSTRUCTION TOTAL				**$**	**495,000**
Interest During Construction		(6 months)		**$**	**11,000**
TOTAL CAPITAL COST				**$**	**506,000**
ANNUAL COSTS					
Debt Service - Total Capital				$	37,000
O&M					
Transmission	1%			$	1,200
Well(s)	2.5%			$	8,310
Add Chemicals, Etc.	12,886	1000 gal	$ 0.10	$	1,300
Pumping Costs				$	2,300
Total Annual Cost				**$**	**50,110**
UNIT COSTS (First 30 Years)					
Cost per ac-ft				$	1,267
Cost per 1000 gallons				$	3.89
UNIT COSTS (After 30 Years)					
Cost per ac-ft				$	332
Cost per 1000 gallons				$	1.02

Table U-249
Grayson County-Other - New Wells Woodbine Aquifer
Grayson County, Woodbine Aquifer

Need	9	ac-ft/yr		
Water Depth	489	ft		
Well Depth	953	ft		
Well Yield	100	gpm	161	ac-ft (peak)
Well Size	6	in	80.5	ac-ft (average)
Wells Needed	1			

WELLS						
Well(s)	**Number**		**Unit Cost**			
Water Wells	1		$	122,830	$	123,000
Connection to Transmission System	1		$	100,000	$	100,000
Engineering and Contingencies					$	67,000
Subtotal of Well(s)					**$**	**290,000**
PERMITTING AND MITIGATION	1%				**$**	**3,000**
CONSTRUCTION TOTAL					**$**	**293,000**
Interest During Construction		(6 months)			**$**	**6,000**
TOTAL CAPITAL COST					**$**	**299,000**
ANNUAL COSTS						
Debt Service - Total Capital					$	22,000
O&M						
Transmission	1%				$	1,200
Well(s)	2.5%				$	3,690
Add Chemicals, Etc.	3,017	1000 gal	$	0.10	$	300
Pumping Costs					$	400
Total Annual Cost					**$**	**27,590**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	2,980
Cost per 1000 gallons					$	9.14
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	604
Cost per 1000 gallons					$	1.85

Table U-250
Grayson County Irrigation - New Wells
Grayson County, Woodbine Aquifer

Need	232	ac-ft/yr		
Water Depth	489	ft		
Well Depth	953	ft		
Well Yield	100	gpm	161	ac-ft (peak)
Well Size	6	in	80.5	ac-ft (average)
Wells Needed	3			

WELLS						
Well(s)	**Number**			**Unit Cost**		
Water Wells	3		$	122,830	$	368,000
Connection to Transmission System	0		$	100,000	$	-
Engineering and Contingencies					$	110,000
Subtotal of Well(s)					**$**	**478,000**
PERMITTING AND MITIGATION	1%				**$**	**4,000**
CONSTRUCTION TOTAL					**$**	**482,000**
Interest During Construction		(6 months)			**$**	**10,000**
TOTAL CAPITAL COST					**$**	**492,000**
ANNUAL COSTS						
Debt Service - Total Capital					$	36,000
O&M						
Transmission	1%				$	-
Well(s)	2.5%				$	11,040
Add Chemicals, Etc.	75,597	1000 gal	$	-	$	-
Pumping Costs					$	10,400
Total Annual Cost					**$**	**57,440**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	248
Cost per 1000 gallons					$	0.76
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	92
Cost per 1000 gallons					$	0.28

Table U-251
Grayson County Manufacturing - New Wells Trinity Aquifer
Grayson County, Trinity Aquifer

Need	1,111	ac-ft/yr		
Water Depth	648	ft		
Well Depth	2357	ft		
Well Yield	150	gpm	242	ac-ft (peak)
Well Size	8	in	121	ac-ft (average)
Wells Needed	10			

WELLS				
Well(s)	**Number**		**Unit Cost**	
Water Wells	10		$ 310,390	$ 3,104,000
Connection to Transmission System	0		$ 100,000	$ -
Engineering and Contingencies				$ 931,000
Subtotal of Well(s)				**$ 4,035,000**
PERMITTING AND MITIGATION	1%			**$ 37,000**
CONSTRUCTION TOTAL				**$ 4,072,000**
Interest During Construction		(6 months)		**$ 88,000**
TOTAL CAPITAL COST				**$ 4,160,000**
ANNUAL COSTS				
Debt Service - Total Capital				$ 302,000
O&M				
Transmission	1%			$ -
Well(s)	2.5%			$ 93,120
Add Chemicals, Etc.	361,966	1000 gal	$ 0.10	$ 36,200
Pumping Costs				$ 64,000
Total Annual Cost				**$ 495,320**
UNIT COSTS (First 30 Years)				
Cost per ac-ft				$ 446
Cost per 1000 gallons				$ 1.37
UNIT COSTS (After 30 Years)				
Cost per ac-ft				$ 174
Cost per 1000 gallons				$ 0.53

Table U-252
Grayson County Manufacturing - New Wells Woodbine Aquifer
Grayson County, Woodbine Aquifer

Need	858	ac-ft/yr		
Water Depth	489	ft		
Well Depth	953	ft		
Well Yield	150	gpm	242	ac-ft (peak)
Well Size	8	in	121	ac-ft (average)
Wells Needed	8			

WELLS					
Well(s)	**Number**		**Unit Cost**		
Water Wells	8		$ 134,875	$	1,079,000
Connection to Transmission System	0		$ 100,000	$	-
Engineering and Contingencies				$	324,000
Subtotal of Well(s)				**$**	**1,403,000**
PERMITTING AND MITIGATION	1%			**$**	**13,000**
CONSTRUCTION TOTAL				**$**	**1,416,000**
Interest During Construction		(6 months)		**$**	**31,000**
TOTAL CAPITAL COST				**$**	**1,447,000**
ANNUAL COSTS					
Debt Service - Total Capital				$	105,000
O&M					
Transmission	1%			$	-
Well(s)	2.5%			$	32,370
Add Chemicals, Etc.	279,555	1000 gal	$ 0.10	$	28,000
Pumping Costs				$	38,300
Total Annual Cost				**$**	**203,670**
UNIT COSTS (First 30 Years)					
Cost per ac-ft				$	237
Cost per 1000 gallons				$	0.73
UNIT COSTS (After 30 Years)					
Cost per ac-ft				$	115
Cost per 1000 gallons				$	0.35

Table U-253
Grayson Manufacturing - Purchase Additional Water from Denison

Owner:	Manufacturing					
Amount:	315	Ac-Ft/Yr				
Item No. & Description	**Qty.**	**Units**		**Unit Cost**		**Total Cost**
TOTAL CAPITAL COST					**$**	**-**
ANNUAL COSTS						
Debt Service					$	-
Treated Water Cost	102,747	1000 gal	$	2.07	$	212,700
Total Annual Costs					**$**	**212,700**
UNIT COSTS (First 30 Years)						
Per Acre-Foot					$	675
Per 1,000 Gallons					$	2.07
UNIT COSTS (After 30 Years)						
Per Acre-Foot					$	675
Per 1,000 Gallons					$	2.07

Note: Raw water is assumed to cost $163 per acre-foot.

Table U-254
Grayson Manufacturing - Purchase Water from Howe

Owner:	Manufacturing				
Amount:	5	Ac-Ft/Yr			
Item No. & Description	**Qty.**	**Units**	**Unit Cost**		**Total Cost**
TOTAL CAPITAL COST				**$**	**-**
ANNUAL COSTS					
Debt Service				$	-
Treated Water Cost	1,616	1000 gal	$ 3.75	$	6,100
Total Annual Costs				**$**	**6,100**
UNIT COSTS (First 30 Years)					
Per Acre-Foot				$	1,230
Per 1,000 Gallons				$	3.77
UNIT COSTS (After 30 Years)					
Per Acre-Foot				$	1,230
Per 1,000 Gallons				$	3.77

Note: Raw water is assumed to cost $163 per acre-foot.

Table U-255
Grayson Mining - New Wells
Grayson County, Woodbine Aquifer

Need	114	ac-ft/yr		
Water Depth	489	ft		
Well Depth	953	ft		
Well Yield	150	gpm	242	ac-ft (peak)
Well Size	8	in	121	ac-ft (average)
Wells Needed	1			

WELLS						
Well(s)	**Number**			**Unit Cost**		
Water Wells	1		$	134,875	$	135,000
Connection to Transmission System	0		$	100,000	$	-
Engineering and Contingencies					$	41,000
Subtotal of Well(s)					**$**	**176,000**
PERMITTING AND MITIGATION	1%				**$**	**2,000**
CONSTRUCTION TOTAL					**$**	**178,000**
Interest During Construction		(6 months)			**$**	**4,000**
TOTAL CAPITAL COST					**$**	**182,000**
ANNUAL COSTS						
Debt Service - Total Capital					$	13,000
O&M						
Transmission	1%				$	-
Well(s)	2.5%				$	4,050
Add Chemicals, Etc.	37,087	1000 gal	$	-	$	-
Pumping Costs					$	5,100
Total Annual Cost					**$**	**22,150**
UNIT COSTS (First 30 Years)						
Cost per ac-ft					$	195
Cost per 1000 gallons					$	0.60
UNIT COSTS (After 30 Years)						
Cost per ac-ft					$	80
Cost per 1000 gallons					$	0.25

Table U-256
Bethel Ash WSC - New Well in Carrizo-Wilcox Aquifer
Henderson County, Carrizo-Wilcox Aquifer

Need	170	Ac-ft/yr	105	gpm
Depth to Water	106			
Well Depth	697			
Well Yield	215	gpm	346.15	ac-ft (peak)
Well Size	8	in	173.075	ac-ft (average)
Wells Needed	1			

Construction Costs			
Water Well(s)	1	$114,000	$114,000
Connection to Transmission System	1	$100,000	$100,000
Storage tank	1	$50,000	$50,000
Construction Costs Subtotal			$264,000
Engineering and Contingencies			$79,000
Mitigation and Permitting			$10,000
Subtotal			$353,000
Interest During Construction			$8,000
Total Capital Costs			**$361,000**
Annual Costs			
Debt Service - Total Capital			$26,226
O&M			
Transmission			$2,700
Well(s)			$3,420
Add Chemicals etc.		0.1	$5,640
Pumping Costs			$3,881
Total Annual Cost			**$41,867**
UNIT COST (2000)			
Cost per ac-ft			$242
Cost per 1000 gallons			$0.74
UNIT COST (after amortization)			
Cost per ac-ft			$152
Cost per 1000 gallons			$0.47

Table U-257
Eustace - New Well in Carrizo-Wilcox Aquifer
Henderson County, Carrizo-Wilcox Aquifer

Need	69	Ac-ft/yr	43	gpm
Depth to Water	106			
Well Depth	264			
Well Yield	90	gpm	144.9	ac-ft (peak)
Well Size	6	in	72.45	ac-ft (average)
Wells Needed	1			

Construction Costs			
Water Well(s)	1	$46,000	$46,000
Connection to Transmission System	1	$50,000	$50,000
Storage tank	1	$35,000	$35,000
Construction Costs Subtotal			$131,000
Engineering and Contingencies			$39,000
Mitigation and Permitting			$10,000
Subtotal			$180,000
Interest During Construction			$4,000
Total Capital Costs			**$184,000**
Annual Costs			
Debt Service - Total Capital			$13,367
O&M			
Transmission			$1,650
Well(s)			$1,380
Add Chemicals etc.		0.1	$2,361
Pumping Costs			$1,625
Total Annual Cost			**$20,383**
UNIT COST (2000)			
Cost per ac-ft			$281
Cost per 1000 gallons			$0.86
UNIT COST (2010-2020)			
Cost per ac-ft			$185
Cost per 1000 gallons			$0.57

Table U-258
Log Cabin - New Well in Carrizo-Wilcox Aquifer
Henderson County, Carrizo-Wilcox Aquifer

Need	55	Ac-ft/yr	34	gpm
Depth to Water	106			
Well Depth	274			
Well Yield	75	gpm	120.75	ac-ft (peak)
Well Size	6	in	60.375	ac-ft (average)
Wells Needed	1			

Construction Costs			
Water Well(s)	1	$46,000	$46,000
Connection to Transmission System	1	$50,000	$50,000
Storage Tank	1	$35,000	$35,000
Construction Costs Subtotal			$131,000
Engineering and Contingencies			$39,000
Mitigation and Permitting			$10,000
Subtotal			$180,000
Interest During Construction			$4,000
Total Capital Costs			**$184,000**
Annual Costs			
Debt Service - Total Capital			$13,367
O&M			
Transmission			$1,650
Well(s)			$1,380
Add Chemicals etc.		0.1	$1,967
Pumping Costs			$1,354
Total Annual Cost			**$19,719**
UNIT COST (2000)			
Cost per ac-ft			$327
Cost per 1000 gallons			$1.00
UNIT COST (2010-2020)			
Cost per ac-ft			$221
Cost per 1000 gallons			$0.68

Table U-259
Bryson - New Well in Cisco Aquifer
Jack County, Other Aquifer

Need	96	Ac-ft/yr	60	gpm
Depth to Water	150			
Well Depth	380			
Well Yield	120	gpm	193.2	ac-ft (peak)
Well Size	6	in	96.6	ac-ft (average)
Wells Needed	1			

Construction Costs			
Water Well(s)	1	$61,000	$61,000
Connection to Transmission System	1	$50,000	$50,000
Storage tank	1	$40,000	$40,000
Construction Costs Subtotal			$151,000
Engineering and Contingencies			$45,000
Mitigation and Permitting			$10,000
Subtotal			$206,000
Interest During Construction			$4,000
Total Capital Costs			**$210,000**
Annual Costs			
Debt Service - Total Capital			$15,256
O&M			
Transmission			$1,800
Well(s)			$1,830
Add Chemicals etc.		0.1	$3,148
Pumping Costs			$2,588
Total Annual Cost			**$24,622**
UNIT COST (2010)			
Cost per ac-ft			$255
Cost per 1000 gallons			$0.78
UNIT COST (2020-2060)			
Cost per ac-ft			$158
Cost per 1000 gallons			$0.48

TableU-260
Bryson to Graham

Owner: Bryson
Quantity: 200 AF/Y

CONSTRUCTION COSTS
TRANSMISSION FACILITIES

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	6 in.	50,000	LF	$15	$750,000
Right of Way Easements Rural (ROW)		34.4	ACRE	$3,000	$103,000
Engineering and Contingencies (30%)					$225,000
Subtotal of Pipeline					**$1,078,000**
Pump Station(s)					
Booster Pump Station	60 HP	1	LS	$444,000	$444,000
Engineering and Contingencies (35%)					$155,000
Subtotal of Pump Station(s)					**$599,000**
Ground Storage					
Ground Storage Tanks at Booster	60,000	1	Gal	$50,000	$50,000
Engineering and Contingencies (35%)					$18,000
Subtotal of Ground Storage					**$68,000**
CONSTRUCTION TOTAL					**$1,745,000**
Permitting and Mitigation					**$15,000**
Interest During Construction			**(12 months)**		**$73,000**
TOTAL COST					**$1,833,000**
ANNUAL COSTS					
Debt Service (6% for 20 years)					$133,000
Electricity ($0.06 kWh)					$3,000
Operation & Maintenance					$24,000
Raw Water Purchase		65,200	1000 gal	$ 0.50	$32,600
Total Annual Costs					**$192,600**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$963
Per 1,000 Gallons					$2.95
UNIT COSTS (After Amortization)					
Per Acre-Foot					$298
Per 1,000 Gallons					$0.91

Table U-261
Connecting Bryson to Jacksboro (Lost Creek/Jacksboro System)

Owner: City of Jacksboro
Amount: 200 Ac-Ft/Yr

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

CAPITAL COSTS	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
New pipeline	8-inch	84,480	LF	$20	$1,690,000
15-ft Right of Way Easements (ROW)		29	ACRE	$3,000	$87,000
Engineering and Contingencies (30%)					$533,000
Subtotal of Pipeline					**$2,310,000**
Pump Station	50 HP	1	LS	$400,000	$400,000
Engineering and Contingencies (35%)					$140,000
Subtotal of Pump Station(s)					**$540,000**
CONSTRUCTION TOTAL					**$2,850,000**
Permitting and Mitigation					**$25,000**
Interest During Construction			**(12 months)**		**$119,000**
TOTAL COST					**$2,994,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$199,000
Electricity ($0.06 kWh)					$4,400
Operation & Maintenance					$32,000
Raw Water Purchase ($0.50 per 1,000 gallons)					$33,000
Total Annual Costs					**$268,400**
UNIT COSTS (2010-2030)					
Per Acre-Foot					$1,342
Per 1,000 Gallons					$4.12
UNIT COSTS (2040-2060)					
Per Acre-Foot					$347
Per 1,000 Gallons					$1.06

Table U-262
Jack County Other - New Well in Cisco Aquifer
Jack County, Cisco Aquifer

Need	269	Ac-ft/yr	167	gpm
Depth to Water	150			
Well Depth	380			
Well Yield	170	gpm	273.7	ac-ft (peak)
Well Size	8	in	136.85	ac-ft (average)
Wells Needed	2		273.7	

Construction Costs			
Water Well(s)	2	$68,000	$136,000
Connection to Transmission System	2	$100,000	$200,000
Storage tank	2	$50,000	$100,000
Construction Costs Subtotal			$436,000
Engineering and Contingencies			$131,000
Mitigation and Permitting			$10,000
Subtotal			$577,000
Interest During Construction			$13,000
Total Capital Costs			**$590,000**
Annual Costs			
Debt Service - Total Capital			$42,863
O&M			
Transmission			$5,400
Well(s)			$4,080
Add Chemicals etc.		0.1	$8,919
Pumping Costs			$7,332
Total Annual Cost			**$68,594**
UNIT COST (2010)			
Cost per ac-ft			$251
Cost per 1000 gallons			$0.77
UNIT COST (2020-2060)			
Cost per ac-ft			$157
Cost per 1000 gallons			$0.48

Table U-263
Jack County-Other Transmission System

Owner: unknown
Amount: 300 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	10 in.	53,000	LF	$24	$1,272,000
Right of Way Easements (ROW)	20 ft.	24	Acre	$3,000	$73,000
Engineering and Contingencies (30%)					$404,000
Subtotal of Pipeline					**$1,749,000**
Pump Station(s)					
Pumps with intake & building	35 HP	1	LS	$310,000	$310,000
Ground Storage with Roof	0.1 MG	1	LS	$75,000	$75,000
Engineering and Contingencies (35%)					$135,000
Subtotal of Pump Station(s)					**$520,000**
Permitting and Mitigation					**$20,000**
CONSTRUCTION TOTAL					**$2,289,000**
Interest During Construction			**(12 months)**		**$95,000**
TOTAL COST					**$2,384,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$173,000
Electricity ($0.06 kWh)					$4,500
Treated Water ($2.00 per 1,000 gallons)					$196,000
Operation & Maintenance					$24,000
Total Annual Costs					**$397,500**
UNIT COSTS (2010-2030)					
Per Acre-Foot					$1,325
Per 1,000 Gallons					$4.07
UNIT COSTS (2040-2060)					
Per Acre-Foot					$748
Per 1,000 Gallons					$2.30

Table U-264
Jack County S. E. Power

Owner: Unknown
Amount: 3,400 Ac-Ft/Yr

CAPITAL COSTS	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline					
Pipeline	18 in.	42,240	LF	$42	$1,774,000
Right of Way Easements (ROW)	20 ft.	29	Acre	$3,000	$87,000
Engineering and Contingencies (30%)					$558,000
Subtotal of Pipeline					**$2,419,000**
Pump Station(s)					
Pumps with intake & building	200 HP	1	LS	$1,300,000	$1,300,000
Engineering and Contingencies (35%)					$455,000
Subtotal of Pump Station(s)					**$1,755,000**
Permitting and Mitigation					**$37,000**
CONSTRUCTION TOTAL					**$4,211,000**
Interest During Construction			**(12 months)**		**$175,000**
TOTAL COST					**$4,386,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$319,000
Electricity ($0.06 kWh)					$52,000
Raw Water ($0.68 per 1,000 gallons)					$753,000
Operation & Maintenance					$60,000
Total Annual Costs					**$1,184,000**
(Assume project built by 2030.)					
UNIT COSTS (2040-2060)					
Per Acre-Foot					$348
Per 1,000 Gallons					$1.07

Table U-264
Jack County S. E. Power

Owner: Unknown
Amount: 3,400 Ac-Ft/Yr

CAPITAL COSTS	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline					
Pipeline	18 in.	42,240	LF	$42	$1,774,000
Right of Way Easements (ROW)	20 ft.	29	Acre	$3,000	$87,000
Engineering and Contingencies (30%)					$558,000
Subtotal of Pipeline					**$2,419,000**
Pump Station(s)					
Pumps with intake & building	200 HP	1	LS	$1,300,000	$1,300,000
Engineering and Contingencies (35%)					$455,000
Subtotal of Pump Station(s)					**$1,755,000**
Permitting and Mitigation					**$37,000**
CONSTRUCTION TOTAL					**$4,211,000**
Interest During Construction			**(12 months)**		**$175,000**
TOTAL COST					**$4,386,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$319,000
Electricity ($0.06 kWh)					$52,000
Raw Water ($0.68 per 1,000 gallons)					$753,000
Operation & Maintenance					$60,000
Total Annual Costs					**$1,184,000**
(Assume project built by 2030.)					
UNIT COSTS (2040-2060)					
Per Acre-Foot					$348
Per 1,000 Gallons					$1.07

Table U-265
Kaufman County Crandall - Pipeline

Owner: Crandall
Amount: 2,400 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	16 in.	33,800	LF	$37	$1,251,000
Right of Way Easements (ROW)	20 ft.	16	Acre	$3,000	$47,000
Engineering and Contingencies (30%)					$389,000
Subtotal of Pipeline					**$1,687,000**
Pump Station(s)					
Booster Pump Station	200	1	LS	$930,000	$930,000
Engineering and Contingencies (35%)					$326,000
Subtotal of Pump Station(s)					**$1,256,000**
Permitting and Mitigation					**$26,000**
CONSTRUCTION TOTAL					**$2,969,000**
Interest During Construction					**$124,000**
TOTAL COST					**$3,093,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$225,000
Electricity ($0.06 kWh)					$12,000
Operation & Maintenance					$43,000
Total Annual Costs					**$280,000**
UNIT COSTS					
Per Acre-Foot					$117
Per 1,000 Gallons					$0.36

Table U-266
Kaufman County Terrell - Pipeline to Connect to the NTMWD

Owner: Unknown
Amount: 8,800 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	24 in.	32,500	LF	$66	$2,145,000
Right of Way Easements (ROW)	20 ft.	15	Acre	$3,000	$45,000
Engineering and Contingencies (30%)					$657,000
Subtotal of Pipeline					**$2,847,000**
Pump Station(s)					
Booster Pump Station	700	1	LS	$1,900,000	$1,900,000
Ground Storage Tank	2.0 MG	1	LS	$432,000	$432,000
Engineering and Contingencies (35%)					$816,000
Subtotal of Pump Station(s)					**$3,148,000**
Permitting and Mitigation					**$54,000**
CONSTRUCTION TOTAL					**$6,049,000**
Interest During Construction					**$252,000**
TOTAL COST					**$6,301,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$458,000
Electricity ($0.06 kWh)					$124,000
Operation & Maintenance					$96,000
Total Annual Costs					**$678,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$77
Per 1,000 Gallons					$0.24
UNIT COSTS (After Amortization)					
Per Acre-Foot					$25
Per 1,000 Gallons					$0.08

Table U-267
Kaufman County Irrigation - 2 Pipelines with Reuse from NTMWD

Owner: Unknown
Amount: 2,400 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	14 in.	31,680	LF	$32	$1,014,000
Right of Way Easements (ROW)	15 ft.	11	Acre	$3,000	$33,000
Engineering and Contingencies (30%)					$314,000
Subtotal of Pipeline					**$1,361,000**
Pump Station(s)					
Booster Pump Station	50 HP	2	Ea	$400,000	$800,000
Engineering and Contingencies (35%)					$280,000
Subtotal of Pump Station(s)					**$1,080,000**
Permitting and Mitigation					**$22,000**
CONSTRUCTION TOTAL					**$2,463,000**
Interest During Construction					**$103,000**
TOTAL COST					**$2,566,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$186,000
Electricity ($0.06 kWh)					$10,000
Reuse Water ($0.25 per 1,000 gallons)					$196,000
Operation & Maintenance					$36,000
Total Annual Costs					**$428,000**
UNIT COSTS					
Per Acre-Foot					$178
Per 1,000 Gallons					$0.55

Table U-268
Kaufman County Steam Electric Power Pipeline for Forney/Garland

Owner: Forney/Garland
Amount: 12,600 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	30	26,400	LF	$66	$1,742,000
Right of Way Easements (ROW)	20 ft.	12	Acre	$3,000	$36,000
Engineering and Contingencies (30%)					$533,000
Subtotal of Pipeline					**$2,311,000**
Pump Station(s)					
Booster Pump Station	1300 HP	1	LS	$ 2,730,000	$2,730,000
Engineering and Contingencies (35%)					$956,000
Subtotal of Pump Station(s)					**$3,686,000**
Permitting and Mitigation					**$54,000**
CONSTRUCTION TOTAL					**$6,051,000**
Interest During Construction					**$252,000**
TOTAL COST					**$6,303,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$458,000
Electricity ($0.06 kWh)					$161,000
Reuse Water ($0.25 per 1,000 gallons)					$1,026,000
Operation & Maintenance					$103,000
Total Annual Costs					**$1,748,000**
UNIT COSTS					
Per Acre-Foot					$139
Per 1,000 Gallons					$0.43

Table U-269
Kaufman County Steam Electric Power Pipeline for NTMWD

Trinity River Authority
5,000 ac-ft/yr
Assume 2 phases, Phase 1 will have 2,500 from NTMWD in 2020
Phase 2 will add 2,500 from NTMWD in 2050

CAPITAL COSTS

Phase 1 (2020)

	Size	Quantity	Units	Unit Price		Cost	
Transmission Facilities							
Pipeline NTMWD	16	15,840	LF	$	37	$	586,000
Right of Way Easements (Rural)		7.3	Ac	$	3,000	$	22,000
Pipeline Eng &Contingencies (30%)						$	176,000
Pipeline Subtotal						**$**	**784,000**
Pump Station	200 HP	1	LS	$	930,000	$	930,000
Engineering and Contingencies (35%)						$	326,000
Pump Station Subtotal						**$**	**1,256,000**
Permitting and Mitigation						**$**	**18,000**
Interest During Construction			**(12 months)**			**$**	**86,000**
TOTAL CAPITAL COST						**$**	**2,144,000**

Phase 1 ANNUAL COSTS

	Size	Quantity	Units	Unit Price	Cost	
Debt Service (6%, 30 years)					$	156,000
Pipeline O&M (1%)					$	7,000
Pump O&M (2.5%)					$	28,000
Electricity					$	29,000
Reuse Water ($0.25 per 1,000 gallons)					$	203,750
TOTAL ANNUAL COST					**$**	**423,750**

Phase 1 Unit Costs (Pre-Amortization)

Cost per acre-ft	$	170
Cost per 1000 gallons	$	0.52

Phase 1 Unit Costs (After Amortization)

Cost per acre-ft	$	107
Cost per 1000 gallons	$	0.33

Table U-269, Continued

Phase 2 (2050)

	Size	Quantity	Units	Unit Price		Cost	
Transmission Facilities							
Pipeline NTMWD	16	15,840	LF	$	37	$	586,000
Right of Way Easements (Rural)		7.3	Ac	$	3,000	$	22,000
Pipeline Eng &Contingencies (30%)						$	176,000
Pipeline Subtotal						**$**	**784,000**
Pump Station	200	1	LS	$	930,000	$	930,000
Engineering and Contingencies (35%)						$	326,000
Pump Station Subtotal						**$**	**1,256,000**
Permitting and Mitigation						**$**	**18,000**
Interest During Construction			**(12 months)**			**$**	**86,000**
TOTAL CAPITAL COST						**$**	**2,144,000**

Phase 2 ANNUAL COSTS

	Size	Quantity	Units	Unit Price	Cost	
Debt Service (6%, 30 years)					$	156,000
Pipeline O&M (1%)					$	7,000
Pump O&M (2.5%)					$	28,000
Electricity					$	29,000
Reuse Water ($0.25 per 1,000 gallons)					$	203,750
TOTAL ANNUAL COST					**$**	**423,750**

Phase 2 Unit Costs (Pre-Amortization)		
Cost per acre-ft	$	170
Cost per 1000 gallons	$	0.52
Phase 2 Unit Costs (After Amortization)		
Cost per acre-ft	$	107
Cost per 1000 gallons	$	0.33

Table U-270
East Parker County System - Pipeline from Weatherford
to Annetta, Annetta South and Willow Park

Owner:	Unknown			
Amount:	800	Ac-Ft/Yr	Willow Park	34%
	250	Ac-Ft/Yr	Annetta	11%
	100	Ac-Ft/Yr	Annetta South	4%
	1,200	Ac-Ft/Yr	County Other (Parker Co UD #1)	51%
	2,350	Ac-Ft/Yr	Total	

CAPITAL COSTS	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline					
Pipeline (everyone)	18 in.	38,000	LF	$42	$1,596,000
Right of Way Easements (ROW)	20 ft.	17	Acre	$3,000	$52,000
Engineering and Contingencies (30%)					$494,000
Permitting and Mitigation					$19,000
Subtotal of Pipeline (everyone)					**$2,161,000**
Pipeline (County-other)	12 in.	15,840	LF	$28	$444,000
Right of Way Easements (ROW)	20 ft.	7	Acre	$3,000	$22,000
Engineering and Contingencies (30%)					$140,000
Permitting and Mitigation					$5,000
Subtotal of Pipeline (County-other)					**$611,000**
Pipeline (Willow park)	10 in.	8,000	LF	$24	$192,000
Right of Way Easements (ROW)	15 ft.	3	Acre	$3,000	$8,000
Engineering and Contingencies (30%)					$60,000
Permitting and Mitigation					$2,000
Subtotal of Pipeline (Willow Park)					**$262,000**
Pipeline (Annetta & Annetta S.)	8 in.	13,300	LF	$20	$266,000
Right of Way Easements (ROW)	15 ft.	5	Acre	$3,000	$14,000
Engineering and Contingencies (30%)					$84,000
Permitting and Mitigation					$3,000
Subtotal of Pipeline (Annetta & Annetta S.)					**$367,000**
Pipeline (Annetta S.)	6 in.	27,000	LF	$15	$405,000
Right of Way Easements (ROW)	15 ft.	9	Acre	$3,000	$28,000
Engineering and Contingencies (30%)					$130,000
Permitting and Mitigation					$5,000
Subtotal of Pipeline (Annetta S.)					**$568,000**

Table U-270, Continued

Total of Pipeline Cost					**$3,969,000**
County-Other portion of pipelines	*51% of 18 in line, 100% of 12 in line*				*$1,714,489*
Willow Park portion of pipelines	*34% of 18 in line, 100% of 10 in line*				*$997,660*
Annetta portion of pipelines	*11% of 18 n line, 71% of 8 in line*				*$492,036*
Annetta S. portion of pipelines	*4% of 18 in line, 29% of 8 in line, 100% 6 in*				*$764,815*
					$3,969,000
Pump Stations					
Booster Pump Station 1	140	1	LS	$724,000	$724,000
Engineering and Contingencies (35%)					$253,000
Permitting and Mitigation					$9,000
Subtotal of Pump Station 1					**$986,000**
Booster Pump Station 2	120	1	LS	$682,000	$682,000
Engineering and Contingencies (35%)					$239,000
Permitting and Mitigation					$8,000
Subtotal of Pump Station 2					**$929,000**
Total of Pump Stations					**$1,915,000**
County-Other portion of P.S	*51% of P.S 1, 54% of P.S 2*				*$1,070,207*
Willow Park portion of P.S	*34% of P.S 1, 20% of P.S 2*				*$494,856*
Annetta portion of P.S	*11% of P.S 1, 12% of P.S 2*				*$193,786*
Annetta S. portion of P.S	*4% of P.S 1, 14% of P.S 2*				*$156,151*
					$1,915,000
CONSTRUCTION TOTAL					**$5,884,000**
Interest During Construction					**$245,000**
TOTAL COST					**$6,129,000**
County-Other					*$2,900,600*
Willow Park					*$1,554,700*
Annetta portion					*$714,400*
Annetta S. portion					*$959,300*
					$6,129,000

Table U-270, Continued

ANNUAL COSTS

County-Other	
Debt Service (6% for 30 years)	$211,000
Electricity ($0.06 kWh)	$18,000
Treated Water ($2 per 1,000 gallons)	$782,000
Operation & Maintenance	$24,000
Total Annual Costs	**$1,035,000**
Willow Park	
Debt Service (6% for 30 years)	$113,000
Electricity ($0.06 kWh)	$8,000
Treated Water ($2 per 1,000 gallons)	$521,000
Operation & Maintenance	$13,000
Total Annual Costs	**$655,000**
Annetta	
Debt Service (6% for 30 years)	$52,000
Electricity ($0.06 kWh)	$4,000
Treated Water ($2 per 1,000 gallons)	$163,000
Operation & Maintenance	$6,000
Total Annual Costs	**$225,000**
Annetta S.	
Debt Service (6% for 30 years)	$70,000
Electricity ($0.06 kWh)	$3,000
Treated Water ($2 per 1,000 gallons)	$65,000
Operation & Maintenance	$8,000
Total Annual Costs	**$146,000**

TOTAL ANNUAL COSTS

Debt Service (6% for 30 years)	$445,000
Electricity ($0.06 kWh)	$32,000
Treated Water ($2 per 1,000 gallons)	$1,531,000
Operation & Maintenance	$51,000
Total Annual Costs	**$2,059,000**

Table U-270, Continued

UNIT COSTS

County-Other	
Per Acre-Foot	$863
Per 1,000 Gallons	$2.65
Willow Park	
Per Acre-Foot	$819
Per 1,000 Gallons	$2.51
Annetta	
Per Acre-Foot	$900
Per 1,000 Gallons	$2.76
Annetta S.	
Per Acre-Foot	$1,460
Per 1,000 Gallons	$4.48

Table U-271

Aledo - Cost of Overdrafting
Trinity Aquifer Using Existing Wells
Parker County, Trinity Aquifer

Need	148	Ac-ft/yr	92	gpm
Depth to Water	131			
Well Depth	389			
Well Yield	185	gpm	298	ac-ft (peak)
			149	ac-ft (average)

Annual Cost		
Pumping Costs		$2,232
Chemical Costs	0.1	$4,855
Total Annual Cost		**$7,088**
UNIT COSTS		
Cost per ac-ft		$48
Cost per 1000 gallons		$0.15

Table U-272
Aledo to Fort Worth (Aledo's Share of Cost for the Wholesale Water System Extension)

Probable Owner: Aledo/Fort Worth
Amount: 1,146 AF/Y (Aledo's share)

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipelines*	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline from Fort Worth	12 in.	7,000	LF	$50	$350,000
Pipeline Westside IV (100% Aledo)	16 in.	24,000	LF	$72	$1,728,000
Pipeline Westside IV (100% Aledo)	20 in.	14,000	LF	$90	$1,260,000
Pipeline Littlepage Ave. (22.5% Aledo)	30 in.	3,000	LF	$120	$81,000
Pipeline 9th Ave to University (8.5% Aledo)	36 in.	17,500	LF	$150	$223,000
20" Borings Fort Worth (100% Aledo)	20 in.	200	LF	$200	$40,000
36" Borings @ Westside IV (100% Aledo)	36 in.	300	LF	$360	$108,000
48" borings @ 9th Ave to University (8.5% Aledo)	48 in.	500	LF	$480	$20,000
Meter Station		1	LS	$175,000	$175,000
ROW Easements Westside IV (100% Aledo)		17	Acres	$3,000	$51,000
ROW Easements Littlepage Ave (22.5% Aledo)		1	Acres	$3,000	$1,000
ROW Easements 9th to University (8.5% Aledo)		8	Acres	$3,000	$2,000
Engineering and Contingencies (30%)					$1,212,000
Subtotal of Pipelines					**$4,901,000**

Pump Station(s)*	**Size**	**Quantity**	**Unit**		**Cost**
7.5 MGD Pump Station (30% Aledo)	7.5 MGD	1	LS	$1,700,000	$510,000
Pump Station Expansion (100% Aledo)		1	Ea	$1,200,000	$1,200,000
0.5 MG Ground Storage Tank (100%)	0.5 MG	1	Ea	$300,000	$300,000
Engineering and Contingencies (35%)					$704,000
Subtotal of Pump Stations					**$2,714,000**

Permitting and mitigation		$68,000
CONSTRUCTION TOTAL		**$7,615,000**
Interest During Construction	**(18 months)**	**$470,000**
TOTAL COST (Aledo's Share)		**$8,153,000**

Table U-272, Continued

ANNUAL COSTS	
Debt Service (6% for 30 years)	$592,000
Treated Water ($1.50 per 1,000 gallons)	$560,000
Electricity ($0.06 kWh)	$7,000
Operation & Maintenance	$100,000
Total Annual Costs	**$1,259,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot	$1,099
Per 1,000 Gallons	$3.37
UNIT COSTS (After Amortization))	
Per Acre-Foot	$582
Per 1,000 Gallons	$1.79

Notes:
* Costs are based on more detailed information and do match the standard pipeline and pump station costs.

Table U-273

Annetta - Cost of Overdrafting
Trinity Aquifer Using Existing Pumps
Parker County, Trinity Aquifer

Need	56	Ac-ft/yr	35	gpm
Depth to Water	131			
Well Depth	389			
Well Yield	70	gpm	113	ac-ft (peak)
			56.5	ac-ft (average)

Annual Cost		
Pumping Costs		$847
Chemical Costs	0.1	$1,841
Total Annual Cost		**$2,688**
UNIT COSTS		
Cost per ac-ft		$48
Cost per 1000 gallons		$0.15

Table U-274

Annetta South - Cost of Overdrafting
Trinity Aquifer Using Existing Pumps
Parker County, Trinity Aquifer

Need	11	Ac-ft/yr	7	gpm
Depth to Water	131			
Well Depth	389			
Well Yield	15	gpm	24	ac-ft (peak)
			12	ac-ft (average)

Annual Cost		
Pumping Costs		$180
Chemical Costs	0.1	$391
Total Annual Cost		**$571**
UNIT COSTS		
Cost per ac-ft		$48
Cost per 1000 gallons		$0.15

Table U-275
Hudson Oaks - Cost of Overdrafting
Trinity Aquifer Using Existing Pumps
Parker County, Trinity Aquifer

Need	53	Ac-ft/yr		33	gpm
Depth to Water	131				
Well Depth	216				
Well Yield	70	gpm		113	ac-ft (peak)
				56.5	ac-ft (average)

Annual Costs		
Pumping Costs		$847
Add Chemicals etc.	0.1	$1,841
Total Annual Cost		**$2,688**
UNIT COST (2000)		
Cost per ac-ft		$48
Cost per 1000 gallons		$0.15

Table U-276
Parker County Springtown - Pipeline to Walnut Creek SUD (TRWD)

Owner: Springtown
Amount: 663 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	10 in.	15,840	LF	$24	$380,000
Right of Way Easements (ROW)	15 ft.	5	Acre	$3,000	$16,000
Engineering and Contingencies (30%)					$119,000
Subtotal of Pipeline					**$515,000**
Pump Station(s)					
Booster Pump Station	40 HP	1	LS	$340,000	$340,000
Engineering and Contingencies (35%)					$119,000
Subtotal of Pump Station(s)					**$459,000**
Permitting and Mitigation					**$9,000**
CONSTRUCTION TOTAL					**$983,000**
Interest During Construction					**$41,000**
TOTAL COST					**$1,024,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$74,000
Electricity ($0.06 kWh)					$5,000
Treated Water ($3.63 per 1,000 gallons)					$784,000
Operation & Maintenance					$15,000
Total Annual Costs					**$878,000**
UNIT COSTS					
Per Acre-Foot					$1,324
Per 1,000 Gallons					$4.06

Table U-277
Parker County Steam Electric Power - Pipeline to BRA

Owner: Unknown
Amount: 4,000 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	20 in.	26,400	LF	$51	$1,346,000
Right of Way Easements (ROW)	20 ft.	12	Acre	$3,000	$36,000
Engineering and Contingencies (30%)					$415,000
Subtotal of Pipeline					**$1,797,000**
Pump Station(s)					
Booster Pump Station	370 HP	1	LS	$1,410,000	$1,410,000
Engineering and Contingencies (35%)					$494,000
Subtotal of Pump Station(s)					**$1,904,000**
Permitting and Mitigation					**$33,000**
CONSTRUCTION TOTAL					**$3,734,000**
Interest During Construction					**$156,000**
TOTAL COST					**$3,890,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$283,000
Electricity ($0.06 kWh)					$49,000
Raw Water ($.30 per 1,000 gallons)					$391,000
Operation & Maintenance					$58,000
Total Annual Costs					**$781,000**
UNIT COSTS					
Per Acre-Foot					$195
Per 1,000 Gallons					$0.60

Table U-278
Parker County Steam Electric Power - Weatherford Reuse

Owner: Unknown
Amount: 5,000 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	20 in.	26,400	LF	$51	$1,346,000
Right of Way Easements (ROW)	20 ft.	12	Acre	$3,000	$36,000
Engineering and Contingencies (30%)					$415,000
Subtotal of Pipeline					**$1,797,000**
Pump Station(s)					
Booster Pump Station	400	1	LS	$1,500,000	$1,500,000
Engineering and Contingencies (35%)					$525,000
Subtotal of Pump Station(s)					**$2,025,000**
Permitting and Mitigation					**$34,000**
CONSTRUCTION TOTAL					**$3,856,000**
Interest During Construction					**$161,000**
TOTAL COST					**$4,017,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$292,000
Electricity ($0.06 kWh)					$69,000
Reuse Water ($.25 per 1,000 gallons)					$407,000
Operation & Maintenance					$61,000
Total Annual Costs					**$829,000**
UNIT COSTS					
Per Acre-Foot					$166
Per 1,000 Gallons					$0.51

Table U-278
Parker County Steam Electric Power - Weatherford Reuse

Owner: Unknown
Amount: 5,000 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	20 in.	26,400	LF	$51	$1,346,000
Right of Way Easements (ROW)	20 ft.	12	Acre	$3,000	$36,000
Engineering and Contingencies (30%)					$415,000
Subtotal of Pipeline					**$1,797,000**
Pump Station(s)					
Booster Pump Station	400	1	LS	$1,500,000	$1,500,000
Engineering and Contingencies (35%)					$525,000
Subtotal of Pump Station(s)					**$2,025,000**
Permitting and Mitigation					**$34,000**
CONSTRUCTION TOTAL					**$3,856,000**
Interest During Construction					**$161,000**
TOTAL COST					**$4,017,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$292,000
Electricity ($0.06 kWh)					$69,000
Reuse Water ($.25 per 1,000 gallons)					$407,000
Operation & Maintenance					$61,000
Total Annual Costs					**$829,000**
UNIT COSTS					
Per Acre-Foot					$166
Per 1,000 Gallons					$0.51

Table U-279
Bethesda to Fort Worth (Bethesda's Share of Cost to Connect to Fort Worth)

Probable Owner: Bethesda/Fort Worth

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipelines*	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline (16 in.)	16 in.	65,500	LF	$80	$5,240,000
Pipeline (20 in.)	20 in.	11,400	LF	$100	$1,140,000
ROW Easements		35	Acres	$3,000	$105,000
Yard Piping		1	LS	$100,000	$100,000
36" Boring and casing		200	LF	$360	$72,000
Engineering and Contingencies (30%)					$1,997,000
Subtotal of Pipelines					**$8,654,000**
Storage Facility*	**Size**	**Quantity**	**Unit**		**Cost**
1 MG Elevated Storage Tank	1 MG	1	LS	$1,300,000	$1,300,000
Engineering and Contingencies (35%)					$455,000
Subtotal of Pump Stations					**$1,755,000**
Permitting and mitigation					$92,000
CONSTRUCTION TOTAL					**$10,409,000**
Interest During Construction	**(18 months)**				**$642,000**
TOTAL COST					**$11,143,000**
Fort Worth's Share (90%)					**$10,029,000**
Bethesda's Share (10%)					**$1,114,000**
ANNUAL COSTS FOR BETHESDA					
Debt Service (6% for 30 years)					$81,000
Operation & Maintenance					$4,000
Total Annual Costs					**$85,000**

Notes:
* Pipeline and storage tank information and costs based on information provided in Fort Worth Master Plan.

Table U-280
Burleson to Fort Worth (Burleson's Share of Cost to Connect to Fort Worth)

Probable Owner: Burleson/Fort Worth

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipelines*	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline (24 in.)	24 in.	27,000	LF	$120	$3,240,000
Pipeline (30 in.)	30 in.	37,800	LF	$150	$5,670,000
ROW Easements		30	Acres	$3,000	$90,000
Yard Piping		1	LS	$100,000	$100,000
42" Boring and casing		400	LF	$420	$168,000
48" Boring and casing		200	LF	$480	$96,000
Engineering and Contingencies (30%)					$2,809,000
Subtotal of Pipelines					**$12,173,000**
Storage Facility*	**Size**	**Quantity**	**Unit**		**Cost**
3 MGD Pump Station	3 MGD	1	LS	$1,000,000	$1,000,000
1.5 MG Elevated Storage Tank	1.5 MG	1	LS	$1,950,000	$1,950,000
Engineering and Contingencies (35%)					$1,033,000
Subtotal of Pump Stations					**$3,983,000**
Permitting and mitigation					$130,000
CONSTRUCTION TOTAL					**$16,156,000**
Interest During Construction	**(18 months)**				**$996,000**
TOTAL COST					**$17,282,000**
Fort Worth's Share (85%)					**$14,690,000**
Burleson's Share (15%)					**$2,592,000**
ANNUAL COSTS FOR BURLESON					
Debt Service (6% for 30 years)					$188,000
Operation & Maintenance					$25,000
Total Annual Costs					**$213,000**

Notes:
* Pipeline and storage tank information and costs based on information provided in Fort Worth Master Plan.

Table U-281
Crowley to Fort Worth (Crowley's Share of Cost to Connect to Fort Worth)

Probable Owner: Crowley/Fort Worth

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipelines*	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline (16 in.)	16 in.	17,000	LF	$80	$1,360,000
Pipeline (24 in.)	24 in.	8,500	LF	$120	$1,020,000
Pipeline (30 in.)	30 in.	13,500	LF	$150	$2,025,000
ROW Easements		18	Acres	$3,000	$54,000
Engineering and Contingencies (30%)					$1,338,000
Subtotal of Pipelines					**$5,797,000**
Permitting and mitigation					$53,000
CONSTRUCTION TOTAL					**$5,797,000**
Interest During Construction	**(18 months)**				**$358,000**
TOTAL COST					**$6,208,000**
Fort Worth's Share (90%)					**$5,587,000**
Crowley's Share (10%)					**$621,000**
ANNUAL COSTS FOR CROWLEY					
Debt Service (6% for 30 years)					$45,000
Operation & Maintenance					$5,000
Total Annual Costs					**$50,000**

Notes:
* Pipeline and storage tank information and costs based on information provided in Fort Worth Master Plan.

Table U-282
Kennedale - Cost of Overdrafting
Trinity Aquifer Using Existing Wells
Tarrant County, Trinity Aquifer

Need	484	Ac-ft/yr		300	gpm
Depth to Water	473	ft			
Well Depth	1450	ft			
Well Yield	600	gpm		966	ac-ft (peak)
				483	ac-ft (average)

Annual Costs		
Pumping Costs		$23,627
Add Chemicals etc.	0.1	$15,739
Total Annual Cost		$39,365
UNIT COST (2000)		
Cost per ac-ft		$82
Cost per 1000 gallons		$0.25

Table U-283
Tarrant County Kennedale - Pipeline to Fort Worth

Owner: Kennedale
Amount: 705 Ac-Ft/Yr

CAPITAL COSTS	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline					
Pipeline	10 in.	16,500	LF	$36	$594,000
Right of Way Easements (ROW)	15 ft.	6	Acre	$30,000	$170,000
Engineering and Contingencies (30%)					$229,000
Subtotal of Pipeline					**$993,000**
Pump Station(s)					
Booster Pump Station	30 HP	1	LS	$280,000	$280,000
Engineering and Contingencies (35%)					$98,000
Subtotal of Pump Station(s)					**$378,000**
Permitting and Mitigation					**$10,000**
CONSTRUCTION TOTAL					**$1,381,000**
Interest During Construction					**$58,000**
TOTAL COST					**$1,439,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$105,000
Electricity ($0.06 kWh)					$2,000
Treated Water ($1.50 per 1,000 gallons)					$345,000
Operation & Maintenance					$15,000
Total Annual Costs					**$467,000**
UNIT COSTS					
Per Acre-Foot					$662
Per 1,000 Gallons					$2.03

Table U-284
Tarrant County Kennedale - Pipeline to Arlington

Owner: Kennedale
Amount: 705 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	10 in.	9,400	LF	$36	$338,000
Right of Way Easements (ROW)	15 ft.	3	Acre	$30,000	$97,000
Engineering and Contingencies (30%)					$131,000
Subtotal of Pipeline					**$566,000**
Pump Station(s)					
Booster Pump Station	20 HP	1	LS	$250,000	$250,000
Engineering and Contingencies (35%)					$88,000
Subtotal of Pump Station(s)					**$338,000**
Permitting and Mitigation					**$7,000**
CONSTRUCTION TOTAL					**$911,000**
Interest During Construction					**$38,000**
TOTAL COST					**$949,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$69,000
Electricity ($0.06 kWh)					$2,000
Treated Water ($1.50 per 1,000 gallons)					$345,000
Operation & Maintenance					$12,000
Total Annual Costs					**$428,000**
UNIT COSTS					
Per Acre-Foot					$607
Per 1,000 Gallons					$1.86

Table U-285
Lakeside - Cost of Overdrafting
Trinity Aquifer Using Existing Wells in 2010
Tarrant County, Trinity Aquifer

Need	161	Ac-ft/yr	100	gpm
Depth to Water	473	ft		
Well Depth	1450	ft		
Well Yield	200	gpm	322	ac-ft (peak)
			161	ac-ft (average)

Annual Costs		
Pumping Costs		$7,876
Add Chemicals etc.	0.1	$5,246
Total Annual Cost		$13,122
UNIT COST (2000)		
Cost per ac-ft		$82
Cost per 1000 gallons		$0.25

Table U-286
Tarrant County Lakeside - Pipeline to Azle (TRWD)

Owner: Lakeside
Amount: 579 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	10 in.	31,000	LF	$24	$744,000
Right of Way Easements (ROW)	15 ft.	11	Acre	$3,000	$32,000
Engineering and Contingencies (30%)					$233,000
Subtotal of Pipeline					**$1,009,000**
Pump Station(s)					
Booster Pump Station	45 HP	1	LS	$370,000	$370,000
Engineering and Contingencies (35%)					$130,000
Subtotal of Pump Station(s)					**$500,000**
Permitting and Mitigation					**$13,000**
CONSTRUCTION TOTAL					**$1,522,000**
Interest During Construction					**$63,000**
TOTAL COST					**$1,585,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$115,000
Electricity ($0.06 kWh)					$6,000
Treated Water ($2 per 1,000 gallons)					$377,000
Operation & Maintenance					$20,000
Total Annual Costs					**$518,000**
UNIT COSTS					
Per Acre-Foot					$895
Per 1,000 Gallons					$2.75

Table U-287
North Richland Hills and Watauga to Fort Worth (Share of Cost to Connect to Fort Worth)

Probable Owner: North Richland Hills/Watauga/Fort Worth

CONSTRUCTION COSTS

TRANSMISSION FACILITIES

Pipelines*	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline (36 in.)	36 in.	12,500	LF	$180	$2,250,000
ROW Easements		6	Acres	$3,000	$18,000
54" Boring and casing		500	LF	$540	$270,000
Engineering and Contingencies (30%)					$761,000
Subtotal of Pipelines					**$3,299,000**
Permitting and mitigation					$27,000
CONSTRUCTION TOTAL					**$3,299,000**
Interest During Construction	**(12 months)**				**$137,000**
TOTAL COST					**$3,463,000**
North Richland Hill's Share (95%)					**$3,290,000**
Watauga's Share (5%)					**$173,000**
ANNUAL COSTS FOR NORTH RICHLAND HILLS					
Debt Service (6% for 30 years)					$239,000
Operation & Maintenance					$26,000
Total Annual Costs					**$265,000**
ANNUAL COSTS FOR WATAUGA					
Debt Service (6% for 30 years)					$13,000
Operation & Maintenance					$0
Total Annual Costs					**$13,000**

Notes:
* Pipeline and storage tank information and costs based on information provided in Fort Worth Master Plan.

Table U-288
Pantego - Cost of Overdrafting
Trinity Aquifer Using Existing Wells in 2010
Tarrant County, Trinity Aquifer

Need	147	Ac-ft/yr		91	gpm
Depth to Water	473	ft			
Well Depth	1290	ft			
Well Yield	185	gpm		297.85	ac-ft (peak)
				148.925	ac-ft (average)

Annual Costs			
Pumping Costs			$7,285
Add Chemicals etc.		0.1	$4,853
Total Annual Cost			$12,138
UNIT COST (2000)			
Cost per ac-ft			$82
Cost per 1000 gallons			$0.25

Table U-288
Pantego - Cost of Overdrafting
Trinity Aquifer Using Existing Wells in 2010
Tarrant County, Trinity Aquifer

Need	147 Ac-ft/yr		91	gpm
Depth to Water	473 ft			
Well Depth	1290 ft			
Well Yield	185 gpm		297.85	ac-ft (peak)
			148.925	ac-ft (average)
Annual Costs				
Pumping Costs			$7,285	
Add Chemicals etc.		0.1	$4,853	
Total Annual Cost			$12,138	
UNIT COST (2000)				
Cost per ac-ft			$82	
Cost per 1000 gallons			$0.25	

Table U-289
Tarrant County Pantego - Pipeline to Fort Worth

Owner: Pantego
Amount: 112 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	4 in.	5,300	LF	$16	$85,000
Right of Way Easements (ROW)	15 ft.	2	Acre	$16,500	$30,000
Engineering and Contingencies (30%)					$35,000
Subtotal of Pipeline					**$150,000**
Pump Station(s)					
Booster Pump Station					$0
Engineering and Contingencies (35%)					$0
Subtotal of Pump Station(s)					**$0**
Permitting and Mitigation					**$1,000**
CONSTRUCTION TOTAL					**$151,000**
Interest During Construction					**$6,000**
TOTAL COST					**$157,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$11,000
Treated Water ($1.50 per 1,000 gallons)					$54,000
Operation & Maintenance					$1,000
Total Annual Costs					**$66,000**
UNIT COSTS					
Per Acre-Foot					$592
Per 1,000 Gallons					$1.82

Table U-290
Tarrant County Pantego - Pipeline to Arlington

Owner: Pantego
Amount: 112 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	4 in.	5,300	LF	$16	$85,000
Right of Way Easements (ROW)	15 ft.	2	Acre	$16,500	$30,000
Engineering and Contingencies (30%)					$35,000
Subtotal of Pipeline					**$150,000**
Pump Station(s)					
Booster Pump Station					$0
Engineering and Contingencies (35%)					$0
Subtotal of Pump Station(s)					**$0**
Permitting and Mitigation					**$1,000**
CONSTRUCTION TOTAL					**$151,000**
Interest During Construction					**$6,000**
TOTAL COST					**$157,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$11,000
Electricity ($0.06 kWh)					$0
Treated Water ($1.5 per 1,000 gallons)					$55,000
Operation & Maintenance					$1,000
Total Annual Costs					**$67,000**
UNIT COSTS					
Per Acre-Foot					$598
Per 1,000 Gallons					$1.84

Table U-291
Pelican Bay - Cost of Overdrafting
Trinity Aquifer Using New Wells in 2010
Tarrant County, Trinity Aquifer

Need	71	Ac-ft/yr	44	gpm
Depth to Water	473			
Well Depth	1290			
Well Yield	90	gpm	144.9	ac-ft (peak)
Well Size	8	in	72.45	ac-ft (average)
Wells Needed	2		144.9	

Construction Costs			
Water Well(s)	2	$173,000	$346,000
Connection to Transmission System	2	$100,000	$200,000
Storage Tank	1	$50,000	$50,000
Subtotal			$596,000
Engineering and Contingencies			$179,000
Mitigation and Permitting			$10,000
Subtotal			$785,000
Interest During Construction			$17,000
Total Capital Costs			**$802,000**
Annual Costs			
Debt Service - Total Capital			$58,264
O&M			
Transmission			$3,900
Well(s)			$10,380
Add Chemicals etc.		0.1	$4,722
Pumping Costs			$8,526
Total Annual Cost			**$85,792**
UNIT COST (2010-2030)			
Cost per ac-ft			$592
Cost per 1000 gallons			$1.82
UNIT COST (2040-2060)			
Cost per ac-ft			$190
Cost per 1000 gallons			$0.58

Table U-292
Pelican Bay - Cost of Overdrafting
Trinity Aquifer Using Existing Wells in 2010
Tarrant County, Trinity Aquifer

Need	71	Ac-ft/yr		44	gpm
Depth to Water	473	ft			
Well Depth	1290	ft			
Well Yield	90	gpm		144.9	ac-ft (peak)
				72.45	ac-ft (average)

Annual Costs			
Pumping Costs		$3,544	
Add Chemicals etc.	0.1	$2,361	
Total Annual Cost		$5,905	
UNIT COST (2000)			
Cost per ac-ft		$82	
Cost per 1000 gallons		$0.25	

Table U-293
Tarrant County Pelican Bay - Pipeline to Azle (TRWD)

Owner: Pelican Bay
Amount: 259 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	8 in.	13,000	LF	$20	$260,000
Right of Way Easements (ROW)	15 ft.	4	Acre	$3,000	$13,000
Engineering and Contingencies (30%)					$82,000
Subtotal of Pipeline					**$355,000**
Pump Station(s)					
Booster Pump Station		1	LS	$250,000	$250,000
Engineering and Contingencies (35%)					$88,000
Subtotal of Pump Station(s)					**$338,000**
Permitting and Mitigation					**$6,000**
CONSTRUCTION TOTAL					**$699,000**
Interest During Construction					**$29,000**
TOTAL COST					**$728,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$53,000
Electricity ($0.06 kWh)					$2,000
Treated Water ($2 per 1,000 gallons)					$169,000
Operation & Maintenance					$11,000
Total Annual Costs					**$235,000**
UNIT COSTS					
Per Acre-Foot					$907
Per 1,000 Gallons					$2.78

Table U-294
Tarrant County Mining - Pipeline to TRWD

Owner: Unknown
Amount: 274 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	4 in.	15,840	LF	$12	$190,000
Right of Way Easements (ROW)	15 ft.	5	Acre	$3,000	$16,000
Engineering and Contingencies (30%)					$62,000
Subtotal of Pipeline					**$268,000**
Pump Station(s)					
Booster Pump Station	50	1	LS	$400,000	$400,000
Engineering and Contingencies (35%)					$140,000
Subtotal of Pump Station(s)					**$540,000**
Permitting and Mitigation					**$7,000**
CONSTRUCTION TOTAL					**$815,000**
Interest During Construction					**$34,000**
TOTAL COST					**$849,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$62,000
Electricity ($0.06 kWh)					$10,000
Raw Water ($0.68 per 1,000 gallons)					$61,000
Operation & Maintenance					$14,000
Total Annual Costs					**$147,000**
UNIT COSTS					
Per Acre-Foot					$537
Per 1,000 Gallons					$1.65

Table U-295
Tarrant County S. E. Power - Direct Reuse from Fort Worth

Owner: Unknown
Amount: 2,600 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	24 in.	26,400	LF	$66	$1,742,000
Right of Way Easements (ROW)	20 ft	12	Acre	$3,000	$36,000
Engineering and Contingencies (30%)					$533,000
Subtotal of Pipeline					**$2,311,000**
Pump Station(s)					
Booster Pump Station	200 HP	1	LS	$930,000	$930,000
Engineering and Contingencies (35%)					$326,000
Subtotal of Pump Station(s)					**$1,256,000**
Permitting and Mitigation					**$32,000**
CONSTRUCTION TOTAL					**$3,599,000**
Interest During Construction			**(12 months)**		**$150,000**
TOTAL COST					**$3,749,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$272,000
Electricity ($0.06 kWh)					$28,000
Reuse Water ($0.25 per 1,000 gallons)					$212,000
Operation & Maintenance					$49,000
Total Annual Costs					**$561,000**
UNIT COSTS (Pre-Amortization)					
Per Acre-Foot					$216
Per 1,000 Gallons					$0.66
UNIT COSTS (Post Amortization)					
Per Acre-Foot					$111
Per 1,000 Gallons					$0.34

Table U-296
Alvord - New Well in Trinity Aquifer in 2010
Wise County, Trinity Aquifer

Need	135	Ac-ft/yr		84	gpm
Depth to Water	94				
Well Depth	394				
Well Yield	170	gpm		273.7	ac-ft (peak)
Well Size	8	in		136.85	ac-ft (average)
Wells Needed	1			136.85	

Construction Costs			
Water Well(s)	1	$66,000	$66,000
Connection to Transmission System	1	$100,000	$100,000
Storage Tank	1	$50,000	$50,000
Subtotal			$216,000
Engineering and Contingencies			$65,000
Mitigation and Permitting			$10,000
Subtotal			$291,000
Interest During Construction			$6,000
Total Capital Costs			**$297,000**
Annual Costs			
Debt Service - Total Capital			$21,577
O&M			
Transmission			$2,700
Well(s)			$1,980
Add Chemicals etc.		0.1	$4,459
Pumping Costs			$2,906
Total Annual Cost			**$33,622**
UNIT COST (2010-2030)			
Cost per ac-ft			$246
Cost per 1000 gallons			$0.75
UNIT COST (2040-2060)			
Cost per ac-ft			$88
Cost per 1000 gallons			$0.27

Table U-297
Wise County Alvord - Pipeline to Chico (TRWD)

Owner: Alvord
Amount: 135 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	6 in.	39,400	LF	$15	$591,000
Right of Way Easements (ROW)	15 ft.	14	Acre	$3,000	$41,000
Engineering and Contingencies (30%)					$190,000
Subtotal of Pipeline					**$822,000**
Pump Station(s)					
Booster Pump Station	50	1	LS	$250,000	$250,000
Engineering and Contingencies (35%)					$88,000
Subtotal of Pump Station(s)					**$338,000**
Permitting and Mitigation					**$10,000**
CONSTRUCTION TOTAL					**$1,170,000**
Interest During Construction					**$49,000**
TOTAL COST					**$1,219,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$89,000
Electricity ($0.06 kWh)					$1,000
Treated Water ($2 per 1,000 gallons)					$88,000
Operation & Maintenance					$15,000
Total Annual Costs					**$193,000**
UNIT COSTS					
Per Acre-Foot					$1,430
Per 1,000 Gallons					$4.39

Table U-298

Aurora - Cost of Overdrafting
Trinity Aquifer Using Existing Pumps
Wise County, Trinity Aquifer

Need	38	Ac-ft/yr	24	gpm
Depth to Water	94			
Well Depth	395			
Well Yield	50	gpm	81	ac-ft (peak)
			40.5	ac-ft (average)

Annual Cost		
Pumping Costs		$458
Chemical Costs	0.1	$1,320
Total Annual Cost		**$1,778**
UNIT COSTS		
Cost per ac-ft		$44
Cost per 1000 gallons		$0.13

Table U-299
Wise County Aurora - Pipeline to Rhome

Owner: Aurora
Amount: 120 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	6 in.	9,979	LF	$15	$150,000
Right of Way Easements (ROW)	15 ft.	3	Acre	$3,000	$10,000
Engineering and Contingencies (30%)					$48,000
Subtotal of Pipeline					**$208,000**
Pump Station(s)					
Booster Pump Station		1	LS	$250,000	$250,000
Ground storage Tank	0.04 MG	1	LS	$3,000	$3,000
Engineering and Contingencies (35%)					$89,000
Subtotal of Pump Station(s)					**$342,000**
Permitting and Mitigation					**$5,000**
CONSTRUCTION TOTAL					**$555,000**
Interest During Construction					**$23,000**
TOTAL COST					**$578,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$42,000
Electricity ($0.06 kWh)					$0
Operation & Maintenance					$10,000
Total Annual Costs					**$52,000**
UNIT COSTS					
Per Acre-Foot					$433
Per 1,000 Gallons					$1.33

Table U-300

Bolivar WSC - Cost of Overdrafting
Trinity Aquifer Using Existing Pumps
Wise County, Trinity Aquifer

Need	90	Ac-ft/yr	56	gpm
Depth to Water	94			
Well Depth	397			
Well Yield	56	gpm	90	ac-ft (peak)
			45	ac-ft (average)

Annual Cost		
Pumping Costs		$509
Chemical Costs	0.1	$1,466
Total Annual Cost		**$1,975**
UNIT COSTS		
Cost per ac-ft		$44
Cost per 1000 gallons		$0.13

Table U-301

Boyd - Cost of Overdrafting
Trinity Aquifer Using Existing Pumps
Wise County, Trinity Aquifer

Need	19	Ac-ft/yr	12	gpm
Depth to Water	94			
Well Depth	397			
Well Yield	24	gpm	39	ac-ft (peak)
			19.5	ac-ft (average)

Annual Cost		
Pumping Costs		$221
Chemical Costs	0.1	$635
Total Annual Cost		**$856**
UNIT COSTS		
Cost per ac-ft		$44
Cost per 1000 gallons		$0.13

Table U-302
Bridgeport Pump Station Capacity Increase in 2010

Owner: Bridgeport
Amount: 0 Ac-Ft/Yr

CAPITAL COSTS	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pump Station(s)					
Pump Station Upgrade		1	LS	$500,000	$500,000
Engineering and Contingencies (35%)					$175,000
Subtotal of Pump Station(s)					**$675,000**
CONSTRUCTION TOTAL					**$675,000**
Interest During Construction			**(6 months)**		**$15,000**
TOTAL COST					**$690,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$50,000
Operation & Maintenance					$15,000
Total Annual Costs					**$65,000**

Table U-303
Bridgeport Parallel Pipeline Connection to TRWD in 2020

Owner: Bridgeport
Amount: 3,363 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Parallel pipeline to Bridgeport	24 in.	26,000	LF	$66	$1,716,000
Right of Way Easements (ROW)	20 ft.	12	Acre	$3,000	$36,000
Engineering and Contingencies (30%)					$526,000
Subtotal of Pipeline					**$2,278,000**
Pump Station(s)					
Pump Station with Intake Structure	150 HP	1	LS	$1,150,000	$1,150,000
Engineering and Contingencies (35%)					$403,000
Subtotal of Pump Station(s)					**$1,553,000**
Permitting and Mitigation					**$34,000**
CONSTRUCTION TOTAL					**$3,865,000**
Interest During Construction			**(12 months)**		**$161,000**
TOTAL COST					**$4,026,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$292,000
Electricity ($0.06 kWh)					$20,000
Operation & Maintenance					$56,000
Total Annual Costs					**$368,000**
UNIT COSTS (2010-2030)					
Per Acre-Foot					$109
Per 1,000 Gallons					$0.34
UNIT COSTS (2040-2060)					
Per Acre-Foot					$23
Per 1,000 Gallons					$0.07

Table U-304
Wise County Chico - Pipeline to Bridgeport

Owner: Chico
Amount: 365 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	10 in.	34,200	LF	$24	$821,000
Right of Way Easements (ROW)	15 ft.	12	Acre	$3,000	$35,000
Engineering and Contingencies (30%)					$257,000
Subtotal of Pipeline					**$1,113,000**
Pump Station(s)					
Booster Pump Station		1	LS	$250,000	$250,000
Engineering and Contingencies (35%)					$88,000
Subtotal of Pump Station(s)					**$338,000**
Permitting and Mitigation					**$13,000**
CONSTRUCTION TOTAL					**$1,464,000**
Interest During Construction					**$61,000**
TOTAL COST					**$1,525,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$111,000
Electricity ($0.06 kWh)					$2,000
Treated Water ($2 per 1,000 gallons)					$238,000
Operation & Maintenance					$18,000
Total Annual Costs					**$369,000**
UNIT COSTS					
Per Acre-Foot					$1,011
Per 1,000 Gallons					$3.10

Table U-305
Wise County Decatur - Parallel Pipeline to Bridgeport

Owner: Decatur/Wise County WSD
Amount: 3,631 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	24 in.	68,640	LF	$66	$4,530,000
Right of Way Easements (ROW)	20 ft.	32	Acre	$3,000	$95,000
Engineering and Contingencies (30%)					$1,388,000
Subtotal of Pipeline					**$6,013,000**
Pump Station(s)					
Booster Pump Station	300	1	LS	$1,200,000	$1,200,000
Engineering and Contingencies (35%)					$420,000
Subtotal of Pump Station(s)					**$1,620,000**
Permitting and Mitigation					**$69,000**
CONSTRUCTION TOTAL					**$7,702,000**
Interest During Construction					**$321,000**
TOTAL COST					**$8,023,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$583,000
Electricity ($0.06 kWh)					$44,000
Operation & Maintenance					$90,000
Total Annual Costs					**$717,000**
UNIT COSTS					
Per Acre-Foot					$197
Per 1,000 Gallons					$0.61

Table U-306
Wise County New Fairview - Pipeline to Rhome

Owner: New Fairview
Amount: 476 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	10 in.	23,540	LF	$24	$565,000
Right of Way Easements (ROW)	15 ft.	8	Acre	$3,000	$24,000
Engineering and Contingencies (30%)					$177,000
Subtotal of Pipeline					**$766,000**
Pump Station(s)					
Booster Pump Station		1	LS	$250,000	$250,000
Ground storage Tank	0.1 MG	1	LS	$75,000	$75,000
Engineering and Contingencies (35%)					$114,000
Subtotal of Pump Station(s)					**$439,000**
Permitting and Mitigation					**$11,000**
CONSTRUCTION TOTAL					**$1,216,000**
Interest During Construction					**$51,000**
TOTAL COST					**$1,267,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$92,000
Electricity ($0.06 kWh)					$1,000
Operation & Maintenance					$17,000
Total Annual Costs					**$110,000**
UNIT COSTS					
Per Acre-Foot					$231
Per 1,000 Gallons					$0.71

Table U-307
Wise County Newark - Pipeline to Rhome

Owner: Newark
Amount: 695 Ac-Ft/Yr

CAPITAL COSTS	Size	Quantity	Unit	Unit Price	Cost
Pipeline					
Pipeline	10 in.	20,000	LF	$20	$400,000
Right of Way Easements (ROW)	15 ft.	7	Acre	$3,000	$21,000
Engineering and Contingencies (30%)					$126,000
Subtotal of Pipeline					**$547,000**
Pump Station(s)					
Booster Pump Station	32	1	LS	$300,000	$300,000
Ground storage Tank	0.21 MG	1	LS	$90,000	$90,000
Engineering and Contingencies (35%)					$137,000
Subtotal of Pump Station(s)					**$527,000**
Permitting and Mitigation					**$9,000**
CONSTRUCTION TOTAL					**$1,083,000**
Interest During Construction					**$45,000**
TOTAL COST					**$1,128,000**
ANNUAL COSTS					
Debt Service (6% for 30 years)					$82,000
Electricity ($0.06 kWh)					$2,000
Operation & Maintenance					$17,000
Total Annual Costs					**$101,000**
UNIT COSTS					
Per Acre-Foot					$145
Per 1,000 Gallons					$0.45

Table U-308

County Other - Cost of Overdrafting
Trinity Aquifer Using Existing Pumps
Wise County, Trinity Aquifer

Need	674	Ac-ft/yr	418	gpm
Depth to Water	131			
Well Depth	300			
Well Yield	840	gpm	1352	ac-ft (peak)
			676	ac-ft (average)

Annual Cost		
Pumping Costs		$10,128
Chemical Costs	0.1	$22,028
Total Annual Cost		**$32,156**
UNIT COSTS		
Cost per ac-ft		$48
Cost per 1000 gallons		$0.15

Table U-309
Wise County Steam Electric Power Pipeline for Bridgeport Reuse by 2040

Owner: Unknown
Amount: 2,000 AF/Y

CAPITAL COSTS

Phase 1 (2020)

	Size	Quantity	Units	Unit Price			Cost
Transmission Facilities							
Pipeline Bridgeport	20	21,120	LF	$	51	$	1,077,000
Right of Way Easements	20 ft.	9.7	Ac	$	3,000	$	29,000
Pipeline Eng &Contingencies (30%)						$	323,000
Pipeline Subtotal						**$**	**1,429,000**
Pump Station	150	1	LS	$	750,000	$	750,000
Engineering and Contingencies (35%)						$	263,000
Pump Station Subtotal						**$**	**1,013,000**
Permitting and Mitigation						**$**	**22,000**
Interest During Construction			**(12 months)**			**$**	**103,000**
TOTAL CAPITAL COST						**$**	**2,567,000**

Phase 1 ANNUAL COSTS

	Size	Quantity	Units	Unit Price	Cost	
Debt Service (6%, 30 years)					$	186,000
Pipeline O&M (1%)					$	13,000
Pump O&M (2.5%)					$	23,000
Electricity					$	20,000
Reuse Water ($0.25 per 1,000 gallons)					$	163,000
TOTAL ANNUAL COST					**$**	**405,000**

Phase 1 Unit Costs (Pre-Amortization)

Cost per acre-ft	$	203
Cost per 1000 gallons	$	0.62

Phase 1 Unit Costs (After Amortization)

Cost per acre-ft	$	110
Cost per 1000 gallons	$	0.34

Table U-310
Wise County Steam Electric Power Pipeline for Decatur Reuse by 2040

Owner: Unknown
Amount: 2,000 AF/Y

CAPITAL COSTS

Phase 1 (2020)

	Size	Quantity	Units	Unit Price		Cost	
Transmission Facilities							
Pipeline Decatur	20	21,120	LF	$	51	$	1,077,000
Right of Way Easements	20 ft.	9.7	Ac	$	3,000	$	29,000
Pipeline Eng &Contingencies (30%)						$	323,000
Pipeline Subtotal						**$**	**1,429,000**
Pump Station	150	1	LS	$	750,000	$	750,000
Engineering and Contingencies (35%)						$	263,000
Pump Station Subtotal						**$**	**1,013,000**
Permitting and Mitigation						**$**	**22,000**
Interest During Construction			**(12 months)**			**$**	**103,000**
TOTAL CAPITAL COST						**$**	**2,567,000**

Phase 1 ANNUAL COSTS

	Size	Quantity	Units	Unit Price	Cost	
Debt Service (6%, 30 years)					$	186,000
Pipeline O&M (1%)					$	13,000
Pump O&M (2.5%)					$	23,000
Electricity					$	20,000
Reuse Water ($0.25 per 1,000 gallons)					$	163,000
TOTAL ANNUAL COST					**$**	**405,000**

Phase 1 Unit Costs (Pre-Amortization)

Cost per acre-ft	$	203
Cost per 1000 gallons	$	0.62

Phase 1 Unit Costs (After Amortization)

Cost per acre-ft	$	110
Cost per 1000 gallons	$	0.34

APPENDIX V

SUMMARY TABLES FOR WATER USER GROUPS

Table V - 1
Summaries by Water User Group

WUG	Description	2010	2020	2030	2040	2050	2060
Able Springs WSC	**Projected Population**	4,809	6,529	8,297	10,257	12,683	15,693
	Projected Water Demand						
(Region C only)	Municipal Demand	512	783	976	1,195	1,478	1,828
	Total Projected Water Demand	***512***	***783***	***976***	***1,195***	***1,478***	***1,828***
	Currently Available Water Supplies						
	SRA Sources	965	965	959	946	918	887
	Total Supply	***965***	***965***	***959***	***946***	***918***	***887***
	Water Management Strategies						
	Water Conservation - Basic Package	9	38	52	68	89	116
	Purchase water from SRA & participate in MacBee WSC water treatment plant	0	0	1,121	1,121	1,121	1,121
	Total Water Management Strategies	***9***	***38***	***1,173***	***1,189***	***1,210***	***1,237***
	Total Supply Less Projected Demand	**462**	**220**	**1,156**	**940**	**650**	**296**
Addison	**Projected Population**	17,919	20,534	22,358	23,629	24,515	25,133
	Projected Water Demand						
	Municipal Demand	8,852	10,074	10,919	11,514	11,918	12,218
	Total Projected Water Demand	***8,852***	***10,074***	***10,919***	***11,514***	***11,918***	***12,218***
	Currently Available Water Supplies						
	DWU Sources	6,508	6,637	6,599	6,349	5,764	5,088
	Total Supply	***6,508***	***6,637***	***6,599***	***6,349***	***5,764***	***5,088***
	Water Management Strategies						
	Water Conservation - Basic Package	213	345	465	587	707	826
	Water Conservation - Expanded Package	0	1	13	13	15	15
	Purchase water from DWU	2,267	4,596	5,875	7,386	8,332	7,517
	Total Water Management Strategies	***2,480***	***4,942***	***6,353***	***7,986***	***9,054***	***8,358***
	Total Supply Less Projected Demand	**136**	**1,505**	**2,033**	**2,821**	**2,900**	**1,228**
Aledo	**Projected Population**	2,612	3,473	4,426	5,264	6,165	7,162
	Projected Water Demand						
	Municipal Demand	439	591	744	879	1,029	1,195
	Total Projected Water Demand	***439***	***591***	***744***	***879***	***1,029***	***1,195***
	Currently Available Water Supplies						
	Trinity Aquifer	291	291	291	291	291	291
	Total Supply	***291***	***291***	***291***	***291***	***291***	***291***
	Water Management Strategies						
	Water Conservation - Basic Package	15	37	53	71	91	116
	Water Conservation - Expanded Package	0	4	6	8	10	11
	Purchase water from Fort Worth (TRWD)	183	350	566	641	919	1,025
	Overdrafting Trinity Aquifer using existing wells	149	0	0	0	0	0
	Supplemental wells in Trinity (Paluxy) aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***347***	***391***	***625***	***720***	***1,020***	***1,152***
	Total Supply Less Projected Demand	**199**	**91**	**172**	**132**	**282**	**248**
Allen	**Projected Population**	88,000	101,647	119,646	125,617	128,145	129,215
	Projected Water Demand						
	Municipal Demand	23,657	28,806	33,773	35,318	36,029	36,330
	Total Projected Water Demand	***23,657***	***28,806***	***33,773***	***35,318***	***36,029***	***36,330***
	Currently Available Water Supplies						
	NTMWD Sources	16,598	15,635	15,684	14,466	13,410	12,301
	Total Supply	***16,598***	***15,635***	***15,684***	***14,466***	***13,410***	***12,301***
	Water Management Strategies						
	Water Conservation - Basic Package	708	1,430	1,960	2,346	2,694	3,019
	Water Conservation - Expanded Package	20	236	517	593	613	621
	Purchase water from NTMWD	17,069	22,341	26,136	21,978	31,054	30,637
	Total Water Management Strategies	***17,797***	***24,007***	***28,613***	***24,917***	***34,361***	***34,277***
	Total Supply Less Projected Demand	**10,738**	**10,836**	**10,524**	**4,065**	**11,742**	**10,248**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Alvord	**Projected Population**	1,157	1,280	1,399	1,517	1,651	1,806
	Projected Water Demand						
	Municipal Demand	172	185	197	211	227	249
	Total Projected Water Demand	***172***	***185***	***197***	***211***	***227***	***249***
	Currently Available Water Supplies						
	Trinity Aquifer	114	114	114	114	114	114
	Total Supply	***114***	***114***	***114***	***114***	***114***	***114***
	Water Management Strategies						
	Water Conservation - Basic Package	2	8	9	11	12	14
	Purchase water from TRWD	72	83	104	106	141	153
	New well in Trinity Aquifer - Overdraft 2010	137	0	0	0	0	0
	Supplemental wells in Trinity (Paleozoic Erathem) aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***211***	***91***	***113***	***117***	***153***	***167***
	Total Supply Less Projected Demand	**153**	**20**	**30**	**20**	**40**	**32**
Anna	**Projected Population**	6,720	12,000	18,000	24,000	32,000	50,000
	Projected Water Demand						
	Municipal Demand	1,234	2,527	3,770	5,027	6,703	10,473
	Total Projected Water Demand	***1,234***	***2,527***	***3,770***	***5,027***	***6,703***	***10,473***
	Currently Available Water Supplies						
	Trinity Aquifer	88	88	88	88	88	88
	Woodbine Aquifer	124	124	124	124	124	124
	Total Supply	***212***	***212***	***212***	***212***	***212***	***212***
	Water Management Strategies						
	Water Conservation - Basic Package	43	141	243	366	543	936
	Water Conservation - Expanded Package	1	7	16	24	33	48
	Purchase water from NTMWD/GTUA (part of CGMA Project)	1,238	2,862	4,295	4,959	7,984	11,992
	Overdraft Woodbine Aquifer with existing wells in 2010	121	0	0	0	0	0
	New well in Woodbine Aquifer - Overdraft 2010	121	0	0	0	0	0
	New well in Trinity Aquifer - Overdraft 2010	294	0	0	0	0	0
	Supplemental wells in Woodbine aquifer	0	0	0	0	0	0
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***1,818***	***3,010***	***4,554***	***5,349***	***8,560***	***12,976***
	Total Supply Less Projected Demand	**796**	**695**	**996**	**534**	**2,069**	**2,715**
Annetta	**Projected Population**	1,579	1,972	2,289	2,564	2,856	3,176
	Projected Water Demand						
	Municipal Demand	195	236	272	302	333	370
	Total Projected Water Demand	***195***	***236***	***272***	***302***	***333***	***370***
	Currently Available Water Supplies						
	Trinity Aquifer	139	139	139	139	139	139
	Total Supply	***139***	***139***	***139***	***139***	***139***	***139***
	Water Management Strategies						
	Water Conservation - Basic Package	3	13	16	19	22	26
	Purchase water from TRWD	0	113	166	178	243	262
	Overdrafting Trinity Aquifer (existing wells)	57	0	0	0	0	0
	Supplemental wells in aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***60***	***126***	***182***	***197***	***265***	***288***
	Total Supply Less Projected Demand	**4**	**29**	**49**	**34**	**71**	**57**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Annetta South	**Projected Population**	708	836	939	1,028	1,123	1,227
	Projected Water Demand						
	Municipal Demand	87	100	110	119	128	140
	Total Projected Water Demand	***87***	***100***	***110***	***119***	***128***	***140***
	Currently Available Water Supplies						
	Trinity Aquifer	76	76	76	76	76	76
	Total Supply	***76***	***76***	***76***	***76***	***76***	***76***
	Water Management Strategies						
	Water Conservation - Basic Package	1	5	6	7	9	10
	Purchase water from TRWD	0	28	43	47	64	73
	Overdrafting Trinity Aquifer (existing wells)	12	0	0	0	0	0
	Supplemental wells in aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***13***	***33***	***49***	***54***	***73***	***83***
	Total Supply Less Projected Demand	**2**	**9**	**15**	**11**	**21**	**19**
Argyle	**Projected Population**	7,081	11,935	14,983	16,550	18,282	20,000
	Projected Water Demand						
	Municipal Demand	2,316	3,877	4,867	5,358	5,918	6,474
	Total Projected Water Demand	***2,316***	***3,877***	***4,867***	***5,358***	***5,918***	***6,474***
	Currently Available Water Supplies						
	Trinity Aquifer	398	398	398	398	398	398
	UTRWD Sources (through Argyle WSC)	1,345	1,461	1,492	1,499	1,503	1,510
	Total Supply	***1,743***	***1,859***	***1,890***	***1,897***	***1,901***	***1,908***
	Water Management Strategies						
	Water Conservation - Basic Package	69	187	275	347	433	528
	Water Conservation - Expanded Package	0	0	2	2	2	2
	Reduce Trinity Aquifer use (reallocated to others)	-40	-50	-102	-219	-279	-318
	Purchase water from Argyle WSC (from UTRWD)	740	3,554	4,048	4,036	4,505	5,242
	Total Water Management Strategies	***769***	***3,691***	***4,223***	***4,166***	***4,661***	***5,454***
	Total Supply Less Projected Demand	**196**	**1,673**	**1,246**	**705**	**644**	**888**
Argyle WSC	**Projected Population**	4,007	4,012	4,012	4,012	4,012	4,012
	Projected Water Demand						
	Municipal Demand	848	840	827	813	809	809
	Total Projected Water Demand	***848***	***840***	***827***	***813***	***809***	***809***
	Currently Available Water Supplies						
	Trinity Aquifer	398	398	398	398	398	398
	UTRWD Sources	338	221	190	183	179	172
	Total Supply	***736***	***619***	***588***	***581***	***577***	***570***
	Water Management Strategies						
	Water Conservation - Basic Package	26	52	58	64	71	78
	Water Conservation - Expanded Package	1	5	5	5	5	5
	Reduce Trinity Aquifer use (reallocated to others)	-40	-50	-102	-219	-279	-318
	Purchase water from UTRWD	185	537	514	495	535	598
	Supplemental wells in Trinity (Twin Mountains) aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***172***	***544***	***475***	***345***	***332***	***363***
	Total Supply Less Projected Demand	**60**	**323**	**236**	**113**	**100**	**124**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Arlington	**Projected Population**	390,000	453,656	485,000	500,000	510,000	515,000
	Projected Water Demand						
	Municipal Demand	79,508	90,961	96,159	98,013	99,402	100,376
	Total Projected Water Demand	***79,508***	***90,961***	***96,159***	***98,013***	***99,402***	***100,376***
	Currently Available Water Supplies						
	Lake Arlington	8,333	8,267	8,200	8,133	8,067	8,000
	TRWD Sources	76,445	72,096	65,012	57,061	49,111	42,177
	Total Supply	***84,778***	***80,363***	***73,212***	***65,194***	***57,178***	***50,177***
	Water Management Strategies						
	Water Conservation - Basic Package	2,252	4,627	5,714	6,662	7,596	8,507
	Water Conservation - Expanded Package	53	369	1,083	1,401	1,429	1,448
	Purchase water from TRWD	11,721	24,485	44,966	40,876	64,677	62,681
	Water Treatment Expansions						
	WTP Expansion of 65 MGD	0	0	0	0	0	0
	Total Water Management Strategies	***14,026***	***29,481***	***51,763***	***48,939***	***73,702***	***72,636***
	Total Supply Less Projected Demand	**19,296**	**18,883**	**28,816**	**16,120**	**31,478**	**22,437**
Athens	**Projected Population**	13,208	15,807	18,967	22,795	27,398	32,921
	Projected Water Demand						
(Region C only)	Municipal Demand	2,693	3,169	3,739	4,392	5,248	6,306
	Total Projected Water Demand	***2,693***	***3,169***	***3,739***	***4,392***	***5,248***	***6,306***
	Currently Available Water Supplies						
	Carrizo-Wilcox Aquifer	432	429	428	428	428	428
	Lake Athens	1,537	1,663	1,783	1,892	2,003	2,105
	Total Supply	***1,969***	***2,092***	***2,211***	***2,320***	***2,431***	***2,533***
	Water Management Strategies						
	Water Conservation - Basic Package	24	152	212	288	388	520
	Water Conservation - Expanded Package	0	38	131	175	213	258
	Purchase water from Athens MWA	906	1,409	2,010	2,410	3,807	4,136
	Supplemental wells in Carrizo-Wilcox aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***930***	***1,599***	***2,353***	***2,873***	***4,408***	***4,914***
	Total Supply Less Projected Demand	**206**	**522**	**825**	**801**	**1,591**	**1,141**
Aubrey	**Projected Population**	3,300	5,375	8,755	11,767	15,814	21,252
	Projected Water Demand						
	Municipal Demand	462	855	1,373	1,819	2,445	3,285
	Total Projected Water Demand	***462***	***855***	***1,373***	***1,819***	***2,445***	***3,285***
	Currently Available Water Supplies						
	Trinity Aquifer	195	195	195	195	195	195
	UTRWD Sources	112	112	112	112	112	112
	Total Supply	***307***	***307***	***307***	***307***	***307***	***307***
	Water Management Strategies						
	Water Conservation - Basic Package	8	52	95	88	126	181
	Water Conservation - Expanded Package	0	0	5	2	1	2
	Reduce Trinity Aquifer use (reallocated to others)	-20	-24	-50	-107	-137	-156
	Purchase water from UTRWD	245	955	1,510	1,881	2,626	3,590
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***233***	***983***	***1,560***	***1,864***	***2,616***	***3,617***
	Total Supply Less Projected Demand	**78**	**435**	**494**	**352**	**478**	**639**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Aurora	**Projected Population**	1,096	1,295	1,489	1,680	1,896	2,147
	Projected Water Demand						
	Municipal Demand	136	157	177	198	221	250
	Total Projected Water Demand	***136***	***157***	***177***	***198***	***221***	***250***
	Currently Available Water Supplies						
	Trinity Aquifer	98	98	98	98	98	98
	TRWD Sources (through Rhome)	33	37	40	44	47	51
	Total Supply	***131***	***135***	***138***	***142***	***145***	***149***
	Water Management Strategies						
	Water Conservation - Basic Package	2	8	10	12	14	17
	Purchase water from Rhome (from Walnut Creek SUD)	14	32	59	65	106	122
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***16***	***40***	***69***	***77***	***120***	***139***
	Total Supply Less Projected Demand	**11**	**18**	**30**	**21**	**44**	**38**
Azle	**Projected Population**	12,108	16,795	23,473	31,060	38,682	45,362
	Projected Water Demand						
	Municipal Demand	1,953	2,633	3,602	4,697	5,849	6,860
	Total Projected Water Demand	***1,953***	***2,633***	***3,602***	***4,697***	***5,849***	***6,860***
	Currently Available Water Supplies						
	TRWD Sources	1,376	1,401	1,431	1,460	1,477	1,481
	TRWD Sources	304	279	249	220	203	199
	Total Supply	***1,680***	***1,680***	***1,680***	***1,680***	***1,680***	***1,680***
	Water Management Strategies						
	Water Conservation - Basic Package	97	96	146	209	279	350
	Water Conservation - Expanded Package	2	1	0	0	0	0
	Purchase water from TRWD	739	1,395	2,823	3,438	5,607	6,099
	New Water Treatment Plant						
	New WTP of 3 MGD	0	0	0	0	0	0
	Water Treatment Expansions						
	WTP expansion of 3 MGD	0	0	0	0	0	0
	New WTP Expansion of 3 MGD	0	0	0	0	0	0
	Total Water Management Strategies	***838***	***1,492***	***2,969***	***3,647***	***5,886***	***6,449***
	Total Supply Less Projected Demand	**565**	**539**	**1,047**	**630**	**1,717**	**1,269**
Balch Springs	**Projected Population**	21,083	22,564	23,849	24,963	25,930	26,768
	Projected Water Demand						
	Municipal Demand	2,621	2,730	2,805	2,852	2,934	3,028
	Total Projected Water Demand	***2,621***	***2,730***	***2,805***	***2,852***	***2,934***	***3,028***
	Currently Available Water Supplies						
	DWU Sources	1,755	1,573	1,443	1,316	1,154	994
	Total Supply	***1,755***	***1,573***	***1,443***	***1,316***	***1,154***	***994***
	Water Management Strategies						
	Water Conservation - Basic Package	32	119	134	149	164	180
	Purchase water from Dallas County WCID #6 (from DWU)	843	1,471	1,761	2,085	2,317	2,130
	Total Water Management Strategies	***875***	***1,590***	***1,895***	***2,234***	***2,481***	***2,310***
	Total Supply Less Projected Demand	**9**	**433**	**533**	**698**	**701**	**276**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Bardwell	**Projected Population**	838	1,075	1,308	1,546	1,813	2,107
	Projected Water Demand						
	Municipal Demand	103	130	155	182	213	248
	Total Projected Water Demand	***103***	***130***	***155***	***182***	***213***	***248***
	Currently Available Water Supplies						
	Woodbine Aquifer	78	78	78	78	78	78
	Total Supply	***78***	***78***	***78***	***78***	***78***	***78***
	Water Management Strategies						
	Water Conservation - Basic Package	2	7	9	11	13	16
	Additional Woodbine Aquifer (New Wells)	34	58	84	112	135	170
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***36***	***65***	***93***	***123***	***148***	***186***
	Total Supply Less Projected Demand	**11**	**13**	**16**	**19**	**13**	**16**
Bartonville	**Projected Population**	5,000	10,000	14,000	16,500	17,500	18,000
	Projected Water Demand						
	Municipal Demand	941	2,095	2,917	3,438	3,646	3,750
	Total Projected Water Demand	***941***	***2,095***	***2,917***	***3,438***	***3,646***	***3,750***
	Currently Available Water Supplies						
	Trinity Aquifer	196	196	196	196	196	196
	UTRWD Sources (through Bartonville WSC)	663	997	1,162	1,244	1,330	1,190
	Total Supply	***859***	***1,193***	***1,358***	***1,440***	***1,526***	***1,386***
	Water Management Strategies						
	Water Conservation - Basic Package	34	125	199	263	310	350
	Water Conservation - Expanded Package	0	0	1	2	2	2
	Reduce Trinity Aquifer use (reallocated to others)	-20	-25	-50	-108	-137	-157
	Purchase water from Bartonville WSC (UTRWD)	289	1,935	2,449	2,610	2,787	3,042
	Total Water Management Strategies	***323***	***2,060***	***2,649***	***2,875***	***3,099***	***3,394***
	Total Supply Less Projected Demand	**241**	**1,158**	**1,090**	**877**	**979**	**1,030**
Bartonville WSC	**Projected Population**	1,400	1,604	1,786	1,948	2,094	2,224
	Projected Water Demand						
	Municipal Demand	307	347	380	410	439	466
	Total Projected Water Demand	***307***	***347***	***380***	***410***	***439***	***466***
	Currently Available Water Supplies						
	Trinity Aquifer	282	282	282	282	282	282
	UTRWD Sources	46	69	87	105	131	131
	Total Supply	***328***	***351***	***369***	***387***	***413***	***413***
	Water Management Strategies						
	Water Conservation - Basic Package	3	19	25	30	36	42
	Reduce Trinity Aquifer use (reallocated to others)	0	-35	-72	-155	-197	-226
	Overdraft Trinity Aquifer	50	0	0	0	0	0
	Purchase water from UTRWD	20	135	186	223	279	338
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***73***	***119***	***139***	***98***	***118***	***154***
	Total Supply Less Projected Demand	**94**	**123**	**128**	**75**	**92**	**101**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Bedford	**Projected Population**	50,001	52,395	54,407	56,098	57,519	58,713
	Projected Water Demand						
	Municipal Demand	10,138	10,447	10,665	10,808	11,017	11,246
	Total Projected Water Demand	***10,138***	***10,447***	***10,665***	***10,808***	***11,017***	***11,246***
	Currently Available Water Supplies						
	Trinity Aquifer	425	425	425	425	425	425
	TRWD Sources (through TRA)	10,200	8,738	7,569	6,592	5,695	4,941
	Total Supply	***10,625***	***9,163***	***7,994***	***7,017***	***6,120***	***5,366***
	Water Management Strategies						
	Water Conservation - Basic Package	283	529	632	734	841	953
	Water Conservation - Expanded Package	11	57	72	73	74	75
	Purchase water from TRA (from TRWD)	1,600	2,968	5,235	4,722	7,500	7,331
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***1,894***	***3,554***	***5,939***	***5,529***	***8,415***	***8,359***
	Total Supply Less Projected Demand	**2,381**	**2,270**	**3,268**	**1,738**	**3,518**	**2,479**
Bells	**Projected Population**	1,800	2,300	2,750	3,250	3,700	4,000
	Projected Water Demand						
	Municipal Demand	238	296	348	404	456	493
	Total Projected Water Demand	***238***	***296***	***348***	***404***	***456***	***493***
	Currently Available Water Supplies						
	Trinity Aquifer	161	161	161	161	161	161
	Woodbine Aquifer	31	31	31	31	31	31
	Total Supply	***192***	***192***	***192***	***192***	***192***	***192***
	Water Management Strategies						
	Water Conservation - Basic Package	4	14	17	22	26	30
	Grayson County Water Supply Project	0	147	205	258	312	359
	Reduce Trinity Aquifer use (reallocate to others)	0	-35	-35	-35	-35	-35
	Additional Woodbine Aquifer (New Wells)	63	8	7	6	5	1
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***67***	***134***	***194***	***251***	***308***	***355***
	Total Supply Less Projected Demand	**21**	**30**	**38**	**39**	**44**	**54**
Benbrook	**Projected Population**	21,000	25,000	30,000	36,000	43,000	51,000
	Projected Water Demand						
	Municipal Demand	4,893	5,685	6,721	7,984	9,489	11,254
	Total Projected Water Demand	***4,893***	***5,685***	***6,721***	***7,984***	***9,489***	***11,254***
	Currently Available Water Supplies						
	Trinity Aquifer	950	950	950	950	950	950
	TRWD Sources	4,235	4,128	4,265	4,466	4,591	4,705
	Total Supply	***5,185***	***5,078***	***5,215***	***5,416***	***5,541***	***5,655***
	Water Management Strategies						
	Water Conservation - Basic Package	119	287	398	540	722	950
	Water Conservation - Expanded Package	5	47	86	107	131	157
	Purchase water from TRWD	649	1,402	2,950	3,199	6,047	6,981
	Supplemental wells in Trinity (Paluxy) aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***773***	***1,736***	***3,434***	***3,846***	***6,900***	***8,088***
	Total Supply Less Projected Demand	**1,065**	**1,129**	**1,928**	**1,278**	**2,952**	**2,489**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Bethel-Ash WSC	**Projected Population**	2,025	2,474	2,917	3,371	3,925	4,625
	Projected Water Demand						
(Region C only)	Municipal Demand	163	194	222	253	290	342
	Total Projected Water Demand	***163***	***194***	***222***	***253***	***290***	***342***
	Currently Available Water Supplies						
	Carrizo-Wilcox Aquifer	173	172	172	172	171	172
	Total Supply	***173***	***172***	***172***	***172***	***171***	***172***
	Water Management Strategies						
	Water Conservation - Basic Package	3	14	17	21	25	30
	New wells in the Carrizo-Wilcox aquifer	0	173	173	173	173	173
	Supplemental wells in Carrizo-Wilcox aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***3***	***187***	***190***	***194***	***198***	***203***
	Total Supply Less Projected Demand	**13**	**166**	**140**	**113**	**80**	**33**
Bethesda WSC	**Projected Population**	10,585	13,110	15,707	18,447	21,735	25,620
	Projected Water Demand						
(Region C only)	Municipal Demand	1,530	1,850	2,182	2,542	2,970	3,501
	Total Projected Water Demand	***1,530***	***1,850***	***2,182***	***2,542***	***2,970***	***3,501***
	Currently Available Water Supplies						
	Trinity Aquifer	35	35	35	35	35	35
	TRWD Sources (through Fort Worth)	1,606	1,582	1,587	1,592	1,578	1,583
	Total Supply	***1,641***	***1,617***	***1,622***	***1,626***	***1,613***	***1,617***
	Water Management Strategies						
	Water Conservation - Basic Package	21	82	106	132	165	207
	Purchase water from Fort Worth (TRWD)	246	538	1,097	1,141	2,078	2,348
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***267***	***620***	***1,203***	***1,273***	***2,243***	***2,555***
	Total Supply Less Projected Demand	**378**	**387**	**643**	**357**	**886**	**671**
Blackland WSC	**Projected Population**	4,280	5,786	7,093	8,500	10,160	12,106
	Projected Water Demand						
(Region C only)	Municipal Demand	479	694	835	990	1,183	1,410
	Total Projected Water Demand	***479***	***694***	***835***	***990***	***1,183***	***1,410***
	Currently Available Water Supplies						
	NTMWD Sources (through Rockwall)	332	372	381	396	427	455
	Total Supply	***332***	***372***	***381***	***396***	***427***	***455***
	Water Management Strategies						
	Water Conservation - Basic Package	8	33	43	55	69	87
	Purchase water from Rockwall (NTMWD)	246	470	602	594	997	1,169
	Total Water Management Strategies	***254***	***503***	***645***	***649***	***1,066***	***1,256***
	Total Supply Less Projected Demand	**107**	**181**	**191**	**55**	**310**	**301**
Blooming Grove	**Projected Population**	833	833	833	833	833	833
	Projected Water Demand						
	Municipal Demand	149	146	144	141	139	139
	Total Projected Water Demand	***149***	***146***	***144***	***141***	***139***	***139***
	Currently Available Water Supplies						
	Navarro Mills Reservoir (through Corsicana)	163	146	133	121	109	98
	Total Supply	***163***	***146***	***133***	***121***	***109***	***98***
	Water Management Strategies						
	Water Conservation - Basic Package	2	6	6	9	10	12
	Water Conservation - Expanded Package	0	0	0	0	1	1
	Purchase water from Corsicana	0	31	29	27	78	65
	Total Water Management Strategies	***2***	***37***	***35***	***36***	***89***	***78***
	Total Supply Less Projected Demand	**16**	**37**	**24**	**16**	**59**	**37**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Blue Mound	**Projected Population**	2,500	2,500	2,500	2,500	2,500	2,500
	Projected Water Demand						
	Municipal Demand	297	300	294	286	283	283
	Total Projected Water Demand	***297***	***300***	***294***	***286***	***283***	***283***
	Currently Available Water Supplies						
	Trinity Aquifer	183	183	183	183	183	183
	TRWD Sources (through Tecon)	122	102	82	65	54	46
	Total Supply	***305***	***285***	***265***	***248***	***237***	***229***
	Water Management Strategies						
	Water Conservation - Basic Package	4	15	16	17	18	19
	Purchase water from TRWD (through Tecon)	19	35	57	47	71	67
	Total Water Management Strategies	***23***	***50***	***73***	***64***	***89***	***86***
	Total Supply Less Projected Demand	**31**	**35**	**44**	**26**	**43**	**32**
Blue Ridge	**Projected Population**	2,000	4,000	7,000	11,000	16,000	18,000
	Projected Water Demand						
	Municipal Demand	305	627	1,090	1,700	2,473	2,782
	Total Projected Water Demand	***305***	***627***	***1,090***	***1,700***	***2,473***	***2,782***
	Currently Available Water Supplies						
	Woodbine Aquifer	119	119	119	119	119	119
	Total Supply	***119***	***119***	***119***	***119***	***119***	***119***
	Water Management Strategies						
	Water Conservation - Basic Package	5	25	48	80	125	150
	Purchase water from NTMWD	225	646	1,201	1,658	2,925	3,156
	New well in Woodbine Aquifer - Overdraft 2010	189	0	0	0	0	0
	Supplemental wells in Woodbine aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***419***	***671***	***1,249***	***1,738***	***3,050***	***3,306***
	Total Supply Less Projected Demand	**233**	**163**	**278**	**157**	**696**	**643**
Bolivar WSC	**Projected Population**	10,386	12,465	21,806	44,726	70,848	95,836
	Projected Water Demand						
	Municipal Demand	1,279	1,703	3,371	6,863	10,872	14,707
	Total Projected Water Demand	***1,279***	***1,703***	***3,371***	***6,863***	***10,872***	***14,707***
	Currently Available Water Supplies						
	Trinity Aquifer	1,074	1,074	1,074	1,074	1,074	1,074
	Total Supply	***1,074***	***1,074***	***1,074***	***1,074***	***1,074***	***1,074***
	Water Management Strategies						
	Water Conservation - Basic Package	21	85	163	356	600	861
	Cooke County Water Supply Project	0	68	128	228	228	228
	Purchase water from UTRWD	250	850	2,700	4,600	7,500	8,300
	Additional Trinity Aquifer (Existing Wells)	50	100	400	650	850	1,050
	Overdraft Trinity Aquifer (Existing Wells)	180	0	0	0	0	0
	Additional Trinity Aquifer (New Wells)	460	460	800	2,100	3,600	3,600
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***961***	***1,563***	***4,191***	***7,934***	***12,778***	***14,039***
	Total Supply Less Projected Demand	**756**	**934**	**1,894**	**2,145**	**2,980**	**406**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Bonham	**Projected Population**	11,516	12,603	16,000	22,000	30,000	37,000
	Projected Water Demand						
	Municipal Demand	2,735	2,950	3,710	5,076	6,889	8,496
	Total Projected Water Demand	***2,735***	***2,950***	***3,710***	***5,076***	***6,889***	***8,496***
	Currently Available Water Supplies						
	Lake Bonham	3,656	3,649	3,645	3,640	3,636	3,476
	Total Supply	***3,656***	***3,649***	***3,645***	***3,640***	***3,636***	***3,476***
	Water Management Strategies						
	Water Conservation - Basic Package	119	281	385	569	830	1,095
	Water Conservation - Expanded Package	1	9	52	88	119	154
	Additional Lake Bonham	238	231	287	1,046	446	0
	Fannin County Water Supply Project	0	8	9	610	3,017	5,009
	Water Treatment Expansions						
	WTP Expansion of 1 MGD	0	0	0	0	0	0
	Total Water Management Strategies	***358***	***529***	***733***	***2,313***	***4,412***	***6,258***
	Total Supply Less Projected Demand	**1,279**	**1,229**	**668**	**877**	**1,160**	**1,238**
Boyd	**Projected Population**	1,500	2,000	2,200	2,200	2,200	2,200
	Projected Water Demand						
	Municipal Demand	215	278	298	291	288	288
	Total Projected Water Demand	***215***	***278***	***298***	***291***	***288***	***288***
	Currently Available Water Supplies						
	Trinity Aquifer	150	150	150	150	150	150
	TRWD Sources (through Walnut Creek SUD)	56	80	75	62	53	46
	Total Supply	***206***	***230***	***225***	***212***	***203***	***196***
	Water Management Strategies						
	Water Conservation - Basic Package	3	12	14	15	16	17
	Purchase water from Walnut Creek SUD (from TRWD)	25	69	110	92	119	110
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***28***	***81***	***124***	***107***	***135***	***127***
	Total Supply Less Projected Demand	**19**	**33**	**51**	**28**	**50**	**35**
Brandon-Irene WSC	**Projected Population**	300	327	355	385	419	460
	Projected Water Demand						
(Region C only)	Municipal Demand	37	39	41	43	46	51
	Total Projected Water Demand	***37***	***39***	***41***	***43***	***46***	***51***
	Currently Available Water Supplies						
	Lake Aquilla (Files Valley WSC)	37	39	41	43	46	51
	Total Supply	***37***	***39***	***41***	***43***	***46***	***51***
	Water Management Strategies						
	Water Conservation - Basic Package	1	2	2	3	3	3
	Total Water Management Strategies	***1***	***2***	***2***	***3***	***3***	***3***
	Total Supply Less Projected Demand	**1**	**2**	**2**	**3**	**3**	**3**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Bridgeport	**Projected Population**	6,803	8,352	12,001	14,296	16,657	19,936
	Projected Water Demand						
	Municipal Demand	1,570	1,899	2,702	3,187	3,713	4,444
	Total Projected Water Demand	***1,570***	***1,899***	***2,702***	***3,187***	***3,713***	***4,444***
	Currently Available Water Supplies						
	TRWD Sources	1,686	1,656	1,700	1,700	1,700	1,700
	Total Supply	***1,686***	***1,656***	***1,700***	***1,700***	***1,700***	***1,700***
	Water Management Strategies						
	Water Conservation - Basic Package	47	99	164	221	288	382
	Water Conservation - Expanded Package	1	7	23	36	42	51
	Purchase water from TRWD	259	562	1,678	1,773	2,643	3,136
	New Water Treatment Plant						
	New WTP of 2 MGD	0	0	0	0	0	0
	Water Treatment Expansions						
	WTP Expansion (0.9 MGD)	0	0	0	0	0	0
	New WTP Expansion of 2 MGD	0	0	0	0	0	0
	New WTP Expansion of 2 MGD	0	0	0	0	0	0
	Total Water Management Strategies	***307***	***668***	***1,865***	***2,030***	***2,973***	***3,569***
	Total Supply Less Projected Demand	**423**	**425**	**863**	**543**	**960**	**825**
Bryson	**Projected Population**	542	559	570	570	570	570
	Projected Water Demand						
	Municipal Demand	96	97	96	94	94	94
	Total Projected Water Demand	***96***	***97***	***96***	***94***	***94***	***94***
	Currently Available Water Supplies						
	Lake Bryson	0	0	0	0	0	0
	Total Supply	***0***	***0***	***0***	***0***	***0***	***0***
	Water Management Strategies						
	Water Conservation - Basic Package	3	6	7	7	8	9
	Purchase water from Graham	150	150	150	150	150	150
	Supplemental wells in Other aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***153***	***156***	***157***	***157***	***158***	***159***
	Total Supply Less Projected Demand	**57**	**59**	**61**	**63**	**64**	**65**
Buena Vista - Bethel SUD	**Projected Population**	2,938	3,620	3,970	4,513	5,193	5,981
	Projected Water Demand						
	Municipal Demand	553	669	725	819	937	1,079
	Total Projected Water Demand	***553***	***669***	***725***	***819***	***937***	***1,079***
	Currently Available Water Supplies						
	Trinity Aquifer	305	305	305	305	305	305
	Total Supply	***305***	***305***	***305***	***305***	***305***	***305***
	Water Management Strategies						
	Water Conservation - Basic Package	17	40	49	62	79	100
	Water Conservation - Expanded Package	0	2	3	3	5	5
	Rockett SUD-Waxahachie-Red Oak Project	337	408	442	500	573	657
	TRA Ellis County Water Supply Project (Waxahachie)	0	261	284	319	365	422
	Additional Trinity Aquifer (Existing Wells)	56	0	0	0	0	0
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***410***	***711***	***778***	***884***	***1,022***	***1,184***
	Total Supply Less Projected Demand	**163**	**347**	**359**	**370**	**390**	**410**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Burleson	**Projected Population**	4,885	6,218	7,589	9,035	10,770	12,820
	Projected Water Demand						
(Region C only)	Municipal Demand	799	989	1,190	1,397	1,653	1,967
	Total Projected Water Demand	***799***	***989***	***1,190***	***1,397***	***1,653***	***1,967***
	Currently Available Water Supplies						
	TRWD Sources (through Fort Worth)	858	862	880	887	889	898
	Total Supply	***858***	***862***	***880***	***887***	***889***	***898***
	Water Management Strategies						
	Water Conservation - Region G Package	0	0	0	0	0	0
	Purchase water from Fort Worth (TRWD)	132	292	607	634	1,171	1,332
	Total Water Management Strategies	***132***	***292***	***607***	***634***	***1,171***	***1,332***
	Total Supply Less Projected Demand	**191**	**165**	**297**	**124**	**407**	**263**
Caddo Basin SUD	**Projected Population**	4,710	5,869	7,307	8,781	10,324	11,966
	Projected Water Demand						
(Region C only)	Municipal Demand	607	756	942	1,132	1,329	1,541
	Total Projected Water Demand	***607***	***756***	***942***	***1,132***	***1,329***	***1,541***
	Currently Available Water Supplies						
	NTMWD Sources	426	411	437	464	494	522
	Total Supply	***426***	***411***	***437***	***464***	***494***	***522***
	Water Management Strategies						
	Water Conservation - Basic Package	13	42	55	70	87	106
	Purchase water from NTMWD	417	585	854	894	1,267	1,727
	Total Water Management Strategies	***430***	***627***	***909***	***964***	***1,354***	***1,833***
	Total Supply Less Projected Demand	**249**	**282**	**404**	**296**	**519**	**814**
Carrollton	**Projected Population**	121,000	124,000	128,500	131,320	133,450	134,800
	Projected Water Demand						
	Municipal Demand	25,887	26,113	26,772	27,065	27,356	27,632
	Total Projected Water Demand	***25,887***	***26,113***	***26,772***	***27,065***	***27,356***	***27,632***
	Currently Available Water Supplies						
	DWU Sources	19,024	17,197	16,175	14,917	13,226	11,502
	Trinity Aquifer	10	10	10	10	10	10
	Total Supply	***19,034***	***17,207***	***16,185***	***14,927***	***13,236***	***11,512***
	Water Management Strategies						
	Water Conservation - Basic Package	729	1,332	1,595	1,843	2,094	2,346
	Water Conservation - Expanded Package	26	184	271	277	280	286
	Purchase water from DWU	6,629	11,910	14,399	17,355	19,122	16,993
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***7,384***	***13,426***	***16,265***	***19,475***	***21,496***	***19,625***
	Total Supply Less Projected Demand	**531**	**4,520**	**5,678**	**7,337**	**7,376**	**3,505**
Cash SUD	**Projected Population**	638	860	1,053	1,260	1,505	1,792
	Projected Water Demand						
(Region C only)	Municipal Demand	82	111	136	162	194	231
	Total Projected Water Demand	***82***	***111***	***136***	***162***	***194***	***231***
	Currently Available Water Supplies						
	Lake Tawakoni	42	58	62	40	33	26
	NTMWD Sources	33	28	23	66	72	78
	Total Supply	***75***	***86***	***85***	***106***	***105***	***104***
	Water Management Strategies						
	Water Conservation - Basic Package	1	5	7	8	11	13
	Purchase water from SRA	10	30	55	60	90	130
	Total Water Management Strategies	***11***	***35***	***62***	***68***	***101***	***143***
	Total Supply Less Projected Demand	**4**	**10**	**11**	**12**	**12**	**16**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Cedar Hill	**Projected Population**	46,255	59,124	69,927	78,995	86,607	92,998
	Projected Water Demand						
	Municipal Demand	7,979	10,000	11,749	13,096	14,358	15,417
	Total Projected Water Demand	***7,979***	***10,000***	***11,749***	***13,096***	***14,358***	***15,417***
	Currently Available Water Supplies						
	DWU Sources	5,669	6,411	6,939	7,074	6,815	6,308
	Joe Pool Lake	0	0	0	0	0	0
	Trinity Aquifer	275	275	275	275	275	275
	Woodbine Aquifer	0	0	0	0	0	0
	Total Supply	***5,944***	***6,686***	***7,214***	***7,349***	***7,090***	***6,583***
	Water Management Strategies						
	Water Conservation - Basic Package	694	2,258	2,753	3,183	3,610	4,004
	Water Conservation - Expanded Package	65	182	233	263	290	313
	Purchase water from DWU	1,975	4,441	6,178	8,228	9,853	9,320
	Supplemental wells in Woodbine aquifer	0	0	0	0	0	0
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***2,734***	***6,881***	***9,164***	***11,674***	***13,753***	***13,637***
	Total Supply Less Projected Demand	**699**	**3,567**	**4,629**	**5,927**	**6,485**	**4,803**
Celina	**Projected Population**	5,000	22,675	48,000	85,000	130,000	150,000
	Projected Water Demand						
	Municipal Demand	952	4,750	10,001	17,709	27,085	31,252
	Total Projected Water Demand	***952***	***4,750***	***10,001***	***17,709***	***27,085***	***31,252***
	Currently Available Water Supplies						
	Trinity Aquifer	317	317	317	317	317	317
	UTRWD Sources	573	2,520	2,803	2,803	2,903	2,803
	Woodbine Aquifer	408	408	408	408	408	408
	Total Supply	***1,298***	***3,245***	***3,528***	***3,528***	***3,628***	***3,528***
	Water Management Strategies						
	Water Conservation - Basic Package	31	259	630	1,263	2,157	2,750
	Water Conservation - Expanded Package	0	2	24	56	93	124
	Purchase water from NTMWD	288	1,442	2,948	4,443	8,822	11,083
	Purchase water from UTRWD	250	4,891	11,078	19,116	30,614	34,520
	Grayson County Water Supply Project	0	21	487	2,086	4,079	4,800
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***569***	***6,615***	***15,167***	***26,964***	***45,765***	***53,277***
	Total Supply Less Projected Demand	**915**	**5,110**	**8,694**	**12,783**	**22,308**	**25,553**
Chatfield WSC	**Projected Population**	5,285	6,708	8,190	9,799	11,718	14,075
	Projected Water Demand						
	Municipal Demand	539	812	982	1,153	1,378	1,655
	Total Projected Water Demand	***539***	***812***	***982***	***1,153***	***1,378***	***1,655***
	Currently Available Water Supplies						
	Navarro Mills Reservoir (through Corsicana)	589	809	907	989	1,080	1,166
	Total Supply	***589***	***809***	***907***	***989***	***1,080***	***1,166***
	Water Management Strategies						
	Water Conservation - Basic Package	10	39	51	65	82	104
	Purchase water from Corsicana	0	175	197	216	765	776
	Total Water Management Strategies	***10***	***214***	***248***	***281***	***847***	***880***
	Total Supply Less Projected Demand	**60**	**211**	**173**	**117**	**549**	**391**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Chico	**Projected Population**	1,300	1,500	1,800	2,200	2,700	3,300
	Projected Water Demand						
	Municipal Demand	208	235	276	333	405	495
	Total Projected Water Demand	***208***	***235***	***276***	***333***	***405***	***495***
	Currently Available Water Supplies						
	Trinity Aquifer	119	119	119	119	119	119
	TRWD Sources (through West Wise WSC)	96	101	111	111	111	111
	Total Supply	***215***	***220***	***230***	***230***	***230***	***230***
	Water Management Strategies						
	Water Conservation - Basic Package	7	10	12	16	21	27
	Purchase water from West Wise Rural WSC (from TRWD)	99	124	185	222	345	415
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***106***	***134***	***197***	***238***	***366***	***442***
	Total Supply Less Projected Demand	**113**	**119**	**151**	**135**	**191**	**177**
Cockrell Hill	**Projected Population**	4,782	4,947	5,028	5,067	5,086	5,095
	Projected Water Demand						
	Municipal Demand	653	687	681	670	667	668
	Total Projected Water Demand	***653***	***687***	***681***	***670***	***667***	***668***
	Currently Available Water Supplies						
	DWU Sources	480	453	412	369	323	278
	Total Supply	***480***	***453***	***412***	***369***	***323***	***278***
	Water Management Strategies						
	Water Conservation - Basic Package	7	26	29	31	33	36
	Purchase water from DWU	167	313	366	429	466	411
	Total Water Management Strategies	***174***	***339***	***395***	***460***	***499***	***447***
	Total Supply Less Projected Demand	**1**	**105**	**126**	**159**	**155**	**57**
College Mound WSC	**Projected Population**	10,530	13,042	15,624	18,485	22,027	26,421
	Projected Water Demand						
	Municipal Demand	873	1,329	1,820	2,133	2,517	3,019
	Total Projected Water Demand	***873***	***1,329***	***1,820***	***2,133***	***2,517***	***3,019***
	Currently Available Water Supplies						
	NTMWD Sources	342	512	666	716	794	892
	Tawakoni	213	187	168	158	148	134
	Terrell	161	140	127	119	111	101
	Total Supply	***716***	***839***	***961***	***993***	***1,053***	***1,127***
	Water Management Strategies						
	Water Conservation - Basic Package	18	75	97	122	153	194
	Purchase water from NTMWD (through Terrell)	716	1,103	1,480	1,424	2,241	2,593
	Total Water Management Strategies	***734***	***1,178***	***1,577***	***1,546***	***2,394***	***2,787***
	Total Supply Less Projected Demand	**577**	**688**	**718**	**406**	**930**	**895**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Colleyville	**Projected Population**	26,183	28,856	29,947	30,393	30,575	30,649
	Projected Water Demand						
	Municipal Demand	8,681	9,471	9,762	9,873	9,898	9,922
	Total Projected Water Demand	***8,681***	***9,471***	***9,762***	***9,873***	***9,898***	***9,922***
	Currently Available Water Supplies						
	Trinity Aquifer	574	574	574	574	574	574
	TRWD Sources (through TRA)	8,015	7,757	6,791	5,904	5,013	4,268
	Total Supply	***8,589***	***8,331***	***7,365***	***6,478***	***5,587***	***4,842***
	Water Management Strategies						
	Water Conservation - Basic Package	243	454	550	639	724	808
	Water Conservation - Expanded Package	65	142	148	150	150	151
	Purchase water from TRA (from TRWD)	1,335	2,635	4,698	4,229	6,603	6,333
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***1,643***	***3,231***	***5,396***	***5,018***	***7,477***	***7,292***
	Total Supply Less Projected Demand	**1,551**	**2,091**	**2,999**	**1,623**	**3,166**	**2,212**
Collin County-Irrigation	**Projected Water Demand**						
	Irrigation Demand	2,995	2,995	2,995	2,995	2,995	2,995
	Total Projected Water Demand	***2,995***	***2,995***	***2,995***	***2,995***	***2,995***	***2,995***
	Currently Available Water Supplies						
	Direct reuse	380	380	380	380	380	380
	Direct reuse	2,227	2,227	2,227	2,227	2,227	2,227
	Irrigation Local Supply	408	408	408	408	408	408
	Total Supply	***2,635***	***2,635***	***2,635***	***2,635***	***2,635***	***2,635***
	Water Management Strategies						
	Water Conservation	6	99	190	238	283	328
	Purchase water from NTMWD	436	437	424	361	434	417
	Total Water Management Strategies	***442***	***536***	***614***	***599***	***717***	***745***
	Total Supply Less Projected Demand	**81**	**175**	**254**	**239**	**357**	**384**
Collin County-Livestock	**Projected Water Demand**						
	Livestock Demand	884	884	884	884	884	884
	Total Projected Water Demand	***884***	***884***	***884***	***884***	***884***	***884***
	Currently Available Water Supplies						
	Livestock Local Supply (Sabine)	31	31	31	31	31	31
	Livestock Local Supply (Trinity)	971	971	971	971	971	971
	Other Aquifer (Sabine)	4	4	4	4	4	4
	Other Aquifer (Trinity)	114	114	114	114	114	114
	Total Supply	***1,120***	***1,120***	***1,120***	***1,120***	***1,120***	***1,120***
	Water Management Strategies						
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**236**	**236**	**236**	**236**	**236**	**236**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Collin County-Manufacturing	**Projected Water Demand**						
	Manufacturing Demand	3,607	4,137	4,654	5,170	5,633	6,115
	Total Projected Water Demand	***3,607***	***4,137***	***4,654***	***5,170***	***5,633***	***6,115***
	Currently Available Water Supplies						
	Chapman Lake	2,381	2,130	2,062	2,030	2,017	1,998
	Woodbine Aquifer	214	214	214	214	214	214
	Total Supply	***2,595***	***2,344***	***2,276***	***2,244***	***2,231***	***2,212***
	Water Management Strategies						
	Water Conservation	0	6	72	108	119	130
	Purchase water from NTMWD	1,731	2,634	3,174	2,944	4,519	4,815
	Supplemental wells in Woodbine aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***1,731***	***2,640***	***3,246***	***3,052***	***4,638***	***4,945***
	Total Supply Less Projected Demand	**719**	**847**	**868**	**126**	**1,236**	**1,042**
Collin County-Mining	**Projected Water Demand**						
	Mining Demand	341	341	341	341	341	341
	Total Projected Water Demand	***341***	***341***	***341***	***341***	***341***	***341***
	Currently Available Water Supplies						
	Other Local Supply	195	195	195	195	195	195
	Total Supply	***195***	***195***	***195***	***195***	***195***	***195***
	Water Management Strategies						
	Purchase water from NTMWD	177	177	172	147	176	169
	Total Water Management Strategies	***177***	***177***	***172***	***147***	***176***	***169***
	Total Supply Less Projected Demand	**31**	**31**	**26**	**1**	**30**	**23**
Collin County-Other	**Projected Population**	6,408	5,981	5,600	5,208	4,801	4,369
	Projected Water Demand						
	County-Other Demand	818	743	677	613	554	504
	Total Projected Water Demand	***818***	***743***	***677***	***613***	***554***	***504***
	Currently Available Water Supplies						
	NTMWD Sources	287	202	157	126	103	85
	Trinity Aquifer	655	655	655	655	655	655
	Woodbine Aquifer	505	505	505	505	505	505
	Total Supply	***1,447***	***1,362***	***1,317***	***1,286***	***1,263***	***1,245***
	Water Management Strategies						
	Water Conservation - Basic Package	14	42	42	41	39	37
	Purchase water from NTMWD	209	248	242	182	232	205
	Supplemental wells in Trinity & Woodbine aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***223***	***290***	***284***	***223***	***271***	***242***
	Total Supply Less Projected Demand	**852**	**909**	**924**	**896**	**980**	**983**
Collin County-Steam Electric Power	**Projected Water Demand**						
	Steam Electric Power Demand	1,581	1,260	1,473	1,733	2,050	2,436
	Total Projected Water Demand	***1,581***	***1,260***	***1,473***	***1,733***	***2,050***	***2,436***
	Currently Available Water Supplies						
	NTMWD Sources	556	343	343	356	383	414
	Trinity Aquifer	555	555	555	555	555	555
	Total Supply	***1,111***	***898***	***898***	***911***	***938***	***969***
	Water Management Strategies						
	Purchase water from NTMWD	505	524	628	1,016	1,358	1,497
	Supplemental wells in Woodbine aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***505***	***524***	***628***	***1,016***	***1,358***	***1,497***
	Total Supply Less Projected Demand	**35**	**162**	**53**	**194**	**246**	**30**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Collinsville	**Projected Population**	2,035	2,835	3,635	4,435	5,235	6,035
	Projected Water Demand						
	Municipal Demand	324	441	558	666	780	899
	Total Projected Water Demand	***324***	***441***	***558***	***666***	***780***	***899***
	Currently Available Water Supplies						
	Trinity Aquifer	283	283	283	283	283	283
	Total Supply	***283***	***283***	***283***	***283***	***283***	***283***
	Water Management Strategies						
	Water Conservation - Basic Package	11	18	25	32	40	49
	Grayson County Water Supply Project	0	245	353	451	559	676
	Overdraft Trinity Aquifer (Existing Wells)	90	0	0	0	0	0
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***101***	***263***	***378***	***483***	***599***	***725***
	Total Supply Less Projected Demand	**60**	**105**	**103**	**100**	**102**	**109**
Combine	**Projected Population**	2,393	2,969	3,474	4,019	4,702	5,563
	Projected Water Demand						
	Municipal Demand	282	356	405	463	537	635
	Total Projected Water Demand	***282***	***356***	***405***	***463***	***537***	***635***
	Currently Available Water Supplies						
	DWU Sources (through Combine WSC)	208	235	245	256	260	264
	Total Supply	***208***	***235***	***245***	***256***	***260***	***264***
	Water Management Strategies						
	Water Conservation - Basic Package	5	18	23	28	34	43
	Purchase water from Combine WSC (from Seagoville)	73	162	218	297	374	391
	Total Water Management Strategies	***78***	***180***	***241***	***325***	***408***	***434***
	Total Supply Less Projected Demand	**4**	**59**	**81**	**118**	**131**	**63**
Combine WSC	**Projected Population**	4,122	5,737	7,202	8,795	10,785	13,285
	Projected Water Demand						
	Municipal Demand	462	688	855	1,035	1,268	1,562
	Total Projected Water Demand	***462***	***688***	***855***	***1,035***	***1,268***	***1,562***
	Currently Available Water Supplies						
	DWU Sources	340	454	517	571	613	650
	Total Supply	***340***	***454***	***517***	***571***	***613***	***650***
	Water Management Strategies						
	Water Conservation - Basic Package	8	34	45	58	76	98
	Purchase water from Seagoville (from DWU)	118	314	460	665	888	961
	Total Water Management Strategies	***126***	***348***	***505***	***723***	***964***	***1,059***
	Total Supply Less Projected Demand	**4**	**114**	**167**	**259**	**309**	**147**
Community Water Company	**Projected Population**	2,175	2,715	3,316	4,004	4,829	5,812
	Projected Water Demand						
(Region C only)	Municipal Demand	222	328	394	467	557	670
	Total Projected Water Demand	***222***	***328***	***394***	***467***	***557***	***670***
	Currently Available Water Supplies						
	Lake Bardwell (through Ennis)	129	148	134	118	102	78
	Navarro Mills Reservoir (through Coriscana)	116	156	178	203	230	258
	Total Supply	***245***	***304***	***312***	***321***	***332***	***336***
	Water Management Strategies						
	Water Conservation - Basic Package	4	16	21	27	34	43
	Purchase water from Corsicana	0	34	38	44	162	171
	TRA Ellis County Water Supply Project (Ennis)	0	23	67	112	162	188
	Total Water Management Strategies	***4***	***73***	***126***	***183***	***358***	***420***
	Total Supply Less Projected Demand	**27**	**49**	**44**	**37**	**133**	**86**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Community WSC	**Projected Population**	3,536	3,588	3,642	3,699	3,767	3,847
	Projected Water Demand						
	Municipal Demand	444	438	433	422	426	435
	Total Projected Water Demand	***444***	***438***	***433***	***422***	***426***	***435***
	Currently Available Water Supplies						
	TRWD Sources	477	382	320	268	229	198
	Total Supply	***477***	***382***	***320***	***268***	***229***	***198***
	Water Management Strategies						
	Water Conservation - Basic Package	6	22	24	25	27	29
	Purchase water from TRWD	73	130	221	192	301	295
	Water Treatment Expansions						
	Water treatment plant expansion (0.5 MGD)	0	0	0	0	0	0
	Total Water Management Strategies	***79***	***152***	***245***	***217***	***328***	***324***
	Total Supply Less Projected Demand	**112**	**96**	**132**	**63**	**131**	**87**
Cooke County-Irrigation	**Projected Water Demand**						
	Irrigation Demand	444	444	444	444	444	444
	Total Projected Water Demand	***444***	***444***	***444***	***444***	***444***	***444***
	Currently Available Water Supplies						
	Direct reuse	9	9	9	9	9	9
	Irrigation Local Supply	23	23	23	23	23	23
	Trinity Aquifer	176	176	176	176	176	176
	Trinity Aquifer	96	96	96	96	96	96
	Total Supply	***304***	***304***	***304***	***304***	***304***	***304***
	Water Management Strategies						
	Water Conservation	0	6	11	14	18	22
	Cooke County Water Supply Project	0	51	51	51	51	51
	Additional Trinity Aquifer (New Wells)	24	140	140	140	140	140
	Overdraft Trinity Aquifer (New Wells)	116	0	0	0	0	0
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***140***	***197***	***202***	***205***	***209***	***213***
	Total Supply Less Projected Demand	**0**	**57**	**62**	**65**	**69**	**73**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Cooke County-Livestock	**Projected Water Demand**						
	Livestock Demand	1,898	1,898	1,898	1,898	1,898	1,898
	Total Projected Water Demand	***1,898***	***1,898***	***1,898***	***1,898***	***1,898***	***1,898***
	Currently Available Water Supplies						
	Livestock Local Supply (Red)	380	380	380	380	380	380
	Livestock Local Supply (Trinity)	807	807	807	807	807	807
	Trinity Aquifer (Red)	287	287	287	287	287	287
	Trinity Aquifer (Trinity)	611	611	611	611	611	611
	Total Supply	***2,085***	***2,085***	***2,085***	***2,085***	***2,085***	***2,085***
	Water Management Strategies						
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Reduce Trinity Aquifer use in Red Basin (reallocated to others)	-59	-59	-59	-59	-59	-59
	Total Water Management Strategies	***-59***	***-59***	***-59***	***-59***	***-59***	***-59***
	Total Supply Less Projected Demand	**128**	**128**	**128**	**128**	**128**	**128**
Cooke County-Manufacturing	**Projected Water Demand**						
	Manufacturing Demand	273	306	335	364	389	421
	Total Projected Water Demand	***273***	***306***	***335***	***364***	***389***	***421***
	Currently Available Water Supplies						
	Trinity Aquifer	209	209	209	209	209	209
	Total Supply	***209***	***209***	***209***	***209***	***209***	***209***
	Water Management Strategies						
	Water Conservation	0	1	7	10	11	12
	Purchase water from Gainesville	49	90	110	132	152	177
	Muenster Lake	15	37	42	49	56	65
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***64***	***128***	***159***	***191***	***219***	***254***
	Total Supply Less Projected Demand	**0**	**31**	**33**	**36**	**39**	**42**
Cooke County-Mining	**Projected Water Demand**						
	Mining Demand	321	334	341	348	355	361
	Total Projected Water Demand	***321***	***334***	***341***	***348***	***355***	***361***
	Currently Available Water Supplies						
	Other Local Supply	237	237	237	237	237	237
	Trinity Aquifer	49	49	49	49	49	49
	Total Supply	***286***	***286***	***286***	***286***	***286***	***286***
	Water Management Strategies						
	Additional Trinity Aquifer (New Wells)	4	31	35	39	43	47
	Overdraft Trinity Aquifer (New Wells)	31	17	20	23	26	28
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***35***	***48***	***55***	***62***	***69***	***75***
	Total Supply Less Projected Demand	**0**	**0**	**0**	**0**	**0**	**0**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Cooke County-Other	**Projected Population**	9,487	10,181	10,533	10,590	10,586	10,586
	Projected Water Demand						
	County-Other Demand	1,074	1,232	1,251	1,234	1,221	1,222
	Total Projected Water Demand	***1,074***	***1,232***	***1,251***	***1,234***	***1,221***	***1,222***
	Currently Available Water Supplies						
	Trinity Aquifer	775	775	775	775	775	775
	Total Supply	***775***	***775***	***775***	***775***	***775***	***775***
	Water Management Strategies						
	Water Conservation - Basic Package	16	59	65	70	74	78
	Cooke County Water Supply Project	0	132	145	137	131	131
	Additional Trinity Aquifer (New Wells)	213	362	367	356	347	347
	Overdraft Trinity Aquifer (New Wells)	86	0	0	0	0	0
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***315***	***553***	***577***	***563***	***552***	***556***
	Total Supply Less Projected Demand	**16**	**96**	**101**	**104**	**106**	**109**
Cooke County-Steam Electric Power	**Projected Water Demand**						
	Steam Electric Power Demand	0	0	0	0	0	0
	Total Projected Water Demand	***0***	***0***	***0***	***0***	***0***	***0***
	Currently Available Water Supplies						
	Total Supply	***0***	***0***	***0***	***0***	***0***	***0***
	Water Management Strategies						
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**0**	**0**	**0**	**0**	**0**	**0**
Coppell	**Projected Population**	40,415	40,577	40,715	40,832	40,932	41,016
	Projected Water Demand						
	Municipal Demand	10,140	10,090	10,033	10,016	9,996	10,016
	Total Projected Water Demand	***10,140***	***10,090***	***10,033***	***10,016***	***9,996***	***10,016***
	Currently Available Water Supplies						
	DWU Sources	7,454	6,647	6,064	5,522	4,834	4,170
	Total Supply	***7,454***	***6,647***	***6,064***	***5,522***	***4,834***	***4,170***
	Water Management Strategies						
	Water Conservation - Basic Package	286	514	596	679	762	847
	Water Conservation - Expanded Package	9	95	193	216	215	215
	Purchase water from DWU	2,597	4,603	5,398	6,426	6,989	6,162
	Total Water Management Strategies	***2,892***	***5,212***	***6,187***	***7,321***	***7,966***	***7,224***
	Total Supply Less Projected Demand	**206**	**1,769**	**2,218**	**2,827**	**2,804**	**1,378**
Copper Canyon	**Projected Population**	1,442	2,000	3,000	4,450	5,200	5,600
	Projected Water Demand						
	Municipal Demand	396	540	800	1,176	1,375	1,480
	Total Projected Water Demand	***396***	***540***	***800***	***1,176***	***1,375***	***1,480***
	Currently Available Water Supplies						
	Trinity Aquifer	61	61	61	61	61	61
	UTRWD Sources (through Bartonville WSC)	296	253	317	427	503	471
	Total Supply	***357***	***314***	***378***	***488***	***564***	***532***
	Water Management Strategies						
	Water Conservation - Basic Package	11	28	48	81	106	126
	Reduce Trinity Aquifer use (reallocated to others)	-6	-8	-16	-34	-43	-49
	Purchase water from Bartonville WSC (from UTRWD)	129	491	668	895	1,054	1,203
	Total Water Management Strategies	***140***	***519***	***716***	***976***	***1,160***	***1,329***
	Total Supply Less Projected Demand	**101**	**293**	**294**	**288**	**349**	**381**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Corinth	**Projected Population**	16,983	21,319	24,643	28,000	30,000	31,500
	Projected Water Demand						
	Municipal Demand	3,767	4,681	5,383	6,085	6,519	6,845
	Total Projected Water Demand	***3,767***	***4,681***	***5,383***	***6,085***	***6,519***	***6,845***
	Currently Available Water Supplies						
	Trinity Aquifer	13	13	13	13	13	13
	UTRWD Sources	3,260	2,391	2,232	2,260	2,417	2,196
	Total Supply	***3,273***	***2,404***	***2,245***	***2,273***	***2,430***	***2,209***
	Water Management Strategies						
	Water Conservation - Basic Package	116	263	348	445	531	615
	Water Conservation - Expanded Package	4	24	51	69	75	81
	Purchase water from UTRWD	1,419	4,643	4,706	4,741	5,065	5,611
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***1,539***	***4,930***	***5,105***	***5,255***	***5,671***	***6,306***
	Total Supply Less Projected Demand	**1,045**	**2,653**	**1,967**	**1,443**	**1,582**	**1,670**
Corsicana	**Projected Population**	25,537	26,674	27,858	29,144	30,678	32,563
	Projected Water Demand						
	Municipal Demand	5,835	6,006	6,179	6,366	6,667	7,076
	Total Projected Water Demand	***5,835***	***6,006***	***6,179***	***6,366***	***6,667***	***7,076***
	Currently Available Water Supplies						
	Lake Halbert	0	0	0	0	0	0
	Navarro Mills Reservoir (through TRA)	6,373	5,986	5,709	5,463	5,222	4,986
	Total Supply	***6,373***	***5,986***	***5,709***	***5,463***	***5,222***	***4,986***
	Water Management Strategies						
	Water Conservation - Basic Package	46	158	184	341	413	497
	Water Conservation - Expanded Package	0	0	0	62	147	158
	Corsicana Sources	326	1,294	1,239	1,187	3,699	3,320
	Water Treatment Expansions						
	Water treatment plant expansion (5 MGD)	0	0	0	0	0	0
	Water treatment plant expansion (10 MGD)	0	0	0	0	0	0
	Total Water Management Strategies	***372***	***1,452***	***1,423***	***1,590***	***4,259***	***3,975***
	Total Supply Less Projected Demand	**910**	**1,432**	**953**	**687**	**2,814**	**1,885**
Crandall	**Projected Population**	4,373	5,933	7,537	9,314	11,515	14,245
	Projected Water Demand						
	Municipal Demand	730	1,004	1,258	1,544	1,909	2,362
	Total Projected Water Demand	***730***	***1,004***	***1,258***	***1,544***	***1,909***	***2,362***
	Currently Available Water Supplies						
	NTMWD Sources	512	545	584	632	711	800
	Total Supply	***512***	***545***	***584***	***632***	***711***	***800***
	Water Management Strategies						
	Water Conservation - Basic Package	24	63	90	123	169	228
	Water Conservation - Expanded Package	6	19	25	31	39	49
	Purchase water from NTMWD	373	674	899	917	1,593	1,926
	Total Water Management Strategies	***403***	***756***	***1,014***	***1,071***	***1,801***	***2,203***
	Total Supply Less Projected Demand	**185**	**297**	**340**	**159**	**603**	**641**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Cross Roads	**Projected Population**	1,500	3,899	6,351	10,594	16,500	20,600
	Projected Water Demand						
	Municipal Demand	575	1,267	2,056	3,430	5,341	6,669
	Total Projected Water Demand	***575***	***1,267***	***2,056***	***3,430***	***5,341***	***6,669***
	Currently Available Water Supplies						
	Trinity Aquifer	87	87	87	87	87	87
	UTRWD Sources (through Mustang SUD)	431	615	831	1,259	1,788	1,816
	Total Supply	***518***	***702***	***918***	***1,346***	***1,875***	***1,903***
	Water Management Strategies						
	Water Conservation - Basic Package	16	58	112	216	380	530
	Reduce Trinity Aquifer use (reallocated to others)	-9	-11	-22	-48	-61	-70
	Purchase water from Mustang SUD (from UTRWD)	187	1,197	1,757	2,649	4,140	5,467
	Total Water Management Strategies	***194***	***1,244***	***1,847***	***2,817***	***4,459***	***5,927***
	Total Supply Less Projected Demand	**137**	**679**	**709**	**733**	**993**	**1,161**
Crowley	**Projected Population**	9,000	11,000	14,000	19,000	23,000	25,000
	Projected Water Demand						
	Municipal Demand	1,361	1,614	2,023	2,703	3,246	3,528
	Total Projected Water Demand	***1,361***	***1,614***	***2,023***	***2,703***	***3,246***	***3,528***
	Currently Available Water Supplies						
	Trinity Aquifer	153	153	153	153	153	153
	TRWD Sources (through Fort Worth)	1,297	1,274	1,382	1,619	1,663	1,541
	Total Supply	***1,450***	***1,427***	***1,535***	***1,772***	***1,816***	***1,694***
	Water Management Strategies						
	Water Conservation - Basic Package	17	66	90	131	169	195
	Purchase water from Fort Worth (from TRWD)	199	432	956	1,159	2,190	2,286
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***216***	***498***	***1,046***	***1,290***	***2,359***	***2,481***
	Total Supply Less Projected Demand	**305**	**311**	**558**	**359**	**929**	**647**
Culleoka WSC	**Projected Population**	8,534	11,264	13,682	16,161	18,754	21,515
	Projected Water Demand						
	Municipal Demand	908	1,350	1,625	1,883	2,185	2,506
	Total Projected Water Demand	***908***	***1,350***	***1,625***	***1,883***	***2,185***	***2,506***
	Currently Available Water Supplies						
	NTMWD Sources (through Princeton)	637	733	755	771	813	849
	Total Supply	***637***	***733***	***755***	***771***	***813***	***849***
	Water Management Strategies						
	Water Conservation - Basic Package	21	80	102	126	154	185
	Purchase water from Princeton (NTMWD)	463	906	1,161	1,118	1,823	2,043
	Total Water Management Strategies	***484***	***986***	***1,263***	***1,244***	***1,977***	***2,228***
	Total Supply Less Projected Demand	**213**	**369**	**393**	**132**	**605**	**571**
Dallas	**Projected Population**	1,312,324	1,451,878	1,525,450	1,598,223	1,764,681	2,058,767
	Projected Water Demand						
	Municipal Demand	389,548	426,094	442,559	460,091	506,034	590,366
	Total Projected Water Demand	***389,548***	***426,094***	***442,559***	***460,091***	***506,034***	***590,366***
	Currently Available Water Supplies						
	DWU Sources	272,946	267,346	253,903	240,040	230,708	231,417
	Total Supply	***272,946***	***267,346***	***253,903***	***240,040***	***230,708***	***231,417***
	Water Management Strategies						
	Water Conservation	17,598	24,994	31,722	38,670	45,731	53,130
	Additional DWU Sources	109,480	199,843	239,587	300,524	352,448	356,112
	Total Water Management Strategies	***127,078***	***224,837***	***271,309***	***339,194***	***398,179***	***409,242***
	Total Supply Less Projected Demand	**10,476**	**66,089**	**82,653**	**119,143**	**122,853**	**50,293**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Dallas County-Irrigation	**Projected Water Demand**						
	Irrigation Demand	13,087	13,087	13,087	13,087	13,087	13,087
	Total Projected Water Demand	***13,087***	***13,087***	***13,087***	***13,087***	***13,087***	***13,087***
	Currently Available Water Supplies						
	Direct reuse	561	561	561	561	561	561
	DWU Sources	735	659	604	551	484	416
	Indirect Reuse	8,000	8,000	8,000	8,000	8,000	8,000
	Irrigation Local Supply	791	791	791	791	791	791
	Joe Pool Lake	100	100	100	100	100	100
	Other Aquifer	593	593	593	593	593	593
	Total Supply	***10,780***	***10,704***	***10,649***	***10,596***	***10,529***	***10,461***
	Water Management Strategies						
	Water Conservation	26	429	825	1,032	1,227	1,422
	Purchase water from DWU	2,651	9,824	9,584	9,613	9,503	9,000
	Total Water Management Strategies	***2,677***	***10,253***	***10,409***	***10,645***	***10,730***	***10,422***
	Total Supply Less Projected Demand	**370**	**7,870**	**7,971**	**8,154**	**8,172**	**7,796**
Dallas County-Livestock	**Projected Water Demand**						
	Livestock Demand	482	482	482	482	482	482
	Total Projected Water Demand	***482***	***482***	***482***	***482***	***482***	***482***
	Currently Available Water Supplies						
	Livestock Local Supply	712	712	712	712	712	712
	Woodbine Aquifer	69	69	69	69	69	69
	Total Supply	***781***	***781***	***781***	***781***	***781***	***781***
	Water Management Strategies						
	Supplemental wells in Woodbine aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**299**	**299**	**299**	**299**	**299**	**299**
Dallas County-Manufacturing	**Projected Water Demand**						
	Manufacturing Demand	34,115	37,791	41,148	44,214	46,703	46,983
	Total Projected Water Demand	***34,115***	***37,791***	***41,148***	***44,214***	***46,703***	***46,983***
	Currently Available Water Supplies						
	Direct reuse	20	20	20	20	20	20
	DWU sources	18,434	18,299	18,279	17,919	16,602	14,379
	Lake Chapman (through Irving)	2,353	2,480	2,589	2,672	2,700	2,590
	NTMWD Sources	4,548	3,897	3,631	3,441	3,303	3,023
	Trinity Aquifer	250	250	250	250	250	250
	Woodbine Aquifer	521	521	521	521	521	521
	Total Supply	***26,126***	***25,468***	***25,290***	***24,823***	***23,396***	***20,783***
	Water Management Strategies						
	Water Conservation	0	68	781	1,135	1,212	1,258
	Purchase water from DWU	6,423	12,673	16,274	20,846	24,003	21,244
	Purchase water from NTMWD	3,307	4,821	5,588	4,989	7,401	7,282
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Supplemental wells in Woodbine aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***9,730***	***17,562***	***22,643***	***26,970***	***32,616***	***29,784***
	Total Supply Less Projected Demand	**1,741**	**5,238**	**6,785**	**7,579**	**9,309**	**3,584**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Dallas County-Mining	**Projected Water Demand**						
	Mining Demand	2,910	2,910	2,910	2,910	2,910	2,910
	Total Projected Water Demand	***2,910***	***2,910***	***2,910***	***2,910***	***2,910***	***2,910***
	Currently Available Water Supplies						
	Other Local Supply	1,525	1,525	1,525	1,525	1,525	1,525
	Trinity Aquifer	1,138	1,138	1,138	1,138	1,138	1,138
	Total Supply	***2,663***	***2,663***	***2,663***	***2,663***	***2,663***	***2,663***
	Water Management Strategies						
	Purchase water from DWU	248	278	285	298	296	258
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***248***	***278***	***285***	***298***	***296***	***258***
	Total Supply Less Projected Demand	**1**	**31**	**38**	**51**	**49**	**11**
Dallas County-Other	**Projected Population**	1,474	1,143	887	687	533	412
	Projected Water Demand						
	County-Other Demand	190	146	110	81	60	47
	Total Projected Water Demand	***190***	***146***	***110***	***81***	***60***	***47***
	Currently Available Water Supplies						
	DWU Sources	14	13	12	11	10	7
	Trinity Aquifer	150	150	150	150	150	150
	Woodbine Aquifer	89	89	89	89	89	89
	Total Supply	***253***	***252***	***251***	***250***	***249***	***246***
	Water Management Strategies						
	Water Conservation - Basic Package	2	7	6	5	4	3
	Purchase water from DWU	5	9	11	13	14	13
	Supplemental wells in Other aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***7***	***16***	***17***	***18***	***18***	***16***
	Total Supply Less Projected Demand	**70**	**122**	**158**	**187**	**207**	**215**
Dallas County-Steam Electric Power	**Projected Water Demand**						
	Steam Electric Power Demand	12,264	10,842	11,918	13,230	14,829	16,778
	Total Projected Water Demand	***12,264***	***10,842***	***11,918***	***13,230***	***14,829***	***16,778***
	Currently Available Water Supplies						
	DWU sources	3,963	2,629	1,240	1,845	2,381	2,851
	Mountain Creek Lake	6,400	6,400	6,400	6,400	6,400	6,400
	NTMWD Sources	74	46	46	48	51	55
	Run-of-River Wtr Rt #2388	368	368	368	368	368	368
	Total Supply	***10,805***	***9,443***	***8,054***	***8,661***	***9,200***	***9,674***
	Water Management Strategies						
	Purchase water from NTMWD	54	55	70	68	96	112
	Purchase water from DWU	1,410	2,459	2,900	3,457	3,768	4,546
	Mountain Creek Lake Reuse	0	3,000	3,000	3,000	3,000	3,000
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***1,464***	***5,514***	***5,970***	***6,525***	***6,864***	***7,658***
	Total Supply Less Projected Demand	**5**	**4,115**	**2,106**	**1,956**	**1,235**	**554**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Dallas County WCID #6	**Projected Population**	4,728	6,434	7,447	8,453	9,765	11,513
	Projected Water Demand						
	Municipal Demand	577	771	884	994	1,149	1,354
	Total Projected Water Demand	***577***	***771***	***884***	***994***	***1,149***	***1,354***
	Currently Available Water Supplies						
	DWU Sources	424	508	534	548	556	564
	Total Supply	***424***	***508***	***534***	***548***	***556***	***564***
	Water Management Strategies						
	Water Conservation - Basic Package	10	38	47	56	69	86
	Purchase water from DWU	148	352	477	636	804	832
	Total Water Management Strategies	***158***	***390***	***524***	***692***	***873***	***918***
	Total Supply Less Projected Demand	**5**	**127**	**174**	**246**	**280**	**128**
Dalworthington Gardens	**Projected Population**	2,467	2,650	2,771	2,850	2,902	2,935
	Projected Water Demand						
	Municipal Demand	771	816	847	862	874	884
	Total Projected Water Demand	***771***	***816***	***847***	***862***	***874***	***884***
	Currently Available Water Supplies						
	Trinity Aquifer	189	189	189	189	189	189
	TRWD Sources (through Fort Worth)	625	547	486	427	368	317
	Total Supply	***814***	***736***	***675***	***616***	***557***	***506***
	Water Management Strategies						
	Water Conservation - Basic Package	21	40	49	57	65	73
	Water Conservation - Expanded Package	1	5	7	7	7	7
	Purchase water from Fort Worth (TRWD)	96	185	337	306	485	471
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***118***	***230***	***393***	***370***	***557***	***551***
	Total Supply Less Projected Demand	**161**	**150**	**221**	**124**	**240**	**173**
Danville WSC	**Projected Population**	4,570	6,315	7,860	9,444	11,101	12,865
	Projected Water Demand						
	Municipal Demand	845	1,153	1,417	1,693	1,990	2,306
	Total Projected Water Demand	***845***	***1,153***	***1,417***	***1,693***	***1,990***	***2,306***
	Currently Available Water Supplies						
	NTMWD Sources (through McKinney)	593	626	658	693	741	781
	Total Supply	***593***	***626***	***658***	***693***	***741***	***781***
	Water Management Strategies						
	Water Conservation - Basic Package	30	76	106	141	182	231
	Water Conservation - Expanded Package	1	6	10	12	14	16
	Purchase water from McKinney (NTMWD)	431	774	1,012	1,006	1,660	1,881
	Total Water Management Strategies	***462***	***856***	***1,128***	***1,159***	***1,856***	***2,128***
	Total Supply Less Projected Demand	**210**	**329**	**369**	**159**	**607**	**603**
Dawson	**Projected Population**	909	971	1,036	1,106	1,190	1,293
	Projected Water Demand						
	Municipal Demand	177	185	195	204	219	238
	Total Projected Water Demand	***177***	***185***	***195***	***204***	***219***	***238***
	Currently Available Water Supplies						
	Navarro Mills Reservoir (through Corsicana)	193	184	180	175	172	168
	Total Supply	***193***	***184***	***180***	***175***	***172***	***168***
	Water Management Strategies						
	Water Conservation - Basic Package	2	6	7	13	15	19
	Water Conservation - Expanded Package	0	0	0	0	1	1
	Purchase water from Corsicana	0	40	39	38	122	111
	Total Water Management Strategies	***2***	***46***	***46***	***51***	***138***	***131***
	Total Supply Less Projected Demand	**18**	**45**	**31**	**22**	**91**	**61**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Decatur	**Projected Population**	6,804	8,508	11,738	15,253	19,751	23,225
	Projected Water Demand						
	Municipal Demand	1,639	2,011	2,748	3,537	4,580	5,385
	Total Projected Water Demand	***1,639***	***2,011***	***2,748***	***3,537***	***4,580***	***5,385***
	Currently Available Water Supplies						
	TRWD Sources	1,754	1,753	1,754	1,754	1,754	1,754
	Total Supply	***1,754***	***1,753***	***1,754***	***1,754***	***1,754***	***1,754***
	Water Management Strategies						
	Water Conservation - Basic Package	47	102	163	240	349	455
	Water Conservation - Expanded Package	1	10	35	55	71	85
	Purchase water from TRWD	270	596	1,405	1,609	3,244	3,649
	New Water Treatment Plant						
	New WTP of 2 MGD	0	0	0	0	0	0
	Water Treatment Expansions						
	WTP Expansion of 2 MGD	0	0	0	0	0	0
	New WTP Expansion of 2 MGD	0	0	0	0	0	0
	New WTP Expansion of 2 MGD	0	0	0	0	0	0
	Total Water Management Strategies	***318***	***708***	***1,603***	***1,904***	***3,664***	***4,189***
	Total Supply Less Projected Demand	**433**	**450**	**609**	**121**	**838**	**558**
Denison	**Projected Population**	25,000	28,000	30,000	31,000	32,000	33,000
	Projected Water Demand						
	Municipal Demand	5,489	6,053	6,385	6,493	6,667	6,875
	Total Projected Water Demand	***5,489***	***6,053***	***6,385***	***6,493***	***6,667***	***6,875***
	Currently Available Water Supplies						
	Lake Randell	4,720	4,720	4,720	4,720	4,720	4,720
	Lake Texoma	1,100	1,100	1,100	1,100	1,100	1,100
	Trinity Aquifer	157	157	157	157	157	157
	Woodbine Aquifer	155	155	155	155	155	155
	Total Supply	***6,132***	***6,132***	***6,132***	***6,132***	***6,132***	***6,132***
	Water Management Strategies						
	Water Conservation - Basic Package	49	176	209	237	399	469
	Water Conservation - Expanded Package	0	0	0	0	59	181
	Additional Lake Texoma	0	351	683	773	747	800
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***49***	***527***	***892***	***1,010***	***1,205***	***1,450***
	Total Supply Less Projected Demand	**692**	**607**	**639**	**650**	**666**	**687**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Denton	**Projected Population**	145,000	199,000	250,000	295,000	363,586	498,488
	Projected Water Demand						
	Municipal Demand	29,561	39,901	49,566	58,158	71,679	98,275
	Total Projected Water Demand	***29,561***	***39,901***	***49,566***	***58,158***	***71,679***	***98,275***
	Currently Available Water Supplies						
	DWU Sources	841	1,054	1,038	1,118	1,054	941
	Indirect reuse	1,682	2,130	2,915	3,475	4,372	5,382
	Lake Lewisville	7,563	7,387	7,202	7,013	6,830	6,655
	Lake Ray Roberts	20,076	19,562	19,026	18,476	17,944	17,433
	Total Supply	***30,162***	***30,133***	***30,181***	***30,082***	***30,200***	***30,411***
	Water Management Strategies						
	Water Conservation - Basic Package	847	1,912	2,798	3,773	5,247	8,013
	Water Conservation - Expanded Package	14	278	1,151	1,673	2,047	2,719
	Purchase water from DWU	666	11,223	21,013	30,763	45,188	64,491
	New Water Treatment Plant						
	New WTP of 20 MGD	0	0	0	0	0	0
	Water Treatment Expansions						
	Ray Roberts WTP Exp. of 30 MGD	0	0	0	0	0	0
	New WTP Exp. of 30 MGD (total of 50 MGD)	0	0	0	0	0	0
	New WTP Exp. of 30 MGD (total of 80 MGD)	0	0	0	0	0	0
	New WTP Exp. of 30 MGD (total of 110 MGD)	0	0	0	0	0	0
	Total Water Management Strategies	***1,527***	***13,413***	***24,962***	***36,209***	***52,482***	***75,223***
	Total Supply Less Projected Demand	**2,128**	**3,645**	**5,577**	**8,133**	**11,003**	**7,359**
Denton County FWSD	**Projected Population**	3,092	4,952	6,701	8,501	10,328	12,240
	Projected Water Demand						
	Municipal Demand	991	1,581	2,132	2,704	3,286	3,894
	Total Projected Water Demand	***991***	***1,581***	***2,132***	***2,704***	***3,286***	***3,894***
	Currently Available Water Supplies						
	UTRWD Sources	860	810	887	1,006	1,219	1,250
	Total Supply	***860***	***810***	***887***	***1,006***	***1,219***	***1,250***
	Water Management Strategies						
	Water Conservation - Basic Package	30	81	127	184	251	330
	Water Conservation - Expanded Package	1	10	14	19	24	30
	Purchase water from UTRWD	374	1,570	1,865	2,106	2,552	3,192
	Total Water Management Strategies	***405***	***1,661***	***2,006***	***2,309***	***2,827***	***3,552***
	Total Supply Less Projected Demand	**274**	**890**	**761**	**611**	**760**	**908**
Denton County-Irrigation	**Projected Water Demand**						
	Irrigation Demand	2,108	2,108	2,108	2,108	2,108	2,108
	Total Projected Water Demand	***2,108***	***2,108***	***2,108***	***2,108***	***2,108***	***2,108***
	Currently Available Water Supplies						
	Direct reuse	2,099	2,195	2,276	2,348	2,428	2,509
	Woodbine Aquifer	590	590	590	590	590	590
	Total Supply	***2,689***	***2,785***	***2,866***	***2,938***	***3,018***	***3,099***
	Water Management Strategies						
	Purchase water from UTRWD	0	0	0	0	0	0
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**581**	**677**	**758**	**830**	**910**	**991**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Denton County-Livestock	**Projected Water Demand**						
	Livestock Demand	1,235	1,235	1,235	1,235	1,235	1,235
	Total Projected Water Demand	***1,235***	***1,235***	***1,235***	***1,235***	***1,235***	***1,235***
	Currently Available Water Supplies						
	Livestock Local Supply	935	935	935	935	935	935
	Trinity Aquifer	246	246	246	246	246	246
	Woodbine Aquifer	531	531	531	531	531	531
	Total Supply	***1,712***	***1,712***	***1,712***	***1,712***	***1,712***	***1,712***
	Water Management Strategies						
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**477**	**477**	**477**	**477**	**477**	**477**
Denton County-Manufacturing	**Projected Water Demand**						
	Manufacturing Demand	1,068	1,239	1,408	1,579	1,731	1,880
	Total Projected Water Demand	***1,068***	***1,239***	***1,408***	***1,579***	***1,731***	***1,880***
	Currently Available Water Supplies						
	DWU sources	864	833	831	839	801	701
	Lake Chapman (through UTRWD)	102	67	54	45	39	37
	Trinity Aquifer	59	59	59	59	59	59
	Total Supply	***1,025***	***959***	***944***	***943***	***899***	***797***
	Water Management Strategies						
	Water Conservation	0	2	29	44	49	53
	Purchase water from UTRWD	77	234	234	233	255	292
	Purchase water from DWU and Denton	101	376	561	750	966	1,086
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***178***	***612***	***824***	***1,027***	***1,270***	***1,431***
	Total Supply Less Projected Demand	**135**	**332**	**360**	**391**	**438**	**348**
Denton County-Mining	**Projected Water Demand**						
	Mining Demand	341	341	341	341	341	341
	Total Projected Water Demand	***341***	***341***	***341***	***341***	***341***	***341***
	Currently Available Water Supplies						
	Other Local Supply	103	103	103	103	103	103
	Trinity Aquifer	36	36	36	36	36	36
	Total Supply	***139***	***139***	***139***	***139***	***139***	***139***
	Water Management Strategies						
	New wells in Woodbine aquifer	202	202	202	202	202	202
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***202***	***202***	***202***	***202***	***202***	***202***
	Total Supply Less Projected Demand	**0**	**0**	**0**	**0**	**0**	**0**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Denton County-Other	**Projected Population**	34,643	43,946	52,910	61,209	69,294	77,612
	Projected Water Demand						
	County-Other Demand	7,218	9,008	10,727	12,341	13,971	15,649
	Total Projected Water Demand	***7,218***	***9,008***	***10,727***	***12,341***	***13,971***	***15,649***
	Currently Available Water Supplies						
	Other Aquifer	0	0	0	0	0	0
	Trinity Aquifer	1,806	1,806	1,806	1,806	1,806	1,806
	TRWD Sources (through Fort Worth)	775	785	793	783	751	715
	UTRWD Sources	5,011	3,690	3,569	3,673	4,146	4,017
	Woodbine Aquifer	200	200	200	200	200	200
	Total Supply	***7,792***	***6,481***	***6,368***	***6,462***	***6,903***	***6,738***
	Water Management Strategies						
	Water Conservation - Basic Package	94	336	439	548	668	800
	Reduce Trinity Aquifer use (reallocated to others)	-20	-20	-38	-281	-1,327	-1,092
	Purchase water from Fort Worth (TRWD)	119	267	307	319	500	539
	Purchase water from UTRWD	2,181	7,156	7,749	7,936	9,072	10,785
	Supplemental wells in Other aquifer	0	0	0	0	0	0
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***2,374***	***7,739***	***8,457***	***8,522***	***8,913***	***11,032***
	Total Supply Less Projected Demand	**2,948**	**5,212**	**4,098**	**2,643**	**1,845**	**2,121**
Denton County-Steam Electric Power	**Projected Water Demand**						
	Steam Electric Power Demand	524	418	489	575	680	808
	Total Projected Water Demand	***524***	***418***	***489***	***575***	***680***	***808***
	Currently Available Water Supplies						
	Direct Reuse	831	1,840	2,288	2,849	3,363	3,363
	Total Supply	***831***	***1,840***	***2,288***	***2,849***	***3,363***	***3,363***
	Water Management Strategies						
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**307**	**1,422**	**1,799**	**2,274**	**2,683**	**2,555**
DeSoto	**Projected Population**	47,649	57,243	65,849	73,881	82,923	85,400
	Projected Water Demand						
	Municipal Demand	10,675	12,888	14,678	16,386	18,298	18,845
	Total Projected Water Demand	***10,675***	***12,888***	***14,678***	***16,386***	***18,298***	***18,845***
	Currently Available Water Supplies						
	DWU Sources	7,829	8,474	8,856	9,021	8,837	7,837
	Trinity Aquifer	25	25	25	25	25	25
	Total Supply	***7,854***	***8,499***	***8,881***	***9,046***	***8,862***	***7,862***
	Water Management Strategies						
	Water Conservation - Basic Package	309	668	886	1,127	1,413	1,613
	Water Conservation - Expanded Package	9	57	101	127	141	151
	Purchase water from DWU	2,729	5,869	7,884	10,495	12,777	11,579
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***3,047***	***6,594***	***8,871***	***11,749***	***14,331***	***13,343***
	Total Supply Less Projected Demand	**226**	**2,205**	**3,074**	**4,409**	**4,895**	**2,360**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Double Oak	**Projected Population**	2,800	3,100	3,300	3,500	3,700	3,900
	Projected Water Demand						
	Municipal Demand	668	729	769	812	854	900
	Total Projected Water Demand	***668***	***729***	***769***	***812***	***854***	***900***
	Currently Available Water Supplies						
	Trinity Aquifer	106	106	106	106	106	106
	UTRWD Sources (through Bartonville WSC)	497	332	293	284	305	282
	Total Supply	***603***	***438***	***399***	***390***	***411***	***388***
	Water Management Strategies						
	Water Conservation - Basic Package	20	39	48	58	68	79
	Reduce Trinity Aquifer use (reallocated to others)	-11	-13	-27	-58	-74	-85
	Purchase water from Bartonville WSC (from UTRWD)	216	645	618	596	639	721
	Total Water Management Strategies	***225***	***671***	***639***	***596***	***633***	***715***
	Total Supply Less Projected Demand	**160**	**380**	**269**	**174**	**190**	**203**
Duncanville	**Projected Population**	37,100	38,069	38,988	39,862	40,692	41,480
	Projected Water Demand						
	Municipal Demand	7,937	8,230	8,254	8,305	8,432	8,596
	Total Projected Water Demand	***7,937***	***8,230***	***8,254***	***8,305***	***8,432***	***8,596***
	Currently Available Water Supplies						
	DWU Sources	5,835	5,422	4,989	4,579	4,078	3,579
	Joe Pool Lake	0	0	0	0	0	0
	Total Supply	***5,835***	***5,422***	***4,989***	***4,579***	***4,078***	***3,579***
	Water Management Strategies						
	Water Conservation - Basic Package	226	439	513	588	668	753
	Water Conservation - Expanded Package	5	29	50	55	55	57
	Purchase water from DWU	2,033	3,755	4,442	5,327	5,896	5,289
	Total Water Management Strategies	***2,264***	***4,223***	***5,005***	***5,970***	***6,619***	***6,099***
	Total Supply Less Projected Demand	**162**	**1,415**	**1,740**	**2,244**	**2,265**	**1,082**
East Cedar Creek FWSD	**Projected Population**	13,623	17,096	20,521	24,034	28,320	33,730
	Projected Water Demand						
	Municipal Demand	2,319	2,853	3,402	3,931	4,631	5,516
	Total Projected Water Demand	***2,319***	***2,853***	***3,402***	***3,931***	***4,631***	***5,516***
	Currently Available Water Supplies						
	TRWD Sources	717	737	754	763	774	783
	Total Supply	***717***	***737***	***754***	***763***	***774***	***783***
	Water Management Strategies						
	Water Conservation - Basic Package	74	178	241	313	407	531
	Water Conservation - Expanded Package	1	9	13	17	20	24
	Purchase water from TRWD	2,156	2,595	3,499	3,520	4,995	5,472
	Water Treatment Expansions						
	WTP Expansion of 4 MGD	0	0	0	0	0	0
	New WTP Expansion of 2 MGD	0	0	0	0	0	0
	New WTP Expansion of 2 MGD	0	0	0	0	0	0
	New WTP Expansion of 2 MGD	0	0	0	0	0	0
	Total Water Management Strategies	***2,231***	***2,782***	***3,753***	***3,850***	***5,422***	***6,027***
	Total Supply Less Projected Demand	**629**	**666**	**1,105**	**682**	**1,565**	**1,294**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
East Fork SUD	**Projected Population**	4,809	6,034	7,106	8,204	9,360	10,599
	Projected Water Demand						
	Municipal Demand	678	831	963	1,103	1,248	1,413
	Total Projected Water Demand	***678***	***831***	***963***	***1,103***	***1,248***	***1,413***
	Currently Available Water Supplies						
	NTMWD Sources	476	451	448	451	465	479
	Total Supply	***476***	***451***	***448***	***451***	***465***	***479***
	Water Management Strategies						
	Water Conservation - Basic Package	12	42	54	65	79	96
	Purchase water from NTMWD	346	559	688	656	1,040	1,151
	Total Water Management Strategies	***358***	***601***	***742***	***721***	***1,119***	***1,247***
	Total Supply Less Projected Demand	**156**	**221**	**227**	**69**	**336**	**313**
Ector	**Projected Population**	652	691	720	741	763	786
	Projected Water Demand						
	Municipal Demand	96	99	101	102	104	107
	Total Projected Water Demand	***96***	***99***	***101***	***102***	***104***	***107***
	Currently Available Water Supplies						
	Woodbine Aquifer	113	113	113	113	113	113
	Total Supply	***113***	***113***	***113***	***113***	***113***	***113***
	Water Management Strategies						
	Water Conservation - Basic Package	1	5	5	6	6	7
	Fannin County Water Supply Project	0	10	39	57	71	71
	Trinity Aquifer (New Wells)	10	10	10	10	10	10
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***11***	***25***	***54***	***73***	***87***	***88***
	Total Supply Less Projected Demand	**28**	**39**	**66**	**84**	**96**	**94**
Edgecliff	**Projected Population**	2,550	2,550	2,550	2,550	2,550	2,550
	Projected Water Demand						
	Municipal Demand	460	451	443	434	428	428
	Total Projected Water Demand	***460***	***451***	***443***	***434***	***428***	***428***
	Currently Available Water Supplies						
	TRWD Sources (through Fort Worth)	494	393	327	276	230	195
	Total Supply	***494***	***393***	***327***	***276***	***230***	***195***
	Water Management Strategies						
	Water Conservation - Basic Package	14	28	31	35	38	41
	Water Conservation - Expanded Package	0	2	3	4	4	4
	Purchase water from Fort Worth (TRWD)	76	134	227	197	304	290
	Total Water Management Strategies	***90***	***164***	***261***	***236***	***346***	***335***
	Total Supply Less Projected Demand	**124**	**106**	**145**	**78**	**148**	**102**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Ellis County-Irrigation	**Projected Water Demand**						
	Irrigation Demand	583	583	583	583	583	583
	Total Projected Water Demand	***583***	***583***	***583***	***583***	***583***	***583***
	Currently Available Water Supplies						
	Irrigation Local Supply	3	3	3	3	3	3
	Trinity Aquifer	17	17	17	17	17	17
	Total Supply	***20***	***20***	***20***	***20***	***20***	***20***
	Water Management Strategies						
	Water Conservation	1	15	29	37	44	51
	Additional Woodbine Aquifer (New Wells)	563	563	563	563	563	563
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Trinity/Ellis Direct Reuse	125	125	125	125	125	125
	Total Water Management Strategies	***689***	***703***	***717***	***725***	***732***	***739***
	Total Supply Less Projected Demand	**126**	**140**	**154**	**162**	**169**	**176**
Ellis County-Livestock	**Projected Water Demand**						
	Livestock Demand	1,183	1,183	1,183	1,183	1,183	1,183
	Total Projected Water Demand	***1,183***	***1,183***	***1,183***	***1,183***	***1,183***	***1,183***
	Currently Available Water Supplies						
	Livestock Local Supply	1,688	1,688	1,688	1,688	1,688	1,688
	Woodbine Aquifer	154	154	154	154	154	154
	Total Supply	***1,842***	***1,842***	***1,842***	***1,842***	***1,842***	***1,842***
	Water Management Strategies						
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Reduce Woodbine Aquifer use (reallocated to others)					-75	-75
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***-75***	***-75***
	Total Supply Less Projected Demand	**659**	**659**	**659**	**659**	**584**	**584**
Ellis County-Manufacturing	**Projected Water Demand**						
	Manufacturing Demand	3,466	3,670	3,841	3,987	4,089	3,912
	Total Projected Water Demand	***3,466***	***3,670***	***3,841***	***3,987***	***4,089***	***3,912***
	Currently Available Water Supplies						
	Lake Bardwell (through Ennis)	386	317	256	204	159	114
	Lake Waxahachie (through Waxahachie)	939	941	793	661	540	410
	Midlothian sources	1,009	1,335	1,332	1,143	979	769
	Trinity Aquifer	1,007	1,007	1,007	1,007	1,007	1,007
	Woodbine Aquifer	364	364	364	364	364	364
	Total Supply	***3,705***	***3,964***	***3,752***	***3,379***	***3,049***	***2,664***
	Water Management Strategies						
	TRA Ellis County Water Supply Project (Ennis)	0	0	0	0	0	0
	TRA Ellis County Water Supply Project (Midlothian)	100	429	1,406	1,866	2,229	2,219
	TRA/Waxahachie Indirect Reuse	31	87	282	455	605	685
	Additional Woodbine Aquifer (New Wells)	101	0	0	0	0	0
	Reduce Trinity Aquifer use (reallocated to others)	-175	-210	-225	-225	-225	-250
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***57***	***306***	***1,463***	***2,096***	***2,609***	***2,654***
	Total Supply Less Projected Demand	**296**	**600**	**1,374**	**1,488**	**1,569**	**1,406**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Ellis County-Mining	**Projected Water Demand**						
	Mining Demand	90	90	90	90	90	90
	Total Projected Water Demand	***90***	***90***	***90***	***90***	***90***	***90***
	Currently Available Water Supplies						
	Woodbine Aquifer	113	113	113	113	113	113
	Total Supply	***113***	***113***	***113***	***113***	***113***	***113***
	Water Management Strategies						
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Reduce Woodbine Aquifer use (reallocated to others)	0	0	0	-15	-15	-15
	Total Water Management Strategies	***0***	***0***	***0***	***-15***	***-15***	***-15***
	Total Supply Less Projected Demand	**23**	**23**	**23**	**8**	**8**	**8**
Ellis County-Other	**Projected Population**	10,707	10,707	10,707	10,707	10,707	10,707
	Projected Water Demand						
	County-Other Demand	2,015	2,003	1,979	1,967	1,955	1,955
	Total Projected Water Demand	***2,015***	***2,003***	***1,979***	***1,967***	***1,955***	***1,955***
	Currently Available Water Supplies						
	Lake Bardwell (through Ennis)	224	173	132	101	76	57
	Lake Waxahachie (through Waxahachie)	131	0	0	0	0	0
	Other Aquifer	0	0	0	0	0	0
	Trinity Aquifer	497	497	497	497	497	497
	Woodbine Aquifer	260	260	260	260	260	260
	Total Supply	***1,112***	***930***	***889***	***858***	***833***	***814***
	Water Management Strategies						
	Water Conservation - Basic Package	19	68	74	81	87	93
	TRA Ellis County Water Supply Project (Ennis)	0	0	0	0	0	0
	TRA Ellis County Water Supply Project (Waxahachie)	0	1,072	1,090	1,109	1,123	1,139
	Overdraft/ New Trinity Aquifer (New Wells)	201	192	170	150	131	120
	Additional Woodbine Aquifer (New Wells)	729	880	919	959	983	941
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***949***	***2,212***	***2,253***	***2,299***	***2,324***	***2,293***
	Total Supply Less Projected Demand	**46**	**1,140**	**1,164**	**1,190**	**1,201**	**1,153**
Ellis County-Steam Electric Power	**Projected Water Demand**						
	Steam Electric Power Demand	14,237	20,379	23,825	28,027	33,148	39,391
	Total Projected Water Demand	***14,237***	***20,379***	***23,825***	***28,027***	***33,148***	***39,391***
	Currently Available Water Supplies						
	Direct reuse	2,098	2,615	3,302	3,363	3,363	3,363
	Midlothian sources	204	175	114	91	74	64
	Total Supply	***2,302***	***2,789***	***3,417***	***3,454***	***3,437***	***3,427***
	Water Management Strategies						
	TRA Direct Reuse	20,000	20,000	30,000	30,000	40,000	40,000
	TRA Ellis County Water Supply Project (Midlothian)	20	49	110	133	150	160
	Total Water Management Strategies	***20,020***	***20,049***	***30,110***	***30,133***	***40,150***	***40,160***
	Total Supply Less Projected Demand	**8,085**	**2,459**	**9,702**	**5,560**	**10,439**	**4,196**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Ennis	**Projected Population**	20,539	26,290	33,655	43,081	55,148	70,596
	Projected Water Demand						
	Municipal Demand	3,497	4,358	5,504	6,949	8,834	11,308
	Total Projected Water Demand	***3,497***	***4,358***	***5,504***	***6,949***	***8,834***	***11,308***
	Currently Available Water Supplies						
	Lake Bardwell	3,888	3,762	3,668	3,556	3,426	3,297
	TRWD Sources	0	0	0	0	0	0
	Total Supply	***3,888***	***3,762***	***3,668***	***3,556***	***3,426***	***3,297***
	Water Management Strategies						
	Water Conservation - Basic Package	110	266	384	546	770	1,079
	Water Conservation - Expanded Package	28	91	183	262	337	436
	Ennis Indirect Reuse	0	70	135	1,037	2,269	3,696
	TRA Ellis County Water Supply Project (Ennis)	2,101	2,356	3,596	5,153	5,306	5,537
	Water Treatment Expansions						
	WTP Expansion of 6 MGD	0	0	0	0	0	0
	WTP Expansion of 8 MGD	0	0	0	0	0	0
	Total Water Management Strategies	***2,239***	***2,783***	***4,298***	***6,998***	***8,682***	***10,748***
	Total Supply Less Projected Demand	**2,630**	**2,187**	**2,462**	**3,605**	**3,274**	**2,737**
Euless	**Projected Population**	53,446	60,416	63,854	65,550	66,386	66,798
	Projected Water Demand						
	Municipal Demand	9,698	10,760	11,158	11,308	11,377	11,448
	Total Projected Water Demand	***9,698***	***10,760***	***11,158***	***11,308***	***11,377***	***11,448***
	Currently Available Water Supplies						
	Trinity Aquifer	931	931	931	931	931	931
	TRWD Sources (through TRA)	8,743	8,569	7,559	6,588	5,617	4,802
	Total Supply	***9,674***	***9,500***	***8,490***	***7,519***	***6,548***	***5,733***
	Water Management Strategies						
	Water Conservation - Basic Package	272	539	655	761	862	963
	Water Conservation - Expanded Package	82	236	323	346	349	351
	Purchase water from TRA (from TRWD)	1,444	2,910	5,229	4,720	7,397	7,126
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***1,798***	***3,685***	***6,207***	***5,827***	***8,608***	***8,440***
	Total Supply Less Projected Demand	**1,774**	**2,425**	**3,539**	**2,038**	**3,779**	**2,725**
Eustace	**Projected Population**	881	971	1,060	1,151	1,262	1,402
	Projected Water Demand						
	Municipal Demand	149	161	172	183	199	221
	Total Projected Water Demand	***149***	***161***	***172***	***183***	***199***	***221***
	Currently Available Water Supplies						
	Carrizo-Wilcox Aquifer	153	153	153	153	153	153
	Total Supply	***153***	***153***	***153***	***153***	***153***	***153***
	Water Management Strategies						
	Water Conservation - Basic Package	5	11	13	16	19	23
	Water Conservation - Expanded Package	1	2	4	4	4	4
	New well in Carrizo-Wilcox Aquifer	72	72	72	72	72	72
	Supplemental wells in Carrizo-Wilcox aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***78***	***85***	***89***	***92***	***95***	***99***
	Total Supply Less Projected Demand	**82**	**77**	**70**	**62**	**49**	**31**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Everman	**Projected Population**	6,500	7,100	7,700	8,300	8,900	9,000
	Projected Water Demand						
	Municipal Demand	808	859	906	948	1,007	1,018
	Total Projected Water Demand	***808***	***859***	***906***	***948***	***1,007***	***1,018***
	Currently Available Water Supplies						
	Trinity Aquifer	412	412	412	412	412	412
	TRWD Sources (through Fort Worth)	425	390	365	340	320	277
	Total Supply	***837***	***802***	***777***	***752***	***732***	***689***
	Water Management Strategies						
	Water Conservation - Basic Package	11	41	47	53	60	65
	Purchase water from Fort Worth (TRWD)	66	132	253	244	420	410
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***77***	***173***	***300***	***297***	***480***	***475***
	Total Supply Less Projected Demand	**106**	**116**	**171**	**101**	**205**	**146**
Fairfield	**Projected Population**	5,000	5,500	6,000	6,500	7,000	7,500
	Projected Water Demand						
	Municipal Demand	1,120	1,208	1,297	1,383	1,482	1,588
	Total Projected Water Demand	***1,120***	***1,208***	***1,297***	***1,383***	***1,482***	***1,588***
	Currently Available Water Supplies						
	Carrizo-Wilcox Aquifer	893	893	893	893	893	893
	Total Supply	***893***	***893***	***893***	***893***	***893***	***893***
	Water Management Strategies						
	Water Conservation - Basic Package	34	65	81	98	118	139
	Purchase water from TRWD	1	3	509	537	739	793
	New well in Carrizo-Wilcox Aquifer	282	282	282	282	282	282
	Supplemental wells in Carrizo-Wilcox aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***317***	***350***	***872***	***917***	***1,139***	***1,214***
	Total Supply Less Projected Demand	**90**	**35**	**468**	**427**	**550**	**519**
Fairview	**Projected Population**	4,615	6,196	8,000	12,000	20,000	35,000
	Projected Water Demand						
	Municipal Demand	1,721	2,290	2,948	4,395	7,326	12,820
	Total Projected Water Demand	***1,721***	***2,290***	***2,948***	***4,395***	***7,326***	***12,820***
	Currently Available Water Supplies						
	NTMWD Sources	1,207	1,243	1,369	1,800	2,727	4,341
	Total Supply	***1,207***	***1,243***	***1,369***	***1,800***	***2,727***	***4,341***
	Water Management Strategies						
	Water Conservation - Basic Package	48	105	160	275	520	1,017
	Water Conservation - Expanded Package	2	26	54	83	140	249
	Purchase water from NTMWD	878	1,537	2,107	2,612	6,111	10,457
	Total Water Management Strategies	***928***	***1,668***	***2,321***	***2,970***	***6,771***	***11,723***
	Total Supply Less Projected Demand	**414**	**621**	**742**	**375**	**2,172**	**3,244**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Fannin County-Irrigation	**Projected Water Demand**						
	Irrigation Demand	4,608	4,608	4,608	4,608	4,608	4,608
	Total Projected Water Demand	***4,608***	***4,608***	***4,608***	***4,608***	***4,608***	***4,608***
	Currently Available Water Supplies						
	Irrigation Local Supply - Red River	14,758	14,758	14,758	14,758	14,758	14,758
	Other Aquifer	2,620	2,620	2,620	2,620	2,620	2,620
	Total Supply	***17,378***	***17,378***	***17,378***	***17,378***	***17,378***	***17,378***
	Water Management Strategies						
	Supplemental Wells in Other Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**12,770**	**12,770**	**12,770**	**12,770**	**12,770**	**12,770**
Fannin County-Livestock	**Projected Water Demand**						
	Livestock Demand	1,270	1,270	1,270	1,270	1,270	1,270
	Total Projected Water Demand	***1,270***	***1,270***	***1,270***	***1,270***	***1,270***	***1,270***
	Currently Available Water Supplies						
	Livestock Local Supply	1,583	1,583	1,583	1,583	1,583	1,583
	Trinity Aquifer	24	24	24	24	24	24
	Woodbine Aquifer	131	131	131	130	131	130
	Total Supply	***1,738***	***1,738***	***1,738***	***1,737***	***1,738***	***1,737***
	Water Management Strategies						
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**468**	**468**	**468**	**467**	**468**	**467**
Fannin County-Manufacturing	**Projected Water Demand**						
	Manufacturing Demand	73	82	90	98	105	114
	Total Projected Water Demand	***73***	***82***	***90***	***98***	***105***	***114***
	Currently Available Water Supplies						
	Lake Bonham	73	82	90	98	105	114
	Woodbine Aquifer	0	0	0	0	0	0
	Total Supply	***73***	***82***	***90***	***98***	***105***	***114***
	Water Management Strategies						
	Additional Lake Bonham	0	8	9	10	11	0
	Fannin County Water Supply Project	0	0	0	0	0	11
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***0***	***8***	***9***	***10***	***11***	***11***
	Total Supply Less Projected Demand	**0**	**8**	**9**	**10**	**11**	**11**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Fannin County-Mining	**Projected Water Demand**						
	Mining Demand	12	12	12	12	12	12
	Total Projected Water Demand	***12***	***12***	***12***	***12***	***12***	***12***
	Currently Available Water Supplies						
	Other Local Supply	72	72	72	72	72	72
	Total Supply	***72***	***72***	***72***	***72***	***72***	***72***
	Water Management Strategies						
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**60**	**60**	**60**	**60**	**60**	**60**
Fannin County-Other	**Projected Population**	11,610	11,568	11,391	11,091	10,735	10,322
	Projected Water Demand						
	County-Other Demand	1,496	1,452	1,390	1,317	1,251	1,202
	Total Projected Water Demand	***1,496***	***1,452***	***1,390***	***1,317***	***1,251***	***1,202***
	Currently Available Water Supplies						
	Lake Bonham	75	73	70	66	63	60
	Run-of-river - Red River	20	20	20	20	20	20
	Run-of-river - Sulphur River	49	49	49	49	49	49
	Trinity Aquifer	353	353	353	353	353	353
	Woodbine Aquifer	845	845	845	845	845	845
	Total Supply	***1,342***	***1,340***	***1,337***	***1,333***	***1,330***	***1,327***
	Water Management Strategies						
	Water Conservation - Basic Package	18	68	73	74	75	76
	Additional Lake Bonham	238	231	222	210	199	0
	Fannin County Water Supply Project	0	24	24	24	24	192
	Additional Woodbine Aquifer (New Wells)	215	190	180	155	145	120
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***471***	***513***	***499***	***463***	***443***	***388***
	Total Supply Less Projected Demand	**317**	**401**	**446**	**479**	**522**	**513**
Fannin County-Steam Electric Power	**Projected Water Demand**						
	Steam Electric Power Demand	5,152	4,748	5,184	5,717	6,366	7,157
	Total Projected Water Demand	***5,152***	***4,748***	***5,184***	***5,717***	***6,366***	***7,157***
	Currently Available Water Supplies						
	Lake Texoma	10,000	10,000	10,000	10,000	10,000	10,000
	Woodbine Aquifer	629	629	629	629	629	629
	Total Supply	***10,629***	***10,629***	***10,629***	***10,629***	***10,629***	***10,629***
	Water Management Strategies						
	Reduce Woodbine Aquifer use (reallocated to others)	-120	-100	-100	-100	-100	-100
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***-120***	***-100***	***-100***	***-100***	***-100***	***-100***
	Total Supply Less Projected Demand	**5,357**	**5,781**	**5,345**	**4,812**	**4,163**	**3,372**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Farmers Branch	**Projected Population**	30,470	33,161	35,608	37,833	39,855	41,693
	Projected Water Demand						
	Municipal Demand	11,229	12,109	12,883	13,603	14,286	14,945
	Total Projected Water Demand	***11,229***	***12,109***	***12,883***	***13,603***	***14,286***	***14,945***
	Currently Available Water Supplies						
	DWU Sources	8,255	7,977	7,786	7,501	6,909	6,223
	Total Supply	***8,255***	***7,977***	***7,786***	***7,501***	***6,909***	***6,223***
	Water Management Strategies						
	Water Conservation - Basic Package	295	525	667	819	980	1,149
	Water Conservation - Expanded Package	5	61	254	352	375	397
	Purchase water from DWU	2,877	5,524	6,932	8,726	9,989	9,196
	Total Water Management Strategies	***3,177***	***6,110***	***7,853***	***9,897***	***11,344***	***10,742***
	Total Supply Less Projected Demand	**203**	**1,978**	**2,756**	**3,795**	**3,967**	**2,020**
Farmersville	**Projected Population**	3,683	7,000	10,000	15,000	22,000	30,000
	Projected Water Demand						
	Municipal Demand	565	1,035	1,445	2,151	3,154	4,301
	Total Projected Water Demand	***565***	***1,035***	***1,445***	***2,151***	***3,154***	***4,301***
	Currently Available Water Supplies						
	NTMWD Sources	396	562	671	881	1,174	1,456
	Total Supply	***396***	***562***	***671***	***881***	***1,174***	***1,456***
	Water Management Strategies						
	Water Conservation - Basic Package	6	38	59	96	151	221
	Purchase water from NTMWD	289	695	1,033	1,278	2,630	3,508
	Total Water Management Strategies	***295***	***733***	***1,092***	***1,374***	***2,781***	***3,729***
	Total Supply Less Projected Demand	**126**	**260**	**318**	**104**	**801**	**884**
Ferris	**Projected Population**	2,175	2,175	2,175	2,175	2,175	2,175
	Projected Water Demand						
	Municipal Demand	331	324	317	309	305	305
	Total Projected Water Demand	***331***	***324***	***317***	***309***	***305***	***305***
	Currently Available Water Supplies						
	Lake Waxahachie	39	0	0	0	0	0
	Midlothian sources	15	0	0	0	0	0
	Woodbine Aquifer	327	327	327	327	327	327
	Total Supply	***381***	***327***	***327***	***327***	***327***	***327***
	Water Management Strategies						
	Water Conservation - Basic Package	3	12	13	14	15	16
	Rockett SUD-Waxahachie-Red Oak Project	0	79	42	34	29	29
	TRA Ellis County Water Supply Project (Waxahachie)	0	30	30	30	30	30
	Reduced Woodbine Aquifer use (reallocated to others)	0	0	0	-10	-10	-10
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***3***	***121***	***85***	***68***	***64***	***65***
	Total Supply Less Projected Demand	**53**	**124**	**95**	**86**	**86**	**87**
Files Valley WSC	**Projected Population**	688	751	813	876	947	1,025
	Projected Water Demand						
(Region C only)	Municipal Demand	143	153	163	173	186	201
	Total Projected Water Demand	***143***	***153***	***163***	***173***	***186***	***201***
	Currently Available Water Supplies						
	Lake Aquilla	143	153	163	173	186	201
	Trinity Aquifer	0	0	0	0	0	0
	Total Supply	***143***	***153***	***163***	***173***	***186***	***201***
	Water Management Strategies						
	Water Conservation - Basic Package	1	5	6	7	8	9
	Total Water Management Strategies	***1***	***5***	***6***	***7***	***8***	***9***
	Total Supply Less Projected Demand	**1**	**5**	**6**	**7**	**8**	**9**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Flo Community WSC	**Projected Population**	252	263	269	271	271	271
	Projected Water Demand						
(Region C only)	Municipal Demand	20	20	20	20	19	19
	Total Projected Water Demand	***20***	***20***	***20***	***20***	***19***	***19***
	Currently Available Water Supplies						
	Carrizo-Wilcox Aquifer	25	25	25	25	25	25
	Total Supply	***25***	***25***	***25***	***25***	***25***	***25***
	Water Management Strategies						
	Water Conservation - Basic Package	0	2	2	2	2	2
	Supplemental wells in Carrizo-Wilcox aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***0***	***2***	***2***	***2***	***2***	***2***
	Total Supply Less Projected Demand	**5**	**7**	**7**	**7**	**8**	**8**
Flower Mound	**Projected Population**	64,000	85,000	100,000	115,000	124,000	130,089
	Projected Water Demand						
	Municipal Demand	16,919	22,280	25,987	29,757	32,085	33,661
	Total Projected Water Demand	***16,919***	***22,280***	***25,987***	***29,757***	***32,085***	***33,661***
	Currently Available Water Supplies						
	DWU Sources	9,065	8,123	7,453	6,799	5,964	5,135
	UTRWD Sources	3,981	5,094	5,679	6,482	7,328	6,845
	Total Supply	***13,046***	***13,217***	***13,132***	***13,281***	***13,292***	***11,980***
	Water Management Strategies						
	Water Conservation - Basic Package	490	1,159	1,573	2,051	2,479	2,882
	Water Conservation - Expanded Package	143	442	616	754	821	867
	Purchase water from DWU	3,159	5,626	6,635	7,910	8,623	7,587
	Purchase water from UTRWD	1,732	9,882	11,946	13,579	15,347	17,388
	Total Water Management Strategies	***5,524***	***17,109***	***20,770***	***24,294***	***27,270***	***28,724***
	Total Supply Less Projected Demand	**1,651**	**8,046**	**7,915**	**7,818**	**8,477**	**7,043**
Forest Hill	**Projected Population**	14,339	15,641	16,980	18,392	20,000	21,000
	Projected Water Demand						
	Municipal Demand	1,783	1,892	1,997	2,122	2,285	2,399
	Total Projected Water Demand	***1,783***	***1,892***	***1,997***	***2,122***	***2,285***	***2,399***
	Currently Available Water Supplies						
	TRWD Sources (through Fort Worth)	1,915	1,650	1,476	1,347	1,229	1,095
	Total Supply	***1,915***	***1,650***	***1,476***	***1,347***	***1,229***	***1,095***
	Water Management Strategies						
	Water Conservation - Basic Package	23	84	98	113	130	144
	Purchase water from Fort Worth (from TRWD)	294	561	1,021	965	1,618	1,625
	Total Water Management Strategies	***317***	***645***	***1,119***	***1,078***	***1,748***	***1,769***
	Total Supply Less Projected Demand	**449**	**403**	**598**	**303**	**692**	**465**
Forney	**Projected Population**	12,000	24,000	30,000	35,000	39,000	42,803
	Projected Water Demand						
	Municipal Demand	1,936	4,033	4,973	5,763	6,422	7,048
	Total Projected Water Demand	***1,936***	***4,033***	***4,973***	***5,763***	***6,422***	***7,048***
	Currently Available Water Supplies						
	NTMWD Sources	1,358	2,189	2,309	2,361	2,390	2,386
	Total Supply	***1,358***	***2,189***	***2,309***	***2,361***	***2,390***	***2,386***
	Water Management Strategies						
	Water Conservation - Basic Package	67	249	350	455	561	674
	Water Conservation - Expanded Package	2	17	38	52	59	65
	Purchase water from NTMWD	988	2,709	3,554	3,423	5,356	5,750
	Total Water Management Strategies	***1,057***	***2,975***	***3,942***	***3,930***	***5,976***	***6,489***
	Total Supply Less Projected Demand	**479**	**1,131**	**1,278**	**528**	**1,944**	**1,827**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Forney Lake WSC	**Projected Population**	18,200	22,000	23,000	24,000	25,000	26,000
	Projected Water Demand						
	Municipal Demand	3,975	4,732	4,896	5,054	5,236	5,446
	Total Projected Water Demand	***3,975***	***4,732***	***4,896***	***5,054***	***5,236***	***5,446***
	Currently Available Water Supplies						
	NTMWD Sources	2,789	2,568	2,274	2,070	1,948	1,844
	Total Supply	***2,789***	***2,568***	***2,274***	***2,070***	***1,948***	***1,844***
	Water Management Strategies						
	Water Conservation - Basic Package	134	260	312	366	422	484
	Water Conservation - Expanded Package	4	26	30	32	34	36
	Purchase water from NTMWD	2,028	3,180	3,500	3,006	4,370	4,444
	Total Water Management Strategies	***2,166***	***3,466***	***3,842***	***3,404***	***4,826***	***4,964***
	Total Supply Less Projected Demand	**980**	**1,302**	**1,220**	**420**	**1,538**	**1,362**
Fort Worth	**Projected Population**	632,940	786,306	953,237	1,168,901	1,477,264	1,848,759
	Projected Water Demand						
	Municipal Demand	149,596	182,321	218,891	265,795	334,259	418,317
	Total Projected Water Demand	***149,596***	***182,321***	***218,891***	***265,795***	***334,259***	***418,317***
	Currently Available Water Supplies						
	TRWD Sources	160,673	158,946	161,774	168,732	179,717	190,982
	Total Supply	***160,673***	***158,946***	***161,774***	***168,732***	***179,717***	***190,982***
	Water Management Strategies						
	Water Conservation - Basic Package	4,193	9,047	12,724	17,713	25,091	34,887
	Water Conservation - Expanded Package	77	624	2,555	3,914	4,835	6,054
	Purchase water from TRWD	24,570	53,896	111,793	120,073	235,025	281,370
	New Water Treatment Plant						
	New Northwest WTP 35 MGD	0	0	0	0	0	0
	New Southwest WTP 25 MGD	0	0	0	0	0	0
	Water Treatment Expansions						
	Eagle Mountain WTP Exp. of 35 MGD	0	0	0	0	0	0
	Rolling Hills WTP Exp. of 40 MGD	0	0	0	0	0	0
	Holly WTP Exp. of 40 MGD (total of 200 MGD)	0	0	0	0	0	0
	Eagle Mountain WTP Exp. of 35 MGD	0	0	0	0	0	0
	Rolling Hills WTP Exp. of 50 MGD	0	0	0	0	0	0
	New Northwest WTP Exp. of 35 MGD	0	0	0	0	0	0
	Eagle Mountain WTP Exp. of 70 MGD	0	0	0	0	0	0
	New Northwest WTP Exp. of 35 MGD	0	0	0	0	0	0
	New Southwest WTP Exp. of 25 MGD	0	0	0	0	0	0
	New Northwest WTP Exp. of 70 MGD	0	0	0	0	0	0
	New Southwest WTP Exp. of 50 MGD	0	0	0	0	0	0
	Total Water Management Strategies	***28,840***	***63,567***	***127,072***	***141,700***	***264,951***	***322,311***
	Total Supply Less Projected Demand	**39,910**	**39,819**	**69,515**	**44,778**	**111,252**	**95,950**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Freestone County-Irrigation	**Projected Water Demand**						
	Irrigation Demand	8	8	8	8	8	8
	Total Projected Water Demand	***8***	***8***	***8***	***8***	***8***	***8***
	Currently Available Water Supplies						
	Carrizo-Wilcox Aquifer	2	2	2	2	2	2
	Carrizo-Wilcox Aquifer	19	19	19	19	19	19
	Irrigation Local Supply	87	87	87	87	87	87
	Total Supply	***108***	***108***	***108***	***108***	***108***	***108***
	Water Management Strategies						
	Supplemental wells in Carrizo-Wilcox aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**100**	**100**	**100**	**100**	**100**	**100**
Freestone County-Livestock	**Projected Water Demand**						
	Livestock Demand	1,528	1,528	1,528	1,528	1,528	1,528
	Total Projected Water Demand	***1,528***	***1,528***	***1,528***	***1,528***	***1,528***	***1,528***
	Currently Available Water Supplies						
	Carrizo-Wilcox Aquifer	669	669	669	669	669	669
	Livestock Local Supply	1,043	1,043	1,043	1,043	1,043	1,043
	Other Aquifer	50	50	50	50	50	50
	Queen City Aquifer	40	40	40	40	40	40
	Total Supply	***1,802***	***1,802***	***1,802***	***1,802***	***1,802***	***1,802***
	Water Management Strategies						
	Supplemental wells in Carrizo-Wilcox & Queen City aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**274**	**274**	**274**	**274**	**274**	**274**
Freestone County-Manufacturing	**Projected Water Demand**						
	Manufacturing Demand	0	0	0	0	0	0
	Total Projected Water Demand	***0***	***0***	***0***	***0***	***0***	***0***
	Currently Available Water Supplies						
	Total Supply	***0***	***0***	***0***	***0***	***0***	***0***
	Water Management Strategies						
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**0**	**0**	**0**	**0**	**0**	**0**
Freestone County-Mining	**Projected Water Demand**						
	Mining Demand	116	126	132	138	144	149
	Total Projected Water Demand	***116***	***126***	***132***	***138***	***144***	***149***
	Currently Available Water Supplies						
	Carrizo-Wilcox Aquifer	38	38	38	38	38	38
	Other Local Supply	120	120	120	120	120	120
	Total Supply	***158***	***158***	***158***	***158***	***158***	***158***
	Water Management Strategies						
	Supplemental wells in Carrizo-Wilcox aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**42**	**32**	**26**	**20**	**14**	**9**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Freestone County-Other	**Projected Population**	9,019	9,425	9,637	9,698	9,698	9,698
	Projected Water Demand						
	County-Other Demand	1,251	1,271	1,265	1,240	1,229	1,229
	Total Projected Water Demand	***1,251***	***1,271***	***1,265***	***1,240***	***1,229***	***1,229***
	Currently Available Water Supplies						
	Carrizo-Wilcox Aquifer	1,649	1,649	1,649	1,649	1,649	1,649
	Run-of-River local supply	41	41	41	41	41	41
	TRWD Sources	394	323	273	230	193	164
	Total Supply	***2,084***	***2,013***	***1,963***	***1,920***	***1,883***	***1,854***
	Water Management Strategies						
	Water Conservation - Basic Package	16	58	63	67	71	75
	Purchase water from TRWD	60	110	188	165	254	244
	Purchase water from Corsicana	194	225	208	189	241	211
	Supplemental wells in Carrizo-Wilcox aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***270***	***393***	***459***	***421***	***566***	***530***
	Total Supply Less Projected Demand	**1,103**	**1,135**	**1,157**	**1,101**	**1,220**	**1,155**
Freestone County-Steam Electric Power	**Projected Water Demand**						
	Steam Electric Power Demand	18,210	20,524	23,999	28,234	33,398	39,692
	Total Projected Water Demand	***18,210***	***20,524***	***23,999***	***28,234***	***33,398***	***39,692***
	Currently Available Water Supplies						
	Carrizo-Wilcox Aquifer	115	115	115	115	115	115
	Lake Fairfield	1,567	1,433	1,300	1,167	1,033	900
	Lake Livingston (TXU-Fairfield)	20,000	20,000	20,000	20,000	20,000	20,000
	TRWD Sources	5,602	5,602	4,971	4,270	3,617	3,071
	Total Supply	***27,284***	***27,150***	***26,386***	***25,552***	***24,765***	***24,086***
	Water Management Strategies						
	Purchase water from TRWD	1,606	1,991	3,438	3,059	4,762	4,557
	Purchase water from TRWD (above existing contract)	0	0	0	1,090	1,246	1,133
	TRA Direct Reuse	0	0	10,000	10,000	20,000	20,000
	Total Water Management Strategies	***1,606***	***1,991***	***13,438***	***14,149***	***26,008***	***25,690***
	Total Supply Less Projected Demand	**10,680**	**8,617**	**15,825**	**11,467**	**17,375**	**10,084**
Frisco	**Projected Population**	137,115	200,000	244,000	269,000	290,000	300,000
	Projected Water Demand						
	Municipal Demand	45,615	66,088	80,628	88,889	95,829	99,133
	Total Projected Water Demand	***45,615***	***66,088***	***80,628***	***88,889***	***95,829***	***99,133***
	Currently Available Water Supplies						
	NTMWD Sources	32,004	35,870	37,444	36,409	35,668	33,566
	Trinity Aquifer	61	61	61	61	61	61
	Total Supply	***32,065***	***35,931***	***37,505***	***36,470***	***35,729***	***33,627***
	Water Management Strategies						
	Water Conservation - Basic Package	2,009	5,993	7,983	9,542	11,086	12,294
	Water Conservation - Expanded Package	391	1,762	2,759	3,077	3,321	3,443
	Purchase water from NTMWD	23,634	45,532	60,269	55,329	84,650	84,769
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***26,034***	***53,287***	***71,011***	***67,948***	***99,057***	***100,506***
	Total Supply Less Projected Demand	**12,484**	**23,130**	**27,888**	**15,529**	**38,957**	**35,000**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Frost	**Projected Population**	694	744	796	852	919	1,002
	Projected Water Demand						
	Municipal Demand	87	91	95	98	105	114
	Total Projected Water Demand	***87***	***91***	***95***	***98***	***105***	***114***
	Currently Available Water Supplies						
	Navarro Mills Reservoir (through Corsicana)	95	91	88	84	82	80
	Woodbine Aquifer	0	0	0	0	0	0
	Total Supply	***95***	***91***	***88***	***84***	***82***	***80***
	Water Management Strategies						
	Water Conservation - Basic Package	1	5	5	6	7	8
	Purchase water from Corsicana	0	19	19	19	58	53
	Supplemental wells in Woodbine aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***1***	***24***	***24***	***25***	***65***	***61***
	Total Supply Less Projected Demand	**9**	**24**	**17**	**11**	**42**	**27**
Gainesville	**Projected Population**	18,601	20,251	22,500	24,500	26,500	29,000
	Projected Water Demand						
	Municipal Demand	3,750	3,992	4,385	4,693	5,046	5,522
	Total Projected Water Demand	***3,750***	***3,992***	***4,385***	***4,693***	***5,046***	***5,522***
	Currently Available Water Supplies						
	Hubert H. Moss Lake	1,121	1,121	1,121	1,121	1,121	1,121
	Trinity Aquifer	2,066	1,555	1,066	1,059	1,055	1,051
	Total Supply	***3,187***	***2,676***	***2,187***	***2,180***	***2,176***	***2,172***
	Water Management Strategies						
	Water Conservation - Basic Package	111	222	282	342	411	496
	Water Conservation - Expanded Package	3	14	18	19	20	22
	Bed and Banks Authorization (Indirect Reuse)	0	0	0	0	0	0
	Bed and Banks Authorization (Moss Lake)	0	0	0	0	0	0
	Cooke County Water Supply Project	0	242	1,100	1,540	1,705	1,569
	Divert Water from Red River to Moss Lake	0	0	0	0	0	1,121
	Expand Gainesville WTP capacity	483	470	450	428	408	383
	Indirect Reuse Moss Lake	0	561	561	561	561	561
	Water Treatment Expansions						
	WTP Expansion of 2 MGD	0	0	0	0	0	0
	WTP Expansion of 4 MGD	0	0	0	0	0	0
	WTP Expansion of 3 MGD	0	0	0	0	0	0
	WTP Expansion of 1 MGD	0	0	0	0	0	0
	Supplemental Wells						
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***597***	***1,509***	***2,411***	***2,890***	***3,105***	***4,152***
	Total Supply Less Projected Demand	**34**	**193**	**213**	**377**	**235**	**802**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Garland	**Projected Population**	235,020	255,000	272,000	287,000	300,000	300,000
	Projected Water Demand						
	Municipal Demand	42,911	45,702	48,139	50,151	52,087	52,087
	Total Projected Water Demand	***42,911***	***45,702***	***48,139***	***50,151***	***52,087***	***52,087***
	Currently Available Water Supplies						
	NTMWD Sources	30,106	24,806	22,356	20,542	19,387	17,636
	Total Supply	***30,106***	***24,806***	***22,356***	***20,542***	***19,387***	***17,636***
	Water Management Strategies						
	Water Conservation - Basic Package	1,251	2,533	3,083	3,646	4,229	4,663
	Water Conservation - Expanded Package	352	971	1,529	1,774	1,852	1,871
	Purchase water from NTMWD	21,893	30,686	34,403	29,787	43,451	42,491
	Total Water Management Strategies	***23,496***	***34,190***	***39,015***	***35,207***	***49,532***	***49,025***
	Total Supply Less Projected Demand	**10,691**	**13,294**	**13,232**	**5,598**	**16,832**	**14,574**
Gastonia-Scurry	**Projected Population**	8,000	10,000	11,648	14,122	17,186	20,986
	Projected Water Demand						
	Municipal Demand	842	1,199	1,370	1,629	1,983	2,421
	Total Projected Water Demand	***842***	***1,199***	***1,370***	***1,629***	***1,983***	***2,421***
	Currently Available Water Supplies						
	NTMWD Sources	591	651	636	667	738	820
	Total Supply	***591***	***651***	***636***	***667***	***738***	***820***
	Water Management Strategies						
	Water Conservation - Basic Package	16	59	73	93	120	155
	Purchase water from NTMWD	429	805	980	967	1,654	1,975
	Total Water Management Strategies	***445***	***864***	***1,053***	***1,060***	***1,774***	***2,130***
	Total Supply Less Projected Demand	**194**	**316**	**319**	**98**	**529**	**529**
Glenn Heights	**Projected Population**	9,992	12,557	14,992	17,339	19,702	22,087
	Projected Water Demand						
	Municipal Demand	1,231	1,519	1,780	2,039	2,295	2,573
	Total Projected Water Demand	***1,231***	***1,519***	***1,780***	***2,039***	***2,295***	***2,573***
	Currently Available Water Supplies						
	DWU Sources	737	850	938	998	999	976
	Trinity Aquifer	229	229	229	229	229	229
	Total Supply	***966***	***1,079***	***1,167***	***1,227***	***1,228***	***1,205***
	Water Management Strategies						
	Water Conservation - Basic Package	20	77	98	120	143	169
	Purchase water from DWU	256	590	835	1,160	1,444	1,442
	Supplemental wells in Woodbine aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***276***	***667***	***933***	***1,280***	***1,587***	***1,611***
	Total Supply Less Projected Demand	**11**	**227**	**320**	**468**	**520**	**243**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Grand Prairie	**Projected Population**	175,987	212,932	250,345	294,137	343,148	393,743
	Projected Water Demand						
	Municipal Demand	29,176	34,585	40,101	46,785	54,197	62,188
	Total Projected Water Demand	***29,176***	***34,585***	***40,101***	***46,785***	***54,197***	***62,188***
	Currently Available Water Supplies						
	DWU Sources	18,600	19,492	21,216	23,040	23,794	23,815
	Trinity Aquifer	1,637	1,637	1,637	1,637	1,637	1,637
	TRWD Sources (through Fort Worth)	1,203	976	828	711	602	511
	Total Supply	***21,440***	***22,105***	***23,681***	***25,388***	***26,033***	***25,963***
	Water Management Strategies						
	Water Conservation - Basic Package	899	1,994	2,661	3,502	4,519	5,705
	Water Conservation - Expanded Package	21	207	434	538	641	750
	Purchase water from DWU	6,482	13,498	18,888	26,804	34,400	35,182
	TRA Ellis County Water Supply Project (Midlothian)	1,120	2,241	2,241	2,241	2,241	2,241
	Purchase water from Fort Worth (from TRWD)	183	331	572	510	793	759
	Purchase water from Mansfield (from TRWD)	1,388	2,617	2,802	2,442	2,792	2,541
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***10,093***	***20,888***	***27,598***	***36,037***	***45,386***	***47,178***
	Total Supply Less Projected Demand	**2,357**	**8,408**	**11,178**	**14,640**	**17,222**	**10,953**
Grapevine	**Projected Population**	51,352	58,023	62,812	66,250	68,718	70,490
	Projected Water Demand						
	Municipal Demand	13,518	15,729	16,886	17,662	18,243	18,713
	Total Projected Water Demand	***13,518***	***15,729***	***16,886***	***17,662***	***18,243***	***18,713***
	Currently Available Water Supplies						
	DWU Sources	1,470	1,315	1,203	1,100	967	832
	Indirect reuse (Lake Grapevine)	1,824	2,033	2,180	2,278	2,352	2,412
	Lake Grapevine	1,833	1,767	1,700	1,633	1,567	1,500
	TRWD Sources (through TRA)	6,894	6,894	6,894	6,894	6,667	5,872
	Total Supply	***12,021***	***12,009***	***11,977***	***11,905***	***11,553***	***10,616***
	Water Management Strategies						
	Water Conservation - Basic Package	375	747	944	1,137	1,328	1,518
	Water Conservation - Expanded Package	112	343	520	598	622	640
	Purchase water from TRA (from TRWD)	5,593	4,114	6,778	6,671	10,179	9,944
	Total Water Management Strategies	***6,080***	***5,204***	***8,242***	***8,406***	***12,129***	***12,102***
	Total Supply Less Projected Demand	**4,583**	**1,484**	**3,333**	**2,649**	**5,439**	**4,005**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Grayson County-Irrigation	**Projected Water Demand**						
	Irrigation Demand	3,561	3,751	3,950	4,158	4,381	4,616
	Total Projected Water Demand	***3,561***	***3,751***	***3,950***	***4,158***	***4,381***	***4,616***
	Currently Available Water Supplies						
	Irrigation Local Supply	2,394	2,394	2,394	2,394	2,394	2,394
	Lake Texoma	150	150	150	150	150	150
	Woodbine Aquifer	3,939	3,939	3,939	3,939	3,939	3,939
	Total Supply	***6,483***	***6,483***	***6,483***	***6,483***	***6,483***	***6,483***
	Water Management Strategies						
	Reduced Woodbine Aquifer use - Trinity Basin (reallocated to others)	-698	-531	-355	-172	0	0
	Reduced Woodbine Aquifer use - Red Basin (reallocated to others)	0	-19	-33	-43	-52	-60
	Additional Woodbine Aquifer - Trinity Basin (New Wells)	0	0	0	0	25	232
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***-698***	***-550***	***-388***	***-215***	***-27***	***172***
	Total Supply Less Projected Demand	**2,224**	**2,182**	**2,145**	**2,110**	**2,075**	**2,039**
Grayson County-Livestock	**Projected Water Demand**						
	Livestock Demand	1,297	1,297	1,297	1,297	1,297	1,297
	Total Projected Water Demand	***1,297***	***1,297***	***1,297***	***1,297***	***1,297***	***1,297***
	Currently Available Water Supplies						
	Livestock Local Supply	1,683	1,683	1,683	1,683	1,683	1,683
	Woodbine Aquifer	167	167	167	167	167	167
	Total Supply	***1,850***	***1,850***	***1,850***	***1,850***	***1,850***	***1,850***
	Water Management Strategies						
	Reduced Woodbine Aquifer use (reallocated to others)	0	-31	-55	-72	-86	-100
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***0***	***-31***	***-55***	***-72***	***-86***	***-100***
	Total Supply Less Projected Demand	**553**	**522**	**498**	**481**	**467**	**453**
Grayson County-Manufacturing	**Projected Water Demand**						
	Manufacturing Demand	7,010	7,781	8,453	9,088	9,621	10,444
	Total Projected Water Demand	***7,010***	***7,781***	***8,453***	***9,088***	***9,621***	***10,444***
	Currently Available Water Supplies						
	Lake Randell	500	500	500	500	500	500
	Lake Texoma	8,569	5,255	4,997	4,736	4,363	3,986
	Local supply - WR # 4903 (Red River)	30	30	30	30	30	30
	Woodbine Aquifer	0	0	0	0	0	0
	Total Supply	***9,099***	***5,785***	***5,527***	***5,266***	***4,893***	***4,516***
	Water Management Strategies						
	Water Conservation	0	15	175	255	272	291
	Grayson County Water Supply Project	0	1,500	2,014	2,617	3,357	4,393
	Purchase additional water from Denison	46	109	145	188	241	315
	Purchase water from Howe (from NTMWD)	85	93	100	91	97	102
	Additional Trinity Aquifer (New Wells)	639	810	899	983	1,037	1,111
	Additional Woodbine Aquifer (New Wells)	40	318	537	684	778	858
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***810***	***2,845***	***3,870***	***4,818***	***5,782***	***7,070***
	Total Supply Less Projected Demand	**2,899**	**849**	**944**	**996**	**1,054**	**1,142**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Grayson County-Mining	**Projected Water Demand**						
	Mining Demand	1,052	1,050	1,049	1,048	1,047	1,046
	Total Projected Water Demand	***1,052***	***1,050***	***1,049***	***1,048***	***1,047***	***1,046***
	Currently Available Water Supplies						
	Lake Texoma	100	100	100	100	100	100
	Trinity Aquifer	431	431	431	431	431	431
	Woodbine Aquifer	559	559	559	559	559	559
	Total Supply	***1,090***	***1,090***	***1,090***	***1,090***	***1,090***	***1,090***
	Water Management Strategies						
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**38**	**40**	**41**	**42**	**43**	**44**
Grayson County-Other	**Projected Population**	26,925	26,799	26,482	25,160	23,185	20,727
	Projected Water Demand						
	County-Other Demand	3,468	3,393	3,263	3,016	2,753	2,461
	Total Projected Water Demand	***3,468***	***3,393***	***3,263***	***3,016***	***2,753***	***2,461***
	Currently Available Water Supplies						
	Lake Randell	60	60	60	60	60	60
	Lake Texoma	891	891	891	891	891	891
	Other Aquifer	35	35	35	35	35	35
	Trinity Aquifer	1,169	1,169	1,169	1,169	1,169	1,169
	Woodbine Aquifer	1,659	1,658	1,658	1,658	1,658	1,658
	Total Supply	***3,814***	***3,813***	***3,813***	***3,813***	***3,813***	***3,813***
	Water Management Strategies						
	Water Conservation - Basic Package	43	159	167	168	164	155
	Reduce Trinity Aquifer use (reallocated to others)	-100	-200	-300	-400	-400	-500
	Reduce Woodbine Aquifer use (reallocated to others)	-670	-710	-763	-841	-920	-1,044
	Purchase water from Red River Authority	641	712	721	1,362	1,360	1,356
	Grayson County Water Supply Project	0	1,348	1,476	1,520	1,536	1,528
	Purchase additional water from Denison	0	162	165	175	170	161
	Purchase water from Pottsboro	0	150	150	300	300	300
	Purchase water from NTMWD	61	122	118	101	101	97
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***-25***	***1,743***	***1,734***	***2,385***	***2,311***	***2,053***
	Total Supply Less Projected Demand	**321**	**2,163**	**2,284**	**3,182**	**3,371**	**3,405**
Grayson County-Steam Electric Power	**Projected Water Demand**						
	Steam Electric Power Demand	0	0	0	0	0	0
	Total Projected Water Demand	***0***	***0***	***0***	***0***	***0***	***0***
	Currently Available Water Supplies						
	Total Supply	***0***	***0***	***0***	***0***	***0***	***0***
	Water Management Strategies						
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**0**	**0**	**0**	**0**	**0**	**0**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Gun Barrel City	**Projected Population**	6,131	7,201	8,256	9,338	10,658	12,324
	Projected Water Demand						
	Municipal Demand	1,257	1,452	1,637	1,841	2,089	2,416
	Total Projected Water Demand	***1,257***	***1,452***	***1,637***	***1,841***	***2,089***	***2,416***
	Currently Available Water Supplies						
	TRWD Sources (through East Cedar Creek FWSD)	389	375	363	357	349	343
	Total Supply	***389***	***375***	***363***	***357***	***349***	***343***
	Water Management Strategies						
	Water Conservation - Basic Package	37	82	106	135	171	218
	Purchase water from East Cedar Creek FWSD (from TRWD)	1,168	1,321	1,684	1,649	2,253	2,397
	Total Water Management Strategies	***1,205***	***1,403***	***1,790***	***1,784***	***2,424***	***2,615***
	Total Supply Less Projected Demand	**337**	**326**	**516**	**300**	**684**	**542**
Gunter	**Projected Population**	3,000	5,000	6,000	7,000	8,000	9,000
	Projected Water Demand						
	Municipal Demand	407	666	786	902	1,022	1,149
	Total Projected Water Demand	***407***	***666***	***786***	***902***	***1,022***	***1,149***
	Currently Available Water Supplies						
	Trinity Aquifer	214	214	214	214	214	214
	Total Supply	***214***	***214***	***214***	***214***	***214***	***214***
	Water Management Strategies						
	Water Conservation - Basic Package	6	26	34	42	51	62
	Grayson County Water Supply Project	0	372	498	612	733	865
	Purchase water from Sherman	50	50	50	50	50	50
	Additional Trinity Aquifer (Existing Wells)	80	122	119	124	126	123
	Overdraft Trinity Aquifer (Existing Wells)	113	0	0	0	0	0
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***249***	***570***	***701***	***828***	***960***	***1,100***
	Total Supply Less Projected Demand	**55**	**117**	**128**	**140**	**152**	**165**
Gunter Rural WSC	**Projected Population**	5,300	7,200	8,653	10,679	13,471	16,560
	Projected Water Demand						
	Municipal Demand	653	871	1,027	1,256	1,585	1,948
	Total Projected Water Demand	***653***	***871***	***1,027***	***1,256***	***1,585***	***1,948***
	Currently Available Water Supplies						
	Trinity Aquifer	472	472	472	472	472	472
	Total Supply	***472***	***472***	***472***	***472***	***472***	***472***
	Water Management Strategies						
	Water Conservation - Basic Package	14	52	65	84	111	143
	Reduce Trinity Aquifer supply (reallocated to others)	0	-50	-50	-50	-50	-50
	Purchase water from UTRWD	338	833	997	1,226	1,673	2,125
	Grayson County Water Supply Project	0	205	370	608	936	1,302
	Purchase water from Sherman	280	280	280	280	280	280
	Overdraft Trinity Aquifer (New Wells)	50	0	0	0	0	0
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***682***	***1,320***	***1,662***	***2,148***	***2,950***	***3,800***
	Total Supply Less Projected Demand	**501**	**921**	**1,107**	**1,364**	**1,837**	**2,324**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Hackberry	**Projected Population**	1,086	1,619	2,120	2,361	2,477	2,533
	Projected Water Demand						
	Municipal Demand	142	210	275	304	319	326
	Total Projected Water Demand	***142***	***210***	***275***	***304***	***319***	***326***
	Currently Available Water Supplies						
	NTMWD Sources	100	114	128	125	119	110
	Trinity Aquifer	73	73	73	73	73	73
	Total Supply	***173***	***187***	***201***	***198***	***192***	***183***
	Water Management Strategies						
	Water Conservation - Basic Package	3	10	14	17	19	20
	Purchase water from NTMWD	72	141	196	179	265	267
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***75***	***151***	***210***	***196***	***284***	***287***
	Total Supply Less Projected Demand	**106**	**128**	**136**	**90**	**157**	**144**
Haltom City	**Projected Population**	44,855	50,322	53,058	54,428	55,113	55,456
	Projected Water Demand						
	Municipal Demand	7,135	7,835	8,142	8,231	8,272	8,324
	Total Projected Water Demand	***7,135***	***7,835***	***8,142***	***8,231***	***8,272***	***8,324***
	Currently Available Water Supplies						
	TRWD Sources (through Fort Worth)	7,663	6,831	6,018	5,226	4,448	3,801
	Total Supply	***7,663***	***6,831***	***6,018***	***5,226***	***4,448***	***3,801***
	Water Management Strategies						
	Water Conservation - Basic Package	216	265	306	340	371	401
	Water Conservation - Expanded Package	57	3	16	30	30	30
	Purchase water from Fort Worth (TRWD)	1,175	2,320	4,163	3,743	5,858	5,639
	Total Water Management Strategies	***1,448***	***2,588***	***4,485***	***4,113***	***6,259***	***6,070***
	Total Supply Less Projected Demand	**1,976**	**1,584**	**2,361**	**1,108**	**2,435**	**1,547**
Haslet	**Projected Population**	2,000	4,000	7,000	7,000	7,000	7,000
	Projected Water Demand						
	Municipal Demand	412	811	1,411	1,404	1,404	1,404
	Total Projected Water Demand	***412***	***811***	***1,411***	***1,404***	***1,404***	***1,404***
	Currently Available Water Supplies						
	Trinity Aquifer	153	153	153	153	153	153
	TRWD Sources (through Fort Worth)	278	574	930	794	673	571
	Total Supply	***431***	***727***	***1,083***	***947***	***826***	***724***
	Water Management Strategies						
	Water Conservation - Basic Package	13	47	94	105	117	128
	Purchase water from Fort Worth (TRWD)	43	194	643	569	885	847
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***56***	***241***	***737***	***674***	***1,002***	***975***
	Total Supply Less Projected Demand	**75**	**157**	**409**	**217**	**424**	**295**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Heath	**Projected Population**	6,971	9,857	12,362	15,058	18,238	21,968
	Projected Water Demand						
	Municipal Demand	1,757	2,562	3,199	3,879	4,699	5,660
	Total Projected Water Demand	***1,757***	***2,562***	***3,199***	***3,879***	***4,699***	***5,660***
	Currently Available Water Supplies						
	NTMWD Sources	1,233	1,391	1,486	1,589	1,749	1,916
	Total Supply	***1,233***	***1,391***	***1,486***	***1,589***	***1,749***	***1,916***
	Water Management Strategies						
	Water Conservation - Basic Package	52	131	190	263	358	478
	Water Conservation - Expanded Package	0	0	1	2	2	2
	Purchase water from NTMWD	896	1,720	2,287	2,304	3,920	4,617
	Total Water Management Strategies	***948***	***1,851***	***2,478***	***2,569***	***4,280***	***5,097***
	Total Supply Less Projected Demand	**424**	**680**	**765**	**279**	**1,330**	**1,353**
Hebron	**Projected Population**	961	1,500	2,500	5,000	7,500	8,100
	Projected Water Demand						
	Municipal Demand	220	334	549	1,087	1,630	1,760
	Total Projected Water Demand	***220***	***334***	***549***	***1,087***	***1,630***	***1,760***
	Currently Available Water Supplies						
	DWU Sources	129	176	264	478	630	586
	UTRWD Sources	38	34	46	81	121	113
	Total Supply	***168***	***210***	***310***	***559***	***751***	***699***
	Water Management Strategies						
	Water Conservation - Basic Package	6	18	35	78	130	155
	Purchase water from UTRWD	17	67	95	169	253	288
	Purchase water from Carrollton (DWU)	45	121	237	558	912	866
	Total Water Management Strategies	***68***	***206***	***367***	***805***	***1,295***	***1,309***
	Total Supply Less Projected Demand	**16**	**82**	**128**	**277**	**416**	**248**
Henderson County-Irrigation	**Projected Water Demand**						
	Irrigation Demand	0	0	0	0	0	0
	Total Projected Water Demand	***0***	***0***	***0***	***0***	***0***	***0***
	Currently Available Water Supplies						
	Carrizo-Wilcox Aquifer	25	25	25	25	25	25
	Direct reuse	32	31	31	30	30	30
	Irrigation Local Supply	415	415	415	415	415	415
	Total Supply	***472***	***471***	***471***	***470***	***470***	***470***
	Water Management Strategies						
	Supplemental wells in Carrizo-Wilcox aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**472**	**471**	**471**	**470**	**470**	**470**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Henderson County-Livestock	**Projected Water Demand**						
	Livestock Demand	854	854	854	854	854	854
	Total Projected Water Demand	***854***	***854***	***854***	***854***	***854***	***854***
	Currently Available Water Supplies						
	Carrizo-Wilcox Aquifer	518	518	518	518	518	518
	Livestock Local Supply	341	341	341	341	341	341
	Other Aquifer	126	126	126	126	126	126
	Queen City Aquifer	43	43	43	43	43	43
	Total Supply	***1,028***	***1,028***	***1,028***	***1,028***	***1,028***	***1,028***
	Water Management Strategies						
	Supplemental wells in Carrizo-Wilcox, Queen City & other aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**174**	**174**	**174**	**174**	**174**	**174**
Henderson County-Manufacturing	**Projected Water Demand**						
	Manufacturing Demand	110	118	133	151	172	195
	Total Projected Water Demand	***110***	***118***	***133***	***151***	***172***	***195***
	Currently Available Water Supplies						
	Carrizo-Wilcox Aquifer	11	12	13	15	17	20
	Lake Athens	44	43	43	43	43	42
	Total Supply	***55***	***55***	***56***	***58***	***60***	***62***
	Water Management Strategies						
	Water Conservation	0	0	3	4	5	5
	Purchase water from Athens MWA	63	75	94	104	144	145
	Supplemental wells in Carrizo-Wilcox aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***63***	***75***	***97***	***108***	***149***	***150***
	Total Supply Less Projected Demand	**8**	**12**	**20**	**15**	**37**	**17**
Henderson County-Mining	**Projected Water Demand**						
	Mining Demand	265	302	327	352	378	399
	Total Projected Water Demand	***265***	***302***	***327***	***352***	***378***	***399***
	Currently Available Water Supplies						
	Carrizo-Wilcox Aquifer	583	583	583	583	583	583
	TRWD Sources	165	134	114	98	83	70
	Total Supply	***748***	***717***	***697***	***681***	***666***	***653***
	Water Management Strategies						
	Purchase water from TRWD	26	46	79	70	109	105
	Supplemental wells in Carrizo-Wilcox aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***26***	***46***	***79***	***70***	***109***	***105***
	Total Supply Less Projected Demand	**509**	**461**	**449**	**399**	**397**	**359**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Henderson County-Other	**Projected Population**	1,328	1,327	1,326	1,326	1,325	1,324
	Projected Water Demand						
	County-Other Demand	262	257	253	248	246	246
	Total Projected Water Demand	***262***	***257***	***253***	***248***	***246***	***246***
	Currently Available Water Supplies						
	Carrizo-Wilcox Aquifer	846	846	846	846	846	846
	Other Aquifer	41	41	41	41	41	41
	TRWD Sources	141	112	93	79	66	56
	Total Supply	***1,028***	***999***	***980***	***966***	***953***	***943***
	Water Management Strategies						
	Water Conservation - Basic Package	2	8	9	10	11	12
	Purchase water from TRWD	21	38	65	56	88	85
	Supplemental wells in Carrizo-Wilcox aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***23***	***46***	***74***	***66***	***99***	***97***
	Total Supply Less Projected Demand	**789**	**788**	**801**	**784**	**806**	**794**
Henderson County-Steam Electric Power	**Projected Water Demand**						
	Steam Electric Power Demand	2,387	2,308	2,376	2,458	2,559	2,681
	Total Projected Water Demand	***2,387***	***2,308***	***2,376***	***2,458***	***2,559***	***2,681***
	Currently Available Water Supplies						
	Carrizo-Wilcox Aquifer	0	0	0	0	0	0
	Cedar Creek	0	0	0	0	0	0
	Forest Grove Reservoir	0	0	0	0	0	0
	Lake Trinidad	3,067	3,033	3,000	2,967	2,933	2,900
	Total Supply	***3,067***	***3,033***	***3,000***	***2,967***	***2,933***	***2,900***
	Water Management Strategies						
	Supplemental wells in Carrizo-Wilcox aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**680**	**725**	**624**	**509**	**374**	**219**
Hickory Creek	**Projected Population**	3,500	5,300	6,500	8,000	10,500	13,500
	Projected Water Demand						
	Municipal Demand	529	825	1,005	1,219	1,600	2,057
	Total Projected Water Demand	***529***	***825***	***1,005***	***1,219***	***1,600***	***2,057***
	Currently Available Water Supplies						
	Trinity Aquifer	33	39	42	45	51	57
	UTRWD Sources (through Lake Cities MUA)	377	375	384	429	575	648
	Woodbine Aquifer	71	84	90	97	111	124
	Total Supply	***481***	***498***	***516***	***571***	***737***	***829***
	Water Management Strategies						
	Water Conservation - Basic Package	8	33	44	58	82	112
	Purchase water from Lake Cities MUA (from UTRWD)	164	727	811	899	1,206	1,656
	Total Water Management Strategies	***172***	***760***	***855***	***957***	***1,288***	***1,768***
	Total Supply Less Projected Demand	**124**	**433**	**366**	**309**	**425**	**540**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Hickory Creek SUD	**Projected Population**	244	285	319	349	380	415
	Projected Water Demand						
(Region C only)	Municipal Demand	42	48	53	56	61	67
	Total Projected Water Demand	***42***	***48***	***53***	***56***	***61***	***67***
	Currently Available Water Supplies						
	Woodbine Aquifer	45	45	44	44	44	30
	Total Supply	***45***	***45***	***44***	***44***	***44***	***30***
	Water Management Strategies						
	Water Conservation - Basic Package	0	3	3	5	6	7
	Additional Woodbine aquifer	0	3	6	7	12	30
	Supplemental wells in Woodbine aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***0***	***6***	***9***	***12***	***18***	***37***
	Total Supply Less Projected Demand	**3**	**3**	**0**	**0**	**1**	**0**
High Point WSC	**Projected Population**	5,218	6,619	8,030	9,589	11,509	13,877
	Projected Water Demand						
	Municipal Demand	556	793	944	1,117	1,328	1,601
	Total Projected Water Demand	***556***	***793***	***944***	***1,117***	***1,328***	***1,601***
	Currently Available Water Supplies						
	NTMWD Sources (through Forney)	297	359	377	403	445	497
	Lake Tawakoni	66	58	53	49	46	42
	Lake Terrell	50	44	39	37	35	31
	Total Supply	***413***	***461***	***469***	***489***	***526***	***570***
	Water Management Strategies						
	Water Conservation - Basic Package	10	39	50	63	80	102
	Purchase water from Forney (from NTMWD)	451	663	786	762	1,197	1,387
	Total Water Management Strategies	***461***	***702***	***836***	***825***	***1,277***	***1,489***
	Total Supply Less Projected Demand	**318**	**370**	**361**	**197**	**475**	**458**
Highland Park	**Projected Population**	8,937	9,025	9,106	9,181	9,249	9,313
	Projected Water Demand						
	Municipal Demand	4,255	4,266	4,274	4,278	4,289	4,319
	Total Projected Water Demand	***4,255***	***4,266***	***4,274***	***4,278***	***4,289***	***4,319***
	Currently Available Water Supplies						
	Lake Grapevine (through Dallas County Parks Cities MUD)	5,960	5,694	5,452	5,223	4,986	4,757
	Total Supply	***5,960***	***5,694***	***5,452***	***5,223***	***4,986***	***4,757***
	Water Management Strategies						
	Water Conservation - Basic Package	24	73	87	102	117	132
	Total Water Management Strategies	***24***	***73***	***87***	***102***	***117***	***132***
	Total Supply Less Projected Demand	**1,729**	**1,501**	**1,265**	**1,047**	**814**	**570**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Highland Village	**Projected Population**	15,148	16,868	17,862	18,437	18,769	19,000
	Projected Water Demand						
	Municipal Demand	3,394	3,722	3,902	3,986	4,037	4,086
	Total Projected Water Demand	***3,394***	***3,722***	***3,902***	***3,986***	***4,037***	***4,086***
	Currently Available Water Supplies						
	Trinity Aquifer	1,411	1,411	1,411	1,411	1,411	1,411
	UTRWD Sources	1,843	1,364	1,271	1,247	1,340	1,221
	Total Supply	***3,254***	***2,775***	***2,682***	***2,658***	***2,751***	***2,632***
	Water Management Strategies						
	Water Conservation - Basic Package	102	208	252	291	329	367
	Water Conservation - Expanded Package	3	45	85	92	93	94
	Reduce Trinity Aquifer use (reallocated to others)	-141	-176	-361	-776	-988	-1,129
	Purchase water from UTRWD	802	2,645	2,672	2,611	2,807	3,119
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***766***	***2,722***	***2,648***	***2,218***	***2,241***	***2,451***
	Total Supply Less Projected Demand	**626**	**1,775**	**1,428**	**890**	**955**	**997**
Honey Grove	**Projected Population**	1,858	1,978	2,105	2,241	2,386	2,539
	Projected Water Demand						
	Municipal Demand	421	438	459	482	511	544
	Total Projected Water Demand	***421***	***438***	***459***	***482***	***511***	***544***
	Currently Available Water Supplies						
	Woodbine Aquifer	441	441	441	441	441	441
	Total Supply	***441***	***441***	***441***	***441***	***441***	***441***
	Water Management Strategies						
	Water Conservation - Basic Package	4	12	15	37	66	75
	Water Conservation - Expanded Package	0	0	0	0	5	7
	Reduce Woodbine Aquifer use (reallocated to others)	0	-20	-40	-60	-80	-100
	Fannin County Water Supply Project	0	103	229	307	404	424
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***4***	***95***	***204***	***284***	***395***	***406***
	Total Supply Less Projected Demand	**24**	**98**	**186**	**243**	**325**	**303**
Howe	**Projected Population**	3,899	5,730	7,552	8,764	9,772	10,781
	Projected Water Demand						
	Municipal Demand	593	918	1,193	1,355	1,499	1,655
	Total Projected Water Demand	***593***	***918***	***1,193***	***1,355***	***1,499***	***1,655***
	Currently Available Water Supplies						
	Woodbine Aquifer	409	409	409	409	409	409
	Total Supply	***409***	***409***	***410***	***410***	***409***	***410***
	Water Management Strategies						
	Water Conservation - Basic Package	8	51	77	59	71	84
	Water Conservation - Expanded Package	0	1	5	1	0	0
	Purchase water from NTMWD/GTUA (part of CGMA Project)	222	716	1,117	1,195	1,612	1,721
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***230***	***768***	***1,199***	***1,255***	***1,683***	***1,805***
	Total Supply Less Projected Demand	**46**	**259**	**416**	**310**	**593**	**560**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Hudson Oaks	**Projected Population**	2,960	4,262	5,673	6,943	8,330	9,884
	Projected Water Demand						
	Municipal Demand	361	511	674	817	980	1,163
	Total Projected Water Demand	***361***	***511***	***674***	***817***	***980***	***1,163***
	Currently Available Water Supplies						
	Trinity Aquifer	206	206	206	206	206	206
	TRWD Sources (through Weatherford)	102	102	102	102	102	102
	Total Supply	***308***	***308***	***308***	***308***	***308***	***308***
	Water Management Strategies						
	Water Conservation - Basic Package	6	26	36	47	60	75
	Purchase water from Weatherford (from TRWD)	90	254	483	564	861	983
	Overdrafting Trinity Aquifer (existing wells)	57	0	0	0	0	0
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***153***	***280***	***519***	***611***	***921***	***1,058***
	Total Supply Less Projected Demand	**100**	**77**	**153**	**102**	**249**	**203**
Hurst	**Projected Population**	38,829	41,224	42,841	43,932	44,669	45,167
	Projected Water Demand						
	Municipal Demand	7,524	7,850	8,014	8,070	8,156	8,247
	Total Projected Water Demand	***7,524***	***7,850***	***8,014***	***8,070***	***8,156***	***8,247***
	Currently Available Water Supplies						
	Trinity Aquifer	1,081	1,081	1,081	1,081	1,081	1,081
	TRWD Sources	6,920	5,901	5,124	4,437	3,804	3,272
	Total Supply	***8,001***	***6,982***	***6,205***	***5,518***	***4,885***	***4,353***
	Water Management Strategies						
	Water Conservation - Basic Package	214	416	494	568	643	719
	Water Conservation - Expanded Package	63	161	235	268	271	273
	Purchase water from Fort Worth (TRWD)	1,061	2,004	3,544	3,178	5,010	4,854
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***1,338***	***2,581***	***4,273***	***4,014***	***5,924***	***5,846***
	Total Supply Less Projected Demand	**1,815**	**1,713**	**2,464**	**1,462**	**2,653**	**1,952**
Hutchins	**Projected Population**	5,000	10,000	16,000	24,000	32,000	34,000
	Projected Water Demand						
	Municipal Demand	1,210	2,375	3,782	5,646	7,527	7,998
	Total Projected Water Demand	***1,210***	***2,375***	***3,782***	***5,646***	***7,527***	***7,998***
	Currently Available Water Supplies						
	DWU Sources	890	1,565	2,286	3,113	3,640	3,330
	Woodbine Aquifer	0	0	0	0	0	0
	Total Supply	***890***	***1,565***	***2,286***	***3,113***	***3,640***	***3,330***
	Water Management Strategies						
	Water Conservation - Basic Package	37	126	232	394	589	692
	Water Conservation - Expanded Package	0	5	26	48	68	83
	Purchase water from DWU	310	1,084	2,035	3,622	5,263	4,919
	Total Water Management Strategies	***347***	***1,215***	***2,293***	***4,064***	***5,920***	***5,694***
	Total Supply Less Projected Demand	**27**	**405**	**797**	**1,531**	**2,033**	**1,026**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Irving	**Projected Population**	219,238	240,099	255,853	267,751	276,736	283,521
	Projected Water Demand						
	Municipal Demand	55,501	59,975	63,050	65,382	67,267	68,916
	Total Projected Water Demand	***55,501***	***59,975***	***63,050***	***65,382***	***67,267***	***68,916***
	Currently Available Water Supplies						
	DWU Sources	10,804	1,477	1,355	1,236	1,311	1,843
	Lake Chapman	44,815	43,908	43,019	42,156	41,348	40,678
	Trinity Aquifer	0	0	0	0	0	0
	Total Supply	***55,619***	***45,385***	***44,374***	***43,392***	***42,659***	***42,521***
	Water Management Strategies						
	Water Conservation - Basic Package	1,452	2,563	3,229	3,900	4,577	5,263
	Water Conservation - Expanded Package	38	368	1,116	1,427	1,482	1,527
	Purchase water from DWU	3,765	1,023	1,206	1,439	1,894	2,722
	Indirect Reuse	0	16,815	25,811	25,294	24,809	24,407
	Total Water Management Strategies	***5,255***	***20,769***	***31,362***	***32,060***	***32,762***	***33,919***
	Total Supply Less Projected Demand	**5,373**	**6,179**	**12,686**	**10,070**	**8,154**	**7,524**
Italy	**Projected Population**	2,376	2,731	3,081	3,438	3,838	4,279
	Projected Water Demand						
	Municipal Demand	282	330	362	397	439	489
	Total Projected Water Demand	***282***	***330***	***362***	***397***	***439***	***489***
	Currently Available Water Supplies						
	Trinity Aquifer	111	111	111	111	111	111
	Woodbine Aquifer	79	79	79	79	79	79
	Total Supply	***190***	***190***	***190***	***190***	***190***	***190***
	Water Management Strategies						
	Water Conservation - Basic Package	4	16	20	23	27	32
	TRA Ellis County Water Supply Project (Waxahachie)	0	140	172	207	250	299
	Additional Woodbine Aquifer (New Wells)	95	140	172	207	249	233
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***99***	***296***	***364***	***437***	***526***	***564***
	Total Supply Less Projected Demand	**7**	**156**	**192**	**230**	**276**	**265**
Jack County-Irrigation	**Projected Water Demand**						
	Irrigation Demand	0	0	0	0	0	0
	Total Projected Water Demand	***0***	***0***	***0***	***0***	***0***	***0***
	Currently Available Water Supplies						
	Direct reuse	26	27	26	26	25	25
	Irrigation Local Supply	110	110	110	110	110	110
	Other Aquifer	5	5	5	5	5	5
	Reuse	385	390	388	382	379	379
	Total Supply	***526***	***532***	***529***	***523***	***519***	***519***
	Water Management Strategies						
	Supplemental wells in Other aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**526**	**532**	**529**	**523**	**519**	**519**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Jack County-Livestock	**Projected Water Demand**						
	Livestock Demand	1,025	1,025	1,025	1,025	1,025	1,025
	Total Projected Water Demand	***1,025***	***1,025***	***1,025***	***1,025***	***1,025***	***1,025***
	Currently Available Water Supplies						
	Livestock Local Supply	1,665	1,665	1,665	1,665	1,665	1,665
	Other Aquifer	134	134	134	134	134	134
	Total Supply	***1,799***	***1,799***	***1,799***	***1,799***	***1,799***	***1,799***
	Water Management Strategies						
	Supplemental wells in Other aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**774**	**774**	**774**	**774**	**774**	**774**
Jack County-Manufacturing	**Projected Water Demand**						
	Manufacturing Demand	2	2	2	2	2	2
	Total Projected Water Demand	***2***	***2***	***2***	***2***	***2***	***2***
	Currently Available Water Supplies						
	Lost Creek/Jacksboro System	2	2	2	2	2	2
	Total Supply	***2***	***2***	***2***	***2***	***2***	***2***
	Water Management Strategies						
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**0**	**0**	**0**	**0**	**0**	**0**
Jack County-Mining	**Projected Water Demand**						
	Mining Demand	433	433	433	433	433	433
	Total Projected Water Demand	***433***	***433***	***433***	***433***	***433***	***433***
	Currently Available Water Supplies						
	Other Aquifer	3	3	3	3	3	3
	Other Aquifer	76	76	76	76	76	76
	Other Local Supply	370	370	370	370	370	370
	Total Supply	***449***	***449***	***449***	***449***	***449***	***449***
	Water Management Strategies						
	Supplemental wells in Other aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**16**	**16**	**16**	**16**	**16**	**16**
Jack County-Other	**Projected Population**	4,375	4,918	5,448	5,948	6,448	6,948
	Projected Water Demand						
	County-Other Demand	549	600	647	686	736	793
	Total Projected Water Demand	***549***	***600***	***647***	***686***	***736***	***793***
	Currently Available Water Supplies						
	Lake Bryson	0	0	0	0	0	0
	Lost Creek/Jacksboro System	5	5	5	5	5	5
	Other Aquifer	519	519	519	519	519	519
	Total Supply	***524***	***524***	***524***	***524***	***524***	***524***
	Water Management Strategies						
	Water Conservation - Basic Package	8	28	34	39	44	50
	Purchase water from Jacksboro	300	300	300	300	300	300
	Purchase water from Bryson	50	50	50	50	50	50
	Supplemental wells in Other aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***358***	***378***	***384***	***389***	***394***	***400***
	Total Supply Less Projected Demand	**333**	**302**	**261**	**227**	**182**	**131**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Jack County-Steam Electric Power	**Projected Water Demand**						
	Steam Electric Power Demand	0	3,674	4,296	5,053	5,977	7,102
	Total Projected Water Demand	***0***	***3,674***	***4,296***	***5,053***	***5,977***	***7,102***
	Currently Available Water Supplies						
	TRWD sources	0	0	0	0	0	0
	Total Supply	***0***	***0***	***0***	***0***	***0***	***0***
	Water Management Strategies						
	Purchase water from TRWD	0	4,291	5,371	5,505	7,446	8,053
	Total Water Management Strategies	***0***	***4,291***	***5,371***	***5,505***	***7,446***	***8,053***
	Total Supply Less Projected Demand	**0**	**617**	**1,075**	**452**	**1,469**	**951**
Jacksboro	**Projected Population**	4,650	4,798	4,897	4,897	4,897	4,897
	Projected Water Demand						
	Municipal Demand	688	699	697	686	680	680
	Total Projected Water Demand	***688***	***699***	***697***	***686***	***680***	***680***
	Currently Available Water Supplies						
	Lost Creek/Jacksboro System	993	993	993	993	993	993
	Total Supply	***993***	***993***	***993***	***993***	***993***	***993***
	Water Management Strategies						
	Water Conservation - Basic Package	7	23	26	28	30	33
	Water Treatment Expansions						
	Water treatment plant expansion (0.5 MGD)	0	0	0	0	0	0
	Total Water Management Strategies	***7***	***23***	***26***	***28***	***30***	***33***
	Total Supply Less Projected Demand	**312**	**317**	**322**	**335**	**343**	**346**
	Projected Population	2,406	3,015	3,638	4,294	5,076	5,994
Johnson County SUD	**Projected Water Demand**						
	Municipal Demand	461	587	725	885	1,080	1,276
(Region C only)	***Total Projected Water Demand***	***461***	***587***	***725***	***885***	***1,080***	***1,276***
	Currently Available Water Supplies						
	Lake Granbury	21	21	21	21	21	21
	Lake Granbury	210	210	210	210	210	210
	Trinity Aquifer	1	0	0	0	1	1
	Total Supply	***232***	***231***	***231***	***231***	***232***	***232***
	Water Management Strategies						
	Water Conservation - Basic Package	5	20	27	35	45	57
	Purchase water from DWU	1,794	1,793	1,794	1,794	1,794	1,796
	Total Water Management Strategies	***1,799***	***1,813***	***1,821***	***1,829***	***1,839***	***1,853***
	Total Supply Less Projected Demand	**1,579**	**1,687**	**1,603**	**1,543**	**1,341**	**885**
Josephine	**Projected Population**	679	2,000	2,000	2,000	2,000	2,000
	Projected Water Demand						
(Region C only)	Municipal Demand	100	282	276	271	271	271
	Total Projected Water Demand	***100***	***282***	***276***	***271***	***271***	***271***
	Currently Available Water Supplies						
	NTMWD Sources	72	155	130	113	103	94
	Total Supply	***72***	***155***	***130***	***113***	***103***	***94***
	Water Management Strategies						
	Water Conservation - Basic Package	1	13	14	15	16	16
	Purchase water from NTMWD	53	191	199	163	232	228
	Total Water Management Strategies	***54***	***204***	***213***	***178***	***248***	***244***
	Total Supply Less Projected Demand	**26**	**77**	**67**	**20**	**80**	**67**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Justin	**Projected Population**	2,710	4,480	7,228	11,878	14,500	16,000
	Projected Water Demand						
	Municipal Demand	501	863	1,376	2,249	2,745	3,029
	Total Projected Water Demand	***501***	***863***	***1,376***	***2,249***	***2,745***	***3,029***
	Currently Available Water Supplies						
	Trinity Aquifer	353	353	353	353	353	353
	UTRWD Sources	159	306	484	778	841	841
	Total Supply	***512***	***659***	***837***	***1,131***	***1,194***	***1,194***
	Water Management Strategies						
	Water Conservation - Basic Package	16	48	89	165	224	272
	Water Conservation - Expanded Package	4	16	26	44	54	60
	Redistribution of Trinity Aquifer Supplies (alloctaed to others)	-35	-88	-141	-194	-247	-282
	Purchase water from UTRWD	69	594	1,018	1,630	2,188	2,533
	Supplemental wells in Trinity Peak aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***54***	***570***	***992***	***1,645***	***2,219***	***2,583***
	Total Supply Less Projected Demand	**65**	**366**	**453**	**527**	**668**	**748**
Kaufman	**Projected Population**	8,256	10,864	13,020	14,753	16,484	19,883
	Projected Water Demand						
	Municipal Demand	1,156	1,716	2,013	2,264	2,511	3,029
	Total Projected Water Demand	***1,156***	***1,716***	***2,013***	***2,264***	***2,511***	***3,029***
	Currently Available Water Supplies						
	NTMWD Sources	811	931	935	927	935	1,026
	Total Supply	***811***	***931***	***935***	***927***	***935***	***1,026***
	Water Management Strategies						
	Water Conservation - Basic Package	15	97	82	100	120	155
	Water Conservation - Expanded Package	0	16	2	5	5	6
	Purchase water from NTMWD	590	1,153	1,439	1,346	2,094	2,471
	Total Water Management Strategies	***605***	***1,266***	***1,523***	***1,451***	***2,219***	***2,632***
	Total Supply Less Projected Demand	**260**	**481**	**445**	**114**	**643**	**629**
Kaufman County-Irrigation	**Projected Water Demand**						
	Irrigation Demand	2,916	2,916	2,916	2,916	2,916	2,916
	Total Projected Water Demand	***2,916***	***2,916***	***2,916***	***2,916***	***2,916***	***2,916***
	Currently Available Water Supplies						
	Cedar Creek Lake	125	109	92	79	67	57
	Direct reuse	576	758	927	1,116	1,359	1,659
	Irrigation Local Supply	64	64	64	64	64	64
	Nacatoch Aquifer	4	4	4	4	4	4
	Total Supply	***769***	***935***	***1,087***	***1,263***	***1,494***	***1,784***
	Water Management Strategies						
	Water Conservation	4	72	140	177	212	247
	Purchase water from NTMWD	2,666	2,671	2,594	2,208	2,654	2,540
	Purchase water from TRWD	30	37	64	57	89	85
	Supplemental wells in Nacatoch aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***2,700***	***2,780***	***2,798***	***2,442***	***2,955***	***2,872***
	Total Supply Less Projected Demand	**553**	**799**	**969**	**789**	**1,533**	**1,740**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Kaufman County-Livestock	**Projected Water Demand**						
	Livestock Demand	1,545	1,545	1,545	1,545	1,545	1,545
	Total Projected Water Demand	***1,545***	***1,545***	***1,545***	***1,545***	***1,545***	***1,545***
	Currently Available Water Supplies						
	Livestock Local Supply	1,622	1,622	1,622	1,622	1,622	1,622
	Nacatoch Aquifer	73	73	73	73	73	73
	Woodbine Aquifer	121	121	121	121	121	121
	Total Supply	***1,816***	***1,816***	***1,816***	***1,816***	***1,816***	***1,816***
	Water Management Strategies						
	Supplemental wells in Nacatoch aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**271**	**271**	**271**	**271**	**271**	**271**
Kaufman County-Manufacturing	**Projected Water Demand**						
	Manufacturing Demand	760	813	869	928	993	1,061
	Total Projected Water Demand	***760***	***813***	***869***	***928***	***993***	***1,061***
	Currently Available Water Supplies						
	Lake Terrell	108	101	97	97	97	94
	NTMWD Sources	352	291	266	251	244	237
	Tawakoni	143	134	130	130	130	126
	Total Supply	***603***	***526***	***493***	***478***	***471***	***457***
	Water Management Strategies						
	Water Conservation	0	1	15	22	23	25
	Purchase water from NTMWD	569	696	758	757	960	1,025
	Total Water Management Strategies	***569***	***697***	***773***	***779***	***983***	***1,050***
	Total Supply Less Projected Demand	**412**	**410**	**397**	**329**	**461**	**446**
Kaufman County-Mining	**Projected Water Demand**						
	Mining Demand	79	80	81	82	83	84
	Total Projected Water Demand	***79***	***80***	***81***	***82***	***83***	***84***
	Currently Available Water Supplies						
	Other Local Supply	86	86	86	86	86	86
	Total Supply	***86***	***86***	***86***	***86***	***86***	***86***
	Water Management Strategies						
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**7**	**6**	**5**	**4**	**3**	**2**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Kaufman County-Other	**Projected Population**	14,426	14,426	14,426	14,426	14,426	14,426
	Projected Water Demand						
	County-Other Demand	2,182	2,166	2,150	2,133	2,117	2,117
	Total Projected Water Demand	***2,182***	***2,166***	***2,150***	***2,133***	***2,117***	***2,117***
	Currently Available Water Supplies						
	Lake Tawakoni	483	420	377	351	325	295
	Nacatoch Aquifer	241	241	241	241	241	241
	NTMWD sources	765	588	499	437	394	358
	Terrell	364	316	283	264	244	222
	TRWD Sources (part through Mabank)	234	189	159	135	114	97
	Total Supply	***2,087***	***1,754***	***1,559***	***1,428***	***1,318***	***1,213***
	Water Management Strategies						
	Water Conservation - Basic Package	29	87	94	101	108	115
	Purchase water from NTMWD	1,615	1,780	1,784	1,519	1,686	1,612
	Purchase water from TRWD	36	64	110	97	157	161
	Supplemental wells in Nacatoch aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***1,680***	***1,931***	***1,988***	***1,717***	***1,951***	***1,888***
	Total Supply Less Projected Demand	**1,585**	**1,519**	**1,397**	**1,012**	**1,152**	**984**
Kaufman County-Steam Electric Power	**Projected Water Demand**						
	Steam Electric Power Demand	8,979	17,798	20,808	24,478	28,950	34,403
	Total Projected Water Demand	***8,979***	***17,798***	***20,808***	***24,478***	***28,950***	***34,403***
	Currently Available Water Supplies						
	Reuse from Garland (through Forney)	3,000	3,000	3,000	3,000	3,000	3,000
	Total Supply	***3,000***	***3,000***	***3,000***	***3,000***	***3,000***	***3,000***
	Water Management Strategies						
	Purchase water from NTMWD	0	1,214	2,358	3,011	4,826	5,772
	TRA Reuse	0	7,500	7,500	7,500	15,000	15,000
	Direct Reuse from Garland (through Forney)	5,979	12,600	12,600	12,600	12,600	12,600
	Total Water Management Strategies	***5,979***	***21,314***	***22,458***	***23,111***	***32,426***	***33,372***
	Total Supply Less Projected Demand	**0**	**6,516**	**4,650**	**1,633**	**6,476**	**1,969**
Keller	**Projected Population**	40,285	48,097	48,097	48,097	48,097	48,097
	Projected Water Demand						
	Municipal Demand	9,160	10,829	10,775	10,667	10,667	10,667
	Total Projected Water Demand	***9,160***	***10,829***	***10,775***	***10,667***	***10,667***	***10,667***
	Currently Available Water Supplies						
	Trinity Aquifer	0	0	0	0	0	0
	TRWD Sources (through Fort Worth)	9,838	9,441	7,964	6,772	5,736	4,870
	Total Supply	***9,838***	***9,441***	***7,964***	***6,772***	***5,736***	***4,870***
	Water Management Strategies						
	Water Conservation - Basic Package	279	597	685	770	859	948
	Water Conservation - Expanded Package	9	52	85	98	98	98
	Purchase water from Fort Worth (from TRWD)	1,509	3,206	5,509	4,851	7,555	7,225
	Total Water Management Strategies	***1,797***	***3,855***	***6,279***	***5,719***	***8,512***	***8,271***
	Total Supply Less Projected Demand	**2,466**	**2,418**	**3,417**	**1,774**	**3,529**	**2,425**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Kemp	**Projected Population**	1,133	1,133	1,133	1,133	1,133	1,133
	Projected Water Demand						
	Municipal Demand	181	178	174	170	168	168
	Total Projected Water Demand	***181***	***178***	***174***	***170***	***168***	***168***
	Currently Available Water Supplies						
	TRWD Sources	194	155	129	108	90	77
	Total Supply	***194***	***155***	***129***	***108***	***90***	***77***
	Water Management Strategies						
	Water Conservation - Basic Package	6	12	8	8	9	9
	Purchase water from TRWD	30	53	89	77	120	114
	Total Water Management Strategies	***36***	***65***	***97***	***85***	***129***	***123***
	Total Supply Less Projected Demand	**49**	**42**	**52**	**23**	**51**	**32**
Kennedale	**Projected Population**	7,509	9,064	10,114	10,824	11,303	11,626
	Projected Water Demand						
	Municipal Demand	1,346	1,594	1,756	1,867	1,937	1,992
	Total Projected Water Demand	***1,346***	***1,594***	***1,756***	***1,867***	***1,937***	***1,992***
	Currently Available Water Supplies						
	Trinity Aquifer	805	805	805	805	805	805
	Total Supply	***805***	***805***	***805***	***805***	***805***	***805***
	Water Management Strategies						
	Water Conservation - Basic Package	57	151	181	209	233	256
	Water Conservation - Expanded Package	1	6	18	26	28	29
	Purchase water from Arlington & Fort Worth (TRWD)	670	921	1,189	1,157	1,409	1,347
	Overdrafting Trinity Aquifer (existing wells)	483	0	0	0	0	0
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***1,211***	***1,078***	***1,388***	***1,392***	***1,670***	***1,632***
	Total Supply Less Projected Demand	**670**	**289**	**437**	**330**	**538**	**445**
Kerens	**Projected Population**	1,681	1,681	1,681	1,681	1,681	1,681
	Projected Water Demand						
	Municipal Demand	399	394	388	382	378	378
	Total Projected Water Demand	***399***	***394***	***388***	***382***	***378***	***378***
	Currently Available Water Supplies						
	Navarro Mills Reservoir (through Corsicana)	436	393	359	328	296	266
	Run-of-River Wtr Rt #4971	252	252	252	252	252	252
	Total Supply	***688***	***645***	***611***	***580***	***548***	***518***
	Water Management Strategies						
	Water Conservation - Basic Package	3	11	12	14	15	16
	Purchase water from Corsicana	0	85	78	71	209	177
	Total Water Management Strategies	***3***	***96***	***90***	***85***	***224***	***193***
	Total Supply Less Projected Demand	**292**	**347**	**313**	**283**	**394**	**333**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Kiowa Homeowners WSC	**Projected Population**	3,324	3,567	3,691	3,711	3,710	3,709
	Projected Water Demand						
	Municipal Demand	503	531	542	536	532	532
	Total Projected Water Demand	***503***	***531***	***542***	***536***	***532***	***532***
	Currently Available Water Supplies						
	Trinity Aquifer	630	630	630	630	630	630
	Total Supply	***630***	***630***	***630***	***630***	***630***	***630***
	Water Management Strategies						
	Water Conservation - Basic Package	6	21	24	26	28	29
	Cooke County Water Supply Project	0	182	205	194	184	185
	Reduced Trinity Aquifer Supply (reallocated to others)	0	-100	-100	-100	-100	-100
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***6***	***103***	***129***	***120***	***112***	***114***
	Total Supply Less Projected Demand	**133**	**202**	**217**	**214**	**210**	**212**
Krugerville	**Projected Population**	1,326	1,521	1,767	2,300	3,000	4,300
	Projected Water Demand						
	Municipal Demand	162	181	204	263	339	486
	Total Projected Water Demand	***162***	***181***	***204***	***263***	***339***	***486***
	Currently Available Water Supplies						
	Trinity Aquifer	57	57	57	57	57	57
	UTRWD Sources (through Mustang SUD)	96	71	70	88	108	130
	Total Supply	***153***	***128***	***127***	***145***	***165***	***187***
	Water Management Strategies						
	Water Conservation - Basic Package	3	9	12	16	22	33
	Reduce Trinity Aquifer use (reallocated to others)	-6	-7	-15	-31	-40	-46
	Purchase water from Mustang SUD (from UTRWD)	42	137	148	185	250	389
	Total Water Management Strategies	***45***	***146***	***160***	***201***	***272***	***422***
	Total Supply Less Projected Demand	**36**	**93**	**83**	**83**	**98**	**123**
Krum	**Projected Population**	3,271	4,212	5,222	7,000	9,000	11,500
	Projected Water Demand						
	Municipal Demand	469	661	807	1,066	1,371	1,752
	Total Projected Water Demand	***469***	***661***	***807***	***1,066***	***1,371***	***1,752***
	Currently Available Water Supplies						
	Trinity Aquifer	298	298	298	298	298	298
	UTRWD Sources	174	224	261	347	448	448
	Total Supply	***472***	***522***	***559***	***645***	***746***	***746***
	Water Management Strategies						
	Water Conservation - Basic Package	7	40	36	52	71	97
	Purchase water from UTRWD	76	435	550	725	1,023	1,482
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***83***	***475***	***586***	***777***	***1,094***	***1,579***
	Total Supply Less Projected Demand	**86**	**336**	**338**	**356**	**469**	**573**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Ladonia	**Projected Population**	1,500	1,600	2,000	2,200	2,500	3,000
	Projected Water Demand						
	Municipal Demand	546	577	715	779	879	1,055
	Total Projected Water Demand	***546***	***577***	***715***	***779***	***879***	***1,055***
	Currently Available Water Supplies						
	Trinity Aquifer	276	276	276	276	276	276
	Total Supply	***276***	***276***	***276***	***276***	***276***	***276***
	Water Management Strategies						
	Water Conservation - Basic Package	16	27	40	50	64	85
	Water Conservation - Expanded Package	0	2	5	6	6	8
	Ralph Hall Reservoir	0	558	709	754	914	1,140
	New Water Treatment Plant						
	New WTP of 4 MGD	0	0	0	0	0	0
	Wells						
	Overdraft Trinity Aquifer (New Wells)	254	0	0	0	0	0
	Supplemental Wells						
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***270***	***587***	***754***	***810***	***984***	***1,233***
	Total Supply Less Projected Demand	**0**	**286**	**315**	**307**	**381**	**454**
Lake Dallas	**Projected Population**	7,902	9,102	9,933	10,507	10,904	11,179
	Projected Water Demand						
	Municipal Demand	1,230	1,478	1,591	1,671	1,722	1,766
	Total Projected Water Demand	***1,230***	***1,478***	***1,591***	***1,671***	***1,722***	***1,766***
	Currently Available Water Supplies						
	Trinity Aquifer	77	70	66	61	55	49
	UTRWD Sources (through Lake Cities MUA)	878	672	598	588	619	557
	Woodbine Aquifer	166	150	142	133	119	106
	Total Supply	***1,121***	***892***	***806***	***782***	***793***	***712***
	Water Management Strategies						
	Water Conservation - Basic Package	15	82	102	122	140	158
	Purchase water from Lake Cities MUA (from UTRWD)	381	1,302	1,281	1,233	1,297	1,422
	Total Water Management Strategies	***396***	***1,384***	***1,383***	***1,355***	***1,437***	***1,580***
	Total Supply Less Projected Demand	**287**	**798**	**598**	**466**	**508**	**526**
Lake Worth	**Projected Population**	4,854	5,400	6,000	6,600	7,200	7,500
	Projected Water Demand						
	Municipal Demand	930	1,010	1,102	1,190	1,290	1,344
	Total Projected Water Demand	***930***	***1,010***	***1,102***	***1,190***	***1,290***	***1,344***
	Currently Available Water Supplies						
	Trinity Aquifer	345	345	345	345	345	345
	TRWD Sources (through Fort Worth)	628	580	560	536	508	456
	Total Supply	***973***	***925***	***905***	***881***	***853***	***801***
	Water Management Strategies						
	Water Conservation - Basic Package	28	59	75	91	110	125
	Water Conservation - Expanded Package	1	4	11	17	18	19
	Purchase water from Fort Worth (TRWD)	97	197	387	385	669	677
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***126***	***260***	***473***	***493***	***797***	***821***
	Total Supply Less Projected Demand	**169**	**175**	**276**	**184**	**360**	**278**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Lakeside	**Projected Population**	1,252	1,451	1,655	1,871	2,130	2,436
	Projected Water Demand						
	Municipal Demand	447	512	580	652	740	846
	Total Projected Water Demand	***447***	***512***	***580***	***652***	***740***	***846***
	Currently Available Water Supplies						
	Trinity Aquifer	267	267	267	267	267	267
	Total Supply	***267***	***267***	***267***	***267***	***267***	***267***
	Water Management Strategies						
	Water Conservation - Basic Package	20	49	61	74	90	110
	Water Conservation - Expanded Package	3	11	16	18	20	24
	Purchase water from TRWD (through Fort Worth and Azle)	223	286	391	419	589	657
	Overdrafting Trinity Aquifer using existing wells in 2010	161	0	0	0	0	0
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***407***	***346***	***468***	***511***	***699***	***791***
	Total Supply Less Projected Demand	**227**	**101**	**155**	**126**	**226**	**212**
Lancaster	**Projected Population**	50,000	80,000	100,000	120,000	136,000	146,000
	Projected Water Demand						
	Municipal Demand	7,505	11,739	14,450	17,205	19,499	20,933
	Total Projected Water Demand	***7,505***	***11,739***	***14,450***	***17,205***	***19,499***	***20,933***
	Currently Available Water Supplies						
	DWU Sources	5,251	7,495	8,515	9,287	9,255	8,566
	Trinity Aquifer	362	362	362	362	362	362
	Total Supply	***5,613***	***7,857***	***8,877***	***9,649***	***9,617***	***8,928***
	Water Management Strategies						
	Water Conservation - Basic Package	100	429	583	756	921	1,059
	Purchase water from DWU	1,830	5,190	7,580	10,804	13,382	12,655
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***1,930***	***5,619***	***8,163***	***11,560***	***14,303***	***13,714***
	Total Supply Less Projected Demand	**38**	**1,737**	**2,590**	**4,004**	**4,421**	**1,709**
Lavon WSC	**Projected Population**	6,525	9,569	13,245	21,815	31,668	41,841
	Projected Water Demand						
	Municipal Demand	702	1,168	1,602	2,615	3,796	5,015
	Total Projected Water Demand	***702***	***1,168***	***1,602***	***2,615***	***3,796***	***5,015***
	Currently Available Water Supplies						
	NTMWD Sources	493	634	744	1,071	1,413	1,698
	Total Supply	***493***	***634***	***744***	***1,071***	***1,413***	***1,698***
	Water Management Strategies						
	Water Conservation - Basic Package	16	68	99	172	262	363
	Purchase water from NTMWD	358	784	1,144	1,554	3,166	4,091
	Total Water Management Strategies	***374***	***852***	***1,243***	***1,726***	***3,428***	***4,454***
	Total Supply Less Projected Demand	**165**	**318**	**385**	**182**	**1,045**	**1,137**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Leonard	**Projected Population**	2,149	2,502	3,500	5,500	8,000	10,000
	Projected Water Demand						
	Municipal Demand	303	342	466	720	1,040	1,299
	Total Projected Water Demand	***303***	***342***	***466***	***720***	***1,040***	***1,299***
	Currently Available Water Supplies						
	Woodbine Aquifer	276	276	276	276	276	276
	Total Supply	***276***	***276***	***276***	***276***	***276***	***276***
	Water Management Strategies						
	Water Conservation - Basic Package	4	15	22	37	58	77
	Fannin County Water Supply Project	0	147	354	612	1,117	1,368
	Overdraft Woodbine Aquifer (Existing Wells)	23	0	0	0	0	0
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***27***	***162***	***376***	***649***	***1,175***	***1,445***
	Total Supply Less Projected Demand	**0**	**96**	**186**	**205**	**411**	**422**
Lewisville	**Projected Population**	105,690	132,412	152,002	165,316	175,002	185,002
	Projected Water Demand						
	Municipal Demand	20,837	25,660	29,286	31,666	33,325	35,230
	Total Projected Water Demand	***20,837***	***25,660***	***29,286***	***31,666***	***33,325***	***35,230***
	Currently Available Water Supplies						
	DWU Sources	15,317	16,903	17,699	17,459	16,116	14,668
	DWU Sources	1	1	1	1	1	1
	Total Supply	***15,318***	***16,904***	***17,700***	***17,460***	***16,117***	***14,669***
	Water Management Strategies						
	Water Conservation - Basic Package	601	1,306	1,737	2,146	2,540	2,979
	Water Conservation - Expanded Package	169	563	1,027	1,253	1,335	1,416
	Purchase water from DWU	5,338	11,708	15,757	20,313	23,302	21,674
	New Water Treatment Plant						
	New WTP of 10 MGD	0	0	0	0	0	0
	Water Treatment Expansions						
	WTP Expansion of 8 MGD	0	0	0	0	0	0
	WTP Expansion of 8 MGD	0	0	0	0	0	0
	WTP Expansion of 5 MGD	0	0	0	0	0	0
	Total Water Management Strategies	***6,108***	***13,577***	***18,521***	***23,712***	***27,177***	***26,069***
	Total Supply Less Projected Demand	**589**	**4,821**	**6,935**	**9,506**	**9,969**	**5,508**
Lincoln Park	**Projected Population**	880	1,236	1,571	1,916	2,266	2,632
	Projected Water Demand						
	Municipal Demand	132	195	246	298	353	410
	Total Projected Water Demand	***132***	***195***	***246***	***298***	***353***	***410***
	Currently Available Water Supplies						
	Trinity Aquifer	49	49	49	49	49	49
	UTRWD Sources	76	81	90	103	112	112
	Total Supply	***125***	***130***	***139***	***152***	***161***	***161***
	Water Management Strategies						
	Water Conservation - Basic Package	2	12	11	14	18	22
	Purchase water from UTRWD	34	157	190	215	276	344
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***36***	***169***	***201***	***229***	***294***	***366***
	Total Supply Less Projected Demand	**29**	**104**	**94**	**83**	**102**	**117**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Lindsay	**Projected Population**	879	943	976	981	981	981
	Projected Water Demand						
	Municipal Demand	154	161	164	162	160	160
	Total Projected Water Demand	***154***	***161***	***164***	***162***	***160***	***160***
	Currently Available Water Supplies						
	Trinity Aquifer	130	130	130	130	130	130
	Total Supply	***130***	***130***	***130***	***130***	***130***	***130***
	Water Management Strategies						
	Water Conservation - Basic Package	5	10	12	13	14	16
	Water Conservation - Expanded Package	0	1	1	1	1	1
	Cooke County Water Supply Project	0	52	57	53	50	50
	Overdraft Trinity Aquifer (Existing Wells)	20	0	0	0	0	0
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***25***	***63***	***70***	***67***	***65***	***67***
	Total Supply Less Projected Demand	**1**	**32**	**36**	**35**	**35**	**37**
Little Elm	**Projected Population**	27,600	40,000	47,477	47,477	47,477	47,477
	Projected Water Demand						
	Municipal Demand	5,441	8,289	9,785	9,785	9,785	9,785
	Total Projected Water Demand	***5,441***	***8,289***	***9,785***	***9,785***	***9,785***	***9,785***
	Currently Available Water Supplies						
	NTMWD Sources	3,329	4,121	4,221	3,723	3,383	3,077
	Woodbine Aquifer	696	696	696	696	696	696
	Total Supply	***4,025***	***4,817***	***4,917***	***4,419***	***4,079***	***3,773***
	Water Management Strategies						
	Water Conservation - Basic Package	190	475	643	725	806	888
	Water Conservation - Expanded Package	4	64	124	128	128	128
	Purchase water from NTMWD	2,421	5,098	6,496	5,398	7,582	7,415
	Supplemental wells in Woodbine aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***2,615***	***5,637***	***7,263***	***6,251***	***8,516***	***8,431***
	Total Supply Less Projected Demand	**1,199**	**2,165**	**2,395**	**885**	**2,810**	**2,419**
Log Cabin	**Projected Population**	883	1,046	1,200	1,200	1,200	1,200
	Projected Water Demand						
	Municipal Demand	96	128	144	142	141	141
	Total Projected Water Demand	***96***	***128***	***144***	***142***	***141***	***141***
	Currently Available Water Supplies						
	Carrizo-Wilcox Aquifer	89	89	89	89	89	89
	Total Supply	***89***	***89***	***89***	***89***	***89***	***89***
	Water Management Strategies						
	Water Conservation - Basic Package	2	7	8	9	9	10
	New well in the Carrizo - Wilcox Aquifer	60	60	60	60	60	60
	Supplemental wells in Carrizo-Wilcox aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***62***	***67***	***68***	***69***	***69***	***70***
	Total Supply Less Projected Demand	**55**	**28**	**13**	**16**	**17**	**18**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Lowry Crossing	**Projected Population**	1,624	2,083	2,490	2,907	3,343	12,635
	Projected Water Demand						
	Municipal Demand	313	392	463	537	614	2,321
	Total Projected Water Demand	***313***	***392***	***463***	***537***	***614***	***2,321***
	Currently Available Water Supplies						
	NTMWD Sources (through Milligan WSC)	220	213	215	220	229	786
	Total Supply	***220***	***213***	***215***	***220***	***229***	***786***
	Water Management Strategies						
	Water Conservation - Basic Package	10	23	31	40	51	214
	Purchase water from Milligan WSC (from NTMWD)	159	263	331	318	512	1,894
	Total Water Management Strategies	***169***	***286***	***362***	***358***	***563***	***2,108***
	Total Supply Less Projected Demand	**76**	**107**	**114**	**41**	**178**	**573**
Lucas	**Projected Population**	6,400	9,849	12,000	15,500	22,000	30,000
	Projected Water Demand						
	Municipal Demand	1,032	1,533	1,828	2,344	3,327	4,537
	Total Projected Water Demand	***1,032***	***1,533***	***1,828***	***2,344***	***3,327***	***4,537***
	Currently Available Water Supplies						
	NTMWD Sources	724	832	849	960	1,238	1,536
	Total Supply	***724***	***832***	***849***	***960***	***1,238***	***1,536***
	Water Management Strategies						
	Water Conservation - Basic Package	37	64	84	116	175	254
	Purchase water from NTMWD	527	1,029	1,307	1,392	2,775	3,701
	Total Water Management Strategies	***564***	***1,093***	***1,391***	***1,508***	***2,950***	***3,955***
	Total Supply Less Projected Demand	**256**	**392**	**412**	**124**	**861**	**954**
Luella WSC	**Projected Population**	3,930	4,420	4,760	4,950	5,080	5,770
	Projected Water Demand						
	Municipal Demand	489	535	565	582	592	672
	Total Projected Water Demand	***489***	***535***	***565***	***582***	***592***	***672***
	Currently Available Water Supplies						
	Woodbine Aquifer	408	408	408	408	408	408
	Total Supply	***408***	***408***	***408***	***408***	***408***	***408***
	Water Management Strategies						
	Water Conservation - Basic Package	7	26	30	33	36	43
	Grayson County Water Supply Project	0	126	213	275	329	428
	Additional Woodbine Aquifer (Existing Wells)	81	28	0	0	0	0
	Supplemental Wells						
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***88***	***180***	***243***	***308***	***365***	***471***
	Total Supply Less Projected Demand	**7**	**53**	**86**	**134**	**181**	**208**
M E N WSC	**Projected Population**	3,421	3,755	4,137	4,477	4,762	5,180
	Projected Water Demand						
	Municipal Demand	441	471	510	542	571	621
	Total Projected Water Demand	***441***	***471***	***510***	***542***	***571***	***621***
	Currently Available Water Supplies						
	Navarro Mills Reservoir (through Corsicana)	482	469	471	465	447	438
	Total Supply	***482***	***469***	***471***	***465***	***447***	***438***
	Water Management Strategies						
	Water Conservation - Basic Package	7	22	26	30	34	39
	Purchase water from Corsicana	0	102	102	102	317	292
	Total Water Management Strategies	***7***	***124***	***128***	***132***	***351***	***331***
	Total Supply Less Projected Demand	**48**	**122**	**89**	**55**	**227**	**148**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Mabank	**Projected Population**	2,708	3,254	3,814	4,433	5,199	6,149
	Projected Water Demand						
	Municipal Demand	591	699	807	933	1,089	1,288
	Total Projected Water Demand	***591***	***699***	***807***	***933***	***1,089***	***1,288***
	Currently Available Water Supplies						
	TRWD Sources	635	609	596	592	586	588
	Total Supply	***635***	***609***	***596***	***592***	***586***	***588***
	Water Management Strategies						
	Water Conservation - Basic Package	42	124	151	182	222	273
	Water Conservation - Expanded Package	0	2	3	3	4	4
	Purchase water from TRWD	97	207	413	425	771	873
	Water Treatment Expansions						
	Water treatment plant expansion (2.3 MGD)	0	0	0	0	0	0
	Total Water Management Strategies	***139***	***333***	***567***	***610***	***997***	***1,150***
	Total Supply Less Projected Demand	**183**	**241**	**353**	**266**	**490**	**446**
Mac Bee WSC	**Projected Population**	277	348	421	502	602	726
	Projected Water Demand						
(Region C only)	Municipal Demand	36	45	54	65	78	94
	Total Projected Water Demand	***36***	***45***	***54***	***65***	***78***	***94***
	Currently Available Water Supplies						
	SRA Sources	71	75	80	86	91	95
	Total Supply	***71***	***75***	***80***	***86***	***91***	***95***
	Water Management Strategies						
	Water Conservation - Basic Package	1	2	3	3	4	6
	Water Treatment Expansions						
	Water treatment plant expansion (2 MGD)	0	0	0	0	0	0
	Total Water Management Strategies	***1***	***2***	***3***	***3***	***4***	***6***
	Total Supply Less Projected Demand	**36**	**32**	**29**	**24**	**17**	**7**
Malakoff	**Projected Population**	2,390	2,535	2,678	2,824	3,003	3,228
	Projected Water Demand						
	Municipal Demand	420	437	453	468	494	532
	Total Projected Water Demand	***420***	***437***	***453***	***468***	***494***	***532***
	Currently Available Water Supplies						
	Carrizo-Wilcox Aquifer	410	410	410	410	410	410
	TRWD Sources	231	202	183	167	155	149
	Total Supply	***641***	***612***	***593***	***577***	***565***	***559***
	Water Management Strategies						
	Water Conservation - Basic Package	4	14	16	18	21	24
	Purchase water from TRWD	35	69	127	120	205	223
	Supplemental wells in Carrizo-Wilcox aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***39***	***83***	***143***	***138***	***226***	***247***
	Total Supply Less Projected Demand	**260**	**258**	**283**	**247**	**297**	**274**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Mansfield	**Projected Population**	50,460	70,991	91,729	112,695	125,985	127,675
	Projected Water Demand						
(Region C only)	Municipal Demand	13,340	19,403	24,866	30,423	34,010	34,466
	Total Projected Water Demand	***13,340***	***19,403***	***24,866***	***30,423***	***34,010***	***34,466***
	Currently Available Water Supplies						
	TRWD Sources	10,961	11,011	11,038	11,054	11,062	11,061
	Total Supply	***10,961***	***11,011***	***11,038***	***11,054***	***11,062***	***11,061***
	Water Management Strategies						
	Water Conservation - Basic Package	401	994	1,491	2,086	2,623	2,960
	Water Conservation - Expanded Package	111	381	634	847	961	986
	Purchase water from TRWD	5,526	11,689	20,175	22,293	31,641	28,329
	New Water Treatment Plant						
	New WTP of 20 MGD	0	0	0	0	0	0
	Water Treatment Expansions						
	WTP Expansion of 15 MGD	0	0	0	0	0	0
	New WTP Expansion of 10 MGD	0	0	0	0	0	0
	New WTP Expansion of 10 MGD	0	0	0	0	0	0
	Total Water Management Strategies	***6,038***	***13,064***	***22,300***	***25,226***	***35,225***	***32,275***
	Total Supply Less Projected Demand	**3,659**	**4,672**	**8,472**	**5,857**	**12,277**	**8,870**
Maypearl	**Projected Population**	746	746	746	746	746	746
	Projected Water Demand						
	Municipal Demand	145	142	140	137	135	135
	Total Projected Water Demand	***145***	***142***	***140***	***137***	***135***	***135***
	Currently Available Water Supplies						
	Trinity Aquifer	55	55	55	55	55	55
	Woodbine Aquifer	49	49	49	49	49	49
	Total Supply	***104***	***104***	***104***	***104***	***104***	***104***
	Water Management Strategies						
	Water Conservation - Basic Package	4	9	10	11	12	13
	Water Conservation - Expanded Package	0	1	1	1	1	1
	TRA Ellis County Water Supply Project (Waxahachie)	0	73	70	68	66	66
	Additional Woodbine Aquifer (Existing Wells)	19	0	0	0	0	0
	Additional Woodbine Aquifer (New Wells)	27	46	49	53	55	46
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***50***	***129***	***130***	***133***	***134***	***126***
	Total Supply Less Projected Demand	**9**	**91**	**94**	**100**	**103**	**94**
McKinney	**Projected Population**	93,492	147,235	215,118	292,231	348,508	400,000
	Projected Water Demand						
	Municipal Demand	24,715	40,242	58,554	79,216	94,472	108,430
	Total Projected Water Demand	***24,715***	***40,242***	***58,554***	***79,216***	***94,472***	***108,430***
	Currently Available Water Supplies						
	NTMWD Sources	17,340	21,842	27,193	32,447	35,163	36,714
	Total Supply	***17,340***	***21,842***	***27,193***	***32,447***	***35,163***	***36,714***
	Water Management Strategies						
	Water Conservation - Basic Package	931	2,996	4,851	7,228	9,407	11,700
	Water Conservation - Expanded Package	207	978	1,852	2,569	3,098	3,572
	Purchase water from NTMWD	12,609	27,019	41,847	47,051	78,807	88,453
	Total Water Management Strategies	***13,747***	***30,993***	***48,550***	***56,848***	***91,312***	***103,725***
	Total Supply Less Projected Demand	**6,372**	**12,593**	**17,189**	**10,079**	**32,003**	**32,009**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
McLendon-Chisholm	**Projected Population**	1,285	1,664	1,993	2,347	2,765	3,255
	Projected Water Demand						
	Municipal Demand	194	246	290	339	396	467
	Total Projected Water Demand	***194***	***246***	***290***	***339***	***396***	***467***
	Currently Available Water Supplies						
	NTMWD Sources (through Rockwall)	136	134	135	139	147	158
	Total Supply	***136***	***134***	***135***	***139***	***147***	***158***
	Water Management Strategies						
	Water Conservation - Basic Package	3	11	14	17	22	27
	Purchase water from Rockwall (NTMWD)	99	164	207	201	331	381
	Total Water Management Strategies	***102***	***175***	***221***	***218***	***353***	***408***
	Total Supply Less Projected Demand	**44**	**63**	**66**	**18**	**104**	**99**
Melissa	**Projected Population**	14,400	20,000	26,000	32,000	40,000	50,000
	Projected Water Demand						
	Municipal Demand	2,323	4,324	5,592	6,882	8,603	10,753
	Total Projected Water Demand	***2,323***	***4,324***	***5,592***	***6,882***	***8,603***	***10,753***
	Currently Available Water Supplies						
	NTMWD Sources	1,554	2,288	2,547	2,775	3,162	3,604
	Woodbine Aquifer	108	108	108	108	108	108
	Total Supply	***1,662***	***2,396***	***2,655***	***2,883***	***3,270***	***3,712***
	Water Management Strategies						
	Water Conservation - Basic Package	87	240	357	497	693	956
	Water Conservation - Expanded Package	1	12	38	58	72	89
	Purchase water from NTMWD/GTUA (part of CGMA Project)	1,130	2,831	3,919	4,023	7,086	8,683
	Supplemental wells in Woodbine aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***1,218***	***3,083***	***4,314***	***4,578***	***7,851***	***9,728***
	Total Supply Less Projected Demand	**559**	**1,150**	**1,368**	**572**	**2,509**	**2,676**
Mesquite	**Projected Population**	160,002	195,003	225,004	242,006	249,008	250,610
	Projected Water Demand						
	Municipal Demand	28,676	34,294	38,814	41,475	42,396	42,670
	Total Projected Water Demand	***28,676***	***34,294***	***38,814***	***41,475***	***42,396***	***42,670***
	Currently Available Water Supplies						
	NTMWD Sources	20,118	18,614	18,025	16,988	15,780	14,448
	Total Supply	***20,118***	***18,614***	***18,025***	***16,988***	***15,780***	***14,448***
	Water Management Strategies						
	Water Conservation - Basic Package	869	1,949	2,548	3,075	3,504	3,882
	Water Conservation - Expanded Package	229	634	1,113	1,382	1,436	1,455
	Purchase water from NTMWD	14,630	23,026	27,740	24,634	35,366	34,808
	Total Water Management Strategies	***15,728***	***25,609***	***31,401***	***29,091***	***40,306***	***40,145***
	Total Supply Less Projected Demand	**7,170**	**9,929**	**10,612**	**4,604**	**13,690**	**11,923**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Midlothian	**Projected Population**	13,600	21,700	32,100	39,130	45,412	50,163
	Projected Water Demand						
	Municipal Demand	2,834	4,448	6,544	7,933	9,207	10,170
	Total Projected Water Demand	***2,834***	***4,448***	***6,544***	***7,933***	***9,207***	***10,170***
	Currently Available Water Supplies						
	Joe Pool Lake (through TRA)	2,543	3,430	3,304	3,186	3,012	2,853
	Trinity Aquifer	36	36	36	36	36	36
	Total Supply	***2,579***	***3,466***	***3,340***	***3,222***	***3,048***	***2,889***
	Water Management Strategies						
	Water Conservation - Basic Package	89	248	421	577	747	910
	Water Conservation - Expanded Package	21	94	268	390	463	521
	Additional Joe Pool Lake	283	217	138	108	88	75
	TRA Ellis County Water Supply Project	550	974	3,897	4,664	6,272	7,276
	Water Treatment Expansions						
	WTP Expansion of 9 MGD	0	0	0	0	0	0
	WTP Expansion of 6 MGD	0	0	0	0	0	0
	Supplemental Wells						
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***943***	***1,533***	***4,724***	***5,739***	***7,570***	***8,782***
	Total Supply Less Projected Demand	**688**	**551**	**1,520**	**1,029**	**1,411**	**1,501**
Milford	**Projected Population**	685	685	685	685	685	685
	Projected Water Demand						
	Municipal Demand	86	84	81	79	77	77
	Total Projected Water Demand	***86***	***84***	***81***	***79***	***77***	***77***
	Currently Available Water Supplies						
	Lake Aquilla	84	84	81	79	77	77
	Woodbine Aquifer	53	53	53	53	53	53
	Total Supply	***137***	***137***	***134***	***132***	***130***	***130***
	Water Management Strategies						
	Water Conservation - Basic Package	1	4	4	5	5	5
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***1***	***4***	***4***	***5***	***5***	***5***
	Total Supply Less Projected Demand	**52**	**57**	**57**	**58**	**58**	**58**
Milligan WSC	**Projected Population**	1,621	1,621	1,621	1,621	1,621	1,621
	Projected Water Demand						
	Municipal Demand	202	196	191	185	183	183
	Total Projected Water Demand	***202***	***196***	***191***	***185***	***183***	***183***
	Currently Available Water Supplies						
	NTMWD Sources	142	106	89	76	68	62
	Total Supply	***142***	***106***	***89***	***76***	***68***	***62***
	Water Management Strategies						
	Water Conservation - Basic Package	3	11	12	13	13	14
	Purchase water from NTMWD	103	132	135	110	151	149
	Total Water Management Strategies	***106***	***143***	***147***	***123***	***164***	***163***
	Total Supply Less Projected Demand	**46**	**53**	**45**	**14**	**49**	**42**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Mineral Wells	**Projected Population**	4,000	4,000	4,000	4,000	4,000	4,000
	Projected Water Demand						
(Region C only)	Municipal Demand	766	753	744	730	726	726
	Total Projected Water Demand	***766***	***753***	***744***	***730***	***726***	***726***
	Currently Available Water Supplies						
	Lake Mineral Wells	0	0	0	0	0	0
	Lake Palo Pinto	766	753	744	730	726	726
	Total Supply	***766***	***753***	***744***	***730***	***726***	***726***
	Water Management Strategies						
	Water Conservation - (Region G)	23	38	52	52	52	52
	Total Water Management Strategies	***23***	***38***	***52***	***52***	***52***	***52***
	Total Supply Less Projected Demand	**23**	**38**	**52**	**52**	**52**	**52**
Mountain Peak WSC	**Projected Population**	6,691	7,509	7,964	9,194	11,305	14,031
	Projected Water Demand						
(Region C only)	Municipal Demand	1,207	1,337	1,409	1,607	1,975	2,452
	Total Projected Water Demand	***1,207***	***1,337***	***1,409***	***1,607***	***1,975***	***2,452***
	Currently Available Water Supplies						
	Midlothian Sources	408	436	286	227	185	159
	Trinity Aquifer	751	751	751	751	751	751
	Total Supply	***1,159***	***1,187***	***1,037***	***978***	***936***	***910***
	Water Management Strategies						
	Water Conservation - Basic Package	148	443	479	560	705	896
	Water Conservation - Expanded Package	1	4	8	11	13	16
	Rockett SUD-Waxahachie-Red Oak Project	287	322	329	515	848	1,269
	TRA Ellis County Water Supply Project (Midlothian)	24	91	199	235	266	285
	Additional Trinity Aquifer (New Wells)	204	265	300	316	329	354
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***664***	***1,125***	***1,315***	***1,637***	***2,161***	***2,820***
	Total Supply Less Projected Demand	**616**	**975**	**943**	**1,008**	**1,122**	**1,278**
Mt Zion WSC	**Projected Population**	1,700	2,500	2,800	3,100	3,400	3,500
	Projected Water Demand						
	Municipal Demand	442	641	709	774	842	866
	Total Projected Water Demand	***442***	***641***	***709***	***774***	***842***	***866***
	Currently Available Water Supplies						
	NTMWD Sources (through Rockwall)	310	348	329	317	314	293
	Total Supply	***310***	***348***	***329***	***317***	***314***	***293***
	Water Management Strategies						
	Water Conservation - Basic Package	13	33	42	53	64	73
	Purchase water from NTMWD	226	433	511	463	708	710
	Total Water Management Strategies	***239***	***466***	***553***	***516***	***772***	***783***
	Total Supply Less Projected Demand	**107**	**173**	**173**	**59**	**244**	**210**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Muenster	**Projected Population**	1,900	2,200	2,430	2,700	3,000	3,300
	Projected Water Demand						
	Municipal Demand	379	429	468	511	565	621
	Total Projected Water Demand	***379***	***429***	***468***	***511***	***565***	***621***
	Currently Available Water Supplies						
	Trinity Aquifer	301	301	301	301	301	301
	Total Supply	***301***	***301***	***301***	***301***	***301***	***301***
	Water Management Strategies						
	Water Conservation - Basic Package	11	25	31	38	47	57
	Water Conservation - Expanded Package	0	1	6	9	10	11
	Muenster Lake	78	146	178	214	266	320
	Negotiate subordination agreement	0	0	0	0	0	0
	New Water Treatment Plant						
	New WTP of 1.6 MGD	0	0	0	0	0	0
	Supplemental Wells						
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***89***	***172***	***215***	***261***	***323***	***388***
	Total Supply Less Projected Demand	**11**	**44**	**48**	**51**	**59**	**68**
Murphy	**Projected Population**	7,500	28,500	28,500	28,500	28,500	28,500
	Projected Water Demand						
	Municipal Demand	1,554	5,810	5,778	5,746	5,746	5,746
	Total Projected Water Demand	***1,554***	***5,810***	***5,778***	***5,746***	***5,746***	***5,746***
	Currently Available Water Supplies						
	NTMWD Sources	1,090	3,154	2,683	2,354	2,139	1,946
	Total Supply	***1,090***	***3,154***	***2,683***	***2,354***	***2,139***	***1,946***
	Water Management Strategies						
	Water Conservation - Basic Package	51	337	384	431	479	527
	Water Conservation - Expanded Package	2	31	41	42	42	42
	Purchase water from NTMWD	793	3,900	4,131	3,412	4,794	4,687
	Total Water Management Strategies	***846***	***4,268***	***4,556***	***3,885***	***5,315***	***5,256***
	Total Supply Less Projected Demand	**382**	**1,612**	**1,461**	**493**	**1,708**	**1,456**
Mustang SUD	**Projected Population**	6,580	9,897	13,015	16,225	19,484	22,894
	Projected Water Demand						
	Municipal Demand	921	1,474	1,939	2,399	2,881	3,385
	Total Projected Water Demand	***921***	***1,474***	***1,939***	***2,399***	***2,881***	***3,385***
	Currently Available Water Supplies						
	Trinity Aquifer	331	331	331	331	331	331
	UTRWD Sources	541	628	728	839	1,169	1,307
	Total Supply	***872***	***959***	***1,059***	***1,170***	***1,500***	***1,638***
	Water Management Strategies						
	Water Conservation - Basic Package	18	72	101	134	170	211
	Reduce Trinity Aquifer use (reallocated to others)	-33	-41	-85	-182	-232	-265
	Purchase water from UTRWD	236	1,217	1,524	1,753	2,161	2,720
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***221***	***1,248***	***1,540***	***1,705***	***2,099***	***2,666***
	Total Supply Less Projected Demand	**172**	**733**	**660**	**476**	**718**	**919**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Navarro County-Irrigation	**Projected Water Demand**						
	Irrigation Demand	0	0	0	0	0	0
	Total Projected Water Demand	***0***	***0***	***0***	***0***	***0***	***0***
	Currently Available Water Supplies						
	Irrigation Local Supply	226	226	226	226	226	226
	Total Supply	***226***	***226***	***226***	***226***	***226***	***226***
	Water Management Strategies						
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**226**	**226**	**226**	**226**	**226**	**226**
Navarro County-Livestock	**Projected Water Demand**						
	Livestock Demand	1,543	1,543	1,543	1,543	1,543	1,543
	Total Projected Water Demand	***1,543***	***1,543***	***1,543***	***1,543***	***1,543***	***1,543***
	Currently Available Water Supplies						
	Carrizo-Wilcox Aquifer	15	15	15	15	15	15
	Livestock Local Supply	1,603	1,603	1,603	1,603	1,603	1,603
	Nacatoch Aquifer	10	10	10	10	10	10
	Other Aquifer	104	104	104	104	104	104
	Total Supply	***1,732***	***1,732***	***1,732***	***1,732***	***1,732***	***1,732***
	Water Management Strategies						
	Supplemental wells in Carrizo-Wilcox aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**189**	**189**	**189**	**189**	**189**	**189**
Navarro County-Manufacturing	**Projected Water Demand**						
	Manufacturing Demand	1,172	1,328	1,468	1,607	1,730	1,872
	Total Projected Water Demand	***1,172***	***1,328***	***1,468***	***1,607***	***1,730***	***1,872***
	Currently Available Water Supplies						
	Lake Halbert (through Corsicana)	0	0	0	0	0	0
	Navarro Mills Reservoir (through Corsicana)	653	675	692	703	691	673
	TRWD Sources	617	567	532	500	456	419
	Total Supply	***1,270***	***1,242***	***1,224***	***1,203***	***1,147***	***1,092***
	Water Management Strategies						
	Water Conservation	0	1	16	23	25	27
	Purchase water from Corsicana	0	146	150	154	489	448
	Purchase water from TRWD	94	193	367	358	601	621
	Total Water Management Strategies	***94***	***340***	***533***	***535***	***1,115***	***1,096***
	Total Supply Less Projected Demand	**192**	**254**	**289**	**131**	**532**	**316**
Navarro County-Mining	**Projected Water Demand**						
	Mining Demand	89	89	89	89	89	89
	Total Projected Water Demand	***89***	***89***	***89***	***89***	***89***	***89***
	Currently Available Water Supplies						
	Carrizo-Wilcox Aquifer	73	73	73	73	73	73
	Nacatoch Aquifer	38	38	38	38	38	38
	Total Supply	***111***	***111***	***111***	***111***	***111***	***111***
	Water Management Strategies						
	Supplemental wells in Carrizo-Wilcox & Nacatoch aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**22**	**22**	**22**	**22**	**22**	**22**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Navarro County-Other	**Projected Population**	1,760	1,760	1,760	1,760	1,760	1,760
	Projected Water Demand						
	County-Other Demand	250	244	239	233	229	229
	Total Projected Water Demand	***250***	***244***	***239***	***233***	***229***	***229***
	Currently Available Water Supplies						
	Navarro Mills Reservoir (Corsicana)	137	122	110	100	90	81
	TRWD Sources	134	106	88	74	62	52
	Total Supply	***271***	***228***	***198***	***174***	***152***	***133***
	Water Management Strategies						
	Water Conservation - Basic Package	3	11	11	12	13	13
	Purchase water from TRWD	21	36	61	53	81	78
	Purchase water from Corsicana	0	26	24	22	64	54
	Total Water Management Strategies	***24***	***73***	***96***	***87***	***158***	***145***
	Total Supply Less Projected Demand	**45**	**57**	**55**	**28**	**81**	**49**
Navarro County-Steam Electric Power	**Projected Water Demand**						
	Steam Electric Power Demand	0	0	0	0	0	0
	Total Projected Water Demand	***0***	***0***	***0***	***0***	***0***	***0***
	Currently Available Water Supplies						
	Total Supply	***0***	***0***	***0***	***0***	***0***	***0***
	Water Management Strategies						
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**0**	**0**	**0**	**0**	**0**	**0**
Navarro Mills WSC	**Projected Population**	3,213	4,016	5,020	6,274	7,843	9,804
	Projected Water Demand						
	Municipal Demand	342	481	585	724	896	1,120
	Total Projected Water Demand	***342***	***481***	***585***	***724***	***896***	***1,120***
	Currently Available Water Supplies						
	Navarro Mills Reservoir (Corsicana)	374	479	541	621	702	789
	Total Supply	***374***	***479***	***541***	***621***	***702***	***789***
	Water Management Strategies						
	Water Conservation - Basic Package	6	23	31	41	54	72
	Purchase water from Corsicana	0	104	117	136	498	526
	Total Water Management Strategies	***6***	***127***	***148***	***177***	***552***	***598***
	Total Supply Less Projected Demand	**38**	**125**	**104**	**74**	**358**	**267**
Nevada	**Projected Population**	690	1,500	1,800	3,600	6,000	15,000
	Projected Water Demand						
	Municipal Demand	247	528	631	1,254	2,090	5,226
	Total Projected Water Demand	***247***	***528***	***631***	***1,254***	***2,090***	***5,226***
	Currently Available Water Supplies						
	NTMWD Sources	173	287	294	513	777	1,770
	Total Supply	***173***	***287***	***294***	***513***	***777***	***1,770***
	Water Management Strategies						
	Water Conservation - Basic Package	7	25	35	79	150	418
	Purchase water from NTMWD	126	355	453	747	1,750	4,276
	Total Water Management Strategies	***133***	***380***	***488***	***826***	***1,900***	***4,694***
	Total Supply Less Projected Demand	**59**	**139**	**151**	**85**	**587**	**1,238**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
New Fairview	**Projected Population**	1,587	2,167	2,732	3,290	3,921	4,654
	Projected Water Demand						
	Municipal Demand	201	272	340	409	488	579
	Total Projected Water Demand	***201***	***272***	***340***	***409***	***488***	***579***
	Currently Available Water Supplies						
	Trinity Aquifer	103	103	103	103	103	103
	Total Supply	***103***	***103***	***103***	***103***	***103***	***103***
	Water Management Strategies						
	Water Conservation - Basic Package	4	15	20	26	32	40
	Purchase water from Rhome (Walnut Creek SUD)	121	197	296	333	480	540
	Supplemental wells in aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***125***	***212***	***316***	***359***	***512***	***580***
	Total Supply Less Projected Demand	**27**	**43**	**79**	**53**	**127**	**104**
New Hope	**Projected Population**	826	1,200	2,000	3,000	4,500	10,000
	Projected Water Demand						
	Municipal Demand	267	383	632	944	1,416	3,148
	Total Projected Water Demand	***267***	***383***	***632***	***944***	***1,416***	***3,148***
	Currently Available Water Supplies						
	NTMWD Sources (N. Collins WSC)	187	208	294	387	527	1,066
	Total Supply	***187***	***208***	***294***	***387***	***527***	***1,066***
	Water Management Strategies						
	Water Conservation - Basic Package	7	19	36	62	105	259
	Purchase water from N.Collin WSC (NTMWD)	137	259	453	564	1,186	2,579
	Total Water Management Strategies	***144***	***278***	***489***	***626***	***1,291***	***2,838***
	Total Supply Less Projected Demand	**64**	**103**	**151**	**69**	**402**	**756**
Newark	**Projected Population**	1,137	1,772	2,339	3,302	4,458	6,216
	Projected Water Demand						
	Municipal Demand	154	232	301	418	564	787
	Total Projected Water Demand	***154***	***232***	***301***	***418***	***564***	***787***
	Currently Available Water Supplies						
	Trinity Aquifer	92	92	92	92	92	92
	Total Supply	***92***	***92***	***92***	***92***	***92***	***92***
	Water Management Strategies						
	Water Conservation - Basic Package	2	10	15	22	32	47
	Purchase water from Walnut Creek SUD (from TRWD)	77	164	261	355	588	788
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***79***	***174***	***276***	***377***	***620***	***835***
	Total Supply Less Projected Demand	**17**	**34**	**67**	**51**	**148**	**140**
North Collin WSC	**Projected Population**	5,044	6,510	7,808	9,138	10,530	12,012
	Projected Water Demand						
	Municipal Demand	876	1,116	1,321	1,525	1,757	2,005
	Total Projected Water Demand	***876***	***1,116***	***1,321***	***1,525***	***1,757***	***2,005***
	Currently Available Water Supplies						
	NTMWD Sources	615	606	613	625	654	679
	Total Supply	***615***	***606***	***613***	***625***	***654***	***679***
	Water Management Strategies						
	Water Conservation - Basic Package	31	76	102	131	166	206
	Water Conservation - Expanded Package	1	5	8	9	11	12
	Purchase water from NTMWD	447	750	945	905	1,467	1,634
	Total Water Management Strategies	***479***	***831***	***1,055***	***1,045***	***1,644***	***1,852***
	Total Supply Less Projected Demand	**218**	**321**	**347**	**145**	**541**	**526**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
North Hunt WSC	**Projected Population**	380	427	462	488	514	542
	Projected Water Demand						
(Region C only)	Municipal Demand	49	55	60	63	66	70
	Total Projected Water Demand	***49***	***55***	***60***	***63***	***66***	***70***
	Currently Available Water Supplies						
	Woodbine Aquifer	60	65	71	71	71	71
	Total Supply	***60***	***65***	***71***	***71***	***71***	***71***
	Water Management Strategies						
	Water Conservation - Basic Package	1	3	3	3	4	4
	Total Water Management Strategies	***1***	***3***	***3***	***3***	***4***	***4***
	Total Supply Less Projected Demand	**12**	**13**	**14**	**11**	**9**	**5**
North Richland Hills	**Projected Population**	64,861	73,503	79,341	83,286	85,951	87,751
	Projected Water Demand						
	Municipal Demand	12,496	13,832	14,753	15,300	15,693	16,022
	Total Projected Water Demand	***12,496***	***13,832***	***14,753***	***15,300***	***15,693***	***16,022***
	Currently Available Water Supplies						
	Trinity Aquifer	14	14	14	14	14	14
	TRWD Sources (through Fort Worth)	4,026	3,618	3,271	2,914	2,531	2,194
	TRWD Sources (through TRA)	6,446	6,446	6,446	6,446	5,899	5,114
	Total Supply	***10,486***	***10,078***	***9,731***	***9,374***	***8,444***	***7,322***
	Water Management Strategies						
	Water Conservation - Basic Package	366	758	936	1,102	1,264	1,424
	Water Conservation - Expanded Package	109	312	407	440	455	466
	Purchase water from TRA (from TRWD)	3,057	3,606	4,889	3,598	5,764	5,644
	Purchase water from Fort Worth (TRWD)	618	1,228	2,263	2,087	3,334	3,257
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***4,150***	***5,904***	***8,495***	***7,227***	***10,817***	***10,791***
	Total Supply Less Projected Demand	**2,140**	**2,150**	**3,473**	**1,301**	**3,568**	**2,091**
Northlake	**Projected Population**	4,974	5,753	11,059	16,364	19,684	21,195
	Projected Water Demand						
	Municipal Demand	786	934	1,796	2,658	3,197	3,443
	Total Projected Water Demand	***786***	***934***	***1,796***	***2,658***	***3,197***	***3,443***
	Currently Available Water Supplies						
	TRWD Sources (Fort Worth)	563	543	885	1,125	1,146	1,048
	Woodbine Aquifer	9	9	9	9	9	9
	Total Supply	***572***	***552***	***894***	***1,134***	***1,155***	***1,057***
	Water Management Strategies						
	Water Conservation - Basic Package	29	59	128	212	281	332
	Purchase water from Fort Worth (TRWD)	86	185	612	806	1,509	1,555
	Purchase water from UTRWD	327	468	773	1,020	1,223	1,309
	Supplemental wells in Woodbine aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***442***	***712***	***1,513***	***2,038***	***3,013***	***3,196***
	Total Supply Less Projected Demand	**228**	**330**	**611**	**514**	**971**	**810**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Oak Grove	**Projected Population**	928	1,141	1,360	1,602	1,902	2,274
	Projected Water Demand						
	Municipal Demand	124	148	172	201	236	283
	Total Projected Water Demand	***124***	***148***	***172***	***201***	***236***	***283***
	Currently Available Water Supplies						
	NTMWD Sources (Kaufman)	87	80	80	82	88	96
	Total Supply	***87***	***80***	***80***	***82***	***88***	***96***
	Water Management Strategies						
	Water Conservation - Basic Package	2	7	9	12	15	19
	Purchase water from Kaufman (NTMWD)	63	100	123	120	197	231
	Total Water Management Strategies	***65***	***107***	***132***	***132***	***212***	***250***
	Total Supply Less Projected Demand	**28**	**39**	**40**	**13**	**64**	**63**
Oak Leaf	**Projected Population**	1,502	1,774	2,042	2,316	2,622	2,960
	Projected Water Demand						
	Municipal Demand	338	393	448	503	567	640
	Total Projected Water Demand	***338***	***393***	***448***	***503***	***567***	***640***
	Currently Available Water Supplies						
	DWU Sources (Glen Heights)	248	259	271	277	274	266
	Total Supply	***248***	***259***	***271***	***277***	***274***	***266***
	[Note: Oak Leaf also receives a small amount of water from Rockett SUD and Sardis Lone Elm.]						
	Water Management Strategies						
	Water Conservation - Basic Package	10	22	29	37	47	58
	Purchase water from Glenn Heights (DWU)	87	180	241	322	397	394
	Total Water Management Strategies	***97***	***202***	***270***	***359***	***444***	***452***
	Total Supply Less Projected Demand	**7**	**68**	**93**	**133**	**151**	**78**
Oak Point	**Projected Population**	3,485	5,193	6,799	8,452	10,130	11,886
	Projected Water Demand						
	Municipal Demand	511	838	1,097	1,354	1,623	1,904
	Total Projected Water Demand	***511***	***838***	***1,097***	***1,354***	***1,623***	***1,904***
	Currently Available Water Supplies						
	Trinity Aquifer	145	145	145	145	145	145
	UTRWD Sources (Mustang SUD)	330	373	419	479	531	512
	Total Supply	***475***	***518***	***564***	***624***	***676***	***657***
	Water Management Strategies						
	Water Conservation - Basic Package	8	50	74	103	137	177
	Water Conservation - Expanded Package	0	0	0	0	1	2
	Purchase water from Mustang SUD (from UTRWD)	143	724	883	1,003	1,227	1,538
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***151***	***774***	***957***	***1,106***	***1,365***	***1,717***
	Total Supply Less Projected Demand	**115**	**454**	**424**	**376**	**418**	**470**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Ovilla	**Projected Population**	5,351	7,221	9,146	10,508	11,050	11,846
	Projected Water Demand						
	Municipal Demand	1,091	1,456	1,824	2,083	2,191	2,349
	Total Projected Water Demand	***1,091***	***1,456***	***1,824***	***2,083***	***2,191***	***2,349***
	Currently Available Water Supplies						
	DWU Sources	768	922	1,069	1,118	1,033	955
	Woodbine Aquifer	56	56	56	56	56	56
	Total Supply	***824***	***978***	***1,125***	***1,174***	***1,089***	***1,011***
	Water Management Strategies						
	Water Conservation - Basic Package	35	86	124	159	186	219
	Water Conservation - Expanded Package	1	6	7	9	11	12
	Purchase water from DWU	265	639	951	1,301	1,492	1,412
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***301***	***731***	***1,082***	***1,469***	***1,689***	***1,643***
	Total Supply Less Projected Demand	**34**	**253**	**383**	**560**	**587**	**305**
Palmer	**Projected Population**	1,924	2,063	2,200	2,340	2,497	2,670
	Projected Water Demand						
	Municipal Demand	239	250	259	267	282	302
	Total Projected Water Demand	***239***	***250***	***259***	***267***	***282***	***302***
	Currently Available Water Supplies						
	Woodbine Aquifer	280	280	280	280	280	280
	Total Supply	***280***	***280***	***280***	***280***	***280***	***280***
	Water Management Strategies						
	Water Conservation - Basic Package	3	13	14	16	18	20
	Rockett SUD-Waxahachie-Red Oak Project	30	30	30	30	29	29
	TRA Ellis County Water Supply Project (Waxahachie)	0	50	52	53	57	61
	Additional Woodbine Aquifer (Existing Wells)	0	0	0	0	2	17
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***33***	***93***	***96***	***99***	***106***	***127***
	Total Supply Less Projected Demand	**74**	**123**	**117**	**112**	**104**	**105**
Pantego	**Projected Population**	2,318	2,318	2,318	2,318	2,318	2,318
	Projected Water Demand						
	Municipal Demand	649	641	634	626	621	621
	Total Projected Water Demand	***649***	***641***	***634***	***626***	***621***	***621***
	Currently Available Water Supplies						
	Trinity Aquifer	469	469	469	469	469	469
	Total Supply	***469***	***469***	***469***	***469***	***469***	***469***
	Water Management Strategies						
	Water Conservation - Basic Package	18	32	37	42	47	52
	Water Conservation - Expanded Package	1	4	5	5	5	5
	Purchase water from Arlington & Fort Worth (TRWD)	223	201	206	171	188	172
	Overdrafting Trinity Aquifer using existing wells in 2010	149	0	0	0	0	0
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***391***	***237***	***248***	***218***	***240***	***229***
	Total Supply Less Projected Demand	**211**	**65**	**83**	**61**	**88**	**77**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Parker	**Projected Population**	5,000	10,900	16,000	26,000	38,000	52,000
	Projected Water Demand						
	Municipal Demand	1,915	4,078	5,950	9,669	14,132	19,338
	Total Projected Water Demand	***1,915***	***4,078***	***5,950***	***9,669***	***14,132***	***19,338***
	Currently Available Water Supplies						
	NTMWD Sources	1,344	2,213	2,763	3,960	5,260	6,548
	Total Supply	***1,344***	***2,213***	***2,763***	***3,960***	***5,260***	***6,548***
	Water Management Strategies						
	Water Conservation - Basic Package	55	186	322	604	1,000	1,530
	Water Conservation - Expanded Package	2	24	43	72	107	150
	Purchase water from NTMWD	977	2,740	4,253	5,743	11,789	15,776
	Total Water Management Strategies	***1,034***	***2,950***	***4,618***	***6,419***	***12,896***	***17,456***
	Total Supply Less Projected Demand	**463**	**1,085**	**1,431**	**710**	**4,024**	**4,666**
Parker County-Irrigation	**Projected Water Demand**						
	Irrigation Demand	422	422	422	422	422	422
	Total Projected Water Demand	***422***	***422***	***422***	***422***	***422***	***422***
	Currently Available Water Supplies						
	Direct reuse	202	202	202	202	202	202
	Irrigation Local Supply	122	122	122	122	122	122
	Irrigation Local Supply	117	117	117	117	117	117
	Trinity Aquifer	88	88	88	88	88	88
	Total Supply	***529***	***529***	***529***	***529***	***529***	***529***
	Water Management Strategies						
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**107**	**107**	**107**	**107**	**107**	**107**
Parker County-Livestock	**Projected Water Demand**						
	Livestock Demand	1,856	1,856	1,856	1,856	1,856	1,856
	Total Projected Water Demand	***1,856***	***1,856***	***1,856***	***1,856***	***1,856***	***1,856***
	Currently Available Water Supplies						
	Livestock Local Supply	903	903	903	903	903	903
	Livestock Local Supply	1,019	1,019	1,019	1,019	1,019	1,019
	Trinity Aquifer	213	213	213	213	213	213
	Total Supply	***2,135***	***2,135***	***2,135***	***2,135***	***2,135***	***2,135***
	Water Management Strategies						
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**279**	**279**	**279**	**279**	**279**	**279**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Parker County-Manufacturing	**Projected Water Demand**						
	Manufacturing Demand	779	879	974	1,068	1,150	1,248
	Total Projected Water Demand	***779***	***879***	***974***	***1,068***	***1,150***	***1,248***
	Currently Available Water Supplies						
	Lake Palo Pinto (Mineral Wells)	25	25	25	25	25	25
	Lake Weatherford (Weatherford)	268	233	207	189	171	154
	Trinity Aquifer	18	18	18	18	18	18
	TRWD Sources (Weatherford)	169	168	171	180	185	191
	Total Supply	***480***	***444***	***421***	***412***	***399***	***388***
	Water Management Strategies						
	Water Conservation	0	0	6	9	10	10
	Purchase water from TRWD	194	291	414	454	593	613
	Purchase water from Mineral Wells	250	250	250	300	250	250
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***444***	***541***	***670***	***763***	***853***	***873***
	Total Supply Less Projected Demand	**145**	**106**	**117**	**107**	**102**	**13**
Parker County-Mining	**Projected Water Demand**						
	Mining Demand	98	112	122	132	142	150
	Total Projected Water Demand	***98***	***112***	***122***	***132***	***142***	***150***
	Currently Available Water Supplies						
	Other Local Supply	16	16	15	15	14	14
	Other Local Supply	4	4	5	5	6	6
	Possum Kingdom (BRA)	2,000	2,000	2,000	2,000	2,000	2,000
	Trinity Aquifer	59	59	59	59	59	59
	Total Supply	***2,079***	***2,079***	***2,079***	***2,079***	***2,079***	***2,079***
	Water Management Strategies						
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**1,981**	**1,967**	**1,957**	**1,947**	**1,937**	**1,929**
Parker County-Other	**Projected Population**	38,144	37,824	38,905	39,396	37,396	35,396
	Projected Water Demand						
	County-Other Demand	4,785	4,618	4,663	4,634	4,357	4,124
	Total Projected Water Demand	***4,785***	***4,618***	***4,663***	***4,634***	***4,357***	***4,124***
	Currently Available Water Supplies						
	Lake Palo Pinto (Mineral Wells)	479	479	479	479	479	479
	Lake Weatherford (Weatherford)	15	12	11	9	8	8
	Other Aquifer	33	33	33	33	33	33
	Trinity Aquifer	4,815	4,815	4,815	4,815	4,815	4,815
	TRWD Sources (through Weatherford)	173	125	102	88	76	67
	Total Supply	***5,515***	***5,464***	***5,440***	***5,424***	***5,411***	***5,402***
	Water Management Strategies						
	Water Conservation - Basic Package	55	222	243	261	262	261
	Purchase water from TRWD (Weatherford)	0	0	0	0	0	0
	Purchase water from TRWD (Parker Co. UD)	0	1,284	1,199	897	871	660
	Purchase water from Mineral Wells	280	280	280	280	280	280
	Supplemental wells in Trinity & Other aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***335***	***1,786***	***1,722***	***1,438***	***1,413***	***1,201***
	Total Supply Less Projected Demand	**1,065**	**2,632**	**2,499**	**2,228**	**2,467**	**2,479**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Parker County-Steam Electric Power	**Projected Water Demand**						
	Steam Electric Power Demand	30	4,617	5,397	6,349	7,509	8,923
	Total Projected Water Demand	***30***	***4,617***	***5,397***	***6,349***	***7,509***	***8,923***
	Currently Available Water Supplies						
	Lake Weatherford	30	24	28	32	38	46
	Total Supply	***30***	***24***	***28***	***32***	***38***	***46***
	Water Management Strategies						
	Purchase water from BRA (Possum Kingdom Lake)	0	4,000	4,000	4,000	4,000	4,000
	Purchase reuse from Weatherford		5,000	5,000	5,000	5,000	5,000
	Total Water Management Strategies	***0***	***9,000***	***9,000***	***9,000***	***9,000***	***9,000***
	Total Supply Less Projected Demand	**0**	**4,407**	**3,631**	**2,683**	**1,529**	**123**
Payne Springs	**Projected Population**	730	781	831	882	945	1,024
	Projected Water Demand						
	Municipal Demand	165	174	182	191	203	220
	Total Projected Water Demand	***165***	***174***	***182***	***191***	***203***	***220***
	Currently Available Water Supplies						
	TRWD Sources (East Cedar Creek FWSD)	51	45	40	37	34	31
	Total Supply	***51***	***45***	***40***	***37***	***34***	***31***
	Water Management Strategies						
	Water Conservation - Basic Package	5	10	12	14	16	20
	Water Conservation - Expanded Package	0	1	1	1	1	1
	Purchase water from East Cedar Creek FWSD (from TRWD)	153	158	188	171	219	218
	Total Water Management Strategies	***158***	***169***	***201***	***186***	***236***	***239***
	Total Supply Less Projected Demand	**44**	**40**	**59**	**32**	**67**	**50**
Pecan Hill	**Projected Population**	813	943	1,072	1,203	1,350	1,512
	Projected Water Demand						
	Municipal Demand	160	183	205	228	254	285
	Total Projected Water Demand	***160***	***183***	***205***	***228***	***254***	***285***
	Currently Available Water Supplies						
	Lake Waxahachie (Waxahachie)	29	0	0	0	0	0
	Other Aquifer	111	111	111	111	111	111
	Total Supply	***140***	***111***	***111***	***111***	***111***	***111***
	Water Management Strategies						
	Water Conservation - Basic Package	5	10	13	17	21	26
	Rockett SUD-Waxahachie-Red Oak Project	31	137	129	164	184	213
	Supplemental Wells in Other Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***36***	***147***	***142***	***181***	***205***	***239***
	Total Supply Less Projected Demand	**16**	**75**	**48**	**64**	**62**	**65**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Pelican Bay	**Projected Population**	1,727	1,935	2,149	2,374	2,644	2,963
	Projected Water Demand						
	Municipal Demand	157	202	253	274	302	339
	Total Projected Water Demand	***157***	***202***	***253***	***274***	***302***	***339***
	Currently Available Water Supplies						
	Trinity Aquifer	80	80	80	80	80	80
	Total Supply	***80***	***80***	***80***	***80***	***80***	***80***
	Water Management Strategies						
	Water Conservation - Basic Package	3	12	14	16	19	22
	Purchase water from TRWD	95	142	216	211	277	295
	Overdrafting Trinity Aquifer using new wells in 2010	72	0	0	0	0	0
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***170***	***154***	***230***	***227***	***296***	***317***
	Total Supply Less Projected Demand	**93**	**32**	**57**	**33**	**74**	**58**
Pilot Point	**Projected Population**	8,000	10,500	12,000	13,290	14,100	15,000
	Projected Water Demand						
	Municipal Demand	1,210	1,670	1,895	2,069	2,195	2,335
	Total Projected Water Demand	***1,210***	***1,670***	***1,895***	***2,069***	***2,195***	***2,335***
	Currently Available Water Supplies						
	Trinity Aquifer	587	587	587	587	587	587
	UTRWD Sources	0	0	0	0	0	0
	Total Supply	***587***	***587***	***587***	***587***	***587***	***587***
	Water Management Strategies						
	Water Conservation - Basic Package	18	94	123	90	103	117
	Reduce Trinity Aquifer use (reallocated to others)	0	0	-113	-264	-352	-411
	Purchase water from UTRWD	850	1,852	1,991	2,079	2,317	2,529
	Overdrafting Trinity Aquifer using existing wells	200	0	0	0	0	0
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***1,068***	***1,946***	***2,001***	***1,905***	***2,068***	***2,235***
	Total Supply Less Projected Demand	**445**	**863**	**693**	**423**	**460**	**487**
Plano	**Projected Population**	253,608	264,932	275,000	285,000	295,000	305,000
	Projected Water Demand						
	Municipal Demand	72,439	75,080	77,318	79,810	82,281	85,069
	Total Projected Water Demand	***72,439***	***75,080***	***77,318***	***79,810***	***82,281***	***85,069***
	Currently Available Water Supplies						
	NTMWD Sources	50,823	40,751	35,907	32,690	30,625	28,804
	Total Supply	***50,823***	***40,751***	***35,907***	***32,690***	***30,625***	***28,804***
	Water Management Strategies						
	Water Conservation - Basic Package	1,979	3,541	4,300	5,109	5,958	6,869
	Water Conservation - Expanded Package	78	409	471	486	502	520
	Purchase water from NTMWD	36,957	50,409	55,252	47,406	68,640	69,395
	Total Water Management Strategies	***39,014***	***54,359***	***60,023***	***53,001***	***75,100***	***76,784***
	Total Supply Less Projected Demand	**17,398**	**20,030**	**18,612**	**5,881**	**23,444**	**20,519**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Ponder	**Projected Population**	1,800	5,000	10,000	16,000	18,500	19,000
	Projected Water Demand						
	Municipal Demand	621	1,714	3,416	5,466	6,320	6,491
	Total Projected Water Demand	***621***	***1,714***	***3,416***	***5,466***	***6,320***	***6,491***
	Currently Available Water Supplies						
	Trinity Aquifer	201	201	201	201	201	201
	Total Supply	***201***	***201***	***201***	***201***	***201***	***201***
	Water Management Strategies						
	Water Conservation - Basic Package	18	78	184	340	446	512
	Water Conservation - Expanded Package	0	6	15	28	35	37
	Reduce Trinity Aquifer use (reallocated to others)	0	0	-39	-90	-121	-141
	Purchase water from UTRWD	549	2,354	4,254	6,190	7,184	6,958
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***567***	***2,438***	***4,414***	***6,468***	***7,544***	***7,366***
	Total Supply Less Projected Demand	**147**	**925**	**1,199**	**1,203**	**1,425**	**1,076**
Pottsboro	**Projected Population**	3,000	5,000	7,000	9,000	11,000	12,000
	Projected Water Demand						
	Municipal Demand	504	851	1,176	1,492	1,811	1,976
	Total Projected Water Demand	***504***	***851***	***1,176***	***1,492***	***1,811***	***1,976***
	Currently Available Water Supplies						
	Lake Texoma (Denison)	561	561	561	561	561	561
	Woodbine Aquifer	123	123	123	123	123	123
	Total Supply	***684***	***684***	***684***	***684***	***684***	***684***
	Water Management Strategies						
	Water Conservation - Basic Package	17	52	82	118	158	189
	Water Conservation - Expanded Package	0	4	8	13	16	19
	Permit Lake Texoma supply	0	0	0	0	0	0
	Purchase additional water treatment capacity from Denison	0	200	525	834	1,142	1,292
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***17***	***256***	***615***	***965***	***1,316***	***1,500***
	Total Supply Less Projected Demand	**197**	**89**	**123**	**157**	**189**	**208**
Princeton	**Projected Population**	5,000	10,000	18,000	30,000	50,000	75,000
	Projected Water Demand						
	Municipal Demand	666	1,568	2,782	4,604	7,673	11,509
	Total Projected Water Demand	***666***	***1,568***	***2,782***	***4,604***	***7,673***	***11,509***
	Currently Available Water Supplies						
	NTMWD Sources	467	851	1,292	1,886	2,856	3,897
	Total Supply	***467***	***851***	***1,292***	***1,886***	***2,856***	***3,897***
	Water Management Strategies						
	Water Conservation - Basic Package	9	55	108	194	350	563
	Purchase water from NTMWD	340	1,053	1,988	2,733	6,401	9,388
	Total Water Management Strategies	***349***	***1,108***	***2,096***	***2,927***	***6,751***	***9,951***
	Total Supply Less Projected Demand	**150**	**391**	**606**	**209**	**1,934**	**2,339**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Prosper	**Projected Population**	10,000	35,000	53,000	65,000	70,000	75,000
	Projected Water Demand						
	Municipal Demand	2,498	9,449	14,307	17,547	18,897	20,247
	Total Projected Water Demand	***2,498***	***9,449***	***14,307***	***17,547***	***18,897***	***20,247***
	Currently Available Water Supplies						
	NTMWD Sources	978	3,775	5,034	5,502	5,402	5,280
	NTMWD Sources	196	863	1,329	1,778	1,775	1,760
	Woodbine Aquifer	605	605	605	605	605	605
	Total Supply	***1,583***	***4,380***	***5,639***	***6,107***	***6,007***	***5,885***
	Water Management Strategies						
	Water Conservation - Basic Package	80	483	851	1,190	1,439	1,710
	Water Conservation - Expanded Package	3	49	86	109	120	128
	Purchase water from NTMWD	710	4,669	7,749	7,978	12,106	12,719
	Purchase water from UTRWD	623	2,846	3,695	4,041	4,338	4,619
	Supplemental wells in Woodbine aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***1,416***	***8,047***	***12,381***	***13,318***	***18,003***	***19,176***
	Total Supply Less Projected Demand	**501**	**2,978**	**3,713**	**1,878**	**5,113**	**4,814**
R-C-H WSC	**Projected Population**	2,317	2,548	2,748	2,963	3,217	3,515
	Projected Water Demand						
	Municipal Demand	410	440	468	495	533	583
	Total Projected Water Demand	***410***	***440***	***468***	***495***	***533***	***583***
	Currently Available Water Supplies						
	NTMWD Sources (Rockwall)	288	239	217	203	198	198
	Total Supply	***288***	***239***	***217***	***203***	***198***	***198***
	Water Management Strategies						
	Water Conservation - Basic Package	12	26	32	38	46	55
	Purchase water from Rockwall (NTMWD)	209	297	337	298	448	479
	Total Water Management Strategies	***221***	***323***	***369***	***336***	***494***	***534***
	Total Supply Less Projected Demand	**99**	**122**	**118**	**44**	**159**	**149**
Red Oak	**Projected Population**	5,833	7,254	8,655	10,086	11,688	13,455
	Projected Water Demand						
	Municipal Demand	1,104	1,389	1,638	1,898	2,186	2,517
	Total Projected Water Demand	***1,104***	***1,389***	***1,638***	***1,898***	***2,186***	***2,517***
	Currently Available Water Supplies						
	Midlothian sources	100	0	0	0	0	0
	Woodbine Aquifer	698	698	698	698	698	698
	Total Supply	***798***	***698***	***698***	***698***	***698***	***698***
	Water Management Strategies						
	Water Conservation - Basic Package	33	76	104	137	176	224
	Water Conservation - Expanded Package	1	6	9	10	11	14
	Rockett SUD-Waxahachie-Red Oak Project	309	305	422	545	747	1,238
	TRA Ellis County Water Supply Project (Waxahachie)	0	387	519	657	661	661
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***343***	***774***	***1,054***	***1,349***	***1,595***	***2,137***
	Total Supply Less Projected Demand	**37**	**83**	**114**	**149**	**107**	**318**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Reno	**Projected Population**	2,569	2,676	2,763	2,838	2,918	3,005
	Projected Water Demand						
	Municipal Demand	319	321	322	321	327	337
	Total Projected Water Demand	***319***	***321***	***322***	***321***	***327***	***337***
	Currently Available Water Supplies						
	Trinity Aquifer	167	167	167	167	167	167
	TRWD Sources (Springtown & Walnut Creek SUD))	164	129	109	93	83	75
	Total Supply	***331***	***296***	***276***	***260***	***250***	***242***
	Water Management Strategies						
	Water Conservation - Basic Package	4	16	18	19	21	22
	Purchase water from Springtown (TRWD)	15	27	47	41	68	72
	Purchase water from Walnut Creek SUD (from TRWD)	25	8	39	36	59	57
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***44***	***51***	***104***	***96***	***148***	***151***
	Total Supply Less Projected Demand	**56**	**26**	**58**	**35**	**71**	**56**
Rhome	**Projected Population**	2,300	4,519	6,461	8,263	9,863	11,825
	Projected Water Demand						
	Municipal Demand	575	1,119	1,592	2,036	2,431	2,914
	Total Projected Water Demand	***575***	***1,119***	***1,592***	***2,036***	***2,431***	***2,914***
	Currently Available Water Supplies						
	Trinity Aquifer	125	125	125	125	125	125
	TRWD Sources (Walnut Creek SUD)	389	619	748	837	882	930
	Total Supply	***514***	***744***	***873***	***962***	***1,007***	***1,055***
	Water Management Strategies						
	Water Conservation - Basic Package	19	60	99	144	192	254
	Purchase water from Walnut Creek SUD (from TRWD)	168	542	1,086	1,295	1,991	2,233
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***187***	***602***	***1,185***	***1,439***	***2,183***	***2,487***
	Total Supply Less Projected Demand	**126**	**227**	**466**	**365**	**759**	**628**
Rice	**Projected Population**	954	1,123	1,299	1,490	1,718	1,998
	Projected Water Demand						
	Municipal Demand	229	265	304	347	398	463
	Total Projected Water Demand	***229***	***265***	***304***	***347***	***398***	***463***
	Currently Available Water Supplies						
	Lake Bardwell (Ennis through Rice WSC)	0	0	0	0	0	0
	Navarro Mills Reservoir (Corsicana through Rice WSC)	250	264	281	298	312	326
	Total Supply	***250***	***264***	***281***	***298***	***312***	***326***
	Water Management Strategies						
	Water Conservation - Basic Package	2	8	16	21	28	36
	Purchase water from Rice WSC (Corsicana)	0	57	61	65	221	218
	Total Water Management Strategies	***2***	***65***	***77***	***86***	***249***	***254***
	Total Supply Less Projected Demand	**23**	**64**	**54**	**37**	**163**	**117**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Rice WSC	**Projected Population**	7,667	9,734	11,867	14,161	16,872	20,152
	Projected Water Demand						
	Municipal Demand	945	1,167	1,409	1,650	1,966	2,347
	Total Projected Water Demand	***945***	***1,167***	***1,409***	***1,650***	***1,966***	***2,347***
	Currently Available Water Supplies						
	Lake Bardwell (Ennis)	85	85	67	52	39	29
	Navarro Mills Reservoir (Corsicana)	949	1,065	1,209	1,329	1,461	1,583
	Total Supply	***1,034***	***1,150***	***1,276***	***1,381***	***1,500***	***1,612***
	Water Management Strategies						
	Water Conservation - Basic Package	14	57	74	94	118	149
	TRA Ellis County Water Supply Project (Ennis)	0	14	34	49	62	71
	Purchase water from Corsicana	0	230	282	328	1,092	1,126
	Total Water Management Strategies	***14***	***301***	***390***	***471***	***1,272***	***1,346***
	Total Supply Less Projected Demand	**103**	**284**	**257**	**202**	**806**	**611**
Richardson	**Projected Population**	102,880	116,000	116,000	116,000	116,000	116,000
	Projected Water Demand						
	Municipal Demand	32,383	36,123	35,993	35,602	35,343	35,343
	Total Projected Water Demand	***32,383***	***36,123***	***35,993***	***35,602***	***35,343***	***35,343***
	Currently Available Water Supplies						
	NTMWD Sources	22,720	19,607	16,715	14,583	13,155	11,967
	Total Supply	***22,720***	***19,607***	***16,715***	***14,583***	***13,155***	***11,967***
	Water Management Strategies						
	Water Conservation - Basic Package	863	1,618	1,914	2,195	2,477	2,772
	Water Conservation - Expanded Package	38	276	371	368	365	365
	Purchase water from NTMWD	14,583	24,253	25,724	21,145	29,482	28,832
	Total Water Management Strategies	***15,484***	***26,147***	***28,009***	***23,708***	***32,324***	***31,969***
	Total Supply Less Projected Demand	**5,821**	**9,631**	**8,731**	**2,689**	**10,136**	**8,593**
Richland Hills	**Projected Population**	8,400	9,000	9,600	10,300	10,700	10,850
	Projected Water Demand						
	Municipal Demand	1,327	1,381	1,441	1,511	1,558	1,580
	Total Projected Water Demand	***1,327***	***1,381***	***1,441***	***1,511***	***1,558***	***1,580***
	Currently Available Water Supplies						
	Trinity Aquifer	153	153	153	153	153	153
	TRWD Sources (Fort Worth)	1,261	1,071	952	862	755	652
	Total Supply	***1,414***	***1,224***	***1,105***	***1,015***	***908***	***805***
	Water Management Strategies						
	Water Conservation - Basic Package	40	49	57	65	73	79
	Water Conservation - Expanded Package	0	0	2	3	3	3
	Purchase water from Fort Worth (TRWD)	193	363	658	618	995	967
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***233***	***412***	***717***	***686***	***1,071***	***1,049***
	Total Supply Less Projected Demand	**320**	**255**	**381**	**190**	**421**	**274**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
River Oaks	**Projected Population**	7,100	7,100	7,100	7,100	7,100	7,100
	Projected Water Demand						
	Municipal Demand	1,010	986	954	931	923	923
	Total Projected Water Demand	***1,010***	***986***	***954***	***931***	***923***	***923***
	Currently Available Water Supplies						
	TRWD Sources	1,085	860	705	591	496	421
	Total Supply	***1,085***	***860***	***705***	***591***	***496***	***421***
	Water Management Strategies						
	Water Conservation - Basic Package	12	43	46	49	52	55
	Purchase water from TRWD	166	292	488	423	655	626
	Total Water Management Strategies	***178***	***335***	***534***	***472***	***707***	***681***
	Total Supply Less Projected Demand	**253**	**209**	**285**	**132**	**280**	**179**
Roanoke	**Projected Population**	4,692	6,999	11,000	15,000	20,000	24,094
	Projected Water Demand						
	Municipal Demand	1,177	1,897	2,957	4,016	5,354	6,450
	Total Projected Water Demand	***1,177***	***1,897***	***2,957***	***4,016***	***5,354***	***6,450***
	Currently Available Water Supplies						
	Trinity Aquifer	63	63	63	63	63	63
	TRWD Sources (Fort Worth)	1,196	1,599	2,139	2,510	2,845	2,916
	Total Supply	***1,259***	***1,662***	***2,202***	***2,573***	***2,908***	***2,979***
	Water Management Strategies						
	Water Conservation - Basic Package	34	91	168	261	393	527
	Water Conservation - Expanded Package	1	11	34	55	75	94
	Purchase water from Fort Worth (TRWD)	184	543	1,479	1,798	3,746	4,327
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***219***	***645***	***1,681***	***2,114***	***4,214***	***4,948***
	Total Supply Less Projected Demand	**301**	**410**	**926**	**671**	**1,768**	**1,477**
Rockett SUD	**Projected Population**	32,672	40,249	44,163	50,064	57,464	66,139
	Projected Water Demand						
	Municipal Demand	4,318	5,185	5,590	6,281	7,145	8,223
	Total Projected Water Demand	***4,318***	***5,185***	***5,590***	***6,281***	***7,145***	***8,223***
	Currently Available Water Supplies						
	Lake Waxahachie (Waxahachie)	948	0	0	0	0	0
	Midlothian sources	1,544	0	0	0	0	0
	Trinity Aquifer	71	71	71	71	71	71
	Total Supply	***2,563***	***71***	***71***	***71***	***71***	***71***
	Water Management Strategies						
	Water Conservation - Basic Package	63	239	280	338	411	500
	Rockett SUD-Waxahachie-Red Oak Project	1,852	5,114	4,472	5,026	5,716	6,577
	TRA Ellis County Water Supply Project (Waxahachie)	0	1,126	1,296	1,274	1,662	1,743
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***1,915***	***6,479***	***6,048***	***6,638***	***7,789***	***8,820***
	Total Supply Less Projected Demand	**160**	**1,365**	**529**	**428**	**715**	**668**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Rockwall	**Projected Population**	32,000	55,000	71,000	80,000	82,113	82,113
	Projected Water Demand						
	Municipal Demand	8,423	14,971	19,167	21,507	22,075	22,075
	Total Projected Water Demand	***8,423***	***14,971***	***19,167***	***21,507***	***22,075***	***22,075***
	Currently Available Water Supplies						
	NTMWD Sources	5,910	8,126	8,901	8,809	8,216	7,475
	Total Supply	***5,910***	***8,126***	***8,901***	***8,809***	***8,216***	***7,475***
	Water Management Strategies						
	Water Conservation - Basic Package	247	737	1,106	1,422	1,643	1,827
	Water Conservation - Expanded Package	9	75	109	127	133	134
	Purchase water from NTMWD	4,297	10,052	13,698	12,774	18,415	18,007
	Total Water Management Strategies	***4,553***	***10,864***	***14,913***	***14,323***	***20,191***	***19,968***
	Total Supply Less Projected Demand	**2,040**	**4,019**	**4,647**	**1,625**	**6,332**	**5,368**
Rockwall County-Irrigation	**Projected Water Demand**						
	Irrigation Demand	1,125	1,125	1,125	1,125	1,125	1,125
	Total Projected Water Demand	***1,125***	***1,125***	***1,125***	***1,125***	***1,125***	***1,125***
	Currently Available Water Supplies						
	Direct reuse	112	112	112	112	112	112
	Reuse	672	672	672	672	672	672
	Total Supply	***784***	***784***	***784***	***784***	***784***	***784***
	Water Management Strategies						
	Water Conservation	2	37	71	89	106	123
	Purchase Reuse water from NTMWD	413	414	402	342	411	394
	Total Water Management Strategies	***415***	***451***	***473***	***431***	***517***	***517***
	Total Supply Less Projected Demand	**74**	**110**	**132**	**90**	**176**	**176**
Rockwall County-Livestock	**Projected Water Demand**						
	Livestock Demand	131	131	131	131	131	131
	Total Projected Water Demand	***131***	***131***	***131***	***131***	***131***	***131***
	Currently Available Water Supplies						
	Livestock Local Supply	168	168	168	168	168	168
	Other Aquifer	21	21	21	21	21	21
	Total Supply	***189***	***189***	***189***	***189***	***189***	***189***
	Water Management Strategies						
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**58**	**58**	**58**	**58**	**58**	**58**
Rockwall County-Manufacturing	**Projected Water Demand**						
	Manufacturing Demand	20	23	26	29	32	35
	Total Projected Water Demand	***20***	***23***	***26***	***29***	***32***	***35***
	Currently Available Water Supplies						
	NTMWD Sources	14	13	12	12	12	12
	Total Supply	***14***	***13***	***12***	***12***	***12***	***12***
	Water Management Strategies						
	Water Conservation	0	0	0	0	1	1
	Purchase water from NTMWD	10	16	19	19	27	28
	Total Water Management Strategies	***10***	***16***	***19***	***19***	***28***	***29***
	Total Supply Less Projected Demand	**4**	**6**	**5**	**2**	**8**	**6**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Rockwall County-Mining	**Projected Water Demand**						
	Mining Demand	33	33	33	33	33	33
	Total Projected Water Demand	***33***	***33***	***33***	***33***	***33***	***33***
	Currently Available Water Supplies						
	Other Local Supply	33	33	33	33	33	33
	Total Supply	***33***	***33***	***33***	***33***	***33***	***33***
	Water Management Strategies						
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**0**	**0**	**0**	**0**	**0**	**0**
Rockwall County-Other	**Projected Population**	1,816	1,816	1,816	1,816	1,816	1,816
	Projected Water Demand						
	County-Other Demand	385	385	385	383	383	383
	Total Projected Water Demand	***385***	***385***	***385***	***383***	***383***	***383***
	Currently Available Water Supplies						
	NTMWD Sources	203	157	134	118	107	98
	Other Aquifer	187	187	187	187	187	187
	Total Supply	***390***	***344***	***321***	***305***	***294***	***285***
	Water Management Strategies						
	Water Conservation - Basic Package	4	11	13	14	15	17
	Purchase water from NTMWD	197	258	245	210	285	276
	Supplemental wells in Other aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***201***	***269***	***258***	***224***	***300***	***293***
	Total Supply Less Projected Demand	**206**	**228**	**194**	**146**	**211**	**195**
Rockwall County-Steam Electric Power	**Projected Water Demand**						
	Steam Electric Power Demand	0	0	0	0	0	0
	Total Projected Water Demand	***0***	***0***	***0***	***0***	***0***	***0***
	Currently Available Water Supplies						
	Total Supply	***0***	***0***	***0***	***0***	***0***	***0***
	Water Management Strategies						
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**0**	**0**	**0**	**0**	**0**	**0**
Rowlett	**Projected Population**	59,271	70,856	80,178	87,714	93,811	98,747
	Projected Water Demand						
	Municipal Demand	12,283	15,318	17,154	18,668	19,860	20,905
	Total Projected Water Demand	***12,283***	***15,318***	***17,154***	***18,668***	***19,860***	***20,905***
	Currently Available Water Supplies						
	NTMWD Sources	7,513	7,413	7,202	6,975	6,785	6,526
	NTMWD Sources	1,105	901	764	671	607	552
	Total Supply	***8,618***	***8,314***	***7,966***	***7,646***	***7,392***	***7,078***
	Water Management Strategies						
	Water Conservation - Basic Package	376	857	1,107	1,363	1,618	1,878
	Water Conservation - Expanded Package	11	68	84	91	97	102
	Purchase water from NTMWD	6,266	10,285	12,260	11,088	14,155	14,598
	Total Water Management Strategies	***6,653***	***11,210***	***13,451***	***12,542***	***15,870***	***16,578***
	Total Supply Less Projected Demand	**2,988**	**4,206**	**4,263**	**1,520**	**3,402**	**2,751**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Royse City	**Projected Population**	13,125	25,767	28,446	37,184	45,646	48,146
	Projected Water Demand						
	Municipal Demand	2,735	5,426	5,959	7,789	9,561	10,085
	Total Projected Water Demand	***2,735***	***5,426***	***5,959***	***7,789***	***9,561***	***10,085***
	Currently Available Water Supplies						
	NTMWD Sources	1,919	2,945	2,767	3,190	3,559	3,415
	Total Supply	***1,919***	***2,945***	***2,767***	***3,190***	***3,559***	***3,415***
	Water Management Strategies						
	Water Conservation - Basic Package	92	307	387	571	781	908
	Water Conservation - Expanded Package	2	19	38	55	68	76
	Purchase water from NTMWD	1,395	3,643	4,259	4,627	7,974	8,228
	Total Water Management Strategies	***1,489***	***3,969***	***4,684***	***5,253***	***8,823***	***9,212***
	Total Supply Less Projected Demand	**673**	**1,488**	**1,492**	**654**	**2,821**	**2,542**
Runaway Bay	**Projected Population**	1,532	1,881	2,221	2,557	2,937	3,378
	Projected Water Demand						
	Municipal Demand	321	390	455	521	595	685
	Total Projected Water Demand	***321***	***390***	***455***	***521***	***595***	***685***
	Currently Available Water Supplies						
	TRWD Sources	345	340	336	331	320	313
	Total Supply	***345***	***340***	***336***	***331***	***320***	***313***
	Water Management Strategies						
	Water Conservation - Basic Package	10	21	29	37	47	60
	Purchase water from TRWD	53	115	233	237	421	464
	Water Treatment Expansions						
	WTP Expansion of 0.5 MGD	0	0	0	0	0	0
	Total Water Management Strategies	***63***	***136***	***262***	***274***	***468***	***524***
	Total Supply Less Projected Demand	**87**	**86**	**143**	**84**	**193**	**152**
Sachse	**Projected Population**	14,153	18,592	21,650	24,012	25,982	27,745
	Projected Water Demand						
	Municipal Demand	3,028	4,019	4,657	5,110	5,530	5,905
	Total Projected Water Demand	***3,028***	***4,019***	***4,657***	***5,110***	***5,530***	***5,905***
	Currently Available Water Supplies						
	NTMWD Sources	2,124	2,181	2,163	2,093	2,058	1,999
	Total Supply	***2,124***	***2,181***	***2,163***	***2,093***	***2,058***	***1,999***
	Water Management Strategies						
	Water Conservation - Basic Package	93	224	299	372	449	529
	Water Conservation - Expanded Package	26	80	103	116	126	134
	Purchase water from NTMWD	1,545	2,700	3,328	3,035	3,989	4,159
	Total Water Management Strategies	***1,664***	***3,004***	***3,730***	***3,523***	***4,564***	***4,822***
	Total Supply Less Projected Demand	**760**	**1,166**	**1,236**	**506**	**1,092**	**916**
Saginaw	**Projected Population**	15,995	19,387	21,859	23,660	24,973	25,930
	Projected Water Demand						
	Municipal Demand	2,885	3,540	3,942	4,240	4,448	4,618
	Total Projected Water Demand	***2,885***	***3,540***	***3,942***	***4,240***	***4,448***	***4,618***
	Currently Available Water Supplies						
	TRWD Sources (Fort Worth)	3,099	3,086	2,914	2,692	2,392	2,109
	Total Supply	***3,099***	***3,086***	***2,914***	***2,692***	***2,392***	***2,109***
	Water Management Strategies						
	Water Conservation - Basic Package	90	207	265	321	375	428
	Water Conservation - Expanded Package	2	15	24	28	30	30
	Purchase water from Fort Worth (TRWD)	475	1,048	2,016	1,928	3,149	3,128
	Total Water Management Strategies	***567***	***1,270***	***2,305***	***2,277***	***3,554***	***3,586***
	Total Supply Less Projected Demand	**781**	**816**	**1,277**	**729**	**1,498**	**1,077**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Saint Paul	**Projected Population**	1,000	2,500	5,000	8,000	9,500	10,000
	Projected Water Demand						
	Municipal Demand	192	468	930	1,479	1,756	1,848
	Total Projected Water Demand	***192***	***468***	***930***	***1,479***	***1,756***	***1,848***
	Currently Available Water Supplies						
	NTMWD Sources	135	254	432	606	654	626
	Total Supply	***135***	***254***	***432***	***606***	***654***	***626***
	Water Management Strategies						
	Water Conservation - Basic Package	6	28	63	113	149	172
	Purchase water from NTMWD	98	315	664	878	1,463	1,508
	Total Water Management Strategies	***104***	***343***	***727***	***991***	***1,612***	***1,680***
	Total Supply Less Projected Demand	**47**	**129**	**229**	**118**	**510**	**458**
Sanger	**Projected Population**	12,623	15,051	17,947	21,400	23,998	25,000
	Projected Water Demand						
	Municipal Demand	2,206	2,765	3,277	3,883	4,355	4,537
	Total Projected Water Demand	***2,206***	***2,765***	***3,277***	***3,883***	***4,355***	***4,537***
	Currently Available Water Supplies						
	Trinity Aquifer	543	543	543	543	543	543
	UTRWD Sources	561	561	561	561	561	561
	Total Supply	***1,104***	***1,104***	***1,104***	***1,104***	***1,104***	***1,104***
	Water Management Strategies						
	Water Conservation - Basic Package	75	162	220	294	366	419
	Water Conservation - Expanded Package	0	0	2	2	3	3
	Redistribution of Trinity Aquifer Supplies (allocated to others)	-54	-136	-217	-299	-380	-434
	Purchase water from UTRWD	1,580	2,990	3,250	3,629	4,250	4,490
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***1,601***	***3,016***	***3,255***	***3,626***	***4,239***	***4,478***
	Total Supply Less Projected Demand	**499**	**1,355**	**1,082**	**847**	**988**	**1,045**
Sansom Park Village	**Projected Population**	4,376	4,527	4,644	4,734	4,804	4,857
	Projected Water Demand						
	Municipal Demand	603	609	609	605	608	615
	Total Projected Water Demand	***603***	***609***	***609***	***605***	***608***	***615***
	Currently Available Water Supplies						
	Trinity Aquifer	422	422	422	422	422	422
	TRWD Sources (Fort Worth)	194	163	138	116	100	88
	Total Supply	***616***	***585***	***560***	***538***	***522***	***510***
	Water Management Strategies						
	Water Conservation - Basic Package	8	28	30	33	35	38
	Purchase water from Fort Worth (TRWD)	30	55	96	83	131	130
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***38***	***83***	***126***	***116***	***166***	***168***
	Total Supply Less Projected Demand	**51**	**59**	**77**	**49**	**80**	**63**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Sardis-Lone Elm WSC	**Projected Population**	8,065	8,309	8,363	9,301	11,097	13,444
	Projected Water Demand						
	Municipal Demand	1,681	1,712	1,705	1,875	2,225	2,695
	Total Projected Water Demand	***1,681***	***1,712***	***1,705***	***1,875***	***2,225***	***2,695***
	Currently Available Water Supplies						
	Midlothian sources	0	0	0	0	0	0
	Trinity Aquifer	1,150	1,150	1,150	1,150	1,150	1,150
	Total Supply	***1,150***	***1,150***	***1,150***	***1,150***	***1,150***	***1,150***
	Water Management Strategies						
	Water Conservation - Basic Package	51	96	111	138	182	243
	Water Conservation - Expanded Package	1	6	7	8	10	13
	Purchase water from TRA (from TRWD)	0	200	214	205	280	309
	Rockett SUD-Waxahachie-Red Oak Project	585	695	706	1,004	1,354	1,808
	Overdraft Trinity Aquifer (New Wells)	50	0	0	0	0	0
	Reduce Trinity Aquifer use (reallocated to others)	0	-250	-250	-250	-250	-250
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***687***	***747***	***788***	***1,105***	***1,576***	***2,123***
	Total Supply Less Projected Demand	**156**	**185**	**233**	**380**	**501**	**578**
Savoy	**Projected Population**	869	889	910	930	952	974
	Projected Water Demand						
	Municipal Demand	108	108	106	105	107	109
	Total Projected Water Demand	***108***	***108***	***106***	***105***	***107***	***109***
	Currently Available Water Supplies						
	Woodbine Aquifer	123	123	123	123	123	123
	Total Supply	***123***	***123***	***123***	***123***	***123***	***123***
	Water Management Strategies						
	Water Conservation - Basic Package	1	5	5	6	6	7
	Fannin County Water Supply Project	0	12	38	56	70	69
	Overdraft Woodbine Aquifer (Existing Wells)	4	0	0	0	0	0
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***5***	***17***	***43***	***62***	***76***	***76***
	Total Supply Less Projected Demand	**20**	**32**	**60**	**80**	**92**	**90**
Seagoville	**Projected Population**	16,668	19,183	21,352	23,699	25,536	27,517
	Projected Water Demand						
	Municipal Demand	2,465	2,751	3,037	3,319	3,576	3,853
	Total Projected Water Demand	***2,465***	***2,751***	***3,037***	***3,319***	***3,576***	***3,853***
	Currently Available Water Supplies						
	DWU Sources	1,812	1,812	1,836	1,830	1,729	1,604
	Total Supply	***1,812***	***1,812***	***1,836***	***1,830***	***1,729***	***1,604***
	Water Management Strategies						
	Water Conservation - Basic Package	30	100	121	145	168	194
	Purchase water from DWU	632	1,255	1,634	2,129	2,500	2,371
	Total Water Management Strategies	***662***	***1,355***	***1,755***	***2,274***	***2,668***	***2,565***
	Total Supply Less Projected Demand	**9**	**416**	**554**	**785**	**821**	**316**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Seven Points	**Projected Population**	1,402	1,681	1,956	2,238	2,582	3,016
	Projected Water Demand						
	Municipal Demand	174	205	234	266	304	355
	Total Projected Water Demand	***174***	***205***	***234***	***266***	***304***	***355***
	Currently Available Water Supplies						
	TRWD Sources (West Cedar Creek MUD)	108	89	81	77	74	71
	Total Supply	***108***	***89***	***81***	***77***	***74***	***71***
	Water Management Strategies						
	Water Conservation - Basic Package	2	10	12	15	18	22
	Purchase water from West Cedar MUD (from TRWD)	108	150	212	213	305	331
	Total Water Management Strategies	***110***	***160***	***224***	***228***	***323***	***353***
	Total Supply Less Projected Demand	**44**	**44**	**71**	**39**	**93**	**69**
Shady Shores	**Projected Population**	2,117	2,762	3,368	3,992	4,625	5,288
	Projected Water Demand						
	Municipal Demand	306	436	524	617	710	811
	Total Projected Water Demand	***306***	***436***	***524***	***617***	***710***	***811***
	Currently Available Water Supplies						
	Trinity Aquifer	19	21	22	23	23	23
	UTRWD Sources (Lake Cities MUD)	218	198	200	217	255	256
	Woodbine Aquifer	41	44	47	49	49	49
	Total Supply	***278***	***263***	***269***	***289***	***327***	***328***
	Water Management Strategies						
	Water Conservation - Basic Package	4	26	23	29	36	44
	Purchase water from Lake Cities MUA (from UTRWD)	95	384	422	456	535	653
	Total Water Management Strategies	***99***	***410***	***445***	***485***	***571***	***697***
	Total Supply Less Projected Demand	**71**	**237**	**190**	**157**	**188**	**214**
Sherman	**Projected Population**	39,300	44,400	50,600	57,700	67,000	80,000
	Projected Water Demand						
	Municipal Demand	10,081	12,135	13,660	15,382	17,787	21,238
	Total Projected Water Demand	***10,081***	***12,135***	***13,660***	***15,382***	***17,787***	***21,238***
	Currently Available Water Supplies						
	Lake Texoma (GTUA)	2641	5955	6213	6474	6847	7224
	Trinity Aquifer	4674	4674	4674	4674	4674	4674
	Woodbine Aquifer	3463	3463	3463	3463	3463	3463
	Total Supply	***10,778***	***14,092***	***14,350***	***14,611***	***14,984***	***15,361***
	Water Management Strategies						
	Water Conservation - Basic Package	316	710	915	1,162	1,493	1,960
	Water Conservation - Expanded Package	79	217	422	559	641	756
	Reduce Trinity Aquifer use (realoocated to others)	-660	-1,150	-1,350	-1,350	-1,300	-1,100
	Grayson County Water Supply Project	0	0	612	2,142	4,162	7,096
	Additional Woodbine Aquifer (Existing Wells)	827	742	428	272	197	154
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***562***	***519***	***1,027***	***2,785***	***5,193***	***8,866***
	Total Supply Less Projected Demand	**1,259**	**2,476**	**1,717**	**2,014**	**2,390**	**2,989**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
South Grayson WSC	**Projected Population**	2,700	3,450	4,100	4,825	5,650	6,675
	Projected Water Demand						
	Municipal Demand	381	479	561	654	760	897
	Total Projected Water Demand	***381***	***479***	***561***	***654***	***760***	***897***
	Currently Available Water Supplies						
	Trinity Aquifer	363	363	362	362	362	362
	Woodbine Aquifer	358	358	358	358	358	358
	Total Supply	***721***	***721***	***720***	***720***	***721***	***720***
	Water Management Strategies						
	Water Conservation - Basic Package	7	25	31	39	48	60
	Reduce Trinity Aquifer use (reallocated to others)	-75	-75	-75	-75	-75	-50
	Reduce Woodbine Aquifer use (reallocated to others)	-75	-75	-75	-50	-25	-25
	Collin Grayson Municipal Alliance Project	61	122	118	101	120	115
	Grayson County Water Supply Project	0	50	51	50	57	164
	Supplemental wells in Woodbine Aquifer	0	0	0	0	0	0
	Supplemental wells in Trinity Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***-82***	***47***	***50***	***65***	***125***	***264***
	Total Supply Less Projected Demand	**258**	**289**	**209**	**131**	**86**	**87**
Southlake	**Projected Population**	35,578	43,543	48,138	50,993	53,751	54,445
	Projected Water Demand						
	Municipal Demand	11,837	14,437	15,907	16,793	17,701	17,930
	Total Projected Water Demand	***11,837***	***14,437***	***15,907***	***16,793***	***17,701***	***17,930***
	Currently Available Water Supplies						
	TRWD Sources (Fort Worth)	12,713	12,587	11,757	10,661	9,518	8,187
	Total Supply	***12,713***	***12,587***	***11,757***	***10,661***	***9,518***	***8,187***
	Water Management Strategies						
	Water Conservation - Basic Package	337	690	894	1,085	1,291	1,457
	Water Conservation - Expanded Package	0	0	4	4	4	4
	Purchase water from Fort Worth (TRWD)	1,950	4,275	8,132	7,638	12,535	12,146
	Total Water Management Strategies	***2,287***	***4,965***	***9,030***	***8,727***	***13,830***	***13,607***
	Total Supply Less Projected Demand	**3,163**	**3,115**	**4,880**	**2,595**	**5,647**	**3,864**
Southmayd	**Projected Population**	1,600	3,000	3,800	4,500	5,100	5,600
	Projected Water Demand						
	Municipal Demand	199	366	455	529	594	652
	Total Projected Water Demand	***199***	***366***	***455***	***529***	***594***	***652***
	Currently Available Water Supplies						
	Trinity Aquifer	99	99	99	99	99	99
	Woodbine Aquifer	49	49	49	49	49	49
	Total Supply	***148***	***148***	***148***	***148***	***148***	***148***
	Water Management Strategies						
	Water Conservation - Basic Package	3	18	24	30	36	42
	Grayson County Water Supply Project	0	162	246	319	390	461
	Additional Trinity Aquifer (Existing Wells)	0	25	30	34	33	29
	Additional Woodbine Aquifer (New or Purchased Wells)	54	50	52	51	46	37
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***57***	***255***	***352***	***434***	***505***	***569***
	Total Supply Less Projected Demand	**6**	**37**	**45**	**53**	**59**	**65**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Southwest Fannin County SUD	**Projected Population**	5,504	6,953	7,960	8,865	9,670	10,476
	Projected Water Demand						
	Municipal Demand	530	810	954	1,052	1,137	1,232
	Total Projected Water Demand	***530***	***810***	***954***	***1,052***	***1,137***	***1,232***
	Currently Available Water Supplies						
	Woodbine Aquifer	453	453	453	453	453	453
	Total Supply	***453***	***453***	***453***	***453***	***453***	***453***
	Water Management Strategies						
	Water Conservation - Basic Package	11	40	49	59	69	78
	Fannin County Water Supply Project	0	488	749	828	1,098	1,160
	Overdraft Woodbine Aquifer (Existing Wells)	33	0	0	0	0	0
	Overdraft Woodbine Aquifer (New Wells)	50	0	0	0	0	0
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***94***	***528***	***798***	***887***	***1,167***	***1,238***
	Total Supply Less Projected Demand	**17**	**171**	**297**	**288**	**483**	**459**
Springtown	**Projected Population**	3,000	4,000	5,000	6,000	7,000	8,000
	Projected Water Demand						
	Municipal Demand	504	659	807	961	1,113	1,272
	Total Projected Water Demand	***504***	***659***	***807***	***961***	***1,113***	***1,272***
	Currently Available Water Supplies						
	Trinity Aquifer	236	236	236	236	236	236
	TRWD Sources	288	369	422	460	472	473
	Total Supply	***524***	***605***	***658***	***696***	***708***	***709***
	Water Management Strategies						
	Water Conservation - Basic Package	17	42	58	78	100	125
	Water Conservation - Expanded Package	4	10	16	20	23	27
	Purchase water from TRWD	44	125	292	330	621	702
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***65***	***177***	***366***	***428***	***744***	***854***
	Total Supply Less Projected Demand	**85**	**123**	**217**	**163**	**339**	**291**
Sunnyvale	**Projected Population**	5,000	7,000	9,000	11,000	13,000	13,300
	Projected Water Demand						
	Municipal Demand	1,770	2,454	3,135	3,820	4,514	4,618
	Total Projected Water Demand	***1,770***	***2,454***	***3,135***	***3,820***	***4,514***	***4,618***
	Currently Available Water Supplies						
	NTMWD Sources	1,242	1,332	1,456	1,565	1,680	1,564
	Total Supply	***1,242***	***1,332***	***1,456***	***1,565***	***1,680***	***1,564***
	Water Management Strategies						
	Water Conservation - Basic Package	50	115	173	243	325	371
	Water Conservation - Expanded Package	2	13	17	21	26	27
	Purchase water from NTMWD	903	1,648	2,240	2,269	3,168	3,180
	Total Water Management Strategies	***955***	***1,776***	***2,430***	***2,533***	***3,519***	***3,578***
	Total Supply Less Projected Demand	**427**	**654**	**751**	**278**	**685**	**524**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Talty	**Projected Population**	2,447	3,832	5,256	6,834	8,788	11,211
	Projected Water Demand						
	Municipal Demand	863	1,348	1,849	2,404	3,091	3,943
	Total Projected Water Demand	***863***	***1,348***	***1,849***	***2,404***	***3,091***	***3,943***
	Currently Available Water Supplies						
	NTMWD Sources	587	719	846	973	1,139	1,323
	Total Supply	***587***	***719***	***846***	***973***	***1,139***	***1,323***
	Water Management Strategies						
	Water Conservation - Basic Package	24	59	96	145	213	304
	Water Conservation - Expanded Package	1	5	8	10	13	16
	Purchase water from Forney (from NTMWD)	441	905	1,321	1,427	2,578	3,217
	Total Water Management Strategies	***466***	***969***	***1,425***	***1,582***	***2,804***	***3,537***
	Total Supply Less Projected Demand	**190**	**340**	**422**	**151**	**852**	**917**
Tarrant County-Irrigation	**Projected Water Demand**						
	Irrigation Demand	8,417	8,417	8,417	8,417	8,417	8,417
	Total Projected Water Demand	***8,417***	***8,417***	***8,417***	***8,417***	***8,417***	***8,417***
	Currently Available Water Supplies						
	Direct reuse	1,708	1,986	2,381	2,827	3,300	3,715
	Indirect reuse	1,493	1,663	1,784	1,864	1,924	1,974
	Irrigation Local Supply	549	549	549	549	549	549
	Trinity Aquifer	15	15	15	15	15	15
	TRWD sources	2,187	2,187	2,187	1,941	1,644	1,396
	Total Supply	***5,952***	***6,400***	***6,916***	***7,196***	***7,432***	***7,649***
	Water Management Strategies						
	Water Conservation	17	274	527	660	785	910
	TRA Indirect Reuse to Lake Grapevine	3,750	3,750	3,750	3,750	3,750	3,750
	Purchase water from TRWD	628	1,022	1,688	1,500	2,291	2,185
	Direct Reuse from Fort Worth	0	4,600	7,170	8,290	8,290	8,290
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***4,395***	***9,646***	***13,135***	***14,200***	***15,116***	***15,135***
	Total Supply Less Projected Demand	**1,930**	**7,629**	**11,634**	**12,979**	**14,131**	**14,367**
Tarrant County-Livestock	**Projected Water Demand**						
	Livestock Demand	803	803	803	803	803	803
	Total Projected Water Demand	***803***	***803***	***803***	***803***	***803***	***803***
	Currently Available Water Supplies						
	Livestock Local Supply	442	442	442	442	442	442
	Trinity Aquifer	361	361	361	361	361	361
	Total Supply	***803***	***803***	***803***	***803***	***803***	***803***
	Water Management Strategies						
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***0***	***0***	***0***	***0***	***0***	***0***
	Total Supply Less Projected Demand	**0**	**0**	**0**	**0**	**0**	**0**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Tarrant County-Manufacturing	**Projected Water Demand**						
	Manufacturing Demand	17,258	20,444	23,630	26,924	29,919	32,457
	Total Projected Water Demand	***17,258***	***20,444***	***23,630***	***26,924***	***29,919***	***32,457***
	Currently Available Water Supplies						
	TRWD Sources	18,536	17,824	17,465	17,093	16,087	14,819
	Total Supply	***18,536***	***17,824***	***17,465***	***17,093***	***16,087***	***14,819***
	Water Management Strategies						
	Water Conservation	0	35	413	630	711	784
	Purchase water from TRWD	2,842	6,053	12,080	12,244	21,187	21,989
	Total Water Management Strategies	***2,842***	***6,088***	***12,493***	***12,874***	***21,898***	***22,773***
	Total Supply Less Projected Demand	**4,120**	**3,468**	**6,328**	**3,043**	**8,066**	**5,135**
Tarrant County-Mining	**Projected Water Demand**						
	Mining Demand	433	484	519	554	589	616
	Total Projected Water Demand	***433***	***484***	***519***	***554***	***589***	***616***
	Currently Available Water Supplies						
	Other Local Supply	342	342	342	342	342	342
	Total Supply	***342***	***342***	***342***	***342***	***342***	***342***
	Water Management Strategies						
	Purchase water from TRWD	124	175	250	272	374	340
	Total Water Management Strategies	***124***	***175***	***250***	***272***	***374***	***340***
	Total Supply Less Projected Demand	**33**	**33**	**73**	**60**	**127**	**66**
Tarrant County-Other	**Projected Population**	23,911	23,911	23,911	23,911	23,911	23,911
	Projected Water Demand						
	County-Other Demand	3,482	3,402	3,348	3,268	3,241	3,241
	Total Projected Water Demand	***3,482***	***3,402***	***3,348***	***3,268***	***3,241***	***3,241***
	Currently Available Water Supplies						
	Trinity Aquifer	354	354	354	354	354	354
	TRWD sources	3,740	2,966	2,475	2,075	1,743	1,480
	Total Supply	***4,094***	***3,320***	***2,829***	***2,429***	***2,097***	***1,834***
	Water Management Strategies						
	Water Conservation - Basic Package	41	150	161	171	182	192
	Purchase water from TRWD	573	1,007	1,712	1,486	2,294	2,195
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***614***	***1,157***	***1,873***	***1,657***	***2,476***	***2,387***
	Total Supply Less Projected Demand	**1,226**	**1,075**	**1,354**	**818**	**1,332**	**980**
Tarrant County-Steam Electric Power	**Projected Water Demand**						
	Steam Electric Power Demand	4,158	3,419	4,168	5,081	6,194	7,550
	Total Projected Water Demand	***4,158***	***3,419***	***4,168***	***5,081***	***6,194***	***7,550***
	Currently Available Water Supplies						
	Run-of-River Wtr Rt #3375	235	187	219	257	304	362
	TRWD sources	4,213	2,818	2,919	3,063	3,167	3,282
	Total Supply	***4,448***	***3,005***	***3,138***	***3,320***	***3,471***	***3,644***
	Water Management Strategies						
	Purchase water from TRWD	647	957	2,018	2,194	4,171	4,869
	Direct Reuse from Fort Worth	500	500	1,100	2,000	2,600	2,600
	Total Water Management Strategies	***1,147***	***1,457***	***3,118***	***4,194***	***6,771***	***7,469***
	Total Supply Less Projected Demand	**1,437**	**1,043**	**2,088**	**2,433**	**4,048**	**3,563**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Teague	**Projected Population**	5,201	5,846	6,450	7,135	7,779	8,424
	Projected Water Demand						
	Municipal Demand	536	720	773	839	906	982
	Total Projected Water Demand	***536***	***720***	***773***	***839***	***906***	***982***
	Currently Available Water Supplies						
	Carrizo-Wilcox Aquifer	523	523	523	523	523	523
	Teague City Lake	0	0	0	0	0	0
	Total Supply	***523***	***523***	***523***	***523***	***523***	***523***
	Water Management Strategies						
	Water Conservation - Basic Package	7	27	32	38	45	52
	New wells in the Carrizo-Wilcox aquifer	221	222	221	443	443	443
	Supplemental wells in Carrizo-Wilcox aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***228***	***249***	***253***	***481***	***488***	***495***
	Total Supply Less Projected Demand	**215**	**51**	**3**	**165**	**105**	**36**
Terrell	**Projected Population**	15,196	18,642	21,664	23,650	25,599	28,445
	Projected Water Demand						
	Municipal Demand	3,575	4,302	4,926	5,325	5,735	6,372
	Total Projected Water Demand	***3,575***	***4,302***	***4,926***	***5,325***	***5,735***	***6,372***
	Currently Available Water Supplies						
	Lake Terrell	1,490	1,570	1,621	1,644	1,656	1,671
	NTMWD Sources	0	0	0	0	0	0
	Tawakoni (SRA)	1,981	2,086	2,155	2,186	2,201	2,222
	Total Supply	***3,471***	***3,656***	***3,776***	***3,830***	***3,857***	***3,893***
	Water Management Strategies						
	Water Conservation - Basic Package	100	218	292	361	438	539
	Water Conservation - Expanded Package	28	78	142	181	195	214
	Purchase water from NTMWD	3,727	4,588	5,077	4,333	6,356	6,842
	Total Water Management Strategies	***3,855***	***4,884***	***5,511***	***4,875***	***6,989***	***7,595***
	Total Supply Less Projected Demand	**3,751**	**4,238**	**4,361**	**3,380**	**5,111**	**5,116**
The Colony	**Projected Population**	42,800	56,000	63,000	65,000	67,000	67,600
	Projected Water Demand						
	Municipal Demand	5,178	6,586	7,269	7,427	7,580	7,648
	Total Projected Water Demand	***5,178***	***6,586***	***7,269***	***7,427***	***7,580***	***7,648***
	Currently Available Water Supplies						
	DWU Sources	3,426	3,905	3,954	3,686	3,299	2,866
	NTMWD Sources (Plano)	363	357	338	304	282	259
	Trinity Aquifer	934	934	934	934	934	934
	Total Supply	***4,723***	***5,196***	***5,226***	***4,924***	***4,515***	***4,059***
	Water Management Strategies						
	Water Conservation - Basic Package	90	341	407	444	482	511
	Purchase water from DWU	1,194	2,703	3,519	4,288	4,770	4,233
	Purchase water from Plano (from NTMWD)	264	444	518	442	531	526
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***1,548***	***3,488***	***4,444***	***5,174***	***5,783***	***5,270***
	Total Supply Less Projected Demand	**1,093**	**2,098**	**2,401**	**2,671**	**2,718**	**1,681**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Tioga	**Projected Population**	1,100	2,500	3,500	4,000	4,400	4,600
	Projected Water Demand						
	Municipal Demand	192	428	588	663	725	757
	Total Projected Water Demand	***192***	***428***	***588***	***663***	***725***	***757***
	Currently Available Water Supplies						
	Trinity Aquifer	130	130	130	130	130	130
	Total Supply	***130***	***130***	***130***	***130***	***130***	***130***
	Water Management Strategies						
	Water Conservation - Basic Package	6	27	42	53	64	73
	Water Conservation - Expanded Package	1	8	14	16	18	19
	Grayson County Water Supply Project	0	222	345	415	484	535
	Additional Trinity Aquifer (Existing Wells)	9	86	119	118	111	92
	Overdraft Trinity Aquifer (New Wells)	50	0	0	0	0	0
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***66***	***343***	***520***	***602***	***677***	***719***
	Total Supply Less Projected Demand	**3**	**45**	**62**	**69**	**82**	**92**
Tom Bean	**Projected Population**	1,320	1,500	1,700	1,800	1,900	2,000
	Projected Water Demand						
	Municipal Demand	311	348	388	405	426	448
	Total Projected Water Demand	***311***	***348***	***388***	***405***	***426***	***448***
	Currently Available Water Supplies						
	Woodbine Aquifer	289	288	288	288	288	288
	Total Supply	***289***	***288***	***288***	***288***	***288***	***288***
	Water Management Strategies						
	Water Conservation - Basic Package	27	79	91	99	107	116
	Water Conservation - Expanded Package	0	1	1	2	2	2
	Grayson County Water Supply Project	0	100	160	200	241	285
	Additional Woodbine Aquifer (New Wells)	29	0	0	0	0	0
	Trinity Aquifer (New Wells)	74	58	54	50	47	44
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***130***	***238***	***306***	***351***	***397***	***447***
	Total Supply Less Projected Demand	**108**	**178**	**206**	**234**	**259**	**287**
Tool	**Projected Population**	2,618	2,990	3,357	3,733	4,192	4,771
	Projected Water Demand						
	Municipal Demand	405	452	500	548	610	695
	Total Projected Water Demand	***405***	***452***	***500***	***548***	***610***	***695***
	Currently Available Water Supplies						
	TRWD Sources (West Cedar Creek MUD)	251	196	173	160	148	139
	Total Supply	***251***	***196***	***173***	***160***	***148***	***139***
	Water Management Strategies						
	Water Conservation - Basic Package	5	18	22	26	31	38
	Purchase water from West Cedar MUD (from TRWD)	251	332	452	437	612	648
	Total Water Management Strategies	***256***	***350***	***474***	***463***	***643***	***686***
	Total Supply Less Projected Demand	**102**	**94**	**147**	**75**	**181**	**130**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Trenton	**Projected Population**	1,000	1,500	2,500	4,000	6,000	8,000
	Projected Water Demand						
	Municipal Demand	206	302	496	780	1,163	1,550
	Total Projected Water Demand	***206***	***302***	***496***	***780***	***1,163***	***1,550***
	Currently Available Water Supplies						
	Woodbine Aquifer	189	189	189	189	189	189
	Total Supply	***189***	***189***	***189***	***189***	***189***	***189***
	Water Management Strategies						
	Water Conservation - Basic Package	22	88	148	240	368	503
	Water Conservation - Expanded Package	0	1	2	4	5	7
	Fannin County Water Supply Project	0	183	451	707	1,312	1,702
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***22***	***272***	***601***	***951***	***1,685***	***2,212***
	Total Supply Less Projected Demand	**5**	**159**	**294**	**360**	**711**	**851**
Trinidad	**Projected Population**	1,112	1,135	1,158	1,181	1,210	1,246
	Projected Water Demand						
	Municipal Demand	183	183	183	181	184	190
	Total Projected Water Demand	***183***	***183***	***183***	***181***	***184***	***190***
	Currently Available Water Supplies						
	Trinidad City Lake	484	484	484	484	484	484
	Total Supply	***484***	***484***	***484***	***484***	***484***	***484***
	Water Management Strategies						
	Water Conservation - Basic Package	2	7	8	9	10	11
	Total Water Management Strategies	***2***	***7***	***8***	***9***	***10***	***11***
	Total Supply Less Projected Demand	**303**	**308**	**309**	**312**	**310**	**305**
Trophy Club	**Projected Population**	7,806	8,803	9,658	10,400	11,200	12,000
	Projected Water Demand						
	Municipal Demand	2,693	3,017	3,289	3,530	3,801	4,073
	Total Projected Water Demand	***2,693***	***3,017***	***3,289***	***3,530***	***3,801***	***4,073***
	Currently Available Water Supplies						
	Trinity Aquifer	546	546	546	546	546	546
	TRWD Sources (Fort Worth)	2,306	2,154	2,027	1,894	1,750	1,610
	Total Supply	***2,852***	***2,700***	***2,573***	***2,440***	***2,296***	***2,156***
	Water Management Strategies						
	Water Conservation - Basic Package	74	142	182	225	274	328
	Water Conservation - Expanded Package	2	13	41	58	63	69
	Purchase water from Fort Worth (TRWD)	354	732	1,402	1,357	2,305	2,390
	Total Water Management Strategies	***430***	***887***	***1,625***	***1,640***	***2,642***	***2,787***
	Total Supply Less Projected Demand	**589**	**570**	**909**	**550**	**1,137**	**870**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Two Way SUD	**Projected Population**	5,081	6,720	8,251	9,819	11,382	12,945
	Projected Water Demand						
	Municipal Demand	575	813	979	1,155	1,326	1,508
	Total Projected Water Demand	***575***	***813***	***979***	***1,155***	***1,326***	***1,508***
	Currently Available Water Supplies						
	Trinity Aquifer	441	442	442	441	441	441
	Total Supply	***441***	***442***	***442***	***441***	***441***	***441***
	Water Management Strategies						
	Water Conservation - Basic Package	9	41	52	66	81	96
	Grayson County Water Supply Project	0	444	609	773	938	1,120
	Reduce Trinity Aquifer use (reallocated to others)	0	-24	-18	-11	-9	-8
	Overdraft Trinity Aquifer (Existing Wells)	59	0	0	0	0	0
	Overdraft Trinity Aquifer (New Wells)	100	0	0	0	0	0
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***168***	***461***	***643***	***828***	***1,010***	***1,208***
	Total Supply Less Projected Demand	**34**	**90**	**106**	**114**	**125**	**141**
University Park	**Projected Population**	24,092	24,647	25,046	25,335	25,543	25,693
	Projected Water Demand						
	Municipal Demand	7,286	7,371	7,407	7,407	7,439	7,483
	Total Projected Water Demand	***7,286***	***7,371***	***7,407***	***7,407***	***7,439***	***7,483***
	Currently Available Water Supplies						
	Lake Grapevine (Dallas County PCMUD)	8,968	8,968	8,968	8,968	8,647	8,243
	Total Supply	***8,968***	***8,968***	***8,968***	***8,968***	***8,647***	***8,243***
	Water Management Strategies						
	Water Conservation - Basic Package	49	154	180	206	232	259
	Total Water Management Strategies	***49***	***154***	***180***	***206***	***232***	***259***
	Total Supply Less Projected Demand	**1,731**	**1,751**	**1,741**	**1,767**	**1,440**	**1,019**
Valley View	**Projected Population**	1,500	3,000	5,000	7,000	12,000	15,000
	Projected Water Demand						
	Municipal Demand	187	363	594	808	1,371	1,714
	Total Projected Water Demand	***187***	***363***	***594***	***808***	***1,371***	***1,714***
	Currently Available Water Supplies						
	Trinity Aquifer (through Bolivar WSC)	78	78	78	78	78	78
	Total Supply	***78***	***78***	***78***	***78***	***78***	***78***
	Water Management Strategies						
	Water Conservation - Basic Package	3	17	31	46	83	110
	Cooke County Water Supply Project	0	71	129	182	323	400
	Purchase water distribution system	0	0	0	0	0	0
	Purchase water from Bolivar WSC	135	410	575	698	1,180	1,467
	Total Water Management Strategies	***138***	***498***	***735***	***926***	***1,586***	***1,977***
	Total Supply Less Projected Demand	**29**	**213**	**219**	**196**	**293**	**341**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Van Alstyne	**Projected Population**	5,014	11,000	15,000	17,000	18,500	19,200
	Projected Water Demand						
	Municipal Demand	966	2,341	3,159	3,561	3,875	4,022
	Total Projected Water Demand	***966***	***2,341***	***3,159***	***3,561***	***3,875***	***4,022***
	Currently Available Water Supplies						
	Trinity Aquifer	468	468	468	468	468	468
	Woodbine Aquifer	0	0	0	0	0	0
	Total Supply	***468***	***468***	***468***	***468***	***468***	***468***
	Water Management Strategies						
	Water Conservation - Basic Package	31	127	198	254	308	353
	Water Conservation - Expanded Package	1	7	27	40	47	49
	Collin-Grayson Municipal Alliance Project (NTMWD/GTUA)	603	2,387	3,393	3,386	3,743	3,835
	Additional Trinity Aquifer (New Wells)	229	713	870	866	821	713
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***864***	***3,234***	***4,488***	***4,546***	***4,919***	***4,950***
	Total Supply Less Projected Demand	**367**	**1,362**	**1,797**	**1,454**	**1,512**	**1,396**
Virginia Hill WSC	**Projected Population**	3,131	3,146	3,161	3,176	3,195	3,219
	Projected Water Demand						
	Municipal Demand	393	384	375	366	361	364
	Total Projected Water Demand	***393***	***384***	***375***	***366***	***361***	***364***
	Currently Available Water Supplies						
	Carrizo-Wilcox Aquifer	443	443	443	443	443	443
	Total Supply	***443***	***443***	***443***	***443***	***443***	***443***
	Water Management Strategies						
	Water Conservation - Basic Package	5	19	20	21	22	24
	Supplemental wells in Carrizo-Wilcox aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***5***	***19***	***20***	***21***	***22***	***24***
	Total Supply Less Projected Demand	**55**	**78**	**88**	**98**	**104**	**103**
Walnut Creek SUD	**Projected Population**	18,549	23,975	28,456	32,401	36,633	41,311
	Projected Water Demand						
	Municipal Demand	2,264	2,874	3,347	3,775	4,268	4,812
	Total Projected Water Demand	***2,264***	***2,874***	***3,347***	***3,775***	***4,268***	***4,812***
	Currently Available Water Supplies						
	TRWD Sources (North Richland Hills)	1,956	1,789	1,706	1,653	1,633	1,604
	Total Supply	***1,956***	***1,789***	***1,706***	***1,653***	***1,633***	***1,604***
	Water Management Strategies						
	Water Conservation - Basic Package	37	140	177	214	256	305
	Purchase water from TRWD	848	1,566	2,480	2,460	4,195	4,444
	New Water Treatment Plant						
	New WTP of 2 MGD	0	0	0	0	0	0
	Water Treatment Expansions						
	WTP expansion of 2 MGD	0	0	0	0	0	0
	WTP expansion of 2 MGD	0	0	0	0	0	0
	WTP expansion of 3 MGD	0	0	0	0	0	0
	WTP expansion of 2 MGD	0	0	0	0	0	0
	WTP expansion of 2 MGD	0	0	0	0	0	0
	Total Water Management Strategies	***885***	***1,706***	***2,657***	***2,674***	***4,451***	***4,749***
	Total Supply Less Projected Demand	**577**	**621**	**1,016**	**552**	**1,816**	**1,541**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Watauga	**Projected Population**	23,423	24,632	25,596	26,365	26,979	27,468
	Projected Water Demand						
	Municipal Demand	3,437	3,532	3,584	3,603	3,657	3,723
	Total Projected Water Demand	***3,437***	***3,532***	***3,584***	***3,603***	***3,657***	***3,723***
	Currently Available Water Supplies						
	TRWD Sources (North Richland Hills)	3,691	3,079	2,649	2,287	1,966	1,700
	Total Supply	***3,691***	***3,079***	***2,649***	***2,287***	***1,966***	***1,700***
	Water Management Strategies						
	Water Conservation - Basic Package	42	154	171	187	203	220
	Purchase water from North Richland Hills (from TRWD)	567	1,046	1,832	1,639	2,590	2,522
	Total Water Management Strategies	***609***	***1,200***	***2,003***	***1,826***	***2,793***	***2,742***
	Total Supply Less Projected Demand	**863**	**747**	**1,068**	**510**	**1,102**	**719**
Waxahachie	**Projected Population**	28,281	36,202	46,342	59,322	75,937	97,206
	Projected Water Demand						
	Municipal Demand	6,462	8,151	10,330	13,090	16,672	21,341
	Total Projected Water Demand	***6,462***	***8,151***	***10,330***	***13,090***	***16,672***	***21,341***
	Currently Available Water Supplies						
	Lake Bardwell (TRA)	3,855	3,668	3,483	3,296	3,111	2,925
	Lake Waxahachie	512	1,632	1,687	1,726	1,753	1,790
	Reuse	1,886	2,166	2,445	2,724	3,004	3,283
	Total Supply	***6,253***	***7,466***	***7,615***	***7,746***	***7,868***	***7,998***
	Water Management Strategies						
	Water Conservation - Basic Package	229	580	823	1,155	1,612	2,241
	Water Conservation - Expanded Package	3	25	135	219	279	357
	Rockett SUD-Waxahachie-Red Oak Project	1,448	1,611	3,838	6,726	6,726	6,727
	TRA Ellis County Water Supply Project (Waxahachie)	0	511	511	512	2,392	5,212
	TRA/Waxahachie Indirect Reuse	3,080	2,876	2,402	1,950	1,520	1,161
	Water Treatment Expansions						
	WTP Expansion of 12 MGD	0	0	0	0	0	0
	WTP Expansion of 18 MGD	0	0	0	0	0	0
	Total Water Management Strategies	***4,760***	***5,603***	***7,709***	***10,562***	***12,529***	***15,698***
	Total Supply Less Projected Demand	**4,552**	**4,918**	**4,994**	**5,218**	**3,725**	**2,354**
Weatherford	**Projected Population**	25,412	32,161	38,365	43,389	48,773	54,799
	Projected Water Demand						
	Municipal Demand	5,209	6,448	7,607	8,554	9,561	10,741
	Total Projected Water Demand	***5,209***	***6,448***	***7,607***	***8,554***	***9,561***	***10,741***
	Currently Available Water Supplies						
	Lake Weatherford	2,399	2,301	2,184	2,056	1,927	1,792
	Trinity Aquifer	50	50	50	50	50	50
	TRWD Sources	1,556	1,706	1,857	2,000	2,149	2,301
	Total Supply	***4,005***	***4,057***	***4,091***	***4,106***	***4,126***	***4,143***
	Water Management Strategies						
	Water Conservation - Basic Package	156	355	484	617	771	955
	Water Conservation - Expanded Package	3	40	147	204	233	264
	Purchase water from TRWD	1,391	2,683	4,536	4,758	7,080	7,607
	New Water Treatment Plant						
	New WTP of 8 MGD	0	0	0	0	0	0
	Water Treatment Expansions						
	WTP Expansion of 4 MGD (12 MGD total)	0	0	0	0	0	0
	WTP Expansion of 6 MGD (18 MGD total)	0	0	0	0	0	0
	Total Water Management Strategies	***1,550***	***3,078***	***5,167***	***5,579***	***8,084***	***8,826***
	Total Supply Less Projected Demand	**346**	**687**	**1,651**	**1,131**	**2,649**	**2,228**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
West Cedar Creek MUD	**Projected Population**	21,673	28,602	35,601	43,119	52,374	63,933
	Projected Water Demand						
	Municipal Demand	2,184	3,300	4,227	5,072	6,160	7,520
	Total Projected Water Demand	***2,184***	***3,300***	***4,227***	***5,072***	***6,160***	***7,520***
	Currently Available Water Supplies						
	TRWD Sources	1,355	1,429	1,461	1,477	1,492	1,504
	Total Supply	***1,355***	***1,429***	***1,461***	***1,477***	***1,492***	***1,504***
	Water Management Strategies						
	Water Conservation - Basic Package	41	171	227	292	375	483
	Purchase water from TRWD	1,350	2,425	3,825	4,049	6,181	7,024
	Water Treatment Expansions						
	Water treatment plant expansion (5 MGD)	0	0	0	0	0	0
	Water treatment plant expansion (5 MGD)	0	0	0	0	0	0
	Total Water Management Strategies	***1,391***	***2,596***	***4,052***	***4,341***	***6,556***	***7,507***
	Total Supply Less Projected Demand	**562**	**725**	**1,286**	**746**	**1,888**	**1,491**
West Wise SUD	**Projected Population**	3,581	3,957	4,323	4,684	5,093	5,568
	Projected Water Demand						
	Municipal Demand	497	536	571	609	656	717
	Total Projected Water Demand	***497***	***536***	***571***	***609***	***656***	***717***
	Currently Available Water Supplies						
	TRWD Sources (Walnut Creek SUD)	521	435	383	343	306	277
	Total Supply	***521***	***435***	***383***	***343***	***306***	***277***
	Water Management Strategies						
	Water Conservation - Basic Package	6	23	27	32	36	42
	Purchase water from Walnut Creek SUD (from TRWD)	12	37	53	69	81	112
	Purchase water from TRWD	70	122	239	208	384	375
	Total Water Management Strategies	***88***	***182***	***319***	***309***	***501***	***529***
	Total Supply Less Projected Demand	**112**	**81**	**131**	**43**	**151**	**89**
Weston	**Projected Population**	2,000	4,000	7,000	20,000	35,000	60,000
	Projected Water Demand						
	Municipal Demand	251	672	1,482	4,234	7,410	12,702
	Total Projected Water Demand	***251***	***672***	***1,482***	***4,234***	***7,410***	***12,702***
	Currently Available Water Supplies						
	Woodbine Aquifer	64	64	64	64	64	64
	Total Supply	***64***	***64***	***64***	***64***	***64***	***64***
	Water Management Strategies						
	Water Conservation - Basic Package	5	41	92	299	584	1,108
	Water Conservation - Expanded Package	0	1	7	21	38	66
	Purchase water from NTMWD/GTUA	227	754	1,702	4,222	8,908	14,633
	Overdraft Woodbine Aquifer using existing wells in 2010	121	0	0	0	0	0
	Supplemental wells in Woodbine aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***353***	***796***	***1,801***	***4,542***	***9,530***	***15,807***
	Total Supply Less Projected Demand	**166**	**188**	**383**	**372**	**2,184**	**3,169**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Westover Hills	**Projected Population**	658	658	658	658	658	658
	Projected Water Demand						
	Municipal Demand	276	274	272	270	268	268
	Total Projected Water Demand	***276***	***274***	***272***	***270***	***268***	***268***
	Currently Available Water Supplies						
	TRWD Sources (Fort Worth)	296	239	201	171	144	122
	Total Supply	***296***	***239***	***201***	***171***	***144***	***122***
	Water Management Strategies						
	Water Conservation - Basic Package	7	12	14	17	19	21
	Water Conservation - Expanded Package	2	4	4	4	4	4
	Purchase water from Fort Worth (TRWD)	46	81	139	123	190	182
	Total Water Management Strategies	***55***	***97***	***157***	***144***	***213***	***207***
	Total Supply Less Projected Demand	**75**	**62**	**86**	**45**	**89**	**61**
Westworth Village	**Projected Population**	2,250	2,375	2,525	2,700	2,900	3,200
	Projected Water Demand						
	Municipal Demand	244	287	297	308	328	362
	Total Projected Water Demand	***244***	***287***	***297***	***308***	***328***	***362***
	Currently Available Water Supplies						
	TRWD Sources (Fort Worth)	262	250	220	196	176	165
	Total Supply	***262***	***250***	***220***	***196***	***176***	***165***
	Water Management Strategies						
	Water Conservation - Basic Package	4	15	17	19	21	24
	Purchase water from Fort Worth (TRWD)	40	85	151	140	233	246
	Total Water Management Strategies	***44***	***100***	***168***	***159***	***254***	***270***
	Total Supply Less Projected Demand	**62**	**63**	**91**	**47**	**102**	**73**
White Settlement	**Projected Population**	15,800	17,000	18,500	19,000	20,500	22,000
	Projected Water Demand						
	Municipal Demand	2,531	2,647	2,818	2,831	3,031	3,253
	Total Projected Water Demand	***2,531***	***2,647***	***2,818***	***2,831***	***3,031***	***3,253***
	Currently Available Water Supplies						
	Trinity Aquifer	829	829	829	829	829	829
	TRWD Sources (Fort Worth)	1,828	1,585	1,470	1,271	1,184	1,107
	Total Supply	***2,657***	***2,414***	***2,299***	***2,100***	***2,013***	***1,936***
	Water Management Strategies						
	Water Conservation - Basic Package	142	87	103	115	134	154
	Water Conservation - Expanded Package	2	1	0	0	0	0
	Purchase water from Fort Worth (TRWD)	280	538	1,017	910	1,558	1,642
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***424***	***626***	***1,120***	***1,025***	***1,692***	***1,796***
	Total Supply Less Projected Demand	**550**	**393**	**601**	**294**	**674**	**479**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Whitesboro	**Projected Population**	6,000	7,500	8,500	9,250	9,750	10,000
	Projected Water Demand						
	Municipal Demand	1,042	1,277	1,429	1,524	1,594	1,636
	Total Projected Water Demand	***1,042***	***1,277***	***1,429***	***1,524***	***1,594***	***1,636***
	Currently Available Water Supplies						
	Trinity Aquifer	761	761	761	761	761	760
	Total Supply	***761***	***761***	***761***	***761***	***761***	***760***
	Water Management Strategies						
	Water Conservation - Basic Package	34	77	98	118	137	155
	Water Conservation - Expanded Package	1	6	14	19	21	22
	Grayson County Water Supply Project	0	682	861	974	1,070	1,155
	Reduce Trinity Aquifer use (reallocate to others)	0	-117	-156	-191	-231	-280
	Overdraft Trinity Aquifer (Existing Wells)	190	0	0	0	0	0
	Overdraft Trinity Aquifer (New Wells)	100	0	0	0	0	0
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***325***	***648***	***817***	***920***	***997***	***1,052***
	Total Supply Less Projected Demand	**44**	**132**	**149**	**157**	**164**	**176**
Whitewright	**Projected Population**	2,522	3,528	4,532	5,535	6,538	7,541
	Projected Water Demand						
	Municipal Demand	554	763	965	1,159	1,362	1,572
	Total Projected Water Demand	***554***	***763***	***965***	***1,159***	***1,362***	***1,572***
	Currently Available Water Supplies						
	Woodbine Aquifer	437	438	437	438	438	437
	Total Supply	***437***	***438***	***437***	***438***	***438***	***437***
	Water Management Strategies						
	Water Conservation - Basic Package	17	41	60	83	108	138
	Grayson County Water Supply Project	0	176	354	532	731	962
	Additional Woodbine Aquifer (New Wells)	116	185	211	227	225	197
	Supplemental Wells in Woodbine Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***133***	***402***	***625***	***842***	***1,064***	***1,297***
	Total Supply Less Projected Demand	**16**	**77**	**97**	**120**	**140**	**162**
Willow Park	**Projected Population**	3,832	4,764	5,829	6,736	7,688	8,722
	Projected Water Demand						
	Municipal Demand	627	758	914	1,049	1,188	1,348
	Total Projected Water Demand	***627***	***758***	***914***	***1,049***	***1,188***	***1,348***
	Currently Available Water Supplies						
	Trinity Aquifer	642	642	642	642	642	642
	Total Supply	***642***	***642***	***642***	***642***	***642***	***642***
	Water Management Strategies						
	Water Conservation - Basic Package	20	49	40	50	60	73
	Purchase water from TRWD (Weatherford)	0	135	340	443	680	801
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***20***	***184***	***380***	***493***	***740***	***874***
	Total Supply Less Projected Demand	**35**	**68**	**108**	**86**	**194**	**168**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Wilmer	**Projected Population**	5,500	7,500	8,800	10,500	14,000	22,000
	Projected Water Demand						
	Municipal Demand	641	899	1,035	1,223	1,631	2,563
	Total Projected Water Demand	***641***	***899***	***1,035***	***1,223***	***1,631***	***2,563***
	Currently Available Water Supplies						
	Trinity Aquifer	322	322	322	322	322	322
	Total Supply	***322***	***322***	***322***	***322***	***322***	***322***
	Water Management Strategies						
	Water Conservation - Basic Package	10	39	49	62	88	147
	Purchase water from DWU (through Hutchins or Lancaster)	451	875	1,095	1,417	1,963	2,821
	Overdrafting Trinity Aquifer using existing wells until 2010	322	0	0	0	0	0
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***783***	***914***	***1,144***	***1,479***	***2,051***	***2,968***
	Total Supply Less Projected Demand	**464**	**337**	**431**	**578**	**742**	**727**
Wise County-Irrigation	**Projected Water Demand**						
	Irrigation Demand	502	502	502	502	502	502
	Total Projected Water Demand	***502***	***502***	***502***	***502***	***502***	***502***
	Currently Available Water Supplies						
	Irrigation Local Supply	139	139	139	139	139	139
	Trinity Aquifer	251	251	251	251	251	251
	TRWD Sources	124	108	92	79	67	57
	Total Supply	***514***	***498***	***482***	***469***	***457***	***447***
	Water Management Strategies						
	Water Conservation	0	5	10	13	15	18
	Purchase water from TRWD	21	37	63	56	87	84
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***21***	***42***	***73***	***69***	***102***	***102***
	Total Supply Less Projected Demand	**33**	**38**	**53**	**36**	**57**	**47**
Wise County-Livestock	**Projected Water Demand**						
	Livestock Demand	1,714	1,714	1,714	1,714	1,714	1,714
	Total Projected Water Demand	***1,714***	***1,714***	***1,714***	***1,714***	***1,714***	***1,714***
	Currently Available Water Supplies						
	Livestock Local Supply	1,117	1,117	1,117	1,117	1,117	1,117
	Trinity Aquifer	807	807	807	807	807	807
	Total Supply	***1,924***	***1,924***	***1,924***	***1,924***	***1,924***	***1,924***
	Water Management Strategies						
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Reduce Trinity Aquifer use (reallocated to others)	-100	-100	-100	-100	-100	-100
	Total Water Management Strategies	***-100***	***-100***	***-100***	***-100***	***-100***	***-100***
	Total Supply Less Projected Demand	**110**	**110**	**110**	**110**	**110**	**110**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Wise County-Manufacturing	**Projected Water Demand**						
	Manufacturing Demand	2,313	2,660	2,979	3,277	3,539	3,858
	Total Projected Water Demand	***2,313***	***2,660***	***2,979***	***3,277***	***3,539***	***3,858***
	Currently Available Water Supplies						
	Other Aquifer	14	14	14	14	14	14
	Other Local Supply	0	0	0	0	0	0
	TRWD Sources	2,469	2,307	2,191	2,071	1,895	1,755
	Total Supply	***2,483***	***2,321***	***2,205***	***2,085***	***1,909***	***1,769***
	Water Management Strategies						
	Water Conservation	0	1	12	18	19	21
	Purchase water from TRWD	379	783	1,516	1,484	2,496	2,603
	Supplemental wells in Other aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***379***	***784***	***1,528***	***1,502***	***2,515***	***2,624***
	Total Supply Less Projected Demand	**549**	**445**	**754**	**310**	**885**	**535**
Wise County-Mining	**Projected Water Demand**						
	Mining Demand	23,627	27,824	30,530	33,303	36,168	38,866
	Total Projected Water Demand	***23,627***	***27,824***	***30,530***	***33,303***	***36,168***	***38,866***
	Currently Available Water Supplies						
	Reuse Supply	15,930	14,074	12,152	10,643	9,236	8,061
	Run-of-river - Trinity	51	51	51	51	51	51
	Trinity Aquifer	239	239	239	239	239	239
	TRWD Sources	2,896	2,525	2,140	1,839	1,557	1,322
	Total Supply	***19,116***	***16,889***	***14,582***	***12,772***	***11,083***	***9,673***
	Water Management Strategies						
	Purchase water from TRWD	4,779	4,711	5,607	4,913	6,162	5,704
	Reuse - Recycled water	14,337	14,133	22,428	19,652	24,648	28,520
	Reduce Trinity Aquifer use (reallocated to others)	0	0	0	-50	-50	-50
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***19,116***	***18,844***	***28,035***	***24,515***	***30,760***	***34,174***
	Total Supply Less Projected Demand	**14,605**	**7,909**	**12,087**	**3,984**	**5,675**	**4,981**
Wise County-Other	**Projected Population**	32,364	35,909	35,909	35,909	35,909	35,909
	Projected Water Demand						
	County-Other Demand	3,843	4,344	4,304	4,223	4,183	4,183
	Total Projected Water Demand	***3,843***	***4,344***	***4,304***	***4,223***	***4,183***	***4,183***
	Currently Available Water Supplies						
	Trinity Aquifer	2,161	2,161	2,161	2,161	2,161	2,161
	TRWD Sources (Walnut Creek SUD)	1,024	926	772	647	541	458
	Total Supply	***3,185***	***3,087***	***2,933***	***2,808***	***2,702***	***2,619***
	Water Management Strategies						
	Water Conservation - Basic Package	57	209	223	236	250	264
	Purchase water from Walnut Creek SUD (from TRWD)	17	40	57	53	68	64
	Purchase water from TRWD	149	1,126	1,233	1,221	1,316	1,275
	Overdrafting Trinity Aquifer (existing wells)	676	0	0	0	0	0
	Supplemental wells in Trinity aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***899***	***1,375***	***1,513***	***1,510***	***1,634***	***1,603***
	Total Supply Less Projected Demand	**241**	**118**	**142**	**95**	**153**	**39**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Wise County-Steam Electric Power	**Projected Water Demand**						
	Steam Electric Power Demand	3,949	5,653	6,609	7,774	9,195	10,927
	Total Projected Water Demand	***3,949***	***5,653***	***6,609***	***7,774***	***9,195***	***10,927***
	Currently Available Water Supplies						
	TRWD sources	4,600	4,010	3,400	2,920	2,473	2,100
	Total Supply	***4,600***	***4,010***	***3,400***	***2,920***	***2,473***	***2,100***
	Water Management Strategies						
	Purchase water from TRWD	1,098	2,592	3,863	4,679	6,372	5,951
	Purchase reuse water from Bridgeport	0	0	0	1,500	2,000	2,000
	Purchase reuse water from Decatur	0	0	0	2,000	2,000	2,000
	Total Water Management Strategies	***1,098***	***2,592***	***3,863***	***8,179***	***10,372***	***9,951***
	Total Supply Less Projected Demand	**1,749**	**949**	**654**	**3,325**	**3,650**	**1,124**
Woodbine WSC	**Projected Population**	5,336	5,879	6,416	6,949	7,481	8,013
	Projected Water Demand						
	Municipal Demand	669	712	762	802	855	915
	Total Projected Water Demand	***669***	***712***	***762***	***802***	***855***	***915***
	Currently Available Water Supplies						
	Trinity Aquifer	***529***	***529***	***529***	***529***	***529***	***529***
	Total Supply	***529***	***529***	***529***	***529***	***529***	***529***
	Water Management Strategies						
	Water Conservation - Basic Package	9	35	41	46	52	59
	Cooke County Water Supply Project	0	240	283	316	369	427
	Additional Trinity Aquifer (Existing Wells)	23	0	0	0	0	0
	Overdraft Trinity Aquifer (Existing Wells)	117	0	0	0	0	0
	Supplemental Wells in Trinity Aquifer	0	0	0	0	0	0
	Total Water Management Strategies	***149***	***275***	***324***	***362***	***421***	***486***
	Total Supply Less Projected Demand	**9**	**92**	**91**	**89**	**95**	**100**
Wortham	**Projected Population**	1,131	1,182	1,209	1,217	1,217	1,217
	Projected Water Demand						
	Municipal Demand	246	253	255	252	251	251
	Total Projected Water Demand	***246***	***253***	***255***	***252***	***251***	***251***
	Currently Available Water Supplies						
	Lake Mexia	0	1	0	0	0	0
	Wortham Lake	0	0	0	0	0	0
	Total Supply	***0***	***1***	***0***	***0***	***0***	***0***
	Water Management Strategies						
	Water Conservation - Basic Package	7	14	16	18	20	22
	Purchase treated water from Corsicana	250	300	300	300	300	300
	Water Treatment Expansions						
	Water treatment plant expansion (0.25 MGD)	0	0	0	0	0	0
	Total Water Management Strategies	***257***	***314***	***316***	***318***	***320***	***322***
	Total Supply Less Projected Demand	**11**	**62**	**61**	**66**	**69**	**71**

Table V-1, Continued

WUG		2010	2020	2030	2040	2050	2060
Wylie	**Projected Population**	35,000	50,000	62,413	86,956	91,543	100,000
	Projected Water Demand						
	Municipal Demand	6,862	10,754	13,353	18,506	19,483	21,283
	Total Projected Water Demand	***6,862***	***10,754***	***13,353***	***18,506***	***19,483***	***21,283***
	Currently Available Water Supplies						
	NTMWD Sources	4,814	5,837	6,202	7,580	7,252	7,206
	Total Supply	***4,814***	***5,837***	***6,202***	***7,580***	***7,252***	***7,206***
	Water Management Strategies						
	Water Conservation - Basic Package	291	911	1,244	1,880	2,142	2,517
	Water Conservation - Expanded Package	5	78	156	221	239	261
	Purchase water from NTMWD	3,501	7,222	9,545	10,992	16,191	17,301
	Total Water Management Strategies	***3,797***	***8,211***	***10,945***	***13,093***	***18,572***	***20,079***
	Total Supply Less Projected Demand	**1,749**	**3,294**	**3,794**	**2,167**	**6,341**	**6,002**

APPENDIX W

RECOMMENDATION MEMORANDUM FROM THE UNIQUE STREAM SEGMENT COMMITTEE

FREESE • NICHOLS

MEMORANDUM TO FILE

FROM: Unique Stream Segment Committee

File [NTD02182] T:\Task 8 - Unique Designations and Regulatory Issues\Unique streams\Draft Committee Memo.doc

SUBJECT: Summary of Regional Water Planning Groups' Thoughts Regarding the Recommendation of Stream Segments as Unique

DATE: March 1, 2005

COMMITTEE MEMBERS

Dr. Paul Phillips, Chair
Jerry Chapman
Elaine Petrus
Mary Vogelson
Paul Zweiacker

RECOMMENDATIONS

- Recommend Coffee Mill Creek as designated by TPWD, Lost Creek as designated by TPWD (with the proviso that the existing Lake Jacksboro and Lost Creek Lake maintenance and repair of their dams should not be prevented), and Clear Creek upstream from F.M. 2164 for designation as unique stream segments.
- Recommend Purtis Creek and the Brazos River in Parker County for designation as unique stream segments <u>if</u> adjoining regions recommend adjoining segments.
- Recommend Hickory Creek in Denton County and Fish Creek in Cooke County for designation as unique stream segments <u>if</u> TPWD indicates that such designation would be appropriate.

INTRODUCTION

As part of the Senate Bill One planning process, regional water planning groups are asked to make recommendations for designation of unique stream segments. In the last round of regional water planning, resulting in the 2001 *Region C Water* Plan, the Region C Water Planning Group did not recommend the designation of any unique stream segments. The members of the planning group felt that it was difficult to make such recommendations because of the uncertain implications of designation of unique stream segments. Many other regional water planning groups had similar concerns, and only one of the 16 regions recommended unique stream segments to the Legislature. The Legislature has not designated any of the recommended segments.

In the interim between the completion of the *2001 Region C Water Plan* and the current round of planning, the Texas legislature clarified that the only intended effect of the designation of a unique stream segment was to prevent the development of a reservoir on the designated segment by a political subdivision of the state. However, Texas Water Development Board regulations governing regional water planning require analysis of the impact of water management strategies on unique stream segments, which implies some level of protection beyond the mere prevention of reservoir development. Some regional water planning groups are planning not to recommend unique stream segments in this round of planning, while others are still considering the possibility. Table 1 shows the status of plans for unique stream segment designation by the various planning groups as of early February, 2005. At that time, no regions had definitely decided to recommend unique stream segments, five regions had definitely decided not to recommend any segments, two regions were leaning toward designating segments

Table 1

Summary of RWPG Recommendations Regarding Unique Stream Segments

Region	**Is the RWPG Recommending Unique Stream Segment(s) to the Texas Legislature?**				
	Yes	**No**	**Yes?**	**No?**	**?**
A				X	
B		X			
C					X
D					X
E					X
F		X			
G					X
H			X		
I		X			
J		X			
K				X	
L				X	
M					X
N		X			
O				X	
P			X		

but had not made a final decision, four regions were leaning against designating segments but had not made final decision, and five regions were undecided.

The Region C Water Planning Group appointed a committee to consider the designation of unique stream segments. This committee has met several times and has been joined by representatives of the Texas Water Development Board and the Texas Parks and Wildlife Department. This memorandum presents the committee's recommendations to the Region C Water Planning Group.

TEXAS PARKS AND WILDLIFE DEPARTMENT RECOMMENDATIONS

The Texas Parks and Wildlife Department (TPWD) developed *Ecologically Significant River and Stream Segments for Region C, April 2002.* This report recommended 10 stream segments to the Region C Water Planning Group as candidates for unique stream segment status. Table 2 lists these segments and summarizes the attributes that TPWD sees as qualifying them for unique stream segment status. Figure 1 is a map showing the location of these segments. Attachment A is a summary of the TPWD report, which is available in full on line at www.tpwd.state.tx.us/texaswater/sb1/rivers/unique/regions_text/regions_list/region_c.phtml.

RECOMMENDATIONS OF THE COMMITTEE

The Region C unique stream segment committee adopted the following criteria for the designation of unique stream segments:

- The committee did not wish to recommend segments that would conflict with any water management strategies being considered for Region C.
- The committee did not wish to recommend segments adjacent to segments in other regions or shared with other regions unless the other regions also recommended the segments.
- The committee tried to communicate with local water user groups before designating a segment.

Applying these criteria, the committee recommends that the Region C Water Planning recommend the following segments for designation as unique stream segments:

- The entire length of Coffee Mill Creek in Fannin County.

Table 2

Texas Parks and Wildlife Department Recommendations for Designation as Ecologically Unique River and Stream Segments from *Ecologically Significant River and Stream Segments of Region C, April 2002*

				TPWD Reasons for Designation[a]				
River or Stream Segment	**Description**	**Basin**	**County**	**Biological Function**	**Hydro-logic Function**	**Riparian Conservation Area**	**High Water Quality/Aesthetic Value**	**Endangered Species/ Unique Communities**
Bois d'Arc Creek	Entire length	Red	Fannin	X	X	X		
Brazos River	Parker/Palo Pinto Co. line to F.M. 2580	Brazos	Parker	X			X	X
Buffalo Creek	Alligator Ck.-S.H. 164	Trinity	Freestone	X	X			
Clear Creek	Denton/Cooke Co. line to Elm Fk. Trinity R.	Trinity	Denton				X	
Coffee Mill Creek	Entire length	Red	Fannin			X		
Linn Creek	Buffalo Ck. – C.R. 691	Trinity	Freestone	X	X			
Lost Creek	Entire length	Trinity	Jack			X	X	
Purtis Creek	S. Twin Ck. to Henderson Co. line	Trinity	Henderson			X		
Trinity River	Freestone/Leon to Henderson/Anderson Co. line	Trinity	Freestone/ Anderson	X		X		X

[a] The criteria listed are from Texas Administration Code Section 357.8. The Texas Parks and Wildlife feels that their recommended reaches meet the criteria marked with an X.

- The entire length of Lost Creek in Jack County (noting that the creek already has Lost Creek Lake and Lake Jacksboro on it, and that the designation should expressly not affect these reservoirs or the ability to repair and maintain the dams that create them).
- Clear Creek in Denton County upstream from F.M. 2164.

The committee also recommends that the Region C Water Planning recommend the following segments for designation as unique stream segments <u>if the listed conditions are met</u>:

- The Brazos River in Parker County <u>if</u> Region G recommends designation of the segment upstream that is recommended by TPWD for their region. (It is our understanding that they do not plan to do so.)
- Purtis Creek in Henderson County <u>if</u> Region D recommends designation of the segment upstream that is recommended by TPWD for their region.

The committee has requested input from the Texas Parks and Wildlife Department on the suitability of the following stream segments as additional recommendations:

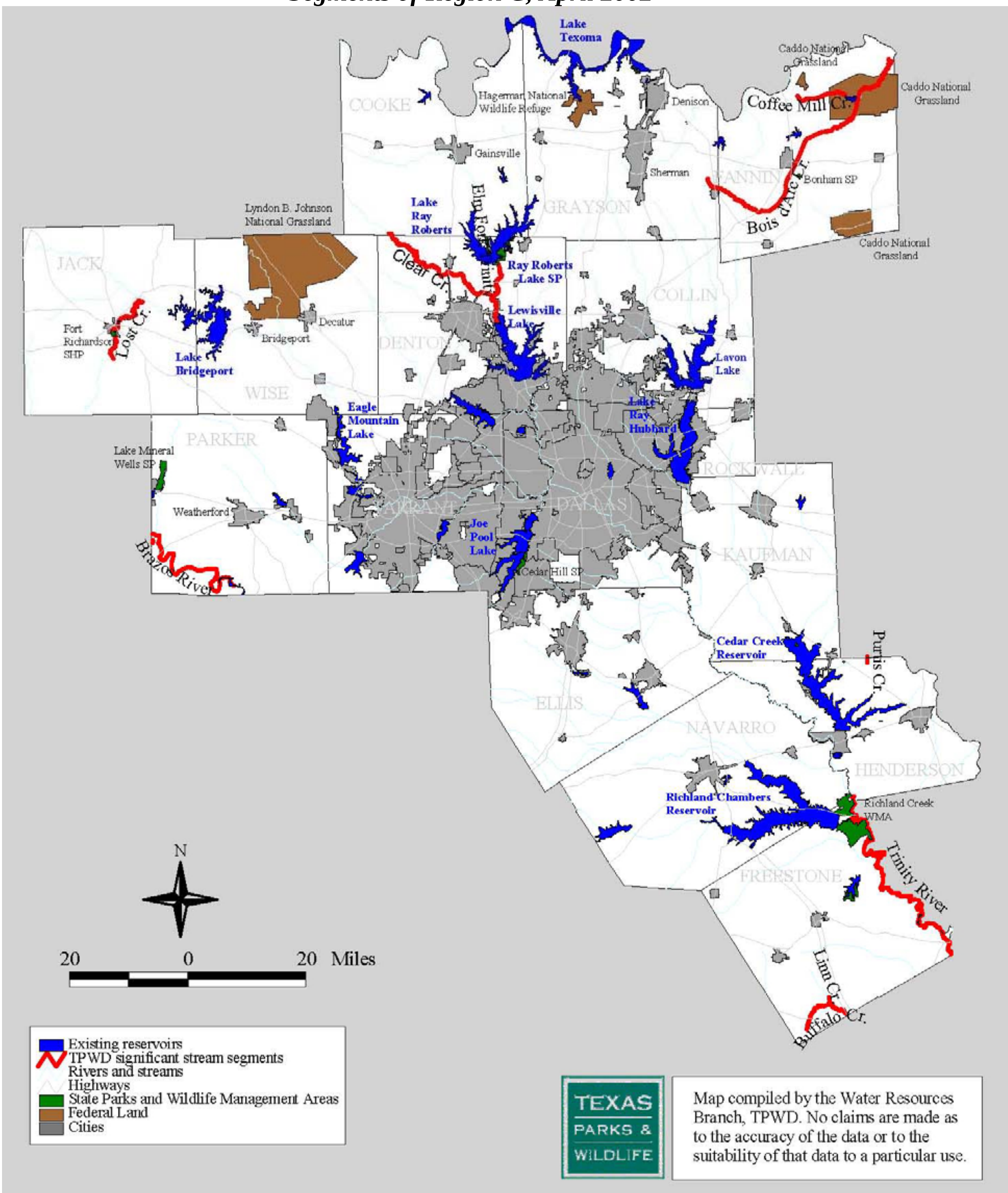
- Hickory Creek in Denton County.
- Fish Creek in Cooke County (upstream from Moss Lake).

We are awaiting input from TPWD on these segments.

The committee recommends against unique stream segments for the following segments for the reasons listed:

- Bois d'Arc Creek because it conflicts with Bois d'Arc Creek Lake, a recommended water management strategy in the *2001 Region C Water Plan.*
- Buffalo Creek because local planning group members indicate that the ecological value has been greatly reduced by timber harvesting and other activities.
- The Elm Fork of the Trinity River because of concerns about possible impacts of designation on the flood control and water supply operations of Lake Ray Roberts and Lake Lewisville.
- Linn Creek because local planning group members indicate that the ecological value has been greatly reduced by timber harvesting and other activities.
- Trinity River in Freestone County because it is shared with Region I (on the east bank of the river), which has decided not to designate any unique stream segments. Region H is also apparently not planning to recommend the segment of the Trinity River located immediately downstream.

Figure 1
Texas Parks and Wildlife Department Recommendations for Designation as Ecologically Unique River and Stream Segments from *Ecologically Significant River and Stream Segments of Region C, April 2002*



Attachment A

Texas Parks and Wildlife Department List of Potential Unique Stream Sites for Region C

http://www.tpwd.state.tx.us/texaswater/sb1/rivers/unique/regions_text/regions_list/region_c.phtml

1. **Bois d' Arc Creek** - From the confluence with the Red River in Fannin County upstream to its headwaters in east Grayson County.

   Biological function: priority bottomland hardwood habitat displays significant overall habitat value (USFWS, 1985)
   Hydrologic function: bottomland hardwood forest provides valuable hydrologic function relating to water quality and flood attenuation (USFWS, 1985)
   Riparian conservation area: Caddo National Grassland

2. **Brazos River** - From a point 330 feet upstream of FM 2580 in Parker County upstream to the Parker/Palo Pinto County line (within TNRCC classified stream segment 1206).

   Biological function: Texas Natural Rivers System nominee for outstandingly remarkable wildlife values (NPS, 1995)
   High water quality/exceptional aquatic life/high aesthetic value: rated as #1 scenic and recreational river in the northern half of Texas (NPS, 1995)
   Threatened or endangered species/unique communities: very rare, endemic Texas fawnsfoot freshwater mussel (Howells, 1997)

3. **Buffalo Creek** - From the confluence with Alligator Creek in Freestone County upstream to State Route 164 in Freestone County.

   Biological function: priority bottomland hardwood habitat displays significant overall habitat value (USFWS, 1985; Bauer et al., 1991)
   Hydrologic function: bottomland hardwood forest provides valuable hydrologic function relating to water quality and flood attenuation (USFWS, 1985)

4. **Clear Creek** - From the confluence with the Elm Fork of the Trinity River about 5 miles northeast of Denton in Denton County upstream to the Denton/Cooke County line.

   High water quality/exceptional aquatic life/high aesthetic value: ecoregion stream; high water quality, diverse benthic macroinvertebrate community (Bayer et al., 1992)

5. **Coffee Mill Creek** - From the confluence with Bois d' Arc Creek in Fannin County upstream to its headwaters in Fannin County.

   Riparian conservation area : Caddo National Grassland

6. **Elm Fork of the Trinity River -** From the headwaters of Lewisville Lake in Denton County upstream to Lake Ray Roberts Dam in Denton County (TNRCC classified stream segment 0839).

   Riparian conservation area : Lake Ray Roberts/Lake Lewisville Greenbelt

7. **Linn Creek** - From the confluence with Buffalo Creek in Freestone County upstream to County Road 691 in Freestone County.

   Biological function: priority bottomland hardwood habitat displays significant overall habitat value (USFWS, 1985; Bauer et al., 1991)
   Hydrologic function: bottomland hardwood forest provides valuable hydrologic function relating to water quality and flood attenuation (USFWS, 1985)

8. **Lost Creek** - From the confluence with the West Fork of the Trinity River northeast of Jacksboro in Jack County upstream to the headwaters located about four miles southwest of Jacksboro in Jack County.

   Riparian conservation area : Fort Richardson State Park and Trail and Lost Creek Reservoir State Trailway
   High water quality/exceptional aquatic life/high aesthetic value - exceptional aesthetic value (M. Howell, 1999, pers. comm.)

9. **Purtis Creek -** From the confluence with South Twin Creek in Henderson County upstream to the Henderson/Van Vandt County line.

   Riparian conservation area : Purtis Creek State Park

10. **Trinity River** - From the Freestone/Anderson/Leon County line upstream to the Anderson/Henderson County line (within TNRCC classified stream segment 0804).

    Biological function: bottomland hardwood habitat displays significant overall habitat value (TPWD, 1999)
    Riparian conservation area: Big Lake Bottom Wildlife Management Area
    Threatened or endangered species/unique communities: one of the two largest populations of rare, endemic Texas heelsplitter freshwater mussel remaining (Neck and Howells, 1994; Howells, 1997; Howells et al., 1997)

APPENDIX X

RECOMMENDATION MEMORANDUM FROM THE POLICY TOPICS COMMITTEE

Freese and Nichols

MEMORANDUM TO FILE

FROM: Policy Topics Committee
[NTD02182] T:\Task 8 - Unique Designations and Regulatory Issues\Policy Topics\DRAFT memo of proposed policy topics.doc

SUBJECT: Summary of Regional Water Planning Groups' Thoughts Regarding Policy Topics

DATE: March 7, 2005

Committee Members

George Shannon, Chair
Marsh Rice
Robert Scott
Connie Standridge
Danny Vance

Senate Bill One Planning Process

Alternative Strategies

Section 357.7(a)(9) of the TWDB Regional Water Planning guidelines requires "specific recommendations of water management strategies to meet the needs…". As we understand the TWDB interpretation of this requirement, listing alternative strategies among which a water supplier can choose is not allowed.

This requirement decreases the local control and flexibility that have been an important part of the successful efforts to meet water needs in Region C and throughout Texas. Water suppliers need to have a full range of options as they seek to provide new water supplies for Texas' future. It is impossible to foresee all the possibilities for new water supplies in a planning process such as this, and changing circumstances can change the preferred alternative for new supplies very quickly. New laws, court decisions, regulatory changes, permitting decisions, changes in growth patterns, and other factors may make a recommended strategy impossible and require a supplier to develop other alternatives. Limiting the options of water suppliers will make negotiations to obtain needed land or water more difficult and drive up the cost of new water supplies. The following steps should be taken to address these concerns:

- Willing buyer/willing seller transactions of water rights and treated water should not be controlled by this regulation. Such transactions may be beneficial to all concerned and may simply not have been foreseen in the planning process.
- The TWDB and the Texas Commission on Environmental Quality (TCEQ) should interpret existing legislation to give the maximum possible flexibility to water suppliers as they seek to serve the public and provide new supplies. Changes in the timing of supply development, the order in which strategies are implemented, the amount of supply from a management strategy, or the details of a project should not be interpreted as making that project inconsistent with the regional plan.
- The TWDB and TCEQ should make liberal use of their ability to waive consistency requirements if local water suppliers elect strategies that differ from those in the regional plan.
- Legislative and/or regulatory changes should be made to allow plans to present alternative sources of supply where appropriate. Until alternative sources of supply can be included in regional water plans, state agencies should be free to consider and approve TWDB funding and TCEQ water rights permitting for alternatives not included as part of the recommended regional water plan.

Clear Guidance on Resolving Consistency Issues (new)

The TWDB has implemented a policy that any project that is not specified in the tables summarizing the recommended water management strategies (Tables 12 and 13 in the 2001 Plan) is not consistent with the regional water plan. The TWDB does not consider the language in the regional water plan reports or any other factors in its determinations. This TWDB policy was not made clear to the regional water planning groups prior to adoption of the regional plans. One result of the TWDB's policy is that the existing regional water plan must be amended with some frequency as changing conditions dictate changes to water management strategies. The TCEQ is following the TWDB's lead on this topic. Because alternative strategies are not allowed at this time, the regional water plans will have to be amended even more frequently to reflect new conditions not originally conceived in the approved plans.

The TWDB should publish the criteria for what projects will be considered consistent with the currently approved regional water plans prior to those plans being approved. This way, the regional water planning groups can adopt policies or include additional projects as recommended projects in order to decrease the need for plan amendments.

Allow waivers of plan amendments for entities with small strategies (new)

The TWDB currently requires regional water plans to be amended to include any projects that were not originally included as recommended water management strategies. The amendment process is time consuming and can be costly. Region C recommends that the TWDB allow waivers for consistency issues for plan amendments that involve projects resulting in small amounts of additional supply.

Coordination between TWDB and TCEQ Regarding Use of the WAMs for Planning (new)

The TWDB requires that the Water Availability Models (WAMs) developed under the direction of TCEQ be used in the determination of available surface water supplies. These models were developed for the purpose of evaluating new water rights permits. Assumptions in the TCEQ-approved WAM models are not appropriate for water supply planning. The TWDB should coordinate with the TCEQ to determine the appropriate use of the data and tools available through the WAM program for use in regional water planning. The TWDB should allow the regional water planning groups some flexibility in applying the models available to them.

Support Water Conservation Task Force Recommendation Regarding Targets for Water Conservation

The Water Conservation Task Force recommended that the targets developed in their work be used as voluntary per capita water goals for entities to consider. The Task Force indicated that their voluntary goals should not be mandatory. Per capita water use is unique to each water supplier. Each supplier should strive to incorporate water conservation measures that are appropriate for its particular situation. A statewide per capita water use value is not appropriate for the State of Texas, given its wide variation of rainfall, economic development, purposes of use, and other factors. The Region C Water Planning Group supports the decision of the Water Conservation Task Force that the targets recommended in their report should be voluntary targets rather than mandatory goals.

TCEQ Policy and Water Rights

Cancellation of Water Rights for Non-Use

The Texas Water Code currently allows TCEQ to cancel any water right, in whole or in part, for ten consecutive years of non-use. This rule inhibits long-term water supply planning and is particularly undesirable in the case of major reservoirs constructed for municipal water supply. In order to take full advantage of the yield available at a given site, reservoirs are often constructed to meet needs far into the future. In many cases, only part of the supply is used in the first ten years, with the remainder allocated to meeting future growth.

This should be addressed by changing the water code to exempt certain projects from cancellation for ten years of non-use. The exemption might extend to:

- Municipal water rights
- Water rights for steam electric power generation
- Water rights associated with major reservoirs
- Water rights included as long-term supplies in an approved regional water plan.

Requirements for Interbasin Transfers Introduced in Senate Bill One

Senate Bill One introduced a number of new requirements for applications for water right permits to allow interbasin transfers. The requirements are in Section 11.085 of the water code, and they include many provisions not required for any other type of water right. Requirements imposed on interbasin transfers and not on any other water right include the following:

- Analysis of the impact of the transfers on user rates by class of ratepayer
- Public meetings in the basin of origin and the receiving basin
- Extra notice to county judges, mayors, and groundwater districts in the basin of origin
- Extra notice to legislators in the basin of origin and the receiving basin
- TCEQ request for comments from each county judge in the basin of origin
- Proposed mitigation to the basin of origin
- Demonstration that the applicant has prepared plans that will result in the "highest practicable water conservation and efficiency achievable…"

Exceptions to these extra requirements placed on interbasin transfers were made for emergencies, small transfers (less than 3,000 acre-feet under one water right), transfers to an adjoining coastal basin, transfers to a county partially in the basin of origin, and transfers to a municipality whose retail service area is partially within the basin of origin.

The effect of these changes is to make obtaining a permit for interbasin transfer significantly more difficult than it was under prior law and thus to discourage the use of interbasin transfers for water supply. This is undesirable for several reasons:

- Interbasin transfers have been used extensively in Texas and are an important part of the state's current water supply. For example, current permits allow interbasin transfers of over 600,000 acre-feet per year from the Red, Sulphur, Sabine, and Neches Basins to meet needs in the Trinity Basin in Region C. This represents almost one-third of the region's reliable water supply.
- Current supplies greatly exceed projected demands in some basins, and the supplies already developed in those basins can only be used through interbasin transfers.
- Senate Bill One water supply plans for major metropolitan areas in Texas (Dallas-Fort Worth, Houston, and San Antonio) rely on interbasin transfers as a key component of their plans. It is difficult to envision developing a water supply plan for these areas without significant new interbasin transfers.
- Texas water law has always regarded surface water as belonging to the people of the state, to be used for the benefit of the state as a whole. It is important that the law on interbasin transfers reflect this basic approach.
- The current requirements for permitting interbasin transfers provide an unnecessary barrier to development of the best, most economical, and most environmentally acceptable water supplies.
- Since no contested interbasin transfer permits have been granted under these new requirements, the meaning of some of the provisions and the way in which they will be applied by TCEQ are undefined.

The legislature should revisit the current law on interbasin transfers and remove some of the unnecessary and counterproductive barriers to such transfers that now exist.

Disposal of Brine Waste (new)

Desalination projects result in a brine waste that must be disposed in an environmentally friendly fashion. There are different regulations regarding the disposal of brine waste and different agencies governing those regulations. The brine resulting from water that is desalinated for municipal and industrial purposes is regulated by TCEQ and must be disposed according to much stricter standards than the brine resulting from petroleum development activities. (The Railroad Commission regulates the disposal of brine waste from petroleum development activities.) The way that brine is created should not affect the regulations that govern the disposal of the resulting brine. Region C recommends that the brine resulting from municipal and industrial desalination be disposed according to the same regulations as that resulting from petroleum development activities.

Reuse of Treated Wastewater

Policies Limiting the Use of Treated Wastewater

The TCEQ has recently implemented policies, some in response to legislative requirements in Senate Bill One, that limit TCEQ's ability to permit projects for indirect reuse, in which water is returned to a reservoir or watercourse before being diverted for reuse. The policy of discouraging indirect reuse has a number of negative impacts on water suppliers in Region C and throughout the state:

- The policies are logically inconsistent with policies encouraging direct reuse of treated wastewater.
- The policies inhibit reuse for municipal purposes by prohibiting the most effective approach to municipal reuse, which incorporates "multiple barriers" between wastewater discharge and eventual reuse. Streams and reservoirs are among the most effective of such multiple barriers.
- The policies encourage reuse for irrigation and industrial purposes, where direct reuse is appropriate, while discouraging reuse to meet municipal needs, where indirect reuse is a preferred approach.
- It is poor public policy to discourage indirect reuse, which is a water supply alternative with relatively low environmental impacts.
- It is poor public policy to require the construction of infrastructure for direct reuse in cases when natural watercourses can deliver water much more economically.
- Indirect reuse of treated wastewater is an important element of water supply planning in Region C.

The legislature should revisit the issue of indirect reuse of treated wastewater using the bed and banks of state watercourses, with a view to reducing the obstacles to indirect reuse. The historical discharge of treated wastewater effluent should not make the indirect reuse of wastewater more difficult.

Reuse projects, both direct and indirect, are a significant portion of Region C's future water supplies. Large-scale indirect reuse projects are planned for Richland-Chambers Reservoir, Cedar

Creek Reservoir, Lake Ray Hubbard, and Lake Lavon. The permitting process for large-scale indirect reuse projects needs to be clearly defined for the applicants. The reuse permit for Richland-Chambers/Cedar Creek reuse project took seven years to process. Clarification of what is needed to pursue such a permit would significantly expedite the process in obtaining such a permit for future projects.

State and Federal Programs – Water Supply Issues

Increased State Funding for Texas Water Development Board Loans and the State Participation Program

The Senate Bill One regional water planning studies are showing significant needs for new water supply projects to allow Texas to grow and prosper. The loan and state participation programs of the Texas Water Development Board have been important tools in the development of existing supplies. These programs need to be continued and extended with additional funding to assist with the development of the next generation of projects as the state seeks to implement the Senate Bill One regional plans.

State Funding for Water Conservation Efforts

As a result of the policy recommendations in the 2001 regional water plans, the TWDB established a water conservation task force and developed a state-wide water conservation campaign. The water conservation task force developed recommendations regarding best management practices for various types of water uses. The conservation campaign was released to the public on January 26, 2005.

The current TWDB regulations require that water conservation be considered as a water management strategy for each water shortage. In Region C, four model water conservation plans have been developed and are included in Appendices N and O of the 2006 Plan. It is important that programs be developed to help local water suppliers achieve the conservation savings recommended in this regional water plan.

The legislature should provide funding to allow the TWDB and other state agencies to undertake or expand the following programs:

- A study of the effectiveness of municipal water conservation programs in Texas and how state agencies can assist local suppliers in achieving conservation goals.
    - What are the trends in per capita use in the state, in various regions, and for various suppliers, after adjusting for climate?
    - Where has conservation been particularly effective?
    - What are the elements of effective programs, and how might they be applied elsewhere in the state?
    - What other factors besides conservation programs affect per capita municipal use (positively or negatively)?
    - Are conservation-oriented water rates effective? If so, how might they be implemented?
    - How can state agencies most effectively assist water suppliers in implementing conservation programs?
- Similar studies of the effectiveness of conservation in industrial and irrigation water use and how state agencies can assist in achieving conservation goals.
- State funding for educational programs on water conservation in the schools (such as the Major Rivers program and others).
- State funding for seminars on water conservation and conservation issues to educate policy makers and the public-at-large.
- State funding should be allocated to support the recently released statewide water conservation campaign Water IQ.

Funding for NRCS Structures as a Form of Watershed Protection

One key element of water supply planning is the protection of the quality and usability of supplies we have already developed. Over the past 50 years, the U.S. Natural Resources Conservation Service (NRCS, formerly the Soil Conservation Service) has built numerous small dams for sediment control and flood control in Texas. The NRCS reservoirs also improve water quality and prevent erosion in the watershed. The NRCS reservoirs provide water for livestock and increase streamflows during low flow periods. The design life for the majority of the NRCS watershed dams is 50 years. Most of the projects were built in the 1950s and 1960s and are nearing the end of their design life. Many of the NRCS structures are in need of maintenance or repair in order to extend the life of the dams.

The Dam Rehabilitation Act funds the rehabilitation and upgrade of existing NRCS structures. Every year, the NRCS accepts applications for funding such projects and prioritizes them. The rehab program is a 65/35 split of federal funds to the sponsor's funds. Currently in the Region C area, ten NRCS structures are being planned, designed or constructed with funding through the dam rehabilitation act.

The Small Watershed Act allocates federal funds for the development of new NRCS structures. The federal government provides 100% of the construction costs and the sponsor provides the land acquisition costs. Eight projects in Region C are being planned, designed, or constructed. Several of these projects are ready to construct, but the funding is not currently available.

The state should develop a program to provide funding for the development and rehabilitation of new and existing NRCS structures, as a form of watershed protection. Elements of such a program could include:

- State grants or matching funding for studies of NRCS structures.
- Seminars on watershed protection.

The Region C Water Planning Group recommends that the State of Texas seek additional federal funding to improve and maintain NRCS structures. Region C also recommends that the State provide funding to the local sponsors to aid them in paying for their required 35% of the cost for the dam rehabilitation projects.

Funding Assistance for Desalination Projects (new)

In December 2002, the TWDB completed a report for Governor Perry recommending a large-scale demonstration seawater desalination project. This project will result in greater information available to Texas on the challenges involved in developing large-scale desalination projects. However, many smaller communities could make use of brackish groundwater or surface water if the treatment process was more affordable.

The Red River and Lake Texoma in Region C have high concentrations of salts. The water from these sources must either be blended with a less saline supply or desalinated for direct use. The smaller communities neighboring these water supplies could potentially use this water with help in funding the necessary desalination process. These sources would be more economical for the smaller communities than building small pipeline of great lengths to purchase water from a larger supplier. Region C recommends that the TWDB provide funding assistance for desalination projects for smaller communities. Region C also recommends that federal funds be sought for desalination projects.

Oversight of Groundwater Conservation District Rule Making (new)

The Texas Legislature has established groundwater conservation districts across Texas, often without regard for aquifer boundaries. The groundwater conservation districts develop rules and regulations regarding the groundwater pumping within their districts. Often, the rules that have been developed by these districts are inconsistent from one district to the next, resulting in inconsistent regulation of the same aquifer. Although one-size-fits all regulations are inappropriate, the groundwater conservation districts need state oversight, particularly with regards to their rule-making policies. Region C recommends that the TWDB or TCEQ provide oversight for the current and future groundwater conservation districts.

Each potential policy is ranked from 1 to 5 with "1" being of lowest importance and "5" being of highest importance to the region.

Senate Bill One Planning Process

Page Number of Text	Committee Rank	Policy Description	TWDB-Related Topic
1	5	Allow alternative strategies to be designated to meet water needs or encourage state agencies to exercise discretion in the consideration and approval of TWDB funding and TCEQ water rights permitting for alternative strategies not included as part of the regional water plan.	10. Other Issues
2	4	Provide clear guidance on resolving consistency issues.	10. Other Issues
2	5	Allow waivers of plan amendments for entities with strategies involving small amounts of water.	10. Other Issues
3	3	Coordination between TWDB and TCEQ regarding use of the WAMs for planning.	4. Surface Water
3	4 - 5	Support the Water Conservation Task Force recommendation that water conservation targets are voluntary.	5. Conservation – Per Capita Water Use

TCEQ Policy and Water Rights

Page Number of Text	Committee Rank	Policy Description	TWDB-Related Topic
3	4	Make certain water rights exempt from cancellation for ten years of non-use.	4. Surface Water
4	5	Reduce regulatory and legislative obstacles to interbasin transfers of water. Define "highest practicable use" of water.	4. Surface Water – IBT
5	3	Develop consistent permitting requirements for disposal of brine waste for municipal and petroleum users. (new)	6. Innovative Strategies – Desal

Reuse of Treated Wastewater

Page Number of Text	Committee Rank	Policy Description	TWDB-Related Topic
5	5	Reduce the regulatory and legislative obstacles to indirect reuse of treated wastewater by developing clearly defined policy regarding reuse project permits.	6. Innovative Strategies - Reuse

State and Federal Programs – Water Supply Issues

Page Number of Text	Committee Rank	Policy Description	TWDB-Related Topic
6	3	Increase funding for Texas Water Development Board loans and the state participation program to assist with the development of water supply projects.	8. Providing and Financing Water and Wastewater Systems – State participation
7	4	Seek federal and state funding for water conservation efforts.	5. Conservation 10. Other Issues - Education
8	4	Encourage federal funding for development, maintenance, and upgrading of NRCS structures as a method of watershed protection.	7. Environmental – Watershed planning/source water protection 10. Other Issues
9	3	Seek federal and state funding assistance for desalination projects. (new)	6. Innovative Strategies – Desalination of seawater and brackish water
9	3	Oversight of groundwater conservation district rule-making. (new)	3. Groundwater

Unique Streams

Page Number of Text	Committee Rank	Policy Description	TWDB-Related Topic
		Unique Stream Segment Committee may develop a policy on this topic.	7. Environmental – Unique stream segments

Unique Reservoirs

Page Number of Text	Committee Rank	Policy Description	TWDB-Related Topic
		RCWPG may develop a list of unique reservoir sites.	7. Environmental

APPENDIX Y

INFRASTRUCTURE FINANCING INFORMATION

APPENDIX Y
INFRASTRUCTURE FINANCING INFORMATION

This appendix includes information related to infrastructure financing. The topics included in this appendix are as follows:

- Description of funding programs
- Questionnaires on infrastructure financing and recommended water management strategies, including information on the TWDB's state participation program
- Summary of survey responses to questionnaires.

This appendix reviews funding programs available to water users in Region C for water supply infrastructure projects. For each program discussed below, the purpose of the program, eligible applicants, restrictions on the use of funds, the loan maturity, the interest rate, and the total available funding are reported where available. Water users that are interested in one of these programs should contact the program manager to determine whether additional restrictions apply.

1.0 Market Financing

Market financing through local bank loans and municipal bonds that are repaid through increased fees and revenues are the primary mechanisms for funding municipal infrastructure projects. This funding mechanism places the burden of paying for the capital improvements on the beneficiaries of the project. It also provides for local control in the implementation and timing of the needed improvements. Private and local financing (both taxable and tax-exempt) will continue to be an integral component for financing water infrastructure, especially for non-municipal users. This is because most non-municipal water users are involved in for-profit activities, and most public water supply infrastructure funding programs are available only to non-profit entities. It will be necessary for many non-municipal users to locate private financing sources.

Service providers have historically used various debt instruments to fund costs that were not covered by governmental assistance. The conventional debt instruments that public entities have used for long-term financing include General Obligation Bonds, Revenue Bonds, Double-Barreled Bonds and Certificates of Obligation.

General Obligation Bonds

General Obligation Bonds (GOs) are secured by the full faith and credit of the city or the issuing taxing authority entity and used for a specific purpose. GOs are secured by the pledge of a city's ad valorem taxing power. One disadvantage of GO bonds is that the approval process usually takes a longer amount of time. The public must authorize the issuance of this bond through an election. In addition, the governmental issuer may have a practical or legal debt limit that they must adhere to. The positive aspects of GOs are that they are considered the most secure type of debt obligation and the issuance process tends to be simpler and less costly.

Revenue Bonds

Revenue Bonds are completely paid for by the revenue received from the provision of a service. Thus, repayment of Revenue Bonds used in the financing of water and wastewater facility improvements is made through the revenue collected from the designated revenue source, i.e. water sales and wastewater treatment. The Service Provider must/should conduct a cost of service and rate design study in which the revenue requirements include not only the operation and maintenance costs for the system, but also the debt service payments and reserve fund deposits for this debt. Revenue Bonds may have any number of reserve fund requirements including debt service reserve fund, construction fund, renewal and replacement fund, operating fund, insurance fund, and/or arbitrage rebate fund. The Service Provider must also be aware of any coverage requirements required for the issuance of the Revenue Bond. The issuance of Revenue Bonds is limited to the amount of rate increase that the Service Provider is willing to implement.

Double-Barreled Bonds / Certificates of Obligation

Double-Barreled Bonds are revenue bonds that are additionally guaranteed by a larger municipal entity. It is considered a hybrid of a Revenue Bond and a General Obligation Bond. The first source of funds for the principal and interest is derived from the designated revenue source, i.e. water sales. If the revenue source does not match the revenue requirement during a specific period of time, then the tax revenue of the larger municipal entity is used to cover the principal and interest requirement. Double-Barreled Bonds have similar advantages and disadvantages to General Obligation Bonds.

Certificates of Obligation (COs) have different issuance requirements than the General Obligation Bonds but can be used for the same purpose. Certificates of Obligation can either be a tax pledge or a combination of tax and revenue pledges (Combination Tax and Revenue COs). If CO bonds are only backed by tax revenue then they can only be used for limited purposes. However, if it is a Combination Tax and Revenue Bond then it can be used for any lawful purpose.

2.0 Texas Water Development Board Programs

Texas Water Development Board (TWDB) programs are targeted towards political subdivisions and non-profit water supply corporations and districts. Three programs benefit *colonias* and state-designated economically distressed areas. Since Region C does not have any *colonias* or economically distressed counties, these programs would not be applicable. Other programs specific to municipalities include the Drinking Water State Revolving Loan Fund, Clean Water State Revolving Fund Program (CWSRF), Development Fund II Water and Wastewater Loan Program, State Participation Program (SPP), and the Water Infrastructure Fund.

Five TWDB programs that may provide indirect benefits to non-municipal users are the CWSRF, SPP, Agriculture Water Conservation Loans, the Rural Water Assistance Fund, and the Water Infrastructure Fund. The CWSRF and the SPP provide assistance for development of wastewater recycling and reuse projects. With the exception of livestock water use, the non-municipal water uses are well suited for wastewater reuse projects. Each of these TWDB programs is discussed below.

Drinking Water State Revolving Loan Fund Program [1]

The Drinking Water State Revolving Loan Fund (DWSRF) provides low interest loans to finance projects for public drinking water systems. Additional subsidies are available for disadvantaged communities. The purpose of this program is to assist applicants in providing water that meets drinking water regulations. Applicants may be a political subdivision of the state, non-profit water supply corporation, privately owned water system or state agency.

The loans can be used for planning, design and construction of projects to upgrade or replace water infrastructure, purchase additional capacity, and/or purchase land integral to the project. This land could be for the construction of the project or to protect the source water from potential contamination, such as nitrate contamination of a municipal well field.

Applicants to the DWSRF program must submit an information form to the TWDB each year for inclusion in the TWDB's intended use plan for the year. The TCEQ prioritizes potential DWSRF projects and funding is distributed based on the priority rating and applicant's readiness to proceed. Depending on the source of funds, interest rates vary from 0.7 percent to 1.2 percent below market interest rates and the maximum repayment period is 20 years after completion of construction. The DWSRF program has a budget of approximately $330 million in 2005.

Clean Water State Revolving Fund [1]

The Clean Water State Revolving Fund Program (CWSRF) provides low-interest loans for planning, design, and construction of wastewater treatment facilities, wastewater recycling and reuse facilities, collection systems, stormwater pollution control projects, and implementation of nonpoint source pollution control projects. The applicant for assistance from the CWSRF program must be a political subdivision. Therefore, any reuse project to provide reclaimed water for non-municipal users must also benefit a political subdivision, and the political subdivision must plan, design, and construct the project. A water quality based priority system is used to rank potential applicants and fund projects with the greatest environmental benefits.

Applicants to the CSWRF program must submit an information form to the TWDB each year for inclusion in the TWDB's intended use plan for the year. The TWDB identifies priority projects and requests funding applications for these projects. Depending on the source of funds, interest rates vary from 0.7 percent to 1.95 percent below market interest rates. The maximum repayment period is 20 years after completion of construction.

State Participation Program [3]

Deferred interest loans from the TWDB's State Participation Program may be used for regional systems where the project sponsors are unable to assume debt for an optimally sized facility. The program is intended to promote the "Right Sizing" of projects in consideration of future growth. In return for state participation, the TWDB may acquire ownership interest in the project. The benefits of assistance from the State Participation Program include deferred payments until the customer base grows into the project capacity and no interest on the deferred payments. TWDB will fund up to 80% of costs for new water supply projects and up to 50% of costs for other projects. Remaining costs may be eligible for funding from other TWDB programs.

Applicants must be political subdivisions or water supply corporations that are sponsoring construction of a regional water or wastewater project. Applications are accepted on a first-come, first-served basis. An application must consist of an engineering feasibility report and environmental information, as well as general, fiscal, and legal information.

The maximum repayment term for assistance from the State Participation Program is 34 years. The repayment schedule may be obtained from the TWDB. State Participation Program funding will vary depending on funds received from ongoing participation projects.

Texas Water Development Fund II [4]

The Development Fund II is a pure state loan fund used for financing water supply, water quality enhancement, flood control and municipal solid waste. This program provides financing for water supply infrastructure as well as acquisition of water rights. The applicants can be political subdivisions of the state and water supply corporations with applicable projects.

Interest rates for the loans will vary depending on the length of the loan and other factors. The maximum length of a loan is 50 years. System revenues and/or tax pledges are typically required to secure the loans.

Agriculture Water Conservation Loans [2]

Under this program, the TWDB loans money to borrower and lender districts, such as soil and water conservation districts, irrigation districts and underground water conservation districts. In turn, these districts make loans to individual borrowers to purchase and install more efficient irrigation equipment on private property for agricultural water conservation purposes. Eligible applicants include soil and water conservation districts, underground water conservation districts or districts authorized to supply water for irrigation. Although only these public entities may apply for funding under this program, the purpose is to encourage lending to individual borrowers. Therefore, non-municipal water users may indirectly benefit from this funding program.

Funds may be used for conservation programs or conservation projects. "A conservation program is: an agricultural water conservation technical assistance program; a research, demonstration, technology transfer, or educational program relation to agricultural water use and conservation; a precipitation enhancement program in an area of the state where the program, in the TWDB's judgment, would be most effective; or other state agency or political subdivision administered conservation programs that provide loans to a person for a conservation project. A conservation project: improves efficiency of water delivery and application on existing irrigation systems; prepares irrigated land for conversion to dry land conditions; prepares dry land for more efficient use of natural precipitation; purchases and installs on public or private property devices designed to indicate the amount of water withdrawn for irrigation purposes; or prepares and maintains land to be used for brush control activities in areas of the state where those activities, in the TWDB's judgment, would be most effective."

The interest on the loan to the district is tied to the TWDB's cost of funds. In June 2005, the TWDB interest rate for an agricultural loan was 3.67 percent.

Water Infrastructure Fund [6]

Senate Bill Two, passed in 2001 during the 77th Session of the Texas Legislature, created a Water Infrastructure Fund and a Rural Water Assistance Fund. Using the Water Infrastructure Fund, the TWDB will provide funding at below-market interest rates for water management strategies recommended in the state or regional water plans. Only political subdivisions are eligible to apply. Therefore, to use funds from this program to implement a recommended water management strategy for non-municipal users, a political subdivision must lead the project.

Funds may be used for eligible projects and for planning and design costs, permitting costs, and other costs associated with state or federal regulatory activities with respect to a project. An eligible project is "any undertaking or work, including planning and design activities and work to obtain regulatory authority, to conserve, mitigate, convey, and develop water resources of the state, including any undertaking or work done outside the state that the board determines will result in water being available for use in or for the benefit of the state."

The Water Infrastructure Fund is a new program and is not yet funded.

Rural Water Assistance Fund [7]

Using the Rural Water Assistance Fund, the TWDB will provide low-interest loans for development of rural water supplies or for regionalization of rural water supplies. Eligible applicants are rural political subdivisions, defined as a "nonprofit water supply or sewer service corporation, district, or municipality with a service area of 10,000 or less in population or that otherwise qualifies for financing from a federal agency or a county in which no urban area exceeds 50,000 in population." Non-municipal water users are not eligible for this program, but these users may be able to work with eligible rural political subdivisions to obtain funding for water supply infrastructure projects. Joint applications between a rural political subdivision and the U.S. Department of Agriculture, the Texas Department of Agriculture, or the Texas Department of Housing and Community Affairs are permitted.

Funds may be used for the following purposes: water or water-related projects, including the purchase of well fields, the purchase or lease of rights to produce groundwater, and interim financing of construction projects; to enable a rural political subdivision to obtain water supplied by a larger political subdivision or to finance the consolidation or regionalization of neighboring political subdivisions, or both; or water quality enhancement projects such as wastewater collection or treatment projects. The term of the loan cannot exceed 120 percent of the average estimated useful life of the project.

3.0 U.S. Department of Agriculture Programs

The U.S. Department of Agriculture administers the Farm Ownership program (through its Farm Service Agency), the Rural Utilities Service, and the Watershed Protection and Flood Prevention Program. Each of these is discussed below.

Farm Ownership Program [8]

The Farm Ownership program provides direct loans or loan guarantees to be used for purchase of farmland, construction or repair of buildings or other facilities, development of farmland to promote soil and water conservation, or refinancing of debt. Eligible applicants must be U.S. citizens; must have sufficient education, training, or experience in managing or operating a farm or ranch; must be unable to get credit elsewhere; must not have received debt forgiveness from the Farm Service Agency (with some exceptions); must not be delinquent on any federal debt; and must be the owner or tenant operator of a family farm after the loan closes.

The maximum loan guarantee amount is the lesser of 90 percent of the loan amount or $759,000. The maximum direct loan amount is $200,000. The maximum term of the loan is 40 years. The interest rate is negotiated with the lender and must not exceed the rate charged to the lender's average farm customer. Under the Interest Assistance program, the Farm Service Agency may subsidize 4 percent of the interest rate.

Rural Utilities Service Water and Waste Disposal Loans and Grants [9]

The Rural Utilities Service Water and Environmental Programs division provides loans, grants, and loan guarantees for drinking water, sanitary sewer, solid waste, and storm drainage facilities in rural areas or in cities of 10,000 people or less. Eligible applicants are public bodies, non-profit organizations, and recognized Native American tribes. Non-municipal water users are not eligible for this program, but these users may be able to work with eligible public bodies, non-profit organizations, or recognized Native American tribes to obtain funding for water supply infrastructure projects.

Direct loans and grants have been set aside for communities along the U.S.-Mexico border designated as "*colonias*;" areas designated Empowerment Zones/Enterprise Communities and Rural Economic Area Partnership Zones; certain projects where at least 50 percent of the users of the facility/project are Native Americans; rural Alaskan villages; and water emergencies and disaster relief.

Loans and grants may be used to construct, repair, modify, expand, or otherwise improve water supply and distribution systems and waste collection and treatment systems, including storm drainage and solid waste disposal facilities; acquire needed land, water sources, and water rights; and pay costs such as legal and engineering fees when necessary to develop the facilities.

Grants may be made for up to 75 percent of eligible project costs. The maximum term of a loan is the lesser of 40 years or the useful life of the facilities being financed. The interest rate may be a poverty rate of 4.5 percent, a market rate, or an intermediate rate, depending on the project.

The Water and Waste Disposal Loan Program had $974 million available for fiscal year 2005. The Water and Waste Disposal Grant Program had $322 million available for fiscal year 2005.

Watershed Protection and Flood Prevention Program [10]

The Watershed Protection and Flood Prevention Program, also known as the Small Watershed Program or the PL566 Program, is operated by the Natural Resources Conservation Service (NRCS). This program provides grants and technical assistance to local sponsoring organizations, state, and other public agencies to voluntarily plan and install watershed-based projects on private lands. Eligible watershed projects include watershed protection; flood prevention; water quality improvements; soil erosion reduction; rural, municipal and industrial water supply; irrigation water management; sedimentation control; fish and wildlife habitat enhancement; and creation and restoration of wetlands and wetland functions. Eligible applicants include state or local agencies, counties, municipalities, towns or townships, soil and water conservation districts, flood prevention/flood control districts, Native American tribes or tribal organizations, or other governmental subunits. Projects are limited to watersheds containing no more than 250,000 acres.

Although only governmental subunits may apply for funding, projects funded under this program are targeted at private land and can be used for rural and industrial water supply. Therefore, this program is indirectly applicable to non-municipal users.

Projects involving more than $5,000,000 of federal assistance or involving a single structure having a storage capacity of more than 2,500 acre-feet require approval from Congress. Other plans are approved administratively. Typical projects entail $3.5 million to $5 million in federal assistance.

4.0 Texas Department of Agriculture Programs

The Texas Department of Agriculture administers the Texas Capital Fund Infrastructure Development Program. Funding from this source may be used for water supply infrastructure improvements. In addition, the Texas Agricultural Finance Authority (TAFA), a public authority within the Texas Department of Agriculture, administers the following finance programs: the Linked Deposit Program, the Rural Municipal Finance Program, and the Young Farmer Loan Guarantee Program.

The Texas Capital Fund Infrastructure Development Program, the Linked Deposit Program, and the Rural Municipal Finance Program specifically mention use of funds for water supply infrastructure projects. The Young Farmer Loan Guarantee Program does not specifically mention water supply infrastructure projects, but the rules are very general, and this use of funds may be acceptable. At the very least, funding from these programs may allow non-municipal water users to shift funds from other uses to water supply infrastructure projects. Each of these programs is reviewed below.

Texas Capital Fund Infrastructure Development Program [11]

The Texas Capital Fund Infrastructure Development Program provides grants to non-entitlement communities to assist in economic development. Eligible applicants include incorporated city or county governments that are not entitled to receive Community Development funding from the U.S. Department of Housing and Urban Development. In addition, eligible cities must have a population of less than 50,000 people. Non-municipal water users are not eligible for this program, but these users may be able to work with eligible city or county governments to obtain funding for water supply infrastructure projects.

Funds from the Texas Capital Fund Infrastructure Development Program may be used for public infrastructure to assist a business that commits to create and/or retain permanent jobs, primarily for low- and moderate-income persons. Funding may be used for the following public infrastructure improvements: water and sewer; road/street improvements; natural gas lines; electric, telephone, and fiber optic lines; harbor/channel dredging; purchase of real estate related to infrastructure; drainage channels and ponds; pre-treatment facilities; traffic signals and signs; and railroad spurs.

Award amounts are directly related to the number of jobs created and to the matching funds available. In the regular program, the minimum award is $50,000, and the maximum award is $750,000. Up to an additional $750,000 may be awarded if the project creates a sufficient number of permanent jobs (the “jumbo” program). The award may not exceed 50 percent of the total project costs.

Linked Deposit Program [12]

The TAFA Linked Deposit Program encourages private commercial lending at below market rates. The Linked Deposit Program is an interest buy down program and not a guaranteed loan program. Eligible applicants are businesses that are in the business of: processing and marketing agricultural crops in Texas; producing alternative crops in Texas; producing agricultural crops in Texas, the production of which has declined markedly because of natural disasters; producing agricultural crops in Texas using water conservation equipment; developing water conservation projects; or providing nonagricultural goods or services in a rural area.

Eligible water conservation equipment includes: underground pipe; in-line valves; pipe increasers/reducers; gate valves; fittings and bushings; flow meters and accessories; complete circular watering systems; drip irrigation systems complete with installation; and any other equipment which can be identified and verified as water conservation equipment for use within the state. Eligible water conservation projects include: brush control projects, stock tank renovation or construction; dam renovation or construction; or any other project that can be identified as a water conservation project.

The maximum loan amount is $250,000 for water-related projects. The interest rate is "determined on the date the loan is funded and based on matching the loan maturity date to the closest treasury bill/note maturity date or the end of state's fiscal biennium (August 31 of each odd numbered year)."

Rural Municipal Finance Program [13]

The TAFA Rural Municipal Finance Program provides loans and loan guarantees to municipalities, water supply corporations and non-agricultural businesses located in rural Texas. Eligible applicants must be located within rural Texas, provide significant benefit to their rural area and provide evidence to repay the commitment. Eligible applicants include municipalities, special utility districts, water supply corporations, and others.

"Funds must be used to improve or assist in the economic development of the rural area such as: purchase of real estate, construction of buildings and site improvements, equipment, water and wastewater systems, municipal infrastructure projects." Loan amounts range from $100,000 to an amount determined by the lender and the TAFA, but targeting projects less than $1,000,000. The Authority Board approves the interest rate, and the terms of the loan are determined on a case-by-case basis. Projects financed with anticipation notes have a maximum maturation of 30 years from the issuance of the notes.

Young Farmer Loan Guarantee Program [14]

The TAFA Young Farmer Loan Guarantee Program provides loan guarantees to applicants wishing to "establish or enhance their farm and/or ranch operation or establish an agricultural-related business." Applicants must be at least 18 years of age but less than 40 years of age. Funds may be used to "provide working capital for operating the farm and/or ranch including the lease of facilities and the purchase of machinery and equipment, or for any agriculture-related business purpose, including the purchase of real estate for the agricultural-related business, as identified in the plan." The maximum loan amount is $250,000. Interest rates are determined by the lender and approved by the TAFA. If eligible, the applicant and lender may apply for the Interest Reduction Program, which reimburses the applicant up to 3 percent of the fixed interest rate. The maximum loan term is 10 years or the useful life of the assets being financed.

5.0 U.S. Department of Commerce Economic Development Administration Public Works Program [15]

The United States Economic Development Administration (EDA) Public Works Program "empowers distressed communities to revitalize, expand, and upgrade their physical infrastructure to attract new industry, encourage business expansion, diversify local economies, and generate or retain long-term, private sector jobs and investment." In particular, water and sewer systems for industrial use are eligible for funding. Eligible applicants include units of state and local government, Native American tribes, economic development districts, public and private non-profit organizations, universities, and other institutions of higher learning.

Although non-municipal water users are not strictly eligible for funding, projects funded under this program are targeted at industrial and commercial development and can be used for public works facilities to support this development. Therefore, this program is indirectly applicable to non-municipal users.

Projects must be consistent with the Comprehensive Economic Development Strategy (CEDS) approved by the EDA for the project area. Applicants must develop a preapplication for review by the EDA that shows how the project will address economic development needs and objectives outlined in the CEDS. Upon approval of the preapplication, applicants will be invited to submit a full application.

Public Works Program grants generally require a 50 percent match from applicant contributions, state and local grants and loans, general obligation bonds, and other public and private contributions.

6.0 U.S. Small Business Administration Programs

Among other programs, the U.S. Small Business Administration (SBA) offers the 7a Loan Guaranty Program and the Certified Development Company (504) Program. The

7a Loan Guaranty Program does not specifically mention financing for water supply infrastructure projects, but the rules are very general, and this use may be acceptable. At the very least, funding from the 7a Loan Guaranty Program may allow non-municipal water users to shift funds from other uses to water supply infrastructure projects.

Each of the SBA programs is reviewed below.

7a Loan Guaranty Program [16]

The 7a Loan Guaranty Program offers loan guarantees to small businesses that are unable to secure financing on reasonable terms through normal lending channels. The proceeds may be used for most business purposes, including purchase of real estate to house the business operations; construction, renovation or leasehold improvements; acquisition of furniture, fixtures, machinery, and equipment; purchase of inventory; and working capital. The 7a Loan Guarantee Program is available to small businesses that are independently owned and operated and are not dominant in their field.

The maximum loan guarantee amount is $1.5 million, and the maximum loan to which the guarantee may be applied is $2 million. For loans of $150,000 or less, the maximum guarantee is 85 percent. For loans of more than $150,000, the maximum guarantee is 75 percent. The maximum loan term is 25 years for real estate and equipment and 7 years for working capital. Interest rates may be fixed or variable, and they depend on the size of the loan. For a loan of more than $50,000, the interest rate must not exceed the prime rate plus 3.25 percent if the loan maturity is less than 7 years and must not exceed the prime rate plus 3.75 percent if the loan maturity is 7 years or more.

Certified Development Company (504) Program [17]

The Certified Development Company (CDC) Program offers businesses long-term, fixed-rate financing for major fixed assets, such as land and buildings. A CDC is a non-profit corporation formed for the purpose of economic development. There are approximately 270 CDCs nationwide, each covering a specific geographic area. CDCs that serve portions of Region C include the Central Texas Certified Development Company, the Dallas Business Finance Corporation, the East Texas Regional

Development Company, Inc., the Fort Worth Economic Development Corporation, the East Texas Certified Development Company, and the North Texas Certified Development Corporation[18].

Proceeds from loans may be used for the following purposes: purchasing land and improvements, including existing buildings; grading, street improvements, utilities, parking lots and landscaping; construction of new facilities, or modernizing, renovating or converting existing facilities; or purchasing long-term machinery and equipment. Eligible businesses must have a tangible net worth of less than $6 million and an average net income of less than $2 million after taxes for the preceding two years. In general, the business must also create or retain one job for every $50,000 provided by the SBA—except for small manufacturers, which must create or retain one job for every $100,000 provided by the SBA.

A typical project includes "a loan secured with a senior lien from a private-sector lender covering up to 50 percent of the project cost, a loan secured with a junior lien from the CDC (backed by a 100 percent SBA-guaranteed debenture) covering up to 40 percent of the cost, and a contribution of at least 10 percent equity from the small business being helped." Loan maturities of 10 and 20 years are available. Interest rates are pegged to an increment above the current market rate for 5-year and 10-year U.S. Treasury issues.

7.0 Texas Department of Economic Development Programs

The Texas Department of Economic Development offers several financing programs, including the Texas Capital Access Fund, the Texas Industrial Revenue Bond Program, and the Texas Leverage Fund. Other programs are also available, but these appear to be the most general in scope. None of these programs specifically target water supply infrastructure projects, but each could allow non-municipal water users to shift other funds to water supply infrastructure projects. Each of the above programs is reviewed below.

Texas Capital Access Fund [19]

The Texas Capital Access Fund targets businesses and non-profit organizations that face barriers in accessing capital. The program establishes a reserve account at a lending institution to act as a credit enhancement. Eligible applicants include small businesses (100 or fewer employees), medium businesses (100 to 500 employees), or non-profit organizations. Eligible applicants must be domiciled in Texas or have at least 51 percent of its employees located in the state. Proceeds from this program may be used for “working capital or the purchase, construction, or lease of capital assets, including buildings and equipment used by the business.”

Texas Industrial Revenue Bond Program [20]

The Texas Industrial Revenue Bond Program provides tax-exempt bond financing for land and depreciable property for industrial and manufacturing projects. Cities, counties, and conservation and reclamation districts may form non-profit industrial development corporations or authorities to issue taxable and tax-exempt bonds for eligible projects in their jurisdictions.

Texas Leverage Fund [21]

The Texas Leverage Fund offers additional financing to communities that have passed the economic development sales tax. Eligible applicants must be Industrial Development Corporations and may serve municipalities, businesses, or nonprofit entities. The fund does not specifically mention financing for water or wastewater projects, but the rules are very general, and this use may be acceptable. At the very least, this fund may allow municipalities to shift funds from other uses to water or wastewater projects. The maximum loan amount is no more than $3 million, and interest rates are given as the Wall Street Journal prime floating rate. Maximum life on the loans is 15 years.

Texas Enterprise Zone Program

The Texas Enterprise Zone Program encourages job creation and capital investment in areas of economic distress using state and local incentives. With the exception of Wise and Jack Counties, enterprise zones have been created in every county in Region C. Qualified businesses must be nominated for the program by a city or county that governs the enterprise zone. A qualified business must be active within an enterprise zone, and 25 percent of its new employees must live in the jurisdiction of the governing body or be economically disadvantaged[3]. State incentives may include refunds of state sales taxes or use taxes, franchise tax benefits, or franchise tax economic development credits. The Enterprise Zone program also requires that the governing body offer at least one local financial incentive[22].

8.0 Corps of Engineers Assistance

The Corps of Engineers has traditionally been involved in large-scale flood damage reduction projects through the construction of reservoirs. In Region C, there are nine Corps-operated reservoirs. The Corps of Engineers offers federal financing opportunities through partnering and constructing projects with a federal purpose. Examples of such projects include new reservoir construction and wastewater reuse projects. The Corps can participate in multipurpose reservoir projects through their existing flood damage reduction, ecosystem restoration and water supply authorities. The cost sharing agreements for reservoir projects may vary with the local sponsor and ability to pay. Generally, under current policies the total non-federal interest should be a minimum of 35 percent of the project for flood control, 35 percent for the ecosystem restoration portion of the project and 100 percent for water supply. Reservoir projects that are primarily for water supply will require Congressional authorization to benefit from Corps assistance.

Water supply through reuse could be sponsored with the Corps through the ecosystem restoration authority. The purpose of this authority is to improve ecosystem functions to produce environmental benefits. The proposed reuse projects in Region C that utilize constructed wetlands could potentially qualify under this authority. For ecosystem restoration projects, the federal contribution is 65 percent for that portion of the project.

9.0 Local Economic Development Incentives

More than 20 local economic development agencies in Region C offer incentives for businesses to locate in certain areas. Incentives may include tax abatements, electric rate discounts, economic development grants, sales tax rebates, permit/development fee waivers, and infrastructure cost participation. The level of the incentives is generally predicated on the number of jobs that the business will create, the average wage and the gross payroll generated, the amount of capital investment, and the new taxes generated by the project. Economic development incentives that are not specifically targeted toward water supply infrastructure projects may still allow a potential water user to shift other funds to water supply infrastructure projects.

10.0 Bureau of Reclamation Programs [22]

The United States Bureau of Reclamation in the Department of the Interior recently announced a new program called Water 2025. Water 2025 is intended to prevent water crises and conflict in the western US. At the heart of this initiative is the Challenge Grant Program, which promotes conservation projects. These projects include those that will "conserve water, increase water use efficiency, or enhance water management, using advanced technology, improvements to existing facilities, and water banks and markets." All irrigation or water districts within states identified in the Reclamation Act of 1902, as amended, are eligible to apply. Texas is identified by this Act; thus, all irrigation and water districts within Texas are eligible to apply.

The Bureau of Reclamation will share up to 50% of the total cost of the project or activity. However, any operation, maintenance, repair, or rehabilitation of facilities will not be funded. Priority is given to projects that are less than 24 months in duration and to those areas identified as having a water crisis problem by 2025. There are several areas within Texas that are identified.[23] Approximately $10 million in funding is available for fiscal year 2005.

11.0 Texas Office of Rural Community Affairs

Small Town Environment Program (STEP) [24]

The Office of Rural Community Affairs (ORCA) administers the Small Towns Environment Program (STEP). The STEP program is similar to TWDB's Community Self-Help program in that it promotes using local resources to solve water and wastewater problems. Funds are provided through the Community Development Block Grant program and are generally available to rural counties and cities with less than 50,000 people that are not eligible to participate in the entitlement portion of the federal

Community Block Grant Program. Water and wastewater are eligible under the national program's objectives to a) benefit low- and moderate-income persons and b) meet community needs that represent an immediate threat to the health and safety of the residents of the community. The maximum grant available is $350,000.

Community Development Fund [4]

The Office of Rural Community Affairs (ORCA) also administers the Community Development (CD) Fund. The CD Fund is a grant program to address the needs of communities including sewer, water system, road, and drainage improvements. The projects must benefit at least 51 percent low to moderate income persons. The maximum grant is $800,000, and approximately $47 million has been allocated for fiscal year 2005.

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[1] "Drinking Water State Revolving Fund Program," Texas Water Development Board, available online at http://www.twdb.state.tx.us/assistance/financial/fin_infrastructure/dwsrf.asp, July 2005.

[1] "Clean Water State Revolving Fund Program," Texas Water Development Board, available online at http://www.twdb.state.tx.us/assistance/financial/fin_infrastructure/cwsrffund.asp, July 2005.

[3] "State Participation Program," Texas Water Development Board, available online at http://www.twdb.state.tx.us/assistance/financial/fin_infrastructure/StateParticipation.asp, July 2005.

[4] "Texas Water Development Fund II," Texas Water Development Board, available online at http://www.twdb.state.tx.us/assistance/financial/fin_infrastructure/DfundII.asp, July 2005.

[2] "Agricultural Water Conservation Loan Program," Texas Water Development Board, available online at http://www.twdb.state.tx.us/assistance/financial/fin_infrastructure/awcfund.asp, July 2005.

[6] "Water Infrastructure Fund," Texas Administrative Code, Title 31, Chapter 382, available online at http://info.sos.state.tx.us/pls/pub/readtac$ext.ViewTAC?tac_view=4&ti=31&pt=10&ch=382, July 2005.

[7] "Rural Water Assistance Fund," Texas Administrative Code, Title 31, Chapter 384, available online at http://www.twdb.state.tx.us/assistance/financial/fin_infrastructure/RWAF.asp, July 2005.

[8] "Farm Loan Programs," Farm Service Agency, U.S. Department of Agriculture, available online at http://www.fsa.usda.gov/dafl/default.htm, July 2005.

[9] "Fiscal Year 2005: Water and Environmental Programs," Rural Utilities Service, U.S. Department of Agriculture, available online at http://www.usda.gov/rus/water/2005funding.htm, July 2005.

[10] "NRCS PL566 Watersheds," Natural Resources Conservation Service, U.S. Department of Agriculture, available online at http://www.nrcs.usda.gov/programs/watershed/index.html, July 2005.

[11] "Texas Capital Fund Infrastructure Development Program," Texas Department of Agriculture, available online at http://www.agr.state.tx.us/eco/rural_eco_devo/capital_fund/fin_infrastructure.htm, July 2005.

[12] "Linked Deposit Program," Texas Department of Agriculture, available online at http://www.agr.state.tx.us/eco/finance_ag_development/tafa/fin_linked.htm, July 2005.

[13] "Rural Municipal Finance Program," Texas Department of Agriculture, available online at http://www.agr.state.tx.us/eco/finance_ag_development/tafa/fin_rdfp.htm, July 2005.

[14] "Young Farmer Loan Guaranty Program," Texas Department of Agriculture, available online at http://www.agr.state.tx.us/eco/finance_ag_development/tafa/fin_yfarmer.htm, July 2005.

[15] "Investment Programs," Economic Development Administration, U.S. Department of Commerce, available online at http://www.eda.gov/AboutEDA/Programs.xml, July 2005.

[16] "Basic 7(a) Loan Program," U.S. Small Business Association, available online at http://www.sba.gov/financing/sbaloan/7a.html, July 2005.

[17] "Certified Development Company (504) Loan Program," U.S. Small Business Administration, available online at http://www.sba.gov/financing/frcdc504.html, July 2005.

[18] "Certified Development Companies for SBA 504 Program – TX," U.S. Small Business Administration. Available online at http://www.sba.gov/gopher/Local-Information/Certified-Development-Companies/cdctx.txt, July 2005.

[19] "Capital Access Program," Texas Department of Economic Development, available online at http://www.governor.state.tx.us/divisions/ecodev/ed_bank/cap_access, July 2005.

[20] "Industrial Revenue Bonds," Texas Department of Economic Development, available online at http://www.txed.state.tx.us/TexasIRBProgram/, July 2005.

[21] "Texas Leverage Fund," Texas Department of Economic Development, available online at http://www.txed.state.tx.us/TexasLeverageFund/, July 2005.

[3] "Texas Enterprise Zone Program Application and Benefit Updates," Texas Department of Economic Development, Austin, January 2002. Available online at http://www.txed.state.tx.us/TexasEnterpriseZone/EZincentives.DOC, March 2002.

[22] "Water 2025," United States Bureau of Reclamation, Department of the Interior, available online at http://www.doi.gov/water2025/, July 2005.

[23] "Potential Water Supply Crisis by 2025," United States Bureau of Reclamation, Department of the Interior, available online at http://www.doi.gov/water2025/supply.html, July 2005.

[24] "Small Towns Environment Program (STEP)," Office of Rural Community Affairs. Available online at http://www.orca.state.tx.us/ORCAFundsService/CDBG/index.htm#STEP, July 2005.

[4] "Community Development Fund," Office of Rural Community Affairs. Available online at http://www.orca.state.tx.us/ORCAFundsService/CDBG/index.htm#CD, July 2005.

REGION C WATER PLANNING GROUP

Senate Bill One Second Round of Regional Water Planning - Texas Water Development Board

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July 8, 2005

«Title» «FirstName» «LastName»
«WUGName_of_Political_Subdivision»
«Address1»
«City», TX «PostalCode»

Dear «Title» «LastName»:

As part of the regional water planning process, the Region C Water Planning Group would like to get your input on the water management strategies we are proposing to recommend in our water plan. We are also interested in the financing options you might use to fund these projects.

The Region C Water Planning Group is charged with developing water management strategies to meet projected demands from now through 2060. **Current state law requires that the Texas Commission on Environmental Quality consider consistency with the regional water plan in granting water rights. Current state law also requires that the Texas Water Development Board (TWDB) consider consistency with the regional water plan before granting state financing for water projects. For these reasons, the Region C Water Planning Group wants to do its best to make sure that our plan reflects your intentions and desires.** Please review the attached information and let us know if you have water supply strategies that we have not included or if you do not wish to consider some of the strategies we are recommending. The Region C water plan covers raw water supply (reservoirs, wells), raw water transmission (pipelines, pump stations), treatment, and delivery to wholesale water customers. In general, improvements to the retail distribution system and the wastewater collection, transmission and treatment systems are not included.

The Texas Water Development Board has been charged with examining the financial assistance, if any, that will be needed to implement the water management strategies recommended in the regional water plans for the state. We are addressing this issue by a survey of water user groups that shows capital costs associated with the projects proposed to meet water needs during the 50-year planning period.

I am attaching the Recommended Water Management Strategies and Financing Survey, the TWDB explanation of the State Participation Program, and a table summarizing the recommended water management strategies for your water user group that have been included in the June 2005 *Initially Prepared Region C Water Plan*. Your response to the survey is very important to the regional water planning process. Even if you plan to finance these strategies on your own, the RCWPG needs you to respond. **Please answer the questions in the survey and return them to the Region C Water Planning Group consultant by July 22, 2005.** The results of this survey will be included in the 2006 *Region C Water Plan*. If you have any questions, please contact our consultant, Tom Gooch at (817) 735-7300.

In order to best represent your entity's future water plans, we need your input. We would also like your input throughout the review period of the *Initially Prepared Plan*. Our meetings are open public meetings, and you can find out the date and times of our meetings on our website at www.regioncwater.org. Please join us as we plan for the water needs of North Texas.

Thank you in advance for participating in our survey efforts. The Region C Water Planning Group appreciates your input.

Sincerely,

James (Jim) M. Parks
Chair, Region C Water Planning Group

c: Robert Johnson, Vice-Chair
Paul Zweiacker, Secretary

Region C Water Planning Group
Recommended Water Management Strategies and Financing Survey
Please Return by July 22, 2005

Entity:________________________________Contact Person:_________________________
Telephone Number:_____________________FAX:________________________________
Email Address:____
Mailing Address:____

When comparing currently available supplies to your projected water demands, your city/utility/district will need additional water supplies before 2060. The proposed water management strategies to meet these projected water demands are also listed in the attached table along with the cost for each strategy.

1. Are you planning to implement the recommended projects/strategies? Yes or No

   If "No" for any strategies, please continue with question 2.

   If "Yes", skip to question 3.

2. Please describe how you will meet future water needs.

____
____

3. How do you plan to finance the proposed total cost of capital improvements identified by your Regional Water Planning Group? Please indicate:

   1) Funding source(s)[1] by checking the corresponding box(es) below and
   2) Percent share of the total cost to be met by each funding source.

- □ _______% Cash Reserves
- □ _______% Bonds
- □ _______% Bank Loans
- □ _______% Federal Government Programs
- □ _______% State Government Programs, including TWDB Bonds
- □ _______% Other ______________________
- □ _______**%** *TOTAL – (Sum should equal 100%)*

If state government programs are to be utilized for funding, indicate the programs and the provisions of those programs.

____
____

[1] Funding source refers to the initial capital funds needed to construct or implement a project, not the means of paying off loans or bonds used for the construction or implementation.

Notes: The water conservation basic package was developed by Region C. The basic municipal package includes increasing water prices, new clothes washer standards (energy-efficiency standards), public and school education, and water system audits.

The water conservation expanded package was developed by Region C. The expanded municipal package includes water conservation pricing, coin-operated clothes washer rebates, industrial-commercial-institutional general rebate, industrial-commercial-institutional water surveys, and water waste prohibition.

N/A means not applicable.

Cost estimates are based on second quarter 2002 dollars.

Table Y-1
Sample Table of Supplies, Demands and Capital Costs
Town of Double Oak

		2010	2020	2030	2040	2050	2060
Projected Population in City		2,800	3,100	3,300	3,500	3,700	3,900
Projected Water User Group Demand (acre-feet per year)							
	Projected Municipal Demand	668	729	769	812	854	900
Total Demand		**668**	**729**	**769**	**812**	**854**	**900**
Current Supplies (acre-feet per year)							
	Trinity Aquifer	106	106	106	106	106	106
	UTRWD Sources (Bartonville WSC)	497	332	293	284	305	282
Total Supply		**603**	**438**	**399**	**390**	**411**	**388**
Supply Minus Demand		**-65**	**-291**	**-370**	**-422**	**-443**	**-512**
Water Management Strategies (acre-feet per year)							
	Conservation						
	Water Conservation - Basic Package	20	39	48	58	68	79
	Water Management Strategies						
	Purchase water from Bartonville WSC (from UTRWD)	216	645	617	596	639	720
Total Water Management Strategies		**236**	**684**	**665**	**654**	**707**	**799**
Total Supply and Strategies Minus Projected D		**171**	**393**	**295**	**232**	**264**	**287**
Capital Costs (2002 Dollars)							
	Water Conservation - Basic Package	$0	$0	$0	$0	$0	$0
	Purchase water from Bartonville WSC (from UTRWD)	$0	$0	$0	$0	$0	$0
Total Capital Cost		**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

State Participation

What is State Participation?

Generally, the State Participation Program enables the Texas Water Development Board (TWDB) to assume a temporary ownership interest in a regional project when the local sponsors are unable to assume debt for the optimally sized facility. The TWDB may acquire ownership interest in the water rights or a co-ownership interest of the property and treatment works. The loan repayments that would have been required, if the assistance had been from a loan, are deferred. Ultimately, however, the cost of the funding is repaid to the TWDB based upon purchase payments, which allow the TWDB to recover its principal and interest costs and issuance expenses, etc., but on a deferred timetable.

The intent of this program is to allow for optimization of regional projects through limited State participation where the benefits can be documented, and such development is unaffordable without State participation. The goal is to allow for the "Right Sizing" of projects in consideration of future growth. The program recognizes two types of State Participation Projects those that create a new supply of water and those that do not. For the new water supply projects the TWDB can fund up to 80% of costs, provided the applicant will finance at least 20% of the total project cost from sources other than the State Participation Account, and at least 20% of the total capacity of the proposed project will serve existing needs. For the other typy projects the TWDB can fund up to 50% of costs, provided the applicant will finance at least 50% of the total project cost from sources other than the State Participation Account, and at least 50% of the total capacity of the proposed project will serve existing needs.

Who can Apply for the Funds?

Any political subdivision of the State and water supply corporations which is sponsoring construction of a regional water, or wastewater project can apply to the TWDB for participation in the project. Although it is not required, the applicant usually acquires a loan from the TWDB for the community's immediate needs.

How do I Apply for State Participation Funding?

The applicant is encouraged to meet with TWDB staff for assistance in the preparation of the application and to discuss the terms of the loan. The applicant must submit an engineering feasibility report and environmental information, as well as general, fiscal and legal application information (Financial Assistance Application Procedure Guidelines (available in Portable Document Format, file size=13KB) to the TWDB's Office of Project Finance and Construction Assitance.

Provided funds are available to finance state participation projects, the TWDB will normally consider applications for financial assistance from the State Participation Account at its March and October meetings each year. It will apply a priority rating to project if there is more than one project competing for the funds. The applications must be submitted by the first of February or first of September to be considered at the March and October TWDB meetings, respectively. The priority rating criteria is in TWDB Rule 31 TAC 363.1007. See the TWDB Board and Committee Meeting Calendar for Board meeting dates.

Click HERE to access the Program Guidance Manuals and other forms and guidelines needed to apply for State Participation.

How does TWDB get Funds for the Program?

The State Legislature, recognizing the value in optimizing and "Right Sizing" systems, has appropriated funds to assist local governments in regional optimization projects. To offset some of the initial cost of processing these projects, the TWDB charges an administrative cost recovery fee of 0.77%. As the earlier projects repurchase the TWDB's interest, there will be additional funds available to future projects.

What Savings does State Participation provide?

The benefits to the participant are threefold. First, payments are deferred until the customer base grows into the added capacity facilitated, which will augment the applicant's ability to make the payments to the TWDB. Second, the TWDB does not accrue interest on the deferred interest portion thereby reducing the overall carrying cost of the facility for the applicant. Third, optimizing regional projects reduces the necessity and added expense to local governments of building new structures or replacing undersized structures in the future.

These funds are limited in availability both as to the total amount approved by the Legislature each biennium and by limitations to participation in individual projects. The TWDB's participation from this program is limited to a maximum of 80% of costs for projects creating a new water supply, and to 50% of costs for other types of projects. In both cases state participation is limited to the portion of the project designated as excess capacity. The remaining costs of the project may be funded through other TWDB programs.

There is also a requirement that the project cannot be reasonably financed without state participation assistance, and that the optimum regional development of the project cannot be reasonably financed without the State participation. Other findings must also be made.

What are the Terms of Financial Assistance?

Security Instrument: A Master Agreement will be developed to establish responsibilities, duties and liabilities of each party, and to govern the funding arrangements, including provisions for a defined source of revenue which will be used to purchase the State's portion of the facility.

Pledge: System revenues and/or tax pledges are typically required. Contract revenue pledges for river authorities and others are possible. The TWDB may subordinate this obligation relative to your debt issuance.

Length of Board Participation and Repurchase Payments: Period of useful life of the project facilities being constructed with a maximum financing life of 34 years. Contracts between the TWDB and the applicant includes a repurchase payment schedule which approximates the following:

- 1st & 2nd Years $0 interest payable/$0 principal (interest accrues but deferred as to payment)
- 3rd & 4th Years @ 20% of accrued int./$0 principal (80% of accrued interest deferred)
- 5th Year @ 30% of accrued interest/$0 principal (70% of accrued interest deferred)
- 6th Year @ 40% of accrued interest/$0 principal (60% of accrued interest deferred)
- 7th Year @ 55% of accrued interest/$0 principal (45% of accrued interest deferred)
- 8th Year @ 70% of accrued interest/$0 principal (30% of accrued interest deferred)

- 9th Year @ 85% of accrued interest/$0 principal (15% of accrued interest deferred)
- 10th through 12th Years @ 100% of accrued interest/$0 principal (No accrued interest deferred)
- 13th through 19th Years @ all annual accruing interest plus recovery of equal portions of the previously deferred interest each year
- 20th through 34th Years @ all annual accruing interest plus principal.

A portion of the TWDB's ownership is transferred only when the principal portion of the payment begins.

THE INTENT IN THE SCHEDULE IS TO PRODUCE APPROXIMATELY LEVEL DEBT SERVICE BEGINNING IN THE 13TH YEAR, BUT THE DEFERRED INTEREST COMPONENT IS RECOVERED PRIOR TO THE APPLICATION OF PAYMENTS TO PRINCIPAL.

Interest Rates: While the assistance is not a loan, the purchase requirement is certain as to terms of payment and does include a component of the repurchase cost that includes the interest costs of the TWDB's funds in financing the project. These rates are based upon the TWDB's cost of the funds for loans at such time as the TWDB's acquisition payment is made to establish its participation in the project. Rates are established by maturity date for each installment closed. The rates are set approximately 45 days prior to installment closing, and are based upon the TWDB's TIC composite lending rate scale for State Participation bonds. The rate is set in accordance with the TWDB Rules in 31 TAC 363.33(a).

Fees: Please be aware that there is an Administrative cost recovery fee relating to State Participation Commitments. This is for commitments made for State Participation after 9/01/1999 only. As of 8/8/00, the fee will be $0.77 per $100 of Participation funds provided.

The fee will be paid at closing in full, or a minimum of 1/3 of the fee may be paid at closing. If the applicant chooses to pay 1/3 of the fee at closing, the remaining 2/3 of the fee may be arranged in 2 subsequent installments in the first, second or third years based upon terms agreed upon in the individual contracts.

Conditions to Close: Environmental Review and Water Conservation Plans in addition to financial conditions. Upon Board commitment a letter is provided detailing all special conditions.

Applicable Rules: 31 TAC 363 Subchapter A and F. To access these rules click here.

Where Can I Get More Information?

For further information please contact the Texas Water Development Board's Office of Project Finance and Construction Assistance, Program and Policy Development Division at (512) 463-3119.

Source: http://www.twdb.state.tx.us/assistance/financial/fin_infrastructure/StateParticipation.asp
Downloaded on March 8, 2005.

Table Y-2
Summary of Infrastructure Financing Survey Results

County	WUG/Name of Political Subdivision	WWP?	Date Survey Received	Planning to implement strategies?	Comments	Requested Strategies	% Cash Reserves	% Bonds	% Bank Loans	% Federal Govt. Programs	% State Govt. Programs (TWDB Bonds)	% Other	% Total	Description of State Programs	Description of Other Programs
	Sabine River Authority	Yes	8/5/05	Yes				100					100		
	Sulphur River Water District	Yes	8/1/05	No		None provided							No information provided.		
	Upper Neches Municipal Water Authority	Yes	7/21/05	Yes								100	100		DWU will fund Lake Fastrill
COLLIN	Caddo Basin SUD		8/1/05	Yes	Continue to purchase from current provider.								No information provided.		
COLLIN	City of Allen		7/26/05	Yes			75	25					100		
COLLIN	City of Anna		8/16/05	Yes			25	10			65		100	all available TWDB programs	
COLLIN	City of Blue Ridge												0		
COLLIN	City of Celina		8/15/05	Yes				100					100		
COLLIN	City of Farmersville		8/4/05	Yes				100					100		
COLLIN	City of Frisco		7/13/05	Yes				100					100		
COLLIN	City of Josephine		8/8/05	Yes					80	20			100		
COLLIN	City of Lowry Crossing		8/1/05	Yes	Continue to purchase from current provider.								No information provided.		
COLLIN	City of Lucas												0		
COLLIN	City of McKinney		7/26/05	Yes		Population projections are too low						100	100		
COLLIN	City of Melissa		7/20/05	Yes			100						100		
COLLIN	City of Murphy												0		
COLLIN	City of Nevada												0		
COLLIN	City of Parker												0		
COLLIN	City of Plano		7/21/05	Yes		Projected population and demands are too high.		100					100		
COLLIN	City of Princeton		8/21/05	Yes									no capital costs		
COLLIN	City of Weston		8/23/05	Yes								100	100		Real estate developer assessments
COLLIN	City of Wylie		7/21/05	Yes				100					100		
COLLIN	Culleoka WSC		8/15/05	Yes									no capital costs		
COLLIN	Danville WSC		8/1/05	not applicable	Danville WSC going out of business in 3-4 years. Celina, Prosper & McKinney are planning to take over parts of the service area. Each city will have to connect to Danville's system to supply the area.								no capital costs		
COLLIN	East Fork SUD		8/17/05	Yes	Demands are too low. Provided demand projections. Asked us to change demands.		5			5	90		100		
COLLIN	Gunter Special Utility District		8/8/05	No response				60	40				100		

Table Y-2, Continued

County	WUG/Name of Political Subdivision	WWP?	Date Survey Received	Planning to implement strategies?	Comments	Requested Strategies	% Cash Reserves	% Bonds	% Bank Loans	% Federal Govt. Programs	% State Govt. Programs (TWDB Bonds)	% Other	% Total	Description of State Programs	Description of Other Programs
COLLIN	Lavon WSC		5/17/05	Yes	Does not understand how the numbers were developed or what they mean. FNI made follow-up call.		5		5	80		10	100		
COLLIN	Milligan WSC		7/20/05	Yes		Concerned that the demand is decreasing when the population the WSC is serving is increasing.	100						100		
COLLIN	North Collin WSC												0		
COLLIN	North Texas Municipal Water District	Yes	8/4/05	Yes				100					100		
COLLIN	South Grayson WSC		8/5/05	Yes			20		80				100		
COLLIN	Town of Fairview		8/2/05	No response	Population projections are too low.			100					100		
COLLIN	Town of New Hope												0		
COLLIN	Town of Prosper												0		
COLLIN	Town of Saint Paul		8/2/05	Yes	Continue to purchase from current provider.								No information provided.		
COOKE	City of Gainesville	Yes	8/2/05	Yes							100		100	all available TWDB programs	
COOKE	City of Lindsay		7/22/05	No		To increase gpm, the pump in well #3 will be replaced with a 40 HP pump to gain 200 gpm. Also, a 10" line is in place along HWY 82 connecting to Gainesville should the need arise.	20	20	20	20	20		100	to be determined	
COOKE	City of Muenster		8/3/05	Yes				31	5	64			100		
COOKE	Kiowa Homeowners WSC		8/2/05	No		Want to participate in Cooke Co. SWSP			100				100		
COOKE	Town of Valley View		7/19/05	No response		Water system is owned by Bolivar WSC.							No information provided.		
COOKE	Two Way Special Utility District		8/17/05	Yes			X		X	X	X		percentages unknown at this time		

Table Y-2, Continued

County	WUG/Name of Political Subdivision	WWP?	Date Survey Received	Planning to implement strategies?	Comments	Requested Strategies	% Cash Reserves	% Bonds	% Bank Loans	% Federal Govt. Programs	% State Govt. Programs (TWDB Bonds)	% Other	% Total	Description of State Programs	Description of Other Programs
COOKE	Woodbine WSC		8/4/05	Yes			25					75	100		Buy-in equity programs; long needed rate increase from retail; increase customers rates; service membership increases; control excess inventory and spending; careful budgets.
DALLAS	City of Balch Springs												0		
DALLAS	City of Cedar Hill	Yes											0		
DALLAS	City of Cockrell Hill		7/28/05	Yes							70	30	100	CDBG survey family annual income to be determined ay G/L process	self (city funds)
DALLAS	City of Combine												0		
DALLAS	City of Coppell		7/22/05	Yes			25	75					100		
DALLAS	City of Dallas	Yes	7/22/05	Yes				90		6	4		100	Specific state and federal program are yet to be identified. Options include the TWDB State Participation Program and TWDB, TCEQ, and federal grants.	
DALLAS	City of DeSoto		8/2/05	Yes								100	100		"Pay as you go" program from utility fund in annual budget
DALLAS	City of Duncanville		8/3/05	Yes	City is approximately 96% built out.		95	5					100		
DALLAS	City of Farmers Branch		7/26/05	Yes								100	100		Utility Fund
DALLAS	City of Garland	Yes	7/26/05	No		Already implemented. Future needs to be paid for by user.							No information provided.		
DALLAS	City of Glenn Heights												0		
DALLAS	City of Grand Prairie		8/12/05	Yes	Population too high. Reach buildout of 261,854 in 2040. Also, purchases water directly from Fort Worth now - TRA is not involved.	Add capital cost of $2,190,000 for the Midlothian supply line.		100					100		
DALLAS	City of Highland Village		7/22/05	Yes			30	70					100		
DALLAS	City of Hutchins												0		
DALLAS	City of Irving		7/22/05	Yes		Considering options in Sulphur Basin. Wants to see Marvin Nichols as an option for them.		100					100		
DALLAS	City of Lancaster												0		
DALLAS	City of Mesquite		7/21/05	No response			40	10				50	100		
DALLAS	City of Richardson												0		
DALLAS	City of Sachse												0		
DALLAS	City of Seagoville	Yes											0		
DALLAS	City of University Park												0		

Table Y-2, Continued

County	WUG/Name of Political Subdivision	WWP?	Date Survey Received	Planning to implement strategies?	Comments	Requested Strategies	% Cash Reserves	% Bonds	% Bank Loans	% Federal Govt. Programs	% State Govt. Programs (TWDB Bonds)	% Other	% Total	Description of State Programs	Description of Other Programs
DALLAS	City of Wilmer		8/3/05	Yes		In addition to strategies, also plan to purchase treated water from DWU, Hutchins, and Lancaster.						100	100		MUD
DALLAS	Dallas County Park Cities MUD	Yes	7/12/05	No		Have enough supply to meet needs through 2060							no capital costs		
DALLAS	Dallas County WCID #6												0		
DALLAS	Town of Addison												0		
DALLAS	Town of Highland Park		7/15/05	No		Projections are for adequate supplies to meet future demand through 2060.							no capital costs		
DALLAS	Town of Sunnyvale		8/23/05	No			50	50					100		
DENTON	Argyle WSC		7/22/05	sort of		Plan for less conservation. Continue to purchase from UTRWD is correct.	25			25	50		100		
DENTON	Bartonville WSC		7/13/05	sort of	Strategies look good.	Additional water wells to meet future growth and less dependant on UTRWD.	100						100		
DENTON	Bolivar WSC		7/19/05	Yes			20			50	30		100	TWDB and TAFA Tx Agricultural Finance Authority	
DENTON	City of Argyle		8/2/05	Yes	Continue to purchase from Argyle WSC.								No information provided.		
DENTON	City of Aubrey												0		
DENTON	City of Carrollton		7/20/05	No	FNI - ASR mistakenly added to table.	Purchase water from DWU. ASR is not part of plan.		100					100		
DENTON	City of Corinth												0		
DENTON	City of Denton	Yes	7/18/05	Yes				100					100		
DENTON	City of Hebron		8/15/05	No response	Plans to continue purchasing from Carrollton								no capital costs		
DENTON	City of Justin												0		
DENTON	City of Krugerville		8/3/05	Yes	Continue to purchase from current provider.								No information provided.		
DENTON	City of Krum												0		

Table Y-2, Continued

County	WUG/Name of Political Subdivision	WWP?	Date Survey Received	Planning to implement strategies?	Comments	Requested Strategies	% Cash Reserves	% Bonds	% Bank Loans	% Federal Govt. Programs	% State Govt. Programs (TWDB Bonds)	% Other	% Total	Description of State Programs	Description of Other Programs
DENTON	City of Lake Dallas		8/1/05	Yes	Currently members of UTRWD and support their efforts to obtain future water.		100						100		
DENTON	City of Lewisville		7/29/05	No response			10	80			10		100	water treatment plant expansions	
DENTON	City of Lincoln Park												0		
DENTON	City of Oak Point		8/2/05	Yes	Continue to purchase from current provider.								No information provided.		
DENTON	City of Pilot Point												0		
DENTON	City of Roanoke												0		
DENTON	City of Sanger												0		
DENTON	City of The Colony		8/9/05	Yes				100					100		
DENTON	Denton County FWSD		8/5/05	Yes				100					100		
DENTON	Lake Cities MUA	Yes	8/1/05	Yes	Currently members of UTRWD and support their efforts to obtain future water.		100						100		
DENTON	Mustang SUD	Yes											0		
DENTON	Town of Bartonville		8/2/05	Yes	Continue to purchase from current provider.								No information provided.		
DENTON	Town of Copper Canyon												0		
DENTON	Town of Cross Roads		8/17/05	No response	Not participating in survey.								No information provided.		
DENTON	Town of Double Oak		8/2/05	No Response	Population projections is too high. City is landlocked and will only grow by 100's, not 1,000's. Plan to continue purchasing from Bartonville WSC.								No information provided.		
DENTON	Town of Flower Mound		7/22/05	Yes			100						100		
DENTON	Town of Hackberry												0		
DENTON	Town of Hickory Creek		8/3/05	Yes	Continue to purchase from current provider.								No information provided.		
DENTON	Town of Little Elm		8/3/05	Yes				100					100		
DENTON	Town of Northlake		8/2/05	Yes	Continue to purchase from Fort Worth								No information provided.		
DENTON	Town of Ponder												0		
DENTON	Town of Shady Shores		8/2/05	Yes	Continue to purchase from Lake Cities MUA.								No information provided.		
DENTON	Town of Trophy Club												0		
DENTON	Upper Trinity RWD	Yes	7/26/05	Yes				73.7			20.5	5.8	100	State Participation funding for the Lake Ralph Hall and Marvin Nichols projects assumed at 50% of project costs.	Commercial paper
ELLIS	Buena Vista - Bethel SUD		7/28/05	Yes					100				100		

Table Y-2, Continued

County	WUG/Name of Political Subdivision	WWP?	Date Survey Received	Planning to implement strategies?	Comments	Requested Strategies	% Cash Reserves	% Bonds	% Bank Loans	% Federal Govt. Programs	% State Govt. Programs (TWDB Bonds)	% Other	% Total	Description of State Programs	Description of Other Programs
ELLIS	City of Bardwell		8/9/05	Yes				X			X		percentages unknown at this time		
ELLIS	City of Ennis	Yes	7/14/05	Yes				80			20		100		
ELLIS	City of Ferris		8/5/05	No		Plan to buy water from other entities		50			50		100	Texas Community Development Program	
ELLIS	City of Italy		8/3/05	Yes	TCDP Grants - matching funds		10		55	35			100		
ELLIS	City of Maypearl		8/16/05	Yes	Will seek funding where ever city can find it.			100					100		
ELLIS	City of Midlothian	Yes	7/21/05	Yes				60				40	100		TIRZ
ELLIS	City of Milford		7/14/05	No		Projected population in 2060 is same as now. Thus, no additional water needed.							no capital costs		
ELLIS	City of Oak Leaf		8/9/05	No		Also currently receive water from Rockett SUD & Sardis Lone Elm.							no capital costs		
ELLIS	City of Ovilla		8/16/05	Yes	currently constructing a 30" pipeline to DWU that will be operational in 2006.								No information provided.		
ELLIS	City of Palmer		8/10/05	Yes			25					75	100		EDC Contribution
ELLIS	City of Pecan Hill		7/13/05	no response		All water is provided by Rockett SUD							no capital costs		
ELLIS	City of Red Oak		8/19/05	No response	Population and demand projections too low. Capital costs should be $10 M.	Pipeline to DWU or TRA in next 2 (or 7?) years.		100					100		
ELLIS	City of Waxahachie	Yes	8/5/05	Yes		Ellis County Project (raw water from TRWD) has been moved forward to the top of the list of strategies.	20	80					100		
ELLIS	Community Water Company		7/18/05	No		Increase purchase from Corsicana, TRA Ellis Co.			100				100		
ELLIS	Files Valley WSC		8/12/05	Yes						X	X	X	percentages unknown at this time	RDA grants and loans	RDA grants and loans

Table Y-2, Continued

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ELLIS	Mountain Peak WSC		8/19/05	Yes								100	100		Up-front capital improvement fees are reserved for projects. If possible, try to stay ahead of growth with positive cash flow.
ELLIS	Rockett SUD	Yes											0		
ELLIS	Sardis-Lone Elm WSC		7/20/05	Yes			10		90				100		
FANNIN	City of Bonham												0		
FANNIN	City of Ector		8/4/05	Yes									No information provided.		
FANNIN	City of Honey Grove		7/14/05	Yes	Surface water from Lower Bois d'Arc Res		25			60	15		100	TWDB - share from TWDB and fed program will depend on availability of funds in each program.	
FANNIN	City of Ladonia												0		
FANNIN	City of Leonard		8/3/05	No	Would apply to TWDB for funding	Plans on having access to surface water out of Lowe Bois d'Arc.			50		50		100		
FANNIN	City of Savoy		7/18/05	Yes					100				100		
FANNIN	City of Trenton		8/16/05	No response	Not participating in survey.								No information provided.		
FANNIN	Hickory Creek SUD		7/29/05	Yes				100					100		
FANNIN	North Hunt WSC		7/13/05	Yes			20		5	50	15	10	100	TWDB grant	
FANNIN	Southwest Fannin County SUD		8/16/05	No		Drilling new wells	100						100		
FREESTONE	City of Fairfield		8/5/05	Yes	Population too low. Industrial/commercial demand not included.	building pipeline to Richland-Chambers in 2006-08 timeframe for $12.5 M. What does the $5.478 M in 2030 represent?	5				95		100	TWDB - SRF	Bonds and bank loans are alternative funding mechanisms
FREESTONE	City of Teague												0		
FREESTONE	City of Wortham		8/8/05	No		Unlikely to pursue TRWD supplies due to cost. Plan for Corsicana water. Keep WTP expansions. Cost to connect to Navarro Mills is about $5 M.				X	X	X	percentages unknown at this time		
FREESTONE	Flo Community WSC												0		

Table Y-2, Continued

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GRAYSON	City of Bells		8/10/05	Yes	New water or supplemental wells		10	10		40	40		100	TCDBG & USDA	
GRAYSON	City of Collinsville												0		
GRAYSON	City of Denison												0		
GRAYSON	City of Gunter												0		
GRAYSON	City of Howe		8/8/05	Yes							100		100	TWDB funds	
GRAYSON	City of Pottsboro												0		
GRAYSON	City of Sherman		9/7/05	No response				25			75		100	TWDB Loan Program	
GRAYSON	City of Southmayd												0		
GRAYSON	City of Tioga		8/10/05	Yes						X	X		percentages unknown at this time		
GRAYSON	City of Tom Bean		7/18/05	Yes		Adding new wells in near future.		50		50			100		
GRAYSON	City of Van Alstyne		8/26/05	Yes							100		100	TWDB State Participation Fund & TWDB Board Loan Fund	
GRAYSON	City of Whitesboro		8/9/05	Yes			10				90		100	TWDB Revolving Fund Program	
GRAYSON	City of Whitewright												0		
GRAYSON	Greater Texoma Utility Authority	Yes	8/2/05	Yes				20			80		100	TWDB water and wastewater program, Drinking water state revolving loan program	
GRAYSON	Luella WSC		7/11/05	Yes					100				100		
HENDERSON	Athens MWA	Yes	8/4/05	Yes			10					90	100		Future advalorem revenue
HENDERSON	Bethel-Ash WSC		8/10/05	Yes			50		50				100		
HENDERSON	City of Athens		8/4/05	Yes				100					100		
HENDERSON	City of Eustace		8/5/05	Yes		Drilling new well by end of 2005 (move timing from 2020 to 2010)	X	X		X	X		percentages unknown at this time	TCDP and USDA/Rural Development Loan/Grant	
HENDERSON	City of Gun Barrel City												0		
HENDERSON	City of Log Cabin												0		
HENDERSON	City of Malakoff		8/9/05	Yes						50	50		100	USDA grants	
HENDERSON	City of Payne Springs		8/4/05	Yes	Continue to purchase from current provider.								No information provided.		
HENDERSON	City of Seven Points		8/17/05	Yes									no capital costs		
HENDERSON	City of Tool		8/18/05	Yes									no capital costs		
HENDERSON	City of Trinidad												0		
HENDERSON	East Cedar Creek FWSD	Yes	8/18/05	no response			40				60		100	TWDB Bonds, grants	
HENDERSON	Virginia Hill WSC		7/25/05	Yes			100						100		
HENDERSON	West Cedar Creek MUD	Yes	8/18/05	sort of	Agree with the strategies with the exception that WTP expansions will be done as they are needed, not necessarily in 2020 and 2040.		100						100		

Table Y-2, Continued

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JACK	City of Bryson												0		
JACK	City of Jacksboro		9/12/05	Yes	population too low.								No information provided.		
KAUFMAN	Able Springs WSC		7/26/05	Yes			20					80	100		federal or state loans
KAUFMAN	City of Crandall		7/23/05	Yes				50			50		100	revolving fund	
KAUFMAN	City of Forney	Yes	8/29/05	No	Higher population in 2010 and reach buildout of 24,000 in 2018.	Forney does not plan to supply power plant.							No information provided.		
KAUFMAN	City of Kaufman		7/11/05	Yes			5	25	5		10	55	100	Grants and State Revolving Funds	Increased revenues
KAUFMAN	City of Kemp		8/9/05	Yes				15		50	30		95		
KAUFMAN	City of Mabank		8/5/05	No response		Population and demand projections are too low because they do not include the county-other that City serves.							No information provided.		
KAUFMAN	City of Oak Grove												0		
KAUFMAN	City of Terrell	Yes	7/19/05	Yes				100					100		
KAUFMAN	College Mound WSC		8/5/05	Yes		Utilize NTMWD, Terrell & Terrell WTP			100				100		
KAUFMAN	Combine WSC		8/5/05	Yes	Population projections too high. Seagoville has advised that they can increase their contract as necessary. DWU has also indicated that they could tap into the DWU system directly.		25		75				100		
KAUFMAN	Forney Lake WSC		8/4/05	No response	Not participating in survey.								No information provided.		
KAUFMAN	Gastonia-Scurry WSC		7/22/05	Yes			25				75		100	TWDB Bonds, possibly	
KAUFMAN	High Point WSC		8/29/05	No response	Population and demand projections too low.								No information provided.		
KAUFMAN	Mac Bee Special Utility District		7/22/05	no response							100		100	Loan pending from TWDB for $3.7 M to expand treatment plant to 4 MGD membrane plant.	
KAUFMAN	Town of Talty		8/29/05	No response	Population and demand projections too low.								No information provided.		
NAVARRO	Brandon-Irene WSC		8/9/05	Yes						100			100		USDA

Table Y-2, Continued

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NAVARRO	Chatfield WSC		8/4/05	Yes	Continue to purchase from current provider.								No information provided.		
NAVARRO	City of Blooming Grove												0		
NAVARRO	City of Corsicana	Yes	7/19/05	Yes				75			25		100	State revolving funds	
NAVARRO	City of Dawson		8/9/05	Yes									no capital costs		
NAVARRO	City of Frost		8/4/05	unknown		continue to purchase more water from Corsicana.				50	50		100	TX CMTY DVMPT Program - HUD USA	
NAVARRO	City of Kerens		8/19/05	Yes					X		X		percentages unknown at this time		
NAVARRO	City of Rice		8/5/05	Does not wish to participate in RCWPG surveys									No information provided.		
NAVARRO	M E N WSC												0		
NAVARRO	Navarro Mills WSC		8/10/05	Yes	purchase water from Corsicana and conservation								no capital costs		
NAVARRO	Rice WSC												0		
PARKER	City of Aledo												0		
PARKER	City of Hudson Oaks												0		
PARKER	City of Mineral Wells		7/22/05	No		None needed							no capital costs		
PARKER	City of Reno												0		
PARKER	City of Springtown		8/15/05	Yes			X	X	X	X	X	X	percentages unknown at this time	TWDB, Community Development Block Grant Program	
PARKER	City of Weatherford	Yes	7/19/05	Yes			10	90					100		
PARKER	City of Willow Park		8/17/05	No response	Not participating in survey.								No information provided.		
PARKER	Parker County UD #1	Yes											0		
PARKER	Town of Annetta												0		
PARKER	Town of Annetta South												0		
PARKER	Walnut Creek SUD	Yes	8/9/05	Yes			10	40			50		100	TWDB Bonds	
ROCKWALL	Blackland WSC		7/21/05	Yes		In process of looking for other water sources to increase supply. Also adding more storage.	90		10				100		
ROCKWALL	Cash SUD		7/19/05	No		Purchase additional water from SRA (Region D)			100				100		

Table Y-2, Continued

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ROCKWALL	City of Heath		9/22/05	no response	TCG followed up and entity plans to continue purchasing from NTMWD								No information provided.		
ROCKWALL	City of McLendon-Chisholm		8/22/05	no response	listed comments and questions and asked for feedback								No information provided.		
ROCKWALL	City of Rockwall	Yes	7/21/05	Yes									no capital costs		
ROCKWALL	City of Rowlett		7/19/05	Yes	Continue purchasing from NTMWD. Find out more about "basic" and "expanded" water conservation packages and try to implement them. (What is the real impact? What control?)							100	100		customer sales revenue
ROCKWALL	City of Royse City		8/19/05	No		Has unlimited supply from NTMWD	25	75					100		
ROCKWALL	Mt Zion WSC		7/12/05	No		Ground storage tank, new pump stations, and distribution lines	100						100		
ROCKWALL	R C H WSC		7/12/05	No		Future plans call for large diameter delivery line, storage tanks, and additional distribution lines	100						100		
TARRANT	Benbrook Sewer & Water Authority		8/22/05	no response	phone call indicated "yes" response			100					100		
TARRANT	Bethesda WSC		7/20/05	No response	Portion in Region G should be getting water from Ft. Worth too.		20	80					100		
TARRANT	City of Arlington		8/10/05	Yes	WTP expansion in 2 phases: 32.5 MGD in 2009 for $28.3 M and 32.5 MGD before 2020 for $30 M.			100					100		
TARRANT	City of Azle		8/18/05	Yes			10	90					100		
TARRANT	City of Bedford		8/25/06	Yes	Population too high.			100					100		
TARRANT	City of Benbrook		8/22/05	no response	phone call indicated "yes" response			100					100		
TARRANT	City of Blue Mound		8/9/05										No information provided.		
TARRANT	City of Burleson												0		

Table Y-2, Continued

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TARRANT	City of Colleyville												0		
TARRANT	City of Crowley		8/10/05	Yes				100					100		
TARRANT	City of Dalworthington Gardens												0		
TARRANT	City of Euless		7/19/05	Yes			60	30		10			100		
TARRANT	City of Everman		7/19/05	Yes	Population projections are too high.	Adding new well in Trinity Aquifer in next 2 years						100	100		CDBG
TARRANT	City of Forest Hill		7/13/05	No		City is built-out and will only require an additional 50 MG ground storage.	50			50			100		
TARRANT	City of Fort Worth	Yes	8/4/05	Yes				75			25		100	TWDB SRF	
TARRANT	City of Grapevine		7/18/05	No response		Purchase water from TRA and water conservation	25	75					100		
TARRANT	City of Haltom City		7/15/05	Yes			100						100		
TARRANT	City of Haslet		8/12/05	Yes			100						100		
TARRANT	City of Hurst		8/17/05	Yes	Added cost amounts to the capital costs, but these appear to be annual costs.		10	70				20	100		Operating Funds
TARRANT	City of Keller		8/11/05	Yes	Costs should be associated with Ft Wortham and Keller will pay through increased rates.								no capital costs		
TARRANT	City of Kennedale												0		
TARRANT	City of Lake Worth												0		
TARRANT	City of Mansfield	Yes	8/18/05	Yes			60	40					100		Cash reserves plus impact fees.
TARRANT	City of North Richland Hills	Yes	7/15/05	sort of	Does not plan to use groundwater, except for an emergency situation. Currently constructing larger facilities with Ft Worth and TRA.							100	100		annual budget
TARRANT	City of Pelican Bay		7/21/05	No response	WSC is in great need for improvements.	City is in final stage of drilling new deep well. City is in the process of drilling 2 more deep wells.	10	15		50		25	100	ORCA helped fund the two wells in progress.	

Table Y-2, Continued

County	WUG/Name of Political Subdivision	WWP?	Date Survey Received	Planning to implement strategies?	Comments	Requested Strategies	% Cash Reserves	% Bonds	% Bank Loans	% Federal Govt. Programs	% State Govt. Programs (TWDB Bonds)	% Other	% Total	Description of State Programs	Description of Other Programs
TARRANT	City of Richland Hills		7/15/05	Yes	City gets all water from Ft Worth (70%) and wells (30%) and will continue to do so.			50			50		100	TWDB loans/grants if available	
TARRANT	City of River Oaks		8/19/05	no response	Will have a slight increase in population, but not enough to exceed the current WTP capacity.					4	6	90	100	CDBG and TWDB Bonds	Revenues/Expenditures of the annual operating budget
TARRANT	City of Saginaw		8/18/05	No		Increase supply from Fort Worth to account for population increase.	50	50					100		
TARRANT	City of Sansom Park												0		
TARRANT	City of Southlake												0		
TARRANT	City of Watauga		7/18/05	No response	Continue purchasing water from North Richland Hills.								no capital costs		
TARRANT	City of Westworth Village		8/26/05	Yes			100						100		
TARRANT	City of White Settlement												0		
TARRANT	Community WSC		8/23/05	No	Recently completed a 1 MGD plant that should meet needs until 2020.					100			100		
TARRANT	Johnson County SUD		7/20/05	Yes	Working on long-range water plan	TWDB population projections are too low by 10-20%.	20	80					100		
TARRANT	Tarrant Regional Water District	Yes	8/8/05	Yes			5	95					100		
TARRANT	Town of Edgecliff Village		8/11/05	No		Supply solely from Ft Worth	50					50	100		water sales
TARRANT	Town of Lakeside		8/25/05	no response		Purchase water from Fort Worth and Azle	100						100		
TARRANT	Town of Pantego		7/18/05	No		Pantego is landlocked with little undeveloped land. Water conservation should meet future needs.							no capital costs		
TARRANT	Town of Westover Hills		8/12/05	Yes									No information provided.		
TARRANT	Trinity River Authority	Yes	7/27/05	Yes	Maybe TWDB funds if available			100					100		
WISE	City of Alvord												0		
WISE	City of Aurora		7/18/05	No		Currently only have well-water							no capital costs		

Table Y-2, Continued

County	WUG/Name of Political Subdivision	WWP?	Date Survey Received	Planning to implement strategies?	Comments	Requested Strategies	% Cash Reserves	% Bonds	% Bank Loans	% Federal Govt. Programs	% State Govt. Programs (TWDB Bonds)	% Other	% Total	Description of State Programs	Description of Other Programs
WISE	City of Boyd		8/12/05	Yes			5	25		20	50		100		
WISE	City of Bridgeport												0		
WISE	City of Chico		7/22/05	No		Drill more wells and continue to purchase from West Wise SUD	10		30	20	25	15	100	to be determined	Chico 4B EDC
WISE	City of Decatur		7/18/05	No		Expansions will be based on water master plan. Recommendatio ns do not seem aggressive enough.	10	90					100		
WISE	City of New Fairview		8/19/05	Yes	Would connect to Rhome if ever approved for an ad valorem tax.								No information provided.		
WISE	City of Newark												0		
WISE	City of Rhome												0		
WISE	City of Runaway Bay		8/23/05	Yes					100				100		
WISE	West Wise SUD		8/12/05	Yes	New WTP, additional water from TRWD. Possible interconnect with City of Bridgeport.								percentages unknown at this time		
WISE	Wise County WSD	Yes	8/26/05	Yes			5	45			50		100	TWDB	

APPENDIX Z

REGION C NEWSLETTERS

Collin
Cooke
Dallas
Denton
Ellis
Fannin
Freestone
Grayson
Henderson
Jack
Kaufman
Navarro
Parker
Rockwall
Tarrant
Wise

REGION C

Water Planning for North Texas

Phase Two of Regional Water Planning

Why is regional water planning needed?

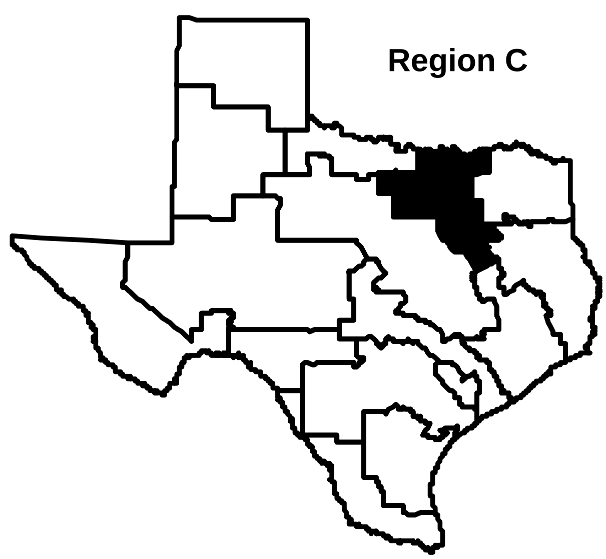
In June 1997, Governor George W. Bush signed into law Senate Bill 1 (SB 1), comprehensive water legislation enacted by the 75th Texas Legislature. This water legislation was an outgrowth of increased awareness of the vulnerability of Texas to drought and to the limits of existing water supplies to meet increasing demands as population grows. The state's population is expected to increase from its current level of about 19 million people to more than 39 million people by 2050.

With passage of SB 1, the Legislature put in place a "bottom up" water planning process designed to ensure that the water needs of all Texans are met as water demands increase. SB 1 allowed individuals representing 11 interest groups to serve as members of Regional Water Planning Groups (RWPGs) to prepare regional water plans for their respective areas. In January 2002, the Texas Water Development Board (TWDB) approved all 16 regional water plans and incorporated them into a comprehensive state water plan – "Water for Texas-2002" – which maps out how to conserve water supplies, meet future water supply needs and respond to future droughts in planning areas.

During the next four years, RWPGs will be actively updating their regional water plans to comply with Senate Bill 2 (SB 2), water legislation recently enacted by the 77th Texas Legislature. The passage of SB 2 brings RWPGs into the second round of water planning, or "Phase 2." Phase 2 requires the RWPGs to review, revise and refine the currently approved regional water plans to respond to changed conditions that may impact water supplies or recommended water management strategies.

Who is involved in Phase 2's updates to regional water plans?

The TWDB is the lead state agency in charge of coordinating the regional water planning process and revising the comprehensive state water plan. To accomplish this, the TWDB adopted state and regional water planning rules, delineated 16 regional planning areas – of which Region C is one – chose planning group representatives and developed planning guidance documents to govern development of regional water plans.



With the passage of SB 2, the TWDB has now issued new planning rules and guidance to RWPGs to help them update their regional water plans by January 2006 and comply with SB 1 and SB 2 mandates. There are 16 RWPGs made up of 300 individuals from 11 interest groups. The Region C water plan was developed under the direction of the 19-member Region C RWPG. Each RWPG is now responsible for updating its regional water plan as mandated by SB 1 and SB 2.

How much will it cost to update Region C's water plan?

The TWDB has approved $1.9 million for Region C to complete its mandated SB 1 Phase 2 work and make recommendations for revising the existing regional water plan.

What is Region C and why does it need water planning?

Region C covers all or part of 16 counties in North Central Texas including Collin, Cooke, Dallas, Denton, Ellis, Fannin, Freestone, Grayson, Henderson, Jack, Kaufman, Navarro, Parker, Rockwall, Tarrant and Wise. Region C includes 12 of the 20 fastest growing communities in Texas.

The region's population is expected to grow tremendously between 2000 and 2050. Approximately 25% of the state's population lives in Region C. The primary rivers and major aquifers supplying water to the region are the Trinity River, Red River, Sabine River, Sulphur River and the Trinity Aquifer.

What are the next steps for Region C's water planning?

In order to review, revise and refine Region C's water plan in response to changed conditions and SB 1 and SB 2 mandates, the RWPG will take these steps over the next four years:

- Update area descriptions contained in the 2001 regional water plan
- Review and propose revisions to current regional population and water demand projections to incorporate 2000 census data
- Analyze water supply and availability numbers to incorporate Groundwater Availability Models and Water Availability Models
- Identify, evaluate and select water management strategies based on needs, update water management strategies to meet needs not previously identified and make revisions to respond to changed conditions
- Assess the impacts of proposed projects on the environment and on water quality
- Describe major impacts of selected water management strategies on key parameters of water quality and economic impacts of moving water from rural and agricultural areas
- Include water conservation and drought management recommendations
- Describe how the regional water plan is consistent with long-term protection of Texas' water resources, agricultural resources and natural resources
- Develop legislative recommendations
- Compile and report data to the TWDB
- Report to legislature on Water Infrastructure Funding Recommendations
- Involve the public in plan adoption by holding public meetings to gather public input

What are the benefits of participating in developing Region C's water plan?

- The opportunity to develop regional solutions to water supply needs with resulting lower water supply costs
- The opportunity to obtain detailed current population data for small communities and rural areas within the region
- The opportunity to analyze water supplies, water demand and water resource management strategies for local communities
- The opportunity to determine regional water infrastructure needs and best strategies to meet those needs
- The opportunity to identify and address local issues and concerns within the framework of SB 1 and regional water plans
- The ability to receive low-interest TWDB loans for financing water supply projects

How can I participate in regional water planning efforts?

Voicing your water needs and sharing any information concerning your local community are vital components in updating the Region C water plan. Without your help and input, the RWPG cannot provide the state with the most current and accurate information concerning the future of water in Texas.

To participate in regional water planning efforts, you may attend any of the RWPG meetings or contact regional group members or the TWDB for more information. Meeting notices are posted in advance by the North Texas Municipal Water District (NTMWD), the contract administrator for Region C.

For meeting information, refer to the Public Notice section of your local newspaper or contact NTMWD at (972) 442-5405. The Region C Water Planning Group usually meets at the TRA Central Wastewater Treatment Plant in Grand Prairie. At the TWDB, you may contact Ms. Virginia Towles by calling (512) 475-2056 or by e-mail at Virginia.Towles@twdb.state.tx.us. Also you may visit the TWDB web site at www.twdb.state.tx.us.

REGION C RWPG

CHAIR
Terrace W. Stewart,
Director, Dallas Water Utilities

AGRICULTURAL
Brad Barnes

COUNTIES
Tom Vandergriff, Tarrant County

ELECTRIC GENERATING UTILITIES
Paul Zweiacker, Texas Utilities

ENVIRONMENTAL
Elaine J. Petrus
Robert O. Scott

INDUSTRIES
A. Leroy Burch

MUNICIPALITIES
Howard Martin, City of Denton
Dale Fisseler, City of Fort Worth
Paul Phillips, City of Weatherford
Terrace W. Stewart, City of Dallas

PUBLIC
Irvin M. Rice
Mary E. Vogelson

RIVER AUTHORITIES
Danny Vance,
Trinity River Authority

SMALL BUSINESSES
Roy J. Eaton

WATER DISTRICTS
Jerry W. Chapman,
Greater Texoma Utility Authority
James M. Parks, North Texas MWD
George Shannon,
Tarrant Regional Water District

WATER UTILITIES
Jim McCarter, Navarro Mills WSC
Connie Standridge, Winkler WSC

www.twdb.state.tx.us

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Cooke
Dallas
Denton
Ellis
Fannin
Freestone
Grayson
Henderson
Jack
Kaufman
Navarro
Parker
Rockwall
Tarrant
Wise

REGION C

Water Planning for North Texas

2002 Fourth Quarter Newsletter

Participate in Region C Water Planning

Public attendance is welcome at Region C Water Planning Group meetings.

All meetings are held at:

Trinity River Authority
Central Wastewater
Treatment Plant
6500 W. Singleton Blvd.
Grand Prairie, TX

Next RCWPG meeting:

Monday, December 2, 2002
1:30 p.m.

For additional meeting information:

Visit the RCWPG Web site at www.regioncwater.org

For more information, contact:

James M. Parks
Interim Chair, RCWPG
at:
North Texas Municipal Water District
P.O. Box 2408
Wylie, TX 75098
Phone: 972.442.5405
ntmwd@airmail.net

Region C Water Planning Group Enters Phase 2

In 2002 regional water planning groups (RWPGs) across Texas entered the second round of water planning, or "Phase 2." During Phase 2, which will last until 2006, regional water planning groups, including Region C, will be actively updating their regional water plans as mandated by Senate Bill 1 (SB 1) that was passed in 1999.

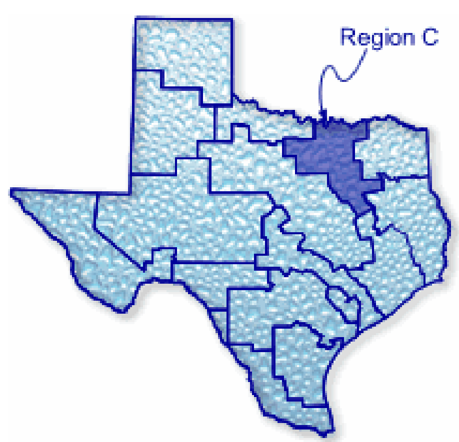
Texas law requires the RWPGs to review, revise and refine the existing regional water plans to respond to changed conditions that may impact water, water supplies or recommended water management strategies.

As part of its Phase 2 efforts, the Region C Water Planning Group (RCWPG) has already taken steps to begin updating its regional water plan. In September 2002, the RCWPG issued population projection surveys to North Texas-area organizations to evaluate population projections over the next 50 years. In December, the planning group will also send out water demand surveys. (For more information on these surveys, see the article on page two of this newsletter)

Public participation is a vital component of the regional water planning process. In addition to sending out surveys on population projections and water needs, the RCWPG is also involving the public in other ways during Phase 2. The group is publishing quarterly newsletters, such as this one, to help keep the public informed of Region C's planning efforts.

Newsletters will include important information on the planning process, including notices of upcoming public meetings and hearings, updates on where the RCWPG is in the water planning process, contact information for RCWPG members and water conservation tips.

To be added to the mailing list to receive Region C's quarterly newsletters, please send your name and mailing address to Amanda Pendegrass at Cooksey Communications via e-mail at Amanda@cookseypr.com or via fax at (972) 580-0852.



RCWPG Launches Interactive Web Site

As part of its ongoing effort to involve and inform the public about North Central Texas' long-range water plans, the Region C Water Planning Group (RCWPG) has launched an interactive, informational Web site at www.regioncwater.org.

Region C's Web site provides critical information on the water planning process and also offers visitors an opportunity for interactive communication. On the site, users can provide input on water issues via e-mail to RCWPG members and their consultants, as well as sign up for newsletter distributions and other important notices.

The site's wealth of information on the regional water planning process includes the following:

- Contact information for all 19 members of the regional planning group and the consultants working with the planning group
- Important planning information such as population projections, water need projections, maps, links to Region C's current water plan and the state's existing water plan
- A newsroom offering a place for interested parties to find timely press releases, newsletters and other communications from the water planning group
- Water conservation tips and other pertinent information supplied by the Texas Water Development Board (TWDB)
- Answers to frequently asked questions about the basics of regional water planning and Region C
- Notices of upcoming public meetings and hearings

Did You Know…

Water facts about Texas and Region C based on 2001 Region C Water Plan

- Texas' population is expected to almost double from its 2000 total of 21 million people to about 39 million people in 2050
- Based on current population projections, if a drought were to occur in 2050 in Texas, almost half of the municipal water needs would not be satisfied by current water sources
- Region C includes 12 of the 20 fastest-growing communities in Texas
- Approximately 25 percent of the state's population lives in Region C
- Without any additional water supplies, Region C's projected 2050 population would be limited to 6,078,289, instead of 9,481,157, a reduction of 35.9 percent
- Without any additional water supplies, Region C's projected 2050 employment would be limited to 2,605,111, instead of 4,425,184, a reduction of 41.1 percent
- Without any additional water supplies, Region C's projected 2050 income would be limited to $109,505,000,000, instead of $171,199,000,000, a reduction of 36.3 percent

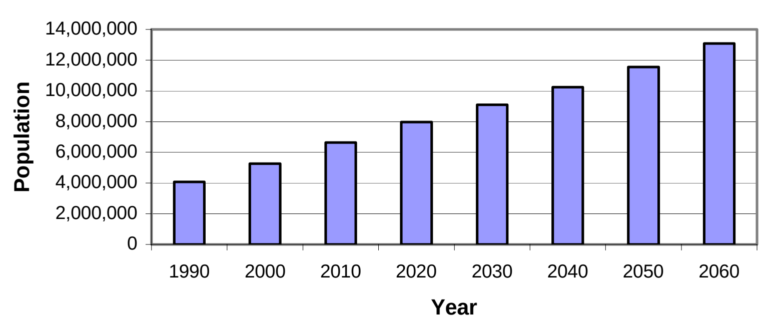
RCWPG Evaluates Population Projections and Water Needs Through Critical Surveys

As part of an effort to fine-tune the statewide water plan for the next 50 years, the RCWPG mailed surveys to North Texas-area municipalities, water utilities and other organizations in September to evaluate population projections over the next 50 years. In mid-December, the planning group will also send out water demand surveys to municipalities, water utilities and other entities to gauge water demand in North Texas during the 50-year time span.

As instructed by the Texas State Legislature, the Texas Water Development Board (TWDB) has formulated regulations governing the updating of regional water plans by Regional Water Planning Groups (RWPGs). These regulations require each RWPG to update its regional water plan based on projections of population and water needs developed by the Texas Water Development Board (TWDB), unless the water planning groups can provide convincing evidence that the TWDB projections are not representative of expected growth.

Because the water needs of Region C affect every person, industry and municipality throughout the region, the RCWPG strongly urges cities to provide input on their population projections and water needs so all needs will be taken into consideration during the water plan updates.

Draft TWDB Population Projections for Region C (1990 & 2000 based on Census Data)



Region C Explores Variety of Water Management Strategies

Q: ***What water management strategies does the RCWPG consider when developing and revising its regional water plan?***

A: The RCWPG considered a wide variety of water management strategies in its original planning, and will continue to examine the appropriateness of these strategies in its plan revisions over the next few years. Among the strategies under consideration are the following:

- Water conservation and drought response planning
- Reuse of wastewater
- Expanded use or acquisition of existing supplies
- Reallocation of reservoir storage to new uses
- Voluntary redistribution of water resources
- Enhancement of yields of existing sources
- Control of naturally occurring chlorides
- Interbasin transfers
- New supply development
- Water management strategies in the current state water plan
- Brush control, precipitation enhancement and desalination
- Water right cancellation
- Aquifer storage and recovery
- Other measures

Q: ***How does the RCWPG evaluate the water management strategies that are under consideration for use in the regional water plan?***

A: The RCWPG assesses each potential strategy based on the following factors:

- Quantity of water made available
- Reliability of supply
- Unit cost of delivered and treated water
- Difficulty of addressing environmental issues
- Impacts on water resources and other management strategies
- Impacts on agricultural and natural resources
- Consistency with plans of Region C suppliers
- Consistency with other regions

Water Conservation Corner

Top 10 Personal Water Conservation Tips

1. Replace your showerhead with a water efficient model. This saves as much as six gallons of water per minute.
2. Recycle your old toilet and replace with a water efficient toilet. This saves as much as five gallons per flush.
3. Pay attention to dripping sounds and fix leaks.
4. Don't waste water when brushing your teeth. Shut off the water until it's time to rinse.
5. Don't waste water while shaving. Fill the sink with hot water instead of letting the water run continuously. Don't shave in the shower.
6. Never use the toilet to dispose of trash.
7. Get in the shower right away after the water becomes hot enough.
8. Take short showers and wash hands using only as much water flow as you really need.
9. Take a shower instead of taking a bath.
10. Turn off the water while you are shampooing your hair.

Source: *Texas Water Development Board*

REGION C
Water Planning
for North Texas
5525 N MacArthur Blvd.
Suite 530
Irving, TX 75038

Benchmark Dates in Phase 2 of the Regional Water Planning Process

August 2002	Draft Texas Water Development Board (TWDB) population projections released
December 2002	Draft TWDB water needs projections expected to be released
January 2, 2003	Requested revisions to draft TWDB population projections due to TWDB
June 1, 2003	Requested revisions to draft TWDB water needs projections due to TWDB
June 1, 2005	Initially Prepared Plans (IPP) due to TWDB
January 5, 2006	Planning group-adopted Regional Water Plans due to TWDB
January 5, 2007	TWDB-approved State Water Plan due to Texas Legislature

RCWPG Says Farewell to Chair

Terrace Stewart Steps Down as Chairman of RCWPG in December

The RCWPG would like to offer Terrace Stewart, RCWPG chair, best wishes in his future endeavors. As of December 2, 2002, Stewart will no longer serve as Region C's planning group chairman. He is retiring from the City of Dallas Water Utilities Department and moving to Atlanta, Georgia, where he will pursue new career opportunities.

Terrace Stewart

The RCWPG would like to take this opportunity to thank Stewart for his dedication to Region C's water planning efforts and his continued support of water planning for the future of all Texans.

Until a new chair is appointed to fill Stewart's position, James M. Parks will serve as interim chair of the RCWPG.

REGION C
Water Planning for North Texas
2003 First Quarter Newsletter

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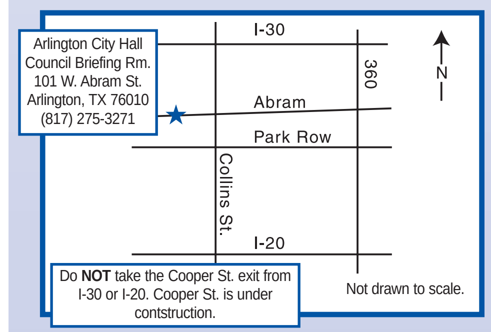
Parker
Rockwall
Tarrant
Wise

Participate in Region C Water Planning

Public attendance is welcome at Region C Water Planning Meetings.

Next Meeting:
Monday, April 7, 1:30 p.m.

Note New Location:



For more information, contact:
James (Jim) M. Parks, RCWPG Chair
At:
North Texas Municipal
Water District
P.O. Box 2408
Wylie, TX 75098
Phone: 972.442.5405
E-mail: jparks@ntmwd.com

To be added to the mailing list to receive the quarterly RCWPG newsletter, send your name and mailing address to Amanda Pendegrass at Cooksey Communications via e-mail at Amanda@cookseypr.com or via fax at 972.580.0852.

www.regioncwater.org

RCWPG appoints new chair and vice chair

The RCWPG would like to welcome James (Jim) M. Parks as its new chair and Robert (Bob) Johnson as new vice chair. The water planning group made the announcement on January 27 after both Parks and Johnson were unanimously voted into their new positions by RCWPG members.

Parks has been serving as interim chair of the RCWPG since December 2002, when Terrace Stewart resigned from the City of Dallas Water Utilities Department and stepped down as chair of the planning group to pursue new career opportunities in Atlanta, Georgia.

Parks currently serves as executive director and general manager of the North Texas Municipal Water District (NTMWD), where he has worked since 1979. In addition to his position with RCWPG, he is also a member of the American Water Works Association, the Texas Water Conservation Association and the National Water Resources Association.

Johnson currently serves as interim director of water utilities for the City of Dallas Water Utilities Department. In addition to serving as a member of the RCWPG, he is also a member of the American Water Works Association, the Water Environment Federation, the Texas Water Conservation Association and other industry organizations.

Parks

Johnson

Region C Water Planning Group Members

Chair
James (Jim) M. Parks,
North Texas MWD

Agricultural
Brad Barnes

Counties
Tom Vandergriff, Tarrant County

Electric Generating Utilities
Paul Zweiacker, TXU

Environmental
Elaine J. Petrus
Robert O. Scott

Industries
A. Leroy Burch

Municipalities
Howard Martin, City of Denton
Dale Fisseler, City of Fort Worth
Paul Phillips, City of Weatherford
Robert Johnson, City of Dallas

Public
Irvin M. Rice
Mary E. Vogelson

River Authorities
Danny Vance, Trinity River Authority

Small Business
Roy J. Eaton

Water Districts
Jerry W. Chapman, Greater Texoma Utility Authority
James (Jim) M. Parks, North Texas MWD
George Shannon, Tarrant Regional Water District

Water Utilities
Jim McCarter, Navarro Mills WSC
Connie Standridge, Winkler WSC

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Water Planning
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5525 N MacArthur Blvd.
Suite 530
Irving, TX 75038

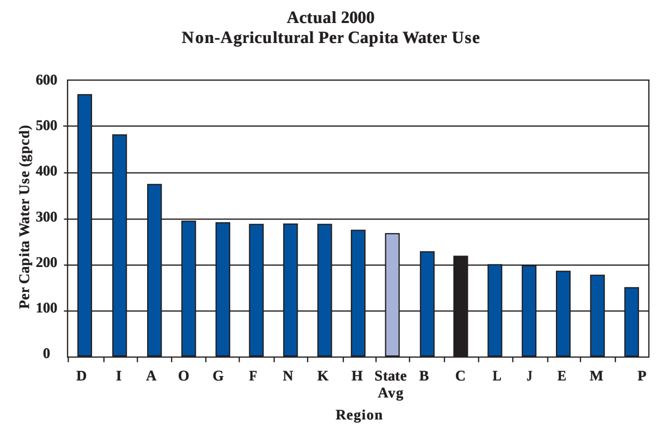
2000 Region C Actual Water Use

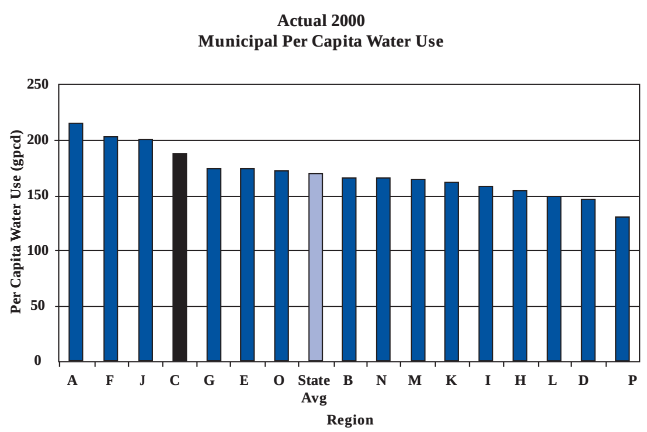
How does Region C compare in terms of water use to other parts of Texas? Based on year 2000 figures released by the Texas Water Development Board (TWDB) and in comparison to other regions in Texas, Region C has the:

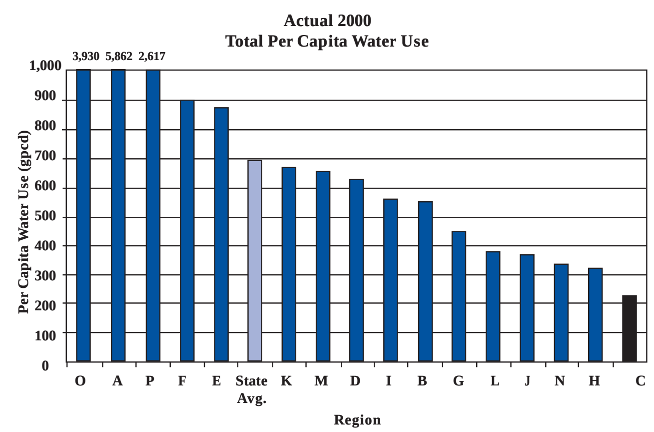
• 4th-largest *municipal* per capita water use (including commercial use, but not heavy industrial use);

• 6th-lowest *non-agricultural* per capita water use (including mining, steam-electric, manufacturing and municipal use);

• Smallest *total* per capita water use of any region in Texas.







Get water-smart in March with second annual Texas SmartScape month

March is the second annual Texas SmartScape month, when local governments are encouraged to participate in educating Texans about storm water pollution prevention and water conservation.

The Texas SmartScape program, developed as part of the North Central Texas Council of Governments (NCTCOG) Storm Water Management Program, is a CD-ROM that shows homeowners how to create and care for native and adapted landscapes to help protect the environment.

To kickoff Texas SmartScape Month, a new interactive Web version of the program is being debuted as a result of the sponsorship of the five major regional water providers – Dallas Water Utilities, City of Irving, North Texas Municipal Water District, Tarrant Regional Water District and the Upper Trinity Regional Water District.

Last year, more than 24 local governments throughout North Central Texas participated in the first SmartScape month by hosting a variety of activities in their cities and towns.

For more information on this year's events, visit www.DFWinfo.com.

RCWPG urges user groups to complete critical water needs survey

The RCWPG mailed surveys the first week of February to North Texas-area Water User Groups (WUGs) to determine whether existing water needs projections developed by the Texas Water Development Board (TWDB) for the area are appropriate and will meet the water needs of all North Texans during the next 50 years.

This important survey is the follow-up to the population projections survey previously issued by the RCWPG to North Texas-area WUGs. The population projections survey distributed in September 2002 helped determine the appropriateness of population projections developed by the TWDB. The two surveys together will help the RCWPG effectively revise and refine its regional water plan.

Surveys were mailed to all North Texas WUGs –municipalities, non-city water suppliers, water supply corporations and other water suppliers providing more than 280 acre-feet per year in retail water supplies. Surveys were also mailed to agricultural extension agents, councils of governments and county judges.

"It is critical for all Water User Groups in Region C to respond to the water needs survey," said Jim Parks, chairman of the RCWPG. "We need to ensure that we are adequately preparing for the future of water for all North Texans, and this survey is critical in that endeavor."

For more information about the water needs surveys, or if you represent a WUG and did not receive a survey, please contact Ed Motley with Chiang, Patel and Yerby at 214.638.0500 or via e-mail at emotley@cpyi.com.

RCWPG Per Capita Water Needs Projections Schedule

- On December 21, 2002, the Texas Water Development Board (TWDB) sent year 2000 regional per capita water use comparisons to the RCWPG for review.
- On February 4, 2003, the RCWPG issued water needs surveys to North Texas-area water user groups (WUGs) to assess the TWDB water needs projections.
- February 28, 2003 was the due date for WUGs to return completed water needs surveys to the RCWPG.
- After WUGs return their completed surveys, the Region C consultants will develop a request for recommended revisions to Region C's water needs projections.
- In mid-April, the Region C consultants will send their request for recommended revisions of the water needs projections to the RCWPG.
- By the beginning of May, the consultants will obtain RCWPG approval of request for revisions of the water needs projections.
- By June 2, 2003, the RCWPG will send its request for revisions to the per capita water needs projections to the TWDB.

Water Conservation Corner
Tips to help conserve water outdoors during warm-weather months

As the spring and summer months get closer, the need to water and maintain a healthy lawn becomes a reality for most North Texans. Landscape irrigation can account for more than 30 percent of all the water used during the summer in Texas. Unfortunately, about half of this water is wasted due to overwatering. The Texas Water Development Board (TWDB) developed the following tips to help Texans to be "water-wise" outdoors during the spring and summer months.

When should I water?
Pay attention to signs of stressed grass, such as a dull green color, footprints that remain visible after walking on the lawn or curled leaf blades. Water only after the top 2" of the soil has dried out. Check moisture by feel with a soil probe or screwdriver.

What time of day should I water?
Evaporation loss can be 60 percent higher during the day, so water during the early morning or in the evening. Do not water on windy days.

How often should I water?
Proper watering once every five days or longer will help grass and shrubs develop deep roots (it is especially important to start this during the spring when root growth is at its peak). Overwatered turf will have a short root system and will not be drought-tolerant.

How long should I water?
To determine how long you should run your sprinkler, place three to five empty cans at different distances away from the sprinkler. Run the sprinkler for 15 minutes and measure the amount of water collected in each can. Calculate an average water depth and determine how long it will take to apply one inch of water, which will keep most Texas grasses healthy in the summer. Don't forget to account for any rainfall since the last irrigation. To avoid runoff on sloping areas, place sprinklers near the top of the slope and apply water slowly and intermittently.

What should I water?
Only plants - don't water the sidewalks and driveways. Use a broom to sweep debris away rather than cleaning with a hose – this can save 30 gallons of water per five minutes.

How can I use rainwater?
Harvest it. Funnel the water from your gutters into a rain barrel and save it. Rainwater is free, and is better for your plants because it doesn't contain hard minerals. Also, the pH of rainwater may be better for plants.

Source: Texas Water Development Board in cooperation with the City of Austin Water Conservation

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Water Utilities
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Freestone
Grayson
Henderson
Jack
Kaufman
Navarro
Parker
Rockwall
Tarrant
Wise

REGION C
Water Planning for North Texas

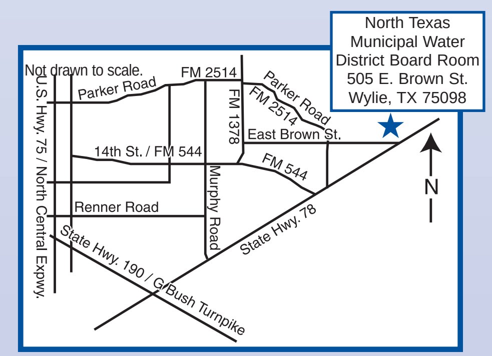
2003 Second Quarter Newsletter

Participate in Region C Water Planning

Public attendance is welcome at Region C Water Planning Meetings.

Next Meeting:
Monday, June 23, 1:30 p.m.

Note New Location:



For more information, contact:
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Wylie, TX 75098
Phone: 972.442.5405
E-mail: jparks@ntmwd.com

To be added to the mailing list to receive the quarterly RCWPG newsletter, send your name and mailing address to Amanda Pendegrass at Cooksey Communications via e-mail at Amanda@cookseypr.com or via fax at 972.580.0852.

www.regioncwater.org

RCWPG Hosts Public Hearing on June 23

On Monday, June 23, the Region C Water Planning Group will hold a special public hearing to discuss two requests for amendments to the 2001 *Region C Water Plan.*

The Athens Municipal Water Authority (AMWA) and the Greater Texoma Utility Authority (GTUA) have both requested amendments to Region C's water plan to add new water management strategies not originally included in the 2001 *Region C Water Plan.*

The requests resulted when the entities were told by the Texas Commission on Environmental Quality (TCEQ) and the Texas Water Development Board (TWDB) that projects for which they were seeking permits and/or funding from the state agencies were not consistent with the 2001 *Region C Water Plan.*

In order for the RCWPG to amend the 2001 *Region C Water Plan*, the planning group must respond to an amendment request within 180 days of the request's filing, hold a public hearing and take public comments at that meeting.

The public hearing will begin at 1:30 p.m. on June 23, 2003 at the North Texas Municipal Water District, located at 505 E. Brown St., Wylie, TX 75098. The regular RCWPG public meeting will follow the conclusion of the public hearing. The RCWPG will consider action on the proposed amendments during its regular group meeting following the public hearing.

Interested members of the public are welcome and encouraged to attend and participate in the hearing.

Copies of the proposed amendments are available online at:
www.regioncwater.org
and hard copies are available at county clerk's offices and various public libraries throughout Region C.

Regional Water Plan is Much More Than the Marvin Nichols Reservoir

By Roy J. Eaton

For more than five years, the Region C Water Planning Group has been developing a long-range water supply plan for the Dallas/Fort Worth area and sixteen counties in North Central Texas.

As part of that planning process, literally dozens of water management strategies have been recommended to promote conservation, development of new water sources, reuse of waste water, improvement of water quality, drought management, yield enhancement of existing water supplies and other key objectives.

Despite all these strategies, however, all of the attention seems to have centered on the proposed Marvin Nichols Reservoir on the Sulphur River in Northeast Texas. It would appear that some feel the Region C Water Planning Group just "dreamed up" the idea of a reservoir on the Sulphur River in a spur-of-the-moment decision. That is far from the truth. In fact, a reservoir on the Sulphur River has been a part of the long-range Texas Water Plan for more than 30 years.

The Marvin Nichols Reservoir is just one of *many* possibilities for expanded water supplies for our fast-growing area. Many others are being considered, including purchasing water from Mesa's proposed Panhandle Water Project in the Texas Panhandle, desalinating the Red River, piping water to the Dallas/Fort Worth area from the Toledo Bend Reservoir in East Texas, expanding existing water supplies by connecting with existing reservoirs such as Lake Fork, expanding the Cedar Creek/Richland Chambers pipeline, connecting to Lake Palestine and Lake Chapman, and many other options.

The water in every reservoir in Texas is allocated for some specific purpose, be it municipal use, recreation, hydroelectric power, agriculture, industrial use, mining and so on. There is always the possibility that some of those unused allocations could be re-directed for municipal use to provide additional supplies for our fast-growing cities.

Despite the fact that conservation measures abound in the Region C Water Plan, there are some who feel that we could do more – and we probably can. Some have suggested that the water plan mandate a "tiered" water rate system to discourage the excessive use of water for landscaping. My community has such a rate program, and I think it's an excellent idea – but our water planning group simply is not empowered to force our cities to institute such a pricing program.

Several of the major water suppliers in our area – particularly the Tarrant Regional Water District, the Trinity River Authority, the North Texas Municipal Water District, Dallas Water Utilities and others – have ongoing programs to improve the reuse of waste water. Lots of new reuse ideas are now coming forward from cities such as Irving, Grapevine and Athens.

Other ideas abound as we begin our work on Phase II of the Region C Water Plan. Possibilities include groundwater management districts to protect underground aquifers, water wellhead management to protect groundwater quality, neighborhood conservation studies and others.

The Region C Water Plan is much more than the Marvin Nichols Reservoir. It's important to understand nevertheless that Marvin Nichols is now, and has been for three decades, an important part of the overall plan to provide adequate water supplies for our sixteen county region. It is simply not realistic for anyone to believe that Marvin Nichols will ever be taken out of the Region C Water Plan.

The Marvin Nichols Reservoir on the Sulphur River may or may not be built, but it would be foolish for those of us charged with assuring long-range water supplies for the Dallas/Fort Worth area to remove it from the list of potential sources of water. To do so would be an abdication of our responsibilities to our region.

Roy J. Eaton is secretary of the Region C Water Planning Group and is publisher of the *Wise County Messenger* in Decatur. He represents Small Businesses on the Water Planning Group.

RCWPG's Quarterly Newsletter Recognized as Award-Winning Public Awareness Publication

Cooksey Communications, one of RCWPG's consultants in charge of public participation and awareness for the planning group, recently won a prestigious award on behalf of the RCWPG.

Cooksey received a Crystal Award of Distinction in the International Communicator Awards 2003 Print Media Competition for the series of public awareness newsletters it produces for the RCWPG to educate and inform interested parties about Region C's water planning activities.

RCWPG Initiates New Procedures at Public Meetings to Enhance Public Input

At the RCWPG's June 23 public meeting, a new procedure aimed at increasing public input on agenda action items will be implemented. The new agenda change will allow the public to comment on action items after they have been presented to the planning group, but before the group votes on them.

Prior to the start of the meeting, speakers will be asked to fill out a card to identify themselves and which agenda item they wish to discuss. They will be given five minutes to speak directly about specific agenda action items.

A general comment period will still be held at the end of the meeting, when speakers will have three minutes to discuss any topic they wish to present to the RCWPG. Anyone wishing to speak on a non-action item will be invited to speak at this time.

Water Conservation Corner

Top 10 tips to help conserve water at home in your kitchen

- *Never run the dishwasher without a full load.*
  This will save water, energy, detergent and money. If your dishes are not very dirty, use the short wash cycle. If you buy a new machine, ask for a water saving model.
- *Don't leave the water running when you aren't using it.*
- *Install faucet aerators.*
  You'll never notice the difference and you'll cut your sink water consumption in half. Also, don't ignore leaky faucets, as they waste lots of water.
- *Keep a container of drinking water in the refrigerator.*
  Running water from the tap until it is cool is wasteful.
- *Dry scrape dishes instead of rinsing.*
  Your dishwasher will take care of the rest.
- *Garbage disposals can waste water unnecessarily.*
  Use them only for really messy food, not food that can easily be dumped in the garbage.
- *Soak pans rather than scrubbing them while the water is running*.
- *Rinse your vegetables in a pan of cold water; it doesn't take gallons of water to get the dirt off.*
- *Steam your vegetables instead of boiling them in a pot of water.*
- *Don't over-water your houseplants.*
  More plants die from over-watering than from being on the dry side. Collect rainwater or recycle water from fish tanks to water your plants.

Source: Texas Water Development Board

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Ellis
Fannin
Freestone
Grayson
Henderson
Jack
Kaufman
Navarro
Parker
Rockwall
Tarrant
Wise

REGION C

Water Planning for North Texas

2003 Third Quarter Newsletter

Participate in Region C Water Planning

Public attendance is welcome at Region C Water Planning Meetings.

Next Meeting:
Monday, October 6, 1:30 p.m.

Meeting Location:
Trinity River Authority
Central Wastewater Treatment Plant
6500 W. Singleton Blvd.
Grand Prairie, TX 75212
(972) 263-2251

For more information, contact:
James (Jim) M. Parks, RCWPG Chair
At:
North Texas Municipal
Water District
P.O. Box 2408
Wylie, TX 75098
Phone: 972.442.5405
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Visit **www.regioncwater.org** for the most up-to-date news, water planning information, water conservation tips and RCWPG meeting information.

Update: RCWPG Adopts Two Proposed Amendments to Regional Water Plan, Awaits Final Approval from TWDB

The RCWPG has adopted two proposed amendments to its 2001 *Region C Water Plan*. The amendments were requested by the Athens Municipal Water Authority (AMWA) and the Greater Texoma Utility Authority (GTUA) and will add new water management strategies not originally included in the region's water plan.

On Monday, June 23, the RCWPG held a special public hearing to discuss the two requests for amendments. After discussion and public comment at the hearing, the planning group voted to adopt the amendment requested by GTUA. The amendment requested by the AMWA was later adopted at the August 23 RCWPG public meeting.

After the planning group voted to adopt the amendments, they were sent to the Texas Water Development Board (TWDB) to be considered for approval and incorporated into the regional water plan. On August 20, the TWDB approved the GTUA amendment. The Athens amendment will be considered for approval by the TWDB at its Sept. 17 board meeting.

The last step for approval of the amendments is final inclusion of the amendments into the State Water Plan. The TWDB must hold a public hearing and consider approval of their inclusion in the State Water Plan. The TWDB is aiming to hold that public hearing sometime in November 2003, at which time the board will also consider final inclusion of an amendment adopted by Region M encompassing Cameron, Hidalgo, Jim Hogg, Maverick, Starr, Webb, Willacy and Zapata counties in Texas.

Richland-Chambers Wetlands Water Reuse Project: A Water Reuse Success Story in Region C

What does a regional water provider do when it faces increasing demand for water supplies and a population boom of one million additional people by 2050? It joins forces with a leading state agency to develop an innovative water reuse project, the likes of which have never been seen before in the United States.

In May of this year, the Tarrant Regional Water District (TRWD), one of Region C's largest water suppliers, in cooperation with the Texas Parks and Wildlife Department, launched the second phase of its Richland-Chambers Wetlands Water Reuse Project, an integrated water supply and wildlife habitat project designed to divert water from the Trinity River to the Richland-Chambers Reservoir in Corsicana via a series of wetlands used to filter contaminants.

The project, originally begun in 1991, was designed to increase the supply of Dallas/Fort Worth drinking water while providing an additional habitat for wildlife. The TRWD decided to try to tap into an available water resource to supplement the water supply from existing reservoirs. Wastewater that has been discharged by the wastewater treatment system in Fort Worth would be withdrawn from the Trinity River and diverted through a series of wetland cells made up of indigenous plants to the Richland-Chambers Reservoir – where it could then be used as a viable water supply for the 10 North Central Texas counties the TRWD serves.

The TRWD projects that the $20 million project will eventually increase water yields from the Richland-Chambers Reservoir by as much as 63,000 acre-feet per year – a 30 percent increase and enough water to serve an additional 300,000 people for one year.

"The wetlands project is one that responds to the increasing needs for water conservation and appreciation for the environment," said George Shannon, Tarrant Regional Water District board president and RCWPG member.

"As a result of this project, fully one-third of our downstream reservoir's yield is expanded, and we have also created a new environmental sanctuary for marine life and water fowl," Shannon continued. "The District is proud to have Texas Parks and Wildlife as a partner in so productive a venture."

Phase one of the project was a "pilot-scale" wetland developed by Alan Plummer Associates, Inc. to test the feasibility of the TRWD's project. After eight years of study and success with the pilot-scale wetland, the District initiated the second phase, or the "field-scale" phase of its water reuse project, with the addition of almost 250 acres of new wetlands that have had water flowing through them since May 2003.

The TRWD is still testing the program during its second phase, which will last more than a year. Right now, recycled water is being returned to the Trinity River. However, during this phase, a pump station will be constructed to lift water into the Richland-Chambers Reservoir. The last phase, or "full-scale" wetlands, will eventually include a comparable wetland system at Cedar Creek Reservoir.

Once all is said and done, there will be approximately 2,000 acres of wetland treatment systems adjacent to each reservoir and an additional water supply for North Central Texas residents. Wildlife in the area will also have a new habitat they can occupy, making the project a success in meeting the needs of humans *and* the environment.

Region C Water Conservation Strategies Already Underway

As the population of Texas continues to grow and demand for water rises, water conservation becomes an increasingly important water management strategy. Since regional water planners began their work more than five years ago, conservation has been a viable strategy considered by the Region C Water Planning Group (RCWPG).

In addition to conservation efforts suggested by the planning group, many cities and towns across North Central Texas have long been implementing water conservation measures on their own. From basic programs including tiered rate structures and plumbing retrofits to more elaborate and highly publicized initiatives such as the Richland-Chambers Wetlands Project and the Dallas Water Utilities Conservation Program, water conservation is becoming a significantly bigger part of local water management strategies.

The following list represents various water conservation measures that are currently in use across North Central Texas:

- Tiered rate structures in many cities
- Water rebate programs for entities that use less water than in the previous year
- Richland-Chambers Wetlands Project
- Leak detection and repair programs
- Meter testing and replacement programs
- Plumbing retrofits
- Enforcement
- Reuse
- Xeriscape gardening demonstrations
- Distribution of Texas Smartscape CDs
- Education and public outreach, including the Waterwise program, presentations to various community organizations about water conservation and the development of publications such as brochures, newsletter articles, bill stuffers and information on city Web sites

For more information about water conservation measures taking place in your community, contact your local city or town government.

Planning Group Member Chosen as Texas' Outstanding Environmentalist for 2003

Congratulations to Region C Water Planning Group member Bob Scott for being chosen as Texas' Outstanding Environmentalist for 2003 by the League of Women Voters of Texas.

A longtime advocate of the environment and conservation, Scott received his award in April 2003 for going above and beyond to protect the environment. In addition to serving on the RCWPG, Scott currently is president of the Tarrant County Coalition for Environmental Awareness. He has also been involved with various other environmental organizations, including the Fort Worth Audubon Society, the Sierra Club and the National Wildlife Federation. Scott received a chemical engineering degree from North Texas State University, now the University of North Texas.

Water Conservation Corner
Tips for repairing and preventing leaks in your home

In the average household, water lost through leakage is equivalent to 9.5 gallons per person. While most of the water lost to leaks is attributed to toilet leaks, faucets are another common contributor to water leak problems.

Most common toilet leaks occur from worn or broken toilet parts, leaking refill valves, broken or improperly adjusted lift chains or poorly sized replacement parts. In order to repair and prevent water leaks in your home, follow these simple steps:

Approximately 25 percent of all toilets leak. Check to see if yours is leaking. Here's how:

- To determine if the toilet is leaking, remove the tank lid after the tank has stopped filling. If there is a leak you will be able to see a leak or hear water running.
- To test for a silent leak, mix a few drops of food coloring or place a dye capsule or tablet into the water in the toilet tank. Wait 10 minutes without flushing the toilet. If the dye appears in the toilet bowl, the toilet has a silent leak.
- Deteriorated toilet parts are the most common cause of toilet leaks. Remember to check each toilet part, replace worn parts with good quality parts and retest to make sure leaks have been fixed.

Leaks can account for 10 percent or more of the water bill, wasting both water and energy if the source is a hot water faucet. Fix leaky faucets immediately:

- Faucet leaks are usually caused by worn washers or "O" rings. Usually these can be replaced using a screwdriver and an adjustable wrench. However, if you have to replace the entire stem assembly, know the faucet brand and take the original part with you to a home improvement center. Universal parts often do not work, so you need to ask for replacement parts specific to your brand.

The water meter can be a good resource for detecting leaks:

- When using the water meter to check for leaks, turn off all faucets and water-using appliances. Read the dial on the water meter and record the reading. After 15 to 20 minutes, recheck the meter. If no water has been used and the reading has changed, a leak is occurring somewhere in the plumbing system.

Source: Texas Water Development Board. Some reference material was adapted from "Handbook of Water Use and Conservation" by Amy Vickers.

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Tarrant
Wise

REGION C
Water Planning for North Texas

2004 First Quarter Newsletter

Participate in Region C Water Planning

Public attendance is welcome at Region C Water Planning Meetings.

Next Meeting:
Thursday, Feb. 12, 1:30 p.m.

Meeting Location:
Trinity River Authority
Central Wastewater Treatment Plant
6500 W. Singleton Blvd.
Grand Prairie, TX 75212
(972) 263-2251

For more information, contact:
James (Jim) M. Parks, RCWPG Chair
At:
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Visit **www.regioncwater.org** for the most up-to-date news, water planning information, water conservation tips and RCWPG meeting information.

RCWPG elects members to represent nine interest groups

Members will serve five-year terms on the planning group

The Region C Water Planning Group (RCWPG) elected nine members at its Dec. 8, 2003 public meeting to serve five-year terms on the 19-member planning group.

Among the members elected, two were newly elected to serve on the board and seven were re-elected to their previously held positions.

Russell Laughlin, senior vice president of Hillwood Properties — developer of Alliance Texas, a 15,000-acre mixed-use, master-planned community — was elected to represent industries on the RCWPG. Laughlin has been instrumental in leading the North Fort Worth and Tarrant County areas in long-term regional planning initiatives. In addition, he serves on the Board of the Fort Worth Chamber of Commerce and the Texas Tech University Rawls College of Business Advisory Council.

The planning group elected **G.K. Maenius** to represent counties on the RCWPG. Maenius is currently the county administrator for Tarrant County. In this position, he is responsible for overseeing community development, county facilities, human resources, transportation services, public health and human services, policy formation, budget and risk management and federal/state grant programs countywide.

The planning group also re-elected seven members of the RCWPG to continue serving on the board:

- **Municipalities – Howard Martin**
- **Public – Irvin (Marsh) Rice**
- **Environmental – Robert Scott**
- **Water Districts – George W. Shannon**
- **Water Utilities – Connie Standridge**
- **River Authorities – Danny Vance**
- **Electric Generating Utilities – Paul Zweiacker**

In addition, the RCWPG selected representatives of the group to serve as liaisons to surrounding regions. The Region B liaison is Jerry Chapman, Region D is Mike Rickman, Region G is Paul Zweiacker, Region H is Danny Vance and Region I is Connie Standridge.

Region C water planners keep all options open

Water – and where our water is going to come from over the next 50 years – are topics that lead to sometimes-heated discussions among Texas residents, water providers, water planners and elected officials.

During the past few weeks, there has been a lot of focus on the proposed Marvin Nichols Reservoir, and whether or not it is a feasible and necessary water supply for North Texas.

The continuing large population increases in Region C make it critical for regional water planners to develop additional water resources to meet growing demands.

The Region C Water Planning Group remains dedicated to its task of planning for the future of water in North Texas. Region C has been charged by the Texas Legislature and the Texas Water Development Board with planning to meet the needs of all North Texans over the next five decades. That means that it is the *duty* of the planning group to research multiple possible water supply options, including Marvin Nichols, so North Texas cities do not run out of water now or in the future.

At this point, the Marvin Nichols Reservoir project remains a proposed water management strategy for Region C, and it is currently the subject of extensive research and evaluation by teams of water planners.

However, it is also important to remember that the Region C Water Plan is much more than just the Marvin Nichols Reservoir. The planning group continues to investigate viable water supply options to meet the needs of North Texas, including water conservation, water reuse, the construction of other reservoirs and the transmission of water from existing reservoirs.

Although teams of analysts and engineers provide invaluable expertise in their evaluation of proposed water management strategies, public input and participation remain critical components of the regional and state water planning process. The availability of water in North Texas affects all residents – those living here now, and those who will live here in the future – and has tremendous implications for our economy and our daily lives.

Since this issue is so vital, members of the public are strongly encouraged to attend Region C's public meetings. Background information and details about Region C and its planning initiatives can be found at www.regioncwater.org. Information about water planning for the entire state can be found on the Texas Water Development Board's Web site at www.twdb.state.tx.us.

RCWPG to discuss process for screening water management strategies at Feb. 12 meeting

At its next meeting, RCWPG consultants will discuss a draft process that will be used to determine which water management strategies are considered and studied by the region's consultants and the planning group. The TWDB requires that all regional water planning groups develop a protocol for deciding which water management strategies to evaluate in detail. Public attendance at the February 12th meeting and comments on RCWPG proposals are welcome.

TWDB approves Region C water needs projections

In November 2003, the Texas Water Development Board (TWDB) approved Region C's water needs projections. The next step in the planning process for Region C is to determine the currently available water supply for the region and begin comparing each water user group's needs with its available supply, to determine where and when water shortages will occur. The planning group is trying to have the currently available water supply figures compiled by late January 2004.

Update: TWDB approves two Region C amendments for inclusion in 2002 State Water Plan

Two amendments adopted by the RCWPG have been approved by the Texas Water Development Board (TWDB) for inclusion in the 2002 State Water Plan. The decision was made at a November 2003 TWDB board meeting.

The Athens amendment increases the city's water demand projections and includes reuse of the City of Athen's wastewater as a recommended water management strategy. The Anna amendment increases the City of Anna population and water demand projections and includes the Greater Texoma Utility Authority's (GTUA's) Grayson-Collin County Surface Water Supply System from Lake Texoma as a recommended water management strategy for Anna.

A look ahead at 2004 regional water planning in Region C

- Currently available water supplies will be finalized
- Surveys will be sent to water user groups to garner preliminary input on water management strategies
- Water shortages and strategies to meet those needs will be analyzed
- Impacts of water management strategies on water quality will be evaluated
- Potential unique stream segments will be studied
- Texas Water Development Board policy topics will be discussed
- Water conservation and drought management recommendations will be evaluated
- Surveys will be sent to water user groups regarding financing for recommended projects to develop an Infrastructure Financing Report

RCWPG's Parks, Oliver selected to be members of new water conservation implementation task force

In September 2003, RCWPG Chair James (Jim) Parks and Jim Oliver- RCWPG designated alternate for member George Shannon – were chosen to serve on a special water conservation implementation task force led by the Texas Water Development Board (TWDB).

The TWDB, as mandated by Senate Bill 1094, has created this new 32-person task force to evaluate matters regarding water conservation. As water conservation becomes an increasingly important water management strategy, the task force will be charged with reviewing, evaluating and recommending optimum levels of water use efficiency and conservation for the state by:

- identifying, evaluating and selecting best management practices for municipal, industrial and agricultural water uses and evaluating the costs and benefits for those practices;
- evaluating the implementation of water conservation strategies recommended in regional and state water plans;
- considering the need to establish and maintain a statewide public awareness program for water conservation;
- evaluating the proper role, if any, for state funding of incentive programs that may facilitate the implementation of best management practices and water conservation strategies;
- advising the TWDB and the Texas Commission on Environmental Quality (TCEQ) on a standardized methodology for reporting and using per capita water use data, establishing per capita water use targets and goals, accounting for such local effects as climate and demographics and other possible uses as appropriate; and
- evaluating the appropriate state oversight and support of any conservation initiatives adopted by the Legislature.

Senate Bill 1094, which took effect in September 2003, requires that the task force develop a best management practices guide for use by regional water planning groups and political subdivisions responsible for water delivery service by no later than Nov. 1, 2004. For more information, visit the TWDB's Web site at www.twdb.state.texas.us.

RCWPG to survey water user groups to garner preliminary input on water management strategies

In mid to late February, the RCWPG will send out surveys to all water user groups in Region C, soliciting input on the planning group's initial strategies for meeting water needs in each city.

Each water user group will receive a customized survey that provides details on that city's population projections, water needs projections, currently available supply, as well as initial thoughts on water management strategies being considered for the city by the consultants.

In addition, water user groups will have the chance to provide vital feedback to the planning group about their future plans, so the planning group can make recommendations to the state that accurately reflect the needs and goals of each city.

The surveys will be the planning group's first real look at water management strategies for each water user group.

For more information, contact Region C consultant Tom Gooch with Freese & Nichols at 817-735-7314.

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Howard Martin
Dale Fisseler
Paul Phillips

Public
Irvin M. Rice
Mary E. Vogelson

River Authorities
Danny Vance

Small Business
Roy J. Eaton

Water Districts
Jerry W. Chapman
James (Jim) M. Parks
George Shannon

Water Utilities
Jim McCarter
Connie Standridge

Collin
Cooke
Dallas
Denton
Ellis
Fannin
Freestone
Grayson
Henderson
Jack
Kaufman
Navarro
Parker
Rockwall
Tarrant
Wise

REGION C

Water Planning for North Texas

2004 Fall Newsletter

Participate in Region C Water Planning

Public attendance is welcome at Region C Water Planning Meetings.

Next Meeting:
Monday, Dec. 6, 2004, 1:00 p.m.

Meeting Location:
Trinity River Authority
Central Wastewater Treatment Plant
6500 W. Singleton Blvd.
Grand Prairie, TX 75212
(972) 263-2251

For more information, contact:
James (Jim) M. Parks, RCWPG Chair
c/o:
North Texas Municipal
Water District
P.O. Box 2408
Wylie, TX 75098
Phone: 972.442.5405
E-mail: jparks@ntmwd.com

To be added to the mailing list to receive the quarterly RCWPG newsletter, send your name and mailing address to Amy Fuhrer at Cooksey Communications via e-mail at Amy@cookseypr.com or via fax at 972.580.0852.

Visit **www.regioncwater.org** for the most up-to-date news, water planning information, water conservation tips and RCWPG meeting information.

Region C Begins Evaluation of Water Management Strategies for Revised Regional Plan

The Region C Water Planning Group is now entering the heart of the second round of the water planning process for North Texas. Over the next year, the planning group will review, revise and refine the currently approved 2001 Regional Water Plan to respond to changed conditions that may impact projected water demands and available water supplies for the area. To ensure the region's future water needs are met, the group is studying various water management strategies, such as:

- Conservation
- Reuse
- Connection of existing supplies
- New supply development
  - Surface water resources
  - Groundwater resources
- Interbasin transfers
- Desalination
- Development of regional systems
- Miscellaneous strategies

Water Conservation
Water conservation continues to remain a necessary and important water management strategy in Region C. Water conservation strategies adopted by the planning group in the 2001 Region C Water Plan include taking active measures to achieve a 15 percent water conservation savings in municipal demand, expanding public education programs and encouraging state funding for research on the effectiveness of water conservation programs and funding for support of education programs. Since the completion of the 2001 plan, major water suppliers in Region C have strengthened their water conservation programs and adopted new water conservation plans. Currently, the Region C Water Planning Group is reviewing potential water conservation strategies for the 2006 Regional Water Plan.

Reuse
Reuse is becoming an increasingly important source of water in Region C and across Texas. Water reuse is an effective water conservation measure and provides a reliable source that remains available even during droughts. The Region C Water Planning Group has determined that our available water supply could be significantly expanded with the development of water reuse projects such as commercial and residential landscape irrigation; agricultural irrigation; industrial and power generation reuse for cooling, boiler feed, process water and heavy construction; and recreational and environmental uses such as lakes, ponds, wetlands and stream flow augmentation. Region C suppliers (including Dallas Water Utilities, North Texas Municipal Water District, Tarrant Regional Water District, Trinity River Authority, Irving and Upper Trinity Regional Water District) are also pursuing indirect reuse projects, where treated return flows are used to supplement water from other sources and made part of the region's supplies.

Connection of Existing Supplies
Connection of existing water supplies is another major part of the 2001 Region C Water Plan and will continue to be critical for the 2006 revised plan. There are several sources of

water supply that are committed for use in Region C and that will be connected and used between now and 2050. Specific projects include:

- Lake Chapman Supply to Lake Lewisville (completed in 2003)
- Pump station expansion for Tarrant Regional Water District (planned for 2005)
- Lake Fork Connection for Dallas Water Utilities (planned for 2007)
- West Fork Connection for Tarrant Regional Water District (planned for 2008)
- Lake Palestine Connection for Dallas Water Utilities
- Additional Lake Texoma Water for North Texas Municipal Water District

In the 2006 update, the connection of other existing supplies like Toledo Bend Lake and Lake Wright Patman in East Texas is also being considered.

New Supply Development
New supplies that might be developed for Region C include new reservoir sites and currently undeveloped groundwater supplies. Over the years, many new reservoir sites have been considered as sources of potential water supply for Region C. Even with conservation efforts, reuse projects and the connection of existing supplies, new supplies will still be necessary to meet growing demands in Region C. Marvin Nichols I Reservoir, Lower Bois d'Arc Creek Lake and Ralph Hall Reservoir are examples of the new water supplies in the 2001 Region C Water Plan and currently under consideration for the 2006 update.

Interbasin Transfers
Another strategy under consideration is interbasin transfers. An interbasin transfer occurs when surface water from one river basin is moved to another river basin to supplement water supplies. In the 2001 Region C Water Plan, water from Lake Texoma, Moss Lake, Lake Chapman, Lake Tawakoni, Lake Fork and Athens Lake would be diverted from one basin to another to supply part of the demand for Region C. Currently, Dallas Water Utilities is also constructing facilities to deliver water from Lake Fork and planning to use Lake Palestine with plans to connect the two before 2020. Since most water supplies in the Upper Trinity Basin are already developed, the connection of existing supplies and the development of new supplies for Region C will generally require interbasin transfers.

Desalination
Desalination is the process of removing dissolved salts from water. The water must be desalinated or blended with high quality water in order to meet drinking water standards. Region C could potentially utilize additional supplies from Lake Texoma and the Red River, but absent extensive treatment, and/or blending, the salinity of these water sources is too high for municipal use.

Development of Regional Systems
Regional systems of pipelines and pump stations are designed to bring regional treated water to a number of entities needing additional water supplies. Regional system initiatives noted in the 2001 Region C Water Plan and under consideration for 2006 include Ellis County Water Supply Project, Cooke County Water Supply Project, Fannin County Water Supply Project, Grayson County Water Supply Project, Wise County Regional System, Parker County Regional System and the continued development of the North Texas MWD system and the Upper Trinity RWD system.

Miscellaneous Strategies
The 2001 Region C Water Plan also includes system operation of existing reservoirs. These and other proposed, new sources of water supply are being investigated for the 2006 Regional Water Plan.

For more information on the water management strategies included in the 2001 Plan or under consideration for 2006, please visit www.regioncwater.org.

Water Conservation Implementation Task Force Makes Final Edits to New Conservation Plan

It's quite possible that Texas could one day find itself unable to provide enough water to meet the demands of its residents. Many state and local officials and lawmakers have worked hard to keep this from happening. One of the most critical efforts revolves around water conservation.

The Texas Water Development Board, as mandated by Senate Bill 1094, created an important group – the Water Conservation Implementation Task Force. This 32-person Task Force was charged with reviewing, evaluating and recommending optimum levels of water use efficiency and conservation for the state. The group also looked at ways to boost those efforts.

The members of the Task Force included community officials who deal with water issues, such as engineers, environmentalists, as well as representatives of industries, municipalities and regional water planning groups.

For the past year, members have reviewed, evaluated and prepared recommendations for the state. During a three-week period in August, the Task Force took public comments on a draft conservation report and the BMP Guide. The BMP Guide is a best-management practices guide for use by planning groups and political subdivisions responsible for water-delivery service.

As of September 27, the Task Force finalized the edits to the plan and received the final approvals for presentation to the Texas Legislature.

Task Force members prepared a final report and will deliver it to Gov. Rick Perry and the Texas Legislature by Nov. 1. The draft report points out the damaging effect of predictions that the state could fall 7.5 million acre/feet short of supplying enough water in 2050 if ongoing drought conditions exist.

The report also includes recommendations to facilitate and encourage the implementation of appropriate water conservation measures by municipalities, industry and agricultural interests. One key suggestion is the creation of a statewide public awareness program for water conservation that would be comparable to the highly successful Don't Mess with Texas highway anti-litter campaign.

"The Task Force is made up of such a diverse group of interests that I'm proud to say we've been able to work together in a very positive way throughout the whole development process," said Jim Parks, member of the Water Conservation Implementation Task Force and chairman of the RCWPG. "By working together, we've been able to develop conservation guidance documents that can help protect our very valuable water resources in Texas for future generations."

RCWPG Neighborhood Water Conservation Study Reveals Effects of Water Conservation and Water Usage

As part of the 2006 Region C Water Plan, the Region C Water Planning Group must evaluate the effectiveness and potential water savings associated with different water conservation methods. There has been a general study done on the effects of water conservation and water usage, but prior to now, there has been little evaluation of how water conservation impacts Region C.

As part of the consultant team for the Region C Water Planning Group, Alan Plummer Associates, Inc. (APAI) recently conducted a neighborhood-scale study of residential water conservation and water usage within the Dallas/Fort Worth area. This study will help the Region C Water Planning Group determine how much water families actually use and how much they conserve.

In the neighborhood study, there were two water conservation methods that were researched: low-flow plumbing fixtures and customer water audits.

APAI selected eight neighborhoods in Arlington, Fort Worth, Dallas, and Plano for evaluation of water usage and the impact of low-flow plumbing fixtures. The neighborhoods for the study were selected based on the availability of seasonal water use data, existing water conservation measures in each area, the age of the neighborhood and socioeconomic conditions. These neighborhoods were also selected to reflect a broad range of family income and housing age.

The results of the water conservation and water usage neighborhood study indicate that indoor water usage increases with the growing rate of family income and lot size. The data also shows that indoor water usage is greater in older neighborhoods, which have older plumbing fixtures, than in newer neighborhoods. For a given home in the selected neighborhoods, a low-flow plumbing fixture is projected to save about 21 to 23 percent on indoor water use compared to older fixtures.

Home Conservation Tips

Water Use	Water Amounts (No Conservation)	Conservation Methods	Water Amounts (With Conservation)
Shower/bath	5 gallons/minute	Install low flow shower head; wet & soap, rinse off; reduce shower time	2.5 gallons/minute
Flushing toilet	5 gallons/flush	Use tank displacement; do not use toilet to flush household trash; replace with low flow toilet	1.6 gallons/flush
Brushing teeth	2 gallons (water running)	Use glass to wet, brush and rinse	1/8 gallon
Washing hands	1/2 gallon (water running)	Wet hands, turn off water, lather, rinse; replace with low flow faucet	1/4 gallon
Washing clothes	40 gallons/load (top water level)	Use minimum water level; use shortest necessary wash cycle; wash with full loads	25 gallons
Hand Washing dishes	7-14 gallons	Wash, rinse in tub	5 gallons
Dishwasher	7-14 gallons/load (full cycle)	Use short cycle	7 gallons

Key dates in the water planning process –

June 1, 2005 – Initially Prepared Plans due to TWDB

June & July 2005 – Planned public meeting/hearings

January 5, 2006 – Planning group-adopted Regional Water Plans due to TWDB

January 5, 2007 – TWDB-approved State Water Plan due to the Legislature

REGION C
Water Planning
for North Texas
5525 N MacArthur Blvd.
Suite 530
Irving, TX 75038

Region C Water Planning Group Members

For more information about Region C Water Planning, contact:

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North Texas Municipal Water District
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Wylie, TX 75098
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E-mail: jparks@ntmwd.com

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James (Jim) M. Parks

Vice Chair
Robert Johnson

Secretary
Paul Zweiacker

Agricultural
Brad Barnes

Counties
G.K. Maenius

Electric Generating Utilities
Paul Zweiacker

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Industries
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Dale Fisseler
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Irvin M. Rice
Mary E. Vogelson

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Small Business
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Water Districts
Jerry W. Chapman
Jim Oliver, alternate
James (Jim) M. Parks

Water Utilities
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Kaufman
Navarro
Parker
Rockwall
Tarrant
Wise

REGION C
Water Planning for North Texas

Winter 2005/2006 Newsletter

Region C Water Planning Group Elects New Officers

On December 5, 2005, the RCWPG elected a new slate of officers to lead the Planning Group. The following officers were all re-elected: James (Jim) M. Parks, RCWPG Chair; Robert Johnson, RCWPG Vice Chair; and Paul Zweiacker, RCWPG Secretary. Please see the back panel of the newsletter for a full list of current Planning Group members.

Next Meeting:

No meetings currently scheduled.

Region C Approves Updated 2006 Water Plan

The Region C Water Planning Group (RCWPG), the group preparing an updated water plan for North Central Texas, approved its Regional Water Plan at a public meeting on December 5, 2005 and recently submitted the updated plan to the Texas Water Development Board (TWDB). This issue of the RCWPG newsletter provides a synopsis of the updated Region C Water Plan, which will be reviewed by the TWDB in 2006 and consolidated with other Regional Water Plans into the State Water Plan, for submission to the Texas Legislature by January 5, 2007.

Findings in the Updated Region C Water Plan:

Water planning in Texas is critical to prepare for the contingencies of the future:

- Texas is prone to severe droughts (as witnessed in the 1950's)
- The population of Region C will more than double over the next 50 years, from 5.2 million in 2000 census to projected 13.1 million in 2060
- As a result, water demands will grow tremendously, from just under 1.4 million acre-feet/year today to 3.3 million acre-feet/year in 2060
- Currently available supplies will decline slightly over time due to sedimentation in reservoirs, with available supplies reaching 1.4 million acre-feet/year by 2060
- So, Region C faces a shortage of 1.9 million acre-feet/year by 2060 if new supplies are not developed *(See Fig. 1)*
- If a severe drought occurred during the next 50 years, the socioeconomic impacts to Region C would be significant:
  - Projected 2060 population would be reduced by just over one million (a seven percent reduction)
  - Projected 2060 employment would be reduced by nearly 700,000 jobs (a 17 percent reduction)
  - Projected 2060 income to the region would be reduced by $58.8 billion (a 21 percent reduction)
  - In addition, constraints on growth from the limited water supplies would result in a $160 billion loss of income and taxes.

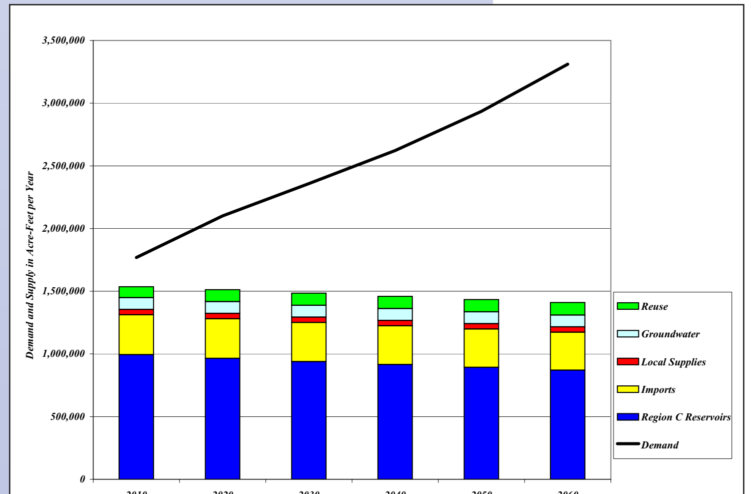


Fig. 1 *The Gap Between Supply and Demand*

What Are the Recommended Water Management Strategies in Region C's Plan?

To meet projected, future shortfalls, Region C's updated Regional Water Plan includes recommendations for a variety of water management strategies to be implemented between now and 2060 *(see Fig. 2)*.

Of the supplies available by 2060 under the plan:

- Approximately one-third would come from currently available, connected supplies (both surface water and groundwater)
- One-quarter would come from conservation and reuse strategies

- One-quarter would come from the connection of existing water sources
- Slightly less than one-fifth would come from new reservoirs
  - New reservoirs in the plan are Marvin Nichols Reservoir, Lower Bois d'Arc Creek Reservoir, Lake Fastrill, Lake Ralph Hall and Muenster Lake
  - By comparison, more than 25 new reservoirs were built in Region C to supply water over the last 55 years
- Additional water management strategies called for in the plan include development of regional systems, system operation of reservoirs and use of groundwater

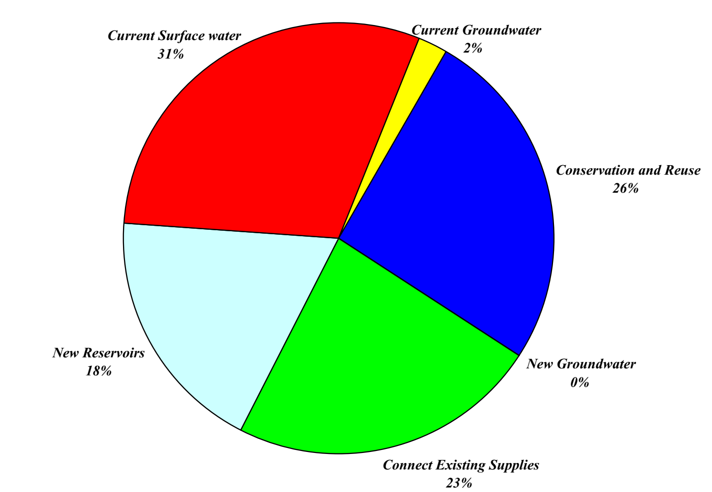


Fig. 2 *Sources of Water Available to Region C as of 2060*

The major water management strategies included in the updated plan (with type of strategy noted in parentheses) and amount to be supplied from each are:

- **Marvin Nichols Reservoir** (new reservoir): 489,840 acre-feet/year
- **Toledo Bend Reservoir** (connecting existing supply): 400,000 acre-feet/year
- **Tarrant Regional Water District 3rd Pipeline & Reuse Project** (reuse): 188,765 acre-feet/year
- **Lower Bois d'Arc Creek Reservoir** (new reservoir): 123,000 acre-feet/year
- **Lake Fork Reservoir** (connecting existing supply): 120,000 acre-feet/year
- **Oklahoma Water** (connecting existing supply): 115,000 acre-feet/year
- **Lake Palestine** (connecting existing supply): 111,460 acre-feet/year
- **New Lake Texoma blending** (connecting existing supply): 113,000 acre-feet/year
- **Lake Fastrill** (new reservoir): 112,100 acre-feet/year
- **Wright Patman Lake**, converting flood storage to conservation storage (connecting existing supply): 112,100 acre-feet/year
- **East Fork Reuse Project** (reuse): 102,000 acre-feet/year
- **Return Flows Above Dallas Water Utilities Lakes** (reuse): 79,605 acre-feet/year
- **Southside/Lake Ray Hubbard Reuse Project** (reuse): 67,253 acre-feet/year
- **Lake Lewisville Reuse** (reuse): 67,253 acre-feet/year
- **Lake Ralph Hall and Reuse** (new reservoir and reuse): 50,740 acre-feet/year
- Various other strategies each supplying less than 50,000 acre-feet/year

In total, the Region C plan includes water management strategies to develop 2.7 million acre-feet per year of new supplies, for a total available supply of 4.05 million acre-feet per year by 2060. The supply is about 20 percent greater than the projected demand, leaving a reasonable reserve to provide for difficulties developing strategies in a timely manner, droughts worse than the drought of record and greater-than-expected growth *(see Fig. 3)*.

The total cost of implementing all the water management strategies in the plan would be approximately $14 billion.

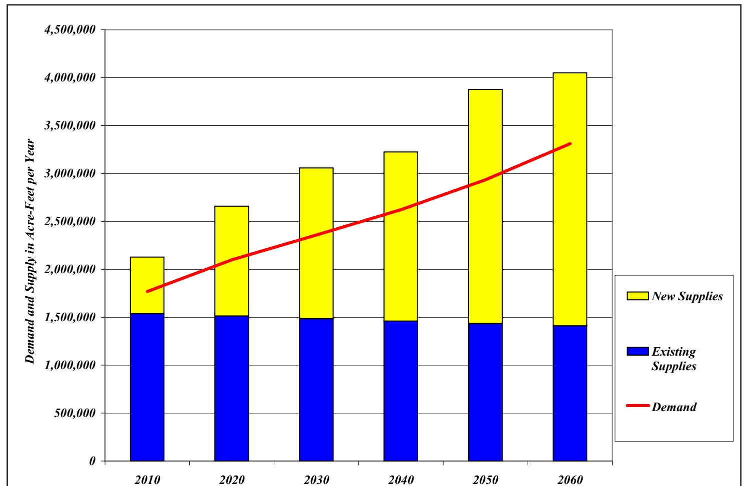


Fig. 3 *Supply & Demand for Region C With Development of New Supplies*

How Important Are Conservation and Reuse in the Region C Plan?

Region C's 2001 Regional Water Plan included more reuse than all other regions in Texas combined. During the second round of planning, Region C incorporated even more conservation and reuse strategies into its planning.

- Based on the recent work of a statewide Water Conservation Implementation Task Force, Region C considered 23 municipal water conservation strategies identified as "best management practices" and selected 16 as potentially feasible

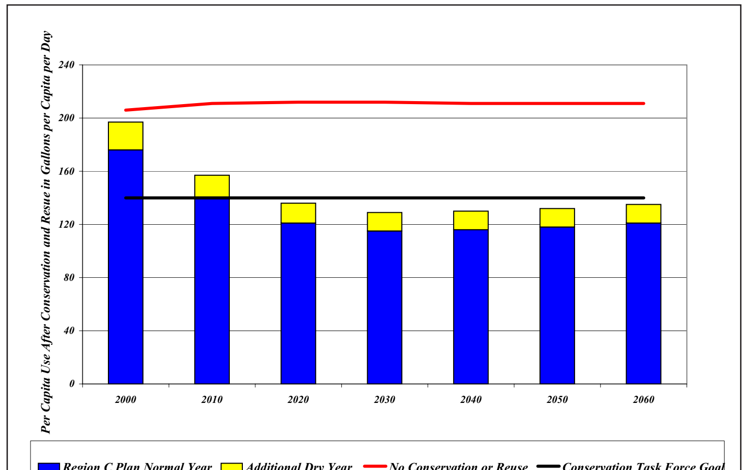
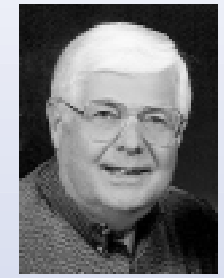


Fig. 4 *Projected Per Capita Municipal Use in Region C with Full Implementation of Planned Conservation & Reuse*

- The Water Conservation Implementation Task Force called for a statewide goal of reducing municipal per capita use below 140 gallons per capita per day after credit for reuse. The conservation and reuse strategies called for in the updated Region C plan would reduce the average per capita municipal water demand in Region C from 197 gallons per capita per day in 2000, to less than 140 gallons per capita per day by 2020 (meeting the statewide task force's recommended goal) *(See Fig. 4)*.



Remembering a Dedicated Water Planner

It is with great sadness that the Region C Water Planning Group notes the recent passing of George W. Shannon, a member of the RCWPG and a long-time public servant. For 21 years, Shannon served as a board member of the Tarrant Regional Water District, including 15 years as its president. During both five-year rounds of regional water planning, he was a valued member of the RCWPG, representing the interests of water districts passionately and ably.

During his years of community service, Shannon worked tirelessly to ensure that North Central Texas residents and businesses would have a safe, plentiful water supply for many decades to come. Shannon helped oversee the completion of several high-profile TRWD projects, including the construction of the Richland-Chambers Reservoir, Benbrook Pipeline Connection and the Richland-Chambers Water Reuse Project. He also guided the development of the Trinity River Vision Plan, and he worked largely without public recognition for these many efforts. Shannon was a cherished friend to many members of the RCWPG, the TRWD board and other community leaders, as well as a devoted husband, brother, father and grandfather to his family.

We salute George Shannon for his selfless service to the community, and we will miss his presence on the Planning Group, though his legacy lives on in the Region C Water Plan and countless other public projects throughout the region.

- Over 25 percent of Region C's water supply in 2060 would come from conservation and reuse
- Region C's updated plan recommends two different packages of conservation and reuse – a "basic" package and an "expanded" package
- The "basic" package recommended for all municipal water user groups in Region C includes:
  - Low-flow plumbing fixture rules
  - Public and school education on conservation
  - Water use reduction through higher water prices
  - Water system audit, leak detection and repair, and pressure control
  - Federal residential clothes washer standards
- The "expanded" package recommended for 107 of the 271 municipal water user groups in Region C includes the "basic" package plus one or more of the following:
  - Water conservation pricing structure
  - Water waste prohibition
  - Residential customer water audit
  - Coin-operated clothes washer rebate
  - Industrial, commercial and institutional (ICI) general rebate
  - ICI water waste audit, water waste reduction, and site-specific conservation program
  - Reuse of treated wastewater effluent
- Recommended non-municipal water management strategies include manufacturing general rebates and golf course conservation programs

What Feasible Strategies Are Not Included as Recommendations, and Why Not?

A number of potentially feasible strategies were considered during Region C's water planning efforts but not included as recommended strategies in the plan, for a variety of reasons. Among the most significant of these were the following:

- **Gulf of Mexico With Desalination**: Although the Gulf of Mexico offers a potentially limitless supply of water, the cost of desalinating this water and transporting it all the way to Region C makes this a very expensive option compared to the other strategies under consideration.
- **Sam Rayburn Reservoir/Lake B.A. Steinhagen**: These two, existing reservoirs in East Texas could supply 200,000 acre-feet/year to Region C, but the 200-mile distance from the Metroplex and high cost of transporting water over long distances makes this a relatively expensive option compared to other strategies. In the updated plan, this is an alternative strategy for both Dallas Water Utilities and the Tarrant Regional Water District.
- **Lake Livingston**: This existing reservoir about 180 miles from the Metroplex could supply 200,000 acre-feet/year of water to Region C, but the cost of transporting water over long distances makes this a relatively expensive option. This is an alternative strategy in the updated plan for Dallas Water Utilities, the Tarrant Regional Water District and the North Texas Municipal Water District.
- **Ogallala Groundwater** (Roberts County): Mesa Water, Inc. proposed selling groundwater from the Ogallala Aquifer in the Panhandle and transporting it to Region C, offering up to 200,000 acre-feet/year of water to the region. At 250 miles from the Metroplex, this is a relatively expensive source of supply. In the updated plan, this is an alternative strategy for Dallas Water Utilities and the North Texas Municipal Water District.
- For a discussion of other potentially feasible water management strategies evaluated by the Region C Water Planning Group, see Chapter Four of Region C's Plan on the Region C website, www.regioncwater.org

More information about water planning in Region C and Texas can be found at the following websites:

- www.regioncwater.org (Region C Water Planning Group)
- www.twdb.tx.state.us (Texas Water Development Board)

The updated Region C plan is available to the public at www.regioncwater.org, where instructions for purchasing a copy of the plan can be found. The plan can also be viewed in the county clerk's office for each of the region's 16 counties, as well as at the following public libraries: Schimelpfenig Library, Plano; Cooke County Library, Gainesville; Dallas Public Central Library, Dallas; Lewisville Public Library, Lewisville; Nicholas P. Sims Library, Waxahachie; Bonham Public Library, Bonham; Fairfield Library Association, Fairfield; Sherman Public Library, Sherman; Denison Public Library, Denison; Henderson County Library, Athens; G. J. Ritchie Public Library, Jacksboro; Kaufman County Library, Kaufman; Corsicana Public Library, Corsicana; Weatherford Public Library, Weatherford; Rockwall County Library, Rockwall; Fort Worth Central Library, Fort Worth; and the Decatur Public Library, Decatur.

APPENDIX AA

COMMENTS ON THE INITIALLY PREPARED PLAN

Comments Received on the *Initially Prepared 2006 Region C Water Plan*

Letters/Emails Received by the Region C Water Planning Group

Count	Name	Representing
1	Tom Baker	self
2	Alan Walne	Greater Dallas Chamber
3	Albert Black	Greater Dallas Chamber
4	Charles Gummer	Comerica Bank
5	Pedro Aguirre	Aguirre Corporation
6	Thomas Leppert	The Turner Corporation
7	John Kessel	City of McKinney
8	Pat Boyle	Schepps
9	Craig Roberts	Oak Farms
10	H. Ralph Hawkins	HKS
11	Frank Roby	Holmes Murphy
12	Robert Murchison	Murchison Capital Partners, L.P.
13	Kathleen Mason	Tuesday morning
14	Louis J. Grabowsky	Grant Thornton
15	Joel Allison	Greater Dallas Chamber
16	Stephen Massey	City of Allen
17	Ronda Visintainer	Fort Worth Branch American Society of Civil Engineers
18	Brandt Mannchen	Big Thicket Committee of the Lone Star Chapter of the Sierra Club
19	Albert W. Holmes	Friends of the Texas State Railroad
20	Johnny D. Harris	Lake Cities MUA
21	Karen Walz	Greater Dallas Planning Council
22	Molly Rooke	Sierra Club
23	Kent Rylander	self
24	Mack Turner	self
25	Jose Novoa	Halff Associates
26	mln1229@earthlink.com	self
27	Joe L. Buford	self
28	Marilyn Smith	asked by Sierra Club & League of Women Voters to submit comments
29	Ann Rushing	City of Clarksville
30	Bruce Wilke	self
31	John W. Burnett	City of Bonham
32	Roy Floyd	Floyd Enterprises
33	Ernest Farrow	self
34	Randall Davis	Argyle WSC
35	Ann Rushing	City of Clarksville
36	Martha L. Mason	City of Argyle Representative on the Upper Trinity Regional Water District Board
37	Kimberly Westmoreland	self
38	Jody Smith & city council	City of Flower Mound
39	Jim D. Bush	self
40	Nan Moss	self
41	A.G. Swan	Parker County UD No.1
42	Lori Periche & George Misium	self
43	Wendy Ledbetter	The Nature Conservancy
44	Renee Solinger Audette	self
45	Thomas E. Taylor	Upper Trinity Regional Water District
46	Martha and Charles C. Davis	self
47	Kirk Miller	self
48	Sandra Minatra	self
49	Virginia Blevins	City of Justin

Count	Name	Representing
50	Bruce Walker	Golden Triangle Group Sierra Club
51	Leon Hurse	City of Ladonia
52	Jack Smith	City of Sanger
53	M. Lynn Chapman	self
54	Vicki Baggett	self
55	Kevin Mercer	Denton Co FWSD 7 (Lantana)
56	Bessie Neal Heath	self
57	Ferrin H. Holcomb, D.D.S.	self
58	Frank Crumb	City of Fort Worth
59	Campbell B. Read	TCNR
60	Julie L. Gaylord	self
61	Byron Gaines	Mustang SUD
62	Thomas E. Taylor	Upper Trinity Regional Water District
63	Myron Hess, Mary Kelly, Ken Kramer	NWF, ED, Sierra Club
64	Robert Johnson	City of Dallas
65	James E. Smith	self
66	Red Birdsong	self
67	Barry Blackmon	Friends United for a Safe Environment
68	Grayson Garner	self
69	Llyod P. Jones	self
70	Mary Gail Gilbreath Vincent	self
71	Steve Snyder	self
72	Sierra Club and others	Sierra Club and others
73	Janice Bezanson	Texas Committee on Natural Resources
74	Beth Johnson	TCNR & Sierra Club
75	Ty Abston	Guaranty Bond Bank
76	Kerry Wootten	Mount Pleasant Industrial Foundation
77	Adrian F. Van Dellen	self
78	LauJrv@aol.com	self
79	Ann Rushing	supporters of Marvin Nichols
80	Blaine Hinds	City of Bonham
81	Bill Yoss	City of Leonard
82	Sherry Lundberg	self
83	Anne Olden	self
84	Rita Beving	Sierra Club

(1)

Tom Baker
3517 Southwestern
Dallas, Texas 75225

June 22, 2005

Mr. James M. Parks
Chairman
Region C Water Planning Group
c/o North Texas Municipal Water District
P.O. Box 2408
Wylie, Texas 75098-2408

Dear Mr. Parks:

I would like to express my appreciation for the opportunity to present comments on the Region C Water Planning Group's Initially Prepared 2006 Region C Water Plan. Also, I want to express my appreciation for the work done by the Planning Group, under your leadership, for identifying potential water management strategies to meet the regional water needs for the next 60 years. I support the plan.

I understand considering all the desires and interests of the region, is a very difficult task. It is apparent the Planning Group's process for selecting the identified strategies was composed of four (4) major steps: (1) population projections through 2060, (2) water use projections through 2060, (3) identification of existing supplies and (4) identification of potential water management strategies to meet the demand (i.e., close the gap). I not only agree with the aforementioned four step process, but I also agree with the Planning Group's process of considering first conservation, reuse, and expanding/connecting existing supplies to close the gap, before considering development of new supplies.

I know everyone will not agree with each individual water management strategy. However, I believe the Planning Group has done an excellent job in identifying potential strategies that are economically feasible for possible implementation in the future. Not all of the strategies will be implemented, but the plan meets the major objective of providing each water supplier with possible strategies to meet the future water demands in the region.

Again, I appreciate the opportunity to submit comments. I appreciate the work of the Planning Group under your leadership, and I support the plan.

Sincerely,

Tom Baker

Tom Baker

(2)

GREATER DALLAS CHAMBER

June 22, 2005

Mr. Jim Parks
Chairman
Region C Water Planning Group
c/o North Texas Municipal Water District
P.O. Box 2408
Wylie, Texas 75098

Dear Mr. Parks:

As you know, the Greater Dallas Chamber strongly supports keeping all options on the table when planning for North Texas' future water supply. We continue to encourage the Region C Water Planning Group to keep all options available.

The Greater Dallas Chamber has reviewed the Initially Prepared 2006 Region C Water Plan (IPP). We would like to reiterate our support for planning for the region's long-term water supply through the following measures included in the IPP by Region C:

- **Conservation:** The Chamber supports the Goals and Plan Elements as presented in the five-year strategic plan.
- **Recycling:** The Chamber supports the concept of direct and indirect water reuse.
- **Connection of existing supplies:** The Chamber supports the recommendation to evaluate the connection of existing supplies based on cost, water quality and long-term availability in order to maximize the usage of available reservoirs.
- **Acquisition and connection of other existing and proposed sources:** The Chamber realizes that many additional sources have been investigated and listed in the plans as alternatives. We support further study of the feasibility of all of those sources, including new reservoirs.

The Greater Dallas Chamber thanks the Region C Group for its leadership in planning for adequate water supplies for our region. Please do not hesitate to call upon us if we can be of any assistance to you.

Sincerely,

Alan Walne
Co-Chair, Water Leadership Committee

3

GREATER DALLAS CHAMBER®

June 22, 2005

Mr. Jim Parks
Chairman
Region C Water Planning Group
c/o North Texas Municipal Water District
P.O. Box 2408
Wylie, Texas 75098

Dear Mr. Parks:

As you know, the Greater Dallas Chamber strongly supports keeping all options on the table when planning for North Texas' future water supply. We continue to encourage the Region C Water Planning Group to keep all options available.

The Greater Dallas Chamber has reviewed the Initially Prepared 2006 Region C Water Plan (IPP). We would like to reiterate our support for planning for the region's long-term water supply through the following measures included in the IPP by Region C:

- **Conservation:** The Chamber supports the Goals and Plan Elements as presented in the five-year strategic plan.
- **Recycling:** The Chamber supports the concept of direct and indirect water reuse.
- **Connection of existing supplies:** The Chamber supports the recommendation to evaluate the connection of existing supplies based on cost, water quality and long-term availability in order to maximize the usage of available reservoirs.
- **Acquisition and connection of other existing and proposed sources:** The Chamber realizes that many additional sources have been investigated and listed in the plans as alternatives. We support further study of the feasibility of all of those sources, including new reservoirs.

The Greater Dallas Chamber thanks the Region C Group for its leadership in planning for adequate water supplies for our region. Please do not hesitate to call upon us if we can be of any assistance to you.

Sincerely,

Albert Black
Co-Chair, Water Leadership Committee

President & CEO
On-Target Supplies & Logistics

(4)

Comerica Bank

MC 6507
P. O. Box 650282
Dallas, TX 75265-0282

Charles L. Gummer
President and Chief Executive Officer-
Texas Division

June 22, 2005

Mr. Jim Parks
Chairman
Region C Water Planning Group
c/o North Texas Municipal Water District
P.O. Box 2408
Wylie, Texas 75098

Dear Mr. Parks:

We strongly encourage the Region C Water Planning Group to keep all options available when planning for North Texas' future water supply.

We have reviewed the Initially Prepared 2006 Region C Water Plan (IPP). We continue to support planning for the region's long-term water supply through the following measures included in the IPP by Region C:

- **Conservation:** We support the Goals and Plan Elements as presented in the five-year strategic plan.
- **Recycling:** We support the concept of direct and indirect water reuse.
- **Connection of existing supplies:** We support the recommendation to evaluate the connection of existing supplies based on cost, water quality and long-term availability in order to maximize the usage of available reservoirs.
- **Acquisition and connection of other existing and proposed sources:** We realize that many additional sources have been investigated and listed in the plans as alternatives. We support further study of the feasibility of all of those sources, including new reservoirs.

We thank the Region C Board for its leadership in planning for the future of our region's water supply. Please do not hesitate to call upon us if we can be of any assistance to you.

Sincerely,

Charles L. Gummer

(5)

AGUIRRE CORPORATION
12700 PARK CENTRAL DR FLOOR 15
DALLAS TEXAS 75251
FAX 972 788 1583
PHONE 972 788 1508

AGUIRRE

THE CAN-DO SPIRIT THAT GETS THE JOB DONE

June 22, 2005

Mr. Jim Parks
Chairman
Region C Water Planning Group
c/o North Texas Municipal Water District
P.O. Box 2408
Wylie, Texas 75098

Dear Mr Parks:

We strongly encourage the Region C Water Planning Group to keep all options available when planning for North Texas' future water supply.

We have reviewed the Initially Prepared 2006 Region C Water Plan (IPP). We continue to support planning for the region's long-term water supply through the following measures included in the IPP by Region C:

- **Conservation:** We support the Goals and Plan Elements as presented in the five-year strategic plan.
- **Recycling:** We support the concept of direct and indirect water reuse.
- **Connection of existing supplies:** We support the recommendation to evaluate the connection of existing supplies based on cost, water quality and long-term availability in order to maximize the usage of available reservoirs.
- **Acquisition and connection of other existing and proposed sources:** We realize that many additional sources have been investigated and listed in the plans as alternatives. We support further study of the feasibility of all of those sources, including new reservoirs.

We thank the Region C Board for its leadership in planning for the future of our region's water supply Please do not hesitate to call upon us if we can be of any assistance to you.

Sincerely,

AGUIRRE corporation

Pedro Aguirre
President & CEO

(6)

Turner

Thomas C. Leppert
Chairman and
Chief Executive Officer

The Turner Corporation
Bank of America Plaza
901 Main Street, Suite 4900
Dallas, TX 75202
phone: 214.915.9610
fax: 214.915.9612

June 22, 2005

Mr. Jim Parks
Chairman
Region C Water Planning Group
c/o North Texas Municipal Water District
P.O. Box 2408
Wylie, Texas 75098

Dear Mr. Parks:

We strongly encourage the Region C Water Planning Group to keep all options available when planning for North Texas' future water supply.

We have reviewed the Initially Prepared 2006 Region C Water Plan (IPP). We continue to support planning for the region's long-term water supply through the following measures included in the IPP by Region C:

- **Conservation:** We support the Goals and Plan Elements as presented in the five-year strategic plan.
- **Recycling:** We support the concept of direct and indirect water reuse.
- **Connection of existing supplies:** We support the recommendation to evaluate the connection of existing supplies based on cost, water quality and long-term availability in order to maximize the usage of available reservoirs.
- **Acquisition and connection of other existing and proposed sources:** We realize that many additional sources have been investigated and listed in the plans as alternatives. We support further study of the feasibility of all of those sources, including new reservoirs.

We thank the Region C Board for its leadership in planning for the future of our region's water supply. Please do not hesitate to call upon us if we can be of any assistance to you.

Sincerely,

Thomas C. Leppert
Chairman of the Board and Chief Executive Officer

Building the Future

⑦

McKINNEY
TEXAS
Unique by nature.

June 22, 2005

Mr. Jim Parks
Chairman
Region C Water Planning Group
c/o North Texas Municipal Water District
P.O. Box 2408
Wylie, Texas 75098

Dear Mr. Parks:

We strongly encourage the Region C Water Planning Group to keep all options available when planning for North Texas' future water supply.

We have reviewed the Initially Prepared 2006 Region C Water Plan (IPP). We continue to support planning for the region's long-term water supply through the following measures included in the IPP by Region C:

- **Conservation:** We support the Goals and Plan Elements as presented in the five-year strategic plan.
- **Recycling:** We support the concept of direct and indirect water reuse.
- **Connection of existing supplies:** We support the recommendation to evaluate the connection of existing supplies based on cost, water quality and long-term availability in order to maximize the usage of available reservoirs.
- **Acquisition and connection of other existing and proposed sources:** We realize that many additional sources have been investigated and listed in the plans as alternatives. We support further study of the feasibility of all of those sources, including new reservoirs.

We thank the Region C Board for its leadership in planning for the future of our region's water supply. Please do not hesitate to call upon us if we can be of any assistance to you.

Sincerely,

John Kessel
Executive Director
Development Services

CITY OF McKINNEY
P.O. Box 517 • McKinney, Texas 75070 • Metro 972-562-6080

www.mckinneytexas.or

8

schepps

June 22, 2005

Mr. Jim Parks
Chairman
Region C Water Planning Group
c/o North Texas Municipal Water District
P.O. Box 2408
Wylie, TX 75098

Dear Mr. Parks:

We strongly support the position of the Greater Dallas Chamber regarding the Initially Prepared 2006 Region C Water Plan. We consider it vitally important to our region to keep all options available when planning for North Texas' future water supply.

Thank you for your consideration.

Sincerely,

SCHEPPS DAIRY

Pat Boyle

Pat Boyle
Group V.P. / General Mgr.

PB:nc

3114 South Haskell, Dallas, Texas 75223, telephone 214 824-8163

(9)

June 22, 2005

Mr. Jim Parks
Chairman
Region C Water Planning Group
c/o North Texas Municipal Water District
P.O. Box 2408
Wylie, TX 75098

Dear Mr. Parks:

We strongly support the position of the Greater Dallas Chamber regarding the Initially Prepared 2006 Region C Water Plan. We consider it vitally important to our region to keep all options available when planning for North Texas' future water supply.

Thank you for your consideration.

Sincerely,

OAK FARMS DAIRY

Craig Roberts
General Manager

CR:nc

HKS

H. RALPH HAWKINS FAIA, FACHA
PRESIDENT AND CEO

June 23, 2005

Mr. Jim Parks
Chairman
Region C Water Planning Group
c/o North Texas Municipal Water District
P.O. Box 2408
Wylie, Texas 75098

Dear Mr. Parks:

It is strongly encouraged that the Region C Water Planning Group keep all options available when planning for North Texas' future water supply.

Having reviewed the Initially Prepared 2006 Region C Water Plan (IPP), we continue to support planning for the region's long-term water supply through the following measures included in the IPP by Region C:

- **Conservation:** Support is given to the Goals and Plan Elements as presented in the five-year strategic plan.
- **Recycling:** We support the concept of direct and indirect water reuse.
- **Connection of existing supplies:** Support is given to the recommendation to evaluate the connection of existing supplies based on cost, water quality, and long-term availability in order to maximize the usage of available reservoirs.
- **Acquisition and connection of other existing and proposed sources:** Realizing that many additional sources have been investigated and listed in the plans as alternatives, we support further study of the feasibility of all of those sources, including new reservoirs.

Thanks to the Region C Board for its leadership in planning for the future of our region's water supply. Please do not hesitate to call upon us if we can be of any assistance to you.

Sincerely,

H. Ralph Hawkins

H. Ralph Hawkins, FAIA
President and CEO
HKS, Inc.

(11)

HOLMES MURPHY

June 23, 2005

Mr. Jim Parks
Chairman
Region C Water Planning Group
c/o North Texas Municipal Water District
P.O. Box 2408
Wylie, Texas 75098

Dear Mr. Parks:

I strongly encourage the Region C Water Planning Group to keep all options available when planning for North Texas' future water supply.

I continue to support planning for the region's long-term water supply through the following measures included in the IPP by Region C:

- **Conservation:** I support the Goals and Plan Elements as presented in the five-year strategic plan.
- **Recycling:** I support the concept of direct and indirect water reuse.
- **Connection of existing supplies:** I support the recommendation to evaluate the connection of existing supplies based on cost, water quality and long-term availability in order to maximize the usage of available reservoirs.
- **Acquisition and connection of other existing and proposed sources:** I realize that many additional sources have been investigated and listed in the plans as alternatives. We support further study of the feasibility of all of those sources, including new reservoirs.

I thank the Region C Board for its leadership in planning for the future of the region's water supply.

Sincerely,

Frank M. Roby
CEO, Holmes Murphy Texas

(12)

MURCHISON CAPITAL PARTNERS, L.P.

June 23, 2005

Mr. Jim Parks
Chairman
Region C Water Planning Group
c/o North Texas Municipal Water District
P.O. Box 2408
Wylie, TX 75098

Dear Mr. Parks:

We strongly encourage the Region C Water Planning Group to keep all options available when planning for North Texas' future water supply.

We have reviewed the Initially Prepared 2006 Region C Water Plan ("IPP"). We continue to support planning for the region's long-term water supply through the following measures included in the IPP by Region C:

- **Conservation**: We support the Goals and Plan Elements as presented in the five-year strategic plan.
- **Recycling**: We support the concept of direct and indirect water reuse.
- **Connection of existing supplies**: We support the recommendation to evaluate the connection of existing supplies based on cost, water quality and long-term availability in order to maximize the usage of available reservoirs.
- **Acquisition and connection of other existing and proposed sources**: We realize that many additional sources have been investigated and listed in the plans as alternatives. We support further study of the feasibility of all of those sources, including new reservoirs.

We thank the Region C Board for its leadership in planning for the future of our region's water supply. Please do not hesitate to call upon us if we can be of any assistance to you.

Sincerely,

Robert F. Murchison

5430 LBJ FREEWAY • SUITE 1450 • DALLAS, TEXAS 75240
(972) 490-8080 • FAX (972) 490-0008

(13)

Tuesday Morning
Everything 50% to 80% Off

Kathleen Mason
President
Chief Executive Officer

June 25, 2005

Mr. Jim Parks
Chairman
Region C Water Planning Group
c/o North Texas Municipal Water District
P.O. Box 2408
Wylie, Texas 75098

Dear Mr. Parks:

We strongly encourage the Region C Water Planning Group to keep all options available when planning for North Texas' future water supply.

We have reviewed the Initially Prepared 2006 Region C Water Plan (IPP). We continue to support planning for the region's long-term water supply through the following measures included in the IPP by Region C:

- **Conservation:** We support the Goals and Plan Elements as presented in the five-year strategic plan.
- **Recycling:** We support the concept of direct and indirect water reuse.
- **Connection of existing supplies:** We support the recommendation to evaluate the connection of existing supplies based on cost, water quality and long-term availability in order to maximize the usage of available reservoirs.
- **Acquisition and connection of other existing and proposed sources:** We realize that many additional sources have been investigated and listed in the plans as alternatives. We support further study of the feasibility of all of those sources, including new reservoirs.

We thank the Region C Board for its leadership in planning for the future of our region's water supply. Please do not hesitate to call upon us if we can be of any assistance to you.

Sincerely,

Kathleen Mason
President & CEO

cm

(14)

Grant Thornton

Accountants and Business Advisors

June 28, 2005

Mr. Jim Parks
Chairman
Region C Water Planning Group
c/o North Texas Municipal Water District
P.O Box 2408
Wylie, Texas 75098

Dear Mr. Parks:

We strongly encourage the Region C Water Planning Group to keep all options available when planning for North Texas' future water supply.

We have reviewed the Initially Prepared 2006 Region C Water Plan (IPP), and we continue to support planning for the region's long-term water supply through the following measures included in the IPP by Region C:

- **Conservation:** We support the Goals and Plan Elements as presented in the five-year strategic plan.
- **Recycling:** We support the concept of direct and indirect water reuse.
- **Connection of existing supplies:** We support the recommendation to evaluate the connection of existing supplies based on cost, water quality and long-term availability in order to maximize the usage of available reservoirs.
- **Acquisition and connection of other existing and proposed sources:** We realize that many additional sources have been investigated and listed in the plans as alternatives. We support further study of the feasibility of all of those sources, including new reservoirs.

We thank the Region C Board for its leadership in planning for the future of our region's water supply. Please do not hesitate to call upon us if we can be of any assistance to you.

Very truly yours,

Louis J. Grabowsky

Louis J. Grabowsky, Managing Partner
Grant Thornton LLP

Suite 500
1717 Main Street
Dallas, TX 75201
T 214.561.2300
F 214.561.2370
W www.grantthornton.com

15

GREATER DALLAS CHAMBER®

June 29, 2005

Mr. Jim Parks
Chairman
Region C Water Planning Group
c/o North Texas Municipal Water District
P.O. Box 2408
Wylie, Texas 75098

Dear Mr. Parks:

As you know, the Greater Dallas Chamber strongly supports keeping all options on the table when planning for North Texas' future water supply. We continue to encourage the Region C Water Planning Group to keep all options available.

The Greater Dallas Chamber has reviewed the Initially Prepared 2006 Region C Water Plan (IPP). We would like to reiterate our support for planning for the region's long-term water supply through the following measures included in the IPP by Region C:

- **Conservation:** The Chamber supports the Goals and Plan Elements as presented in the five-year strategic plan.
- **Recycling:** The Chamber supports the concept of direct and indirect water reuse.
- **Connection of existing supplies:** The Chamber supports the recommendation to evaluate the connection of existing supplies based on cost, water quality and long-term availability in order to maximize the usage of available reservoirs.
- **Acquisition and connection of other existing and proposed sources:** The Chamber realizes that many additional sources have been investigated and listed in the plans as alternatives. We support further study of the feasibility of all of those sources, including new reservoirs.

The Greater Dallas Chamber thanks the Region C Group for its leadership in planning for adequate water supplies for our region. Please do not hesitate to call upon us if we can be of any assistance to you.

Sincerely,

Joel Allison
Chairman

President & CEO
Baylor Health Care System

16

CITY OF ALLEN

June 29, 2005

Mr. James M. Parks
RCWPG Chairman/Administrator
c/o NTMWD
P.O. Box 2408
Wylie, Texas 75098-2408

Dear Mr. Parks:

Please accept the attached resolution of the City Council of the City of Allen as our City's endorsement of the *Initially Prepared 2006 Region C Water Plan*. Development of additional water sources as provided for in the plan is clearly a necessity if we are to maintain the economic climate and quality of life we currently enjoy in north Texas. Water resource development is an extremely long-term planning and development effort that must begin as the plan outlines very near-term to assure regional vitality and growth.

Sincerely,

Stephen B. Massey

Stephen B. Massey, P.E.
Community Services Director

ALLEN CIVIC PLAZA • 305 CENTURY PARKWAY • ALLEN, TEXAS 75013-8042
214.509.4100
EMAIL: coa@cityofallen.org

CITY OF ALLEN

CERTIFICATION

CITY OF ALLEN, TEXAS §

COLLIN COUNTY, TEXAS §

I, Shelley B. George, City Secretary of the City of Allen, Collin County, Texas, do hereby certify that the attached is a true and correct copy of the City of Allen Resolution No. 2415-6-05(R) duly passed and approved by the City Council of the City of Allen, Texas, on the 28th day of June, 2005.

WITNESS MY HAND AND SEAL OF SAID CITY, this the 29th day of June, 2005.

Shelley B. George
City Secretary
City of Allen, Texas

RESOLUTION NO. 2415-6-05(R)

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF ALLEN, COLLIN COUNTY, TEXAS, ENDORSING THE REGION C WATER PLANNING GROUP'S INITIALLY PREPARED 2006 REGION C WATER PLAN; AND PROVIDING FOR AN EFFECTIVE DATE.

WHEREAS, the Region C Water Planning Group was established by the Texas Legislature to manage water planning for a 16 county area in north Texas; and,

WHEREAS, the 16 county area is among the most rapidly growing population areas in the state and nation; and,

WHEREAS, provision of water resources are a vital part of economic development and maintenance of quality of life; and,

WHEREAS, the development of new water resources is an extremely long lead time endeavor; and,

WHEREAS, the combination of existing water resources, known reserves, and water conservation cannot provide for the long term water demands of Region C.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF ALLEN, COLLIN COUNTY, TEXAS, THAT:

SECTION 1. The City Council of the City of Allen supports the Region C Water Planning Group as it plans for water resource development to meet the long term needs of the 16 county region; and supports the content of the Initially Prepared 2006 Region C Water Plan so that the region can be assured of adequate supplies of water to support quality of life and economic development in the long term future.

SECTION 2. This resolution shall take effect upon its adoption.

DULY PASSED AND APPROVED BY THE CITY COUNCIL OF THE CITY OF ALLEN, COLLIN COUNTY, TEXAS, ON THIS THE 28TH DAY OF JUNE, 2005.

APPROVED:

Stephen Terrell, MAYOR

ATTEST:

Shelley B. George, TRMC, CITY SECRETARY

17

Fort Worth Branch
Texas Section

ASCE American Society of Civil Engineers

President-Elect – John Wier, P.E., Wier & Assoc. Vice-President/Secretary – Roxanne Pillar, P.E., Huitt Zollar
Treasurer – Stephen Crawford, P.E., Halff Assoc. Past President – Christian Schnitger, P.E., Schrikel Rollins
President – Ronda Visintainer, P.E., Halff Assoc.

July 5, 2005

Region C Planning Group
Attn: Mr. Jim Parks P.E. Chairman

Dear Mr. Parks:

The Dallas-Fort Worth Metroplex and the rest of the North Texas Region within the Region C Planning Area has to ensure that it will have sufficient water to support the projected population and business growth over the next 50 years. This fact is paramount to maintaining an environment supportive of the standard of living to which we have become accustomed, as well as sustaining regional economic activity. Sustaining the economic development of our region without an adequate water supply is not possible.

The Fort Worth Branch of the American Society of Civil Engineers (ASCE) has reviewed the Draft of the 2006 Plan and document. The ASCE supports the recommendations regarding:

- **Recycling:** The Fort Worth Branch of ASCE supports the concept of reuse of treated wastewater effluent as a major water management strategy.

- **Conservation**: The Fort Worth Branch supports the conservation goals as well as the recommendations on water conservation and drought management as presented in the Region C Initially Prepared Plan.

- **Expanded Use of Existing Supplies:** The Fort Worth Branch supports the recommendation to maximize the potential of existing water supplies.

- **Acquisition and connection of other existing and proposed sources:** The Fort Worth Branch of ASCE realizes that many additional sources have been investigated and listed in the plans as alternatives. We support further study of the feasibility of all of those sources, including new reservoirs.

Sincerely,

Fort Worth Branch American Society of Civil Engineers

Ronda Visintainer

Ronda Visintainer, P.E.
2004-2005 President

(18)

SIERRA CLUB
FOUNDED 1892

Houston Regional Group
P. O. Box 3021
Houston, Texas 77253-3021
713-895-9309
http://texas.sierraclub.org/houston/

July 6, 2005

Mr. Jim Parks
Chairman
North Texas Municipal Water District
P.O. Box 2408
Wylie, Texas 75098

and

Mr. J. Kevin Ward
Executive Administrator
Texas Water Development Board
P.O. Box 13231
Austin, Texas 78711-3231

Dear Mr. Hanlon and Mr. Ward,

Enclosed are the comments of the Big Thicket Committee of the Lone Star Chapter of the Sierra Club (Sierra Club) regarding the Region C Water Plan (RIWP).

(a) 1) The Sierra Club opposes including the Fastrill and Rockland Dams in the RCWP or RIWP. These dams will have tremendous negative, cumulative, environmental impacts on the Neches River and East Texas and are unneeded economically and for residential, commercial, agricultural, and industrial water uses.

The Sierra Club supports designating the Neches River, from below Lake Palestine to the Beaumont city limits, as a National Scenic and or Recreational River. We also support the designation of a National Wildlife Refuge by the U.S. Fish and Wildlife Service on the Upper Neches River and a state park or similar protected area on the Middle Neches River.

It is important to protect what little is left in East Texas of our ecological heritage to leave for our children and others in the future. In addition, these areas will provide a more sustainable economic future for East Texas while protecting wildlife, bottomland hardwoods, and adjacent upland forests.

Region C needs to commit to water conservation, in all its forms, so that its per capita use is similar to other major areas in Texas including Houston, El Paso, San Antonio, and Austin.

b 2) The Sierra Club also supports the designation of unique ecological streams to ensure that they get the protection and the recognition they need to protect them for future generations. The streams we support protecting include, but are not limited to, the Neches River, from below the lake Palestine Dam to the Beaumont city limits, Village Creek, Big Sandy Creek, Beech Creek, Hickory Creek, Little Pine Island Bayou, Pine Island Bayou, and Turkey Creek. Most of these streams at least partially flow through Big Thicket National Preserve and deserve our protection so that the Preserve's ecological and biological wonders will not be degraded due to the effects of dam and reservoir construction, maintenance, and operation. The Sierra Club also supports the designation of appropriate unique ecological stream segments in Davy Crockett, Angelina, and Sabine National Forests.

The Sierra Club appreciates this opportunity to provide input for the RCWP. Thank you.

Sincerely,

Brandt Mannchen

Brandt Mannchen
Chair, Big Thicket Committee
Lone Star Chapter of the Sierra Club
5431 Carew
Houston, Texas 77096
713-664-5962

(19)

Subj: Fastrill Reservoir (BAD IDEA)
Date: 7/8/05 9:28:53 AM Central Daylight Time
From: AHOLMES001
To: jparks@ntmwd.com
BCC: Bettylo1050, gdonovan@austin.rr.com, mdecker@att.net

The Region C Water Planning Group needs to know that the PROPOSED FASTRIL RESERVOIR is a bad idea. It would destroy the Texas State Railroad over the Neches, and it would distroy the Big Thicket Wetlands. It would take valuable tax revenue from Anderson and Cherokee Counties, and it would increase the need for more law enforcement in the counties with already tight budgets. It would flood a Native American Burial Ground along the Anderson County side of the Neches River. There are endangered species in the river bottoms that will be lost for ever with another lake below Lake Palestine. We have over 83,000 people that enjoy the Texas State Railroad steam trains, and our largest tourist attraction in Anderson & Cherokee Counties would cease to exist with another lake because it would cost over $105-million to raise the tracts according to a railroad official.

Albert W. Holmes, President
Friends of the Texas State Railroad
"The Official Railroad of Texas"

Date: July 9, 2005

Fax: Mr. Jim Martin
(972) 442-5405

From: Albert W. Holmes
(903) 723-2964

(20)

Lake Cities
MUNICIPAL UTILITY AUTHORITY

July 8, 2005

Mr. Jim Parks, Chairman
And Member of Region C Water Planning Group
C/O North Texas Municipal Water District
P.O. Box 2408
Wylie, Texas 75098

Dear Mr. Parks,

First of all let me say "Thanks" for Region C Planning Group effort in planning for the future water needs of North Texas, especially for us here in Denton County. I'm selfish I guess but that is where I live and try to furnish water to my customers. I have worked for Lake Cities Municipal Utility Authority since 1978, the last 16 years as GM. When I came here we had 3 wells that, as the old timers said, would last this area forever. Well that was wrong and if we did not have people before us that had vision for future surface water supplies, we would not be here today. We still have the 3 wells but also purchase 3.8 mgd from Upper Trinity Regional Water District to meet our needs for Lake Dallas, Hickory Creek and Shady Shores, the 3 entities Lake Cities MUA serves.

Upper Trinity's current water supplies come from three lakes: Lewisville, Chapman and Ray Roberts—but that's not enough water for the next 50 years.

To augment this supply, Upper Trinity is planning a new reservoir in southeast Fannin County-Lake Ralph Hall. It can be built in time to meet the needs of our region.

We urge you to adopt the Plan's water management strategies and the alternatives, including the strategies for our 3 towns and for Upper Trinity Regional Water District.

While some people fight against this long range planning for future water we believe and support the efforts of Region C Planning Group. We believe it has addressed the future needs of our area and this region.

Thanks again for serving and playing a major role in everyone's future water supplies.

Lake Cities Municipal Utility Authority

Johnny D. Harris

Johnny D. Harris
General Manager

P.O. Box 355 Lake Dallas, TX 75065
Phone: **940.497.2999**
Fax: 940.497.2926

(21)

GDPC

Greater Dallas Planning Council

THE MISSION OF THE GDPC IS TO DEFINE, DEBATE AND PROMOTE IDEAS OF CRITICAL IMPORTANCE TO THE FUTURE OF GREATER DALLAS. IT IS TO BE BOTH A FORUM AND AN

July 9, 2005

Mr. James Parks
Chairman, Region C Water Planning Group
c/o NTMWD
P.O. Box 2408
Wylie, Texas 75098-2408

Dear Mr. Parks:

The Board of the Greater Dallas Planning Council is in complete support of the Region C Water Planning Group's efforts to secure a reliable and sufficient water supply to meet our future needs. We believe that increased emphasis must be placed on water conservation measures to avoid waste or undue use of our existing water resources. Further, we support all logical and environmentally sound means of creating more water reuse programs. At the same time, we acknowledge that even if effective and maximum employment of conservation and reuse techniques are effectuated, it is highly probable that additional supply sources will be needed. It is, therefore, imperative that the Planning Group continue to propose the creation of a new water source(s) from among the best alternatives that have been developed – including interstate transfers – so that this region and the whole of Texas are assured of having adequate water in the future.

We appreciate the work and thought you are giving to this difficult matter. Be certain that current citizens and those of new generations will benefit from your efforts.

Yours Truly,

Karen Walz

Karen Walz
President

P.O. Box 227297 Dallas, Texas 75222-7297 214.673.4406 Fax:

(22)

SIERRA CLUB
FOUNDED 1892

Dallas Regional Group

P.O. Box 800365
Dallas, TX 75380

July 10, 2005

Dear Region C Members,

On behalf of the Dallas Regional Group of the Sierra Club, I would like to offer the following observations and suggestions about the degree to which the Draft Plan pursues water use efficiency measures, otherwise known as conservation. I wish to clarify that when we speak of water use efficiency measures or conservation, the Sierra Club is NOT referring to reuse, sometimes called water recycling. In our view reuse, while a very useful strategy to maximize use of existing water supplies, is more akin to a supply mechanism rather than a means to assure efficient at-the-tap USE of water.

If you choose to decline using the suggestions we offer, we hereby request that in your responses to public comments for the Final regional plan, you state your rationale for declining our suggestions.

(a)

1. Region C should consider adopting an approach similar to that of Region L in terms of overall water conservation targets and goals for municipal water suppliers over the 50-year planning period - at least a 1% reduction per year in GPCD for all retail water suppliers with a current GPCD of more than 140 and a .25% (1/4 of 1%) reduction per year in GPCD for all retail water suppliers with a current GPCD of more than 125 but no more than 140. Region C water planners often tout proposals for what you call conservation by including your proposed reuse volumes. Therefore, it is extremely important to note that these figures I'm giving for Region L do NOT include water reuse. Thus, if the current projections in the Region C plan for water savings from municipal water conservation do not reflect the volume that would be saved through the annual reductions proposed by an approach similar to Region L's, we urge that the projections in the Region C plan for water savings from municipal water conservation be adjusted to reflect those annual reductions.

(b)

2. Region C should be commended for including a large range of conservation measures/BMPS in suggested water strategies for municipal water users, including the implementation of federal clothes washer standards. Region C should review the data on the efficacy of such conservation measures as rainwater harvesting and graywater systems and reconsider inclusion of those measures in the proposed strategies (graywater systems being especially relevant for consideration in those areas undergoing new residential and commercial development). Region C should gather additional information to allow the incorporation of proposed water conservation strategies for athletic field and parkland irrigation. Region C should consider suggesting that municipal water suppliers in the region set targets and goals for indoor residential water use at no more than 50 GPCD and for summer-to-winter ratios of water use of no more than 1.6.

(c)

3. Region C ought to adopt drought management as a water management strategy. Dr. Ken Kramer on our Chapter staff – who served on the statewide Conservation Implementation Task Force – made this suggestion in formal comments at the appropriate time many months ago, but this committee has continued to ignore this strategy. Nowhere can we find that you have stated your reason for declining this particular strategy, as required under State rules. It is common knowledge that water supply planning in this state proceeds on an assumption that all customary uses of water are going to be provided for during a time of drought as severe as the critical drought of record of the 1950s, plus sometimes even a "safety" factor of an additional percentage of water over and above that amount - thus causing water supply projects to be built to try to provide for this peak water use, in excess of what is needed in most years. This planning scenario flies in the face of the state approach adopted in 1997 that requires drought contingency plans from major water suppliers. These contingency plans are required to have targets for water use reductions in times of drought. The reality of the implementation of these contingency plans aimed at REDUCING water use during times of drought needs to be recognized in the regional plan as a water management strategy.

(d)

4. Region C should consider incorporating into industrial water demands or in water management strategies for industrial users a reasonable anticipated annual reduction in water use that would reflect implementation of water conservation measures by industries in the region. Even though it is certainly accurate for Region C to conclude that it is difficult to determine what specific conservation measures might be implemented by what specific industrial operations, it is reasonable to assume that as a result of prudent company planning and external forces (including such mundane things as the natural replacement of plumbing fixtures at industrial plants), there will be a certain percentage reduction in industrial water use per unit of product produced over the next 50 years. The multi-decade regional plan ought to anticipate such a reduction in industrial water use by a reasonable percentage (certainly something in the range of 5 to 10% would be a minimum expectation over this long a time frame).

Sincerely,

Molly Rooke

Molly Rooke, Conservation Committee, Dallas Regional Group

(23)

July 10, 2005

Region C Water Planning Group
c/o Jim Parks, Chairman
North Texas Municipal Water District,
P.O. Box 2408
Wylie, TX 75098

Dear Mr. Parks:

I was distressed to learn that the proposed wildlife refuge along the Neches River in the Cherokee and Anderson Counties is threatened by the possible construction of the Fastrill Reservoir.

This part of East Texas is of extreme importance ecologically, as the native habitats it harbors are being altered at an alarming rate throughout the region. The construction of this reservoir would accelerate considerably the general demise of native habitat in Texas that we all regard as crucial to the balanced ecosystem we desire.

I therefore urge you to consider alternate ways to solve Dallas' water needs and to spare the destruction of these East Texas forests.

Respectfully,

Kent Rylander, Ph.D.
Biologist

(24)

MACK TURNER

6586 Chicory Court
Dallas, Texas 75214

7/10/05

James M. Parks
PO Box 2408
Wylie, Tx 75098-2408

Re: Regional Water Plan.

Dear Mr Parks,

Before building new lakes we need to use the existing lakes we have for water such as Texoma and Toledo Bend. We need much stricter conservation rules and ban St Augustine grass.

Thanks,

Mack Turner

214 749-2933

25

Halff Associates

ENGINEERS • ARCHITECTS • SCIENTISTS
PLANNERS • SURVEYORS

8616 NORTHWEST PLAZA DRIVE
DALLAS, TEXAS 75225
(214) 346-6200
FAX (214) 739-0095

July 11, 2005

Region C Planning Group

Attn: Mr. Jim Parks P.E. Chairman
Region C Planning Group

Dear Mr. Parks:

The Dallas Fort Worth Metroplex and the rest of the North Texas Region within the Region C Planning Area will have to assure that it will have sufficient water to support the projected population and business growth over the next 50 years. This fact is paramount to maintaining an environment supportive of business as well as the standard of living that we are accustomed to. Successful economic development without water is just not possible.

The initial prepared 2006 Region C Water Plan establishes guiding principles for water resources development, water management strategies and defines the leadership role in the protection and development of future water supplies for this region. The Plan identifies a portfolio of water supply projects that will enable the Region to provide an affordable, dependable, diversified, and sustainable supply of water resources now and in the future. The Plan contains a wide variety of water management strategies that include current availability, environmental impacts, costs, conservation, reuse/recycling, existing and new supplies in this region and beyond.

The Greater Dallas Chamber of Commerce has reviewed the Draft of the 2006 Plan and supports the recommendations regarding:

- **Conservation:** The Goals and Plan Elements as presented in the five year strategic plan. The Plan recognizes the need to implement the best management practices defined by the State of Texas Conservation Implementation Task Force.

- **Recycling:** Supports the development of indirect water reuse. The Plan is clear that the reuse of treated wastewater will be a significant source of future water supply for Region C.

- **Connection of existing Supplies:** Supports the recommendation to connect existing water supplies in order to maximize the usage of available reservoirs as a cost effective and sustainable supply.

- **Acquisition and connection of other existing and proposed sources:** The Chamber realize that many additional water resources have been investigated and listed in the plans as potential alternatives for development as future water supply resources. We support further study of the feasibility of all of those sources, including new reservoirs.

Sincerely,

HALFF ASSOCIATES, INC.

for

Jose Novoa, P.E.
Air Quality and Environmental Committee

(26)

July 11/2005

James Parks,
P.O. Box 2408 Wylie 75098-2408

Mr. Parks,

I have no idea what is your part in this water issue.

I have no property in Van Zandt County.But I oppose the "right of capture" thing. Maybe it works with oil and gas. But one property owner enabling Ozarka or other enterprises to suck up precious Texas water is criminal.

Texas needs that water. Ozarka has no loyalty to Texas.

While communities are forced to obey water rationing hours, Ozarka continues to siphon. This is criminal. Small communities such as Eustace and Malikoff tried to head off the siphoning, found it too expensive to hire attorneys, held lemonade sales, etc. to pay for their fight over several years. I am told Ozarka "bought off" the town leaders by donating to an athletic field. One church which had opened its doors to opposition meetings, received a donation. The doors closed.

Trees have died along the stream. One family has become rich from Rohr Springs because it bubbled up on its property. Property owners moved out there because of the good water.How many other Rohr Springs projects are allowed because of neglect by our lawmakers?

mln1229@earthlink.com

(27)

July 12,2005
P.O.Box 1007
Mt.Pleasant,Tx 75456-1007

Mr. James M.Parks
RCWPG Chairman
% NTMWD
P.O.Box 2408
Wylie,Tx. 75098

Dear Mr. Parks:

I read in THE DALLAS MORNING NEWS about the long range water plan for the Dallas-Ft.Worth area. As a citizen of East Texas I would like to comment on my feelings concerning the proposed Marvin Nichols lake on the Sulphur River and White Oak Creek in Titus and adjoining counties.

The majority of the citizens in the Mt.Pleasant area are all in favor of this lake project. There are a small minority who have been very vocal against the lake.They all have very selfish personal reasons for their stance. Some of the people who live in the area which would be taken for the lake want everything to remain the same as it has for all the years.They do not realize what a great economic impact the lake would have on our economy. The owners of timber companies are very much against it because it would eliminate a cheap source of their timber. Last you have the extreme envioremental ist who want no changes made that might endanger some insect, fish or animal. The lake would increase the wild life in the area.

I have seven children and five of them live in the Dallas-Ft.Worth region because that is where the good jobs and growth is located;thus I want the jobs and growth to increase. It takes water for this tobe possible so I want my children and grand children to have ample water. This lake would not only let this happen for Dallas-Ft. Worth, but would give our area ample water for our economic growth.

Please do not let a minority of East Texas "Againers" cause you people to abandon one of the greatest sources of water for Dallas-Ft. Worth that being the Marvin Nichols reservoir on Sulphur River and White Oak Creek in Titus and Morris counties.

Sincerely,

Joe L. Buford

Joe L.Buford

(28)

2014 Emerson Lane
Denton, Tx 76209
July 12, 2005

Dear Mr. Parks.

The Sierra Club and the League of Women Voters asked me to comment on opposing the Region C Water Plan which recommends four new dams. Frankly, I think they are short-sighted. Planning for water makes good sense and I entirely support the project.

Sincerely,
Marilyn Smith

(29)

City of Clarksville

800 WEST MAIN • CLARKSVILLE, TEXAS 75426 • (903) 427-3834

July 12, 2005

James M. Parks
RCWPG Chairman/Administrator
C/o NTMWD
P.O. Box 2408
Wylie, Texas 75098-2408

Dear Mr. Parks:

Due to family matters, I was not able to attend the public hearing scheduled for Monday, July11, 2005 at the Bob Duncan Community Center in Arlington, Texas.

I would like to state that the City of Clarksville has supported the Marvin Nichols Reservoir in the past and is in support of studies to determine the feasibility of the lake.

I am aware that the majority of comments you have heard from this area have been negative concerning the Marvin Nichols. Those that are in opposition do not represent me, the city council, the city manager or our Economic Development Corporation and in fact few are even residents of our county that I am aware of. I understand the concern of those that will lose property and I truly sympathize but you have to look at the big picture and the need for water and economic development.

The City of Clarksville looks forward to feasibility studies being conducted, the possibly of an abundance of water and the economic stimulus that can be derived from the development of this reservoir.

If at any time the city can be of assistance, please feel free to contact me. We will be more than happy to meet with you at anytime.

Sincerely,

Ann Rushing
Mayor
City of Clarksville, Texas

Cc: Clarksville City Council, Clarksville EDC
Texas Water Development Board
The Honorable Congressman Ralph Hall
The Honorable Representative Mark Homer
The Honorable Governor Rick Perry
The Honorable Senator Kevin Eltife

(30)

Bruce Wilke

July 15, 2005

James M. Parks
RCWPG Chairman
c/o NTMWD
P.O. Box 2408
Wylie, Texas 75098

Dear Mr. Parks,

Right now we have a once-in-forever opportunity to build the water resources needed 40 or 50 years from now. If it's difficult to do *now*, it will be absolutely impossible in 20 years.

Continuing development on potential reservoir land will make it economically and politically prohibitive, the longer you wait.

I really believe that this will be the only chance we will ever have to reserve land for future reservoirs in Northeast Texas, and if we pass it up, there will never be another one.

Please make sure Texas has enough water in the future.

Thank you.

Bruce Wilke

Bruce Wilke

7227 North Janmar Drive Dallas, Texas 75230 214.361.7789

(31)

CITY OF BONHAM
FANNIN COUNTY, TEXAS

07/15/05

Mr Jim Parks

Just wanted to let you know that I fully support the Region C Water Plan and especially the inclusion of the Lower Bois d' Arc Resovoir in that plan.

Thanks

John W Burnett
City Commissioner
Bonham Tx
903 583 8656

301 E. Fifth St. • Bonham, TX 75418
(903) 583-7555 • FAX (903) 583-5761

(32)

FLOYD ENTERPRISES

P O Box 248 • 407 N Main • Bonham TX 75418
903-583-4902 • Fax 903-583-3839 • 903-583-0130 • royv@netexas.net

North Texas Municipal Water District.
505 E Brown St
P.O. Box 2408
Wylie, TX 75098-2408

July 18, 2005

Mr. Jim Parks,

Just a note to say my family believes you are doing a great job and we support the new Region C Water plan. As a specific part of that plan if our region is to survive and grow we must have available water supply. Therefore, we support the Lower Bois D' Arc Project for water in our area of the state... Fannin County needs this lake. If we can be of help, please let us know.

Sincerely,

Roy

Roy V. Floyd

33

ERNEST G. FARROW
6036 Ridgecrest Rd. #321
Dallas, TX 75231

FX TO: Mr James Parks
PCWPG Chairman
c/o NTMWD
FX: 972.442.5405

From E. G. Farrow

a What happened to the 4 systems for Reclaiming Waste Water that we installed at the WWTPlant City of Dallas.

b What about an education program to get the putlic informed about Reuse of WWTP effluent.

c Hadn't we better put our claim fon Fastril & Nichols before someone else does?

d What is the status of the system of pumping Effluent to north end of Lavon?

Best regards

EG Farrow

(34)

Argyle Water
SUPPLY CORP.

July 22, 2005

Stephanie Griffin
Freese and Nichols, Inc.
4055 International Plaza, Suite 200
Fort Worth TX 76109

Dear Ms. Griffin

In response to the Region C survey, I am enclosing material from our Future Facilities Plan showing projected demand out to 2020. I realize that the mandated plan is for 50 years, but we have not felt like we could comfortably accomplish that with our plan. Since our small utility does not have ordinance powers, we are somewhat limited in our ability to enforce mandatory conservation. We also serve an affluent community, which also limits the sympathy for the need to conserve. Our service area is rural, but moving toward some suburban development.

AWSC has supported conservation actively through mail outs and handout materials, mostly those provided through the TWDB.

For capital funding, we plan to use the USDA Rural Development loan program, along with TWDB bond programs to supplement our contributions from cash reserves.

We appreciate and support the Region C effort and appreciate the difficulty of the task at hand. We would encourage the planning group to support the development of new surface water impoundments. We are one of the original customer utilities of the Upper Trinity Regional Water District, and we feel that the leadership that is ongoing from that organization is timely, appropriate, and in our best interest, especially in the area of developing new lakes to provide water for the continued growth and development of the region. We understand that the transporting of water from one region of the state to another is a difficult, but is very likely critical to the future of the more arid regions of the state.

Our long-range plan depends primarily on being able to increase our supply purchased from UTRWD and not from our well field.

Sincerely,

Randall Davis

Randall Davis, General Manager

P.O. BOX 174 ARGYLE, TEXAS 76226 940-464-7713 FAX 940-464-0518

Region C Water Planning Group
Recommended Water Management Strategies and Financing Survey
Please Return by July 22, 2005

Entity: ARGYLE WSC Contact Person: RANDALL DAVIS
Telephone Number: 940-464-7713 FAX: 940-464-0518
Email Address:
Mailing Address: PO BOX 174 ARGYLE 76226

When comparing currently available supplies to your projected water demands, your city/utility/district will need additional water supplies before 2060. The proposed water management strategies to meet these projected water demands are also listed in the attached table along with the cost for each strategy.

1. Are you planning to implement the recommended projects/strategies? Yes or No

   If "No" for any strategies, please continue with question 2.

   If "Yes", skip to question 3.

2. Please describe how you will meet future water needs.

   See Attached

3. How do you plan to finance the proposed total cost of capital improvements identified by your Regional Water Planning Group? Please indicate:

   1) Funding source(s)[1] by checking the corresponding box(es) below and
   2) Percent share of the total cost to be met by each funding source.

- ☐ 25 % Cash Reserves
- ☐ ____ % Bonds
- ☐ ____ % Bank Loans
- ☐ 25 % Federal Government Programs
- ☐ 50 % State Government Programs, including TWDB Bonds
- ☐ ____ % Other ____________
- ☐ 100 % *TOTAL – (Sum should equal 100%)*

If state government programs are to be utilized for funding, indicate the programs and the provisions of those programs.

[1] Funding source refers to the initial capital funds needed to construct or implement a project, not the means of paying off loans or bonds used for the construction or implementation.

Please return by July 22, 2005, to: Stephanie Griffin, Freese and Nichols, Inc.
4055 International Plaza, Suite 200, Fort Worth, TX 76109 FAX: (817) 735-7491

ARGYLE WATER SUPPLY CORPORATION
P.O. Box 174
Argyle, Texas 76226

WATER USAGE

After review of the past 5 years of water use records of the system, water usage for 2002 was selected as the most representative year and therefore was used as the basis for the planning period (2005 – 2020).

Recorded Water Usage (2002) *

2002
(Average Number of Customers – 1,615)

Month	Usage (gal.)
January	16,924,026
February	13,851,462
March	18,906,183
April	18,185,084
May	20,373,402
June	30,124,017
July	37,934,980
August	54,275,367
September	34,216,632
October	21,506,572
November	18,002,586
December	15,472,371
Total	299,772,682

Calculated Water Usage (2002):

• Peak Day (Per Telemetry)	2,748,507	Gallons
• Peak Day Per Customer	1,702	Gal./Cust.
• Peak Day Flow Rate Per Customer	1.18	GPM/Cust.
• Calc. Peak Hour Per Cust. (2.0 x 1.18)	2.36	GPM/Cust.
• Average Monthly (System Wide)	24,981,057	Gallons
• Average Monthly Per Customer	15,468	Gal./Cust.
• Average Daily Per Customer	516	Gal./Cust.

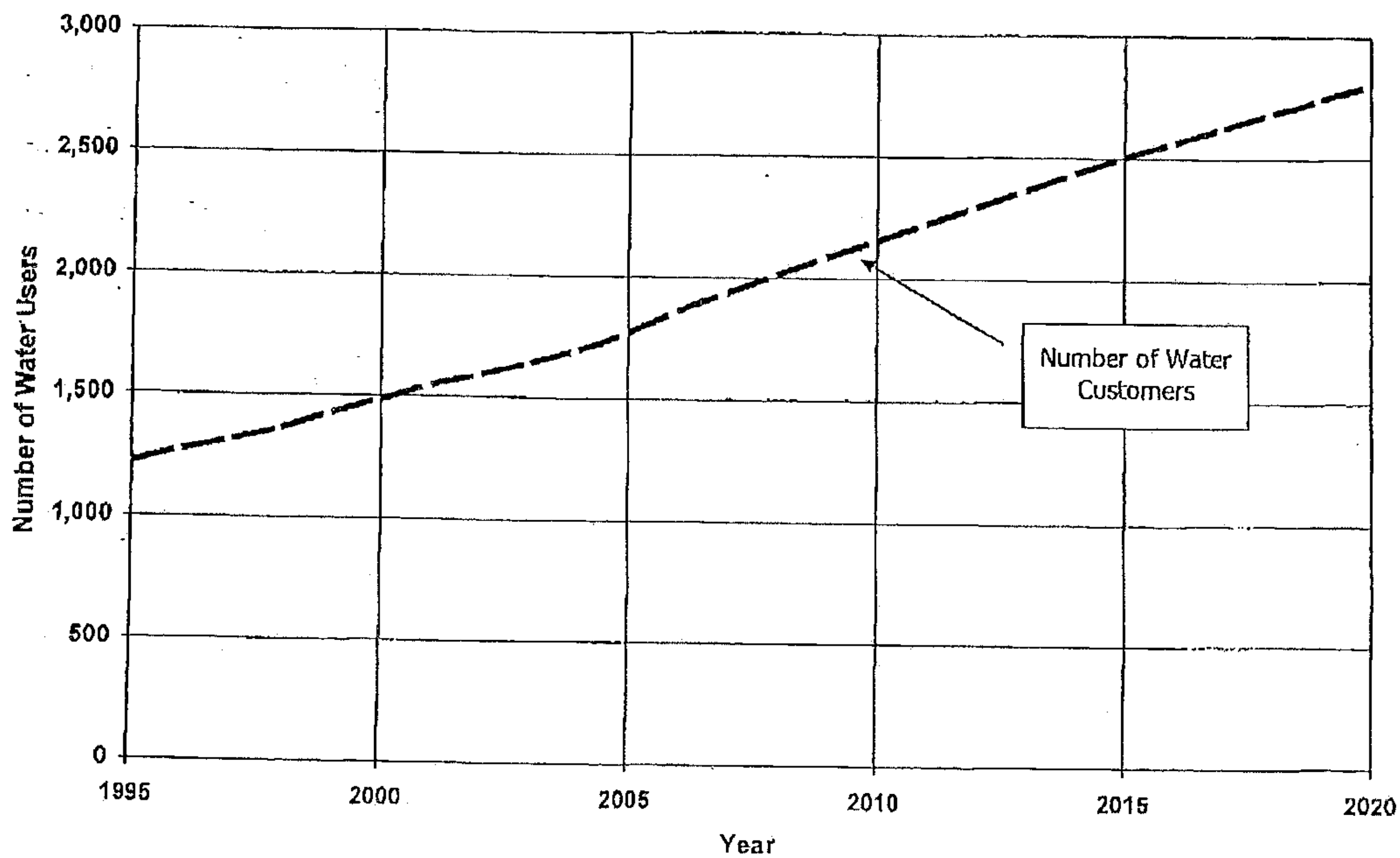
Based on the water usage and peak day usage for the selected year of 2002 and also on calculated values for peak hour for that year, the demands shown below were utilized for the planning period 2005 through 2020.

* Total production for 2004 was 286,783,811 gal. or 880.11 acre ft.

- Average Day = 516 Gal/Cust. – **Average Daily Water Use**
- Peak Day = 1.18 GPM/Cust. – **Req'd. Water Supply Capacity**
- Peak Hour = 2.50 GPM/Cust. – **Req'd. High Service Pump Capacity**

ARGYLE WATER SUPPLY CORPORATION
P.O. Box 174
Argyle, Texas 76226

Historical Growth Rate and Projections



ARGYLE WATER SUPPLY CORPORATION
P.O. Box 174
Argyle, Texas 76226

HISTORICAL GROWTH RATE AND PROJECTIONS

The Argyle Water Supply Corporation's water system serves an area that is in the direct growth path between Dallas-Fort Worth and Denton, and is rapidly becoming more urban than rural The attractiveness of the terrain, the quality of residential construction, and the availability of the necessary utilities further add to the growth potential Over the last several years numerous tracts of land have been developed and requests for water service have been steady as shown below

NUMBER OF WATER CUSTOMERS HISTORICAL AND FUTURE

Year (Jan.)	Water Customers	Increase
1995	1,220	68
1996	1,273	53
1997	1,317	44
1998	1,366	49
1999	1,430	64
2000	1,484	54
2001	1,545	61
2002	1,590	45
2003	1,640	50
2004	1,696	56
2005	1,770	74
2006	1,860	90
2007	1,935	75
2008	2,010	75
2009	2,085	75
2010	2,155	70
2011	2,225	70
2012	2,295	70
2013	2,365	70
2014	2,435	70
2015	2,505	70
2016	2,565	60
2017	2,625	60
2018	2,685	60
2019	2,745	60
2020	2,805	60

ARGYLE WATER SUPPLY CORPORATION
P.O. Box 174
Argyle, Texas 76226

WATER SUPPLY

With the current Upper Trinity Regional Water District (UTRWD) surface water contract and 4 existing water supply wells, Argyle Water Supply Corporation has a total maximum daily supply capacity of 3,218.400 gallons or 2,235 GPM. Based on current water use data and the projected growth of the system, this supply will be adequate only through the year of 2006.

At that time, as a minimum, it is recommended that the Corporation amend their surface water contract with UTRWD to take an additional 500,000 GPD of which then should provide an adequate supply through the year 2010. Between the years 2011 and 2020 an additional 1,250,000 GPD will need to be purchased from UTRWD to meet the required projected water supply demand.

GROUND STORAGE FACILITIES

Presently, there is a total of 1,288,000 gallons of ground storage capacity within the system. The High Plane has 500,000 gallons (Station No. 7) and the remaining 788,000 gallons is in the Low Plane (Stations No. 3, No. 5, No. 6, and 6A.)

With the projected required 2020 capacity for the High Pressure Plane being 203,700 gallons and the Low Pressure Plane being 637,800 gallons, the current ground storage capacity is more than adequate for the fifteen year planning period.

ARGYLE WATER SUPPLY CORPORATION
P.O. Box 174
Argyle, Texas 76226

PROJECTION OF REQUIRED WATER SUPPLY SYSTEM TOTAL

Year	Customers	Avg. Day (MGD)	Max. Day (MGD)	System Supply (GPM)
2005	1,770	0.91	3.01	2,089
2006	1,860	0.96	3.16	2,195
2007	1,935	1.00	3.29	2,283
2008	2,010	1.04	3.42	2,372
2009	2,085	1.08	3.54	2,460
2010	2,155	1.11	3.66	2,543
2011	2,225	1.15	3.78	2,626
2012	2,295	1.18	3.90	2,708
2013	2,365	1.22	4.02	2,791
2014	2,435	1.26	4.14	2,873
2015	2,505	1.29	4.26	2956
2016	2,565	1.32	4.36	3,027
2017	2,625	1.35	4.46	3,098
2018	2,685	1.39	4.56	3,168
2019	2,745	1.42	4.66	3,239
2020	2,805	1.45	4.77	3,310

PROJECTION OF FUTURE GROWTH DISTRIBUTION

Year (Jan.)	High Plane (25%)	Low Plane (75%)	Total Customers
2005	425	1,345	1,770
2006	448	1,412	1,860
2007	466	1,469	1,935
2008	484	1,526	2,010
2009	502	1,583	2,085
2010	519	1,636	2,155
2011	536	1,689	2,225
2012	553	1,742	2,295
2013	570	1,795	2,365
2014	587	1,848	2,435
2015	604	1,901	2,505
2016	619	1,946	2,565
2017	634	1,991	2,625
2018	649	2,036	2,685
2019	664	2,081	2,745
2020	679	2,126	2,805

NOTE: The projected future growth distribution shown in the above table was based on the following assumed percent distribution of the total system growth for each pressure plane as follows:

High Pressure Plane (P.S. No. 7, and 0.75M Gal. Elevated Tank) = 25%
Low Pressure Plane (P.S. No. 3, No 5, No. 6, No. 6A, & East Elev. Tks.) = 75%

(35)

City of Clarksville

800 WEST MAIN • CLARKSVILLE, TEXAS 75426 • (903) 427-3834

July 24, 2005

Mr. James M. Parks
RCWPG Chairman/Administrator
C/o NTMWD
P.O. Box 2408
Wylie, Texas 75098-2408

Dear Mr. Parks,

Enclosed please find a copy of the resolution passed by the Clarksville City Council on July 19, 2005 in continued support of the Marvin Nichols Reservoir and future studies. I have also enclosed a copy of the resolution passed in 2002 for your records. Please share this information with the Region C Water Planning Group.

If the city can be of further assistance, please feel free to contact me. Thank you.

Sincerely,

Ann Rushing

Mayor Ann Rushing
City of Clarksville

City of Clarksville

RESOLUTION NO. 2002-33

WHEREAS, the City Council, of the City of Clarksville,Texas, recognizes the significant impact that the Proposed Marvin Nichols Reservoir could have on the economy and citizens of Clarksville, and;

WHEREAS, there are certain economic and feasibility studies needed on the Proposed Marvin Nichols Reservoir to identify the effect the reservoir would have on Clarksville, and;

WHEREAS, the Sulphur River Basin Authority has been duly authorized by the State of Texas to develop all future water resources within the Sulphur River Basin, and;

WHEREAS, the City Council, of the City of Clarksville, wishes to support any and all studies conducted on the Proposed Marvin Nichols Reservoir so that citizens will have facts on which rational opinions may be formed.

WHEREAS, the Region D Planning Committee has included the Proposed Marvin Nichols Reservoir in the Region D Plan, and;

WHEREAS, the Texas State Water Development Board has included the Proposed Marvin Nichols Reservoir in the State Water Plan;

NOW, THEREFORE, BE IT RESOLVED, BY THE CITY COUNCIL OF THE CITY OF CLARKSVILLE, TEXAS:

> That the Region D Planning committee and the Texas State Water Development Board keep the Proposed Marvin Nichols Reservoir in the Region D Plan until adequate studies can be conducted to factually determine the total impact of the proposed reservoir on the City of Clarksville and Northeast Texas.

PASSED AND APPROVED on the 17th day of September, 2002.

Ann Rushing

Honorable Ann Rushing, Mayor

ATTEST:

Lorene Beers

Lorene Beers, City Secretary

City of Clarksville

RESOLUTION NO. 2005-21

WHEREAS, the City Council, of the City of Clarksville, Texas, recognizes the significant impact that the Marvin Nichols Reservoir could have on the economy and citizens of Clarksville, and ;

WHEREAS, there are certain feasibility studies needed on the Proposed Marvin Nichols Reservoir to identify the effect the reservoir would have on Clarksville, and;

WHEREAS, the City Council, of the City of Clarksville has a very futuristic approach and believe to fully address our needs and those of future generations we must glance to the future and plan now for the next 50 years, and;

WHEREAS, the City Council, of the City of Clarksville, realizes there could be some set backs in some areas; but firmly believe the Marvin Nichols Reservoir will supply water and recreational and economic benefits badly needed in Clarksville and the good will far exceed any negative aspects.

NOW, THEREFORE, BE IT RESOLVED, BY THE CITY COUNCIL, OF THE CITY OF CLARKSVILLE, TEXAS:

> **That the City Council, of the City of Clarksville, continues to support the Marvin Nichols Reservoir, continues to support future studies in an effort to form educated and rational decisions and continues to recognize and acknowledge the economic, recreational and water benefits to reap from building a reservoir such as the Marvin Nichols.**

PASSED AND APPROVED on the 19th day of July, 2005.

Ann Rushing

Honorable Ann Rushing, Mayor

ATTEST:

P. Hobbs

Pennye Hobbs, City Secretary

City of Clarksville

800 WEST MAIN • CLARKSVILLE, TEXAS 75426 • (903) 427-3834

July 21, 2005

Mr. Walt Sears
NETMWD
P.O. Box 955
Hughes, Springs 75656

Dear Mr. Sears:

Enclosed you will find a copy of a resolution approved by the Clarksville City Council at a regular meeting held on July 19, 2005, in support of the Marvin Nichols Reservoir. This 2005 resolution is very similar to the resolution passed in 2002 by the city council of which the Region D Planning Group already has a copy of.

Will you please share a copy of the new resolution with each board member at the public hearing scheduled for August 2, 2005, at 7:00 p.m. at the civic center in Gilmer, Texas and a copy of this letter? I would appreciate it if you would also provide a copy of this resolution to any board member not present at the hearing. It is my understanding the board is continuing to accept written comment. If so, please consider this resolution and letter as such.

There is city and community opposition with North East Texas Regional Water Planning Group's decision to exclude the Marvin Nichols from the latest plan. The Region D committee/board is a planning group and seeing that water needs are met for the next 50 years is part of that planning. Why eliminate the Marvin Nichols before adequate studies have been performed? Why are so many board members opposed?

As you are aware, there has never been a lake built without opposition. In the case of the Marvin Nichols we feel the good will far exceed any bad aspects. There is no denying the positive impact this Reservoir could have on our area and the region.

Sincerely,

Mayor Ann Rushing
City of Clarksville

Cc: Clarksville City Council/CEDC
Kevin Ward/ TWDB
Mike Burke/ SRBA
Mike Huddleston/LRPRWSA
James Parks/RCWPG
Representative Mark Homer
Governor Rick Perry
Senator Kevin Eltife
Red River County Judge Powell Peek
Congressman Ralph Hall

City of Clarksville

800 WEST MAIN • CLARKSVILLE, TEXAS 75426 • (903) 427-3834

July 21, 2005

Texas Water Development Board
Mr. Kevin Ward/Executive Administrator
Stephen F. Austin Building
P.O. Box 13231
1700 N. Congress Avenue
Austin, Texas 78711-3231

Dear Mr. Ward:

Enclosed you will find one copy of a resolution approved by the Clarksville City Council at a regular meeting held on July 19, 2005, in support of the Marvin Nichols Reservoir.

This resolution states that the City Council, of the City of Clarksville, continues to recognize the economic, recreational and water benefits that could be derived and support future studies being conducted in order to make educated and rational decisions.

If you have any questions or concerns, please feel free to contact me.

Sincerely,

Mayor Ann Rushing
City of Clarksville

Cc: Clarksville City Council / CEDC
Red River County Judge Powell Peek
Congressman Ralph Hall
Senator Kevin Eltife
Representative Mark Homer
Governor Rick Perry
Walt Sears/ NETMWD
James Parks/ RCWPG
Mike Burke/ SRBA
Mike Huddleston/ LWPRWSA

Stephanie Griffin

From: Ann Rushing [abrushing@cebridge.net]

Sent: Friday, September 09, 2005 2:11 PM

To: Region C

Subject: Region C Public Comment

August 9, 2005

Mr. James M. Parks
RCWPG Chairman/Administrator
c/o NTMWD
P.O. Box 2408
Wylie, TX 75098-2408

Reference: Public comment on the Initially Prepared Plan

Dear Mr. Parks and Region C Planning Group:

I appreciate the opportunity to give input for consideration in the Region C Planning Group's Long Term Plan.

I recently sent a copy of a resolution approved by the City Council, of the City of Clarksville, in support of the Marvin Nichols Reservoir and future studies. I am faxing a copy with this letter and I ask that you please consider that resolution as public comment and a copy be given to each board member.

As you are aware, the Marvin Nichols would be approximately 62,000 acres of water for industrial, municipal and recreational usage and I have knowledge that the majority of city and county elected officials support the continued studies of a major reservoir site on the Sulphur River.

As you know, to fully address needs we must plan now for the next fifty years. This planning should be done by not only the planning boards but those elected to represent people in their city or county. To think that the next fifty will be anything like the last fifty is like comparing or contrasting transportation with a crawling baby to space age travel. The first has its necessary place but must be outgrown.

We ask that the Marvin Nichols be included in your finalized plan and adequate studies be conducted to factually determine the total impact of this proposed major reservoir.

If the City of Clarksville can be of any assistance please do not hesitate to call. The economic, recreational and water benefits to Red River County, our region and region C goes without saying.

Sincerely,

Mayor Ann Rushing
City of Clarksville

(36)

Mr Jim Parks, Chairman
Region C Water Planning Group
P.O. Box 2408
Wylie, Texas 75098

Dear Mr. Parks:

I had the honor of addressing you and the Region C Planning Group in Arlington at the July Public Hearing. The entire group acted with courtesy and tact.

I an not sure I made my position clear, and want to go on record as supporting all of your recommendations to Austin. I appreciate the fact that reservoirs are not the number one solution or final solution. In fact, I personally have reservations regarding the largest two, Marvin Nichols and Fastrill. However, the smaller reservoirs on the list provide increased water supply and security as well as benefiting local economy. In Lake Ralph Hall's situation, the proposed reservoir would actually correct an environmental problem.

The Upper Trinity Regional Water District Board of Directors spend time and effort in formulating and implementing water strategies. These include conservation (not only of water but watershed protection), reuse (to increase when allowed), and Lake Ralph Hall. I believe in Upper Trinity's plans and commitment.

The Region C Group's recommendations are wide-spread and far-reaching. They take into consideration future needs, land use, and financial benefit. You are all to be commended for your effort.

Sincerely,

Martha L. Mason

Martha L. Mason, Argyle representative
Upper Trinity Regional Water District
624 Charyl Lynn Drive
Argyle, Texas 76226

(37)

Miss Kimberly Westmoreland
1350 Lakeview Dr.
Southlake, TX 76092

July 29, 2005

Region C Water Planning Group
c/o Jim Parks, Chairman
North Texas Municipal Water District
P.O. Box 2408
Wylie, TX 75098

Mr. Parks,

I wish to express my opposition to the Region C Water Planning Group's Draft Plan for four new reservoirs in East Texas. My concern is that these reservoirs would flood hundreds of square miles of East Texas including an area planned by the U.S. Fish and Wildlife Service as the Neches River National Wildlife Refuge. Alternatively, I promote your recommendation of meeting Region C's projected 55-year water demands through conservation, reuse, and bringing water from existing underutilized reservoirs, according to the Draft Plan. For the sake of preserving important wildlife habitat I support removing all proposed new reservoirs as either recommended or alternative strategies in the 55-year Region C Water Plan. Thank you for your consideration.

Sincerely,

Kimberly Westmoreland

Kimberly Westmoreland

THE TOWN OF FLOWER MOUND TEXAS

LEGISLATIVE SERVICES

August 1, 2005

James M. Parks
RCWPG Chairman
c/o NTMWD
P.O. Box 2408
Wylie, Texas 75098-2408

Region C Water Board:

We in Flower Mound understand and appreciate the importance of progress, careful planning, and vision. As public servants, we also know that we have the responsibility to make decisions that are in the best interest of those we serve. When addressing an issue as complex as our water supply, exploring all of the available options is a responsible approach to vigilant planning and we applaud Region C for doing so. There comes a time in the planning process in which one must prioritize the options and proceed with the best possible option. Lake Ralph Hall is not the best possible future water supply for Flower Mound, Denton County, or Region C.

The Town of Flower Mound is opposed to the construction of Lake Ralph Hall on the timeline proposed by the Upper Trinity Regional Water District. We believe that Region C and the Texas Water Development Board were correct in 2001 when they listed this lake as an Alternative Water Supply Strategy, and nothing has changed over the past four years that would warrant upgrading Lake Ralph Hall's priority status. The lack of identified need, the abundance of planned projects, the potential of numerous untapped sources, and the reputation of Dallas Water Utilities as a reliable provider all lead to the conclusion that Lake Ralph Hall is not needed at this time and should remain an alternative supply option.

In addition, because reuse benefits have been prematurely calculated into the per unit cost estimates for Lake Ralph Hall, the retail water rate projections for the reservoir are artificially low. This inaccuracy provides for an inequitable comparison between Lake Ralph Hall and the region's other water supply options. This discrepancy, misinformation, and the conflicting reports and projections, are all bringing Lake Ralph Hall into question and causing more and more residents and elected officials of Denton County to question the justification of this project and voice their concerns related to the lake. They too question why it would be necessary to prematurely drive landowners from their property and increase water rates when other reliable and cost effective water sources exist.

2121 Cross Timbers Road • Flower Mound, Texas 75028 • Office: 972/874-6070 • Fax: 972/874-6453 • TDD· 1-800-RELAY-TX

Dallas Water Utilities has ample supply to meet the Upper Trinity Regional Water District's needs over the next planning horizon. Lake Ralph Hall is a gratuitous project that will unnecessarily force the residents and businesses of Denton County to pay higher water rates much earlier than is necessary. We are not asking that Lake Ralph Hall be disregarded altogether. We are simply requesting that it remain an alternative water supply strategy rather than a recommended reservoir, until such time as it does become a necessary and financially responsible project.

Sincerely,

Jody A. Smith
Mayor

Paul Stone
Mayor Pro Tem
Councilmember Place 2

Joel Lindsey
Deputy Mayor Pro Tem
Councilmember Place 1

Tim Trotter
Councilmember Place 3

Laurie Long
Councilmember Place 4

Jeff Tasker (PP)
Councilmember Place 5

Stephanie Griffin

From: Tom Gooch
Sent: Friday, August 26, 2005 1:32 PM
To: Simone Kiel; Stephanie Griffin
Subject: FW: Town of Flower Mound Resolution
Attachments: Resolution 18-05.pdf

From: Jim Parks [mailto:jparks@NTMWD.COM]
Sent: Friday, August 26, 2005 12:58 PM
To: Tom Gooch
Subject: FW: Town of Flower Mound Resolution

From: Tammy Follett [mailto:tammy.follett@flower-mound.com]
Sent: Friday, August 26, 2005 12:01 PM
To: Jim Parks
Cc: Harlan Jefferson; Paula "Lawrence" Paschal
Subject: Town of Flower Mound Resolution

Attached is Resolution No: 18-05 approved by the Flower Mound Town Council on August 1, 2005

Tammy Follett **<<Resolution 18-05.pdf>>**
Deputy Town Secretary
Town of Flower Mound
Legislative Services
972.874.6070
tammy.follett@flower-mound.com

TOWN OF FLOWER MOUND, TEXAS

RESOLUTION NO. 18-05

A RESOLUTION OF THE TOWN COUNCIL OF THE TOWN OF FLOWER MOUND, TEXAS REQUESTING THAT THE PROPOSED PLAN OF UPPER TRINITY REGIONAL WATER DISTRICT TO DEVELOP AND CONSTRUCT LAKE RALPH HALL BE PLACED ON THE "ALTERNATIVE WATER SUPPLY STRATEGIES" LIST AS ORIGINALLY CONTAINED IN THE REGION C WATER PLANNING GROUP'S 2001 PLAN.

WHEREAS, the Town of Flower Mound ("Town") purchases the majority of its water from Upper Trinity Regional Water District ("UTRWD"); and

WHEREAS, the water rates charged by UTRWD to the Town and its citizens have significantly increased and are proposed to continue to increase in future years; and

WHEREAS, as part of its plan to meet water supply needs, UTRWD is currently purchasing raw water from the City of Dallas ("Dallas"), and has represented that it plans to increase such purchases in the future pursuant to a long-term water supply contract; and

WHEREAS, also as part of its plan to meet water supply needs, UTRWD has proposed to develop Lake Ralph Hall in Fannin County at an estimated cost of $209,000,000 to $265,000,000, which, according to UTRWD's own projections, would yield approximately 30 MGD (million gallons per day) beginning in about 2025; and

WHEREAS, according to UTRWD, the proposed Lake Ralph Hall's yield of 30 MGD will represent approximately fifteen percent (15%) of its estimated demand in 2025; and

WHEREAS, according to UTRWD, Dallas will remain the source for the majority of UTRWD's water in 2025; and

WHEREAS, Dallas, as part of Region C, which also includes UTRWD, is evaluating water sources and is conducting long-term planning to meet expected increased future water demands from its customers, including UTRWD; and

WHEREAS, the Town, a member of UTRWD, has publicly opposed the proposed Lake Ralph Hall on the basis that it is not necessary as other more cost-effective alternatives are, and will be, available to meet increased long-term demands through 2060.

NOW, THEREFORE, BE IT RESOLVED BY THE TOWN COUNCIL OF THE TOWN OF FLOWER MOUND, TEXAS:

SECTION 1

That the Town Council of Flower Mound hereby expresses its support for UTRWD's emphasis on water conservation and reuse of existing water supplies.

SECTION 2

That the Town Council of Flower Mound hereby expresses its support for, and recognizes the need for, UTRWD to diligently evaluate and plan to acquire adequate, long-term water supplies, taking great care to evaluate all reasonable alternatives for cost-effective, safe, and reliable water sources.

SECTION 3

That after careful consideration of the information provided by UTRWD and information acquired from other publicly available sources, UTRWD has not adequately justified or demonstrated the need for the development of Lake Ralph Hall and the attendant costs associated with the project.

SECTION 4

That the Town Council of Flower Mound is supportive of the proposed Lake Ralph Hall remaining on the list of potential UTRWD's projects as an "Alternative Water Supply Strategy" as contained in the 2001 Region C Plan, but is not supportive of UTRWD's plans and expenditures to develop Lake Ralph Hall as provided on their current schedule.

SECTION 5

That should Lake Ralph Hall be developed by UTRWD, the cost of such development should be borne by the future communities and customers, whose water demands have necessitated the project – through a cost-center approach or other similarly designed cost-allocation plan.

SECTION 6

That this Resolution shall take effect immediately from and after its passage, and it is so resolved.

DULY PASSED AND APPROVED on this the 1st day of August 2005.

TOWN OF FLOWER MOUND, TEXAS

Jody A. Smith, MAYOR

ATTEST:

Paula J. Paschal, TMRC, Town Secretary

APPROVED AS TO FORM AND LEGALITY:

Terrence S. Welch, Town Attorney

(39)

August 2, 2005

Region C Water Planning Group
c/o Jim Parks, Chairman
North Texas Municipal Water District
P.O. Box 2408
Wylie, TX 75098

Dear Members of the Planning Group,

I submit the following to be included in the public record.

I write to express my very strong opposition to destruction of any more of our precious Texas rivers through construction of unnecessary and harmful dams.

(a) In particular, I oppose the inclusion of the following dams in the Region C Water Plan: Marvin Nichols, Fastrill, Lower Bois d' Arc Creek and Ralph Hall. It has been clearly and thoroughly demonstrated that, if alternative measures are taken, none of these reservoirs is needed. The dams in question would cause the loss of hundreds of square miles of some of the most important and valuable wildlife habitat in the state. They would also have a tremendously negative impact on ranching, farming and the timber industry.

(b) I think it is becoming undeniably clear that the age of big dams needs to end. The cost simply does not justify the end. And I am not just speaking of the monetary cost, which is tremendous. But the long-range damage done to our increasingly stressed environment is far greater. I have firsthand knowledge of the Neches River. I have canoed it and hiked along its banks on many occasions for many years. The Neches bottomland is an extremely important source of wildlife habitat, and it offers the type of peaceful solitude that is all but extinct in this state. It's rarity demands that it be preserved for future generations to enjoy and cherish. The proposed Fastrill Reservoir would flood an area which the U.S. Fish and Wildlife Service hopes to preserve as the Neches River National Wildlife Refuge. Texas has the smallest amount of public access acreage per capita of almost any other state. We have at this time a rare opportunity to begin remedying that shameful situation. That is clearly the most valuable and visionary use of the land under consideration.

(c) As for Marvin Nichols Reservoir, the Region D Planning Group concludes that it would negatively impact agriculture and natural resources. A majority of the people who live in the area and know it best are very much against the project.

If we are to preserve the environmental integrity of Texas, then we absolutely must preserve what we have left of our hardwood bottomlands. Some of these bottomlands could provide habitat for the Ivorybill Woodpecker which, until recently, was believed to be extinct. It was endangered specifically because of the destruction of the very type of habitat that the proposed dams would decimate.

The reservoirs under discussion are particularly wasteful because they are unneeded! The projected 55-year water demands of Region C can be met through water brought from underutilized reservoirs and, through judicial reuse of water and, above all, through conservation. Wiser use of existing water supplies is clearly what is called for. We waste way too much water. We must not further waste our natural resources by way of constructing unnecessary, terribly damaging dams.

(d) Back in May, the Planning Group indicated a commitment to look into ways of better utilizing existing reservoirs. This is the way of wise use. Your own studies indicate that existing reservoirs can supply 70% more water than the projected need. So why are we even thinking about these expensive, wasteful dams?

To condemn the property of others for water that can be attained in other less wasteful, far less damaging ways is just absolutely and obviously wrong. These dams are wrong in every way. They represent shortsightedness. They represent an abject lack of vision. They represent monumental waste of money and resources. They represent the kind of mistakes that have been made in the past when we treated our precious natural resources as if they were infinite. Surely we have learned that they are not infinite. I pray that we are moving into an age of wise stewardship of the good earth. Rejecting these unneeded, wasteful water projects will help demonstrate that we have. I urge that you do so.

(e) Finally, I come to what I believe is the most important question which is never asked. I hope you will open your mind and heart and give it serious consideration. If these huge areas of forest and field are forever flooded, where will the animals go? Where will the animals go?

Sincerely,

Jim D. Bush

Jim D. Bush
803 Cantrell St.
Waxahachie, TX 75165-3101
Jdbush49@aol.com

August 4, 2005

Dear Mr. Parks -

Concerning the proposed four (4) reservoirs, I and many others I know, who have not written are against their construction. We believe we need to conserve more water and reuse more existing water in current reservoirs.

Instead of displacing farmers & ranchers + families off their land, maybe, for example, the 'Planning Group' needs to coordinate with the towns and close some of the hundreds of golf courses. That would affect me but it makes sense and is feasible.

I would hope your group would not build the Fastrill Reservoir. With our population growth, we should be saving every acre of natural beauty our state has - The planned Neches River National Wildlife Area should be established without question!

Please realize there are many people, who do not write, that are against four new reservoirs being built in Texas.

Thank you for your time. Sincerely,

Nan Moss

41

Parker County Utility District No. One
P. O. Box 1724
Springtown, Tx. 76082

August 6, 2005

James M. Parks
RCWPG Chairman/ Administrator
c/o NTMWD
P. O. Box 2408
Wylie, Tx. 75098-2908

Re: Regional Water Planning

I submit these comments in two Parts. First I strongly encourage the efforts of the regional planning group and support their efforts to ensure an adequate supply of water for the future of North Central Texas.

However when I examine the strategy or purpose of this planning and I note one key factor is absent. That factor is financial programs that allow the end user (cities) the opportunity to utilize the benefits of Regional Planning.

There currently exist numerous rural communities with small populations ranging between 2-4000 people. These small communities have been identified in previous regional planning documents as "high growth areas". The majority of these communities have operated their water systems utilizing wells for the source of supply. Engineers have documented the various aquifers in the region and have concluded although the supply may be ample the real issue is the time lapse to recharge the aquifers. Consequently during the hot dry spells of summer these water systems are over worked to accommodate the demand.

These communities acknowledge the dire need to convert these systems to a surface water supply. Their current maintenance, and treatment costs and existing system debt incurred to install the current water system serves as a deterrent to obtain the new financing required to acquire surface water supply. These communities simply lack the financial capacity to benefit from the regional water programs.

Surface water supply for most communities requires a purchase of water allocation (supply), a pipeline to bring the water to their system, and then an upgrade to existing systems to handle the increased demand. I propose the State is mandated to review the current financial process to accommodate these communities. It is not reasonable to finance new highways and economic growth for the state that provides for increased growth with no provisions provided for the basics of life, like water supply. If these communities cannot accommodate the tremendous growth experienced in the region than I question the value what has been gained by the state promotion of transportation and economic growth.

I submit a financial program with deferred payments could provide an opportunity for these communities to participate in the benefits of regional planning. This financial program should be available for both water and waste water systems. I propose a seven (7) year deferred payment to allow the community to construct their facilities and achieve the increased revenue stream. The State normally occupies the role to create guarantees for the bond issues that create funding for the Water Development Board. I submit the financial planners would have to explore a way to provide for the initial delay by the community to commence repayment. However I also submit that community engineers can document the increase of revenue created by the proposed system improvements that would satisfy the financial prerequisites for making the loan. It is the initial period of time that is crucial for the implementation of this program.

I also submit if such a program was available to assist these communities that a significant increase in demand for supply regional planning would occur.

I realize these comments are not consistent with the current planning directives. I would request the current guidelines be modified to address this issue that directly affects tens of thousands of Texas residents that require this form of assistance to maintain a safe and sanitary standard of life in these communities.

Respectfully,

A.G. Swan
Chairman

Copy to: Freeze & Nichols
Dr. Phillips
PCUD Members
Senator Kay Bailey Hutcheson
Senator John Coryn
Congresswoman Kay Granger

Region C Water Planning Group
c/o Jim Parks, Chairman
North Texas Municipal Water Dist.
PO Box 2408
Wylie, Tx 75098

August 8, 2005

Dear Sirs,

I am writing to express my opposition to any new reservoirs as part of the Region C Water Plan. I see no need for the endless damming of rivers c̄ destruction of valuable property c̄ wildlife. On the other hand, I see every need to promote efficient use of water. I am so distressed at the waste of water c̄ excessive consumption levels in DFW vs. the rest of the state. If we can require/coerce people to water properly, landscape sensibly, repair leaks c̄ replace ancient water pipes we would not need these massive dam projects. I for one would be willing to pay far more for my water if that would encourage conservation.

Sincerely,

Lori Periche c̄ George Misium
12660 Hillcrest #4101
Dallas, Tx 75230

The Nature Conservancy
SAVING THE LAST GREAT PLACES ON EARTH

The Nature Conservancy of Texas
3888 Hwy 327 West
Silsbee, Texas 77656

tel [409] 385 0445
fax [409] 385 4745

nature.org/texas

August 9,2005

Mr. Jim Parks, Chairman
North Texas Municipal Water District
P.O. Box 2408
Wylie, Texas 75098

Mr. J. Kevin Ward, Executive Administrator
Texas Water Development Board
P.O. Box 13231
Austin, Texas 78711-3231

Dear Mr. Parks and Mr. Ward,

Enclosed are comments regarding Region C and Region I of the Texas State Water Plan, specifically regarding the construction of the Fastrill Reservoir and Rockland Dam. Public comments were also expressed at the July 14, 2005 public forum at the Jefferson County Courthouse held in Beaumont, Texas.

The Nature Conservancy's is an international non-profit organization that preserves plants, animals and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. To date the Conservancy and its nearly 1 million members have been responsible for the protection of more than 15 million acres in the United States.

In cooperation with a multitude of conservation partners The Nature Conservancy completed ecoregional assessments of the Upper West and West Gulf Coastal Plain ecoregions in July 2002 and July 2000 respectively. Using current documentation of known species and communities the planning process led to the identification and prioritization of ecologically significant areas for conservation measures. Conservation databases of both The Nature Conservancy and Texas Parks and Wildlife Department where utilized during the planning process.

The Neches River and its major tributaries were identified as priority aquatic sites in the ecoregional assessments. Species and communities of significance associated with Neches River include, but are not limited to the: American swallow-tailed kite, Louisiana pigtoe mussels, sandbank pocketbook mussels, crayfish, Sabine shiner, scarlet catchfly, paddlesfish, suckermouth minnow, timber rattlesnake, mesic slope forests, bald cypress-water tupelo swamp forest and various bottomland hardwood forest associations.

With the Neches River being generally characterized as a slow-moving, wide river occurring on the coastal plain soil and parent material can be carried in high water events far downstream. Various gravel, sand and rubble materials which are important for the lifecycles of certain species such as spawning paddlefish are deposited during the occurrence of flood-pulse events. In addition smaller streams, oxbow lakes and sloughs provide additional habitat including thermal refugia for warm water fish species during the winter months.

With the lack of pronounced topographic relief the Neches River may drain watersheds of several hundred square miles thus highlighting the need to consider impacts and conservation measures from a landscape perspective. In keeping with the mission of The Nature Conservancy our organization is committed to conservation efforts that support maintaining adequate flow regimes for aquatic organisms that utilize systems including the Neches River from below Lake Palestine Dam to the City of Beaumont, Beech Creek, Big Sandy Creek, Hickory Creek, Little Pine Island Bayou, Pine Island Bayou, Turkey Creek, and Village Creek. Of particular interest is the course of these systems as they flow through the Big Thicket National Preserve, Village Creek State Park and the Nature Conservancy's Roy E. Larsen Sandyland Sanctuary, a 5,654-acre project located on Village Creek in Hardin County. In addition the Nature Conservancy supports Alternative B of the proposed North Neches River National Wildlife Refuge which would conserve an additional 25,281 acres of the river system.

The construction of the Fastrill and Rockland Dams have the potential to have cumulative, negative environmental impacts on the Neches River, its major tributaries and well-documented sites of biological diversity. We support the protection of these valuable resources in coordination with conservation measures, education and outreach.

The Nature Conservancy appreciates the opportunity to provide both written and public comments regarding the issue of conservation of the state's water resources. We hope you will give consideration to the provided comments regarding the Region C and Region I sections of the Texas State Water Plan.

I would be happy to provide copies of ecoregional plans as discussed above, or any other information. You may contact me at (409) 385-0445 ext. 12 or wledbetter@tnc.org.

Sincerely,

Wendy J. Ledbetter

Wendy J. Ledbetter
Southeast Texas Projects Director

(44)

Renee Solinger Audette
6009 Laurel Oaks
Dallas, TX 75248

August 14, 2005

James M. Parks
P.O. Box 2408
Wylie, TX 75098-2409

Dear Mr. Parks:

I have been following the water planning issues, and saw in the Morning News that we have an opportunity to write to you and voice our opinion. So I am taking this opportunity to voice my total opposition to any new reservoirs or any other destruction of what little natural habitat is left.

I live in Far North Dallas and walk my neighborhood every day. Most people have sprinkler systems, and EVERY SINGLE SPRINKLER SYSTEM I see waters the sidewalk in addition to the grass. The waste is incredible. I have noticed this with commercial sprinkler systems as well. In addition, we live in a semi-arid environment. Why do we need to have green lawns? People need a paradigm shift when they move here. Stop trying to make your lawn look like what you had up north.

Other than what the City of Dallas inserts into my water bill, there has not been a strong campaign to educate the people moving here and already living here as to what is acceptable water usage and acceptable water needs.

Foundations need to be watered. Vegetation does need to be watered, but you can plant drought tolerant plants and grasses. Builders should stop seeding with Bermuda and use St. Augustine. It's basically a weed, but it is green with little effort. If everyone, real estate agents, local nurseries, builders, etc., helped with a public awareness campaign, you might get people to start thinking differently.

There is SO MUCH MORE that can and should be done before we even consider the destruction of natural habitat. That is the old way. Not changing our ways, but destroying the environment is the old way of doing things. Let's ALL start to change how we use water, how we think about water, and how we think about this incredible planet we have the privilege of living on.

Sincerely,

Renee Solinger Audette

45

UPPER TRINITY
REGIONAL WATER DISTRICT

P.O. Drawer 305 • Lewisville, TX 75067

(972) 219-1228 • Fax: (972) 221-9896

August 15, 2005

Mr. Jim Parks, Chairman
And Members of Region C Planning Group
C/o North Texas Municipal Water District
P. O. Box 2408
Wylie, TX 75098

RE: Initially Prepared 2006 Region C Water Plan

Dear Mr. Parks:

On behalf of Upper Trinity Regional Water District, we appreciate Region C Water Planning Group for its diligence and hard work in drafting the Initially Prepared 2006 Region C Water Plan. The Planning Group has a great responsibility to evaluate and recommend a set of strategies that will assure an adequate regional water supply for the next 50-years.

The Draft Plan is comprehensive and reflects excellent work by the Planning Group. We have conducted a detailed review of the Draft Plan and note only a few items that require correction in the final document. These comments and requested modifications are enclosed for your consideration and action

Thank you again for your vision and staying the course in planning for our future water needs. If you have any questions, please do not hesitate to contact me or Larry Patterson, Director of Engineering Services, at 972-219-1228

Sincerely,

Thomas E. Taylor
Executive Director

TET/jp

Encl: Requested Modifications to Initially Prepared 2006 Region C Water Plan – Volume I
Requested Modifications to Initially Prepared 2006 Region C Water Plan – Volume III

Cc: Tom Gooch, Region C Water Planning Group Consultant, Freese & Nichols
Larry Patterson, Director of Engineering Services, UTRWD

UPPER TRINITY

REGIONAL WATER DISTRICT

Requested Modifications to Initially Prepared 2006 Region C Water Plan – Volume I

	Item	Page Number	Comments
a	1	1.53 to 1.54	Add UTRWD's as a major water provider including its Water Management Strategies. Also, UTRWD should be listed under Marvin Nichols I with a yield allocation of 35,000 acre-feet per year.
b	2	3.5 – Table 3 2	Water supply available from Chapman Lake in 2010 is 16,106.
c	3	3.5 – Table 3.2	Change Upper Trinity MWD to UTRWD
d	4	3.18 – Table 3 8	Water supply available from Chapman Lake in 2010 is 16,106.
e	5	3.24	Should be Lake Cities Municipal Utility Authority
f	6	4C.4 – Table 4C.1	Add UTRWD as a sponsor of Marvin Nichols Reservoir
g	7	4C 7 - Table 4C 2	Add UTRWD as a Potential Sponsor for Lake Wright Patman (raise flood pool), Oklahoma Water, and Lake Wright Patman (Texarkana). not in cost est. Add ?
h	8	4C.7 - Table 4C.2	Add UTWD as alternative to Toledo Bend Reservoir and Lake Texoma Not Yet Authorized (Blend).
i	9	4C 14	Delete reference to City of Irving having completed studies / permit on Lake Ralph Hall.
j	10	4C.22 – Table 4C 6	Make the Potential Sponsors in this table consistent with the Potential Sponsors in Table 4C.2.
k	11	4C 23 – Table 4C 6	Lake Ralph Hall was listed as an alternative in 2001 Water Plan. Under Recommended in 2001 Plan, "No (alternate)".
l	12	4C 23 – Table 4C.6	Update to make consistent with UTRWD Recommended Water Management Strategies.
m	13	4D 4 – Table 4D 2	Add UTRWD as potential supplier for Toledo Bend Reservoir, Wright Patman System, and Lake Texoma Not Yet Authorized (Blend)
n	14	4F.18 – Table 4F.8	Fort Worth should be listed as current/ future sources for Trophy Club instead of UTRWD.
o	15	4F 27	90% of Lake Ralph Hall water will be transported to Denton County and 10% will remain for use in southern Fannin County.
p	16	6.18 – Table 6 4	Add Lake Ralph Hall reuse to table to be consistent with Draft Plan.

General Note:

q The name of the proposed reservoir by Upper Trinity is Lake Ralph Hall. There are several locations in Volume 1 that list it as Ralph Hall Lake

UPPER TRINITY

REGIONAL WATER DISTRICT

Requested Modifications to Initially Prepared 2006 Region C Water Plan – Volume III

	Item	Page Number	Comments
r	1	T-3, Appendix T Table 1	Row 10 - - UTRMWD in Comment column should be changed to UTRWD
s	2	T-3, Appendix T Table 1	Row 14 - - UTRWD should be added as an Entity along with NTMWD for George Parkhouse North
t	3	T-11, Appendix T Table 2	Row 4 - - UTRWD should be added as an Entity along with NTMWD for George Parkhouse North
u	4	Table U-17	Toledo Bend is an Alternative Strategy for UTRWD

(46)

MARTHA DAVIS
P. O. BOX 44
PALESTINE, TEXAS 75802

August 16, 2005

Region C Water Planning Group
Mr. Jim Parks, Chairman
North Texas Municipal Water District

Dear Mr. Parks,

My husband and I are small fourth generation ranchers in Anderson County, and we want No New Reservoirs in the final Region C Water Plan. Our natural resources are precious to us, and we strongly oppose losing our East Texas land to provide water for Metropolitan areas like Dallas who have yet learned how to conserve water.

Thank you.

Martha Davis
(Mrs. Charles C.)

Charles C. Davis

47

Kirk Miller
517 Cap Rock Drive
Richardson, Texas 75080-2307

August 21, 2005

Mr. Jim Parks, Chairman
Region C Water Planning Group
North Texas Municipal Water District
P.O. Box 2408
Wylie, Texas 75098

Dear Mr. Parks:

I strongly oppose the North Texas Draft Plan for *any* new dams in east and northeast Texas.

According to the Draft Plan, your recommendation of conservation, recycled water, and obtaining water from existing sources makes any new reservoirs unnecessary. This recommendation, along with additional existing reservoirs as alternative strategies, provide *twice* the water needed through 2060.

Since our water needs can be met by using existing reservoirs, none of the recommended four dams is needed (Marvin Nichols, Fastrill, Lower Bois d'Arc Creek, Ralph Hall Lake), nor any of the alternative strategies (George Parkhouse, Columbia, Tehuacana).

Please follow through on the commitment that you made at your May meeting: to explore options that fully use existing reservoirs before considering any new reservoirs. Such action will preserve Texans' private land as well as Texas' precious wildlife habitat.

Please follow your group's own recommendation, and do not include *any* new reservoirs in the final Region C Water Plan.

Sincerely,

Kirk Miller

Kirk Miller

48

August 22, 2005

Region C Water Planning Group
c/o Jim Parks, Chairman
North Texas Municipal Water District
P.O. Box 2408
Wylie, TX 75098

Dear Mr. Parks and Planning Group Members,

Please include my comments as part of the public record on this issue.

I am strongly opposed to continued planning for construction of dams which are not needed and are also harmful to river environments in Texas.

Specifically, I strongly oppose the inclusion of the Marvin Nichols, Fastrill, Lower Bois d' Arc Creek and Ralph Hall dams in the Region C Water Plan. There is clear proof that none of these dams or reservoirs are needed if better, alternative plans are used. In addition to river environment destruction, these dams would also have adverse impacts on ranching, farming and timber industries.

The cost in funds and adverse environmental impacts is too great. We have to move away from big dam building to better alternatives. These reservoirs/dams are especially wasteful because they are not needed. Region C's water needs for the next half century can be met through water from underused sources and conservation, not by constructing unnecessary dams.

The Planning Group had indicated last spring that there would be a commitment to look into ways of better utilizing existing reservoirs, and your studies show existing reservoirs can supply 70% more water than the projected need. Where is your commitment now?

Instead of honoring your commitment to wise use and a long view of the situation, there seems to be a stubborn plodding down the short-sighted path to more waste and harm.

It is long past time that business as usual in dam and reservoir building STOP being business as usual. Take the better routes available to you. You already know them.

Sincerely,

Sandra Minatra

Sandra Minatra
803 Cantrell Street
Waxahachie, TX 75165-3101
skminatra@aol.com

Justin
A Proud and Progressive Hometown Community

August 26, 2005

Mr. Jim Parks, Chair RCWPG
North Texas Municipal Water District
P.O. Box 2408
Wylie, Texas 75098

RE: Initially Prepared 2006 Water Management Plan

Dear Mr. Parks:

On behalf of the City of Justin, we want to thank you and the Region C Water Planning Group for your work in preparing the draft Water Plan.

Justin gets it water from local water wells and the Upper Trinity Regional Water District. However, rapid growth is occurring and we will not be able to depend on the water wells for our entire water supply. Because we are a Member and partner with Upper Trinity, they have included our future needs in its long-range water plan to ensure we have enough water for the future.

We urge you to adopt the Plan's water management strategies and the alternatives as written, including the strategies for our area and for Upper Trinity Regional Water District. These strategies will go a long way toward assuring that our families and friends never face a water shortage.

For your reference, I am enclosing a copy of the adopted Resolution our City Council passed in support of Upper Trinity's long-range water supply planning efforts.

Thank you again. If you have any questions or need additional information, please feel free to contact me at 940/648-2541, Ext. 102.

Sincerely yours,

Virginia L. Blevins

Virginia Blevins
Asst. City Administrator / City Secretary

Encl: Resolution No. 2005-325

Cc: Jason Pierce, Manager of Public Information, Upper Trinity Regional Water District

RESOLUTION

RESOLUTION 2005 - 325

A RESOLUTION OF THE CITY COUNCIL, CITY OF JUSTIN CONCERNING LONG-RANGE WATER SUPPLY PLANNING FOR THE SERVICE AREA OF UPPER TRINITY REGIONAL WATER DISTRICT.

WHEREAS, according to the provisions of Senate Bill One (passed by 75th Texas Legislature) Upper Trinity Regional Water District (Upper Trinity) is required to prepare plans to assure an adequate supply of water for its customers for at least 50 years into the future; and

WHEREAS, Upper Trinity has been diligent and prudent in securing an adequate water supply for present needs and for many years into the future; and

WHEREAS, Upper Trinity is implementing measures to promote water conservation and reuse, and is taking steps, including the evaluation of alternative strategies to meet the needs of growth that is expected within its service area, including due consideration for technical, financial and environmental factors; and

WHEREAS, Upper Trinity is currently purchasing raw water from the City of Dallas, and plans to increase such purchases in the future pursuant to a long-term water supply contract; and

WHEREAS, Upper Trinity is working with other entities within Region C to evaluate other water sources that may be beyond the capability of Upper Trinity alone to develop or acquire; and

WHEREAS, over 20 cities and utilities within Region C rely on Upper Trinity's efforts to acquire adequate supplies of water for the future - - and, in doing so, to consider cost, timeliness, reliability, risk, safety and availability; and

WHEREAS, Upper Trinity has filed applications with the Texas Commission on Environmental Quality to secure rights for reuse of water being imported from Chapman Lake and to secure rights to divert additional water from the Sulphur River Basin (Lake Ralph Hall); and

WHEREAS, Upper Trinity has planned ahead and has contracted for capacity in an existing pipeline system to Chapman Lake (owned and operated by City of Irving),

which pipeline has excess capacity that must be considered when comparing alternatives; and

WHEREAS, proposed Lake Ralph Hall is near the existing pipeline and is one of several alternative strategies being considered by Upper Trinity, an alternative that, when all relevant factors are considered, is sound from an environmental perspective and will help serve the long-term needs of this region.

NOW, THEREFORE, be it resolved by the City Council, City of Justin:

SECTION 1. That it is in the best interest of this region for Upper Trinity to diligently pursue and to be successful in acquiring adequate water supplies for the next 50 years, taking great care to spread risks between different strategies and sources.

SECTION 2. That the City Council hereby expresses its support for Upper Trinity's emphasis on water conservation and reuse of existing water supplies, and for Upper Trinity's plans to develop proposed Lake Ralph Hall in Fannin County, enabling the use of existing pipeline capacity to transport the water to the Trinity River Basin.

SECTION 3. That the City Council hereby urges the Region C Water Planning Group to include Lake Ralph Hall as a proposed strategy in the updated water plan now being prepared for this region; and

SECTION 4. That the City Council realizes that typical water supply projects take 25 to 40 years for completion, requiring vision and courage, and involving risks and controversy; and, accordingly the governing body of Upper Trinity Regional Water District is to be commended for its diligent efforts on behalf of its many members and customers.

SECTION 5. That this Resolution shall become effective immediately upon its passage.

DULY PASSED AND APPROVED THIS 14 **DAY OF** March **2005.**

Executed: [illegible]
(Name and Title) Mayor

Attest: Virginia L. Blevins
(Name and Title) City Secretary

CITY OF JUSTIN
JUSTIN, TEXAS

50

TEXAS WATER DEVELOPMENT BOARD

August 29, 2005

Mr. Bruce Walker
Chair, Golden Triangle Group Sierra Club
795 19th Street
Beaumont, Texas 77706-5001

Dear Mr. Walker:

The Texas Water Development Board (TWDB) welcomes public input regarding methods and assumptions applied in state and regional water planning. Thank you for providing us a copy of your comments on the Region C and the Region I draft 2006 regional water plans. The Planning Groups must consider your comments when revising their plans prior to final adoption and submittal to TWDB by January 2006.

Copies of your comments will be forwarded to Region C and Region I.

If we can be of any assistance, please contact me at 512/ 475-0933 or Mr. Bill Roberts of my staff at 512/ 936-0853.

Sincerely,

C L Brittin

Carolyn L. Brittin
Director, Water Resources Planning Division

cs: David Alders, Chair, Region I
Jim Parks, Chair, Region C

August 2, 2005

TWDB
RECEIVED
AUG 22 2005
ROUTETO:
CCTO:

Mr. J. Kevin Ward, Executive Director
Texas Water Development Board
P.O. Box 13231
Austin, TX 78711-3231

Dear Mr. Ward:

(a) The Golden Triangle Group of the Lone Star Chapter of Sierra Club, located in the Beaumont, TX area, and the southern limits of Region I, opposes the consideration of Fastrill and Rockland Dams/Reservoirs in any near future Regional Water Plans, either, Region I, Region C or the final State plan.

This proposed Alternate Management Strategy is ill advised and not completely thought through by all parties concerned based on several facts:

(b) 1) Fastrill Reservoir has been proposed as a future water supply for Region C, aka Dallas area. But Dallas already has the distinction of the highest water consumption rate per capita by far of any of the sixteen Regions in Texas and the least efforts at conservation of any of the Regions.

(c) 2) It has been offered by Region I to sell some of their excess existing reservoir water to Dallas as one possible alternative, and facts support that with the exception of severe drought in Region I, there is sufficient water available for that purpose, provided Region C implements a realistic water conservation strategy.

(d) 3) Each of these two areas proposed for possible future reservoir sites would inundate thousands of acres of irreplaceable bottomland hardwood effectively removing them from production, and therefore, significantly impact a top economic industry in Texas, namely the forest and forest products industry which provides a major portion of the economy for not only the East Texas area, but, the state as well.

(e) 4) Each of the two proposed sites also has significant natural characteristics, which makes each prime areas for visitors, another leading economic industry in Texas. Creating reservoirs in either or both of these sites would remove valuable ecologic heritage from Texas for all future generations.

(f) 5) The Big Thicket Natural Preserve, a world class ecologic area located downstream from both of these proposed sites, is refreshed and recharged by periodic naturally occurring floods on the Neches River. Construction of either or both of the proposed reservoirs would severely or completely eliminate all such flooding and thus significantly alter the ecology of this natural treasure.

6) Sabine Lake, the recipient of all excess waters flowing in the Neches River, is one of only seven estuaries located on the Texas Gulf Coast. Together these estuaries provide for the development of most of the fish and shellfish spawning areas, yet another valuable economic industry not only for the Texas Gulf Coast cities and counties, but the state and nation as well. Limiting the flow of fresh water to any and all of these bays/estuaries has been shown through scientific research to severely hamper the development of the spawning grounds and its inhabitants.

(g)

While water management planning is a necessary component of Texas' future, to fail to adequately make water conservation a top priority/strategy within every Region of Texas, and enforce it diligently, will only require the construction of even more dams/reservoirs in the years to come. With the building of each new dam/reservoir, we take an ever greater amount of land out of other types of production, be it timber, farming, grazing or unique esthetic recreational enjoyment. If water conservation is not aggressively tackled now, this state could find itself without the ability to offer economic livelihoods to its citizens in the not too distant future.

(h)

Water conservation is far better both economically and environmentally than building more dams/reservoirs.

Water management planning is a necessary tool, but that tool must be carefully and thoroughly researched in all aspects before any decision is accepted or a new plan is approved. The creation of the Regional Water Planning Groups a few years ago was a great step forward for the future of Texas. Let us not sidestep that process in the name of big dollars by developers and water hogs as it will have severe effects on all future generations of Texans.

Sincerely,

Bruce Walker

Golden Triangle Group Sierra Club,
Bruce Walker, Chair
bwalker@gt.rr.com

51

City of Ladonia

P. O. Box 5 | Ladonia, Texas 75449
903-367-7011 Office | 903-367-7339 Fax

cityofladonia@koyote.com

August 30, 2005

Mr. Jim Parks, Chairman
Members of Region C Planning Group
C/o North Texas Municipal Water District
P. O. Box 2408
Wylie, Texas 75098

RE: Support for Water Plan

Dear Chairman Parks:

On behalf of the City of Ladonia, thank you and the Region C Water Planning Group for its diligence and hard work in preparing the draft Water Plan. You have an important duty to evaluate and recommend a set of strategies to assure an adequate supply of water for this 16 county area for the next 50 years. We applaud the Planning Group's efforts and appreciate your including the City's water supply needs in the Plan.

Ladonia currently gets its water from water wells. We know that wells are not an adequate long-term water supply source, and we are currently working with Upper Trinity Regional Water District to plan and construct a new reservoir in southeast Fannin County – Lake Ralph Hall. Upper Trinity has included the proposed Lake Ralph Hall as a primary water management strategy in the Plan in order to meet the growing water demands in its service area and meet Ladonia's future needs. Not only will Lake Ralph Hall provide water to Ladonia and Upper Trinity's customers, it is also anticipated to generate approximately $148 million dollars in needed economic development to Fannin County.

We urge the Planning Group to adopt the Plan as prepared – it's the best for the City of Ladonia and for the entire region. Remember that the decisions made now could very well determine what this region and this State can be for generations to come. Thank you again for your foresight and guidance in developing this comprehensive Plan.

If you have any questions or need additional information, please contact me at 903-367-7011.

Sincerely,

Leon Hurse

Leon Hurse
Mayor

City of

SANGER TEXAS

Someplace Special

August 30, 2005

Mr. Jim Parks, Chair RCWPG
North Texas Municipal Water District
P.O. Box 2408
Wylie, Texas 75098

RE: Initially Prepared 2006 Water Management Plan

Dear Mr. Parks:

On behalf of the City of Sanger, we thank you and the Region C Water Planning Group for its hard work in preparing the draft Water Plan.

Sanger currently gets it water from local wells and the Upper Trinity Regional Water District. Upper Trinity has included our future needs into its long-range water plan to ensure we have enough water for the future.

We urge you to adopt the Plan's water management strategies and the alternatives, including the strategies for our area and for Upper Trinity Regional Water District. These strategies will go a long way toward assuring that our families and friends never face a water shortage.

For your reference, I am enclosing a copy of the adopted Resolution our City Council passed in support of Upper Trinity's long-range water supply planning efforts.

Thank you again. If you have any questions or need additional information, please feel free to contact me at 940-458-7930.

Sincerely,

Jack Smith
City Manager

Encl: Adopted Resolution

Cc: Jason Pierce, Manager of Public Information, Upper Trinity Regional Water District

RESOLUTION

RESOLUTION 2005 -#03-03-05

A RESOLUTION OF THE CITY COUNCIL, CITY OF SANGER CONCERNING LONG-RANGE WATER SUPPLY PLANNING FOR THE SERVICE AREA OF UPPER TRINITY REGIONAL WATER DISTRICT.

WHEREAS, according to the provisions of Senate Bill One (passed by 75th Texas Legislature) Upper Trinity Regional Water District (Upper Trinity) is required to prepare plans to assure an adequate supply of water for its customers for at least 50 years into the future; and

WHEREAS, Upper Trinity has been diligent and prudent in securing an adequate water supply for present needs and for many years into the future; and

WHEREAS, Upper Trinity is implementing measures to promote water conservation and reuse, and is taking steps, including the evaluation of alternative strategies to meet the needs of growth that is expected within its service area, including due consideration for technical, financial and environmental factors; and

WHEREAS, Upper Trinity is currently purchasing raw water from the City of Dallas, and plans to increase such purchases in the future pursuant to a long-term water supply contract; and

WHEREAS, Upper Trinity is working with other entities within Region C to evaluate other water sources that may be beyond the capability of Upper Trinity alone to develop or acquire; and

WHEREAS, over 20 cities and utilities within Region C rely on Upper Trinity's efforts to acquire adequate supplies of water for the future - - and, in doing so, to consider cost, timeliness, reliability, risk, safety and availability; and

WHEREAS, Upper Trinity has filed applications with the Texas Commission on Environmental Quality to secure rights for reuse of water being imported from Chapman Lake and to secure rights to divert additional water from the Sulphur River Basin (Lake Ralph Hall); and

WHEREAS, Upper Trinity has planned ahead and has contracted for capacity in an existing pipeline system to Chapman Lake (owned and operated by City of Irving),

which pipeline has excess capacity that must be considered when comparing alternatives; and

WHEREAS, proposed Lake Ralph Hall is near the existing pipeline and is one of several alternative strategies being considered by Upper Trinity, an alternative that, when all relevant factors are considered, is sound from an environmental perspective and will help serve the long-term needs of this region.

NOW, THEREFORE, be it resolved by the City Council, City of Sanger:

SECTION 1. That it is in the best interest of this region for Upper Trinity to diligently pursue and to be successful in acquiring adequate water supplies for the next 50 years, taking great care to spread risks between different strategies and sources.

SECTION 2. That the City Council hereby expresses its support for Upper Trinity's emphasis on water conservation and reuse of existing water supplies, and for Upper Trinity's plans to develop proposed Lake Ralph Hall in Fannin County, enabling the use of existing pipeline capacity to transport the water to the Trinity River Basin.

SECTION 3. That the City Council hereby urges the Region C Water Planning Group to include Lake Ralph Hall as a proposed strategy in the updated water plan now being prepared for this region; and

SECTION 4. That the City Council realizes that typical water supply projects take 25 to 40 years for completion, requiring vision and courage, and involving risks and controversy; and, accordingly the governing body of Upper Trinity Regional Water District is to be commended for its diligent efforts on behalf of its many members and customers.

SECTION 5. That this Resolution shall become effective immediately upon its passage.

DULY PASSED AND APPROVED THIS 7th **DAY OF** March **2005.**

Executed: Tommy Kincaid Mayor
(Name and Title)

Attest: Rosalie Chavez
(Name and Title)

CITY ATTORNEY: Robert L. Dillard
(Name and Title)

CITY OF SANGER
TEXAS

(53)

M. Lynn Chapman
12895 TX Hwy 19 N
Sulphur Springs TX 75482
August 31, 2005

NTMWD
P.O. Box 2408
Wylie, Texas 75098

Att: Mr. James M. Parks
DCWPG Chairman

I am submitting the recommendation that was previously submitted to the Febuary 20, 2002 meeting of the NETWMD. Considering the increasting opposition to Marvin Reservoir, I recommend that the Supplement Studies include my proposal to build Parkhouse I and II as one reservoir.

Sinerely
M. Lynn Chapman

CC: Mickey McKenzie, SRBA
Beth Wisenbaker, RDWPG

M. Lynn Chapman
Rt. 7 BOX 151
Sulphur Springs, TX. 75482
Feb. 12, 2002

Northeast Texas Municipal Water District
P.O. BOX 955
Hughes Springs, Texas 75656

Attn: Walt Sears, Jr.
General Manager

My deteriorating health and my wifes recent major Surgery will prevent our attending the Feburary 20 meeting in Mt. Pleasant.

The proposed Marvin Nichols Reservoir is the largest remaining piece of bottom-land hardwood habitat in Texas. 49% of the area is Wetland, 40% decidusous forest land and 13% in mixed and evergreen forest. Nichols is tremendously opposed by all wild-life and environmente groups and by most of the landowners and residents in the area.

Considering this tremendous opposition and the many lawsuits that will be filed, I recommend considering replacing Marvin Nichols with Geoge Parkhouse I and II as one reservoir. The acre-feet and surface acres are 68% of Nichols but when built as one could approach Nichols.

Environment objections should be greatly reduced. The Parhouse combination will be 82% Cropland and pasture and only 17% forest land. Nichols is only 46% Cropland and pasture 53% forest land. The Parkhouse combination will be 178% more cropland and pasture 300% less forest land.

The 172 mile, 1.1 billion, pipeline could probaly be eliminated for some time and then much shorter when needed. Water can be pumped over Cooper Dam into Jim Chapman Lake and two existing pipelines will probably be sufficent for some time and the cost of pumping will be much less.

The attached Chart presents the comparative data for the Parkhouse Combination and Nichols.

The Parkhouse combination will be a cost saving and less controversial means to provid adequate water for the future.

Sincerely,

M. Lynn Chapman

CC: Patsy McClain, SRBA
Beth Wiscnbaker, Region D Regional Water Planning Group

Comparison of Nichols I to Parkhouse I + II Built as One Lake

	Parkhouse I	Parkhouse II	Parkhouse I+II Combined	% of	Nichols I	% of
Surface Acres	29,740	12,300	42,040	68%	62,128	148%
Acre Feet	685,706	243,600	929,306	68%	1,369,717	147%
Cropland + Pasture	78%	90%	82%	178%	46%	56%
Deciduous Forest Land	21%	9%	17%	43%	40%	235%
Other Forest Land	~	~	~		13%	
Other Land	1%	1%	1%		1%	
Approximate Wetland	~	13%	4%	8%	49%	1,225%
Conservation Pool Elevation	401 ft.	401 ft.	401 ft.		312 ft.	

Data Source:

North East Texas Regional Water Plan Reservoir Site Assessment Study

(54)

lr. Jim Parks
hairman, North Texas Municipal Water District
.O. Box 2409
Vylie, TX 75098

AX 972-442-5405

ear Mr. Parks and Region C Planning Committee,

lo New Dams!

lease encourage your planning committee to focus on water conservation and use of existing eservoirs to fulfill the region's 55-year needs. It is unfair to flood property, displace people rom family farms and ranches, and ruin irreplaceable high-quality habitat withour first putting ito place long-term conservation strategies for the wisest use of Texas' precious resources.

hank you for your consideration,

icki Baggett VB
114 Old Lufkin Rd.
lacogdoches, TX 75964

LANTANA

Denton County Development District 4
Denton County Fresh Water Supply District 6
Denton County Fresh Water Supply District 7

September 1, 2005

Mr. Jim Parks, Chair RCWPG
North Texas Municipal Water District
P.O. Box 2408
Wylie, Texas 75098

RE: Initially Prepared 2006 Water Management Plan

Dear Mr. Parks:

On behalf of the Denton County Fresh Water supply District 7 (Lantana), we thank you and the Region C Water Planning Group for its diligence and hard work in preparing the draft Water Plan.

Denton County Fresh Water Supply District 7 currently gets it water from Upper Trinity Regional Water District. To ensure we have enough water for the future, Upper Trinity has included our future needs into its long-range water plan. We are working with Upper Trinity today to ensure that we have water for our families and businesses tomorrow.

We urge you to adopt the Plan's water management strategies and the alternatives, including the strategies for our area and for Upper Trinity Regional Water District. These strategies will go a long way toward assuring that our families and friends never face a water shortage.

For your reference, I am enclosing a copy of the adopted Resolution our Board of Directors passed in support of Upper Trinity's long-range water supply planning efforts.

2401 FM 407 East
[illegible]
PH #: [illegible]

Thank you again. If you have any questions or need additional information, please feel free to contact me at (214) 869-5416

Sincerely,

Kevin Mercer
General Manager

Encl: Adopted Resolution

Cc: Jason Pierce, Manager of Public Information, Upper Trinity Regional Water District

2401 FM 407 East
Lantana, Texas 76226

PH #: 940-728-5050
FAX #: 940-725-2192

RESOLUTION

RESOLUTION 2005 - 01

A RESOLUTION OF THE BOARD OF DIRECTORS, FRESH WATER SUPPLY DISTRICT #7 CONCERNING LONG-RANGE WATER SUPPLY PLANNING FOR THE SERVICE AREA OF UPPER TRINITY REGIONAL WATER DISTRICT.

WHEREAS, according to the provisions of Senate Bill One (passed by 75th Texas Legislature) Upper Trinity Regional Water District (Upper Trinity) is required to prepare plans to assure an adequate supply of water for its customers for at least 50 years into the future; and

WHEREAS, Upper Trinity has been diligent and prudent in securing an adequate water supply for present needs and for many years into the future; and

WHEREAS, Upper Trinity is implementing measures to promote water conservation and reuse, and is taking steps, including the evaluation of alternative strategies to meet the needs of growth that is expected within its service area, including due consideration for technical, financial and environmental factors; and

WHEREAS, Upper Trinity is currently purchasing raw water from the City of Dallas, and plans to increase such purchases in the future pursuant to a long-term water supply contract; and

WHEREAS, Upper Trinity is working with other entities within Region C to evaluate other water sources that may be beyond the capability of Upper Trinity alone to develop or acquire; and

WHEREAS, over 20 cities and utilities within Region C rely on Upper Trinity's efforts to acquire adequate supplies of water for the future - - and, in doing so, to consider cost, timeliness, reliability, risk, safety and availability; and

WHEREAS, Upper Trinity has filed applications with the Texas Commission on Environmental Quality to secure rights for reuse of water being imported from Chapman Lake and to secure rights to divert additional water from the Sulphur River Basin (Lake Ralph Hall); and

WHEREAS, Upper Trinity has planned ahead and has contracted for capacity in an existing pipeline system to Chapman Lake (owned and operated by City of Irving),

which pipeline has excess capacity that must be considered when comparing alternatives; and

WHEREAS, proposed Lake Ralph Hall is near the existing pipeline and is one of several alternative strategies being considered by Upper Trinity, an alternative that, when all relevant factors are considered, is sound from an environmental perspective and will help serve the long-term needs of this region.

NOW, THEREFORE, be it resolved by the Board of Directors, Fresh Water Supply District #7:

SECTION 1. That it is in the best interest of this region for Upper Trinity to diligently pursue and to be successful in acquiring adequate water supplies for the next 50 years, taking great care to spread risks between different strategies and sources.

SECTION 2. That the Board of Directors hereby expresses its support for Upper Trinity's emphasis on water conservation and reuse of existing water supplies, and for Upper Trinity's plans to develop proposed Lake Ralph Hall in Fannin County, enabling the use of existing pipeline capacity to transport the water to the Trinity River Basin.

SECTION 3. That the Board of Directors hereby urges the Region C Water Planning Group to include Lake Ralph Hall as a proposed strategy in the updated water plan now being prepared for this region; and

SECTION 4. That the Board of Directors realizes that typical water supply projects take 25 to 40 years for completion, requiring vision and courage, and involving risks and controversy; and, accordingly the governing body of Upper Trinity Regional Water District is to be commended for its diligent efforts on behalf of its many members and customers.

SECTION 5. That this Resolution shall become effective immediately upon its passage.

DUPLY PASSED AND APPROVED THIS 28th **DAY OF** APRIL **2005.**

Executed: James Cassels President
(Name and Title)

Attest: Tracy C. Byrne - Secretary
(Name and Title)

CC: Prov. GWN 56

September 2, 2005

Region C Water Planning Group
c/o Jim Parks, Chairman
North Texas Municipal Water District
P. O. Box 2408
Wylie, TX 75098

Dear Mr. Parks:

I am asking for your help in seeing that **no new reservoirs** are in the Region C Water Plan for the next 50+ years. It has been proven over and over that these lakes are not needed for ample water for the Dallas area. You just can't imagine what this will do to the Northeast Texas Area. Our livelihood is from farming, timber, cattle and hunting leases. Please do not destroy my life and my children's lives by building these unneeded lakes. Do you think recreation for the Metroplex is more important than the livelihood of Northeast Texas? Your area needs our beef, pork, eggs, chickens, timber, plant farms, milk and many other things that Dallas cannot produce. Please look further than the money you think Dallas can make from these lakes before you destroy so many people's lives. I own land in Cass County, which the major portion joins Lake Wright Patman. Think what this will do to my life and my children's lives and their families in the future should Marvin Nicholas be built? Please do everything you can to see that this does not happen.

Thank you.

Sincerely,

Bessie Neal Heath

Bessie Neal Heath
P. O. Box 54
Douglassville, TX 75560

cc: Parks
PVN (57)

DENTISTRY
for Infants
Children & Teenagers

9-2-05

Region C Water Planning Group
c/o Jim Parks
North Texas Municipal Water District
P.O. Box 2408
Wylie TX 75098

Dear Mr Parks

I am writing to express my opposition to the Draft Plan for the four new dams under consideration in East Texas area. These reservoirs would have staggering negative impacts on the ecosystems in those areas.

A better plan to provide the necessary needs of water for Region C is through 1) conservation, 2) reuse, 3) the utilization of existing reservoirs. Please do not allow these reservoirs to be approved

Sincerely

Ferrin H Holcomb DDS

3232 Broadway Blvd , Suite I
Garland, Texas 75043
(972) 271-4454
Fax (972) 840-3343
Fholcomb.dds@verizon net

Ferrin H. Holcomb, D.D.S., M.S.D., Inc.
Diplomate American Board of Pediatric Dentistry

58

FORT WORTH

September 6, 2005

Mr. James M. Parks
Chairperson
Region C Planning Group
North Texas Municipal Water District
P.O. Box 2408
Wylie, Texas 75098

Re: City of Fort Worth Water Management Strategies for Direct Reuse

Dear Mr. Parks

This letter is submitted to provide the Region C Planning Group with supplemental information related to reuse projects currently being studied by the City of Fort Worth. The City of Fort Worth is currently in the process of developing a Reuse Priority and Implementation Plan that will identify projects, primarily involving direct reuse that may be adopted by the City in the future. This study is partially funded by the Texas Water Development Board. The study is in the initial stages of development. It is anticipated that the final report will be completed by July 2006.

Based on data from previous studies and some initial information provided by the current study, the City of Fort Worth would like to revise and add to the direct reuse water management strategies listed in the Initially Prepared 2006 Region C Water Plan. The City is evaluating projects to serve four separate regions within the City and parts of Tarrant County. A general description of each of these projects is provided below. Attachment "E" shows the general location of the projects.

1. Mary's Creek Direct Reuse: A satellite wastewater treatment plant (WWTP) and conveyance facilities would be constructed to provide supply for non-potable water needs for the Walsh Ranch development and other nearby users.
2. Central Business District Reuse: A satellite WWTP and conveyance facilities would be constructed to provide supply for non-potable water needs in the Central Business District.
3. Village Creek Direct Reuse: Effluent from the Village Creek WWTP would be used to meet non-potable water needs in the general vicinity of the WWTP. Conveyance facilities would be constructed to transport the water to user delivery points.
4. Alliance Corridor Direct Reuse: A satellite WWTP and conveyance facilities would be constructed to provide supply for non-potable water needs in the Alliance Corridor area.

WATER DEPARTMENT
PLANNING AND BUSINESS SERVICES
THE CITY OF FORT WORTH ★ 1000 THROCKMORTON STREET ★ FORT WORTH, TEXAS 76102
817-392-8240 ★ FAX 817-392-8195

A summary of projected reuse quantities, by decade, for each project is provided in Table 1. Preliminary opinions of probable cost for each project are provided in Tables 2-5, attached to this letter.

Table 1: Projected Reuse Quantities to Year 2060

Project	Estimated Annual Average Demand (acre-feet/year)					
	2010	2020	2030	2040	2050	2060
Mary's Creek Direct Reuse	0	1,240	1,570	1,570	1,570	1,570
Central Business District Direct Reuse	0	2,240	3,360	3,360	3,360	3,360
Village Creek Direct Reuse	500	500	1,100	2,000	2,600	2,600
Alliance Corridor Direct Reuse	0	1,120	2,240	3,360	3,360	3,360
TOTAL	500	5,100	8,270	10,290	10,890	10,890

Please let me know if you have any questions regarding this information.

Sincerely,

S. Frank Crumb

S. Frank Crumb P.E.,
Acting Director
Fort Worth Water Department

Cc: Mr. Thomas C. Gooch, P.E., Freese and Nichols, Inc.
Mr. Richard S. Talley, Fort Worth Water Department
Mr. Chris Harder P.E., Fort Worth Water Department
File

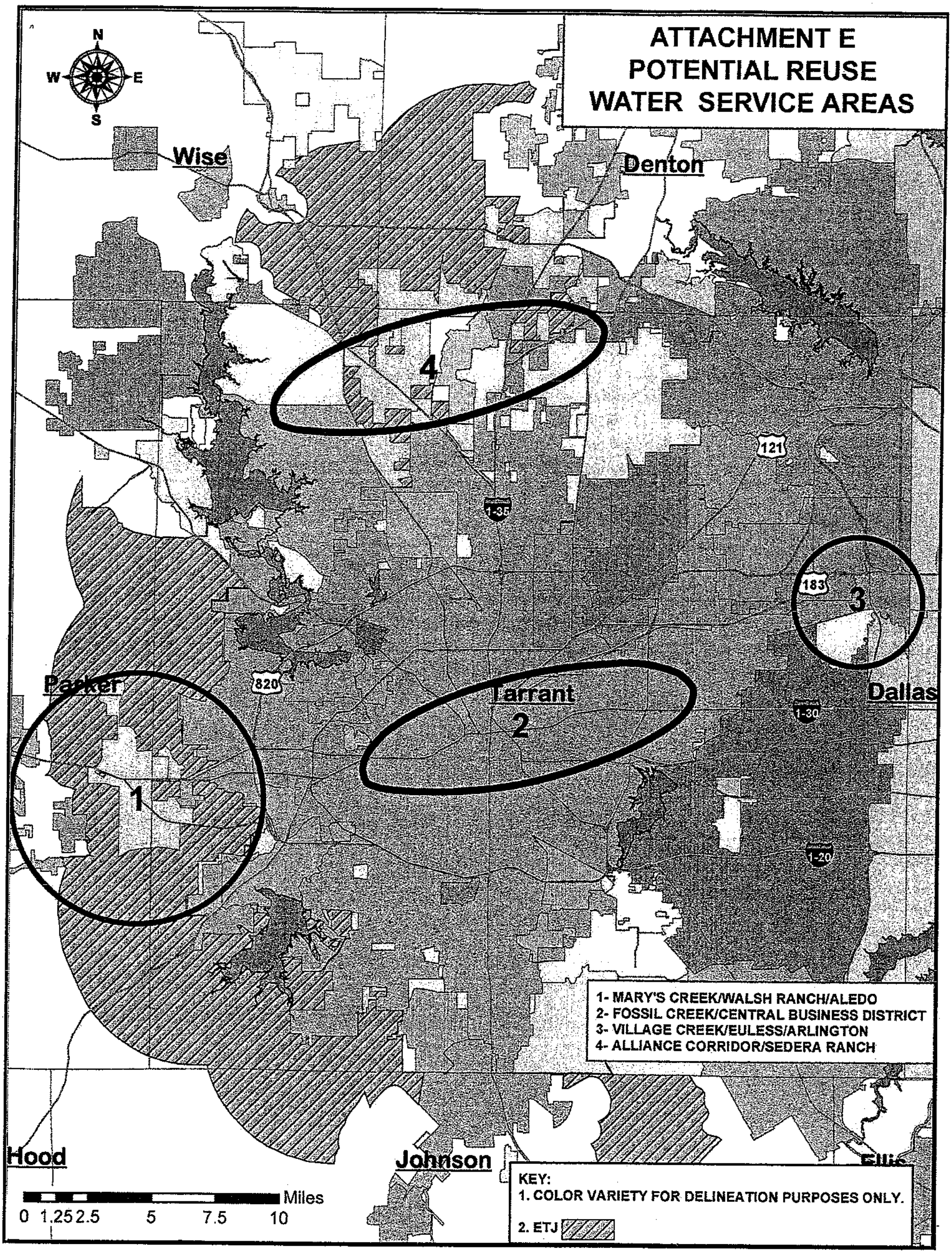

ATTACHMENT E
POTENTIAL REUSE
WATER SERVICE AREAS
N
S
E
W
Wise
Denton
Parker
Tarrant
Dallas
Hood
Johnson
121
1-35
183
820
1-30
1-20
1
2
3
4
1- MARY'S CREEK/WALSH RANCH/ALEDO
2- FOSSIL CREEK/CENTRAL BUSINESS DISTRICT
3- VILLAGE CREEK/EULESS/ARLINGTON
4- ALLIANCE CORRIDOR/SEDERA RANCH
Miles
0 1.25 2.5 5 7.5 10
KEY:
1. COLOR VARIETY FOR DELINEATION PURPOSES ONLY.
2. ETJ

Table 2
Fort Worth Direct Reuse
Mary's Creek

Owner:	Fort Worth
Amount:	1,570 Ac-Ft/Yr

CONSTRUCTION COSTS

TRANSMISSION FACILITIES						
Pipeline(s)	**Qty.**	**Units**	**Unit Cost**			**Total Cost**
24" Water Line						
Pipe	26,400	FT	$	66	$	1,742,000
ROW	12	AC	$	3,000	$	36,000
Engineering and Contingencies	30%				$	523,000
Subtotal of Pipeline(s)					**$**	**2,301,000**
Pump Station(s)						
Station 1						
Pump, building, & appurtances	278	hp			$	1,141,000
Storage Tank	580,000	gal			$	174,000
Engineering and Contingencies	35%				$	460,000
Subtotal of Pump Station(s)					**$**	**1,775,000**
WASTEWATER TREATMENT FACILITIES						
Satellite Wastewater Treatment Plant	4.00	MGD			$	6,400,000
Engineering and Contingencies	35%				$	2,240,000
Subtotal of Wastewater Treatment Plant					**$**	**8,640,000**
PERMITTING AND LAND PURCHASE					**$**	**1,100,000**
CONSTRUCTION TOTAL					**$**	**13,816,000**
Interest During Construction		(18 months)			**$**	**796,000**
TOTAL CAPITAL COST					**$**	**14,612,000**

Table 2, continued

ANNUAL COSTS					
Debt Service				$	1,062,000
Operation and Maintenance Costs					
Pipeline	1%			$	21,000
Pump Station	2.50%			$	39,000
Estimated Annual Power Cost	$0.06/kWh			$	55,000
WWTP Operation	511,586 1000 gal	$	0 35	$	179,000
Total Annual Costs				**$**	**1,356,000**
UNIT COSTS (First 30 Years)					
Per Acre-Foot				$	864
Per 1,000 Gallons				$	2.65
UNIT COSTS (After 30 Years)					
Per Acre-Foot				$	187
Per 1,000 Gallons				$	0.57

Table 3
Fort Worth Direct Reuse
Central Business District

Owner: Fort Worth
Amount: 3,360 Ac-Ft/Yr

CONSTRUCTION COSTS

	Qty.	Units	Unit Cost		Total Cost
TRANSMISSION FACILITIES					
Pipeline(s)					
30" Water Line					
Pipe	26,400	FT	$ 129	$	3,406,000
ROW	12	AC	$ 30,000	$	364,000
Engineering and Contingencies	30%			$	1,022,000
Subtotal of Pipeline(s)				**$**	**4,792,000**
Pump Station(s)					
Station 1					
Pump, building, & appurtances	293	hp		$	1,181,000
Storage Tank	1,250,000	gal		$	315,000
Engineering and Contingencies	35%			$	524,000
Subtotal of Pump Station(s)				**$**	**2,020,000**
WASTEWATER TREATMENT FACILITIES					
Satellite Wastewater Treatment Plant	8.00	MGD		$	12,800,000
Engineering and Contingencies	35%			$	4,480,000
Subtotal of Wastewater Treatment Plant				**$**	**17,280,000**
PERMITTING AND LAND PURCHASE				**$**	**3,300,000**
CONSTRUCTION TOTAL				**$**	**27,392,000**
Interest During Construction		(18 months)		**$**	**1,578,000**
TOTAL CAPITAL COST				**$**	**28,970,000**

Table 3, continued

ANNUAL COSTS						
Debt Service					$	2,105,000
Operation and Maintenance Costs						
Pipeline	1%				$	41,000
Pump Station	2.50%				$	45,000
Estimated Annual Power Cost	$0.06/kWh				$	57,000
WWTP Operation	1,094,859	1000 gal	$	0.35	$	383,000
Total Annual Costs					**$**	**2,631,000**
UNIT COSTS (First 30 Years)						
Per Acre-Foot					$	783
Per 1,000 Gallons					$	2.40
UNIT COSTS (After 30 Years)						
Per Acre-Foot					$	157
Per 1,000 Gallons					$	0.48

Table 4
Fort Worth Direct Reuse
Village Creek

Owner:	Fort Worth
Amount:	2,600 Ac-Ft/Yr

CONSTRUCTION COSTS

TRANSMISSION FACILITIES						
Pipeline(s)	**Qty.**	**Units**	**Unit Cost**			**Total Cost**
24" Water Line						
Pipe	26,400	FT	$	66	$	1,742,000
ROW	12	AC	$	3,000	$	36,000
Engineering and Contingencies	30%				$	523,000
Subtotal of Pipeline(s)					**$**	**2,301,000**
Pump Station(s)						
Station 1						
Pump, building, & appurtances	205	hp			$	944,000
Storage Tank	970,000	gal			$	268,000
Engineering and Contingencies	35%				$	424,000
Subtotal of Pump Station(s)					**$**	**1,636,000**
WASTEWATER TREATMENT FACILITIES						
Satellite Wastewater Treatment Plant	0.00	MGD			$	-
Engineering and Contingencies	35%				$	-
Subtotal of Wastewater Treatment Plant					**$**	-
PERMITTING AND MITIGATION	1%				**$**	**21,000**
CONSTRUCTION TOTAL					**$**	**3,958,000**
Interest During Construction		(12 months)			**$**	**165,000**
TOTAL CAPITAL COST					**$**	**4,123,000**

Table 4, continued

ANNUAL COSTS					
Debt Service				$	300,000
Operation and Maintenance Costs					
Pipeline	1%			$	21,000
Pump Station	2.50%			$	36,000
Estimated Annual Power Cost	$0.06/kWh			$	40,000
WWTP Operation	0	1000 gal	$ 0.35	$	-
Total Annual Costs				**$**	**397,000**
UNIT COSTS (First 30 Years)					
Per Acre-Foot				$	153
Per 1,000 Gallons				$	0.47
UNIT COSTS (After 30 Years)					
Per Acre-Foot				$	37
Per 1,000 Gallons				$	0.11

Table 5
Fort Worth Direct Reuse
Alliance Corridor

Owner:	Fort Worth
Amount:	3,360 Ac-Ft/Yr

CONSTRUCTION COSTS

TRANSMISSION FACILITIES						
Pipeline(s)	**Qty.**	**Units**	**Unit Cost**			**Total Cost**
30" Water Line						
Pipe	26,400	FT	$	86	$	2,270,000
ROW	12	AC	$	3,000	$	36,000
Engineering and Contingencies	30%				$	681,000
Subtotal of Pipeline(s)					**$**	**2,987,000**
Pump Station(s)						
Station 1						
Pump, building, & appurtances	482	hp			$	1,665,000
Storage Tank	1,250,000	gal			$	315,000
Engineering and Contingencies	35%				$	693,000
Subtotal of Pump Station(s)					**$**	**2,673,000**
WASTEWATER TREATMENT FACILITIES						
Satellite Wastewater Treatment Plant	8.00	MGD			$	12,800,000
Engineering and Contingencies	35%				$	4,480,000
Subtotal of Wastewater Treatment Plant					**$**	**17,280,000**
PERMITTING AND LAND PURCHASE					**$**	**1,100,000**
CONSTRUCTION TOTAL					**$**	**24,040,000**
Interest During Construction		(18 months)			**$**	**1,385,000**
TOTAL CAPITAL COST					**$**	**25,425,000**

Table 5, continued

ANNUAL COSTS						
Debt Service					$	1,847,000
Operation and Maintenance Costs						
Pipeline	1%				$	27,000
Pump Station	2.50%				$	59,000
Estimated Annual Power Cost	$0.06/kWh				$	95,000
WWTP Operation	1,094,859	1000 gal	$	0.35	$	383,000
Total Annual Costs					**$**	**2,411,000**
UNIT COSTS (First 30 Years)						
Per Acre-Foot					$	718
Per 1,000 Gallons					$	2.20
UNIT COSTS (After 30 Years)						
Per Acre-Foot					$	168
Per 1,000 Gallons					$	0.52

(59)

Campbell B. Read
5539 Monticello
Dallas Texas 75206
9/6/2005

To: Region C Water Planning Group

No NEW RESERVOIRS

I strongly oppose the construction of the Marvin Nichols Reservoir, the Fastrill Reservoir, and any new reservoirs. Remove these from your state water plan.

Please make sure that all existing reservoirs are fully utilized.

Yours truly,

Campbell B Read

Wildlife Task Force Chair
Texas Committee on Natural Resources

(60)

Region C Water Planning Group
c/o Jim Parks, Chairman
North Texas Municipal Water District
P.O. Box 2408
Wylie, TX 75098

Dear Region C Water Planning Group,

I am strongly opposed to the inclusion of the Marvin Nichols, Fastrill, Lower Bois d'Arc Creek, and Ralph Hall dams in the Region C Water Plan.

Please use other means, such as reuse, conservation, etc., to meet the water needs of the area.

The people and wildlife of East Texas should not have to suffer the loss of hundreds of square miles of precious land.

I am confident that you can come up with a better plan.

Thank you for the time and effort that you are giving to this endeavor.

Sincerely,

Julie L. Gaylord Julie L. Gaylord

Julie Gaylord
3604 Piping Rock
Nacogdoches TX 75965

(H) 936-564-1453

email: jgaylord@cox-internet.com

I wanted you to have a hard copy of the email that I sent.

Please consider this carefully!

9/7/2005

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MUSTANG SUD

September 7, 2005

Mr. Jim Parks, Chair RCWPG
North Texas Municipal Water District
P.O. Box 2408
Wylie, TX 75098

Re: 2006 Water Management Plan

Dear Mr. Parks:

On behalf on Mustang Special Utility District, thank you and the Region C Water Planning Group for its diligence and hard work in preparing the draft water plan.

Mustang Special Utility District is currently subscribed to Upper Trinity Regional Water District in the amount of one million gallons per day. Our projected needs, in the next four to five years, are an estimated four to five million gallons per day. Upper Trinity Regional Water District has included Mustang Special Utility District's future needs into its long-range water supply planning. We continue to work with Upper Trinity Regional Water District to insure that Mustang Special Utility District's supply will meet all future commercial and residential demands within our CCN.

Mustang implores North Texas Municipal Water District to adopt Upper Trinity Regional Water District's long-range water supply planning with its strategies and alternative strategies which greatly contributes to a secure future for Mustang Special Utility District.

Enclosed is a copy of Resolution No. 050905-01 adopted by Mustang Special Utility District's Board of Directors.

Thank you again. Should you have any questions or require additional information, please contact me at (940) 440-9561.

Sincerely,

Byron Gaines
General Manager
Mustang Special Utility District

enc.: Resolution No. 050905-01

c: Jason Pierce, Manager of Public Information, Upper Trinity Regional Water District

RESOLUTION

RESOLUTION NO. 050905-01

A RESOLUTION OF THE BOARD OF DIRECTORS, MUSTANG SPECIAL UTILITY DISTRICT CONCERNING LONG-RANGE WATER SUPPLY PLANNING FOR THE SERVICE AREA OF UPPER TRINITY REGIONAL WATER DISTRICT.

WHEREAS, according to the provisions of Senate Bill One (passed by 75th Texas Legislature) Upper Trinity Regional Water District (Upper Trinity) is required to prepare plans to assure an adequate supply of water for its customers for at least 50 years into the future; and

WHEREAS, Upper Trinity has been diligent and prudent in securing an adequate water supply for present needs and for many years into the future; and

WHEREAS, Upper Trinity is implementing measures to promote water conservation and reuse, and is taking steps, including the evaluation of alternative strategies to meet the needs of growth that is expected within its service area, including due consideration for technical, financial and environmental factors; and

WHEREAS, Upper Trinity is currently purchasing raw water from the City of Dallas, and plans to increase such purchases in the future pursuant to a long-term water supply contract; and

WHEREAS, Upper Trinity is working with other entities within Region C to evaluate other water sources that may be beyond the capability of Upper Trinity alone to develop or acquire; and

WHEREAS, over 20 cities and utilities within Region C rely on Upper Trinity's efforts to acquire adequate supplies of water for the future - - and, in doing so, to consider cost, timeliness, reliability, risk, safety and availability; and

WHEREAS, Upper Trinity has filed applications with the Texas Commission on Environmental Quality to secure rights for reuse of water being imported from Chapman Lake and to secure rights to divert additional water from the Sulphur River Basin (Lake Ralph Hall); and

WHEREAS, Upper Trinity has planned ahead and has contracted for capacity in an existing pipeline system to Chapman Lake (owned and operated by City of Irving),

which pipeline has excess capacity that must be considered when comparing alternatives; and

WHEREAS, proposed Lake Ralph Hall is near the existing pipeline and is one of several alternative strategies being considered by Upper Trinity, an alternative that, when all relevant factors are considered, is sound from an environmental perspective and will help serve the long-term needs of this region.

NOW, THEREFORE, be it resolved by the Board of Directors, Mustang Special Utility District:

SECTION 1. That it is in the best interest of this region for Upper Trinity to diligently pursue and to be successful in acquiring adequate water supplies for the next 50 years, taking great care to spread risks between different strategies and sources.

SECTION 2. That the Board of Directors hereby expresses its support for Upper Trinity's emphasis on water conservation and reuse of existing water supplies, and for Upper Trinity's plans to develop proposed Lake Ralph Hall in Fannin County, enabling the use of existing pipeline capacity to transport the water to the Trinity River Basin.

SECTION 3. That the Board of Directors hereby urges the Region C Water Planning Group to include Lake Ralph Hall as a proposed strategy in the updated water plan now being prepared for this region; and

SECTION 4. That the Board of Directors realizes that typical water supply projects take 25 to 40 years for completion, requiring vision and courage, and involving risks and controversy; and, accordingly the governing body of Upper Trinity Regional Water District is to be commended for its diligent efforts on behalf of its many members and customers.

SECTION 5. That this Resolution shall become effective immediately upon its passage.

DULY PASSED AND APPROVED THIS 9 DAY OF MAY 2005.

Executed: M L Snow
(Name and Title)

Attest: Barbara Likens / Admin. Asst.
(Name and Title)
for Laura Haynie / Asst. Secretary

(62)

UPPER TRINITY
REGIONAL WATER DISTRICT

P.O. Drawer 305 • Lewisville, TX 75067
(972) 219-1228 • Fax: (972) 221-9896

September 7, 2005

Mr. Jim Parks, Chairman
And Members of the Region C Planning Group
c/o North Texas Municipal Water District
P. O. Box 2408
Wylie, TX 75098

Certified Mail
Return Receipt
7001 1140 0004 3430 5902

RE: Support for Initially Prepared 2006 Region C Water Plan

Dear Chairman Parks:

The water we drink tomorrow will be the product of today's visionary planning by the Region C Water Planning Group - - leaders who know that our region's future depends on an adequate water supply. As a regional water provider, it's our responsibility to plan ahead and secure an adequate water supply for the many communities we serve. As the regional water provider for Denton County and portions of Collin, Cooke and Wise Counties, Upper Trinity Regional Water District takes that responsibility seriously. Sometimes, an individual community may not fully understand the regional responsibility we have.

We have reviewed the ***Initially Prepared 2006 Region C Water Plan*** and support the proposed water management strategies for this 16-county region - - especially those strategies listed for Upper Trinity. The population and water demand estimates prepared by the Group's consultant for the Upper Trinity service area are consistent with our expectations. As the Plan indicates, Upper Trinity will face a water supply shortage in about 25 years, if we don't augment our current water supply.

Upper Trinity plans to increase water conservation, water reuse and take all the water that is available under our contract with the City of Dallas - - but that's not enough. Development of Lake Ralph Hall, which is included as a primary water management strategy in the Plan, is an important strategy for Upper Trinity - - one that will provide needed water supply in time to avoid a water crisis.

Lake Ralph Hall, a proposed new reservoir on the North Sulphur River in southeast Fannin County, will supply approximately 30 million gallons of water per day to our customers including Ladonia and other communities in the Sulphur River Basin of Fannin County. Also, the Lake will help solve a serious environmental problem. The Lake is anticipated to bring $18 billion dollars in economic benefits to Denton, Collin, Dallas and Fannin Counties. Development of Lake Ralph Hall is a good strategy for the people of North Texas, and we are committed to plan today for tomorrow's water supply needs.

Some 30 municipalities, utilities, special districts and individuals have passed resolutions and have written letters in support of our long-range water supply planning efforts including Lake Ralph Hall. Also, over 70 residents of Fannin County have sent letters supporting the Lake Ralph Hall project.

Upper Trinity fully supports the ***Initially Prepared Plan*** as written and urges its adoption and prompt submission to the Texas Water Development Board. Thank you for the Group's vision and hard work in drafting this region's long-range water supply plan. Please feel free to contact me at 972-219-1228 should you have any questions or need additional information

Sincerely,

Thomas E. Taylor
Executive Director

TET/JP/nka

c: Leon Hurse, Mayor, City of Ladonia
Tony Romo, President, UTRWD
Larry Patterson, Director of Engineering Services, UTRWD

UPPER TRINITY
REGIONAL WATER DISTRICT

P.O. Drawer 305 • Lewisville, TX 75067

(972) 219-1228 • Fax: (972) 221-9896

September 9, 2005

Mr. Jim Parks, Chairman
Region C Water Planning Group
C/o North Texas Municipal Water District
P.O. Box 2408
Wylie, Texas 75098

RE: Support for Water Management Strategies

Dear Mr. Parks:

Like the Region C Water Planning Group, Upper Trinity Regional Water District is working today to ensure our region has an adequate water supply today and for the next 50 years. In our recent letter supporting the ***Initially Prepared 2006 Region C Water Plan*** and the proposed water management strategies, I mentioned that some 30 municipalities, utilities, special districts and individuals have passed resolutions and written letters of support in favor of our long-range water supply planning efforts - - including Lake Ralph Hall.

For your reference, I am enclosing a list of those entities that have adopted resolutions or sent letters of support for our water supply planning efforts. Specific copies of the resolutions and letters were provided to the Planning Group at it's meeting on April 25, 2005. Since that time, however, other entities have passed similar resolutions. Enclosed are copies of the additional resolutions.

Thank you again for the Planning Group's vision and hard work in drafting this region's long-range water supply plan. Please feel free to contact me at 972-219-1228 should you have any questions or need additional information.

Sincerely,

Thomas E. Taylor
Executive Director

Encl: List of Resolutions & Letters of Support for Long-Range Water Supply Planning Efforts
Resolutions Supporting Long-Range Water Supply Planning Efforts Previously Not Submitted

TET/JP/nka

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RESOLUTIONS & LETTERS OF SUPPORT FOR LONG-RANGE WATER SUPPLY PLANNING EFFORTS

UPPER TRINITY
REGIONAL WATER DISTRICT

September 9, 2005

Argyle Water Supply Corporation (resolution)
City of Celina (resolution)
Collin County Commissioners Court (resolution)
City of Corinth (resolution)
Denton County Judge Mary Horn (letter)
Denton County Fresh Water Supply District No. 1A (letter)
Denton County Fresh Water Supply District No. 7 (resolution)
Denton County Fresh Water Supply District No. 8A (resolution)
Denton County Fresh Water Supply District No. 8B (resolution)
Denton County Fresh Water Supply District No. 9 (resolution)
Denton County Fresh Water Supply District No 10 (resolution)
Denton County Fresh Water Supply District No. 11A (resolution)
Denton County Fresh Water Supply District No. 11B (resolution)
Fannindel Independent School District (resolution)
Greater Dallas Chamber of Commerce (letter)
Town of Hickory Creek (resolution)
City of Highland Village (resolution)
City of Honey Grove (resolution)
City of Irving (letter)
City of Justin (resolution)
City of Krum (resolution)
City of Ladonia (resolution)
Lake Cities Municipal Utility Authority (resolution)
City of Lake Dallas (resolution)
City of Leonard (resolution)
City of Lewisville (resolution)
Mustang Special Utility District (resolution)
City of Ponder (resolution)
City of Sanger (resolution)
Town of Shady Shores (resolution)

RESOLUTION

RESOLUTION 2005 - 26

A RESOLUTION OF THE CITY COUNCIL, CITY OF CELINA CONCERNING LONG-RANGE WATER SUPPLY PLANNING FOR THE SERVICE AREA OF UPPER TRINITY REGIONAL WATER DISTRICT.

WHEREAS, according to the provisions of Senate Bill One (passed by 75th Texas Legislature) Upper Trinity Regional Water District (Upper Trinity) is required to prepare plans to assure an adequate supply of water for its customers for at least 50 years into the future; and

WHEREAS, Upper Trinity has been diligent and prudent in securing an adequate water supply for present needs and for many years into the future; and

WHEREAS, Upper Trinity is implementing measures to promote water conservation and reuse, and is taking steps, including the evaluation of alternative strategies to meet the needs of growth that is expected within its service area, including due consideration for technical, financial and environmental factors; and

WHEREAS, Upper Trinity is currently purchasing raw water from the City of Dallas, and plans to increase such purchases in the future pursuant to a long-term water supply contract; and

WHEREAS, Upper Trinity is working with other entities within Region C to evaluate other water sources that may be beyond the capability of Upper Trinity alone to develop or acquire; and

WHEREAS, over 20 cities and utilities within Region C rely on Upper Trinity's efforts to acquire adequate supplies of water for the future - - and, in doing so, to consider cost, timeliness, reliability, risk, safety and availability; and

WHEREAS, Upper Trinity has filed applications with the Texas Commission on Environmental Quality to secure rights for reuse of water being imported from Chapman Lake and to secure rights to divert additional water from the Sulphur River Basin (Lake Ralph Hall); and

WHEREAS, Upper Trinity has planned ahead and has contracted for capacity in an existing pipeline system to Chapman Lake (owned and operated by City of Irving), which pipeline has excess capacity that must be considered when comparing alternatives; and

WHEREAS, proposed Lake Ralph Hall is near the existing pipeline and is one of several alternative strategies being considered by Upper Trinity, an alternative that, when all relevant factors are considered, is sound from an environmental perspective and will help serve the long-term needs of this region

NOW, THEREFORE, be it resolved by the City Council, City of Celina:

SECTION 1. That it is in the best interest of this region for Upper Trinity to diligently pursue and to be successful in acquiring adequate water supplies for the next 50 years, taking great care to spread risks between different strategies and sources.

SECTION 2. That the City Council hereby expresses its support for Upper Trinity's emphasis on water conservation and reuse of existing water supplies, and for Upper Trinity's plans to develop proposed Lake Ralph Hall in Fannin County, enabling the use of existing pipeline capacity to transport the water to the Trinity River Basin.

SECTION 3. That the City Council hereby urges the Region C Water Planning Group to include Lake Ralph Hall as a proposed strategy in the updated water plan now being prepared for this region; and

SECTION 4. That the City Council realizes that typical water supply projects take 25 to 40 years for completion, requiring vision and courage, and involving risks and controversy; and, accordingly the governing body of Upper Trinity Regional Water District is to be commended for its diligent efforts on behalf of its many members and customers.

SECTION 5. That this Resolution shall become effective immediately upon its passage.

DULY PASSED AND APPROVED THIS 10 **DAY OF** May **2005.**

Executed: [signature]
(Name and Title)

Attest: Corbett Howard, Mayor
(Name and Title)

RESOLUTION NO. 05-06-02-17

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF CORINTH, TEXAS CONCERNING LONG-RANGE WATER SUPPLY PLANNING FOR THE SERVICE AREA OF UPPER TRINITY REGIONAL WATER DISTRICT

WHEREAS, according to the provisions of Senate Bill One (passed by 75th Texas Legislature) Upper Trinity Regional Water District (Upper Trinity) is required to prepare plans to assure an adequate supply of water for its customers for at least 50 years into the future; and

WHEREAS, Upper Trinity has been diligent and prudent in securing an adequate water supply for present needs and for many years into the future; and

WHEREAS, Upper Trinity is implementing measures to promote water conservation and reuse, and is taking steps, including the evaluation of alternative strategies to meet the needs of growth that is expected within its service area, including due consideration for technical, financial and environmental factors; and

WHEREAS, Upper Trinity is currently purchasing raw water from the City of Dallas, and plans to increase such purchases in the future pursuant to a long-term water supply contract; and

WHEREAS, Upper Trinity is working with other entities within Region C to evaluate other water sources that may be beyond the capability of Upper Trinity alone to develop or acquire; and

WHEREAS, over 20 Cities and utilities within Region C rely on Upper Trinity's efforts to acquire adequate supplies of water for the future and, in doing so, to consider cost, timeliness, reliability, risk, safety and availability; and

WHEREAS, Upper Trinity has filed applications with the Texas Commission on Environmental Quality to secure rights for reuse of water being imported from Chapman Lake and to secure rights to divert additional water from the Sulphur River Basin (Lake Ralph Hall); and

WHEREAS, proposed Lake Ralph Hall is near the existing pipeline and is one of several alternative strategies being considered by Upper Trinity, an alternative that, when all relevant factors are considered, is sound from an environmental perspective and will help serve the long-term needs of this region.

NOW, THEREFORE BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF CORINTH:

Section 1. That it is in the best interest of the region for Upper Trinity to diligently pursue and to be successful in acquiring adequate water supplies for the next 50 years, taking great care to spread risks between different strategies and sources.

Section 2. That the City Council hereby expresses its support for Upper Trinity's emphasis on water conservation and reuse of existing water supplies, and for Upper Trinity's plans to develop proposed Lake Ralph Hall in Fannin County, enabling the use of existing pipeline capacity to transport the water to the Trinity River Basin.

Section 3. That the City Council hereby urges the Region C Water Planning Group to include Lake Ralph Hall as a proposed strategy in the updated water plan now being prepared for this region; and

Section 4. That the City Council realizes that typical water supply projects take 25 to 40 years for completion, requiring vision and courage, and involving risks and controversy; and accordingly the governing body of Upper Trinity Regional Water District is to commended for its diligent efforts on behalf of its many members and customers.

Section 5. That this Resolution shall become effective immediately upon its passage.

DULY PASSED AND APPROVED THIS 2nd **DAY OF** June **2005.**

APPROVED:

Victor Burgess

RESOLUTION

RESOLUTION 2005 - 01

A RESOLUTION OF THE BOARD OF DIRECTORS, FRESH WATER SUPPLY DISTRICT #7 CONCERNING LONG-RANGE WATER SUPPLY PLANNING FOR THE SERVICE AREA OF UPPER TRINITY REGIONAL WATER DISTRICT.

WHEREAS, according to the provisions of Senate Bill One (passed by 75th Texas Legislature) Upper Trinity Regional Water District (Upper Trinity) is required to prepare plans to assure an adequate supply of water for its customers for at least 50 years into the future; and

WHEREAS, Upper Trinity has been diligent and prudent in securing an adequate water supply for present needs and for many years into the future; and

WHEREAS, Upper Trinity is implementing measures to promote water conservation and reuse, and is taking steps, including the evaluation of alternative strategies to meet the needs of growth that is expected within its service area, including due consideration for technical, financial and environmental factors; and

WHEREAS, Upper Trinity is currently purchasing raw water from the City of Dallas, and plans to increase such purchases in the future pursuant to a long-term water supply contract; and

WHEREAS, Upper Trinity is working with other entities within Region C to evaluate other water sources that may be beyond the capability of Upper Trinity alone to develop or acquire; and

WHEREAS, over 20 cities and utilities within Region C rely on Upper Trinity's efforts to acquire adequate supplies of water for the future - - and, in doing so, to consider cost, timeliness, reliability, risk, safety and availability; and

WHEREAS, Upper Trinity has filed applications with the Texas Commission on Environmental Quality to secure rights for reuse of water being imported from Chapman Lake and to secure rights to divert additional water from the Sulphur River Basin (Lake Ralph Hall); and

WHEREAS, Upper Trinity has planned ahead and has contracted for capacity in an existing pipeline system to Chapman Lake (owned and operated by City of Irving),

which pipeline has excess capacity that must be considered when comparing alternatives; and

WHEREAS, proposed Lake Ralph Hall is near the existing pipeline and is one of several alternative strategies being considered by Upper Trinity, an alternative that, when all relevant factors are considered, is sound from an environmental perspective and will help serve the long-term needs of this region.

NOW, THEREFORE, be it resolved by the Board of Directors, Fresh Water Supply District #7:

SECTION 1. That it is in the best interest of this region for Upper Trinity to diligently pursue and to be successful in acquiring adequate water supplies for the next 50 years, taking great care to spread risks between different strategies and sources.

SECTION 2. That the Board of Directors hereby expresses its support for Upper Trinity's emphasis on water conservation and reuse of existing water supplies, and for Upper Trinity's plans to develop proposed Lake Ralph Hall in Fannin County, enabling the use of existing pipeline capacity to transport the water to the Trinity River Basin.

SECTION 3. That the Board of Directors hereby urges the Region C Water Planning Group to include Lake Ralph Hall as a proposed strategy in the updated water plan now being prepared for this region; and

SECTION 4. That the Board of Directors realizes that typical water supply projects take 25 to 40 years for completion, requiring vision and courage, and involving risks and controversy; and, accordingly the governing body of Upper Trinity Regional Water District is to be commended for its diligent efforts on behalf of its many members and customers.

SECTION 5. That this Resolution shall become effective immediately upon its passage.

DULY PASSED AND APPROVED THIS 28th **DAY OF** APRIL **2005.**

Executed: James [illegible] PRESIDENT
(Name and Title)

Attest: Troy C. [illegible] - Secretary
(Name and Title)

RESOLUTION

RESOLUTION 2005

A RESOLUTION OF THE FANNINDEL INDEPENDENT SCHOOL DISTRICT, CONCERNING LONG-RANGE WATER SUPPLY PLANNING FOR THE SERVICE AREA OF UPPER TRINITY REGIONAL WATER DISTRICT.

WHEREAS, according to the provisions of Senate Bill One (passed by 75th Texas Legislature) Upper Trinity Regional Water District (Upper Trinity) is required to prepare plans to assure an adequate supply of water for its customers for at least 50 years into the future; and

WHEREAS, Upper Trinity has been diligent and prudent in securing an adequate water supply for present needs and for many years into the future; and

WHEREAS, Upper Trinity is implementing measures to promote water conservation and reuse, and is taking steps, including the evaluation of alternative strategies to meet the needs of growth that is expected within its service area, including due consideration for technical, financial and environmental factors; and

WHEREAS, Upper Trinity is currently purchasing raw water from the City of Dallas, and plans to increase such purchases in the future pursuant to a long-term water supply contract; and

WHEREAS, Upper Trinity is working with other entities within Region C to evaluate other water sources that may be beyond the capability of Upper Trinity alone to develop or acquire; and

WHEREAS, over 20 cities and utilities within Region C rely on Upper Trinity's efforts to acquire adequate supplies of water for the future - - and, in doing so, to consider cost, timeliness, reliability, risk, safety and availability; and

WHEREAS, Upper Trinity has filed applications with the Texas Commission on Environmental Quality to secure rights for reuse of water being imported from Chapman Lake and to secure rights to divert additional water from the Sulphur River Basin (Lake Ralph Hall); and

WHEREAS, Upper Trinity has planned ahead and has contracted for capacity in an existing pipeline system to Chapman Lake (owned and operated by City of Irving), which pipeline has excess capacity that must be considered when comparing alternatives; and

WHEREAS, proposed Lake Ralph Hall is near the existing pipeline and is one of several alternative strategies being considered by Upper Trinity, an alternative that, when all relevant factors are considered, is sound from an environmental perspective and will help serve the long-term needs of this region.

NOW, THEREFORE, be it resolved by FANNINDEL INDEPENDENT SCHOOL DISTRICT;

SECTION 1: That it is in the best interest of this region for Upper Trinity to diligently pursue and to be successful in acquiring adequate water supplies for the next 50 years, taking great care to spread risks between different strategies and sources.

SECTION 2: That the **FANNINDEL INDEPENDENT SCHOOL DISTRICT** hereby expresses its support for Upper Trinity's emphasis on water conservation and reuse of existing water supplies, and for Upper Trinity's plans to develop proposed Lake Ralph Hall in Fannin County, enabling the use of existing pipeline capacity to transport the water to the Trinity River Basin.

SECTION 3: That the **FANNINDEL INDEPENDENT SCHOOL DISTRICT** hereby urges the Region C Water Planning Group to include Lake Ralph Hall as a proposed strategy in the updated water plan now being prepared for this region; and

SECTION 4: That the **FANNINDEL INDEPENDENT SCHOOL DISTRICT** realizes that typical water supply projects take 25 to 40 years for completion, requiring vision and courage, and involving risks and controversy; and accordingly the governing body of Upper Trinity Regional Water District is to be commended for its diligent efforts on behalf of its many members and customers.

SECTION 5: That this Resolution shall become effective immediately upon its passage.

DULY PASSED AND APPROVED THIS 21st **DAY OF** April**, 2005.**

Executed By: Don Daffron
Don Daffron, Board President

Attested By: Gwen Beeler
Gwen Beeler, Board Secretary

CITY OF HIGHLAND VILLAGE, TEXAS

RESOLUTION NO. 05-1740

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF HIGHLAND VILLAGE, TEXAS, CONCERNING THE UPPER TRINITY REGIONAL WATER DISTRICT ("DISTRICT") AND THE DISTRICT'S PLANNING FOR FUTURE WATER NEEDS; REQUESTING THE DISTRICT TO DEVELOP A COST CENTER ACCOUNTING APPROACH FOR EQUITABLY SHARING THE FINANCIAL BURDEN OF PROVIDING FUTURE WATER SUPPLIES; PROVIDING DIRECTION TO THE CITY'S REPRESENTATIVE ON THE UPPER TRINITY WATER DISTRICT BOARD; AND PROVIDING AN EFFECTIVE DATE.

WHEREAS, the City of Highland Village, Texas ("City") is a participating customer municipality in the service area of the Upper Trinity Regional Water District ("District"); and

WHEREAS, over twenty cities and utilities within Region C rely on water from the District, and rely on the District's efforts to acquire adequate supplies of water for the future, considering such factors that include, but are not limited to, cost, timeliness, reliability, safety and availability; and

WHEREAS, the City understands that the District is working with other entities within Region C to evaluate future water sources, including, but not limited to, Lake Ralph Hall; and

WHEREAS, the City Council of the City of Highland Village, Texas is interested in providing for the health, safety and welfare of its citizens as it relates to the provision of water to the City by the District; and

WHEREAS, the City Council of the City of Highland Village, Texas desires to express its support for the District's planning efforts for future water supplies and for reasonable cost structures for participating cities; and

WHEREAS, the City Council of the City of Highland Village, Texas desires to provide direction to the City's appointed representative to the District's Board of Directors concerning issues related to future water supplies and cost structures that affect the citizens of the City of Highland Village.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF HIGHLAND VILLAGE, TEXAS, THAT:

Section 1. The City Council of the City of Highland Village, Texas, as a participating customer municipality, supports the Upper Trinity Regional Water District's planning efforts to provide future supplies of water for Region C cities including Lake Ralph Hall, in order to meet anticipated water needs, given the growth that is expected in the District's service area.

Section 2. The City Council of the City of Highland Village, Texas, requests that the

District remain diligent in planning for adequate future water supplies, and that the District consider cost, timeliness, reliability, safety and availability, in those planning efforts.

Section 3. The City Council of the City of Highland Village, Texas, requests that the District consider developing a cost center financial accounting system that continues to allow participating cities to share equitably in the cost of providing water to its citizens, including allowing the use of rebates for costs based upon specified triggering events, as same may be developed by the District working in conjunction with area participating cities.

Section 4. The City Council of the City of Highland Village, Texas, hereby authorizes and directs the City's representative on the District's Board of Directors to (1) provide a copy of this Resolution to the District's Board of Directors; and (2) express to the Board the City's support for the District's desire to plan for future water supplies, and the City's desire that future water supplies be developed with a cost center financial accounting basis, including allowable rebates, to be developed in conjunction with the participating cities, so that the financial burden of providing future water supplies may be equitably shared.

Section 5. This Resolution shall take effect immediately from and after its adoption and passage, and it is accordingly so resolved.

PASSED AND APPROVED BY THE CITY COUNCIL OF THE CITY OF HIGHLAND VILLAGE, TEXAS ON THIS 26th DAY OF April, 2005.

APPROVED:

Bill Lawrence

Bill Lawrence, MAYOR
City of Highland Village, Texas

ATTEST:

Shari Kuykendall

Shari Kuykendall, CITY SECRETARY
City of Highland Village, Texas

(SEAL)

APPROVED AND TO FORM AND LEGALITY:

Edwin P. Voss, Jr.

Edwin P. Voss, Jr., CITY ATTORNEY
City of Highland Village, Texas

MUSTANG SUD

REC'D SEP 09 2005

September 7, 2005

Mr. Jim Parks, Chair RCWPG
North Texas Municipal Water District
P.O. Box 2408
Wylie, TX 75098

Re: 2006 Water Management Plan

Dear Mr. Parks:

On behalf on Mustang Special Utility District, thank you and the Region C Water Planning Group for its diligence and hard work in preparing the draft water plan.

Mustang Special Utility District is currently subscribed to Upper Trinity Regional Water District in the amount of one million gallons per day. Our projected needs, in the next four to five years, are an estimated four to five million gallons per day. Upper Trinity Regional Water District has included Mustang Special Utility District's future needs into its long-range water supply planning. We continue to work with Upper Trinity Regional Water District to insure that Mustang Special Utility District's supply will meet all future commercial and residential demands within our CCN.

Mustang implores North Texas Municipal Water District to adopt Upper Trinity Regional Water District's long-range water supply planning with its strategies and alternative strategies which greatly contributes to a secure future for Mustang Special Utility District.

Enclosed is a copy of Resolution No. 050905-01 adopted by Mustang Special Utility District's Board of Directors.

Thank you again. Should you have any questions or require additional information, please contact me at (940) 440-9561.

Sincerely,

Byron Gaines
General Manager
Mustang Special Utility District

enc.: Resolution No. 050905-01

c: Jason Pierce, Manager of Public Information, Upper Trinity Regional Water District

RESOLUTION

RESOLUTION NO. 050905-01

A RESOLUTION OF THE BOARD OF DIRECTORS, MUSTANG SPECIAL UTILITY DISTRICT CONCERNING LONG-RANGE WATER SUPPLY PLANNING FOR THE SERVICE AREA OF UPPER TRINITY REGIONAL WATER DISTRICT.

WHEREAS, according to the provisions of Senate Bill One (passed by 75th Texas Legislature) Upper Trinity Regional Water District (Upper Trinity) is required to prepare plans to assure an adequate supply of water for its customers for at least 50 years into the future; and

WHEREAS, Upper Trinity has been diligent and prudent in securing an adequate water supply for present needs and for many years into the future; and

WHEREAS, Upper Trinity is implementing measures to promote water conservation and reuse, and is taking steps, including the evaluation of alternative strategies to meet the needs of growth that is expected within its service area, including due consideration for technical, financial and environmental factors; and

WHEREAS, Upper Trinity is currently purchasing raw water from the City of Dallas, and plans to increase such purchases in the future pursuant to a long-term water supply contract; and

WHEREAS, Upper Trinity is working with other entities within Region C to evaluate other water sources that may be beyond the capability of Upper Trinity alone to develop or acquire; and

WHEREAS, over 20 cities and utilities within Region C rely on Upper Trinity's efforts to acquire adequate supplies of water for the future - - and, in doing so, to consider cost, timeliness, reliability, risk, safety and availability; and

WHEREAS, Upper Trinity has filed applications with the Texas Commission on Environmental Quality to secure rights for reuse of water being imported from Chapman Lake and to secure rights to divert additional water from the Sulphur River Basin (Lake Ralph Hall); and

WHEREAS, Upper Trinity has planned ahead and has contracted for capacity in an existing pipeline system to Chapman Lake (owned and operated by City of Irving),

which pipeline has excess capacity that must be considered when comparing alternatives; and

WHEREAS, proposed Lake Ralph Hall is near the existing pipeline and is one of several alternative strategies being considered by Upper Trinity, an alternative that, when all relevant factors are considered, is sound from an environmental perspective and will help serve the long-term needs of this region.

NOW, THEREFORE, be it resolved by the Board of Directors, Mustang Special Utility District:

SECTION 1. That it is in the best interest of this region for Upper Trinity to diligently pursue and to be successful in acquiring adequate water supplies for the next 50 years, taking great care to spread risks between different strategies and sources.

SECTION 2. That the Board of Directors hereby expresses its support for Upper Trinity's emphasis on water conservation and reuse of existing water supplies, and for Upper Trinity's plans to develop proposed Lake Ralph Hall in Fannin County, enabling the use of existing pipeline capacity to transport the water to the Trinity River Basin.

SECTION 3. That the Board of Directors hereby urges the Region C Water Planning Group to include Lake Ralph Hall as a proposed strategy in the updated water plan now being prepared for this region; and

SECTION 4. That the Board of Directors realizes that typical water supply projects take 25 to 40 years for completion, requiring vision and courage, and involving risks and controversy; and, accordingly the governing body of Upper Trinity Regional Water District is to be commended for its diligent efforts on behalf of its many members and customers.

SECTION 5. That this Resolution shall become effective immediately upon its passage.

DULY PASSED AND APPROVED THIS 9 DAY OF MAY 2005.

Executed: M L Snow
(Name and Title)

Attest: Barbara Aitken / Admin Asst.
(Name and Title)
for Laura Haynie / Asst. Secretary

RESOLUTION NO. 05-16

A RESOLUTION OF THE CITY COUNCIL, TOWN OF PONDER CONCERNING LONG RANGE WATER SUPPLY PLANNING FOR THE SERVICE AREA OF UPPER TRINITY REGIONAL WATER DISTRICT.

WHEREAS, according to the provisions of Senate Bill One (passed by 75th Texas Legislature) Upper Trinity Regional Water District (Upper Trinity) is required to prepare plans to assure an adequate supply of water for its customers for at least 50 years into the future; and

WHEREAS, Upper Trinity has been diligent and prudent in securing an adequate water supply for present needs and for many years into the future; and

WHEREAS, Upper Trinity is implementing measures to promote water conservation and reuse, and is taking steps, including the evaluation of alternative strategies to meet the needs of growth that is expected within its service area, including due consideration for technical, financial and environmental factors; and

WHEREAS, Upper Trinity is currently purchasing raw water from the City of Dallas, and plans to increase such purchases in the future pursuant to a long-term water supply contract; and

WHEREAS, Upper Trinity is working with other entities within Region C to evaluate other water sources that may be beyond the capability of Upper Trinity alone to develop or acquire; and

WHEREAS, over 20 cities and utilities within Region C rely on Upper Trinity's efforts to acquire adequate supplies of water for the future and, in doing so, to consider cost, timeliness, reliability, risk, safety and availability; and

WHEREAS, Upper Trinity has filed applications with the Texas Commission on Environmental Quality to secure rights for reuse of water being imported from Chapman Lake and to secure rights to divert additional water from the Sulphur River Basin (Lake Ralph Hall); and

WHEREAS, Upper Trinity has planned ahead and has contracted for capacity in an existing pipeline system to Chapman Lake (owned and operated by the City of Irving),which pipeline has excess capacity that must be considered when comparing alternatives; and

WHEREAS, proposed Lake Ralph Hall is near the existing pipeline and is one of several alternative strategies being considered by Upper Trinity, an alternative that, when all relevant factors are considered, is sound from an environmental perspective and will help serve the long-term needs of this region.

THEREFORE BE IT RESOLVED BY THE CITY COUNCIL OF THE TOWN OF PONDER, TEXAS THAT:

SECTION 1. That it is in the best interest of this region for Upper Trinity to diligently pursue and to be successful in acquiring adequate water supplies for the next 50 years, taking great care to spread risks between different strategies and sources.

SECTION 2. That the City Council hereby expresses its support for Upper Trinity's emphasis on water conservation and reuse of existing water supplies, and for Upper Trinity's plans to develop proposed Lake Ralph Hall in Fannin County, enabling the use of existing pipeline capacity to transport the water to the Trinity River Basin.

SECTION 3. That the City Council hereby urges the Region C Water Planning Group to include Lake Ralph Hall as a proposed strategy in the updated water plan now being prepared for this region.

SECTION 4. That the City Council realized that typical water supply projects take 25 to 40 years for completion, requiring vision and courage, and involving risks and controversy; and, accordingly the governing body of Upper Trinity Regional Water District is to be commended for its diligent efforts on behalf of its many members and customers.

SECTION 5. That this Resolution shall become effective immediately upon its passage.

Signed this 25th day of April, 2005.

Vivian Cockburn

Vivian Cockburn, Mayor

ATTEST:

Sheri Clearman

Sheri Clearman, City Secretary

RESOLUTION NO. 656

A RESOLUTION OF THE TOWN OF SHADY SHORES SUPPORTING THE UPPER TRINITY REGIONAL WATER DISTRICT.

WHEREAS, the Upper Trinity Water District provides essential water, wastewater, and related services to cities, towns, development districts, and others throughout the area. The District has done so by issuing bonds to finance its projects and entering contracts with its many members and customers for the construction and payment of these projects.

WHEREAS, the Upper Trinity Water District is governed by a board of directors (the "District's Board") comprised of representatives of each of the District's members. The Town of Shady Shores through its representative on the District's Board, is entitled to vote on all general matters before the District's Board.

WHEREAS, the Town of Shady Shores supports the notion that the District's policy matters should be determined by the District's Board in adhering to the principles of representative democracy.

NOW THEREFORE, BE IT RESOLVED THAT THE TOWN COUNCIL OF THE TOWN OF SHADY SHORES AS FOLLOWS:

The Town of Shady Shores unless expressly delegated or contracted away, believes that the District's Board should have discretion to determine how best to advance the interests of the District and its members and customers.

PASSED AND APPROVED this 2nd day of August, 2004.

By: Olive Stephens
Mayor Olive Stephens
Town of Shady Shores

ATTEST:

____

RESOLUTION NO. 0224052

A RESOLUTION SUPPORTING THE CONTINUED AND ONGOING STUDY OF THE SULPHUR RIVER BASIN BY THE SULPHUR RIVER BASIN AUTHORITY AND THE CONSTRUCTION OF THE MARVIN NICHOLS RESERVOIR.

WHEREAS, The Mount Pleasant Industrial Foundation is an organization made up of Business and Government Leaders with a goal of creating new employment and investment opportunities within Titus County and the preservation of an environment which will meet the needs of business and support long term jobs and employment in industry in Northeast Texas;

WHEREAS, The Mount Pleasant Industrial Foundation is vitally interested in the long term maximization of our economic assets and is cognizant of the economic benefit the Marvin Nichols Reservoir could have for this county as well as all of North Texas; and

WHEREAS, we recognize that the vision and leadership from Northeast Texans in the past has proven beneficial for this area by recognizing our water resources and enhancing those resources in the development of Lake Bob Sandlin and other Lakes which had direct impact on property values, created new tourism dollars and brought industry and jobs to Titus County and throughout Northeast Texas; and

WHEREAS, we believe in a similar vision and positive results which can be realized if the Marvin Nichols Reservoir is constructed and operated by a group from this region and for this region's benefit.

NOW, THEREFORE, BE IT RESOLVED, that the Board of Directors of the Mount Pleasant Industrial Foundation, stands behind the Sulphur River Basin Authority in their partnership with Tarrant Regional Water District, North Texas Municipal Water District, the Upper Trinity Regional Water District, the City of Irving and the U. S. Army Corps of Engineers to make a careful study of the entire Sulphur River Basin and determine all of the potential benefits and concerns associated with the construction of the Marvin Nichols Reservoir and if the study warrants to move forward with the construction of said project.

WE FURTHER RESOLVE to encourage our State and National Leadership to recognize the benefits of the reservoir to all the people of the region and to the State and to consider those interests when evaluating and funding the continued study of the project.

PASSED AND APPROVED this the 24th day of February, 2005.

Kerry Wootten, President
Mount Pleasant Industrial Foundation

(63)

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September 7, 2005

James Parks, Chair
Region C Water Planning Group
c/o North Texas Municipal Water District
P.O. Box 2408
Wylie, TX 75098

Re: Comments on Initially Prepared 2006 Regional Water Plan for Region C

Dear Mr. Parks and Planning Group Members:

The National Wildlife Federation, Lone Star Chapter of the Sierra Club, and Environmental Defense appreciate the opportunity to provide written comments on the Initially Prepared Regional Water Plan for Region C. We consider the development of comprehensive water plans to be a high priority for ensuring a healthy and prosperous future for Texas. We recognize and appreciate the contributions that you have made towards that goal. As you know, our organizations have provided, either individually or collectively, periodic input during the process of developing the plan. These written comments will build upon those previous comments in an effort to contribute to making the regional plan a better plan for all residents of Region C and for all Texans.

We do recognize that the draft Plan is subject to revision prior to adoption and is subject to continued revision in the future and provide these comments with such revisions in mind. Our organizations appreciate the amount of effort that has gone into developing the draft Plan for Region C. Your consideration of these comments will be appreciated.

I. BACKGROUND AND OVERVIEW

Our organizations support a comprehensive approach to water planning in which all implications of water use and development are considered. Senate Bills 1 and 2 (SB 1, SB 2), and the process they established, have the potential to produce a major, positive change in the way Texans approach water planning. In order to fully realize that potential, water plans must provide sufficient information to ensure that the likely impacts and costs of each potential water management strategy are described and considered. Only with that information can regional planning groups ensure compliance with the overarching requirement that "strategies shall be selected so that cost effective water management strategies which are consistent with long-term protection of the state's water resources, agricultural resources, and natural resources are adopted." 31 TAC § 357.7 (a)(9). Complying with this charge is essential in order to develop true plans that are likely to be implemented as opposed to a list of potential, but expensive and damaging, projects that likely will lead to more controversy than water supply. Comprehensive regional water plans have the potential to provide clear and effective guidance for development of water supplies within the region.

This document includes two types of comments. We consider the extent to which the initially prepared plan complies with the requirements established by SB1 and SB 2 and by the Texas Water Development Board (TWDB) rules adopted to implement those statutes. Key aspects of the initially prepared plan, including its stated goal of planning for 20% above projected demand and its inadequate treatment of water efficiency measures, do not meet explicit regulatory requirements that are prerequisites for plan approval. In addition, our comments address important aspects of policy that might not be controlled by specific statutes or rules. We do recognize that the financial resources available to the planning group are limited, which may restrict the ability of the group to fully address some issues as much as you would like. These comments are provided in the spirit of an ongoing dialogue intended to make the planning process as effective as possible. We strongly support the state's water planning process and we want the regional water plans and the state plan to be comprehensive templates that can be endorsed by all Texans.

A one-page summary of key comments follows this page. The next section of the letter summarizes key principles that inform our comments and how they relate to the initially prepared plan. The last section of the letter consists of specific comments keyed to different aspects of the initially prepared plan.

SUMMARY TABLE OF KEY COMMENTS

	Area	Comment	Solution
a	**Planning Basis**	The IPP's planning basis of aiming to supply 20% more than projected 2060 demand (an excess of 810,000 acre-feet) results in including four environmentally-damaging and unnecessary reservoirs, at a cost of $4 billion.	To be consistent with planning requirements, the region should plan for projected demand, and drop the four proposed reservoirs. With the implementation of better water efficiency and drought management measures, the projected supply would still likely exceed the 2060 demand.
b	**Maximizing Water Efficiency**	The IPP: (1) fails to include adequate water efficiency measures for many water user groups with very high water use rates, especially municipalities; (2) does not include the reasonably practicable conservation measures that are legal prerequisites to proposed interbasin transfers; (3) appears to greatly over-estimate unit costs of water derived from water efficiency measures, with no supporting justification; and (4) does not comply with legal requirements for separately assessing the impacts of water efficiency and re-use strategies.	The plan should be revised to correct all these problems through improved treatment of water efficiency measures.
c	**Drought Management**	The IPP is based on fully meeting even non-essential water needs during the drought of record and, in doing so, fails to comply with applicable requirements for implementing drought management measures.	The plan should be revised to incorporate drought management strategies for entities required to prepare drought management plans.
d	**Environmental Flows and Protection of Agricultural and Natural Resources**	The IPP fails to include the require quantitative analyses of the environmental impacts of the proposed water management strategies, particularly as it relates to environmental flows, and fails to demonstrate consistency with long-term protection of agricultural and natural resources.	The revised plan should include such analyses.
e	**Groundwater/ Spring flow**	The IPP does not adequate characterize current aquifer or spring conditions or trends.	The plan should be revised to address these deficiencies.
f	**Voluntary Water Transfers**	The IPP fails to adequately consider and evaluate the use of existing supplies available for voluntary transfers, particularly via water banks, leases or other mechanisms, which could be used to meet reasonable water demand, including during drought periods, without new reservoirs.	The plan should be revised to include an analysis of the use of existing supplies via voluntary water transfers.

II. KEY PRINCIPLES

A. Maximize Water Efficiency

We strongly believe that improved efficiency in the use of water must be pursued to the maximum extent reasonable. New provisions included in SB 2 and TWDB rules since the first round of planning mandate strengthened consideration of water efficiency. Potentially damaging and expensive new supply sources simply should not be considered unless, and until, all reasonable efforts to improve efficiency have been exhausted. In fact, that approach is now mandated. Consistent with TWDB's rules for water planning, we consider water conservation measures that improve efficiency to be separate and distinct from reuse projects. We do agree that reuse projects merit consideration. However, the implications of those projects are significantly different than for water efficiency measures and must be evaluated separately.

The Texas Water Code, as amended by SB1 and SB 2, along with the TWDB guidelines, establish stringent requirements for consideration and incorporation of water conservation and drought management. As you know, Section 16.053 (h)(7)(B), which was added after completion of the first round of regional planning, prohibits TWDB from approving any regional plan that doesn't include water conservation and drought management measures at least as stringent as those required pursuant to Sections 11.1271 and 11.1272 of the Water Code In other words, the regional plan must incorporate at least the amount of water savings that are mandated by other law.[1]

In addition, the Board's guidelines require the consideration of more stringent conservation and drought management measures for all other water user groups with water needs. Consistent with the TWDB rules, our comments treat water conservation and drought management as separate issues from reuse. Section 31 TAC § 357.7 (a)(7)(A) of the TWDB rules sets out detailed requirements for evaluation of water management strategies consisting of "water conservation practices." Section 357.7(a)(7)(B) addresses water management strategies that consist of drought management measures. The separate evaluation of water management strategies that rely on reuse is mandated by 31 TAC § 357.7 (a)(7)(C).

We recognize that "reuse" is included in the Chapter 11 definition of water conservation that governs water rights permitting. We also acknowledge that the Water Conservation Implementation Task Force recommendations allow reuse to be included in the calculation of municipal per capita water use. Both water efficiency and reuse merit consideration, but they must be evaluated independently in determining what mix of approaches to include in a regional plan. Under the right circumstances, reuse is an appropriate water management option, but it does not increase the actual efficiency of water use. Water is a finite resource. In order to meet the water needs of a growing population while ensuring the long-term protection of the state's natural resources and agricultural resources, we must use water as efficiently as possible.

[1] This is a common-sense requirement. We certainly should not be basing planning on an assumption of less water conservation than the law already requires. TWDB guidelines also recognize the water conservation requirements of Section 11 085 for interbasin transfers and require the inclusion of the "highest practicable levels of water conservation and efficiency achievable" for entities for which interbasin transfers are recommended as a water management strategy

We certainly acknowledge the progress made by Region C in incorporating water conservation into the initially prepared regional plan as compared to the 2001 version of the plan. However, much more progress is possible and needed. That is particularly true for the many water user groups in Region C for which new interbasin transfers are recommended. TWDB rules are clear in requiring that a regional plan must, for each WUG for which a new interbasin transfer is recommended, include "a conservation water management strategy, pursuant to § 11.085 (l), that will result in the highest practicable level of water conservation <u>and efficiency</u> achievable." See 31 TAC § 357.7 (a)(7)(A)(iii) (emphasis added). The water efficiency measures included in the initially prepared plan simply do not meet applicable requirements and certainly do not achieve the levels of water savings needed to support the authorization of an interbasin transfer of water.

B. Limit Nonessential Use During Drought

Drought management measures aimed at reducing demands during periods of unusually dry conditions are important components of good water management. As noted above, Senate Bill 2 and TWDB rules mandate consideration and inclusion in regional plans of reasonable levels of drought management as water management strategies. It just makes sense to limit some nonessential uses of water during times of serious shortage instead of spending vast sums of money to develop new supply sources simply to meet those nonessential demands. Because drought management measures are not included as water management strategies, the initially prepared plan does not comply with applicable requirements.

C. Plan To Ensure Environmental Flows

Although critically important, designing and selecting new water management strategies that minimize adverse impacts on environmental flows is only one aspect of planning to meet environmental flow needs. New rules applicable to this round of planning require a quantitative analysis of environmental impacts of water management strategies[2] in order to ensure a more careful consideration of those additional impacts. However, if existing water rights, when fully used, would cause serious disruption of environmental flows resulting in harm to natural resources, merely minimizing additional harm from new strategies would not produce a water plan that is consistent with long-term protection of natural resources or that would protect the economic activities that rely on those natural resources.

Accordingly, environmental flows should be recognized as a water demand and plans should seek to provide reasonable levels of environmental flows. Environmental flows provide critical economic and ecological services that must be maintained to ensure consistency with long-term protection of water resources and natural resources. We were unable to locate a quantitative analysis of environmental impacts of the proposed water management strategies and do not believe that the initially prepared plan demonstrates consistency with long-term protection of natural resources or agricultural resources.

[2] The rules require that each potentially feasible water management strategy must be evaluated by including a quantitative reporting of "environmental factors including effects on environmental water needs, wildlife habitat, cultural resources, and effect of upstream development on bays, estuaries, and arms of the Gulf of Mexico." 31 TAC § 357.7 (a)(8)(A)(ii)

D. Minimize New Reservoirs

Because of the associated adverse impacts, new reservoirs should be considered only after existing sources of water, including water efficiency and reuse, are utilized to the maximum extent reasonable. When new reservoirs are considered, adverse impacts to regional economies and natural resources around the reservoir site must be minimized. Regardless of whether the proposed reservoir is located inside or outside the boundaries of the region, reservoir development must be shown to be consistent with long-term protection of the state's water, agricultural, and natural resources. Because alternative sources, including existing reservoirs, that would be less damaging and less costly are available, none of the proposed new reservoirs included in the initially prepared plan have been justified or could be justified. They should be dropped from the plan.

E. Manage Groundwater Sustainably

Wherever possible, groundwater resources should be managed on a sustainable basis. Mining groundwater supplies will, in many instances, adversely affect surface water resources and constitute a tremendous disservice to future generations of Texans. Generally speaking, depleting groundwater sources will not be consistent with long-term protection of the state's water resources, natural resources, or agricultural resources. We commend the Region's stated long-term goal of balancing groundwater withdrawals with recharge.

F. Facilitate Short-Term Transfers

Senate Bill 1 directs consideration of voluntary and emergency transfers of water as a key mechanism for meeting water demands. Those approaches seem to have received little attention in the planning process to date. Water Code Section 16.051 (d) directs that rules governing the development of the state water plan shall give specific consideration to "principles that result in the voluntary redistribution of water resources." Similarly, Section 16.053 (e)(5)(H) directs that regional water plans must include consideration of "voluntary transfers of water within the region using, but not limited to, regional water banks, sales, leases, options, subordination agreements, and financing arrangements…." Thus, there is a clear legislative directive that the regional planning process must include strong consideration of mechanisms for facilitating voluntary transfers of existing water rights within the region, particularly on a short-term basis as a way to meet drought demands.

In addition, emergency transfers are intended as a way to address serious water shortages for municipal purposes. They are a way to address short-term problems without the expense and natural resource damage associated with development of new water supplies. Water Code Section 16.053 (e)(5)(I), as added by SB 1, specifically directs that emergency transfers of water, pursuant to Section 11.139 of the Water Code, are to be considered, including by providing information on the portion of each non-municipal water right that could be transferred without causing undue damage to the holder of the water right. Thus, the water planning process is intended as a mechanism to facilitate voluntary transfers, particularly as a means to address drought situations, by collecting specific information on rights that might be transferred on such a basis and by encouraging a dialogue between willing sellers and willing buyers on that approach. The issue is mentioned on page 4C.9 of the initially prepared plan but without any substantive discussion. We were not able to locate further discussion under other categories.

Existing supplies that would be available for transfer do not appear to have been adequately considered.

III. PAGE-SPECIFIC COMMENTS

For ease of tracking, we have attempted to identify our individual, page-specific comments by preceding each with a number enclosed in brackets.

E.S. EXECUTIVE SUMMARY

[1] Figure ES.4, on page ES.8, graphically illustrates the failure of the initially prepared plan seriously to embrace water efficiency measures. According to that figure, per capita use levels decline in the early years of the planning period, but then again begin to increase. The projected decrease in the early years is due primarily to proposed reuse projects. The return to a projected increase in per capita use illustrates the failure seriously to endorse water efficiency measures. It just is not reasonable to plan for long-term increases in per capita water use rates On the state, regional, and local levels, we can, and must, do better than that.

ES.3 Identification and Selection of Water Management Strategies

[2] For purposes of the regional water planning process, water conservation and reuse are two separate issues. See, for example, 31 TAC § 357.7 (a)(7)(A) requiring evaluation of water conservation separately from the evaluation of reuse, which is mandated by 31 TAC § 357.7 (a)(7)(C). The initially prepared regional plan generally seeks to combine the two strategies. In some instances, it is possible from the context of the plan to separate out the discussion of the two concepts, but the distinction is not as clear as it needs to be. In various places, the plan lumps reuse and conservation as one approach. We certainly agree that both approaches are worthy of consideration. However, they have different implications and require distinct evaluations.

A simplified example illustrates the distinction between efficiency of use and reuse:

	City A	City B
Population	1,000	1,000
Diversion (gallons/day)	100,000	150,000
Per capita use (gpcd)	100	150
Reuse amount (gallons/day)	No reuse	50,000
Adjusted per capita	100 gpcd	100 gpcd
Actual pumped and treated water (gallons/day)	100,000	200,000

Even though the adjusted per capita usage rates are equal for the two hypothetical cities, the actually efficiency of use is much higher in City A. City A supports 1,000 people while diverting only 100,000 gallons per day, compared to 150,000 gallons for City B. Also the actual total pumped (and treated) water is 100,000 gpd for A and 200,000 gpd for City B. Thus, the pumping and treatment costs are much higher in City B. Because water is a limited resource of statewide importance, efficiency in use must be the primary goal if we are to support a growing population while also protecting our natural heritage. When water is reused it is still taken out of streams and rivers. It means less water will flow downstream to support existing water rights, fish and wildlife resources, and to protect water quality.

[3] Thus, the reuse proposed in Region C means 739,938 acre-feet per year[3] of additional water is diverted rather than flowing downstream. Depending on the use of that water, the ultimate reduction in flow may be considerably less because the water diverted for reuse will not be completely consumed. However, even if only 50% is consumed, a reduction of about 370,000 acre-feet per year in flows, particularly during drought periods, could have substantial impacts on Galveston Bay, instream uses, and downstream water rights when combined with diversions in Region H. Evaluating the significance of those changes requires careful analysis, which should include consideration of issues such as whether the water being reused initially was imported into the river basin. Although that analysis is required pursuant to 31 TAC § 357.7 (a)(8)(A)(ii), § 357.7 (a)(13), and other rules, it is not found in the initially prepared plan.

These comments are not intended as a blanket criticism of reuse projects. We believe reuse can play an important water supply role. However, the amount of reuse appropriate in any particular location can only be determined through careful evaluation of the implications of that reuse in the context of expected future stream and river flows. Although the planning process does not mandate the detailed level of review needed for permitting, it does require a meaningful, quantitative evaluation that we believe is lacking here.

Recommended Water Management Strategies

[4] Page ES.9 indicates that the region is planning to develop a supply of 4.05 million acre-feet per year by 2060, which is about 20% greater than projected demand. The Planning Group seeks to support that excess as "leaving a reasonable reserve to provide for difficulties developing strategies in a timely manner, droughts worse than the drought of record, and greater than expected growth." However, that approach flies in the face of the ongoing nature of the planning process, which involves successive plan revisions every five years. It also is directly inconsistent with TWDB's rules directing that the planning process be based on population and demand projections approved by TWDB. *See* 31 TAC § 357.5 (d).

[5] Rather than basing the plan on those projections, the initially prepared plan simply assumes 20% more water demand. This 20% excess alone amounts to about 810,000 acre-feet of water per year, or more than the combined supply to Region C from the four recommended major new reservoir projects: Marvin Nichols, Lower Bois d'Arc Creek, Fastrill, and Ralph Hall. Those four strategies have a combined cost well in excess of $4 billion.

The very reason that plans are updated every 5 years is to allow for adjustments on an incremental basis. If recommended projects aren't moving forward when a future plan is adopted, recommendation of different strategies may be appropriate at that time. Similarly, if population and demand projections have changed at that point, appropriate adjustments in recommendations should be made. Region C's decision to reject the basic premise of using an agreed-upon planning target undermines the value of the planning process. If all regions plan consistently, then no one region should end up using state money or permits to develop or implement a plan that calls for laying claim to an undue portion of the state's limited water resources. Nor does a possible future drought worse than the drought of record justify planning

[3] From Table 6 4 of the IPP on p. 6 18

for such a large excess supply. In fact, SB 1 is quite specific in directing the use of the "drought of record" as the appropriate target for planning. *See* Tex. Water Code Ann. § 16.053 (e)(4).

[5A] The initially prepared plan relies heavily on major new reservoir projects. Particularly given the numerous alternatives that Region C has available, such as use of additional supply from existing surface water reservoirs and better water efficiency measures, heavy reliance on new reservoirs is a high risk approach. The proposed major new reservoirs will be highly controversial. Obtaining required permits will be expensive, complicated, and far from certain.

[6] The Planning Group chose not to consider drought management and emergency response as a way to meet drought demands. This decision was based, at least in part, on the premise that drought management measures should be relied upon in case of a drought worse than the drought of record: "[t]hey provide a backup plan in case a supplier experiences a drought worse than the drought of record or if a water management strategy is not fully implemented when it is needed." IP at p. 6.6 However, instead of relying on drought management measures as a mechanism to address the issue of such a drought, the initially prepared plan proposes extra new water supply projects. Thus, not only is planning for this excess supply inconsistent with TWDB rules and the very premise of the ongoing planning process, it is inconsistent with other assumptions embedded in the remainder of the initially prepared plan.

[7] Water is a limited resource in the state. It must be shared equitably. Using common assumptions for planning across all planning regions is one way to help achieve that equity. The approach stated in the initially prepared plan for planning for demand significantly in excess of projections is not equitable, would result in a huge waste of money, and does not meet regulatory requirements.

Chapter 1. Description of Region C

1.2 Water-Related Physical Features in Region C

[8] Figure 1.6 (p. 1.12) – Although we certainly agree that return flows have increased summer-time flows in the Trinity River downstream of the metroplex, these graphics are not particularly illustrative of those changes because the Trinity River at Rosser wouldn't be expected to behave like the smaller tributary streams in any case. First, the periods of record for the various gages vary dramatically. Particularly in the case of flows at Trinity River near Rosser, it likely would be much more illustrative to break the period of record into a time period representing conditions before major water project development and a period representing conditions after such project development. Such an approach likely would provide better information for understanding flow changes. Second, tributaries with small drainages would be expected to experience more severe low flow periods than the mainstem of the Trinity River which reflects the cumulative flow of a very large area. In addition, seasonal flows may be affected by loss of springflows in the area as a result of groundwater pumping. Because the tributary gages generally have fairly recent periods of record, they may not be a good reflection of natural flow patterns because naturally occurring springflows may already have ceased prior to, or early in, the period of record. As discussed further below, providing a good baseline for consideration of environmental flow changes is essential for evaluating impacts of individual water management strategies and for assessing the consistency of the plan with long-term protection of the state's natural resources.

1.4 Current Sources of Water Supply

[9] Figure 1.10 (page 1.23) The comparison, shown in Figure 1.10, of per capita municipal use for entire regions lends itself much more to an "apples to apples" comparison across the state than the other inter-regional comparisons of Figures 1.11 and 1.12. This is because the basic function being supported in the municipal use category is the same across all regions and from one city to another. We do acknowledge that minor adjustments, for factors such as numbers of offices, hotels, etc., may be appropriate to fine-tune such comparisons.

[10] Regardless, it is also critical to evaluate municipal per capita use on an individual water user group basis If half of the WUGs in a region are achieving excellent water efficiency and half are being highly inefficient, a lot of water still is being wasted. Inefficient water use should be addressed and eliminated on an individual water user group basis.

[11] Figures 1.11 and 1.12 (pp. 1.24, 1.25) – These figures provide various analyses about "per capita" water use among different regions. The apparent message is that, by contrast to municipal water use, Region C water use is comparatively low when compared to other regions. Figure 1.11 excludes agricultural water use. Excluding agricultural water use does indicate lower in-region use in Region C, but people in Region C rely on food and other agricultural products grown in other regions. Similarly, with respect to Figure 1.12, which considers total use per capita, various regions rely primarily on agricultural and manufacturing products produced in other regions. It certainly does not seem appropriate to expect each region to be fully self-sufficient in producing all of the products used within the region or to be critical of high total per-capita water use in a region if the water is used to produce food or products for people in many regions. Accordingly, these broad comparisons really are not very meaningful and the rationale for their inclusion is highly questionable. Certainly, regardless of the type of use, each region and each user should be held accountable for using water efficiently. However, these comparisons do not provide useful insight into whether that is happening.

1.5 Water Providers in Region C

[12] Pages 1.37-1.44 (Tables 1.15 – 1.19). The wholesale water sales detailed in Tables 1.16 and 1.19 do not seem to match the figures shown in Table 1.15.

1.6 Pre-Existing Plans for Water Supply Development

[13] Page 1.56 – The initially prepared plan indicates that proposed rules would require five-year updates to water conservation plans Such five-year updates are required by the Texas Commission on Environmental Quality (TCEQ) rules currently in effect that govern the content of required water conservation plans.

[14] Page 1.56 – In the second bullet point near the bottom of the page, the text does not seem to be consistent with the Water Conservation Implementation Task Force report with regard to reuse and per capita computations.

[15] Page 1.56 – The text references the requirement for many water user groups to develop quantified five-year and 10-year water conservation goals. It is unfortunate that those numerical goals were not established until May of this year. As a result, we certainly understand that the planning group was not able to fully incorporate those goals into its water conservation planning.

We do urge the planning group to provide for the review of as many of those revised plans as possible, particularly for the larger water user groups, to ensure that the adopted regional plan includes at least the level of water conservation, and drought management, called for in those updated water conservation plans.

1.7 Agricultural and Natural Resources in Region C

[16] It is disappointing to see no obvious effort to build on the information included in the 2001 Region C Plan. Other than updating a table, this text appears to be a duplicate of that provided in 2001. Given the revisions to the governing statutes and TWDB rules to place increased emphasis on consideration of natural resources in the planning process, this lack of attention is troubling. TWDB may not approve a regional plan unless it is able to make an affirmative finding that the regional plan is consistent with long-term protection of the state's natural resources. See Texas Water Code Section 16.053 (h)(7)(C). The initially prepared plan simply does not provide the information necessary to support such a finding. The necessary information is lacking even for natural resources located within the boundaries of the region and it is even more insufficient for resources located outside the region but affected by the proposed strategies in the initially prepared plan. This deficiency is particularly glaring with respect to the various proposed reservoir projects, which have the potential for large-scale adverse impacts.

[17] Page 1.59 – We do acknowledge the inclusion of limited information about springs in the region. However, it is disappointing that no additional information has been provided about those springs beyond what was included in the 2001 Region C Water Plan. At a minimum, the IPP should indicate the aquifer from which these springs issue as well as some information about trends in the levels of those aquifers.

[18] Page 1.59 - As you know, TWDB rules were revised since completion of the first round of planning to require consideration of springs important for natural resource protection. See 31 TAC § 357.7 (a)(1)(D). Unfortunately, the information included in the initially prepared plan is not adequate to allow any assessment of whether any of the listed springs is a significant feature in terms of fish and wildlife resources. Particularly for the five "medium" springs listed, inclusion of some additional information about the natural resource significance of those springs would be appropriate in complying with those revised rules.

[19] Page 1.59 - Some discussion also would be appropriate for the springs that feed North Fish Creek and South Fish Creek. Although not actually proposed for designation as a unique stream segment, Fish Creek was identified as one of the streams potentially meriting such designation, in part because of its spring-fed nature. *See* Appendix W to Initially Prepared Plan.

[20] Page 1.59 – The wetlands information provided has only very limited utility. There is no discussion of significant wetland complexes. Information should be provided about significant wetlands associated with seeps or springs and with rivers or streams because those are the wetlands with the greatest potential to be affected by water management decisions. Such information would provide a baseline against which to assess proposed water management strategies that would be located within the boundaries of the Region. Again, it constitutes information needed to assess the implications of the plan for consistency with long-term

protection of natural resources and to provide a meaningful quantitative evaluation of potentially feasible water management strategies.

[21] Page 1.61 – The information on endangered or threatened species also has limited utility. Again, it would be much more useful if it were to highlight species occurring in habitats dependent on seeps and springs or rivers and streams. Those are the habitats and the species most likely to be affected by water management decisions. Mussel species also should be included and discussed. This group of species has suffered significant declines and, because it is sensitive to changes to stream and river systems, it is a good indicator of system alterations. General information about mussel species and areas of occurrence can be found in "Freshwater Mussels of Texas" by Howells, Neck, and Murray. Regardless of whether individual species are listed as threatened or endangered, mussels serve as good indicators of river system health. This constitutes information needed to assess long-term impacts on natural resources and to perform a meaningful quantitative evaluation of potentially feasible water management strategies.

1.9 Summary of Threats and Constraints to Water Supply in Region C

[22] Page 1.76 – In the section on Groundwater Drawdown the information is so general that it is of little practical value. For instance there is a cited overdraft of Trinity and Nacatoch aquifers in "some counties." The counties should be identified and information should be provided regarding if, and how, these lowered aquifer levels affect springflows or other surface flows. Also, additional information should be provided regarding the likely future condition of the aquifer in those areas.

1.9 Water-Related Threats to Agricultural and Natural Resources in Region C

Changes to Natural Flow Conditions

[23] Page 1.78 –The last sentence in this section suggests a significant oversimplification of the complexities of natural flow systems. The science of flow protection has moved far beyond the simple assumption that an increase in low flows is all that is needed to improve a natural system. For example, periodic higher flows may be needed to maintain the characteristics of the stream or river channel. As summarized by the Science Advisory Committee to the Study Commission on Water for Environmental Flows: "The principal goal of providing environmental flows is to assure that sufficient quantities of water, <u>reflecting seasonal and yearly fluctuations, as well as the frequency, timing, and volume of high-flow events</u>, are made available to adequately protect the state's aquatic resources." Science Advisory Committee Report on Water for Environmental Flows (Oct. 26, 2004) at p. 1-7 (emphasis added).

Reservoir construction may dramatically alter the flow cycle. Altering a system from one of natural variability to one characterized by relatively constant flows, particularly during key seasons, can have significant adverse impacts on natural habitats and the species dependent on those habitats. Information about the actual flows likely to have been present under natural conditions is critical for understanding the significance of alteration of those conditions. Unfortunately, that information is sorely lacking. That last sentence also fails to acknowledge the pending, and recommended, reuse projects that have the potential for major alterations of return flow contributions to the river systems of the Region.

[24] Page 1.78 – In the section on **Changes in Natural Flow Conditions,** the information again is extremely general making it of little use. With the TCEQ's Water availability model for the Trinity River, it would be quite feasible to portray "naturalized flows" in a quantitative manner similar to the graphs presented in Section 1.2 (Figure 1.6; p. 1.12). The cited "dramatic" flow changes in the Trinity could be more effectively portrayed by comparing naturalized and historic flows (on Fig 1.6).

In order to evaluate the consistency of the plan with long-term protection of natural resources, the plan must use some type of ecologically-based criterion as a baseline against which to assess changes. A calculation that just reflects changes in flow statistics provides a useful starting place. However, in order to understand how those changes would be expected to affect natural resources an additional step is required that compares the changed flow regime to some biologically-sound baseline or to some established environmental flow regime.

Page 1.79 Inundation Due to Reservoir Development
[25] This discussion is woefully lacking in substance. No information is provided about agricultural uses within the potential footprints of the listed reservoirs. There is a similar lack of information about natural resources found within those footprints. Information also is lacking about potential off-site impacts such as flow reductions downstream, potentially affecting natural resources and flows available for domestic and livestock use, and impacts on agricultural land-use from mitigation requirements. Although it certainly is true that the precise impacts can't be calculated at this point, reasonable estimates are possible and needed. This information is needed to comply with the requirement for a quantitative evaluation of environmental factors, 31 TAC §357.7 (a)(8)(A)(ii), and of impacts on agricultural resources, 31 TAC §357.7 (a)(8)(A)(iii).

4B. Water Conservation and Reuse of Treated Wastewater Effluent in Region C
[26] Page 4B.1 – The citation to the Water Code definition of "water conservation" as including reuse is not particularly helpful. We agree that the definition in Chapter 11 of the Water Code does include reuse. However, for purposes of water planning, the required evaluation of water conservation refers to water efficiency measures. Reuse is to be separately considered as a water supply strategy. Independent evaluations of the two strategies are required. See, for example, 31 TAC § 357.7 (a)(7)(A) requiring evaluation of water conservation. Evaluation of reuse is separately required pursuant to 31 TAC § 357.7 (a)(7)(C)

[27] Page 4B.2 – Table 4B.1, which indicates low levels of existing conservation programs in many categories, reveals great potential for water conservation savings within the Region. The Table could be made much more informative if it were expanded to include information about ranges of potential savings and costs for the various methods listed.

[28] Page 4B.3 and Table 4B.2 (p. 4B.4) – The text indicates that rainwater harvesting and condensate reuse strategies were rejected based on an expectation of limited public participation and relatively high cost. No justification for this opinion is given. Many other Texas cities are implementing rainwater harvesting measures in various fashions. Given its early elimination, no cost data are given for rainwater harvesting, but the cited GDS report gives a cost for implementing such a program in Region C of $541 per acre-foot. That cost would seem to make it an attractive option, particularly for rural settings with limited water needs.

[29] Page 4B.12 and Table 4B.5 itemize "opinions of probable cost" for various conservation water management strategies. The methods for arriving at the costs are not given and the costs themselves are dramatically higher than those provided in cited references on water conservation. For instance, Table 4B.5 places low-flow toilet replacement programs in the "less cost-effective" category with a cost of $1742 per ac-ft saved ($5.36 per 1000 gallons). The cited GDS report gives a cost for implementing a low-flow toilet replacement program in Region C, of $403 per ac-ft. Clothes washer rebates in the GDS report are reported at $801 for Region C instead of the $1388 given in the initially prepared plan. The method and information sources that underlie these "opinions" of high cost require further explanation.

[30] Table 4B.5 - Based on the text on page 4B.9, the IPP's entry here labeled "Residential customer water audit" appears to be essentially equivalent to a measure called "municipal irrigation system audit – high user" described on page 7 in the cited GDS report. This was identified in the GDS report as a measure with the highest potential for saving water in Region C at an attractive cost of $459 per ac-ft. The cost for this measure in the initially prepared plan, however, is listed as $2038 per ac-ft. Again, the methods for arriving at the cost are not given and the cost themselves are in considerable disagreement with cited references on water conservation. The bases for the use of the higher costs must be provided.

[31] Page 4B.14-15 – The "basic package" of water conservation, which is recommended for all municipal water user groups, appears to have little substance. Of the five measures listed, only one, "public and school education," does not appear primarily to be merely an accounting of savings that will result from compliance with existing laws or will result from unavoidable increased costs for water supply. Thus, describing this as a water conservation package "recommended" for all municipal water user groups appears to be largely characterizing activities mandated by existing law as water conservation "recommendations." Those savings certainly are required to be calculated and acknowledged. However, they should not be characterized as being part of the region's proactive water conservation "recommendations."

[32] Page 4B.14-15 –Savings resulting from low flow plumbing fixture requirements should be calculated separately and listed separately from any water conservation "recommendations." Absent an active retrofit program, it is not an activity to be undertaken by a water supplier. Instead, it simply is a process of accounting for already mandated actions. Such automatic savings must be accounted for in order to have an accurate projection of unmet water needs. In various places in the initially prepared plan specific totals are given for plumbing fixture code requirements and they are listed as being separate from the basic package of water conservation. As a result, the current text creates significant confusion about whether there is some other aspect of plumbing fixtures replacement that is appropriately included in the "recommended" basic package for water conservation.

[33] Page 4B.7 - Water use reduction due to increasing water prices does not appear to be a reflection of an attempt to save water through controlling water rates. As described on page 4B.7, it is simply a reflection of "increases in real water prices over time." As used in the initially prepared plan, it is separate from a "water conservation pricing structure." Again, it does not seem to reflect any overt effort by any water supplier to save water. We support the effort to

account for such measures but believe it would be appropriate to categorize the projected reduction under "automatic savings" or some similar heading that is more descriptive of the nature of the activity.

[34] Page 4B.7- Water system audit, leak detection and repair, and pressure control similarly appears to be largely a reflection of compliance with new legislation. House Bill 3338, passed in 2003, requires all retail public utilities to perform water audits. That requirement is codified in Section 16.0121 of the Texas Water Code and explained in a TWDB publication entitled "Water Loss Manual."

[35] Page 4B.7 - "Federal residential clothes washer standards" refers to accounting for savings that will result from compliance with federal law mandating efficiency improvements in clothes washers. Again, it does not reflect any activity by a water supplier to save water and would be more accurately characterized as "automatic savings." The point is that no overt action on the part of a water supplier is needed in order to realize the projected savings.

[36] Pages 4B.3 – 4B.13 - In terms of actual activities by WUGs that are not already mandated by other laws, the "municipal basic package" in essence seems to involve only "public and school education" and the "leak detection and repair" components that may not automatically be encompassed in water audits. Although all of the measures included in the "basic package" should be accounted for, the initially prepared plan should appropriately characterize most of them as accounting exercises reflecting compliance with existing legal requirements rather than as some additional conservation actions being "recommended" as part of the planning process.

[37] Pages 4B.3 – 4B.13 - We certainly support educational activities and leak repair as important water conservation measures that should be included. However, there are additional fundamental steps that also should be included in the "municipal basic package." For example, prohibition of water waste is only included in the "municipal expanded package." At minimum, that fundamental step of prohibiting water waste should be added to the basic package recommended for all water users. House Bill 1152 enacted in 2003 granted many entities additional enforcement authority to prohibit "excessive or wasteful uses of potable water." That provision is now codified in Section 67.011 of the Water Code. Given the extremely low percentage of Region C water suppliers with current waste prohibitions (only 18% of water user groups and 22% of wholesale providers[4]) an across-the-board recommendation certainly appears to be in order.

[38] Page 4B.15 - Upon examination, it appears that the "expanded package," recommended for 107 municipal water user groups, may not involve a "package" at all. It is described, on page 4B.15, as including only "one or more" of the listed strategies rather than an actual package. As a result, there does not seem to be any clear listing of what measures are actually being recommended for a given user. Appendix V does not include any breakout of the component(s) actually being included for individual WUGs. For the vast majority of WUGs, the projected conservation savings from the expanded package are quite minimal, suggesting that few measures are actually included. The overall descriptions of the water management strategies

[4] From Table 4B.1 (p. 4B.2) of the initially prepared plan

being recommended for wholesale water providers, Section 4E, also fail to include any specific information about the components of the "expanded package" that are employed. The Water Conservation Implementation Task Force report and the GDS report provide information on many additional water efficiency measures that should be considered. Those additional measures should be included.

[39] Page 4B.1 & Table 4B.5 - It is not clear if water conservation inducing pricing is included in this package. It appears in the list included in Table 4B.5, but is not included in the description provided on page 4B.15.

[40] Table 4B.5 - Finally, because reuse is included in the package and because of the variation from one user to another, it appears that the "expanded package" of water conservation for any particular water user group could potentially not include a single measure designed to improve actual efficiency in the use of water. That simply is not acceptable and does not comply with applicable requirements.

[41] Section 4B.1 and all of Section 4C – In section 4C of the IPP "Methodology for Evaluation and Selection of Water Management Strategies" the potential yield of each individual strategy is prominently displayed (see, for example, Table 4C.1 and 4C.2). The potential for water savings through improved water efficiency is huge. That potential must be displayed in a similar fashion because water efficiency measures are reasonable water management strategies that are required to be evaluated and, in many instances, included.

[42] Region C, to its credit, is proposing a not insubstantial conservation savings of approximately 290,000 ac-ft/yr by 2060. However, there is potential for much more water efficiency savings. The Table "IPP Comment 1," reproduced below, illustrates the potential savings if just the top ten WUGs were to implement water efficiency measures to reduce demand to a low but quite achievable target level of 140 gpcd.

Table IPP Comment 1 – Calculation of additional savings through municipal water efficiency measures for the ten most populous Water User Groups at the 2060 time frame.

Water User Group (WUG) name	Population	Region C IPP water use rate with efficiency measures* (gpcd)	target demand per person (gpcd)	revised Total Demand of WUG (ac-ft/yr)	additional savings (ac-ft/yr)
DALLAS	2,058,767	**233**	140	322,856	214,375
FORT WORTH	1,848,759	**183**	140	289,923	88,492
ARLINGTON	515,000	**157**	140	80,762	9,996
DENTON	498,488	**156**	140	78,173	8,790
MCKINNEY	400,000	**209**	140	62,728	30,898
GRAND PRAIRIE	393,743	**127**	140		
PLANO	305,000	**229**	140	47,830	30,307
GARLAND	300,000	**136**	140		
FRISCO	300,000	**250**	140	47,046	36,876
IRVING	283,521	**196**	140	44,462	17,903
			totals	973,780	437,637

* for derivation of these water use rates, see Table "IPP Comment 3" below.

[43] In fact, if all Region C municipal water user groups were to achieve a 140 gpcd level through water efficiency measures by 2060, it would represent savings of almost 1,000,000 acre-feet per year.[5] That is more than 650,000 acre-feet of additional savings per year from municipal water efficiency measures than is proposed in the initially prepared Region C plan.

[44] We know that these suggested municipal water use rates are not unreasonable for Texas. San Antonio provides a real world example of the potential of improved water efficiency. Through a concerted effort, San Antonio has reduced its municipal water use to about 132 gpcd from a use level of about 213 gpcd in a period of around 20 years. This reduction was achieved through water efficiency measures without accounting for reuse.

[45] In fact, in its initially prepared plan, Region L has established water efficiency goals as follows:

> "For municipal water user groups (WUGs) with water use of 140 gpcd and greater, reduction of per capita water use by 1 percent per year until the level of 140 gpcd is reached, after which, the rate of reduction of per capita water use is one-fourth percent (0.25) per year for the remainder of the planning period; and
>
> For municipal WUGs having year 2000 water use of less than 140 gpcd, reduction of per capita water use by one-fourth percent per year."

These excerpts are from Initially Prepared 2006 South Central Texas Regional Water Plan (SCTR Plan) at p. 6-1.

[46] Section 4B.1 - It does not appear that lawn irrigation savings are included as uniquely identifiable recommended measures for Region C. A key feature of the Region L water use reductions, particularly in later years, is significant savings from lawn irrigation. The estimate cost per acre-foot of savings in Region L is $400. The estimated cost per acre-foot of savings through lawn irrigation audits in the GDS report prepared by the Texas Water Development Board specifically for use in regional planning is $ 459 for Region C for single family users with high usage rates. By contrast, the estimated cost per acre-foot given in the initially prepared plan is about $3850.[6] We do acknowledge that the measures in the GDS report may not exactly match those considered in the initially prepared plan. However, they are similar enough that the bases for these very high estimates and the dramatic departure from the estimates provided in the GDS report require explanation. Accordingly, the initially prepared plan does not provide adequate justification for failing to include these strategies.

[47] Page 4B.4. The initially prepared plan indicates that conservation strategies for industrial uses were deemed infeasible "due to a lack of necessary data." Section 11.1271 of the Water

[5] NWF has calculated potential Region C savings of 969,076 acre-feet per year at 140 gpcd. The initially prepared plan indicates a water conservation saving of 296,345 acre-feet per year. Accordingly, the 140 gpcd level would result in potential additional savings of about 672,731 acre-feet.

[6] Based on a conversion to dollars per acre-foot from the dollars per $1000 gallons figure in Table 4B.5

Code requires water conservation measures for industrial use served by surface water permits in excess of 1,000 acre-feet/year. In turn, SB 2 and TWDB rules require that water conservation be included as a water management strategy for those entities to which Section 11.1271 applies. Because the initially prepared plan indicates that no water conservation is included for industrial water users, the initially prepared plan fails to comply with applicable requirements. Water conservation plans on file with TCEQ and TWDB provide basic information and data for consideration of water conservation for industrial water users. In addition, information about water conservation strategies for industrial users is provided in the report of the Water Conservation Implementation Task Force

Water Conservation Applicable to Interbasin Transfers

[48] This issue is briefly mentioned in two places in the initially prepared plan, on page 4B.13 and in Table 6.9 on pages 6.34-.35. However, neither of those sections includes any substantive discussion of the purported justification for a determination that the recommended levels of water conservation "will result in the highest practicable level of water conservation and efficiency achievable." As is clear from the express language, this criterion focuses very specifically on water efficiency. There simply is no basis for supporting the contention that the water conservation recommendations in the Region C plan will result in the highest practicable levels of water efficiency achievable.

[49] Indeed, the experience of San Antonio belies the contention that higher levels of water efficiency are not achievable and practicable. Absent compelling evidence to the contrary, a municipal usage rate of no higher than 140 gpcd should be used for evaluating achievable water efficiency (i.e., usage rates not considering reuse). Table 4B.2 (on p. 4B.4) lists municipal water conservation strategies that were determined to be potentially feasible. At minimum, water conservation measures recommended for any water user group that is slated to receive water from a new interbasin transfer must include all of those strategies and the demand for water from the transfer must reflect the savings from those measures.

[50] In addition, industrial water conservation strategies must be included for any users expected to obtain water through an interbasin transfer. For water obtained pursuant to interbasin transfers, strategies listed in Table 4B.3 (p. 4B.5) are feasible because the water supplier providing the water for industrial use would legally be required to implement the programs.

[51] The very brief discussion on page 4B.13 regarding "highest practicable level of water conservation and efficiency achievable" indicates that "evaluation of competing water supply strategies" was a factor in considering the water efficiency levels considered achievable and practicable. That simply is not permissible. Even if it were to be less expensive to import surface water from another basin than to use existing (and new) supplies efficiently, that strategy is not legally available. The standard for water efficiency must be met in order for an interbasin transfer to be authorized. Water efficiency measures are not rendered not practicable or not achievable even if additional water could be obtained and used inefficiently at lower cost. A regional water plan that purports to rely heavily on interbasin transfers but fails seriously to address the requirement for achieving the requisite levels of water efficiency represents a legal house of cards. It does not meet the applicable requirements in the TWDB rules and it recommends reliance on strategies that cannot be authorized because of the failure to meet

explicit permitting requirements. Unfortunately, the initially prepared Region C plan suffers from just such a deficiency.

[52] Because a large amount of water to be obtained through the recommended water management strategies would come from new interbasin transfers, this is a very significant issue for Region C. The requirement of demonstrating compliance with the highest practicable level of water conservation and efficiency achievable is a prerequisite for permitting a new interbasin transfer. It also is a prerequisite for developing an adequate water plan when the plan includes proposed interbasin transfers. The underlying concept is that surface water should not be taken from one part of the state and moved to another unless the receiving area has demonstrated that it is using its water resources as efficiently as can reasonably be expected. Thus, in order for the regional water plan to reflect the realities of permitting, entities contemplating relying on interbasin transfers must plan now to achieve the requisite level of water efficiency. Unless that is done, new interbasin transfers of surface water are not available as water management strategies.

[53] Many major WUGs that are slated to receive water pursuant to new interbasin transfers have projected water use rates, even after implementation of recommended water efficiency measures, that are far in excess of water use levels that are both practicable and achievable. Examples include: Dallas (2060 projected rate of 233 gpcd); Fort Worth (2060 projected rate of 183 gpcd); Arlington (2060 projected rate of 157 gpcd); Denton (2060 projected rate of 156 gpcd); McKinney (2060 projected rate of 209 gpcd); Plano (2060 projected rate of 229 gpcd); Frisco (2060 projected rate of 250 gpcd); and Irving (2060 projected rate of 196 gpcd). (see calculations on comment [77]). Because those WUGs are not eligible to receive water pursuant to an interbasin transfer, the plan is legally deficient and unworkable.

4B.3 Drought Management Measures
[54] Page 4B.17 – As required by 357.7 (a)(7)(B) of TWDB's rules, drought management is a water management strategy that must be evaluated. That provision, along with Section 16.053 (h)(7)(B) of the Water Code, also requires that drought management be **included** as a water management strategy for each entity required to prepare a drought management plan pursuant to Section 11.1272 of the Water Code. The planning group may decide not to include drought management strategies beyond those measures specifically required by Section 11.1272, provided it adequately documents the basis for that decision. However, the planning group must include at least the Section 11.1272 level of drought management as a water management strategy. SB2 made inclusion of drought management measures at least at the level required by Section 11.1272 a mandatory prerequisite for approval by TWDB of a regional water plan. See Tex. Water Code Ann. § 16.053 (h)(7)(B). The initially prepared plan does not comply with that requirement. For each entity required to prepare a drought contingency plan pursuant to Section 11 1272, the water plan must include a water management strategy reflecting the drought period savings from that drought plan.

[55] Page 4B.17 - Rather than including such a strategy, the initially prepared plan states that drought management is reserved for responding to "a drought worse than the drought of record" or responding to a situation where "a water management strategy is not fully implemented when it is needed." However, TCEQ's rules implementing Section 11.1272 make clear that drought

management provisions are appropriately applied during a drought of record, not just during a more severe drought. Section 288.20 (a)(1)(E)(i), which applies for municipal uses, specifically directs that a drought contingency plan must provide for implementation in response to a "reduction in available water supply up to a repeat of a drought of record." Thus, a drought management plan must apply at least during a repeat of the drought of record and may not be reserved only for more serious droughts. Similarly, rules applying to wholesale water suppliers require drought contingency plans to include response stages "in response to water supply conditions during a repeat of the drought-of-record." 30 TAC § 288.22 (a)(4). Drought management is a water management strategy that must be included at least for those entities governed by Section 11.1272.

[56] A repeat of a drought of record would be a serious event. Water would be in short supply for all users. Natural resources would suffer as well. During such conditions, it just makes sense to take steps to reduce nonessential uses of water. As directed by S.B. 1, using the drought of record as the measuring point against which to plan for water supplies provides protection for human water uses. However, considering drought periods but ignoring water savings possible through implementation of drought management measures results in huge costs, both economic and ecological, for developing new water supplies that only would be needed during those severe drought periods and only for nonessential uses.

[57] Consideration of drought management measures, as required by SB 2 and TWDB rules, represents a recognition that it may make more sense to plan to curtail some non-essential uses during rare drought periods than to invest the huge sums necessary to ensure a water supply to meet those non-essential uses at those times. As an example, it will likely make much more sense to reduce activities such as lawn watering, car washing, and fountain filling during drought periods rather than to build another reservoir just to ensure that those activities can continue unabated even during a period of serious rainfall shortage. Building that reservoir would impose major costs, both in terms of the price of developing the supply and in terms of agricultural and natural resources that might be lost.

[58] At minimum, in order to meet the explicit requirements of SB 2 and TWDB rules, the initially prepared plan must be revised to include drought management measures applicable during a repeat of the drought of record for all entities governed by Section 11.1272. In addition, we urge the planning group seriously to consider including water savings that could be achieved through additional drought management measures.

[59] 4B.19 – Footnote "a" to Table 4B.7 is confusing because it appears to refer only to savings from plumbing fixture rules. However, the total for estimated savings of "241,923 acre-feet per year" actually seems to include both the estimated savings from compliance with the plumbing fixtures code and from increased efficiency in new steam electric power plants, as shown in Table 6.5 (p. 6.19).

4D. Evaluation of Major Water Management Strategies

[60] Page 4D.3 – Figure 4D.1. This map appears to show the proposed Lower Bois d'Arc Creek Reservoir as overlying federal land. However, that seems inconsistent with the discussion of the project on page 4D.17. The apparent inconsistency should be addressed. A similar apparent

inconsistency exists for the proposed Lake Ralph Hall as shown in Figure 4D.1 versus the discussion on page 4D.22

[61] Page 4D.4-4D.8 – Table 4D.2 and Figure 4D.2 do not include a unit cost comparison for water conservation and drought management savings. Senate Bill 2 and TWDB rules require the full evaluation of those measures as water management strategies. We recognize that at this general level, without the particular water user group specified, it would be necessary to provide an average cost for such measures. However, cost figures for other water management strategies that have multiple participants apparently are based on average or weighted average costs (not explicitly stated). Accordingly, cost comparisons for these strategies should be included in the tables.

[62] In our Table "IPP Comment 2" below we have calculated the weighted cost for conservation savings for the fifteen water user groups with highest volumes of proposed savings at the 2010 time frame. Appendix U of the IPP details the anticipated cost of water efficiency programs by water user groups and by decade. The calculated $177 per ac-ft should constitute a very representative cost because the savings of these fifteen entities accounts for 70% of the proposed savings from water efficiency measures at the 2010 time frame. Upon inspection of Appendix U, these are also the highest anticipated unit costs over the 55-year planning horizon and would provide a rather conservative cost comparison to other water management strategies.

Table IPP Comment 2 – Calculation of weighted average cost of water efficiency programs for the fifteen WUGs with the highest projected water saving at the 2010 time frame (as tabulated in Appendix U of the IPP).

		IPP data		calculation of weighted cost	
	water user group	proposed conservation savings by 2010 (ac-ft)	estimated cost ($/ac-ft)	savings fraction of total	weighted cost contribution
1	Allen	708	$195	0.0238	$4.65
2	Arlington	2,252	$181	0.0758	$13.72
3	Carrollton	729	$235	0.0245	$5.77
4	Dallas	10,128	$130	0.3409	$44.31
5	Denton	847	$230	0.0285	$6.56
6	Ft. Worth	4,193	$151	0.1411	$21.31
7	Frisco	2,009	$231	0.0676	$15.62
8	Garland	1,251	$223	0.0421	$9.39
9	Grand Prairie	900	$251	0.0303	$7.60
10	Irving	1,452	$183	0.0489	$8.94
11	Lewisville	601	$259	0.0202	$5.24
12	McKinney	931	$370	0.0313	$11.59
13	Mesquite	869	$242	0.0292	$7.08
14	Plano	1,979	$149	0.0666	$9.92
15	Richardson	863	$177	0.0290	$5.14
	sums	29,712		1.000	
			weighted cost ($/ac/ft)		**$177**
			($/1000 gal)		**$0.54**

The cost of conservation and drought management savings must be included to allow an accurate comparison with other water management strategies and to comply with the requirements of SB 2 and TWDB rules. Thus Table 4D.2 and Figure 4D.2 also should be revised to include information for all strategies.

[63] Page 4D.4-4D.8 – Table 4D.2 and Figure 4D.2. These tables and figures should also be revised in another important fashion. Information about costs for treated water is needed to allow for "apples to apples" comparisons with strategies, such as conservation, drought management, and desalination, which automatically make treated water available. Also, groundwater typically requires much less treatment than surface water so comparing raw water cost, as the initially prepared plan does, not provide an informed basis for decision making. TWDB rules specifically require a quantitative reporting of the "cost of water delivered **and treated** for the end user's requirements." 31 TAC § 357.7(a)(8)(A)(i).

[64] Figure 4D.2 - We recognize that the "comments" column of Figure 4D.2 includes an acknowledgement of strategies that deliver treated water. However, that reference is easily missed and, because it does not provide information on the appropriate cost adjustment to be made, still does not provide sufficient information to allow for an informed comparison. Furthermore, water efficiency measures also avoid distribution costs because less water must be delivered, so additional cost adjustments should be noted to allow for an accurate comparison to other strategies.

4E.1. Recommended Strategies for Regional Wholesale Water Providers

[65] Figure 4E.1 – This figure should be updated to include the cost for water efficiency measures. In comment [62] above, we suggest a manner of calculating such costs.

[66] Tables 4E.2, 4E.8. These tables summarize unit cost, by major provider, for all water management strategies except water efficiency measures. In order to have a complete comparison of water management strategies as required by Senate Bill 2 and TWDB rules we believe this is necessary information to be included in the Tables. We recognize that it would be necessary to provide an average cost for such measures, such as in the case of providers like DWU and NTMWD who provide water to a number of entities. However, a weighted average cost, as used elsewhere in the IPP for other water management strategies with multiple recipients would be a reasonable approach. Individual water user group costs are given in Appendix U and in our comment [62] we suggest a weighted average manner of calculation.

[67] Tables 4E.2, 4E.8, 4E.11 - Senate Bill 2 and TWDB rules require information be provided to fairly compare water management strategies. In order to arrive at "apples-to-apples" comparisons among strategies, these Tables should be revised to include information on costs for providing <u>treated</u> water for all strategies for meeting demands for potable water. This is essential since water efficiency measures result in making treated water available, groundwater sources usually require less costly treatment than surface water, and because desalination results in treated water. In order to have accurate comparisons, costs for delivering treated water must be provided for all water user groups that require treated water. Other Regional Plans (e.g. Region

L) provide information on annualized debt service on capital expenditures and other recurring annual cost (operations, maintenance, etc.) to arrive at a final cost of delivering treated water.

[68] Tables 4E.2, 4E.5, 4E.8, 4E.11, and 4E.12 (pages 4E.8, 4E.14, 4E.22, 4E.26, and 4E.34) - Tables 4E.2, 4E.5, 4E.8, and 4E.12 do not give unit costs for water efficiency measures, while Table 4E.11 (for Fort Worth) does. There is a second Table 4E.11 (for Trinity River Authority) that does not address cost issues. Cost information for conservation measures is required in order to allow for consistent comparisons between strategies.

[69] Page 4E.7, Table 4E.1 ((Recommended Water Management Strategies for Dallas Water Utilities). When considered separately from reuse in accordance with TWDB rules, the percent of 2060 supply from water conservation measures or efficiency improvements actually is 8.2% as compared to 17.1% from reuse. That level of conservation simply does not come close to constituting the "highest practicable level of water conservation and efficiency achievable." Because about 224,200 acre-feet of new interbasin transfers are recommended for DWU, that higher level of conservation and water efficiency becomes the applicable standard that DWU must meet in order to obtain supplies through such transfers. As an illustration of the extent of savings achievable, over approximately a 20 year period, San Antonio reduced its per capita water use about 37 percent, with almost all of those savings coming through improved water efficiency measures. The projected 2060 per capita municipal water use level of 233 gpcd for Dallas, see comment [77] below, also can be compared with the water use level of about 132 gpcd for San Antonio as a further illustration of the potential for increased water efficiency.

[70] The recommended 2060 supplies for DWU exceed projected 2060 demands by more than 131,000 acre-feet. The projected excess for 2050 is even greater. The recommended Fastrill Reservoir is projected to supply 112,100 acre-feet beginning in 2050. Obviously, that strategy is not justified because it is not needed to meet projected demands. As discussed above, if circumstances change down the line regarding other proposed strategies there will be ample time to consider whether additional strategies, such as Fastrill Reservoir or other more favorable strategies (which have more favorable cost and environmental impact considerations), should be considered. However, it should be removed from the current plan. When the additional required water conservation measures and drought management measures are included, the excess supply will be even greater.

[71] Page 4E.13 – Table 4E.4 (Recommended Water Management Strategies for Tarrant Regional Water District). When considered separately from reuse in accordance with TWDB rules, the percent of 2060 supply from water conservation measures or efficiency improvements actually is 7.1% as compared to 17.3% from reuse. Given the water usage rates for various customers, that level of conservation simply does not come close to constituting the "highest practicable level of water conservation and efficiency achievable." Because about 430,000 acre-feet of new interbasin transfers are recommended for TRWD, that higher level of conservation and water efficiency becomes the applicable standard. See Comment [69] above.

[72] The recommended 2060 supplies for TRWD exceed projected 2060 demands by almost 120,000 acre-feet. With additional water conservation measures and with inclusion of drought management measures, as required, the excess would be even greater. Accordingly, one or more

of the proposed water management strategies is not justified. In addition, the per-unit cost estimates for some strategies are not accurate because the strategy would produce more supply than there is demand, as a result the actual effective cost would be much higher than that presented in the initially prepared plan. Because of uncertainties about future population growth and about water use patterns, it would not be appropriate simply to assume that demand will continue to increase in the future beyond the 2060 projections. The proposed Marvin Nichols Reservoir serves as a prime example of the need to adjust the per unit cost projections because the proposed supply greatly exceeds projected demand. In addition, the per-unit cost for that project is rendered even more invalid because the project share projected for North Texas Municipal Water District also is unneeded, making the excess of supply over demand even greater. In addition, use of "safe yield" figures for currently available supplies provides a built-in cushion against future demands.

[73] Figure 4E.4 (page 4E.14) - Part of the legend for this Figure did not print.

[74] The recommended 2060 supplies for North Texas Municipal Water District exceed projected 2060 demands by almost 220,000 acre-feet. With additional water conservation measures and with inclusion of drought management measures as water management strategies, as required, the excess of supply would be even greater. Accordingly, some of the recommended water management strategies are unjustified.

[75] In particular, the proposed Marvin Nichols Reservoir should be dropped from the plan because of the high level of controversy and economic and ecological damage it would cause. Reliance on this project just does not make sense: it is extremely controversial, the proposed water efficiency measures do not come close to meeting the applicable statutory prerequisite for authorization of the project, the project is not even needed to meet projected demands and would produce only excess supply, and the per unit cost is inaccurate because it is calculated based on the incorrect assumption that the entire yield from the project would be used on a regular basis.

[76] Sections 4B, 4C or 6 - It is disappointing that neither Sections 4B, 4C nor 6 of the IPP give the expected water consumption rates (in gpcd) of individual WUGs after all the proposed water efficiency measures are implemented. We also were unable to find this information in any appendix. This is a very basic measure of a city's or region's water use. As acknowledged by the Texas Legislature and the Water Conservation Implementation Task Force, it is an important measure of water use efficiency. Given the inclusion in the initially prepared plan of Figures 1.10 – 1.12, it also appears that the planning group considers per capita water use an important criterion to consider. The gpcd rates can be calculated without unreasonable difficulty by finding the proposed savings per WUG from Appendix V and combining these with the final values for demand and population given elsewhere in the IPP.

[77] A sample calculation of gpcd rates for municipal water use is illustrated in the following Table "IPP Comment 3" for the ten largest WUGs at the 2060 time frame:

Table IPP Comment 3 – Calculation of net municipal water use rates for the ten most populous Water User Groups at the 2060 time frame.

	Region C IPP proposed water use and water efficiency data, Year 2060				
Water User Group (WUG) name	**Population**	**Demand of WUG (ac-ft/yr)**	**basic demand per person[1] (gpcd)**	**proposed water efficiency savings (ac-ft/yr)**	**proposed water use rate with efficiency measures (gpcd)**
DALLAS	2,058,767	590,366	**256**	53,135	**233**
FORT WORTH	1,848,759	418,317	**202**	39,902	**183**
ARLINGTON	515,000	100,376	**174**	9,618	**157**
DENTON	498,488	98,275	**176**	11,312	**156**
MCKINNEY	400,000	108,430	**242**	14,804	**209**
GRAND PRAIRIE	393,743	62,188	**141**	6,238	**127**
PLANO	305,000	85,069	**249**	6,932	**229**
GARLAND	300,000	52,087	**155**	6,351	**136**
FRISCO	300,000	99,133	**295**	15,211	**250**
IRVING	283,521	68,916	**217**	6,551	**196**

note· 1 – includes plumbing code savings

As we discussed in comment [11] above, we believe that individual water user group values in gpcd for water use rates are particularly important because they indicate potential for additional water savings. We urge the planning group to include this information in the final plan so that the potential for additional savings through water efficiency measures are identified. This information also is needed for a meaningful assessment of the likelihood that water user groups are achieving, or planning to achieve, the levels of water efficiency necessary to support approval of a new interbasin transfer

[78] Sections 4B, 6, and Appendix V – The initially prepared plan does not include any explanation of how the anticipated water savings due to water efficiency measures itemized for each WUG were derived. As a result, it is difficult to understand or to comment fully on the appropriateness of the calculations and assumptions. The savings are quite variable as a percentage of demand or on a per capita basis as illustrated in our Table "IPP Comment 4" below. The derivation of these water savings should be explained in the final plan.

Table IPP Comment 4 – Illustration of variability in proposed savings through municipal water efficiency measures for the ten most populous Water User Groups at the 2060 time frame.

	Region C IPP proposed water use and water efficiency data, Year 2060					
Water User Group (WUG) name	**Population**	**total demand of WUG (ac-ft/yr)**	**proposed water efficiency savings (ac-ft/yr)**	**proposed water use rate with efficiency measures (gpcd)**	**proposed savings as % reduction in demand (ac-ft/yr)**	**proposed savings - reduction in demand per 1000 persons (ac-ft/yr)**
DALLAS	2,058,767	590,366	53,135	233	9.0%	25 8
FORT WORTH	1,848,759	418,317	39,902	183	9 5%	21.6
ARLINGTON	515,000	100,376	9,618	157	9 6%	18.7
DENTON	498,488	98,275	11,312	156	11 5%	22 7
MCKINNEY	400,000	108,430	14,804	209	13.7%	37 0
GRAND PRAIRIE	393,743	62,188	6,238	127	10 0%	15 8
PLANO	305,000	85,069	6,932	229	8 1%	22 7
GARLAND	300,000	52,087	6,351	136	12.2%	21.2
FRISCO	300,000	99,133	15,211	250	15.3%	50 7
IRVING	283,521	68,916	6,551	196	9.5%	23.1

These results raise important questions about the bases for the projected improvements in water efficiency. Many of these water user groups still demonstrate a very high per capita water usage rate even at 2060. In addition, the improvements are quite variable across the various WUGs. For example, McKinney is projected to achieve savings of 37 gpcd through water efficiency measures but Dallas only 25.8 gpcd. The plan should provide a clear explanation of how these varying levels of water efficiency water management strategies were chosen and evaluated. That information appears to be lacking in the initially prepared plan.

Chapter 5. Impacts of Recommended Water Management Strategies

[79] Page 5 1 – Water conservation is missing from the list of recommended water management strategies evaluated. It certainly is true that water conservation measures generally will not have significant adverse impacts. However, it is important that the plan note the absence of such impacts. As acknowledged elsewhere in the Initially Prepared Plan and in TWDB rules, water conservation is a water management strategy. Providing a comparable discussion of impacts for water conservation is necessary for illustrating the advantages of more aggressive water conservation measures and for ensuring a more balanced comparison of available strategies. It also is expressly required by Section 357.7 (a)(8)(E) of the TWDB rules. One of the basic tenets of regional water planning is that all potentially feasible water management strategies are evaluated "so that the cost effective water management strategies which are environmentally sensitive are considered and adopted unless the regional water planning group demonstrates that adoption of such strategies is not appropriate." 31 TAC § 357.5 (e)(4). Information about the

environmental sensitivity of water conservation measures is necessary to ensure compliance with that basic requirement.

[80] Page 5.3 – In evaluating impacts on water quality it appears that impacts from reduced flows downstream of a proposed reservoir or downstream of a proposed diversion point have been ignored. When flow in a river or stream is reduced but pollutant inputs are not reduced, water quality would be expected to suffer. The initially prepared plan fails to address that important issue. The one exception to this oversight appears to be discussion of direct reuse. That discussion indicates that direct reuse may improve downstream water quality through reductions of effluent discharges. As a general proposition, that may well be true. However, the water-quality impact resulting from the loss of flow and the accompanying reduction in ability to assimilate pollution inputs downstream also merits consideration. At any rate, this type of analysis also is needed for other water management strategies that have the potential for significant impacts on surface flows.

[81] Page 5.3 - Dissolved oxygen should be included in the water quality parameters evaluated. It is an important indicator of impacts to aquatic life and, as such, an important determinant of the effect of water management strategies on the state's natural resources. It also is a parameter for which many measurements are available.

Chapter 6. Water Conservation and Drought Management Recommendations

[82] Chapter 6 includes useful information and analysis about water conservation practices in Region C. We appreciate the efforts of the planning group and consultants in compiling and providing this information. In particular, it helps to illustrate the potential for large-scale savings through improved water efficiency measures. The Chapter 6 discussion creates unfortunate confusion by combining, at times, the discussion of reuse with the discussion of water efficiency measures.

[83] Pages 6.27-6.28 – The text incorrectly indicates that water users receiving water through contracts with entities required to develop water conservation plans pursuant to Section 11.1271 are not required to develop water conservation plans absent state funding. Section 288.5 (1)(G) of TCEQ's rules, 30 TAC § 288.5 (1)(G), requires water supply contracts for wholesale sales of water to include a requirement for each customer to develop a water conservation plan. Thus, the reach of the Section 11.1271 requirement for water conservation implementation is much broader than the initially prepared plan acknowledges. Because the Initially Prepared Plan does not reflect the savings expected through such water conservation plans, the Initially Prepared Plan does not comply with SB2 or TWDB rules. Table 6.8 helps to illustrate this deficiency. That Table purports to list the water users required to develop water conservation plans.

[84] Table 6.8 - Unfortunately, Table 6.8 is very incomplete. For example, the list fails to include the City of Dallas or the Trinity River Authority. Both of those entities hold substantial surface water rights and are required to prepare water conservation plans. The list also fails to list numerous entities that receive surface water pursuant to wholesale contracts and that are required to develop water conservation plans pursuant to Section 288.5 (1)(G) of TCEQ's rules. The Table and overall plan should be revised to include the savings expected through implementation

of water conservation requirements for all of the covered entities. The anticipated savings must be calculated and reflected in the allocation for conservation and subtracted from the needs to be met pursuant to other water management strategy categories.

[85] We appreciate the efforts represented in the Model Water Conservation Plans, included as Appendices M, N and O. They provide information that should be helpful for entities developing water conservation plans. We do believe the model plans should more prominently feature (including noting them as measures that are recommended in the plan) the water conservation measures that are recommended in the initially prepared regional plan, along with any additional measures included in the final plan.

[86] In addition, we urge the planning group to include recommended actions to be taken during each of the drought stages of the Drought Contingency Plan portions of the Model Water Conservation Plans. As drafted, the Plans only list measures that could be initiated. We believe that a drought contingency plan, in order to comply with TCEQ requirements, must establish measures that automatically are initiated when the various drought triggers are reached. Although it may be appropriate to list additional measures that could be used, basic measures that automatically would become applicable should be listed.

[87] We urge the planning group to consider adding a quantitative goal based on amount of water used per unit of production to the Model Manufacturing Water Conservation Plan. As currently drafted, the plan sets out the quantitative goal in total acre-feet of water used. Given the likely variations in production amounts, it seems more useful to develop a numerical goal based on the amount of water used for each unit of production.

Chapter 7. Description of How the Regional Water Plan is Consistent with Long-Term Protection of the State's Water Resources, Agricultural Resources, and Natural Resources.

[88] One of the key changes that SB2 made to the water planning process was to create a specific statutory criterion mandating that a regional water plan may not be approved by TWDB unless it is shown to be consistent with long-term protection of the state's water resources, agricultural resources, and natural resources. The initially prepared plan devotes just over five pages to the discussion of that consistency. Although we certainly acknowledge that quality of discussion is more important than quantity, both are lacking here.

7.2 Consistency with Protection of Water Resources

[89] Of the three consistency subparts, this is by far the most substantive. It does contain very useful information. However, the discussion of reuse projects suffers from the lack of consideration here, or elsewhere in the initially prepared plan, of the impacts of proposed reuse projects on stream and river flows. Those streams and rivers are part of the water resources of the state. Although we acknowledge that highly detailed evaluations are not feasible at this stage, it would be possible to evaluate the overall impact of recommended reuse projects on downstream flows. Indeed, that type of evaluation is required as part of any meaningful consideration of whether the proposed projects are consistent with long-term protection of the state's streams and rivers. If the reuse projects could drastically reduce flows during some time periods, that should be acknowledged and evaluated. Information on the extent of such flow

changes is needed in order to have an effective evaluation of impacts on natural resources that are dependent on those flows and on water quality.

7.3 Consistency with Protection of Agricultural Resources

[90] The most glaring insufficiency with this discussion is that it appears to be limited to consideration of agricultural resources within Region C. Unfortunately, the information provided is so skeletal that it isn't clear what area is being discussed. At any rate, the requirement is for consideration of long-term consistency with protection of the state's agricultural resources. To the extent that the Region C plan would have significant potential implications for agricultural resources anywhere in the state, those implications must be acknowledged and considered. By contrast, the discussion of consistency with protection of water resources appears to recognize the obligation to consider state-wide implications of the regional plan.

[91] The proposed reservoirs that would be located outside of Region C also would affect agricultural resources, both through inundation of lands involved in some form of agriculture and through potential downstream impacts. Similarly, proposed interbasin transfers also could affect agricultural activities outside of the region. Those impacts must be acknowledged and considered in a meaningful way. Reasonably specific information about agricultural land use within the area of proposed reservoirs should be provided and evaluated. Although we understand that precise figures would not be available, reasonable estimates of the impacts are required.

7.4 Consistency with Protection of Natural Resources

[92] This section also is unduly limited in scope. The discussion again is limited only to resources within Region C. Significant impacts on the state's natural resources, wherever located, must be acknowledged and evaluated. Also, although it certainly is true that natural resources **include** "threatened or endangered species; local, state, and federal parks and public land; and energy/mineral reserves," they are not limited to only those categories. Broader consideration of impacts to fish and wildlife resources must be acknowledged and considered.

[93] For example, discussion is needed about impacts to important wetland habitats, such as bottomland hardwood forests, regardless of whether they are publicly owned. A glaring example is the failure anywhere in the plan to acknowledge the conflict between the proposed Fastrill Reservoir and the Neches River National Wildlife Refuge, the creation of which is currently under consideration.

[94] We were unable to locate any quantitative evaluation, in this section, or elsewhere in the plan, of "environmental factors including effects on environmental water needs, wildlife habitat, cultural resources, and effect of upstream development on bays, estuaries, and arms of the Gulf of Mexico." That quantitative evaluation is explicitly required by 31 TAC § 357.7 (a)(8)(A)(ii) and is needed to ensure that the implications of various potential water management strategies have been meaningfully considered. The information is needed in order to demonstrate compliance with the requirement for a showing of consistency with long-term protection of the state's natural resources. We previously submitted a short document entitled "Environmental Flows and Natural Resource Protection in Regional Water Planning" that sets out some

suggestions for reasonable methods for evaluating environmental flow impacts. We urge you to revisit that document.

[95] In considering consistency with long-term protection of natural resources, evaluation of changes in stream flows as a result of increased water use are essential along with a reasonable assessment of the biological implications of such changes. Similarly, a comparable evaluation is needed of changes in flows at springs that support significant natural resources.

Chapter 8. Unique Stream Segments, Unique Reservoir Sites, and Legislative Recommendations

[96] Page 8.3 – It is disappointing to see that the Planning Group has again declined to recommend any stream segments for designation as unique stream segments. The Texas Legislature acted definitively in expressly limiting the legal effect of such designations: "This designation solely means that a state agency or political subdivision of the state may not finance the actual construction of a reservoir in a specific river or stream segment designated by the legislature under this subsection." Tex. Water Code Ann. § 16.053 (f). It is difficult to imagine how that language could be made more clear.

[97] Page 8.10 - On one level it is understandable why the planning group would be reluctant to recommend any formal designations that might adversely affect private property rights. However, the planning group does not seem consistent in its consideration of the private property concerns inherent in recommending unique reservoir site designations. Affixing such a formal designation on privately-owned property could significantly affect the marketability of the property.

[98] One reason for care in unique reservoir site designations is illustrated by the discussion on page 8.10 about new studies indicating a preferred, upstream location for the proposed Marvin Nichols Reservoir. How does one determine exactly what area is covered by a designation? If the Marvin Nichols Reservoir site had been previously designated as a unique reservoir site, would areas included in the previous footprint but not the newly proposed footprint still be covered by the designation? Would the upstream areas not previously within the proposed site now be included? The information included in the discussion of the proposed designations does not describe the areas proposed for designation with anything close to the specificity that would allow a landowner to know if his or her property is proposed for designation.

[99] Page 8.7 – The proposed designation of the Muenster reservoir site as a unique reservoir site is especially inappropriate. It does not appear that any useful purpose would be accomplished. The necessary land for reservoir construction has been acquired and construction is nearing completion. Creating such a designation now would seem to be a waste of effort that would just create confusion about the implications of the designation. Designating a site after the project land already has been acquired would necessarily raise questions about whether the vague designation description affected additional properties not already acquired. Again, this is a significant problem because the actual area proposed for designation is not specifically described.

[100] Page 8.8 – The proposed designation of the Lake Ralph Hall site as a unique reservoir site has not been adequately described or justified. The discussion fails to provide sufficient information for meaningful consideration of the merits or implications of the designation. The area proposed for designation is not described with any reasonable specificity, beyond that it is in "southeast Fannin County, north of Ladonia." The plan simply states, without any explanation, that the "location, geologic, hydrologic, topographic, water availability, water quality, and current development characteristics" make the site unique. At least some information about the aspects within those categories that make the site unique is needed in order to justify the designation and to allow for meaningful comment on the proposal. The rationales given in support of the proposed designations are so general as to be almost meaningless. The text appears simply to repeat the laundry list of features found in TWDB rules that could justify the proposed designation, but fails to provide any information to support the contention that the site is unique in any of the listed respects such that designation actually is justified.

[101] Page 8.8 – The discussion of the proposed designation of the Lower Bois d'Arc Creek provides more information about the potential impacts of the potential reservoir than is provided in the discussion of the others proposed for such designation. Again, however, rather than providing specific information indicating why the reservoir site should be considered unique, the document merely recites the list of the types of characteristics that purportedly qualify the site for listing. In addition, a specific description of the area proposed for designation is lacking.

[102] Page 8.10 – The discussion of the proposed designation of Marvin Nichols as a unique reservoir site is lacking in substance. The rationales given in support of the proposed designations are so general as to be almost meaningless. The text appears simply to repeat the laundry list of features found in TWDB rules that could justify the proposed designation, but fails to provide any information to support the contention that the site is unique in any of the listed respects such that designation actually is justified. In addition, as noted above, the plan fails to identify any actual need for the water from the Marvin Nichols Reservoir so there is no expected beneficiary of the potential water supply.

[103] Page 8.11-8.12 – The proposed unique reservoir designation for Lake Fastrill has not been justified. The rationales given in support of the proposed designation are so general as to be almost meaningless. The text appears simply to repeat the laundry list of features found in TWDB rules that could justify the proposed designation, but fails to provide any information to support the contention that the site is unique in any of the listed respects such that designation actually is justified. The discussion does not even acknowledge the conflict with the possible creation of the Neches River National Wildlife Refuge, which is currently being evaluated. In addition, as discussed above, no need has been demonstrated for the water from the recommended reservoir so there is no expected beneficiary of the potential water supply.

Section 8.4 Policy and Legislative Recommendations

[104] Page 8.13-8.14. Alternative Strategies. We believe the use of alternative strategies generally is problematic. A "plan" can quickly become merely a "list" if alternative strategies are included and treated comparably to recommended strategies. The purpose of the planning exercise, as we understand it, is to compare options and develop a set of recommended

approaches Because the planning process is an ongoing exercise, there are always opportunities to update and revise the plan to reflect changing conditions.

[105] Page 8 14 Allow Waivers of Plan Amendments for Entities with Small Strategies. It is difficult to comment on this recommendation in the abstract, particularly without a definition of "small." We do support recognition of a dichotomy between minor and major amendments. Minor amendments, which should be defined as including only amendments with no potential for significant impacts, should be allowed with a reduced level of notice and comment. However, we do believe that some type of formal amendment process, although simplified, is needed even for small changes to avoid uncertainty about the content of the most recent officially approved regional water plan.

[106] Page 8.14. Coordination between TWDB and TCEQ Regarding Use of the WAMs for Planning. It is far from clear why the state's water availability models are not appropriate for use in water planning. It hardly seems appropriate to use one set of models for developing plans and then another set for determining if those plans can be implemented. That only seems likely to make the plans less useful. Regarding flexibility in use of models, in the absence of any specifics about that flexibility, it is difficult to comment. We do agree that there are some aspects of planning that could appropriately be based on WAM runs other than Run 3.

[107] Page 8.17-8.18. Policies Limiting the Use of Treated Wastewater. This recommendation for legislative action seems premature. TCEQ is still in the process of developing a policy on wastewater reuse. These recommendations also appear to ignore the key role that wastewater discharges play in providing environmental flows. The vast majority of existing water rights were issued without any consideration or protection for environmental flows. As a result, newer water rights necessarily are faced with more stringent conditions to protect environmental flows. One way that existing water rights can equitably contribute to protection of environmental flows is through providing a reasonable level of return flows. A reasonable regulatory approach is needed to ensure that appropriate levels of return flows are returned to streams.

Thank you for your consideration of these comments and please feel free to contact us if you have any questions. We look forward to a continuing positive dialogue with the planning group during this and future planning cycles.

Sincerely,

Myron Hess — Mary E Kelly — Ken Kramer

Myron Hess	Mary Kelly	Ken Kramer
National Wildlife Federation	Environmental Defense	Sierra Club, Lone Star Chapter

cc: Virginia Towles, Region C liaison, TWDB
Bill Mullican, TWDB
Cindy Loeffler, TPWD
Tom Gooch, Freese & Nichols

(64)

dallas water utilities
city of dallas

September 7, 2005

Mr. Jim Parks, Chairman
Region C Planning Group
P.O. Box 2408
Wylie, TX 75098

RE: Comments on Region "C" Initially Prepared Plan

Dear Mr. Parks:

The following comments are based on the Initially Prepared 2006 Region C Water Plan dated May 2005.

The Region C Water Plan contains each of the strategies contained in the letter from the City Manager of Dallas to the Region C Planning Group dated March 17, 2005. There are a number of concerns and questions related to the City of Dallas that are worthy of mention. These are stated below.

(a) On page 1.37, Table 1.15, the year 2000 water sales do not agree with Dallas Water Utilities records. The differences are small. This may potentially be explained by being a difference in looking at a calendar year vs. a fiscal year which is how DWU records are kept. If this is not true, please request the actual information from DWU and it will be provided.

(b) Page 1.39 – DWU has the capacity to treat up to 900 million gallons of water should read 875 million based on current capabilities of Dallas's three (3) water purification plants.

(c) On page 1.40, Table 1.16 titled "Year 2000 Wholesale Sales by Dallas Water Utilities" should have a footnote added to declare the source of this information.

(d) On page 2.32, Table 2.21 provides information on "Projected Demands Placed on Wholesale Providers". The City of Dallas (Dallas Water Utilities) has recently updated its Long Range Water Supply Plan. The process was very thorough to evaluate population projections and projected water demands for Dallas and for all the customer cities served. Our research shows lower population projections, especially beyond 2040, than those for the Region C for our service area. This has resulted in greater projected demands in the Region C Plan than our plan has identified. In discussing this with our consultant, Chiang, Patel, & Yerby, Inc., we believe there is also a difference in the methodology for calculating peak year demands based on a difference in drought conditions analyzed. The result is a demand shown in the Region C Plan for 2060 for DWU of 1,063,131 acre-feet/year vs. the results of CP&Y's analysis showing a demand for 2060 of 982,116 acre-feet/year. For the demands shown for the City of Dallas

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(Dallas Water Utilities), the demands should match the information included in Chapter 4 (Table 4E.1) should be consistent. If changes are made to either, the change should be consistent.

e) On page 3.5, Table 3.2 shows the yield of Lake Palestine not declining due to silt deposits. The permit for diversion for Dallas indicates a percentage of the yield indicating that the quantity would be reduced over time in conjunction with other water rights in the lake. I understand there are water rights that are not being utilized in the reservoir. However, DWU does not have a right to those, and if the rights were obtained, it would be an increased diversion right and not firming up existing rights. For this reason, the availability of water from Lake Palestine should be adjusted based on future silting of the lake. If other water becomes available, it will be treated as additional supply.

f) On page 3.5, Table 3.8 shows a small yield for White Rock Lake with significant reductions over time. It is not clear if these numbers have been adjusted based on the dredging of White Rock Lake that took place recently. If not, these numbers would need to be revised. Although it is not currently used, it is a right and remains an emergency supply option or potential source of water for other purposes for Dallas.

g) On page 3.15, the report shows for Dallas Water Utilities available sources in 2060 of 438,144 acre-feet per year. This does not agree with Table 4E.1 which shows 438,146 acre feet per year. The two numbers should be consistent.

h) Beginning on page 3.16, Table 3.8 indicates water supplies currently available. Direct Reuse is shown for Dallas, which is the irrigation of the Cedar Crest Golf Course with effluent. Would this be counted as a supply as far as per capita needs as well as being counted as conservation with a per capita reduction? This would seem on the surface to be double counted.

i) On page 3.16, Table 3.8 indicates a supply from Lake Fork in the Sabine River Basin that shows water supplies labeled as "Lake Fork (Dallas) – Sabine Basin". The supply is shown as 791 for 2010 and zero (O) after that. The permit allotted to Dallas for water in the basin is actually 11,860 acre-feet/year based on current supplies and contracts. This should be reflected in the table as a supply that is available in the future.

j) On page 3.16, Table 3.8 provides "Water Supplies Currently Available to Regional Wholesale Water Providers". For Dallas Water Utilities, the total of 438,144 Ac.-Ft./Year is inconsistent with the same number reported in Table 4E.1 of 438,146 Ac.-Ft./Year.

k) On page 4C.7, Table 4C.2 indicates a number of water user groups for each of many options for utilizing existing water supplies in the future. In order to be consistent and clear throughout the report, it is recommended that a footnote with reference to an asterisk be added to indicate that many of the suppliers consider these options alternate supply strategies. This would help to prevent someone from misunderstanding one or more of the tables in the plan by taking it out of context with the remainder of the plan. This note should apply to other tables throughout the report such that all may be modified for clarity.

(l) On page 4C.14, there is a reference to "Figure 4C.1" regarding location of potentially feasible reservoir projects. No figure is found with this number. There is a Figure 4D.1 that appears to be the subject map.

(m) On page 4E.7, we have some concerns over Table 4E.1 regarding the values shown in the table. The numbers do not appear to add correctly when looking at the Total Supplies shown. The values shown also indicate a higher demand than found during analysis being done for the update of the City of Dallas Long Range Water Supply Plan. In conversation with the consultant, I understand that there was additional supply from over drafting included in the table. The table should reflect actual supplies that are dependable and available. The Year 2060 demand placed on Dallas Water Utilities is higher than our study indicates. The number shown as 1,063,131 acre feet per year compares with our calculations showing a 2060 demand of 982,116 acre feet per year.
- Also, please show the Source currently shown as "Conservation (DWU Customers)" as "Conservation (DWU Wholesale Customers)".
- Also, the numbers shown for available supply in Lake Tawakoni do not agree with the same criteria listed in Table 3.8 on page 3.16. They are slightly different.

(n) On page 4E.8, Figure 4E.2 will need to be adjusted if there is a change in the planning requirements to meet demands for Dallas Water Utilities based on comments above.

(o) On page 4E.9, Table 4E.3 shows a cost for DWU for Toledo Bend for 200,000 acre-feet per year of $749,289,400. The same amount of water for North Texas Municipal Water District is shown as $886,002,000. An 18% difference in cost seems difficult to understand when the end points are roughly the same distance apart for the delivery system. These numbers might be analyzed to see if the assumptions were the same or if the costs were calculated correctly. There should also be discussion in the report (plan) if the costs were based on mutually sharing the project or if they were calculated based on an independent project.

(p) Page 8.11 – As part of the process to study and potentially develop Lake Fastrill, Dallas has proposed an effort to determine if the reservoir can be developed in cooperation with the US Fish & Wildlife Service Neches River Refuge that is currently under review. I believe this should be mentioned in the plan. My recommendation would be to add the following second paragraph:
"The US Fish & Wildlife Service has prepared a preliminary report to evaluate the development of the Neches River Wildlife Refuge along the Upper Neches River near the same area as the proposed Lake Fastrill. The City of Dallas in cooperation with the Upper Neches River Municipal Water Authority is evaluating the Lake Fastrill project to determine if it can be developed in cooperation with the proposed Neches River Wildlife Refuge."

We will continue to review the document and will provide additional comments if needed and will review the draft plan prior to board approval.

If you have any questions or wish to discuss these comments, please contact me.

Robert M. Johnson

Robert M. Johnson, P.E.
Assistant Director

c: Jo M. Puckett, P.E., Interim Director
Charles Stringer, P.E., Assistant Director
Rick Galceran, P.E., Assistant Director
Maria Alicia Garcia, Assistant Director
Chris Kaakaty, P.E., Assistant Director
Tom Gooch, P.E., Freese & Nichols, Inc.

September 9, 2005

Mr. Jim Parks, Chairman
Region C Planning Group
P.O. Box 2408
Wylie, TX 75098

RE: Comments on Region "C" Initially Prepared Plan

Dear Mr. Parks:

The City of Dallas has a supplemental comment on the Initially Prepared Plan. It is in addition to the comments previously provided.

98 On page 3.17, Table 3.8 indicates that the Lake Fork Reservoir supply for Dallas diminishes over time likely due to sedimentation. I believe that our contract and water rights permit to transport the water to the Trinity River basin does not have a reduction in available supply for any reason including sedimentation. For this reason the amount of water available to Dallas should remain constant at 120,000 acre-feet/year. This should apply everywhere it is used throughout the report. It should also be reflected in the charts that show available supplies to Dallas wherever this data is provided.

I will continue to review the report and provide comments on the supplemental work if appropriate.

Robert M. Johnson, P.E.
Assistant Director

 (65)

Stephanie Griffin

From: Jim Parks [jparks@NTMWD.COM]
Sent: Thursday, September 08, 2005 4:10 PM
To: Stephanie Griffin
Subject: FW: NO NEW RESERVOIRS

-----Original Message-----
From: Jim [mailto:jesmith@cebridge.net]
Sent: Thursday, September 08, 2005 2:26 PM
To: Jim Parks
Subject: NO NEW RESERVOIRS

DEAR REGION C WATER PLANNING GROUND
C/0 JIM PARKS,

I AM OPPOSED TO THE CONSTRUCTION OF NEW RESERVOIRS FOR THE STATE OF TEXAS. AS LONG AS I SEE SPRINKLER SYSTEMS GOING IN TO KEEP ROAD MEDIANS GREEN, I'LL BE OPPOSED TO NEW RESERVOIRS. URBAN AREAS DO NOT HAVE THE RIGHT TO TAKE OUR GOD GIVEN HABITATS AND LAND SO THAT THEY CAN RUN WATER DOWN THEIR GUTTERS IN AUGUST.

THANK YOU FOR CONSIDERING MY OPINION,

JAMES E. SMITH
5269 HWY 377 SO.
AUBREY, TX 76227

To Mr.Jim Parks and the Region C Board:

I have several questions that concern the Region C 2006 Water Plan. Mr. Gooche, from Frease and Nichols, states that the current yield for Wright Patman is 390,000 acre feet per year. The Dallas Water Plan currently only calls for 112,000 AFY from this source. This leaves a balance of **188,000 AFY** still available for use for Dallas and Region C. This is at current lake elevations. By raising the elevation of Wright Patman, you will create an average of 60,000 acre feet of storage for every one foot of elevation that the lake is raised. This is verified using the existing Corps of Engineers data. I spoke with John Jones, the director of the White Oak Creek Mitigation Area, and he stated that any new reservoirs on the Sulphur River would be detrimental to the current mitigation areas on White Oak Creek. He also stated that the lowest mitigation elevation is at **239.5**, allowing the lake elevation to be raised to this point. There is a discrepancy of 11 ft. of elevation between his lowest elevation figures and Frease and Nichols calculations (Tom Gooche). Feel free to give him a call to verify these elevation figures (John Jones 903-884-3800)

Why do we need the cost of a new reservoir (Marvin Nichols) that would be detrimental to the White Oak Creek area, when we could raise Lake Wright Patman's elevation and have plenty of water available for Dallas and Region C's needs ? ? ?

Red Birdsong

FUSE, Inc.

Friends United for a Safe Environment
Post Office Box 85
Texarkana, Ark-Tex 75504-0085

September 8, 2005

Region C Water Planning Group
c/o Jim Parks, Chairman
North Texas Municipal Water District
P.O Box 2408
Wylie, TX 75098

FAX # (972) 442-5405

Dear Members of Region C Water Planning Group

It is incredible that the main entities of Region C, which are artificial, man-made, and grounded in concrete, would want to ravage one of the last centers of natural beauty and vanishing wildlife habitat in Texas. This would be the result of building any new dams in this part of the world. It would give priority to unneeded, unwanted dams and reservoirs by destroying--forever--forests of hardwood and pine timber, of gently rolling sod, and farms and ranches that have been in families for generations, some stretching back to the Republic of Texas

It's land, soil, wildlife, livelihoods, heritage, history

The excuse: To destroy in order to build dams to catch water for wasteful D-FW.

Region C already has enough water to last for more than 50 years and keep the concrete drenched

To step outside Region C's boundaries and raid other law-abiding neighbors is a design for **collective burglary**--stealing the neighbor's property

Another apt label is **economic imperialism**. What else can you call it?

It's even more. It's a plan to loot, not necessarily for the ordinary citizens of Region C. That's the sucker reason. The real and transparent reason is to line the pockets of profiteering engineers and controllers of the results.

We have said for years, and it's still true:

New dams are not about water. They're about money: Taking people's land and profiting from the construction, then raking in millions year after year through sales and administration.

Printed on Recycled Paper

Dams? Water? That's the surface excuse.

The secret that people aren't told is that new dams are the new government-backed payoff slot machines, carefully rigged, that pay only to those inside the schemes, while the ordinary citizens foot the bills.

It's a 21st century Scrabble game: Marvin Nichols, Fastrill, Lower Boi d'Arc Creek, Ralph Hall.

Put them all together and they spell:

MONEY

It's as simple as that.

That kind of money erodes democracy and builds fortunes for a few by taking--stealing, if you will--from the many.

These dams would inflict lasting wounds upon our people and our land--on the whole state of Texas.

Enough is enough. Use what you have, and use it wisely, North Texas. You have enough. Conserve it. Are not Dallas, Fort Worth, and cities as smart as El Paso and San Antonio?

Stop trying to burglarize your neighbors. Stop playing the game of economic imperialism.

Basta!

Yours for a safe and fair environment,

Barry Blackmon

BARRY BLACKMON, President

Grayson Garner
4628 West Northgate Drive #270
Irving, TX 75062-2452
214-596-9827
Grayone@sbcglobal.net

September 08, 2005

Region C Water Planning Group
c/o Mr. Jim Parks, Chairman
North Texas Municipal Water District
Post Office Box 2408
Wylie, TX 75098

Via FAX @ 972-442-5405

SUBJECT: NO NEW RESERVOIRS

Dear Chairman Parks:

- I do not want to have any new reservoirs as either recommended or alternative strategies in the 55-year final version of the Region C Water Plan!
- I want the Planning Group to fully commit to utilizing existing available reservoirs to meet our water needs through the 55-year planning horizon, rather than needlessly damming our rivers, condemning people's land, and destroying valuable wildlife habitat.
- I want the Planning Group to commit to a plan for encouraging active water use efficiency measures (conservation) The Draft Plan's assumed actual water use efficiency measures for Region C cities still lag behind those already being achieved and/or planned for other Texas cities and regional water plans. <u>It's unconscionable that we plan to condemn other people's land when we haven't yet committed to wisely using the reservoirs that Texans have already developed!</u>

The Draft Plan finds that North Texas water needs are satisfied through the year 2060 without constructing any new reservoirs. Yet the current version of the Draft Plan recommends new reservoirs be constructed, neglecting numerous yet unclaimed supplies in existing reservoirs. If you're going to condemn the land of potentially thousands of unwilling Texans and destroy Texas' natural heritage, you ought to have to explain why.

The four new, unneeded reservoirs that are under consideration as recommended strategies (Marvin Nichols, Fastrill, Ralph Hall, Lower Bois d'Arc Creek) would drown approximately 125,000 acres of increasingly rare East Texas and Northeast Texas floodplain habitat in the Sulphur, Neches, and Red River basins. They would take at least 375,000 acres of productive private lands from thousands of mostly unwilling sellers and would devastate ranching, farming, and timber industries in large areas of Texas. Some of Texas' best remaining bottomland hardwood forests and crucial wildlife habitat would be lost forever, including the extremely high-quality proposed Neches River National Wildlife Refuge.

Not content with recommending four unneeded, destructive reservoirs, three OTHER new needless reservoirs are also under consideration as alternative strategies (Parkhouse, Columbia, Tehuacana) in the Sulphur, Angelina, and Trinity basins that would drown about 41,000 acres and condemn 123,000 acres.

To Region C Water Planning Group's credit, you've already recommended conservation, recycled water, and obtaining water from existing sources to meet projected needs through the next half-century. And you've already chosen additional existing reservoirs as alternative strategies to fulfill any margin of error. Together, these lower-impact existing sources provide twice as much water as we need through the required year 2060 planning horizon. With these sources alone, you've fulfilled your responsibility to plan prudently for future water supplies. To flood hundreds of square miles of East Texas, destroy increasingly rare wildlife habitat, take over five hundred square miles of land from thousands of mostly unwilling Texans, and devastate ranching, farming, and timber industries in large areas of Texas is not only unnecessary but unconscionable.

Responsible water planning should be about meeting future needs, not desires. This land will only support a limited (not an endless) amount of human activity. Today's Texans must now learn to conserve and protect water resources for future generations. To date, Texans have not even begun to face these realities. Texans must learn to recycle and conserve water.

Responsible water planning should not be about senseless make work construction projects giving engineers, water bureaucrats and other laborers jobs. In the final analysis, water planning should be about sustainability not the smoke of "employment" or "career development" or "economic development."

Sincerely,

Grayson Garner

Grayson Garner
A Texas resident concerned for the sustainability of our future

Stephanie Griffin

From: Jim Parks [jparks@NTMWD.COM]
Sent: Monday, September 12, 2005 9:45 AM
To: Stephanie Griffin
Subject: FW: dams

-----Original Message-----
From: Jones, Lloyd P [mailto:lpjones@mail.smu.edu]
Sent: Thursday, September 08, 2005 8:22 PM
To: Jim Parks
Subject: dams

Dear Jim Parks,

I strongly oppose--and urge you to remove--the four new reservoirs that your Draft Plan proposes as recommended strategies (Marvin Nichols, Fastrill, Lower Bois d'Arc Creek, Ralph Hall), as well as the four additional new reservoirs listed as alternative strategies (George Parkhouse North and South, Columbia, Tehuacana). These unneeded dams would flood hundreds of square miles of East Texas, destroy increasingly rare wildlife habitat, take over five hundred square miles of land from thousands of mostly unwilling Texans, and devastate ranching, farming, and timber industries in large areas of Texas.

 70

Stephanie Griffin

From: Jim Parks [jparks@NTMWD.COM]
Sent: Monday, September 12, 2005 9:45 AM
To: Stephanie Griffin
Subject: FW: Opposition to Bois d'Arc reservoir

-----Original Message-----
From: garyvincent [mailto:garyvincent2@comcast.net]
Sent: Thursday, September 08, 2005 10:53 PM
To: Jim Parks
Subject: Opposition to Bois d'Arc reservoir

My husband and I are land owners in Fannin County. Three years ago we purchased 34 acres from a distant cousin. This land has been owned by various members of my family since the early 1920s. It is heavily wooded with huge beautiful trees and we see many animals - wild turkeys, raccoons, wolves, etc. We are planning to soon start building a home on the property for our retirement. However, our land would be consumed by the proposed Bois d'Arc reservoir.

I appeal to you to plan no new reservoirs in northeast Texas. The negative impact of flooding thousands of acres of precious land is enormous. While I realize we must plan for future water needs, conservation of all of our existing natural resources – both land and water - is the answer.

Thank you.

Mary Gail Gilbreath Vincent

71

Stephanie Griffin

From: steverino63@hotmail.com
Sent: Thursday, September 08, 2005 12:39 PM
To: Stephanie Griffin
Subject: Comments on Draft Region C Water Plan

TO: Region C Water Planning Group and related personnel
CC: Texas Water Development Board members
The Honorable Ken Armbrister, Chair, Natural Resources Committee, Texas Senate
The Honorable Robert Puente, Chair, Natural Resources Committee, TX House of Reps.

FROM: Steve Snyder, 1100 River Bend #47, Lancaster TX 75146
DATE: 9/8/2005
RE: Comments on Draft Region C Water Plan

My Sept. 8 newspaper column:

James Parks will tell you we need to build more dammed lakes in north Texas.
Well, I'm here to tell you Parks, even though he is chairman, Region C Water Planning Group, is just plain dam wrong.
He's plain dam wrong for hundreds of farmers — including some I got to know for several years — losing their farms and ranches if these lakes are built. He's wrong for his unelected, state-appointed board failing to adequately discuss conservation when the Metroplex uses more water per person than any other metropolitan area in Texas. And he's wrong for promoting growth for growth's sake.
I moved to Texas in November 1994. I moved with my dad, with whom I lived at the time, to Honey Grove. No, actually it was to Allen's Chapel, an unincorporated community north of Honey Grove in Fannin County.
a The Region C water plan calls for four dammed reservoirs to be built. One of them is Lower Bois D'Arc Creek Reservoir. Bois D'Arc Creek runs just north of Allen's Chapel, making its way east from the area around Bonham.
Lower Bois D'Arc Creek Reservoir would flood out the farms of folks like Wayne and Charles Ryser, whose families settled in the area about 125 years ago. It would flood ranches like those of Mike Yarborough, who conducted a quixotic run for state agriculture commissioner in 2002 and whose family moved to the area at about the same time as the Rysers.
And, even before I moved there in 1994, I had a family connection to the area.
My dad's one grandfather served the Lutheran congregation established there as a circuit rider minister in the late 1880s. When my dad graduated seminary himself, he was given a dual-congregation arrangement, serving Allen's Chapel and Denison churches.
I lived there for almost two and one-half years before moving on to another newspaper job in New Mexico. I got to know the Rysers, Yarboroughs and other people my dad had first ministered to 35 years or more previous.
Fannin County is still primarily rural. Farming is a big part of the local life. With abundant northeast Texas rains, it's a productive life. And it's one that doesn't need to be lost.
Agriculture is one of the few things America manages to export these days outside of the entertainment world. As America's and the world's population continues to grow, we don't need to lose more farmland. That's especially true as diminishing water in the Ogallala Aquifer, lying under west Texas and the rest of the southern High Plains, does take farmland out of circulation there.
Nor does precious natural history need to be lost.
Amateur paleontologists regularly find a variety of fossils in the North Sulphur River. Fossils and river would be inundated under another of the four reservoirs the Region C Water Board wants.
But James Parks says it's time to drown out these farmers and fossils. He says we need Lower Bois D'Arc Creek Reservoir, along with Marvin Nichols Reservoir, Lake Fastrill and Lake Ralph Hall.
b Parks and his 18 fellow unelected board members don't mention that Dallas businesses and residents use 75 percent more water per capita than the national average — and between 56 percent and 89 percent more than other Texas cities, like Houston, Austin and San Antonio. They don't mention that if we reduce this to the state average, how those lakes won't even be necessary in 2050.

The Region C Regional Water Planning Group (RCWPG) is 19 unelected volunteers originally appointed by the state and whose bylaws in this region allow them to re-elect themselves and to serve for any length of time. The group is tasked with developing a regional water plan for 16 counties (including the Metroplex and North Texas) and implementing that plan in accordance with Texas Senate Bill 1 and Texas Senate Bill 2.
Parks and his 18 fellow board members strike me as the William Mulhol lands of north and northeast Texas, threatening to create their own "China town" scenario for places like Allen's Chapel, Lannius, Petty and other small farm towns and communities.
Just look at the breadth of their plan. Like L.A. at the turn of the previous century, these water pirates want to shanghai H20 from as far as 150 miles away or more.
If Parks is serious about the fact that North Texas could run short on water if we don't create all of these dammed new lakes, fine. Maybe this means that, in addition to our current water wastefulness, we just don't need 13 million people here. Who says Texas in particular and the Sunbelt in general has to be the only growing part of the country? What's wrong with Kansas City, St. Louis and Cincinnati having a new wave of growth? (And, no, the Midwest is not some wasteland where nobody in their right mind would live.)
Besides, as environmentalist curmudgeon Cactus Ed Abbey once said: "Growth for growth's sake is the theology of the cancer cell."
So, with the day or two of comment you have left, if you'd like to help preserve American agriculture in an area of the country where it still survives without irrigation, and without too often being part of some vast agribusiness conglomerate, contact the Region C Water Planning Group and tell James Parks what he can do with all of his dammed dream lakes. It's handy e-mail address is regionc@ freese.com, or jparks@ntmwd.com. Better yet, use both. And also, go to the Dallas Sierra Club's website action page at http://texas.sierraclub.org/dallas/actionalert/action-page-1.asp.
Because, ultimately, those lakes just aren't worth a dam. According to the Dallas Sierra Club, twice as much water as would be needed to meet Region C's projected 55-year water demands can be obtained from conservation, reuse, and bringing water from existing underutilized reservoirs.
So, if you're still watering your lawn at 3, 4 or 6 p.m., stop it. If you're letting the faucet run while you brush your teeth, stop it. For your children and grandchildren, stop it.

Available online after 5 p.m. Thursday, Sept. 8 at
http://www.todaynewspapers.net/OPINION.HTM

I strongly oppose--and urge you to remove--the four new reservoirs that your Draft Plan proposes as recommended strategies (Marvin Nichols, Fastrill, Lower Bois d'Arc Creek, Ralph Hall), as well as the four additional new reservoirs listed as alternative strategies (George Parkhouse North and South, Columbia, Tehuacana). These unneeded dams would flood hundreds of square miles of East Texas, destroy increasingly rare wildlife habitat, take over five hundred square miles of land from thousands of mostly unwilling Texans, and devastate ranching, farming, and timber industries in large areas of Texas.

None of these staggering negative impacts is necessary, since your Plan shows that twice as much water as would be needed to meet year-2060 demands can be obtained from conservation, reuse, and bringing water from existing underutilized reservoirs. Utilizing less harmful, less controversial existing reservoirs would be a prudent and responsible course of action, whereas relying substantially on proposed new reservoirs is a risky strategy with much higher uncertainty.

I applaud your commitment made at your May meeting to explore scenarios which would fully utilize existing reservoirs before considering any new reservoirs. I urge you to commit to fully utilizing existing available reservoirs to meet demands, rather than needlessly damming our rivers.

The Draft Plan admits that building new reservoirs would negatively impact environmental, agricultural, and rural resources far more than utilizing the available existing water supplies. Yet you do not explain why you have chosen new reservoirs over the numerous yet-unclaimed supplies in existing reservoirs identified in the Draft. If you're going to support a Plan that proposes destructive new reservoir projects, I believe you have the burden of proof to justify your actions.

I urge you to commit to more aggressive water use efficiency measures (conservation). The Draft Plan's assumed water use efficiency measures for Region C cities still lag behind those already being achieved and/or planned for other Texas cities and regional water plans. It's unconscionable to plan to condemn other people's land without first using the reservoirs that Texans have already paid to develop.

Sent by email 9/9

(72)

SIERRA CLUB FOUNDED 1892

TEXAS COMMITTEE ON NATURAL RESOURCES
3532 Bee Caves Road, Suite 110
Austin, Texas 78746

BIG THICKET ASSOCIATION
P.O. Box 198
Saratoga, TX 77585

THE CONSERVATION FUND

SULPHUR RIVER OVERSIGHT SOCIETY
157 P.R 25901, DeKalb, Texas 75559

DALLAS HISTORIC TREE COALITION

FRIENDS OF THE SABINE
P.O. Box 12071
Longview, Texas 75607

East Texas Forest and Wildlife Coalition
910 Whitehouse Drive
Lufkin, Texas 75901

NECHES RIVER PROTECTION INTIATIVE
P.O. Box 154934
Lufkin, TX 75915

SOS

September 2, 2005

Dear Members of the Region C Water Planning Group:

The organizations signing this letter convey our disappointment that the Initially Prepared Plan (IPP) for Region C is essentially unchanged from the version we commented on before and we again urge you to reject this plan that relies on contentious new reservoirs that are economically and ecologically unsound.

Some of the organizations signing this letter will be submitting more detailed comments on the IPP, but we join here in sending the following basic comments:

It simply is not necessary to place substantial reliance on strategies that face increasing uncertainty about their likelihood of being built. By relying instead on increased use of existing supply sources that the IPP itself acknowledges, the final plan can provide better predictability by avoiding huge uncertainties about potential permit issuance and can ensure compliance with the statutory criterion for consistency with long-term protection of the state's natural resources.

The IPP includes four proposed new reservoirs as recommended water management strategies, Marvin Nichols, Fastrill, Lower Bois d'Arc Creek, and Ralph Hall. Together these reservoirs would flood 125,000 acres and condemn at least 375,000 acres. Four additional ones listed as alternative strategies -- George Parkhouse North and South, Columbia, and Tehuacana -- would drown approximately 41,000 acres and condemn at least 123,000 acres.

The IPP's choice of proposed new reservoirs

- Far exceeds the IPP's own projected demands
- Ignores IPP-acknowledged existing sources that are far more appropriate than new reservoirs for any desired reserve supply
- Has higher negative impacts (according to the IPP) than the ignored existing sources
- Is more difficult and uncertain to permit and implement (according to the IPP).

Before adopting the final Plan, you have a last chance to take a hard look at these eight new reservoirs and consider them in light of the data provided by the IPP itself showing that the new reservoirs are both unnecessary and more harmful and uncertain than other listed options. As you weigh these new unneeded reservoirs against other options identified in the IPP, you can choose to spare well over two hundred square miles of increasingly rare East Texas and Northeast Texas floodplain habitat or you can take a step toward drowning them forever. You can choose to avoid subjecting potentially thousands of unwilling Texans to uncertainty about the future of their land or you can take a step that threatens them with decades of uncertainty, confrontation, and the potential loss of their property and family heritage.

Texas Parks and Wildlife Department estimates that more than 75% of the Texas' bottomland hardwood forests are gone, converted to other uses. The loss of this vital wildlife habitat is of great concern to people not only throughout Texas, but nationwide. The proposed reservoirs would drown some of the best remaining bottomland hardwood lands in Texas, threaten pending establishment of an extremely high-quality national wildlife refuge, and devastate regional ranching and timber industries.

On behalf of tens of thousands of our North Texas and statewide members, and many more members nationwide, we ask you to choose strategies that rely on conservation and existing sources and reject strategies that include new reservoirs.

a **Region C IPP Shows New Reservoirs Are Not Needed And Are More Harmful And Uncertain Than Other Strategies:**

Thankfully, you have many options for obtaining the water to meet the projected future demand for Region C. New reservoirs are clearly unneeded and are not a responsible strategy:

- The IPP recommends enough conservation, reuse, and obtaining water from existing large sources to meet the IPP's projected regionwide difference between current connected and unconnected supplies and future demands through the 2060 planning horizon.

- The IPP has also chosen, as "alternative" strategies, enough additional feasible, viable existing large sources to fulfill any reasonable margin of error.

- Together, these lower-impact existing sources provide *twice as much* water as Region C is projected to need to fill the gap between today's supplies and the year-2060 demand. With these existing sources alone, the RCWPG has fulfilled its responsibility to plan prudently for future water supplies.

- The IPP clearly shows that utilizing existing sources rather than new reservoirs would have lower impacts upon the environment, on agricultural resources/rural areas, on other natural resources, and on third parties. Also that it would have fewer implementation or permitting issues to overcome, thus less risk to develop. (Table 4D.2, "Summary of Costs and Impacts of Major Potentially Feasible Strategies for Region C", found on pg. 4D.4)

- Yet without justification or explanation in light of the above, the IPP pursues eight unneeded new reservoirs (four recommended and four alternative strategies) that would permanently flood and/or take by eminent domain over 700 square miles of our fellow Texans' land, devastating ranching, farming, and timber industries in large areas of Texas. In addition to the more-than-sufficient existing sources discussed above, these destructive proposed new reservoirs would bring the total supply to close to *three times as much* water as the IPP says is needed to fill the projected future supply gap.

- To pursue these new reservoirs instead of the vast quantities of available supplies in existing reservoirs is not only unnecessary but unconscionable.

b Region D (North East Texas) IPP Questions New-Reservoir Compliance With State Law:

The concluding paragraph of Chapter 7 of the Draft Region D Water Plan reads as follows:

> Due to the significant negative impacts upon environmental factors, agricultural resources/rural areas, other natural resources, and third parties, Marvin Nichols I Reservoir should not be included as a water management strategy in any 2006 regional water plan or the 2007 State Water Plan. Accordingly, inclusion of the Marvin Nichols I Reservoir in any regional water plan would be inconsistent with the Region's efforts to ensure the long-term protection of the region's water resources, agricultural resources, and natural resources

Region D's adopted Draft Plan language also recommends that "any new reservoirs in Region D be pursued only after all other viable alternatives have been exhausted." The Region C IPP conflicts not only with this recommendation but also with the written views of many state legislators that have been provided to the Region C Water Planning Group.

Region D's adopted Draft Plan also supports the full application of the criteria in current state law for authorization of interbasin transfers, including evaluating benefits of a proposed transfer to the receiving basin against the detriments to the basin supplying the water, and any feasible and practicable alternative supplies. These criteria put Marvin Nichols, Fastrill, and other new reservoirs proposed in the Region C Plan seriously at risk to obtain an interbasin transfer permit.

c Time To Take A Hard Look At New-Reservoir Strategies:

The recent focus by the Texas Legislature shows that using eminent domain unnecessarily is more controversial than ever. The language in the Region D Plan and our own review clearly call into question whether the Region C IPP can meet statutory requirements. New reservoirs are clearly more harmful and less certain and less acceptable to the public and their representatives than existing-source strategies. The Region C IPP clearly offers many options to meet not only its projected demands but also a huge reserve supply by utilizing existing sources rather than new reservoirs. For all these reasons, it is time for you to take a hard look at the illogical new-reservoir strategies in the IPP.

We applaud the commitment the RCWPG made at your May meeting (in response to Connie Standridge's motion) to explore logical scenarios that would fully utilize existing reservoirs before considering any new reservoirs. We are dismayed that such scenarios have not yet been produced by Region C's consultants to enable you or the public to thoroughly review this topic that has been the subject of much focus in Region C for at least a year and a half. We expect a release of such scenarios well ahead of your October 10 meeting so that the public will have time to review and provide comments and so you will have time to thoroughly consider the scenarios prior to adoption of your final 2006 regional plan.

If RCWPG and your consultants do not intend to produce the existing-source scenarios agreed upon at your May meeting, we request an explanation of why this is not being done, who made the decision not to produce the agreed-upon scenarios, and when.

Sincerely,

Ken Kramer, Ph.D., Director
Lone Star Chapter of the Sierra Club

Janice Bezanson, Executive Director
Texas Committee on Natural Resources

Andy Jones, Texas Director
The Conservation Fund of Texas

Bruce Drury, Chair
Big Thicket Association

Bill Seaman, President
Dallas Historic Tree Coalition

Rita Beving, Conservation Chair
Dallas Regional Group, Sierra Club

J. Mark Wolf, President
Save Open Space, Dallas, Texas

Max Shumake, President
Sulphur River Oversight Society

Gina Donovan, Director
Neches River Protection Initiative

Richard LeTourneau, Chair
North East Texas Group, Sierra Club

Richard M. Donovan
East Texas Forest and Wildlife Coalition

Dian Avriett, Chair
Pineywoods Sierra Club

Richard LeTourneau, Chairman
Friends of the Sabine

Edward C. "Ned" Fritz, Founder
Texas Committee on Natural Resources
Dallas, Texas

Genie Fritz
Dallas, Texas

cc: Hon. Kenneth Armbrister, Chair, Natural Resources Committee, Texas Senate
Hon. Robert Puente, Chair, Natural Resources Committee, Texas House of Representatives
Members of the Texas Water Development Board, c/o Kevin Ward, Executive Director

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TEXAS COMMITTEE ON NATURAL RESOURCES
3532 Bee Caves Road, Suite 110
Austin, Texas 78746
512-441-1122

September 9, 2005

To: Region C Water Planning Group

Fr: Janice Bezanson on behalf of Texas Committee on Natural Resources

Re: Region C Initially Prepared Plan

The Region C Initially Prepared Plan (IPP) has several omissions and questionable assumptions that together support recommendations for unnecessary new reservoirs to supply Region C's future water demands. We urge the Region C Water Planning Group to consider these issues carefully and to revise the Region C Water Plan to correct these problems before sending it to the Texas Water Development Board and the Texas Legislature. If these inappropriate cost figures were corrected, it would make clear that the new reservoirs recommended in the IPP are not the most cost-effective strategies for Region C.

a **Possible Error in Reported Water Use Inflates Projections by a Million AFY**

The Region C Initially Prepared Plan bases its projections for future water demand on a water use figure for the year 2000 of 1,380,556 acre-feet per year (AFY). There is considerable evidence that this number is not accurate enough to use for planning purposes.

Discrepancy with reported water use. The three major water providers in Region C – Dallas Water Utilities, Tarrant Region Water District, and North Texas Municipal Water District – reported in 2000 a gross pumpage of approximately one million acre-feet. (Source, DWU's water audit and personal communications from TRWD and NTMWD.) There are of course other water suppliers in Region C but they do not have access to water supplies large enough to make up the discrepancy between the one million acre-feet pumped by the three large suppliers and the 1,380,000 AF used in the IPP. Furthermore, the one million acre-foot pumpage reported for the year 2000 is anomalous. In previous years and in all subsequent years, water providers in Region C have pumped much less than in 2000.

This anomaly with water use in the year 2000 has been explained to us as due to unusual drought conditions in 2000. Yet the World Almanac shows the rainfall in the Dallas – Fort Worth area in 2000 at 36.25 inches, slightly above the 33.7 average annual rainfall for the area. Also, the monthly pumpage figure for DWU gives no indication of a strong peak in any of the summer months, showing a uniformly high pumpage for every month of the year, irrespective of rainfall.

More importantly, county water use figures published by Texas Water Development Board (TWDB), which are the basis of the 1,380,556 figure for 2000, show a slight increase in use from 2000 to 2001. This means that the discrepancy between the state-reported usage for Region C and the amount of water actually pumped by water suppliers in Region C is on the order of 400,000 acre-feet for 2001. If a discrepancy of the magnitude of 400,000 AFY is projected out to the year 2060 using Region C's projection methodology, it produces a demand that is inflated by nearly one million AFY.

The notoriously high per capita use of municipal water in Region C compared to other parts of the state -- 235 gallons per person per day (gpcd) -- has often been attributed to the watering of large lawns, but DWU's independent audit reported that 208,000 single-family homes had a metered water use of 27 billion gallons. Assuming 2.4 people per single-family household gives a per capita water use of 148 gpcd. People living in apartments and condominiums would presumably use significantly less.

These facts taken together constitute a reasonable case for questioning the 1,380,000 AF in 2000 that Region C is using as the basis for planning.

What this means to future projections of demand. If the Region C Water Plan used a more realistic 1,100,000 AF for the region's year 2000 water usage, rather than 1,380,000, the demand projections for the year 2060 would be sufficiently lower that none of the new reservoirs being recommended in the Region C IPP would be needed to meet demand.

Recommendation. TCONR strongly urges the Region C Water Planning Group to undertake a serious effort to accurately measure current water use in Region C using the actual metered pumpage of the area's water providers.

b

IPP Omits Most Economical Options

The Region C IPP omits consideration of the two options that would cost less per unit of water than the alternatives considered.

Increased reuse. An increased amount of reuse (also called "recycled water") is likely to be the lowest-cost option available to the region. Although substantial and a note-worthy increase over past plans, the amount of reuse planned by the water suppliers in Region C, roughly 400,000 AFY, is only a small fraction of the potential for reuse should Region C in fact use the amounts of water the IPP projects. For example, if water demand really were to reach the 3.3 million AFY projected for 2060, then approximately 2 million AFY would be available for reuse, five times the projected 400,000 AFY.

The reason that we have been given for limiting the amount of reuse is that the nutrient content of water from secondary treatment is too high to place in surface reservoirs beyond the amount planned. The cost, however, of further treatment to eliminate the nutrient problem is no more than $0.15/thousand gallons. (Source: cost of ultrafiltration, which results in pure water, produced by Ionics, Inc.) This suggests that reuse would be the cheapest and largest potential supply for Region C, but it is not included in the Region C IPP.

Water from the Brazos River. Another very promising option for water users in the western part of Region C is bringing water from the Brazos River. Water from the Brazos would require some desalination, but even so the proximity of Lake Granbury to Fort Worth makes this an attractive prospect. Studies done for DWU by both Freese and Nichols and HDR Engineering indicate that the cost of desalinated water from Lake Texoma (which has a similar level of salinity as the Brazos River) delivered 70 miles to Dallas has a cost comparable to the lowest cost new supplies piped from East Texas. Since the cost of this water is heavily dependent on pipeline length, it is obvious that the 25-mile distance from Lake Granbury to Fort Worth would make desalinated water from the Brazos the most economical source for Fort Worth, with the possible exception of reuse.

C

Special advantages of reuse and desalination. Reuse and desalination have specific advantages that have not been properly evaluated in the IPP. In the case of reuse, the amount of water available (the return flow) is directly proportional to the total water use, irrespective of how much is being used. In other words, water is increasingly available for reuse as water use increases. Having additional water available *as needed* avoids the uncertainties of the current planning process.

In the case of desalination, studies done for DWU and Region C have not evaluated the cost savings made possible by the modular nature of desalination units. Previous studies have assumed that a 100 million gallon per day (MGD) plant, for example, would purchase the full 100 MGD capacity up front, with an attendant interest cost that could be substantial, but it is not necessary to do that. Because of the modular nature of desalination plants, capacity could be purchased as needed.

Uncounted costs of building new reservoirs. By contrast, water supplies that require the full cost of the project to be paid during the initial construction phase (such as a new reservoir) will tend to have real-world costs much higher than those arrived at in the planning process, because the cost estimates in plans are always based on full utilization of the water to be purchased. A water supplier cannot build 2/3 or 4/5 of a dam. But if only 2/3 or 4/5 of the water is utilized then the total cost must be divided by a fewer number of acre-feet of water, making the unit costs higher. In the early years or decades when little water is used from a reservoir, the costs are dramatically higher.

Because the IPP bases its recommended water management strategies on a demand level that is 10% *in excess of actual projected water demand* (sometimes more than 10% in excess), reservoirs built to meet that excess could be expected *never* to meet full utilization of the firm yield. Yet the price estimates for water in the IPP are based on full utilization.

In addition, contracts for water are often written so that the purchaser pays only for water that is *taken* from a reservoir. In drought years they may take (and pay for) their full allocation of water. But there may be many years in which they take little or none, hence pay for little or none. Basing the prices calculated in the IPP on full utilization of the reservoir may make a particular new reservoir look economical when in reality the fact that only a small amount of water will be taken in most years will make it hugely expensive. [Note: there is usually some annual fee to maintain the contract even when water isn't taken, but it is often trivial compared to the actual cost of the water.]

(d)

Fee Added to Existing Reservoirs Skews Cost Figures

The cost figures given by Region C's consultant for new supplies from East Texas contain the interesting suggestion that using water from existing reservoirs can cost as much or more than building an entirely new reservoir a comparable distance away. This highly counter-intuitive conclusion is due to the fact that the water suppliers who currently own the water rights in the existing reservoirs have the legal right to exact a substantial fee from anyone purchasing water from the reservoir. For water from Lake of the Pines or Wright Patman, for example, the fee is in the range of $0.30 to $0.35 per thousand gallons.

This 30- to 35-cent fee constitutes the difference in cost projected for an existing reservoir and for a new one. But this fee does not represent a real economic cost – that is, nothing of current economic value is given up by the seller in exchange for this fee.

This fee operates as a tax imposed on the people in one part of the state (in this case Region C) for the undeserved gain of the selling entity. In other words, state water planners such as Region C are making decisions for the construction of new reservoirs based on a "cost" advantage that does not really exist. To incur the huge environmental and social costs of building a new reservoir adjacent to an existing reservoir with available water just to avoid this fee is absurd.

Recommendation. TCONR recommends that the Region C Water Planning Group urge the Legislature to correct this inequity.

(e)

Recommendations for Tarrant Regional Particularly Inappropriate

A point that the Region C IPP fails to make is that the most economical strategies for providing water to the western portion of the region vary greatly from the strategies which the IPP finds to be the lowest cost for the eastern portion of the region.

The cost of recommended strategies for the major providers vary greatly with how far west the purchaser is – that is, with varying distances water must be piped from each water source. For example, Freese and Nichols gives a cost of $0.94 per thousand gallons for Marvin Nichols to North Texas Municipal Water District, vs. $1.66 per thousand from Nichols to Tarrant Regional Water District. Clearly, what might be in the realm of "economical" for one entity is very expensive for another.

The IPP's cost estimates for Tarrant Regional Water District show Marvin Nichols at $1.66 per thousand gallons and Toledo Bend at $1.92 for raw water. By contrast, the price given in an earlier chart prepared by Freese and Nichols is $1.07 per thousand gallons for blended water from Lake Texoma. Even the desalinated water from Lake Texoma is cheaper for Tarrant Regional than water from Marvin Nichols or Toledo Bend. The price to TRWD for Lake Texoma desalinated water has been estimated by Freese and Nichols at $2.17 per thousand for *pure treated water* To make an apples-to-apples comparison with water from Marvin Nichols or Toledo Bend, one must add treatment costs to the figures for those lakes' raw water estimates. Using a figure of $0.62 per thousand gallons for conventional water treatment, taken from a cost memo prepared by Freese and Nichols, achieves the following comparisons:

Reservoirs	Price per thousand gallons of raw water	Price per thousand gallons once water is treated
Marvin Nichols	$1.66	$2.28
Toledo Bend	1.92	2.54
Texoma Blended	1.07	1.69
Texoma Desalinated		2.17

Clearly, water from Lake Texoma is more cost-effective for Tarrant Regional than bringing water from East Texas.

When water from East Texas is compared to the much lower-cost (for Tarrant Regional) options of reuse and bringing water from the Brazos River, it is clear that the recommended water management strategies of Marvin Nichols and Toledo are much too expensive to reasonably be recommended for TRWD.

TO: Region C Water Planning Group
FROM: Beth Johnson, consultant to Texas Committee on Natural Resources, Sierra Club
RE: Comments on Region C Initially Prepared Plan
DATE: 9/9/05

Introduction:

1. **The Draft Plan recommends enough conservation, reuse, and obtaining water from existing sources to meet projected needs through the half-century planning horizon.**

2. **The Draft has also chosen (as "alternative" strategies) enough additional feasible, viable existing sources to fulfill any reasonable margin of error.** Together, these lower-impact existing sources provide twice as much water as Region C is projected to need along with today's permitted supplies to meet the required year-2060 planning horizon. With these existing sources alone, the RCWPG has fulfilled its responsibility to plan prudently for future water supplies.

3. **But without justification, the Draft goes on to pursue eight unneeded new reservoirs.** Region C's four new recommended reservoirs and four new alternative reservoirs would flood hundreds of square miles of East and Northeast Texas, destroy increasingly rare wildlife habitat, take over 500 square miles of land from thousands of mostly unwilling Texans, and devastate ranching, farming, and timber industries in large areas of Texas. These destructive new reservoirs would bring the total supply to close to three times as much water as is needed to fill the projected future supply gap. To pursue these new reservoirs instead of the vast quantities of available supplies in existing reservoirs is not only unnecessary but unconscionable. And counting on obtaining permits to build new reservoirs is far less certain and far less responsible a strategy than fully utilizing existing, less-harmful, less-controversial supplies.

Specific Comments:

1. Pgs. 4D.4-4D.7. **New reservoirs are more harmful.** Meeting any "unmet needs" by building new reservoirs is more harmful than utilizing new supplies that are available in existing reservoirs, as noted in Table 4D.2, "Summary of Costs and Impacts of Major Potentially Feasible Strategies for Region C." New reservoirs should be deleted as recommended or alternative strategies.
   a. We pointed out in our April presentation that it was clear from this table's draft layout at that time that negative impacts of new sources are "medium high" and "high", whereas the impacts from existing sources are "low" to "medium". New reservoirs and other new projects were grouped together toward the end of the table at that time. Unfortunately, the table has now been changed in the IPP so that it is no longer as readily apparent that new reservoirs have much greater negative impact. That, combined with the table's failure to identify which sources are new reservoirs as opposed to existing ones, makes it unnecessarily difficult for the public to evaluate what has clearly been the central and long-running controversy in Region C: the RCWPG's pursuit of new reservoirs while failing to aggressively become more efficient in water use and failing to fully utilize available sources that are already developed. We suggest that the table group the new reservoirs together, at the end of the table.

b. We hereby renew our request previously presented at RCWPG meeting(s) that the new reservoirs be clearly delineated on the table so that it's clear which potential strategies are new reservoirs and which utilize existing developed sources.
c. This table presenting impacts should show a range of possible condemnation acreage associated with the different options, preferably in a separate column but at least mentioned under "implementation issues". We have requested this in public session but it has been ignored. We hereby renew our request.
d. We note the repeated references in the text, in Chapter 4D, that provide the useful explanation that "because this is an existing supply, the environmental impacts of this water management strategy are relatively low". But the IPP does not consistently mention this characteristic among the existing supplies. Consistent with Table 4D.2 that shows that existing sources generally have lower negative impacts than new sources, the accompanying text for the existing sources should use language consistently explaining this fact.
e. In Chapter 4D, the text (pg. 4D.11) clearly explains that new reservoir Marvin Nichols "will have significant environmental impacts." However, the IPP text in the same chapter fails to note similar negative impacts for the other recommended new reservoirs. Fastrill, like Marvin Nichols, is also rated as "high" on negative impacts in Table 4D.2, but that fact is not mentioned in the text. The other 2 recommended reservoirs--Lower Bois D'Arc and Ralph Hall— each have negative impacts that are rated as "medium high" on the table but are not mentioned in the text. The four additional new reservoirs that the IPP adopts as "alternative" strategies also have negative impacts that are rated "medium high" on the table but are unmentioned in this chapter's text. The rest of the chapter's text should be made consistent with Marvin Nichols in clearly acknowledging that new reservoirs are higher in negative impact than existing sources.
f. Throughout the development of the IPP, we have provided the RCWPG many summaries and other documents outlining the major environmental, economic, and landowner harms that would be caused by the proposed new reservoirs. Virtually none of this information has found its way into the text of the IPP. We hereby renew and incorporate by reference these previous documents. We request that, at a minimum, these documents (including letters from elected officials) be provided in an appendix.

2. **IPP should admit, depict, and justify its vast recommended excess supply.** The fact that the RCWPG intends a large excess of supply above its own projected demand for each major supplier is depicted inconsistently between the suppliers and is thus not as apparent for some as for others. An excess of any size is unwarranted, is at odds with the planning process adopted by TWDB and other regions, is unnecessarily threatening to landowners and regional economies, and threatens natural resources.
   a. If RCWPG insists upon adopting excess supply above its own projected demands, then the fact that it is so doing should be clearly and consistently acknowledged and depicted between suppliers. We request that the method of depicting volume of recommended strategies relative to projected demand for DWU (pg. 4E.7) and UTRWD (pgs. 4E.37-4E.38) also be used for the other suppliers. Tables for DWU and UTRWD clearly acknowledge surplus volume, whereas those of other suppliers do not.

b. If the RCWPG insists upon this excess, it should explain and justify this decision somewhere in the text of the Plan. The IPP merely declares the excess "reasonable" (pgs. ES.6, ES.9) without explanation.

c. As noted on pg. ES.9, the IPP adopts regionwide approximately 20% supply in excess of its own projected demands. This runs counter to the RCWPG's verbal discussion in one of its public meetings when it suggested adopting 10% supply above demand for major suppliers. No explanation has been provided to the RCWPG, nor have they discussed, why the IPP now adopts 20% in apparent contradiction of their previous discussion. (We reiterate that we view even 10% supply above projected demand as unwarranted. It must be remembered that the projected "demand" itself is for drought of record, and yet the IPP's adopted existing supply and strategies do NOT acknowledge demand-management savings that are planned for droughts.)

d. If one does the math, Tables on pgs. 4E.7, 13, and 20 show the region's large wholesale water providers (DWU, TRWD, and NTMWD) adopting supply greatly in excess of demand. DWU's excess supply is greater than its entire yield from proposed Fastrill, NTMWD's excess is greater than its share of Marvin Nichols, and TRWD's excess is close to its entire proposed share of Marvin Nichols. This is against the backdrop that this excess does not even acknowledge that the supply listed from recommended strategies for TRWD and NTMWD is understated, because the recommended strategies surreptitiously push 100,000 AFY each from their respective "phase II" of Toledo Bend beyond 2060. The IPP's pushing this 200,000 AFY from Toledo Bend beyond 2060 so that it doesn't show up on their recommended strategy tables thus enables TRWD's and NTMWD's excess supply to appear as "small" as it now does. Literally, whole reservoirs are unneeded to meet 2060 demand even according to RCWPG's own figures. But these figures are depicted in such a combination of contorted and subtle fashion that the size of the excess is not readily apparent to the public. These flaws should be corrected.

e. Pg. 4E.8. As is evident from the data and chart on pgs. 4E.7 – 4E.8, the IPP recommends new Fastrill Reservoir for DWU strictly for excess capacity, since the projected demand is satisfied through 2060 without Fastrill. Given the wealth of other options available to DWU that are clearly shown in the IPP, it is extremely inappropriate for a new reservoir to serve strictly for excess capacity. The RCWPG should discuss, and the Final plan should explain, why the RCWPG feels it is logical or appropriate to derail at the eleventh hour a magnificent national wildlife refuge that is on the verge of federal approval after 20 years of discussion and study, to worry local residents for the next 40 years that they'll lose their lands, and to destroy some of the finest bottomland ecosystem remaining in Texas, by recommending a new reservoir that was not in the 2001 Plan and that by the RCWPG's own admission is to be used strictly as excess supply above demand projected. If RCWPG insists on providing this volume of excess, it should explain why it is not choosing the 68,000 AFY unused portion of DWU's own Patman flood pool reallocation strategy (discussed below), the 210,000 AFY available from the other two methods of using Patman, or numerous other large available existing sources that the IPP identifies.

3. **"Consistency" with suppliers' plans.** Table 4D.2 on pg. 4D.4-7 now has a new column inserted that was not on the Draft table. This is (consistency with) "suppliers". And pg. 4C.24 asserts that "Consistency with plans of Region C water suppliers is an important factor in the evaluation of strategies" and that "It has always been the intent of the Region C Water Planning Group to build

the Region C Water Plan on the existing plans of the water suppliers in the region, especially the regional wholesale water providers." This appears to suggest that whatever the large suppliers want is what the Plan will include. Such a suggestion is contrary to SB1's "bottom-up" process that gives a variety of other interests representation on the water planning groups, SB1's provisions for public participation in the planning process, and the overall intent of the Legislature. Nowhere does SB1 suggest that suppliers' plans should somehow be an overriding criterion for adoption of a given water management strategy. In fact, the legislative history of SB1 makes clear that assuring that suppliers' plans NOT be the dominant deciding factor in how Texans decide where and how much water they want to use from their water resource. If the large providers' and their consultants' desires to build new reservoirs is to—by definition—become the regional plan, then what is the purpose of the RCWPG? This approach would substantially moot the time, expertise, and role of the 15 non-supplier representatives who serve on the RCWPG. What is TWDB's role, for that matter? The source of the assertion that "it has always been the intent" of the Planning Group to let large suppliers decide the Plan is unclear, since I find no evidence in the minutes or discussions I've witnessed that the RCWPG as a whole has actually agreed to this approach. The RCWPG needs to discuss—and allow public verbal comment upon same in the meeting, prior to your discussion—the basis for these assertions in the IPP. If the IPP is to retain such curious language, then further explanation should be added as to why RCWPG believes this complies with SB1 and TWDB rules.

4. Pg. 4D.1. **"Consistency with the plans of other regions"** is listed as one of the criteria by which potentially feasible strategies were evaluated. Region D's IPP makes clear its opposition to the proposed Marvin Nichols Reservoir in its region. Reasons for the opposition outlined in Region D's IPP include the fact that its construction would violate state law requiring the protection of natural and agricultural resources. Thus, Region C's assertion in Table 4D.2 on pg. 4D.4 that Marvin Nichols is "not inconsistent" with other regions' plans is inaccurate.

5. **"Known public opposition" to new reservoirs and other "implementation issues".** Pgs. 4D.4-4D.7. (Table 4D.2, "Summary of Costs and Impacts of Major Potentially Feasible Strategies"). Regarding the IPP's 4 recommended new reservoirs, the table's treatment of "opposition" under "implementation issues" is inconsistent. The entry for Marvin Nichols correctly admits "known public opposition," but no mention is made of the known public opposition to the other 3 proposed new reservoirs. More than 300 letters from individuals, numerous appearances at RCWPG meetings by representatives of environmental and landowners' organizations, and letters from members of the Legislature that have been provided to you—all prior to approval of the IPP-- expressed opposition to all the proposed new reservoirs. In addition to this major evidence of opposition to new reservoirs in general, "known public opposition" should be added to the entries in this table for the following specific reasons:
    a. Fastrill, like Marvin Nichols, has public opposition that is both substantial and "known". Region C WPG itself has received over 400 letters opposing Fastrill, as well as verbal and written opposition comments from 14 local and conservation organizations and leaders on several occasions including at least 6 wks. prior to publication of the IPP. On behalf of environmental organizations, I have brought the inaccuracy of the omission of "known public opposition" in this table to RCWPG's attention during its meetings, yet it has not been corrected. Before the IPP was finalized, the U.S. Fish and Wildlife Service had received over 900 letters supporting instead the proposed Neches River National Wildlife

Refuge and opposing Fastrill Reservoir during its comment period that ended May 23. "Known public opposition" should thus be added to the entry for Fastrill in this table.

i. Pg. 4D.6 (Table 4D.2). Also regarding the treatment of Fastrill's "implementation issues," mention should be made here and in related text that the regional office of the U.S. Fish and Wildlife Service has recommended to the national Director that the agency approve the proposed Neches River National Wildlife Refuge. The Refuge could be approved prior to RCWPG's finalizing of its regional plan. We request that the Refuge's regional recommendation and current status be discussed at RCWPG and noted in the Final regional plan. The Refuge would be incompatible with establishment of the Fastrill Reservoir on virtually on the same site. The RCWPG discussion and Plan text should note that the level of grassroots support evidence by the outpouring of positive communications from the public is higher than any proposed refuge has had in many years. Whether or not the Refuge is approved prior to RCWPG's adoption of a Final regional plan, other alternative strategies that utilize existing reservoirs and do not significantly impact a proposed national wildlife refuge should be substituted for this new reservoir.

ii. Pg. 4D.6 and pg. 4D.18-19. The treatment of recommended Fastrill Reservoir in the Table and text should include the following information relevant to regional and statewide decision-makers' and the public's evaluation of whether this new reservoir is justified and how it will affect landowners:
   1. Creation of a reservoir will include the probability of condemnation of private lands for reservoir footprint and/or mitigation lands, whereas the USFWS will NOT use condemnation to establish the Neches River National Wildlife Refuge.
   2. The Refuge's Establishment Proposal and Environmental Assessment states on pg. 7: "Willing Sellers Only -- Although the Service, like all agencies of the United States Government, has condemnation authority, it is the Service's policy to acquire land and interests in land from willing sellers only. No lands have been condemned in the past for any refuge in Texas, and the Service does not propose condemnation of any lands in the future."

b. Lower Bois d'Arc—Last spring, over 100 people opposed this reservoir at local meeting called with little notice and on a weeknight, a very strong indication of "known" public opposition. The chairman of RCWPG was present at this meeting, so surely this opposition is "known" to RCWPG. A bill to designate Lower Bois d'Arc as a unique reservoir site subsequently died in the Legislature.

c. Ralph Hall—The City of Flower Mound has discussed its opposition to this reservoir in several city council meetings, at least one of which was attended by one of the consultants that is subcontracting for Region C. Many representatives and citizens from Flower Mound and from other areas have expressed their opposition repeatedly at RCWPG meetings.

6. Pg. 4D.10-11. **Marvin Nichols Reservoir.** The IPP's assertion that "The Sulphur River Basin Authority and Metroplex water suppliers are currently pursuing a basin-wide study of the Sulphur River Basin in cooperation with the Fort Worth District of the Corps of Engineers to obtain additional information on potential water supplies from the basin, including Marvin Nichols Reservoir" is inaccurate or inconsistent in a couple of respects:

a. The Corps of Engineers has not received an appropriation for this study, and thus the other entities mentioned are not currently pursuing a study "with the...Corps."
b. The study that the Metroplex suppliers are "currently pursuing" is not "basin-wide," since the only activities being undertaken in the near-term relate strictly to Marvin Nichols.
c. Pg. 4D.11-13. Wright Patman Lake. The IPP's description of the study in the Sulphur Basin is inconsistent with that offered on pgs. 4D.10 and is inaccurate:
    i. Pg. 4D.10 claimed that entities "are currently pursuing" a study, whereas pg. 4D.13 labels it a "proposed" study.
    ii. Pg. 4D.13 asserts that the study will be "basin-wide" and "will" provide information on developing supplies from Wright Patman Lake. In fact, as we mention above, the current study is not "basin-wide", will not further information on or ability to obtain supplies from Wright Patman, and relates only to Marvin Nichols.

7. Pg. ES.7 and elsewhere. **Socio-economic Impacts.** The socio-economic impacts of not meeting projected demands are quantified, but the environmental and socio-economic impacts of meeting demand with new reservoirs instead of fully utilizing existing supplies are not discussed and emphasized in the same way. This one-sided (demand-side) treatment of socio-economic impacts is especially disappointing in light of the fact that on behalf of environmental organizations in one or more public RCWPG meetings I specifically requested that the document provide a more balanced discussion and the TWDB liaison and others made note of this request. Furthermore, the discussion on pg. 4A.9 is misleading in that it appears to discuss the socio-economic impacts of failing not only to secure new rights or purchases of water, but also of failing to connect water for which rights are ALREADY held by Region C entities. Such a scenario is extremely unlikely and thus overstates the impacts. At a minimum, the discussion should acknowledge the fact that these impacts include failure to connect supplies that are already secured but which suppliers have simply chosen to leave unconnected at present.

8. **Accountability for choosing new reservoirs over available existing ones.** The IPP adopts four new reservoirs as recommended strategies and four other new reservoirs as alternative strategies, while NOT recommending quantities of available supplies in existing reservoirs that you have identified as feasible and that exceed the volumes from the new reservoirs. Neither the IPP nor RCWPG discussions have clearly acknowledged, depicted, or explained why RCWPG wishes to utilize new reservoirs instead of available existing ones. We request that RCWPG take responsibility for your choices by having this discussion and inserting explanatory language in the text. Such accountability for your decisions and transparent explanation to the public is at the root of the Legislature's intentions with SB1.
    a. For each existing reservoir that the RCWPG is choosing NOT to utilize, the IPP should clearly depict (a) that it is available, (b) whether it is scheduled to be used, (c) rationale for NOT choosing it.
    b.
9. Pg. 6.34. **"Highest practicable".** In the third section of this Table ("Evaluation of Water Conservation and Drought Management Planning Requirements"), the IPP asserts, "It is the consensus of the Region C Water Planning Group that the recommended water conservation strategies represent the 'highest practicable level of water conservation and efficiency achievable' for each water user group or wholesale water provider that is to obtain water from a proposed

interbasin transfer...." Leaving aside here issues of substantive and statutory reasons why the RCWPG's conclusion is inaccurate, we wish to note that there was no RCWPG discussion or consensus on whether it wished to make the assertion that its recommended strategies achieve the "highest practicable" level of water conservation and efficiency. Thus, the IPP's assertion of a "consensus" is factually inaccurate. There was no discussion, let alone consensus.

10. pg. 4D.13-14, 4E.20-21. **Texoma.** Although NTMWD/GTUA's planned utilization of part of this available feasible supply is acknowledged, there is neither clear depiction nor explanation/justification why the rest is NOT utilized. The IPP correctly portrays NTMWD's intent to pursue as a recommended strategy purchasing a volume from the current hydro reallocation that is already authorized by Congress, but the IPP fails to accurately reflect RCWPG Chairman Jim Parks' publicly stated desire (stated and applauded at a RCWPG meeting) to pursue a further reallocation by securing a new authorization by Congress. Such a step could secure a very important water source, since it could supply 220,000 AFY (as acknowledged on pg. 4D.4, where it is labeled "not yet authorized"). The discussion presented in the IPP is flawed because it fails to make clear that no supplier is choosing a new authorization on hydropower reallocation for water supply. In fact, on pgs. 4E.20 – 4E.21, the IPP's labeling as "New Lake Texoma" NTMWD's strategy that uses the CURRENT AUTHORIZED reallocation is highly misleading. First, the terminology should be clarified so that it is clear that there is 220,000 AFY additional Texoma water available and feasible but which the IPP as currently drafted fails to schedule as a recommended strategy for any supplier. Second, the strategies and associated tables should be corrected to reflect Chairman Parks' statement made at RCWPG that NTMWD is pursuing a truly NEW authorization for additional reallocation from hydropower to conservation, presumably in the 220,000 AFY volume listed as "not yet authorized" on pg. 4D.4.
    a. In addition, the IPP's discussion regarding DWU's potential use of Texoma (pg. 4E.9) is misleading or confusing at best. While "Lake Texoma" is correctly listed as an alternative strategy as adopted by Dallas City Council, I believe that the volumes listed in Table 4E.3 on that same pg. regarding Texoma reflect only the current, authorized reallocation (roughly the same water as the recommended strategy that the IPP slates for NTMWD/GTUA) rather than the potential 220,000 AFY from "not yet authorized" new authorization. If this is the case, it needs to be made clear, and it raises the question as to whether it is appropriate for the IPP to simultaneous list the same volume and source of water as a recommended strategy for one supplier and an alternative for another. At any rate, the NEW "not yet authorized" 220,000 AFY should be listed as at least an alternative for DWU (since that's what the Council voted) and for NTMWD if the RCWPG decides not to slate it as a recommended strategy for NTMWD.

11. We request that the Final regional plan include a **depiction of available existing reservoirs that are NOT being utilized,** with text explanation offered for why each one was declined, who decided, when, whether it was discussed by RCWPG. *We request a recorded vote listing each voting member's individual vote deciding between existing sources and new reservoirs.*

12. Conservation.
    a. Pg. 4E.9. No cost or quantity is given for DWU's "additional water conservation" that is listed as an alternative strategy. Like other potentially feasible strategies and those that were designated as alternative strategies, DWU's "additional water conservation" should

be quantified. A rationale should be offered for why this additional water savings was not chosen as a recommended strategy. We request that the Final regional plan quantify the volume from this alternative and give the reasons for not including it among the recommended strategies. By definition, its inclusion as an alternative strategy means that it is feasible and viable, so these factors obviously would NOT be reasons for relegating it to "alternative" rather than "recommended" status. Furthermore, the inclusion of "additional water conservation" as an alternative strategy (by definition, a strategy that is feasible and viable) is an admission that DWU and/or its customer cities cannot assert that their plans will achieve the "highest practicable" conservation and water use efficiency, and thus the IPP's simultaneous admission of "additional" possible conservation and recommended strategies for new interbasin transfers represents a substantial self-contradictory flaw.

b. Chapter 4E. Explanation should be provided as to why DWU is the only major provider who even LISTED "additional water conservation" as an "alternative". Greater data and information is needed to enable the public to evaluate Region C's conservation strategies as easily as they can evaluate the other strategies. Unlike for reservoir or reuse projects which delineate year to be brought online, volume, and exactly where and what strategy is to be used, the conservation discussion in this chapter does NOT delineate what measures a given water user group or supplier will carry out, when, at what cost, and achieving what volume of savings.

c. Executive Summary pg. ES.7 states that RCWPG considered 23 BMPs from Conservation Task Force but selected only 16 as "potentially feasible." The IPP should explain in text form which 7 were ruled out as not even "potentially feasible" and why, and it should clearly explain which of the remaining 16 are recommended strategies, for which suppliers and user groups.

13. Pg. 4D.18. **Fastrill.** The description that the recommended Fastrill Reservoir would inundate "a portion of a potential wildlife refuge currently under study by the U.S. Fish and Wildlife Service" is highly inaccurate in several respects and does not serve well the interests of RCWPG and statewide decision-makers trying to make an objective decision about whether relying on this proposed new reservoir is justified in light of the proposed refuge and other factors.

   a. The proposed footprint of the reservoir is in fact substantially the same as the proposed reservoir--the "portion" of the proposed refuge inundated would be four-fifths or more. On behalf of environmental groups, I brought this point out in my April presentation to RCWPG and in Q & A following that, yet this inaccurate language downplaying the incompatibility of the reservoir with the reservoir was re-asserted in the IPP two months later.

   b. The IPP's characterization that the refuge is merely "potential" and "currently under study" under-represents the near-final stage of approval that the refuge is in. In fact, before the IPP language was adopted, the USFWS had already had already studied the refuge for years, produced and released a Draft Environmental Assessment for public review, held a series of public hearings, and completed a public comment period. Thus, the years-long "study" was in fact complete and there now remains only the federal decision whether to approve the refuge. Since the release of the IPP, the regional director of USFWS has sent the decision documents to the USFWS director with the recommendation that the refuge be established.

14. Pgs. 4E.6-4E.8. **Wright Patman flood pool reallocation.** The IPP only partially utilizes the supply available through flood pool reallocation of Patman when it recommends for DWU only 112,000 AFY of the 180,000 AFY available from this approach. No explanation or discussion occurred at Dallas City Council's meetings or briefings, at Region C WPG meetings, or in the IPP for this partial rather than full utilization of this supply source. (As noted on pg. 4D.12 in the discussion about Wright Patman Lake, at least 180,000 AFY new yield could be made available to Metroplex suppliers just from the flood pool reallocation method of obtaining additional water from Patman.)
    a. Explanation is in order as to why the RCWPG recommends less than two-thirds of the full available volume of a source that is a recommended strategy, especially in light of the fact that the supplier planning to under-utilize this source is also slated to build new Fastrill Reservoir.
    b. As is evident from the data and chart on pgs. 4E.7 – 4E.8, DWU's use of even 112,000 AFY of the 180,000 AFY available yield from the Patman reallocation (along with other recommended strategies short of Fastrill Reservoir) satisfies DWU's projected demand through 2060. Thus, the RCWPG could satisfy its TWDB-required obligations to meet DWU's projected demands without recommending any new reservoir for DWU.
    c. If the RCWPG insists on adopting recommended strategies for supplies in excess of its own projected demands for DWU (which we oppose), we urge RCWPG to adopt as a recommended strategy for DWU the full utilization of the 180,000 AFY available from the Patman flood pool reallocation. Utilizing this additional available 68,000 AFY from a strategy that DWU has already chosen would alleviate the "need" for 61% of the water that the IPP recommends for DWU to obtain by building Fastrill Reservoir. This 68,000 AFY additional available water from the Patman flood pool reallocation would provide a more than adequate excess supply above projected demand without building a new reservoir that would destroy some of the best remaining bottomland hardwood habitat in Texas. If the RCWPG chooses to adopt a Plan that fails to recommend this unutilized 68,000 AFY from the Patman reallocation, it should discuss why it is doing so, why it thinks a new reservoir is more logical and should include that rationale in the Final regional plan.
    d. Since DWU is slated to use only 62% of this particular method of obtaining Patman water and no other supplier lists it as a recommended strategy, this raises the question as to whether the unit cost of existing Patman water from flood pool reallocation is overstated (relative to new reservoirs), since 38% of the available supply from this one method of using the Patman water is not utilized. Some discussion is in order to explain whether capital costs have been spread over a smaller supply than necessary, potentially overstating the unit costs of this existing reservoir relative to a new one like Fastrill.
    e. Pg. 4E.9. Full utilization of the Patman flood pool reallocation yield should at least be adopted as an additional "alternative" strategy for DWU. Since a portion of it is already a recommended strategy, this "full utilization of Patman flood pool reallocation" should be place below "additional water conservation" in the list.
    f. Furthermore, the IPP does not adopt as a recommended strategy either of the other 2 approaches to developing supplies from Patman discussed on pg. 4D.12 (100,000 AFY available to purchase from Texarkana plus 110,000 AFY from system operation with Jim Chapman Lake). Regional cooperation among Region C suppliers is often touted as a goal at Region C meetings and in public statements by Region C suppliers, but in this case two of the three large suppliers have without explanation opted to relegate the Patman supplies

to "alternative" status while the third plans to use one of the three methods of using this source. The bottom line is that the IPP utilizes only 112,000 AFY of the Patman source while leaving an additional 278,000 AFY unused. The RCWPG should discuss and the Plan should divulge the thinking behind this and why "regional cooperation" is not being used as aggressively to utilize existing reservoirs as it seems to be when it comes to pursuing new ones.

15. 4E.35-40. The cost-comparison bar chart is not provided for Upper Trinity as it was other suppliers.

16. **Population projections.** Extensive dialogue has occurred between our volunteers/staff and RCWPG consultants on our finding that the build-out dates and populations for many cities are underrepresented in Region C's figures. This finding was substantially corroborated by Chiang, Patel & Yerby's work developing Dallas Water Utilities' update to its Long Range Water Supply Plan, completed this spring. Region C's consultants acknowledged in a RCWPG meeting that a discrepancy of approximately half a million people exists between Region C's 2060 projection for DWU and its customers and DWU's own 2060 projection. It is unclear whether the relevant population and demand figures have been adjusted for this in the IPP. The projected demand associated with this half a million person overstated population is very significant--very roughly the size of DWU's yield from proposed Fastrill Reservoir. The minimal discussion on pg. 2.30 and suggestion of punting on this issue until the next planning round is an understated way of dismissing this issue.

17. **Summary of Environmental Assessment.** A table by this title (previously labeled "Table 2—Summary of Environmental Assessment") was provided publicly prior to adoption of the IPP. It included columns detailing acres impacted, wetland acres, habitat, cultural resources, and other aspects of Region C consultants' assessment of environmental degradation that will occur from new reservoirs and other strategies, and we discussed it at some length in our April presentation to illustrate our point about the substantial negative impacts from the unneeded new reservoirs that RCWPG proposes. We do not find the current location of this table in the IPP, so please advise. We do not find this table mentioned in the text in Chapters 4C and 4D that discusses the evaluation of strategies. At any rate, we suggest that this table be provided adjacent to Table 4D.2 ("Summary of Costs and Impacts of Major Potentially Feasible Strategies for Region C")—previously labeled "Table 1" since Table 4D.2/formerly Table 1 draws from Table 2 in its summary of environmental impacts.
    a. The figure of 16,358 for "acres inundated" by the proposed Lower Bois d'Arc Reservoir (IPP, pg. 4D.17) differs from the 22,902 shown as "acres impacted" in the former "Table 2—Summary of Environmental Assessment" that we are unable to locate in the IPP. Please advise as to the discrepancy.

Stephanie Griffin

From: Tom Gooch
Sent: Friday, September 09, 2005 4:17 PM
To: Stephanie Griffin; Simone Kiel
Subject: FW:

From: Jim Parks [mailto:jparks@NTMWD.COM]
Sent: Friday, September 09, 2005 3:18 PM
To: Tom Gooch
Subject: FW:

From: Abston, Ty [mailto:tabston@gnty.com]
Sent: Friday, September 09, 2005 3:12 PM
To: Jim Parks
Subject:

Region C Water Board
Attn: Jim Parks

Please enter this email as support for the continued study of the proposed Marvin Nichols Reservoir. I feel this reservoir could be a valuable source of water for our regions and a significant economic benefit for the local communities of East Texas.

Thank you,

Ty Abston
President
Guaranty Bond Bank
Mt. Pleasant, Texas
903-572-9881
www.gnty.com

RESOLUTION NO. 0224052

A RESOLUTION SUPPORTING THE CONTINUED AND ONGOING STUDY OF THE SULPHUR RIVER BASIN BY THE SULPHUR RIVER BASIN AUTHORITY AND THE CONSTRUCTION OF THE MARVIN NICHOLS RESERVOIR.

WHEREAS, The Mount Pleasant Industrial Foundation is an organization made up of Business and Government Leaders with a goal of creating new employment and investment opportunities within Titus County and the preservation of an environment which will meet the needs of business and support long term jobs and employment in industry in Northeast Texas;

WHEREAS, The Mount Pleasant Industrial Foundation is vitally interested in the long term maximization of our economic assets and is cognizant of the economic benefit the Marvin Nichols Reservoir could have for this county as well as all of North Texas; and

WHEREAS, we recognize that the vision and leadership from Northeast Texans in the past has proven beneficial for this area by recognizing our water resources and enhancing those resources in the development of Lake Bob Sandlin and other Lakes which had direct impact on property values, created new tourism dollars and brought industry and jobs to Titus County and throughout Northeast Texas; and

WHEREAS, we believe in a similar vision and positive results which can be realized if the Marvin Nichols Reservoir is constructed and operated by a group from this region and for this region's benefit.

NOW, THEREFORE, BE IT RESOLVED, that the Board of Directors of the Mount Pleasant Industrial Foundation, stands behind the Sulphur River Basin Authority in their partnership with Tarrant Regional Water District, North Texas Municipal Water District, the Upper Trinity Regional Water District, the City of Irving and the U. S. Army Corps of Engineers to make a careful study of the entire Sulphur River Basin and determine all of the potential benefits and concerns associated with the construction of the Marvin Nichols Reservoir and if the study warrants to move forward with the construction of said project.

WE FURTHER RESOLVE to encourage our State and National Leadership to recognize the benefits of the reservoir to all the people of the region and to the State and to consider those interests when evaluating and funding the continued study of the project.

PASSED AND APPROVED this the 24th day of February, 2005.

Kerry Wootten, President
Mount Pleasant Industrial Foundation

77

9 September 2005

Dear Sirs, Members of Region C Water Planning Group,

RE: Initially Prepared Water Plan

I am writing to comment on you're your Initially Prepared Water Plan (IPWP) with particular focus on your ill conceived aim to include four proposed dams/reservoirs as recommended water management strategies, including four additional ones as alternative strategies to meet your projected water needs. Water is our most precious resource, and planning for its utilization demands far better water management strategies than simply building more dams.

There are many reasons why your plan is faulty. In the first place, the proposed reservoirs would yield far more water than your own projected demands, and you generally ignore existing resources that could provide a reserve supply. Furthermore, you have not given adequate consideration of the environmental difficulties, as well as an honest, real appraisal of expenditures (including resistance from East Texas citizens!) you will incur if you pursue the current plan.

Interestingly, you give ample recommendation for conservation and utilization of exiting water resources, as well as water reuse means to meet your future projected needs. If you would couple this with more thoughtful consideration to the effects of building more dams in East Texas, then the IPWP would be more realistic and fair.

It is truly unfair, if not unconscionable, to flood thousands of acres of Priority One hardwood bottomlands, drown considerable, precious historical (cultural) heritage, and preclude establishing a unique national wildlife refuge (for Fastrill reservoir). In addition, your IPWP is most likely unfeasible because of the unwarranted environmental cost and loss of agriculture lands, including not least the enormous negative impact of the sale of lands by unwilling sellers through implementing the increasingly unpopular eminent domain. If you were to be allowed to precede with this plan our children and grand children would not forgive us – there is a better way to harness our limited resources for an expanding population (which, incidentally, would be prudent for us the check, also!!).

Without a doubt, building more dams and creating more reservoirs in East Texas to meet future water needs (even realistic needs!) in the final analysis, I am confident, will not be acceptable to the citizens of East Texas, nor to the water consumers that you serve

To your credit, you have identified other options in the IPWP and I strongly urge you to pursue these for your future water needs.

Sincerely,
Adrian.

Adrian F. Van Dellen, DVM
48 Campers Cove Rd.
Woodville TX 75979

78

Stephanie Griffin

From: Jim Parks [jparks@NTMWD.COM]

Sent: Monday, September 12, 2005 9:44 AM

To: Stephanie Griffin

Subject: FW: NO NEW RESERVOIRS

-----Original Message-----
From: LauJrv@aol.com [mailto:LauJrv@aol.com]
Sent: Friday, September 09, 2005 11:23 AM
To: Jim Parks
Subject: NO NEW RESERVOIRS

Mr. Parks, I am a member of the Dallas Sierra Club and am opposed to any new dams/ reservoirs in east Texas. I am originally from Carthage, Texas (about 35 miles south of Longview). Most of east Texas residents depend on farm land, the timber industry and the natural gas industry for their livelihood. Please do not authorize any more reservoirs in east Texas; we have more than enough water from current reservoirs for the next 55 years.

79

Stephanie Griffin

From: Jim Parks [jparks@NTMWD COM]

Sent: Monday, September 12, 2005 9:47 AM

To: Stephanie Griffin

Subject: FW:

-----Original Message-----
From: Ann Rushing [mailto:abrushing@cebridge.net]
Sent: Friday, September 09, 2005 4:59 PM
To: Jim Parks
Subject:

Mr. Parks:

There are approximately 450 signatures on a petition in support of Marvin Nichols and future studies on hand at this time. The signatures are from individuals that live in Clarksville and Red River County. I could not fax all copies to you due to error messages. Hopefully, enough of the signatures were received to show there is vast support for this major reservoir site on the Sulphur River. Efforts are still underway for this effort. Thank you.

Ann Rushing
hm:(903) 427-4033
fax:(903) 427-0145

(80)

CITY OF BONHAM
FANNIN COUNTY, TEXAS

September 9, 2005

Jim Parks
Chairman, Region C Water Planning Group
P.O. Box 2408
Wylie, TX 75098

RE: Initially Prepared Plan Region C

Dear Mr. Parks:

The City of Bonham has reviewed the *Initially Prepared Region C Water Plan* and concurs with the recommendations that have been outlined for our City.

The City Commission of the City of Bonham passed a Resolution on February 14, 2005 in support of development of the Lower Bois d'Arc Creek Reservoir. Construction of the proposed Lower Bois d' Arc Creek Reservoir is essential to meeting the long-term water supply needs of the City of Bonham. Bonham is currently supplied from Lake Bonham. The limited supply in Lake Bonham does not meet the long-term needs of the City and it customers.

Sincerely,

Blaine R. Hinds

Blaine Hinds
City Manager

301 E. Fifth St. • Bonham, TX 75418
(903) 583-7555 • FAX (903) 583-5761

(81)

CITY OF LEONARD
111 W. Collin Street
P.O. Box 1270
Leonard, TX 75452
(903) 587-3334 fax (903) 587-2580

September 8, 2005

Mr. Jim Parks, Chairman
Members of Region C Planning Group
C/o North Texas Municipal Water District
P.O. Box 2408
Wylie, TX 75098

RE: Support for Water Plan

Dear Chairman Parks:

The City of Leonard wishes to thank the Region C Water Planning Group for its diligence and hard work in preparing the draft water plan. The group has an important task planning for the future needs of the large Region C area. The City of Leonard appreciates the difficult decisions your group faces.

Leonard, located in the southwestern corner of Fannin County, feels that the Region C plan should include both the Lake Ralph Hall project and the lower Bois D'Arc project to ensure that the future water needs of Fannin County and Region C can be met. Thank you again for your efforts on our behalf.

Sincerely,

Bill Yoss

Bill Yoss
Mayor, City of Leonard

82

Sherry G. Lundberg, M.S., LPC
7515 Greenville Avenue, Suite 403
Dallas, Texas 75231
(214) 340-2118

September 8, 2005

Region C. Water Planning Group
C/0 Jim Parks
PO Box 208
Wylie, TX 75098

Dear sir:

I am writing to urge you to have NO NEW RESERVOIRS!!

We Dallasites are learning how to conserve water and we will get better with time. Please, please plan no more reservoirs that will have terrible unintended consequences.

Thanks you for your thoughtful consideration.

Sincerely,

Sherry Lundberg

83

September 9, 2005

Region C Water Planning Group
c/o Jim Parks, Chairman
North Texas Municipal Water District
PO Box 2408
Wylie TX 75098

Dear Mr. Parks:

I urge the Planning Group to reconsider the four proposed and unnecessary new dams: Nichols, Fastrill Lower Bois d'Arc Creek, Hall. It is imperative that we learn to conserve and reuse water, rather than destroying habitat and homesteads. Habitat is rapidly being lost to development. We need to preserve habitat whenever possible, especially what would be lost if these dams and reservoirs are built.

I love canoeing the rivers of Texas. Others love to hunt and fish near them. Let's protect the beauty and resources we enjoy.

Thank you,

Anne Olden

Anne Olden
922 W. 15 ½ St.
Houston TX 77008

(84)

SIERRA CLUB
FOUNDED 1892

Dallas Regional Group

P.O. Box 800365
Dallas, TX 75380

To: Region C Water Planning Group
c/o Jim Parks
NTMWD
PO Box 2408,
Wylie, TX 75098

Sept. 8, 2005

Dear Mr. Parks and Region C Planning Group Members,

Please see the following 336 letters afrom those individuals who have submitted comments regarding the Region C water plan.

Comments made are overwhelming in opposition to the new reservoirs which have been proposed.

We have hand carried these letters out to you to ensure that these comments are entered in the record within the timeframe of this current comment period. This is a follow up to several phone conversations you and I have had on the phone over the last six weeks.

Thank you for your consideration and acceptance of these comments.

Sincerely,

Rita Beving

Rita Beving,
Conservation Co-chair
Dallas Sierra Club

April-May, 2005

To: The Region C Water Planning Group,
c/o Jim Parks, NTMWD, P.O Box 2408, Wylie, TX 75098, jparks@ntmwd.com

Please convey the following comments to each member of the Region C Water Planning Group:

We (I) urge the Planning Group to adopt for the upcoming Region C (North Central Texas) Water Plan water management strategies that utilize conservation, recycled water, and existing developed resources and not to adopt any new reservoirs By doing so, you can provide for the water-supply needs of the people of Region C while avoiding the controversy, waste, condemnation of land, and economic hardship on regions near proposed new water-supply reservoirs As your studies have shown, there is enough water available in existing sources to meet—and far exceed--all of Region C's projected future water needs.

The new and unneeded reservoirs that you are considering (Marvin Nichols, Fastrill, Ralph Hall, Lower Bois d'Arc) would drown well over 100,000 acres of increasingly rare East Texas and Northeast Texas floodplain habitat in the Sulphur, Neches, and Red River basins (more than our designated national forest wilderness areas or our Big Thicket National Preserve), take more than 300,000 acres of productive private lands from mostly unwilling sellers (devastating regional ranching, farming, and timber industries), destroy bottomland hardwood forests crucial for wildlife, drown some of the best remaining bottomland hardwood forests in Texas, and threaten pending establishment of the extremely high-quality Neches River National Wildlife Refuge

Name(s) (print) Nick Magruder Signature(s) NM

Address 3472 Misty Meadow City/State/Zip Dallas, TX 75287

Phone // E-mail address //

cc: Texas Water Development Board members c/o Kevin Ward, P.O Box 13231, Austin, TX 78711, (512) 463-7847, Kevin.Ward@twdb.state tx.us
The Honorable Ken Armbrister, Texas Senate, P.O. Box 12068, Capitol Station, Austin, Texas 78711, Fax--(512) 475-3736, phone--(512) 463-0118, kenneth armbrister@senate.state.tx.us, ja.lazarus sc@senate.state.tx.us (staff)
The Honorable Robert Puente, Texas House of Representatives, P.O. Box 2910, Austin, TX 78768, Fax--(512) 463-1447, phone--(512) 463-0452, robert.puente@house state.tx.us

1/2-Page Form Dated April-May 2005 (Prior to June 1, 2005)

Submitted by Rita Beving on 9/9/05

Supports Removal of New Reservoirs

Count	Name	Count	Name	Count	Name
1	Mary Marcus	47	Brenda L. Marks	93	Walter Freed
2	Ann Drumm	48	Diane McQuarie	94	Frank E. Lane, M.D
3	George Zimmerman	49	Suzanne Wills	95	Dot Haight
4	Calvin Nichols	50	Ruth A. Aaronson	96	James C. Stephens
5	Liz Wheelan	51	Patricia A. Vaughan	97	Elizabeth Harkins
6	William T. Heath	52	Linda R. Camin	98	James Carper*
7	Kelly Loy	53	Liz Wally	99	David Wiggins
8	Jennifer Gearhart-Miller	54	Frances D. McElvaney	100	William Peeples
9	Emily Lamberry	55	Agnes S. Ellsworth	101	Neil Pflum
10	Beth O'Brien	56	Ann H. Adams	102	Rita C. Eason
11	Gina Campbell	57	Janet Eickmeyer	103	B Bornhorst
12	Nathan Butler	58	Lynda Ender	104	Robert S. Delaney
13	Jessica Longshore	59	Elaine Wiant	105	Tara Gregg
14	Randall Davis	60	Judith R. Stuart	106	Scot Krewson
15	Lee Mackey	61	Shirley B Cooper	107	Jay Scott
16	James Orrocks	62	Katherine Homan	108	David Northway
17	David M. Smith	63	Virginia Kerner	109	Crispin Reedy
18	Jan Sanders	64	Dorothy B. Box	110	Ray Gartor
19	Molly Rooke	65	Lou Ann Ligon	111	Nick Magruder
20	Diane Castillo	66	Joanne Hill		
21	Melanie Jacobs	67	Jan Olavarri		
22	Heather Jacobs	68	Alisa Schulte		
23	Ricky Burke	69	Harryette Ehrhardt		
24	Diane Stephenson	70	T Ruth		
25	Mary Senica*	71	Terry Sullivan		
26	David Whestbrooks	72	Paul Heller		
27	Arthur Kuehne	73	Patsy Huston*		
28	Tommy Lopez	74	Diane Klein		
29	Andonia L. Tuttle	75	Nancy Crowe		
30	Chris Fader	76	Calvin Nichols*		
31	Curtis Philbrook	77	Paul Huston		
32	Willard Filyaw	78	Van A. Niemela		
33	Sandra Thornton	79	Greg Holman		
34	John W. Matthews	80	Sue Schaeffer		
35	Barbara Materka	81	John Rath		
36	Carol Donovan	82	Mary Diane McQuarie		
37	Cecilia McKay	83	Penelope Bisbee		
38	Roger Kallenberg	84	Lee Svedeman		
39	Joyce Forney	85	Michael Seay*		
40	Eleanor Sutherland	86	Lars Ohlsson		
41	Betsy M. Beesley	87	Tracye O'Neal		
42	Lucy H. Lockwood	88	Mary Magruder		
43	Barbara Downey	89	Lorraine Mantei		
44	Kathleen Matsumura	90	James Magruder		
45	Nancy G Todes	91	Charles R. Kelly		
46	Michelle Manners	92	Carol Nash		

Note: * second submittal of this letter

Stephanie Griffin

From: amfarris@att.net
Sent: Tuesday, July 19, 2005 3:22 PM
To: Stephanie Griffin
Subject: Comments on Draft Region C Water Plan

TO: Region C Water Planning Group and related personnel
CC: Texas Water Development Board members
The Honorable Ken Armbrister, Chair, Natural Resources Committee, Texas Senate
The Honorable Robert Puente, Chair, Natural Resources Committee, TX House of Reps.

FROM: Amber Farris, 2104 Park Willow Ln Apt B, Arlington TX 76011
DATE: 7/19/2005
RE: Comments on Draft Region C Water Plan

I strongly oppose--and urge you to remove--the four new reservoirs that your Draft Plan proposes as recommended strategies (Marvin Nichols, Fastrill, Lower Bois d'Arc Creek, Ralph Hall), as well as the four additional new reservoirs listed as alternative strategies (George Parkhouse North and South, Columbia, Tehuacana). These unneeded dams would flood hundreds of square miles of East Texas, destroy increasingly rare wildlife habitat, take over five hundred square miles of land from thousands of mostly unwilling Texans, and devastate ranching, farming, and timber industries in large areas of Texas.

None of these staggering negative impacts is necessary, since your Plan shows that twice as much water as would be needed to meet year-2060 demands can be obtained from conservation, reuse, and bringing water from existing underutilized reservoirs. Utilizing less harmful, less controversial existing reservoirs would be a prudent and responsible course of action, whereas relying substantially on proposed new reservoirs is a risky strategy with much higher uncertainty.

I applaud your commitment made at your May meeting to explore scenarios which would fully utilize existing reservoirs before considering any new reservoirs. I urge you to commit to fully utilizing existing available reservoirs to meet demands, rather than needlessly damming our rivers.

The Draft Plan admits that building new reservoirs would negatively impact environmental, agricultural, and rural resources far more than utilizing the available existing water supplies. Yet you do not explain why you have chosen new reservoirs over the numerous yet-unclaimed supplies in existing reservoirs identified in the Draft. If you're going to support a Plan that proposes destructive new reservoir projects, I believe you have the burden of proof to justify your actions.

I urge you to commit to more aggressive water use efficiency measures (conservation). The Draft Plan's assumed water use efficiency measures for Region C cities still lag behind those already being achieved and/or planned for other Texas cities and regional water plans. It's unconscionable to plan to condemn other people's land without first using the reservoirs that Texans have already paid to develop.

First Form Email from Sierra Club Web Site Sent to RCWPG and Others in Spring 2005 (prior to June 1, 2005)

Submitted by Rita Beving on 9/9/05
Supports Removal of New Reservoirs

Count	Name	Count	Name	Count	Name
1	Adrian F Van Dellen*	48	David Gray	95	Jason Hill
2	Albert Sanders	49	David H Gibson	96	Jeannie Gentry*
3	Andrew Fredrickson	50	David Nabors*	97	Jeff Fryer
4	Angela Reno	51	David Todd	98	Jeff Harrell
5	Anne Gove	52	Davina Vora	99	Jeffrey Thomas
6	Anne Tindell	53	Deborah V Greer	100	Jennifer Ellis
7	Annette Aboussie	54	DL Scheef	101	Jennifer Knighton
8	Anthony Edwards	55	Don Callaway	102	Jerrel H Sutton
9	Arthur Kuehne	56	Don Gaines*	103	Jerry Biggs
10	B J.M	57	Donna Martinez	104	Jesse Spears
11	Barbara Spaulding	58	Dorinda Scott	105	Jim Carroll
12	Barry Wolf	59	Doris and Barry Horne	106	Jim Cumley
13	Beth Johnson	60	Ed Soph	107	Jim D. Bush
14	Beth M Harty	61	Ed Travis	108	Jimmy Clark
15	Bill Buckman	62	Edgar Stahl	109	Jodi Godfrey
16	Bo Baggs	63	Edward A. Ipser, Sr	110	John Bartos
17	Bonnie Fyffe Lacy	64	Edward Michaels	111	John L Zaiger
18	Brad Ferguson	65	Eileen McKee	112	John Lemaux
19	Bradley Anderson	66	Elizabeth CortezMathis	113	John Schrader
20	Bradley Landsbaum	67	Elizabeth McCarty	114	Jonna Woodburn
21	Bruce Balfour	68	Elizabeth S Cook	115	Joseph Morales
22	Bruce H McWilliams	69	Elizabeth Walker	116	Joy Lindsey
23	Bruce Handley	70	Emily Crow	117	Judith Aronow
24	Carl Malcolm	71	Emily Townsend	118	Judy Cato
25	Carla Wheeler	72	Evelyn M. Granahan	119	Julie Basham
26	Carrie Pierce	73	G Sumner	120	Julie Roach
27	Cathrine Sherwood	74	Gary Stephens	121	Julie Walker
28	Cathy Ruempolhamer	75	Gary W. Cheatwood	122	Justine Miller
29	Chad B Wemyss	76	Gay Culbertson	123	Katherine Goodbar
30	Charleen Granberry	77	George Marshall	124	Kathleen Elmore
31	Charles Lewis	78	Georgia Prakash	125	Kathy Sokolic
32	Cherry Hudson	79	Glenna Hayes	126	Kay Wilde
33	Cheryl Ehmann	80	Glorian Mulligan	127	Ken Burkett
34	Chris Butler	81	Grant Gurley	128	Kenneth L. Pape
35	Chris Gross	82	Guillermo Esparza	129	Kennith A Startz
36	Chris Meiners	83	Guy Gibbs	130	Kenny Dry
37	Christine Kendrick	84	Hal Gottfried	131	Kent Trulsson
38	Chuck Hobbs	85	Heinz Gaylord	132	Kerry Lemon
39	Chuck Newton	86	Herbert Norman	133	Kevin Araiza
40	Cindy Forbes	87	Hila Ben Avraham	134	Kim Dyer Vavrecka
41	Courtney Jordan	88	Jack Campbell	135	Kirk Beckendorf
42	Crystal Hughes	89	Jack Ferguson	136	Kirsten Siegfried
43	Dana Geldon See	90	James D Flood	137	Kristin Williams
44	Darcus Littrell	91	James E. Smith	138	Kurt Koegler
45	David Dyehouse	92	Jan Sand***	139	Landon Lockett
46	David F. Reichert	93	Janet L. Saltsgiver	140	Larissa Allen
47	David Glowka	94	Janette Scott	141	Laura Ann Lopez

First Form Email (Prior to June 1, 2005)

Count	Name	Count	Name	Count	Name
142	Laura Klueppel*	188	Patricia Allen Bell	234	Shawna Smith
143	Laurie Harris	189	Patricia McKelvey	235	Shelley Palmer
144	Laurie Michelotti	190	Patricia Zilliox	236	Sherry Calder
145	Lawrence Huppert	191	Patti Carothers	237	Shirley Shumake
146	Leo Gaines	192	Paul Brock	238	Stephen Bezanson
147	Leonard Volk	193	Paul Huston	239	Stephen C Whitsett
148	Leslie Redwine	194	Paul Wehrmann	240	Steve Hartung
149	Letitia R. Fort	195	Peggy B. La Point	241	Steven Longley
150	Linda S Green	196	Peggy ClarkHolden	242	Sue Null
151	Lindsey Cullison	197	Peggy Lamb	243	Sue Smith
152	Lori Barr	198	Phillip Hight	244	Sunni E. Baird
153	Lowell Wade*	199	Phyllis Buchanan	245	Susie Mason
154	LTC John H Matthews	200	Priscilla Althaus	246	Tamara Teague
155	Lucy Hopkins	201	R. G. Garner	247	Tammy Boshers
156	Lynn Shumake	202	Ralph Yoas	248	Tara L. Still
157	Lynn W Larremore	203	Ray and Linda Tabb	249	Tatjana and Todd Walker
158	Mandy Wacker	204	Ray Johnston	250	Terry Sullivan
159	Maralyn Hamaker	205	Renee Solinger Audette	251	Terry Wizig
160	Marcia Ingram	206	Richard E. LeTourneau	252	Thomas Jackson
161	Marian Garrett	207	Richard M. Donovan	253	Tim Petrvalsky**
162	Marie Richardson	208	Richard S. Jones	254	Tom Crow
163	Mark Boyden	209	Richard Thienel	255	Tom Rust
164	Mark C. Larson	210	Richard Wehrman	256	Tom Walker
165	Mark Coller	211	Richard Wilder	257	Tom Wilbanks
166	Martha Durke	212	Rita Beving	258	Vicki Baggett
167	Marty Albright	213	Robert A. Soper	259	Vickie Massey
168	Mary Brown	214	Robert Egan	260	Vishal Verma
169	Mary E. Petty	215	Robert Gartner	261	Warren W. Pruess
170	Mary Ellen Whitworth	216	Robert M Larson	262	Wayne Stupka
171	Mary Lou Campbell	217	Robert Ruempolhamer	263	Wesley Massey
172	Mary Lou Strickland	218	Robin Aiken	264	William B. Stallings
173	Mary McGowen	219	Robin Sowton	265	William Burnidge
174	Mary R. Good	220	Rock Morris	266	William Greer
175	Mary Ruth Holder	221	Ronald Brewer	267	William Heath
176	Max Shumake	222	Ruth Heino		
177	Michael Johnson	223	Sam Touchet		
178	Michael R. Van Winkle	224	Sammie L. Van Winkle		
179	Michael Thomas	225	Sandra Cutler		
180	Michele Basham May	226	Sandra K. Minatra		
181	Mike Hill*	227	Sandra Skrei		
182	Mike O'Neill	228	Sara Beckelman		
183	Mona Mehdy	229	Scott Coultas		
184	Monica Broechin	230	Shannon McKinney		
185	Nancy M. Clements	231	Sharon Mielke		
186	Pat Zilliox	232	Sharon S Bailey		
187	Patricia A. Kirk	233	Sharron Nabors		

* Sent same email twice.

** SWG did not receive an electronic copy of this email.

*** Sent same email three times.

Comments Received on the
Initially Prepared 2006 Region C Water Plan

Comments Received by regionc@freese.com

Count	Name	Representing
1	Norma Brock	self
2	Scott Jones	self
3	Ross Canant	Integrated Systems, LP
4	Kenneth Lawson	self
5	Susan Candy	self
6	kirbyword@hillsboro.net	self
7	Max Shumake	self
8	Marcus Wood	Marcus Wood & Company
9	Ann Rushing	City of Clarksville
10	Wendell Davis	GM of Red River Co. WSC
11	Charlotte Connelly	self
12	Kathy Pruitt	self
13	unknown	self
14	Todd K. Maddison	City of Lincoln Park
15	Clay E. Crawford	10, 11A, 11B

①

Stephanie Griffin

From: Norma Brock [nbrock@securedirections.net]

Sent: Tuesday, July 12, 2005 9:42 AM

To: Region C

Subject: North Texas regional water plan

I am a Dallas area resident, but own property in East Texas. I believe that building a new reservoir in the northeast region of Texas would boost the economy of that region as well.
Recreation & sporting can mean jobs and increased land values to an area that is in need of both. Bring your reservoir to East Texas....we will be happy to have it!
Norma Brock
Duncanville, TX

2

Stephanie Griffin

From: SCOTT JONES [sjfrontier@msn.com]

Sent: Tuesday, July 12, 2005 9:54 AM

To: Region C

Subject: Water

Reducing the population by 1 million people in the next 55 years doesn't sound good to some, it sounds great to many!!!!!! Lets focus our attention on that instead planning how all those extra people can have water. As for the billions we stand to lose for our economy, we would just spend it creating more roads and highways for all those people to get around.

Scott Jones
East Texas

(3)

Stephanie Griffin

From: Canant, RL Ross (6656) @ IS [Ross.L.Canant@L-3com.com]
Sent: Tuesday, July 12, 2005 10:30 AM
To: Region C
Subject: Region C water plan

It is past time for the metroplex to scale back plans for unlimited growth. There is a limit to population density. Texas is a land rich state and it makes no sense to plan for every Texan to live in the metroplex at the expense of resources in other parts of the state. East Texas is tired of seeing Ray Hubbard full to the brim in July and August while Lake Tawakoni is 20 feet low. Until Dallas residents are willing to share the burden and take responsibility for water supply and usage within their own home area, East Texans will fight any further attempts to inundate our land and pump our area dry. Why does Dallas need to continue to grow at our expense?

Ross Canant
Sr. Principal Systems Engineer
L-3 Communications Integrated Systems, LP
Surveillance Systems
10001 Jack Finney Blvd.
P.O. Box 6056, CBN 092
Greenville, TX 75403-6056
903-457-6656 voice
903-408-2867 fax
Ross.L.Canant@L-3Com.com

(4)

Stephanie Griffin

From: LAWSON Kenneth M [kenneth.lawson@us.labinal.com]

Sent: Tuesday, July 12, 2005 8:13 AM

To: Region C

Subject: New reservoir

I was unable to attend the public meeting. Thank you for allowing us another means to provide input.

I am a resident of Lewisville. I do not own land or any business interests in anything that may be affected by the decision of whether or not to build a new reservoir. My input is strictly as a concerned citizen.

Building a reservoir is essentially a permanent decision. Even if it was decided at some point after it was built to remove it, it would take generations to restore the area to what it once was. People's homesteads, many passed down through generations, would be lost. Valuable farm and ranch land would be lost. Valuable land for wildlife again would be lost. The state has already lost staggering amounts of comparable land, land that is best left alone just for its natural beauty and value to wildlife. Before we permanently change it, let's make every reasonable attempt to reuse and conserve resources. Let's make full use of existing water sources. Yes, it may be expensive but I believe many, if not most people, will prefer it over building more reservoirs.

I suggest we increase our use of re-using water. There are many uses for water that is not up to water drinking standards.

I suggest we charge homeowners and businesses on a sliding scale. The more you use, the more you pay. If a homeowner decides to use 100 gallons a day, pay the base price. If the homeowner decides to use 500 gallons per day, charge a higher price as the use increases. If the homeowner uses 1000 gallons per day, charge a usage fee on top of the increased price. Such a system will not raise rates for poor families (as they probably do not currently use water at high rates) or for families that conserve. Re-use or conservation projects could be funded with the additional revenue. In addition, financial incentives will naturally encourage conservation in people who do not consider it today. People and businesses will suddenly get extraordinarily inventive if money is at stake.

I also suggest increased enforcement of existing rules (and new rules if necessary). For exercise, I jog on city streets. I usually take different routes on different days just to break the pattern. I consistently see homes and business (especially apartment complexes) watering lawns while it is raining, on the same day it rained, or a day or two after a hard rain or just before an expected rainfall. And many of these places are lucky to get more than 50% of the water in the grass and not on the cement. I see water pouring down the street into the drains because the sprinklers are aiming into the road or sidewalk.

Thank you for your time.

Ken Lawson

(5)

Stephanie Griffin

From: Susan Candy [scandy@sbcglobal.net]
Sent: Tuesday, July 12, 2005 1:25 PM
To: Region C
Subject: North Texas long-range water planning

Sirs:

North Texas does not need more lakes. North Texas, and the entire state, needs a stringent reuse and conservation plan. Compared to western states where such measures are already in place, Texas hasn't even scratched the surface. Before displacing landowners, farmers and ranchers and flooding sensitive and much needed land, the region water planners should push to maximize water conservation in residential, business, public and private concerns throughout North Texas.

Consider rainwater collection systems for new schools, libraries, public and civic buildings currently planned. Retrofit, where possible, existing structures.

Mandate that residential development incorporate gray water reuse, xeriscaping, and, if possible, rainwater collection for housing and community-use spaces in their plans. Preference should be given to developers who will build these systems into their subdivisions.

Restrict future construction of golf courses. Do we really need another golf course in Texas? Legislate that water reuse, rainwater collection, and/or xeriscaping requirements be retrofitted into existing golf courses.

Educate, in the public school systems, and provide tangible examples within schools of water conservation.

Provide worthwhile incentives for business to implement water conservation practices within and around their buildings. (If you want to see prime examples of businesses wasting hundreds of gallons of water regularly, drive around Richardson, TX any day of the week...)

The techniques, tools, equipment, concepts and statistics for water saving by smart reuse and conservation already exist. Why re-invent the wheel when these measures should become welcome changes for the public and private sector? To date, the attitude of most citizens, most especially in Dallas, has been that we'll always have fresh water and it's someone else's problem. This attitude can be changed but penalties for non-compliance should be in place and be strictly enforced.

Cost is always held up as the big hindrance to projects, but delays in implementation cost more in the long run. There are times when you just have to move ahead and know that human nature will always balk at footing the bill for anything.

It would be ridiculous to bypass a true, hard-core effort at water conservation, rainwater collection, and water reuse in Texas. It's time we moved well into the 21st century.

Respectfully submitted,

Mrs. Susan Candy
Dallas, Texas
214-353-9238

Stephanie Griffin

From: kirbyword@hillsboro.net

Sent: Tuesday, July 12, 2005 9:32 PM

To: Region C

Subject: water

raise the level of all lakes by 15 feet,,,,that would double the water supply and not ruin near as many acres. i live by Lake Aquilla and the water level is at its normal level and it just touches the bottom of the dam

 (7)

Stephanie Griffin

From: MAXSHUMAKE@aol.com

Sent: Wednesday, July 13, 2005 10:06 AM

To: Region C

Cc: jimpresley@txk.net

Subject: No Marvin Nichols

This is just one more message to let you know that there will be no Marvin Nichols Lake, so take it out of your plans so our lives can return to normal. We are tired of this constant threat over our heads. Your eco-social terrorism must stop. Thanks Max Shumake

Max Shumake
157 C.R. 4291
De Kalb, Texas 75559
903-244-1747 Mobile Main
903-667-5033 Home

 (8)

Stephanie Griffin

From: Marcus Wood [mwood@advico.com]

Sent: Thursday, July 14, 2005 5:02 PM

To: Region C

Subject: Region C 2006 Water Plan

I have reviewed the various sections and recommendations of the 2006 long-range water plan. I write in support of the projections and plan in all aspects.

I am a 64 year old native of Dallas and learned first hand as a youth the importance of long range water planning – and the need to implement the plans. Many people in the 1940-50s could not grasp the growth that has occurred in this region, but we live good lives today because of the planning and implementation efforts over the decades. I thank the planners, elected officials, and voters of the past.

During my life I have visited New Mexico for both pleasure and business. I saw the concerns expressed in Albuquerque, Santa Fe, and Taos over their water supplies fifteen years ago. Last week I saw the major efforts and costs being expended by individuals there just to provide bare water needs. Santa Fe is considering a 65 percent increase in water rates. Vehicle washing at residences is prohibited; car washing is limited to once a month at commercial establishments.

There are those who object to parts of the Region C Plan, but I feel they are mistaken in their judgment. I simply write in support of the plan in its entirety and urge its prompt approval and implementation.

Regards
Marcus Wood

Marcus Wood & Company
6060 N. Central Expressway, Suite 333
Dallas, Texas 75206
214-739-4025 * 214-739-4026 Fax
Mobile 214-215-2235

(9)

Stephanie Griffin

From: Ann Rushing [abrushing@cebridge.net]

Sent: Friday, September 09, 2005 4:52 PM

To: Region C

Subject: Region C Public Comment-september 9, 2005 comment

September 9, 2005

Mr. James M. Parks
RCWPG Chairman/Administrator
c/o NTMWD
P.O. Box 2408
Wylie, TX 75098-2408

Reference: Public comment on the Initially Prepared Plan

Dear Mr. Parks and Region C Planning Group:

I appreciate the opportunity to give input for consideration in the Region C Planning Group's Long Term Plan.

I recently sent a copy of a resolution approved by the City Council, of the City of Clarksville, in support of the Marvin Nichols Reservoir and future studies. I am faxing a copy with this letter and I ask that you please consider that resolution as public comment and a copy be given to each board member.

As you are aware, the Marvin Nichols would be approximately 62,000 acres of water for industrial, municipal and recreational usage and I have knowledge that the majority of city and county elected officials support the continued studies of a major reservoir site on the Sulphur River.

As you know, to fully address needs we must plan now for the next fifty years. This planning should be done by not only the planning boards but those elected to represent people in their city or county. To think that the next fifty will be anything like the last fifty is like comparing or contrasting transportation with a crawling baby to space age travel. The first has its necessary place but must be outgrown.

We ask that the Marvin Nichols be included in your finalized plan and adequate studies be conducted to factually determine the total impact of this proposed major reservoir.

If the City of Clarksville can be of any assistance please do not hesitate to call. The economic, recreational and water benefits to Red River County, our region and region C goes without saying.

Sincerely,

Mayor Ann Rushing
City of Clarksville

Stephanie Griffin

From: Wendell Davis [daviscw@hotmail.com]
Sent: Friday, September 09, 2005 4:57 PM
To: Region C
Subject: comment on region c water plan

To: Region C Water Planning Group

From: Wendell Davis, General Manager, Red River Co. WSC

We at the RRCWSC understand the importance of planning for the future. Sometimes in the past we may not have done a very good job at water planning. Region C suppliers have planned for the future and I commend them for their forsight to keep developing water sources. The proposed Marvin Nichols I on the Sulphur River Basin is one of the sources that will be in the future of Texans, whether in your region or elsewhere. We have a finite number of sites for reserviors such as this one. Thank you for keeping it alive for use by Texans as needed. We must share resources to enable Texas, and Red River County, to grow and prosper.

Thank You

Wendell Davis

General Manager

Stephanie Griffin

From: Ann Rushing [abrushing@cebridge.net]
Sent: Friday, September 09, 2005 4:52 PM
To: Region C

Public comment from the Red River County WCID Board

Red River County Water Control Improvement District #1-Langford Lake
P.O. Box 513
Clarksville, Texas 75426

September 9, 2005

Mr. James Parks
RCWPG Chairman/Administrator
c/o NTMWD
P.O. Box 2408
Wylie, Texas 75098

Reference: Public comment on the Initially Prepared Plan

Dear Mr. Parks and Region C Planning Group

The Red River County Water Control & Improvement District #1 recently passed and approved a resolution in support of the Marvin Nichols Reservoir, future studies and in recognition of the economic, recreational and water benefits to Clarksville, Red River County and the region on August 31, 2005.

The board is submitting this resolution to Region C as public comment to show our support of the Marvin Nichols and of this major reservoir remaining in the finalized plan.

Sincerely,

Ann Rushing
Secretary- WCID Board

Stephanie Griffin

From: Charlotte Connelly [charlotte.connelly@comcast.net]

Sent: Friday, September 09, 2005 4:59 PM

To: Region C

Subject: Region C water plan comment

To Whom it may Concern,

Please do everything possible to avoid building new dams and resevoirs when finalizing the water plan for region C.

Thank you for your efforts.

Sincerely,
Charlotte Connelly
2736 Gladiolus Lane
Dallas, TX 75233
214-337-5672

Stephanie Griffin

From: KATHY PRUITT [rnkpruittvilleusa@yahoo.com]
Sent: Friday, September 09, 2005 5:14 PM
To: Region C
Subject: Planning water for 13 million

Dear Sir,
I just read the article "Planning water for 13 million" in our local paper, the Jacksboro Gazette-News this afternoon.

We in this area are quite concerned about the affects that a proposed Regional Landfill and (3)Electric Power plants will have on our water and air Two of the power plants are now in operation and one is to be built in the near future.. The people who live in this area which is in the southwest part of Jack County, Texas depend solely on personal water wells and ponds to supply water for people and livestock alike. This landfill is to be put in on a high hill. There are two rivers, one on each side of the landfill, which flow directly into Lake Bridgeport which is also a water source of Fort Worth, Texas. We in this area have no water treatment plant or piped in water. This water contamination will cause a real problem for the future of this area.

At this time our concern is the eventual contamination of water which will make it impossible for any of us to continue living in our homes or on our farms that we have worked so hard on. We are affraid that this will force us all to relocate one day. We have all built our dreams here and would hate to have this all ruined for ourselves and our descendents.

We will be following your findings closely and would also like your input on our situation.

Sincerely,
K.Pruitt

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(13)

Stephanie Griffin

Sent: Friday, September 09, 2005 5:44 PM
To: Region C
Subject: Planning water for 13 million: Comments

Thank you for your article, James M Parks, special to Gazette.

Future landfills, like the proposed Jack County Municipal Landfill, will use water wells as a control device to monitor pollutants:
Landfills should not be placed in areas where creeks feed into a main water shed or where human and live stock are dependent on ground or surface water.
If landfills were required to recycle or if such a program were in place, then water would be used in a conservative way, water would not be subjected to contamination and preparation would be ready for worse than expected droughts.

Stephanie Griffin

From: Todd Madison [texaswatercompany@charter.net]

Sent: Friday, September 09, 2005 4:40 PM

To: Region C

Subject: Region C Water Plan

Attachments: Region C Support Letter.pub; Word version of Region C Support Letter.doc

Please find attached my letter of support for the Region C Water Plan. It is in 'Publisher' format. I am also sending it to you in 'Word' without my letterhead. Thanks for all of your hard work! Todd K. Madison

(14)

Texas Water Company

1807 N. Elm, #109 ~ Denton, Texas 76201
Phone (940) 453-8252
Fax (940) 591-0730
texaswatercompany@charter.net

September 9, 2005

Mr. Jim Parks, Chairman
And Members of the Region C Planning Group
c/o North Texas Municipal Water District
P.O. Box 2408
Wylie, TX 75098
regionc@freese.com

RE: Support for 2006 Region C Water Plan

Dear Mr. Parks,

I first want to thank you and all the members of the Group for your dedicated service and the many hours of labor that have gone into the 2006 Initially Prepared 2006 Region C Water Plan. You have taken on an important task, the planning of strategies that will provide the people of North Texas water in the future. Please do not be dissuaded from your visionary and bold actions to develop this Plan.

I strongly urge you to adopt this Plan, as it is written, and submit it as your recommendations to the Texas Water Development Board.

Sincerely,
Todd K. Madison
The Town of Lincoln Park
UTRWD Board Representative

Stephanie Griffin

From:	Marlo Gordon [mgordon@crawlaw.net]
Sent:	Friday, September 09, 2005 4:31 PM
To:	Region C
Cc:	jpierce@utrwd.com
Subject:	Letter and Resolutions Concerning Long-Range Water Supply Planning
Importance:	High
Attachments:	scan8.pdf

15

Law Offices of
Clay E. Crawford, P.C.

19 Briar Hollow Lane, Suite 245
Houston, Texas 77027
Phone (713) 621.3707 Fax (713) 621.3909

3100 McKinnon Street, Suite 950
Dallas, Texas 75201
Phone (214) 981.9090 Fax (214) 981.9071

September 9, 2005

Mr. Jim Parks, Chair RCWPG
North Texas Municipal Water District
P.O. Box 2408
Wylie, Texas 75098

Re: Initially Prepared 2006 Water Management Plan

Dear Mr. Parks:

This law firm serves as general counsel for the following districts: Denton County Fresh Water Supply District No. 8A, Denton County Fresh Water Supply District No. 8B, Denton County Fresh Water Supply District No. 9, Denton County Fresh Water Supply District No. 10, Denton County Fresh Water Supply District No. 11A, and Denton County Fresh Water Supply District No. 11B (collectively, "Districts"). On behalf of the Districts, we have been requested to thank you and the Region C Water Planning Group for your work in preparing the draft Water Plan.

Each of the Districts is a customer of Upper Trinity Regional Water District. They receive all of their water supply from Upper Trinity and depend on it to make sure their residents have enough water now and in the future. As such, Upper Trinity has included their future needs in its long-range water supply plan.

The Districts urge you to adopt the Plan's water management strategies and the alternatives as written, including the strategies for their area and for the Upper Trinity Regional Water District. These strategies will go a long way toward assuring that the families and friends within the Districts never face a water shortage.

For your reference, I am enclosing a copy of the adopted Resolutions passed in support of Upper Trinity's long-range water supply planning efforts.

Thank you again. If you have any questions or need additional information, please feel free to contact me at (713) 621-3707.

Very truly yours,

Clay E. Crawford

CEC\ksd
Enclosures

cc: Mr. Jason Pierce,
Manager of Public Information
Upper Trinity Regional Water District

RESOLUTION

A RESOLUTION OF THE BOARD OF DIRECTORS, FRESH WATER SUPPLY DISTRICT #8A CONCERNING LONG-RANGE WATER SUPPLY PLANNING FOR THE SERVICE AREA OF UPPER TRINITY REGIONAL WATER DISTRICT.

WHEREAS, according to the provisions of Senate Bill One (passed by 75th Texas Legislature) Upper Trinity Regional Water District (Upper Trinity) is required to prepare plans to assure an adequate supply of water for its customers for at least 50 years into the future; and

WHEREAS, Upper Trinity has been diligent and prudent in securing an adequate water supply for present needs and for many years into the future; and

WHEREAS, Upper Trinity is implementing measures to promote water conservation and reuse, and is taking steps, including the evaluation of alternative strategies to meet the needs of growth that is expected within its service area, including due consideration for technical, financial and environmental factors; and

WHEREAS, Upper Trinity is currently purchasing raw water from the City of Dallas, and plans to increase such purchases in the future pursuant to a long-term water supply contract; and

WHEREAS, Upper Trinity is working with other entities within Region C to evaluate other water sources that may be beyond the capability of Upper Trinity alone to develop or acquire; and

WHEREAS, over 20 cities and utilities within Region C rely on Upper Trinity's efforts to acquire adequate supplies of water for the future - - and, in doing so, to consider cost, timeliness, reliability, risk, safety and availability; and

WHEREAS, Upper Trinity has filed applications with the Texas Commission on Environmental Quality to secure rights for reuse of water being imported from Chapman Lake and to secure rights to divert additional water from the Sulphur River Basin (Lake Ralph Hall); and

WHEREAS, Upper Trinity has planned ahead and has contracted for capacity in an existing pipeline system to Chapman Lake (owned and operated by City of Irving),

which pipeline has excess capacity that must be considered when comparing alternatives; and

WHEREAS, proposed Lake Ralph Hall is near the existing pipeline and is one of several alternative strategies being considered by Upper Trinity, an alternative that, when all relevant factors are considered, is sound from an environmental perspective and will help serve the long-term needs of this region.

NOW, THEREFORE, be it resolved by the Board of Directors, Fresh Water Supply District #8A:

SECTION 1. That it is in the best interest of this region for Upper Trinity to diligently pursue and to be successful in acquiring adequate water supplies for the next 50 years, taking great care to spread risks between different strategies and sources.

SECTION 2. That the Board of Directors hereby expresses its support for Upper Trinity's emphasis on water conservation and reuse of existing water supplies, and for Upper Trinity's plans to develop proposed Lake Ralph Hall in Fannin County, enabling the use of existing pipeline capacity to transport the water to the Trinity River Basin.

SECTION 3. That the Board of Directors hereby urges the Region C Water Planning Group to include Lake Ralph Hall as a proposed strategy in the updated water plan now being prepared for this region; and

SECTION 4. That the Board of Directors realizes that typical water supply projects take 25 to 40 years for completion, requiring vision and courage, and involving risks and controversy; and, accordingly the governing body of Upper Trinity Regional Water District is to be commended for its diligent efforts on behalf of its many members and customers.

SECTION 5. That this Resolution shall become effective immediately upon its passage.

DULY PASSED AND APPROVED THIS 10th DAY OF March 2005.

Executed: ______________________
(Name and Title) Jonathan Kleppe, President Board of Directors

Attest: ______________________
(Name and Title) Jason Shipley, Assistant Secy/Treasurer Board of Directors

RESOLUTION

A RESOLUTION OF THE BOARD OF DIRECTORS, FRESH WATER SUPPLY DISTRICT #6B CONCERNING LONG-RANGE WATER SUPPLY PLANNING FOR THE SERVICE AREA OF UPPER TRINITY REGIONAL WATER DISTRICT.

WHEREAS, according to the provisions of Senate Bill One (passed by 75th Texas Legislature) Upper Trinity Regional Water District (Upper Trinity) is required to prepare plans to assure an adequate supply of water for its customers for at least 50 years into the future; and

WHEREAS, Upper Trinity has been diligent and prudent in securing an adequate water supply for present needs and for many years into the future; and

WHEREAS, Upper Trinity is implementing measures to promote water conservation and reuse, and is taking steps, including the evaluation of alternative strategies to meet the needs of growth that is expected within its service area, including due consideration for technical, financial and environmental factors; and

WHEREAS, Upper Trinity is currently purchasing raw water from the City of Dallas, and plans to increase such purchases in the future pursuant to a long-term water supply contract; and

WHEREAS, Upper Trinity is working with other entities within Region C to evaluate other water sources that may be beyond the capability of Upper Trinity alone to develop or acquire; and

WHEREAS, over 20 cities and utilities within Region C rely on Upper Trinity's efforts to acquire adequate supplies of water for the future - - and, in doing so, to consider cost, timeliness, reliability, risk, safety and availability; and

WHEREAS, Upper Trinity has filed applications with the Texas Commission on Environmental Quality to secure rights for reuse of water being imported from Chapman Lake and to secure rights to divert additional water from the Sulphur River Basin (Lake Ralph Hall); and

WHEREAS, Upper Trinity has planned ahead and has contracted for capacity in an existing pipeline system to Chapman Lake (owned and operated by City of Irving),

which pipeline has excess capacity that must be considered when comparing alternatives; and

WHEREAS, proposed Lake Ralph Hall is near the existing pipeline and is one of several alternative strategies being considered by Upper Trinity, an alternative that, when all relevant factors are considered, is sound from an environmental perspective and will help serve the long-term needs of this region.

NOW, THEREFORE, be it resolved by the Board of Directors, Fresh Water Supply District #8B:

SECTION 1. That it is in the best interest of this region for Upper Trinity to diligently pursue and to be successful in acquiring adequate water supplies for the next 50 years, taking great care to spread risks between different strategies and sources.

SECTION 2. That the Board of Directors hereby expresses its support for Upper Trinity's emphasis on water conservation and reuse of existing water supplies, and for Upper Trinity's plans to develop proposed Lake Ralph Hall in Fannin County, enabling the use of existing pipeline capacity to transport the water to the Trinity River Basin.

SECTION 3. That the Board of Directors hereby urges the Region C Water Planning Group to include Lake Ralph Hall as a proposed strategy in the updated water plan now being prepared for this region; and

SECTION 4. That the Board of Directors realizes that typical water supply projects take 25 to 40 years for completion, requiring vision and courage, and involving risks and controversy; and, accordingly the governing body of Upper Trinity Regional Water District is to be commended for its diligent efforts on behalf of its many members and customers.

SECTION 5. That this Resolution shall become effective immediately upon its passage.

DULY PASSED AND APPROVED THIS 10th **DAY OF** March **2005.**

Executed: ______________________
(Name and Title) Wesley Koemer, Secretary, Board of Directors

Attest: ______________________
(Name and Title) Doug Delsanter, Asst. Secretary, Board of Directors

CERTIFICATE FOR RESOLUTION CONCERNING LONG-RANGE WATER SUPPLY PLANNING FOR THE SERVICE AREA OF UPPER TRINITY REGIONAL WATER DISTRICT

THE STATE OF TEXAS §
COUNTY OF DENTON §
DENTON COUNTY FRESH WATER SUPPLY DISTRICT NO. 9 §

We the undersigned officers of the Board of Directors (the "Board") of **DENTON COUNTY FRESH WATER SUPPLY DISTRICT NO. 9** (the "District") hereby certify as follows:

The Board convened in regular session, open to the public, on Thursday, April 21, 2005, at 6:00 p.m., at the Prairie House Restaurant, 10001 Highway 380E, Aubrey, Texas, and the roll was called of the members of the Board, to-wit:

Debbie Reuther	President
Greg H. Overstreet	Vice President
Janet Kurth	Secretary/Treasurer
Serin M. Yates	Assistant Secretary/Assistant Treasurer
Chris Lowder	Asst. Vice President

All members of the Board were present, thus constituting a quorum. Whereupon other business, the following was transacted at such Meeting: A written

RESOLUTION CONCERNING LONG-RANGE WATER SUPPLY PLANNING FOR THE SERVICE AREA OF UPPER TRINITY REGIONAL WATER DISTRICT

was duly introduced for the consideration of the Board. It was then duly moved and seconded that such Resolution be adopted; and after full discussion, such motion, carrying with it the adoption of such Resolution prevailed, carried, and became effective by the following vote:

AYES: 5 **NOES:** 0

A true, full and correct copy of the aforesaid Resolution adopted at the Meeting described in the above and foregoing paragraph is attached to and follows this Certificate; such Resolution has been duly recorded in the Board's minutes of such Meeting; the above and foregoing paragraph is a true, full, and correct excerpt from the Board's minutes of such Meeting pertaining to the adoption of such Resolution; the persons named in the above and foregoing paragraph are the duly chosen, qualified, and acting officers and members of the Board as indicated therein; each of the officers and members of the Board are duly and sufficiently notified officially and personally, in advance, of the time, place, and purpose of such Meeting, and that such Resolution would be introduced and considered for adoption at such meeting, and each of the officers and members consented, in advance, to the holding of such meeting for such purpose; and such Meeting was open to the public and public notice of the time, place, and purpose of such Meeting was given, all as required by Chapter 551 of the Texas Government Code and Section 49.063 of the Texas Water Code, as amended.

SIGNED this _21st_ day of _April_, 2005.

____
Secretary, Board of Directors

____
President, Board of Directors

(DISTRICT SEAL)

RESOLUTION CONCERNING LONG-RANGE WATER SUPPLY PLANNING FOR THE SERVICE AREA OF UPPER TRINITY REGIONAL WATER DISTRICT

STATE OF TEXAS §
§
COUNTY OF DENTON §

WHEREAS, DENTON COUNTY FRESH WATER SUPPLY DISTRICT NO. 9 of Denton County, Texas (the "District") is a body politic and corporate and a governmental agency of the State of Texas, operating under and governed by the provisions of Chapters 49, 51 and 53 of the Texas Water Code, as amended, and Section 59 of Article XVI of the Texas Constitution; and

WHEREAS, according to the provisions of Senate Bill One (passed by 75th Texas Legislature) Upper Trinity Regional Water District ("Upper Trinity") is required to prepare plans to assure an adequate supply of water for its customers for at least 50 years into the future; and

WHEREAS, Upper Trinity has been diligent and prudent in securing an adequate water supply for present needs and for many years into the future; and

WHEREAS, Upper Trinity is implementing measures to promote water conservation and reuse, and is taking steps, including the evaluation of alternative strategies to meet the needs of growth that is expected within its service area, including due consideration for technical, financial and environmental factors; and

WHEREAS, Upper Trinity is currently purchasing raw water from the City of Dallas, and plans to increase such purchases in the future pursuant to a long-term water supply contract; and

WHEREAS, Upper Trinity is working with other entities within Region C to evaluate other water sources that may be beyond the capability of Upper Trinity alone to develop or acquire; and

WHEREAS, over 20 cities and utilities within Region C rely on Upper Trinity's efforts to acquire adequate supplies of water for the future - - and, in doing so, to consider cost, timeliness, reliability, risk, safety and availability; and

WHEREAS, Upper Trinity has filed applications with the Texas Commission on Environmental Quality to secure rights for reuse of water being imported from Chapman Lake and to secure rights to divert additional water from the Sulphur River Basin (Lake Ralph Hall); and

WHEREAS, Upper Trinity has planned ahead and has contracted for capacity in an existing pipeline system to Chapman Lake (owned and operated by City of Irving), which pipeline has excess capacity that must be considered when comparing alternatives; and

WHEREAS, proposed Lake Ralph Hall is near the existing pipeline and is one of several alternative strategies being considered by Upper Trinity, an alternative that, when all relevant factors are considered, is sound from an environmental perspective and will help serve the long-term needs of this region.

NOW THEREFORE, be is resolved by the Board of Directors of Denton County Fresh Water Supply District No. 9:

SECTION 1. That it is in the best interest of this region for Upper Trinity to diligently pursue and to be successful in acquiring adequate water supplies for the next 50 years, taking great care to spread risks between different strategies and sources.

SECTION 2. That the Board of Directors hereby expresses its support for Upper Trinity's emphasis on water conservation and reuse of existing water supplies, and for Upper Trinity's plans to develop proposed Lake Ralph Hall in Fannin County, enabling the use of existing pipeline capacity to transport the water to the Trinity River Basin.

SECTION 3. That the Board of Directors hereby urges the Region C Water Planning Group to include Lake Ralph Hall as a proposed strategy in the updated water plan now being prepared for this region.

SECTION 4. That the Board of Directors realizes that typical water supply projects take 25 to 40 years for completion, requiring vision and courage, and involving risks and controversy; and, accordingly the governing body of Upper Trinity Regional Water District is to be commended for its diligent efforts on behalf of its many members and customers.

SECTION 5. That this Resolution shall become effective immediately upon its passage.

PASSED AND APPROVED this the 21st day of April, 2005.

DENTON COUNTY FRESH WATER SUPPLY
DISTRICT NO. 9

ATTEST:

By:/s/ Debbie Reuther
President, Board of Directors

/s/ Janet Kurth
Secretary, Board of Directors
(SEAL)

CERTIFICATE FOR RESOLUTION CONCERNING LONG-RANGE WATER SUPPLY PLANNING FOR THE SERVICE AREA OF UPPER TRINITY REGIONAL WATER DISTRICT

THE STATE OF TEXAS §
COUNTY OF DENTON §
DENTON COUNTY FRESH WATER SUPPLY DISTRICT NO. 10 §

We the undersigned officers of the Board of Directors (the "Board") of **DENTON COUNTY FRESH WATER SUPPLY DISTRICT NO. 10** (the "District") hereby certify as follows:

The Board convened in regular session, open to the public, on Thursday, April 21, 2005, at 5:00 p.m., at the Prairie House Restaurant, 10001 Highway 380E, Aubrey, Texas, and the roll was called of the members of the Board, to-wit:

Nancy Heintel	President
Barry Kurth	Vice President
Tammy Fritz	Secretary/Treasurer
Stephanie Blaisure	Asst. Secretary/Treasurer
William E. Dalton, Jr.	Director

All members of the Board were present, with the exception of Director Dalton, thus constituting a quorum. Whereupon other business, the following was transacted at such Meeting: A written

RESOLUTION CONCERNING LONG-RANGE WATER SUPPLY PLANNING FOR THE SERVICE AREA OF UPPER TRINITY REGIONAL WATER DISTRICT

was duly introduced for the consideration of the Board. It was then duly moved and seconded that such Resolution be adopted; and after full discussion, such motion, carrying with it the adoption of such Resolution prevailed, carried, and became effective by the following vote:

AYES: 4 **NOES:** 0

A true, full and correct copy of the aforesaid Resolution adopted at the Meeting described in the above and foregoing paragraph is attached to and follows this Certificate; such Resolution has been duly recorded in the Board's minutes of such Meeting; the above and foregoing paragraph is a true, full, and correct excerpt from the Board's minutes of such Meeting pertaining to the adoption of such Resolution; the persons named in the above and foregoing paragraph are the duly chosen, qualified, and acting officers and members of the Board as indicated therein; each of the officers and members of the Board are duly and sufficiently notified officially and personally, in advance, of the time, place, and purpose of such Meeting, and that such Resolution would be introduced and considered for adoption at such meeting, and each of the officers and members consented, in advance, to the holding of such meeting for such purpose; and such Meeting was open to the public and public notice of the time, place, and purpose of such Meeting was given, all as required by Chapter 551 of the Texas Government Code and Section 49.063 of the Texas Water Code, as amended.

SIGNED this 21st day of April, 2005.

Secretary, Board of Directors

President, Board of Directors

(DISTRICT SEAL)

RESOLUTION CONCERNING LONG-RANGE WATER SUPPLY PLANNING FOR THE SERVICE AREA OF UPPER TRINITY REGIONAL WATER DISTRICT

STATE OF TEXAS	§	
	§	
COUNTY OF DENTON	§	

WHEREAS, DENTON COUNTY FRESH WATER SUPPLY DISTRICT NO. 10 of Denton County, Texas (the "District") is a body politic and corporate and a governmental agency of the State of Texas, operating under and governed by the provisions of Chapters 49, 51 and 53 of the Texas Water Code, as amended, and Section 59 of Article XVI of the Texas Constitution; and

WHEREAS, according to the provisions of Senate Bill One (passed by 75th Texas Legislature) Upper Trinity Regional Water District ("Upper Trinity") is required to prepare plans to assure an adequate supply of water for its customers for at least 50 years into the future; and

WHEREAS, Upper Trinity has been diligent and prudent in securing an adequate water supply for present needs and for many years into the future; and

WHEREAS, Upper Trinity is implementing measures to promote water conservation and reuse, and is taking steps, including the evaluation of alternative strategies to meet the needs of growth that is expected within its service area, including due consideration for technical, financial and environmental factors; and

WHEREAS, Upper Trinity is currently purchasing raw water from the City of Dallas, and plans to increase such purchases in the future pursuant to a long-term water supply contract; and

WHEREAS, Upper Trinity is working with other entities within Region C to evaluate other water sources that may be beyond the capability of Upper Trinity alone to develop or acquire; and

WHEREAS, over 20 cities and utilities within Region C rely on Upper Trinity's efforts to acquire adequate supplies of water for the future - - and, in doing so, to consider cost, timeliness, reliability, risk, safety and availability; and

WHEREAS, Upper Trinity has filed applications with the Texas Commission on Environmental Quality to secure rights for reuse of water being imported from Chapman Lake and to secure rights to divert additional water from the Sulphur River Basin (Lake Ralph Hall); and

WHEREAS, Upper Trinity has planned ahead and has contracted for capacity in an existing pipeline system to Chapman Lake (owned and operated by City of Irving), which pipeline has excess capacity that must be considered when comparing alternatives; and

WHEREAS, proposed Lake Ralph Hall is near the existing pipeline and is one of several alternative strategies being considered by Upper Trinity, an alternative that, when all relevant factors are considered, is sound from an environmental perspective and will help serve the long-term needs of this region.

NOW THEREFORE, be is resolved by the Board of Directors of Denton County Fresh Water Supply District No. 10:

SECTION 1. That it is in the best interest of this region for Upper Trinity to diligently pursue and to be successful in acquiring adequate water supplies for the next 50 years, taking great care to spread risks between different strategies and sources.

SECTION 2. That the Board of Directors hereby expresses its support for Upper Trinity's emphasis on water conservation and reuse of existing water supplies, and for Upper Trinity's plans to develop proposed Lake Ralph Hall in Fannin County, enabling the use of existing pipeline capacity to transport the water to the Trinity River Basin.

SECTION 3. That the Board of Directors hereby urges the Region C Water Planning Group to include Lake Ralph Hall as a proposed strategy in the updated water plan now being prepared for this region.

SECTION 4. That the Board of Directors realizes that typical water supply projects take 25 to 40 years for completion, requiring vision and courage, and involving risks and controversy; and, accordingly the governing body of Upper Trinity Regional Water District is to be commended for its diligent efforts on behalf of its many members and customers.

SECTION 5. That this Resolution shall become effective immediately upon its passage.

PASSED AND APPROVED this the 21st day of April, 2005.

DENTON COUNTY FRESH WATER SUPPLY
DISTRICT NO. 10

ATTEST:

By:/s/ Nancy Heintel
President, Board of Directors

/s/ Tammy Fritz
Secretary, Board of Directors
(SEAL)

RESOLUTION

RESOLUTION 2005 - ___

A RESOLUTION OF THE BOARD OF DIRECTORS, FRESH WATER SUPPLY DISTRICT #11A CONCERNING LONG-RANGE WATER SUPPLY PLANNING FOR THE SERVICE AREA OF UPPER TRINITY REGIONAL WATER DISTRICT.

WHEREAS, according to the provisions of Senate Bill One (passed by 75th Texas Legislature) Upper Trinity Regional Water District (Upper Trinity) is required to prepare plans to assure an adequate supply of water for its customers for at least 50 years into the future; and

WHEREAS, Upper Trinity has been diligent and prudent in securing an adequate water supply for present needs and for many years into the future; and

WHEREAS, Upper Trinity is implementing measures to promote water conservation and reuse, and is taking steps, including the evaluation of alternative strategies to meet the needs of growth that is expected within its service area, including due consideration for technical, financial and environmental factors; and

WHEREAS, Upper Trinity is currently purchasing raw water from the City of Dallas, and plans to increase such purchases in the future pursuant to a long-term water supply contract; and

WHEREAS, Upper Trinity is working with other entities within Region C to evaluate other water sources that may be beyond the capability of Upper Trinity alone to develop or acquire; and

WHEREAS, over 20 cities and utilities within Region C rely on Upper Trinity's efforts to acquire adequate supplies of water for the future - - and, in doing so, to consider cost, timeliness, reliability, risk, safety and availability; and

WHEREAS, Upper Trinity has filed applications with the Texas Commission on Environmental Quality to secure rights for reuse of water being imported from Chapman Lake and to secure rights to divert additional water from the Sulphur River Basin (Lake Ralph Hall); and

WHEREAS, Upper Trinity has planned ahead and has contracted for capacity in an existing pipeline system to Chapman Lake (owned and operated by City of Irving),

which pipeline has excess capacity that must be considered when comparing alternatives; and

WHEREAS, proposed Lake Ralph Hall is near the existing pipeline and is one of several alternative strategies being considered by Upper Trinity, an alternative that, when all relevant factors are considered, is sound from an environmental perspective and will help serve the long-term needs of this region.

NOW, THEREFORE, be it resolved by the Board of Directors, Fresh Water Supply District #11:

SECTION 1. That it is in the best interest of this region for Upper Trinity to diligently pursue and to be successful in acquiring adequate water supplies for the next 50 years, taking great care to spread risks between different strategies and sources.

SECTION 2. That the Board of Directors hereby expresses its support for Upper Trinity's emphasis on water conservation and reuse of existing water supplies, and for Upper Trinity's plans to develop proposed Lake Ralph Hall in Fannin County, enabling the use of existing pipeline capacity to transport the water to the Trinity River Basin.

SECTION 3. That the Board of Directors hereby urges the Region C Water Planning Group to include Lake Ralph Hall as a proposed strategy in the updated water plan now being prepared for this region; and

SECTION 4. That the Board of Directors realizes that typical water supply projects take 25 to 40 years for completion, requiring vision and courage, and involving risks and controversy; and, accordingly the governing body of Upper Trinity Regional Water District is to be commended for its diligent efforts on behalf of its many members and customers.

SECTION 5. That this Resolution shall become effective immediately upon its passage.

DULY PASSED AND APPROVED THIS 17th **DAY OF** March **2005.**

Executed: ______________________
(Name and Title) Robbie L. Patman, President

Attest: ______________________
(Name and Title) Leslie K. Wallendorf, Secretary

EXHIBIT
"B"

RESOLUTION

RESOLUTION 2005 - ___

A RESOLUTION OF THE BOARD OF DIRECTORS, FRESH WATER SUPPLY DISTRICT #11B CONCERNING LONG-RANGE WATER SUPPLY PLANNING FOR THE SERVICE AREA OF UPPER TRINITY REGIONAL WATER DISTRICT.

WHEREAS, according to the provisions of Senate Bill One (passed by 75th Texas Legislature) Upper Trinity Regional Water District (Upper Trinity) is required to prepare plans to assure an adequate supply of water for its customers for at least 50 years into the future; and

WHEREAS, Upper Trinity has been diligent and prudent in securing an adequate water supply for present needs and for many years into the future; and

WHEREAS, Upper Trinity is implementing measures to promote water conservation and reuse, and is taking steps, including the evaluation of alternative strategies to meet the needs of growth that is expected within its service area, including due consideration for technical, financial and environmental factors; and

WHEREAS, Upper Trinity is currently purchasing raw water from the City of Dallas, and plans to increase such purchases in the future pursuant to a long-term water supply contract; and

WHEREAS, Upper Trinity is working with other entities within Region C to evaluate other water sources that may be beyond the capability of Upper Trinity alone to develop or acquire; and

WHEREAS, over 20 cities and utilities within Region C rely on Upper Trinity's efforts to acquire adequate supplies of water for the future - - and, in doing so, to consider cost, timeliness, reliability, risk, safety and availability; and

WHEREAS, Upper Trinity has filed applications with the Texas Commission on Environmental Quality to secure rights for reuse of water being imported from Chapman Lake and to secure rights to divert additional water from the Sulphur River Basin (Lake Ralph Hall); and

WHEREAS, Upper Trinity has planned ahead and has contracted for capacity in an existing pipeline system to Chapman Lake (owned and operated by City of Irving).

which pipeline has excess capacity that must be considered when comparing alternatives; and

WHEREAS, proposed Lake Ralph Hall is near the existing pipeline and is one of several alternative strategies being considered by Upper Trinity, an alternative that, when all relevant factors are considered, is sound from an environmental perspective and will help serve the long-term needs of this region.

NOW, THEREFORE, be it resolved by the Board of Directors, Fresh Water Supply District #11:

SECTION 1. That it is in the best interest of this region for Upper Trinity to diligently pursue and to be successful in acquiring adequate water supplies for the next 50 years, taking great care to spread risks between different strategies and sources.

SECTION 2. That the Board of Directors hereby expresses its support for Upper Trinity's emphasis on water conservation and reuse of existing water supplies, and for Upper Trinity's plans to develop proposed Lake Ralph Hall in Fannin County, enabling the use of existing pipeline capacity to transport the water to the Trinity River Basin.

SECTION 3. That the Board of Directors hereby urges the Region C Water Planning Group to include Lake Ralph Hall as a proposed strategy in the updated water plan now being prepared for this region; and

SECTION 4. That the Board of Directors realizes that typical water supply projects take 25 to 40 years for completion, requiring vision and courage, and involving risks and controversy; and, accordingly the governing body of Upper Trinity Regional Water District is to be commended for its diligent efforts on behalf of its many members and customers.

SECTION 5. That this Resolution shall become effective immediately upon its passage.

DULY PASSED AND APPROVED THIS 17th **DAY OF** March **2005.**

Executed: Jennifer Kleppe
Jennifer Kleppe, Vice President

Attest: Elisabeth A Nye
Elisabeth Nye, Secretary

Stephanie Griffin

From: ltphd@sbcglobal.net
Sent: Wednesday, June 01, 2005 5:13 PM
To: Stephanie Griffin
Subject: My opposition to new reservoirs in your proposed water management strategies

TO: Region C Water Planning Group and related personnel
CC: Texas Water Development Board members
The Honorable Ken Armbrister, Chair, Natural Resources Committee, Texas Senate
The Honorable Robert Puente, Chair, Natural Resources Committee, TX House of Reps.

FROM: Martin R. Gluck, 3851 South Versailles Ave.
, Dallas TX 75209
DATE: 6/1/2005
RE: My opposition to new reservoirs in your proposed water management strategies

I strongly oppose the needless new reservoirs across hundreds of miles of East and Northeast Texas that Region C Water Planning Group is considering for the Draft North Texas regional water plan. I urge you to omit all new reservoirs from recommended or alternative strategies. I ask that you fulfill North Texas' projected unmet needs with existing reservoirs, conservation, and recycled water, which your own studies show are available in quantities that far exceed the region's projected unmet needs in 2060.

The four new, unneeded reservoirs that you are considering as recommended strategies (Marvin Nichols, Fastrill, Ralph Hall, Lower Bois d'Arc Creek) would drown approximately 125,000 acres of increasingly rare East Texas and Northeast Texas floodplain habitat in the Sulphur, Neches, and Red River basins. They would take at least 375,000 acres of productive private lands from thousands of mostly unwilling sellers and would devastate ranching, farming, and timber industries in large areas of Texas. Some of Texas' best remaining bottomland hardwood forests and crucial wildlife habitat would be lost forever, including the extremely high-quality proposed Neches River National Wildlife Refuge.

Not content with recommending four needless, destructive reservoirs, you're also considering three OTHER new needless reservoirs as alternative strategies (Parkhouse, Columbia, Tehuacana) in the Sulphur, Angelina, and Trinity basins that would drown about 41,000 acres and condemn 123,000 acres.

These staggering negative impacts would be from new reservoirs that your own multi-million-dollar taxpayer-funded planning process shows are literally unneeded.

To your credit, you've already chosen recommended conservation, recycled water and existing reservoir sources that meet projected unmet need in the next half-century. And you've already chosen additional existing reservoirs as alternative strategies. Together, these lower-impact existing sources provide about 70% more water than needed to fulfill unmet needs in 2060 on a region-wide basis. With these sources alone, you've fulfilled your responsibility to plan prudently for future water supplies.

Given that you've fulfilled your responsibility with lower-impact available sources, I am utterly dismayed that you are additionally recommending permanently drowning floodplain acreage almost as large as East Texas' Big Thicket National Preserve and five national forest wilderness areas combined. Your own studies show that building new reservoirs will negatively impact environmental, agricultural, and rural resources far more than utilizing the available existing ones.

I cannot fathom why you would want to associate your name--on your behalf or that of your company, organization, or the interest group category you represent--with a plan that needlessly devastates our Texas environment and rural neighbors and industries. Such a plan would be a shameful, uncalled-for way for North Texas to treat fellow Texans--literally with no good reason. Please don't be a part of any such plan.

First Form Email from Sierra Club Web Site Sent to RCWPG and Others in June and July 2005 (During 6/1/05-9/9/05 Public Comment Period)

Count	Name	Representing
1	Martin R. Gluck	self
2	Jonathan Sieders	self
3	Kevin Bush	self
4	Marshall McClay	self
5	Barbara McClay	self
6	Denise Bates	self
7	Tamara Teague	self
8	Sherry Lundberg	self
9	Jeffrey Kanters	self
10	Patricia Lambert	self
11	Matthew Rouser	self
12	Dianne Urey	self
13	Molly Clayton	self
14	James M. Bauer	self
15	Jim Bush	self
16	Irvin Uphoff	self
17	Nancy W. John	self
18	Janet Montpas	self
19	Barbara Kortemeyer	self

Stephanie Griffin

From: amfarris@att.net
Sent: Tuesday, July 19, 2005 3:22 PM
To: Stephanie Griffin
Subject: Comments on Draft Region C Water Plan

TO: Region C Water Planning Group and related personnel
CC: Texas Water Development Board members
The Honorable Ken Armbrister, Chair, Natural Resources Committee, Texas Senate
The Honorable Robert Puente, Chair, Natural Resources Committee, TX House of Reps.

FROM: Amber Farris, 2104 Park Willow Ln Apt B, Arlington TX 76011
DATE: 7/19/2005
RE: Comments on Draft Region C Water Plan

I strongly oppose--and urge you to remove--the four new reservoirs that your Draft Plan proposes as recommended strategies (Marvin Nichols, Fastrill, Lower Bois d'Arc Creek, Ralph Hall), as well as the four additional new reservoirs listed as alternative strategies (George Parkhouse North and South, Columbia, Tehuacana). These unneeded dams would flood hundreds of square miles of East Texas, destroy increasingly rare wildlife habitat, take over five hundred square miles of land from thousands of mostly unwilling Texans, and devastate ranching, farming, and timber industries in large areas of Texas.

None of these staggering negative impacts is necessary, since your Plan shows that twice as much water as would be needed to meet year-2060 demands can be obtained from conservation, reuse, and bringing water from existing underutilized reservoirs. Utilizing less harmful, less controversial existing reservoirs would be a prudent and responsible course of action, whereas relying substantially on proposed new reservoirs is a risky strategy with much higher uncertainty.

I applaud your commitment made at your May meeting to explore scenarios which would fully utilize existing reservoirs before considering any new reservoirs. I urge you to commit to fully utilizing existing available reservoirs to meet demands, rather than needlessly damming our rivers.

The Draft Plan admits that building new reservoirs would negatively impact environmental, agricultural, and rural resources far more than utilizing the available existing water supplies. Yet you do not explain why you have chosen new reservoirs over the numerous yet-unclaimed supplies in existing reservoirs identified in the Draft. If you're going to support a Plan that proposes destructive new reservoir projects, I believe you have the burden of proof to justify your actions.

I urge you to commit to more aggressive water use efficiency measures (conservation). The Draft Plan's assumed water use efficiency measures for Region C cities still lag behind those already being achieved and/or planned for other Texas cities and regional water plans. It's unconscionable to plan to condemn other people's land without first using the reservoirs that Texans have already paid to develop.

Second Form Email from Sierra Club Web Site Sent to RCWPG and Others During 6/1/05-9/9/05 Public Comment Period

Count	Name	Representing
1	Bryan Carpenter	self
2	Amber Farris	self
3	G. Grisham	self
4	Tom Wilbanks	self
5	Eugenia D. Fritz	self
6	Bryan Carpenter	self
7	Kris Sands	self
8	Christina Billingsley	self
9	Sandra Breakfield	self
10	Susan Cannon	self
11	Eileen McKee	self
12	Robert L. Hooton	self
13	Gail J. Reams	self
14	Jesse Spears	self
15	Dale Bulla	self
16	Sarah	self
17	Priscilla Althaus	self
18	Andie Comini	self
19	Vicki Kruchwitz	self
20	Karen Hadden	self
21	Stacey Nagy	self
22	Beth Johnson	self
23	Chris Butler	self
24	Dr. Sylvia Venable	self
25	Cheryl Ehmann	self
26	Evelyn Granahan	self
27	Glorian Mulligam Stratton	self
28	Annette Aboussie	self
29	David L. Chastain	self
30	Bradley Anderson	self
31	Hebert Norman	self
32	Judy Woods	self
33	Terry Wizig	self
34	Nancy W. John	self
35	Patricia Weimer	self
36	Gary Stuard	self
37	Ronald Brewer	self
38	Robert Egan	self

Second Form Email (6/1/05-9/9/05)

Count	Name	Representing
39	Phillip Hight	self
40	Jesse Spears	self
41	Peggy Lamb	self
42	Bonnie Glasgow	self
43	Tamara Bickel	self
44	Vishal Verma	self
45	Landon Lockett	self
46	Katherine Goodbar	self
47	Joy Schilpp	self
48	Marcia Ingram	self
49	Birtie Smith	self
50	Jeremy Hawkins	self
51	Leroy and Sharon Mielke	self
52	Bryan Jackson	self
53	Lynn W. Larremore	self
54	Monica Broechin	self
55	Dr. John Speer	self
56	Cynthia Dawn Meade	self
57	Tatjana Walker	self
58	Shawna Smith	self
59	Jim Carroll	self
60	Charlotte Warrington	self
61	Henry Johnson	self
62	Lucy Hopkins	self
63	Bradley L. Miller	self
64	Dale A. Fletcher	self
65	Paul Zigler Family	self
66	Charles Newsome	self
67	Brian Johannes	self
68	Donna Martinez	self
69	Laurie Harris	self
70	Ralph Yoas	self
71	Mary Lou Strickland	self
72	Kathy Rushing	self
73	Clancey Kilcoyne	self
74	Jason Misium	self
75	Jane Sumner	self
76	William Greer	self
77	Suzanna Brown	self

Second Form Email (6/1/05-9/9/05)

Count	Name	Representing
78	Robert Larson	self
79	Paul Wehrmann	self
80	Billy W. Hallmon	self
81	Joan Morales	self
82	Joan Spanne	self
83	G. Sumner	self
84	Betty A. Holmes	self
85	Bo Baggs	self
86	Timothy M. Scoggins	self
87	Lynette Holtz	self
88	David (Gray?)	self
89	Barry Wolf	self
90	Joe Anne Daigre	self
91	Sue Smith	self
92	Peggy B. La Point	self
93	Steve Snyder	self
94	David Todd	self
95	Andrew Bramley	self
96	Kathleen Elmore	self
97	John Lemaux	self
98	Joanna Woodburn	self
99	Jan Sand	self
100	Richard Wilder	self
101	Louise I. Chandler	self
102	Paul Wehrmann	self
103	Margaret McNiel	self
104	Robert Larson	self
105	Adrian F. Van Dellen	self
106	Max Shumake	self
107	Ray and Linda Tabb	self
108	Sharon Anderson	self
109	Frank Bartholf	self
110	Billy L. Pasley	self
111	Kay Wilde	self
112	Vicki Tabb	self
113	Tamara Teague	self
114	Pat and Sue Tomberlain	self
115	Ddon Gaines	self
116	Janna Schwab	self

Second Form Email (6/1/05-9/9/05)

Count	Name	Representing
117	Ed Stahl	self
118	Gary Stephens	self
119	Tom Rust	self
120	Donald Gagne	self
121	Charles Lewis	self
122	Chris Cockrill	self
123	Terri and Reed Wigigton	self
124	James A. Crawford	self
125	George Misium	self
126	Kelly Hobbs	self
127	Stephanie M. Hobbs	self
128	Margot Clarke	self
129	Doug Lawson	self
130	Jerry Biggs	self
131	Nora Burns	self
132	Judy J. Holmes	self
133	Becky Haschke	self
134	Shirley Shumake	self

Comments Received on the *Initially Prepared 2006 Region C Water Plan*

State and Federal Agency Letters Received by the Region C Water Planning Group

Count	Name	Representing
1	Larry D. McKinney	Texas Parks & Wildlife Department
2	William F. Mullican, III	Texas Water Development Board

(1)

TEXAS PARKS & WILDLIFE

September 8, 2005

Mr. James M. Parks
RCWPG Chairman/Administrator
c/o NTMWD
P.O. Box 2408
Wylie, Texas 75098-2408

Dear Mr. Parks:

Thank you for the opportunity to review and comment on the 2005 Initially Prepared Regional Water Plan (IPP) for Region C. Texas Parks and Wildlife Department (TPWD) acknowledges the time, money and effort required to produce the regional water plan as mandated by Senate Bill 1 of the 75th Legislature. A number of positive steps have been taken since the first planning cycle to advance the issue of environmental protection. For example, the regional water planning groups were faced with a new requirement under 31 TAC §357.7(a)(8)(A), to perform a "quantitative reporting of environmental factors including effects on environmental water needs, wildlife habitat, cultural resources, and effect of upstream development on bays, estuaries, and arms of the Gulf of Mexico" when evaluating water management strategies. TPWD recognizes that each region's unique natural resources, water management strategies and funding limitations dictated the level of quantitative analysis for each regional plan. Nonetheless, TPWD feels strongly that quantification of environmental impacts is a critical step in planning for our state's future water needs while also protecting environmental resources.

TPWD staff has reviewed the IPP to determine if the following questions were addressed:

- Does the plan include a quantitative reporting of environmental factors including the effects on environmental water needs, habitat?
- Does the plan include a description of natural resources and threats to natural resources due to water quantity or quality problems?
- Does the plan discuss how these threats will be addressed?
- Does the plan describe how it is consistent with long-term protection of natural resources?
- Does the plan include water conservation as a water management strategy? Reuse?
- Does the plan recommend any stream segments be nominated as ecologically unique?
- If the plan includes strategies identified in the 2000 regional water plan, does it address concerns raised by TPWD at that time?

(a)

In general the Region C IPP does include a quantitative reporting of environmental factors including the effects on environmental water needs and habitat. The plan also includes a description of natural resources, threats to those natural resources due to water quantity or quality problems and discusses how those threats will be addressed. However, improvement can be made in reporting impacts associated with reservoir construction, including alterations of instream flows and the inundation with reservoir construction, including alterations of instream flows and the inundation of various habitats which both fish and wildlife depend on. The plan includes a description of how natural resources will be protected in the long-term but is not as complete as is necessary for assessment needs. For areas in the Region where groundwater is the primary source of water supply, emphases should be placed on protecting springs that support fish and wildlife

b

Region C is to be commended for including water conservation as a water management strategy. According to the IPP conservation within Region C can reduce municipal per capita use to less than 140 gpcd by 2020. The per capita use includes a credit for the water supply that comes from reuse Even without crediting for reuse the Region is capable of reducing the pre capita municipal use to 140 gpcd. This will require an extensive education program to educate the end users but will also reduce the need for additional new reservoirs. TPWD encourages Region C to consider land stewardship (brush control/management) as an additional means of conserving water while also benefiting wildlife habitat

c

It is disappointing that the plan does not recommend nomination of any stream segments as ecologically unique due to concerns regarding unintended consequences of designating a segment as ecologically unique. The primary concern voiced related to impacts to private property rights of landowners adjacent to a designated stream segment The Region C plan does recommend unique sites for reservoir construction. A unique reservoir site would appear to have greater impacts associated with private landowner rights than an ecologically unique stream segment. Recommending stream segments as ecologically unique gives the regional water planning groups an opportunity to emphasize their commitment to planning for environmental water needs.

d

Many of TPWD's concerns identified in the 2000 regional water plan have been addressed However, several concerns still remain. According to the Region C IPP "The total available supply of 4.05 million acre-feet per year in 2060 is about 20 percent greater than projected demand." That amounts to approximately 800,000 ac-ft extra supply or the equivalent sum total yield of Marvin Nichols, Lower Bois d'Arc, Fastrill and Ralph Hall reservoirs combined. New reservoirs, particularly in areas rich in bottomland hardwood forests, can represent a significant threat to the protection of the State's natural resources and should be considered carefully. Please be assured that TPWD will continue to work closely with the region to explore all possibilities to meet future water supply needs and assure the ecological health of the region's fish and wildlife resources.

e

Please see attached enclosure for additional specific comments and recommendations.

Sincerely,

Larry D. McKinney, Ph.D.
Director of Coastal Fisheries

LDM:CL:dh

Attachment: Additional Specific Comments and Recommendations

Does the plan include a quantitative reporting of environmental factors including the effects on environmental water needs, habitat, etc.?

f

The Region C water plan includes some quantitative reporting of environmental factors associated with the recommended water management strategies. Table 4C.7 list the factors used to evaluate potentially feasible water management strategies and Appendix T summarizes the environmental evaluations which include quantitative reporting of acres impacted, wetland acres impacted, and number of threatened and endangered species. The plan includes 9 potentially feasible strategies for new reservoirs Five of the new reservoirs (Marvin Nichols, Lower Bois d' Arc Creek, Fastrill, Ralph Hall, and Muenster) are recommended in the initially prepared plan and the remaining four reservoirs (George Parkhouse 1 & 2, Tehuacana, and Columbia) are in the plan as alternate strategies. This is a significant number of new reservoirs which will require more detailed information to quantify the environmental impacts. Appendix T is a start at reporting environmental impacts quantitatively. Considerably more work can be done to report impacts associated with reservoir construction, including alterations of instream flows and the inundation of various habitats which both fish and wildlife depend on. It will be important to report any limitations the planning groups has on reporting quantitative information for each recommended water management strategy.

Does the plan include a description of natural resources and threats to natural resources due to water quantity or quality problems?

g

Page 1.59 Agricultural and Natural Resources in Region C: It should be noted that springs can provide valuable habitat for fish and wildlife in the Region. Areas in the Region where groundwater is the primary source of water supply, emphases can be placed on protecting spring that support fish and wildlife. Page 1.65 State and Federal Natural Resource Holdings: This section lists many of the state and federal lands in Region C. These resources are important to the Region and nearly all have non-consumptive water uses, including recreation and fish and wildlife uses. This section can also be used to highlight the state and federal lands in neighboring regions especially Region D, due the dependence on East Texas surface water. Page 1.63 State and Federal Species of Special Concern in Region C: Please note that American peregrine falcon and black-footed ferret are no longer included as state species of concern for all counties in Region C. Similarly, the interior least tern is no longer included for Collin, Denton, Jack, and Rockwall counties.

Does the plan discuss how these threats will be addressed?

h

Page 1.69 Summary of Threats and Constraints to Water Supply in Region C: The last sentence of the first paragraph states "Constraints on the development of new supplies includes…challenges imposed by environmental concerns and permitting". Environmental concerns and permitting are necessary to protect many of Texas' natural resources. These elements should not be considered constraints to the development of new water supplies. Rather, environmental concerns and permitting should be considered as necessities.

i

Page 1.78 Water Related Threats to Agricultural and Natural Resources: Inundation of land due to reservoir development is a significant threat in Region C and in Region D. The return flows in the Trinity River may increase and enhance habitat in that reach. The impacts to the river basin the water is being pumped from should be considered also. Just as one river basin will have an increase in return flows another river basin will have a decrease in return flows.

Does the plan describe how it is consistent with long-term protection of natural resources?
Page 7.1 - Description of How the Regional Water Plan is Consistent with Long-Term Protection of the State's Water Resources, Agricultural Resources, and Natural Resources Water conservation, reuse, utilization of existing supplies will go a long way toward the protection of the State's resources. The water plan includes 9 new reservoirs, 4 of which are recommended strategies. The new reservoirs are the most significant threat toward the protection of the State's natural resources. It may be difficult to find quality land to mitigate for the priority bottomland hardwood habitat that exists at the proposed reservoir sites for Marvin Nichols and Fastrill Lake. Region C must also consider the protection of natural resources in Region D due to its dependence on out of region surface waters.

Does the plan include water conservation as a water management strategy? Reuse?
Conservation was a major strategy for the second round of planning with Region C reducing the municipal per capita use to less than 140 gpcd by 2020. The per capita use includes a credit for the water supply that comes from reuse. Although reuse will be one of the most important water management strategies, the Region is capable of reducing the pre capita municipal use to 140 gpcd without crediting for reuse. With the reuse credit it is feasible that the Region can reduce its municipal use below 100 gpcd by 2060. This will require an extensive education program to educate the end users but will also reduce the need for additional new reservoirs. TPW encourages Region C to consider land stewardship (brush control/management) as an additional means of conserving water while also benefiting wildlife habitat.

Does the plan recommend any ecologically unique stream segments? Region C established a committee to review and recommend river and stream segments as ecologically unique. The committee recommended five stream segments for the planning group to consider. The planning group decided to not take action on any of the stream segments due to unanswered questions regarding unintended consequences of designating a segment as ecologically unique. The primary concern was impacts to private landowner right adjacent to a designated stream segment. The regional water planning groups have the task of recommending ecologically unique stream segments while the Legislature has the authority to designate a segment. The committee was able to decide on five streams that met the criteria of an Ecologically Unique Stream segment. Region C has the option of recommending the segments and using it as an opportunity for the Legislature to address the unanswered questions regarding the unintended consequences of designating a segment. It is interesting that 6 unique sites for reservoir construction are recommended without any of the same concerns regarding private landowner rights. A unique reservoir site would appear to have greater impacts associated with private landowner rights than an ecologically unique stream segment. Recommending stream segments as ecologically unique gives the regional water planning groups an opportunity to emphasize their commitment to planning for environmental water needs.

If the plan includes strategies identified in the 2000 regional water plan, does it address concerns raised at that time?

Comments for the Initially Prepared 2006 Region C Water Plan:

m

Page ES.9 – Recommended Water Management Strategies: The total available supply of 4.05 million acre-feet per year in 2060 is about 20 percent greater than the projected demand. The plan considers this a reasonable reserve to provide for future difficulties. There is a concern that this is excessive and could lead to the construction of new reservoirs without an actual need for the water. This type of planning has the consequence of removing valuable habitat important to fish and wildlife.

n

Page ES.11 - Recommended Water Management Strategies: Lake Fastrill is illustrated in the map with a supply of 112,100 acre-feet per year. The Texas State Railroad travels 25 miles between the Palestine and Rusk State Parks crossing over the Neches River at the Anderson and Cherokee County line. It appears the railroad is in the conservation pool of Lake Fastrill. In addition to the reservoir flooding valuable bottomland hardwood forests it would threaten the historic Texas State Railroad.

o

Page 1.14 Current Water Uses and Demand Centers in Region C There is one paragraph describing non-consumptive water uses. Detailed descriptions of each non-consumptive water use would be valuable information for planning for future water needs. This should also include non-consumptive uses outside of the planning region due to the Regions dependence on out of region surface water.

p

Page 4D.10 – Marvin Nichols Reservoir The proposed reservoir has moved upstream from its originally proposed location to reduce impacts to bottomland hardwoods. High quality bottomland hardwoods would still be inundated. Portions of TPWD's written comments for the 2001 Initial Prepared Water Plan continue to apply to the 2006 plan. "Proposed reservoir would inundate or otherwise impact downstream portions of a 94,252 acre tract identified by USFWS as a Priority 1 preservation site in the Texas Bottomland Hardwood Preservation Program (1985). This site contains habitat of high value to waterfowl and other wildlife. A reach of the Sulpher River downstream of the proposed site includes a wetland habitat mitigation area administered as the White Oak Creek WMA. These areas may be negatively impacted by altered flow regime as a result of reservoir operations. Construction of the proposed reservoir would eliminate or reduce habitat for six state-threatened, flow-dependant fish species: the creek chubsucker, western sand darter, blue sucker, blackside darter, paddlefish, and shovelnose sturgeon as well as several other species of aquatic and terrestrial animals." The Region D 2006 initial prepared plan documents no immediate or long-range need for yield from this proposed project within that region.

q

Page 4D.12 – Wright Patman Lake - Conversion of Flood Storage to Conservation Storage: Increasing the storage capacity of existing reservoirs is preferred over creating a new reservoir to meet future water supply demands. As operating Jim Chapman and Wright Patman Lake as a system operation become a reality it will be important to study how this may alter instream flows between the reservoirs. TPWD manages the White Oak Creek WMA and is interest on how the system operation and conversion of flood storage to conservation storage may influence how the WMA is managed.

Page 4D.17 – Lower Bois d'Arc Creek Reservoir: Portions of TPWD's written comments for the 2001 Initial Prepared Water Plan continue to apply to the 2006 plan. "The Proposed reservoir would inundate a 3,911 acre tract identified by USFWS as a Priority 4 preservation site in the Texas Bottomland Hardwood Preservation Program (1985). This site contains habitat of high value to wildlife. Reservoir may negatively impact adjacent downstream Bois d'Arc Unit of the Caddo National Grasslands (13,370 ac.), which is managed by TPWD as the Caddo National Grasslands WMA.

Additionally, Bois d'Arc Creek from its headwaters in eastern Grayson County to its confluence with the Red River in Fannin County represents a valuable riparian conservation area. The proposed reservoir would inundate about 25% of this stream's length, and the downstream portion may be negatively impacted by altered flow regime as a result of reservoir operations."

Page 4D.18 - Lake Fastrill: The proposed reservoir would inundate portions of a Priority 1 bottomland hardwood site and a potential federal wildlife refuge. Several species of concern would be impacted. The threatened or endangered species include the paddle fish, creek chubsucker, blue sucker and the Neches River rose-mallow. The Texas State Railroad travels 25 miles between the Palestine and Rusk State Parks crossing over the Neches River at the Anderson and Cherokee County line. It appears the railroad is in the conservation pool of Lake Fastrill. In addition to the reservoir flooding valuable bottomland hardwood forests it would threaten the historic Texas State Railroad.

Page 5.1 – Impacts of Recommended Water Management Strategies: As more water is imported to Region C through interbasin transfers, care should be taken on what water quality is allowed to be pumped to the region. The water plan contains strategies that will import Brazos River, Red River, Sulphur River and Sabine River water into surface water of the Trinity River. Both the Red River and Brazos River basins have had toxic golden algal (prymnesium parvum) blooms which cause periodic fish kill. There are documented fish kills where golden alga free surface waters received water contaminated with golden alga which later resulted in a fish kill and a sustainable population of golden alga.

(2)

TEXAS WATER DEVELOPMENT BOARD

E. G. Rod Pittman, *Chairman*
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September 29, 2005

Mr. James M. Parks
Chairman
Region C Water Planning Group
North Texas Municipal Water District
505 E. Brown Street
Wylie, TX 75098-2408

Re: Texas Water Development Board Comments for the Region C Water Planning Group Initially Prepared Plan, Contract No. 2002-483-454

Dear Mr. Parks:

Texas Water Development Board staff completed a review of the Initially Prepared Plan (IPP) submitted June 1, 2005 on behalf of the Region C Water Planning Group. The attached comments follow a format similar to those used in developing the prior regional plans, including:

- Level 1: Comments and questions that must be satisfactorily addressed in order to meet statutory, agency rule, and/or contract requirements; and
- Level 2: Comments and suggestions for consideration that may improve the readability and overall understanding of the regional plan.

In addition, the TWDB reserves the right to submit additional Level 1 comments as missing or incomplete materials become available. Comments will be provided after review of the online database (DB07) is complete. Also, the TWDB's statutory requirement for review of potential interregional conflict will not be completed until all applicable data and information has been provided by any potentially affected planning group. TWDB's streamflow assessment, based on full implementation of the region's IPP, will be provided under separate cover.

Title 31, Texas Administrative Code (TAC) §357.11(b) requires the regional water planning group to consider timely agency and public comment. Section 357.10(a)(3) of the TAC requires the final, adopted plan include summaries of all timely written and oral comments received along with a response explaining any resulting revisions or why changes are not warranted.

If you have questions, please contact Virginia Sabia at (512) 475-2056.

Sincerely,

William F. Mullican III
Deputy Executive Administrator
Office of Planning

Attachment

c w/att.: Mr. Tom Gooch, P.E., Freese and Nichols, Inc.

Attachment

Region C Regional Water Plan

LEVEL 1. Comments and questions *must be satisfactorily addressed* in order to meet statutory, agency rule, and/or contract requirements.

Chapter 1: Planning Area Description

1. Provide information on the plan's impact on navigation. *[Title 31, TAC §357.5(e)(8)]*

Chapter 3: Water Supply Analysis

2. Report information for wholesale water providers by category of use, by county, and by river basin. *[Title 31, TAC §357.7(a)(3)(B)]*
3. Page 3.5, Table 3.5: Include groundwater availability estimates for the portions of the Trinity aquifer located in Kaufmann and Rockwall Counties and for the Woodbine aquifer in Tarrant County. *[Title 31, TAC §358.3(b)(21)]*
4. The year 2000 water use estimate and the projected water demands for the City of Lewisville in Dallas County, Trinity Basin are listed as "0", although the estimate and demands are listed as "1" acre-foot in the online water planning database. Subsequently, the Dallas County total municipal water demand in the table is one acre foot lower in all decades than is listed in the online database. Please reconcile these different demand amounts for the City of Lewisville. [*Title 31, TAC §357.5(d)(1)&(2) and §357.7(a)(1)(B)*]
5. Report water supply by river basin. *[Contract Exhibit "B," Sections 3.1.1]*

Chapter 4: Identification, Evaluation, and Selection of Water Management Strategies Based on Needs

6. Please verify that environmental flow needs were assessed in evaluation of surface water management strategies. *[Contract Exhibit "B," Section 4.2.8.c]*
7. Page 4B.13, Table 4B.5: Provide detailed explanation and source citations for calculation of costs and savings for the conservation strategy packages and the criteria for selecting appropriate packages for each Water User Group. *[Title 31, TAC §357.7(a)(7)(A)]* It is unclear how water conservation costs and savings were calculated for the "Municipal Basic" and "Municipal Expanded" Packages, as shown in Table 4B.5. It is also unclear how package strategies were assigned to each WUG in Appendix U, Tables U-10 and U-11.
8. Section 4C.1, page 4C.16: Include summation of water needs in the basin of origin and in the receiving basin for interbasin transfers. *[Title 31, TAC §357.7(a)(8)(F)]*

Chapter 5: Impacts of Water Management Strategies on Key Parameters of Water Quality and Impacts of Moving Water from Rural and Agricultural Areas

9. Page 5.3 and Appendix T: Include discussion of key water quality parameters in the appropriate portions of the plan. [*Title 31, TAC §357.7(a)(12)*] On page 5.3 the IPP states that "A detailed discussion of the selection of key water quality parameters and definition of baseline conditions for those parameters is included in Appendix T." No such discussion was found in either Appendix T or elsewhere in Chapter 5.

Chapter 6: Water Conservation and Drought Management Recommendations

10. Table 6.5: The calculations reported in this table are incorrect or the column labels need clarification. For example, calculation for 2060 "Percent of Demand met through Conservation" appears to be 36% rather than the noted 16%.

Overall Requirements

11. Appendix V: List supplies delineated by river basin in Appendix V as in DB07. *[Contract Exhibit "B," Sections 3.1.1]*

12. Appendix V: Include projected population in the City of Bridgeport summary table in Appendix V. *[Title 31, TAC §357.5(d)(1)&(2)]*

13. DB07: The contractor must correctly populate the required database fields. *[Contract Exhibit "B," Sections 3.1, 3.2, 4 and 5]* The TWDB reserves the right to issue additional comments that must be addressed once that particular task is finished. As previously noted, additional review time could result in a delay in TWDB consideration of the plan for approval.

Level 2 Comments – Comments/Suggestions for improving the Regional Water Plan

Chapter 1

14. Page 1.14: Consider providing references to the most current data and, where appropriate, edit the text to reflect that more current data is available. On page 1.14 the IPP states that water use estimates in year 2000 are the "most current available"; however, the TWDB website provides estimates through 2003. Similar statements occur elsewhere in the IPP.

15. Chapter 1.8: The first sentence of "Surface Water Quality Concerns" incorrectly refers to "Texas Commission on Environmental Concerns (TCEQ)." Correct to read "Texas Commission on Environmental Quality (TCEQ)."

Chapter 4

16. Chapter 4, Page 4A.10, Figures 4A.4 and 4A.5: Consider not using line charts when presenting socio-economic impact data. The impact data for each decade is assumed to be independent and such line charts imply that there is a link between decadal impacts. Bar charts could be used instead with the specific note indicating the independence of decadal.

17. Chapter 4C, Page 18, Page 4C.18, paragraph 3, and Page 4D.15, paragraph 4: Consider revising section heading and other references to "Groundwater Management Districts" to "Groundwater Conservation Districts."

18. Page 4D.15, paragraph 4: The text implies that Mesa Water owns all the groundwater rights in Roberts County. Consider clarifying this paragraph in order to avoid confusion.

19. Table 4E.3: The "Mesa Groundwater" project is referenced by different names throughout the report, specifically in on pages 4E.9 and 4D.5, and in Table 4D. Consider using consistent references to all projects so they can be easily identified.

20. Page 4E.44, Figure 4E.10: Consider including a legend description for the red dashed line.

21. Page 4E.4: The first two sentences in "DWU Conservation" state "The conservation savings for DWU retail customers are based on DWU's recent conservation plan. The savings for DWU's customers is based on the Region C recommended water conservation program." Consider clarifying the statements to better differentiate between "retail customers" and "customers" in the first and second sentences.

22. Page 4E.17: The figure titled "Potentially Feasible Strategies for NTMWD" is identified incorrectly as "Figure 4E.3." Text on page 4E.16 refers to this as "Figure 4E.5." Verify the appropriate number of this figure and revise.

Chapter 6

23. Page 6.3: The note at the end of the second bullet states "that the Task Force also recommended that water supplied by direct or indirect reuse should not be included when computing per capita use." Specifically, the Task Force recommended that in calculating gpcd for targets and goals that volumes of water diverted for only indirect reuse shall be credited against total diversion volumes. Please clarify the statement in the IPP to reflect the Task Force recommendation.

24. Page 6.6: Under the "Drought Management" section, the second paragraph states that Appendix Q includes a summary of current drought contingency and emergency management plans in Region C. The summary is in Appendix R. Please correct this statement and review reference to Appendices in the plan to make sure information can be readily found.

25. Page 6.20: The first paragraph states "After crediting for reuse as required by the Water Conservation Implementation Task Force *Report to the 79th Legislature…..*" A similar statement is made in the second paragraph of page 6.21, and both statements imply the Conservation Task Force holds regulatory authority. Please consider replacing the word "required" in these sentences with the word "recommended" or a similar term.

26. Pages 6.19 and 6.23: Reference is made to a five-year rolling average as recommended by the Conservation Task Force. Statements that the five-year rolling average "will equate to normal-year use" is misleading because rolling averages might also include use for drier or wetter than normal years. Consider clarifying these statements.

27. Table 6.5: Consider including a footnote explaining term "without conservation."

Chapter 7

28. Page 7.3: In the discussion of new surface reservoirs the text states that "The new reservoirs will make releases for environmental water needs in accordance with state planning guidelines." Consider clarifying the statement as new reservoirs would make releases per environmental regulations and permit conditions.

Chapter 10

29. Page 10.1: The discussion states that "Table 10.1 lists the members of the Region C Water Planning Group, the interests they represent, their organizations, and their counties." However, Table 10.1 on page 10.2 does not include a list of organizations. Please consider reconciling the text and the table contents.

Overall Suggestions

30. Appendix M: This appendix includes a sub-Appendix referred to as "Appendix C-2." Appendix C-2 includes the model water conservation plan for the region. However, as of November 2004, TCEQ has revised the Utility Profile form, which is part of the water conservation requirement and no longer includes those items found in Appendix C-2. Consider providing the current Utility Profile form for the model water conservation plan.

31. Consider designating the units used in tables throughout the report. Examples of tables not including unit designations include, but are not limited to Tables 4B.6 and 4B.7.

APPENDIX BB

RESPONSE TO COMMENTS

APPENDIX BB
RESPONSE TO COMMENTS

This appendix includes summaries of public comments provided at the July 11, 2005 Region C Water Planning Group Public Hearing on the Initially Prepared Plan and responses to those comments. Speaker comments are summarized in italics. A full transcript of the comments may be found on the Region C web site.

This appendix also includes responses to written comments on the *Initially Prepared 2006 Region C Water Plan* (IPP) that were received by the Region C Water Planning Group (RCWPG). Each comment letter is numbered, with specific points identified in outline format. Responses to the comment letters are given below, and the comments themselves are included in Appendix AA.

Public comments are organized as follows:

- Summary of oral comments and responses to oral comments
- Responses to written comments
- Responses to emails received at regionc@freese.com
- Response to form emails and form letters received from Sierra Club
- Response to letters from state and federal agencies

Summary of Oral Comments and Responses to oral Comments

1. Jan Hart Black, Greater Dallas Chamber

Ms. Black stated that the Greater Dallas Chamber has been a vocal supporter of the City of Dallas long-range water planning effort. The Greater Dallas Chamber supports the Region C draft plan, including the water conservation, reuse, connection of existing supplies, and development of new supplies as recommended strategies. The Chamber encourages the RCWPG to keep all of their options available. The Chamber believes that it is imperative to plan for future economic development, including a reliable long-term water supply. Adequate water supplies are necessary for economic development and a healthy region.

Response: The RCWPG appreciates your participation in and support of the regional water planning process. One of the goals of the RCWPG is to meet the water needs for the next 50 years in order to support the expected growth in this area. No changes were made to the final report based on this comment.

2. Jody Smith, Town of Flower Mound

Ms. Smith is the Mayor of Flower Mound. Mayor Smith told the group that the Town of Flower Mound is opposed to the timeline proposed by the Upper Trinity Regional Water District to develop Lake Ralph Hall. According to the town, nothing has changed in the past four years to necessitate changing the status of the proposed lake from an alternative to a recommended strategy. The town understands that Dallas Water Utilities is including the *water needs of the UTRWD in their long-range planning work. Mayor Smith noted that other residents and elected officials are actively voicing concerns about the proposed reservoir, including the Town of Double Oak. The Town of Flower Mound does not want to see their water rates increase for a reservoir that they believe is not needed at this time. Flower Mound would like to see Lake Ralph Hall included as an alternative strategy for the UTRWD.*

Response: The Upper Trinity Regional Water District (UTRWD) is a regional wholesale water provider in Region C. While they do purchase water from Dallas as a part of their water supply, Dallas has assumed in their own long-range water planning that UTRWD will seek other water supplies beyond their current contractual amount, specifically Lake Ralph Hall. If Lake Ralph Hall is changed from a recommended strategy to an alternative strategy, then another water management strategy providing additional water supply will need to be developed to make up the difference. The RCWPG has included Lake Ralph Hall as a recommended strategy as it represents the future plans of both the UTRWD and Dallas. No changes were made to the final report based on this comment.

3. *Mary C. Decker, Friends of Texas State Railroad*

Ms. Decker lives in Jacksonville, Texas. She lives near the area of the proposed Lake Fastrill. She does not think it is right for a place like Dallas to come and take the major resource in Anderson and Cherokee Counties, the water. According to Ms. Decker, the people of Anderson and Cherokee Counties are very opposed to Lake Fastrill.

Response: Dallas has included Lake Fastrill in its long-range water plan and has asked the RCWPG to include the proposed reservoir in the regional water plan. The RCWPG has worked with the water suppliers in Region C trying to develop a plan that represents the plans of the water providers.

The RCWPG understands that new reservoir development will impact landowners, the environment, and others. The RCWPG has put forth a plan with an increased focus on water conservation and reuse, as well as a limited number of new reservoir projects.

The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on this comment.

4. *Walt Humann, Ft. Worth Chamber of Commerce*

Mr. Humann spoke on behalf of the Fort Worth Chamber of Commerce in support of the Region C plan. Mr. Humann brought several bottles of water to demonstrate that in some areas of the world, a person may have the amount of one bottle of water to use for all of his daily needs, while here he may waste up to three bottles of water while brushing his teeth. Following the drought of the 1950s, there was an aggressive effort to satisfy water needs. The Chamber believes that the Region C plan provides a balanced approach to meeting future water needs with conservation, reuse, existing supplies, and new supplies.

Response: The RCWPG appreciates your participation in and support of the regional water planning process. As you noted, the RCWPG has included significant amounts of water conservation and reuse in the plan, as well as utilizing existing water sources. No changes were made to the final report based on this comment.

5. ***Arthur Kuehne***

Mr. Kuehne is opposed to the new reservoir projects, recommended and alternative strategies, in the Region C plan, stating that they are unneeded. According to Mr. Kuehne, the reservoirs would drown bottomland hardwoods and force unwilling sellers from their land. The proposed Lake Fastrill would impact the proposed Neches River National Wildlife Refuge. Mr. Kuehne asked the planning group to eliminate all of the proposed reservoirs from the consideration. He asked the planning group to justify why the plan should include the construction of new reservoirs before the existing sources are fully utilized.

Response: The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The new reservoirs listed as recommended or alternative strategies in the Region C plan are reservoir projects that the water suppliers in Region C have requested the planning group to include. The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project. The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on this comment.

6. ***Julie Hunt, Arlington Water Utilities***

Ms. Hunt welcomed the planning group to the City of Arlington. Ms. Hunt told the planning group that Arlington is committed to water conservation. The City recently adopted a landscape management ordinance, including rain sensors and an inclined water rate structure. The City has also implemented time of day restrictions for outdoor irrigation. The City monitors water supply planning and appreciates the planning of the Tarrant Regional Water District. Ms. Hunt noted that the District has been a participant in the regional water planning effort since the planning group was established. The City of Arlington supports the recommended strategies, including conservation, reuse, transmission projects, existing supplies and new supplies.

The RCWPG appreciates your participation in and support of the regional water planning process. One of the goals of the RCWPG is to meet the water needs for the next 50 years to support the expected growth in this area. No changes were made to the final report based on this comment.

7. ***Beth Johnson, Texas Committee on Natural Resources, Sierra Club***

Ms. Johnson is a consultant representing the Lone Star Chapter of the Sierra Club and the Texas Committee on Natural Resources. Ms. Johnson presented a chart showing various potential water supply projects and the amount of supply potentially available from each. Ms. Johnson noted the strategies that the planning group had included in the plan and the ones that she believes should be included in the plan. She said that she did not believe the *planning group had given a thorough explanation as to why they did not recommend Texoma not yet authorized, additional Wright Patman flood pool, Patman Texarkana, Patman system operation, and additional Oklahoma water. Ms. Johnson told the planning group that the burden of proof was on them to justify the proposed new reservoir projects.*

Response: The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The new reservoirs listed as recommended or alternative strategies in the Region C plan are reservoir projects that the water suppliers in Region C have asked the planning group to include. The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project.

The RCWPG has discussed in their meetings and in the plan the reasons for the recommended strategies. Please see Section 4D of the plan for additional information.

- "Lake Texoma not yet authorized" is not a recommended strategy because it requires Congressional authorization, as well as another fresh water source for blending purposes.
- Additional water from the Wright Patman Lake flood pool above elevation 228.64 is not recommended because it will inundate portions of the White Oak Creek Mitigation Area.
- Other Wright Patman alternatives not recommended in the plan are not consistent with the plans of Region C suppliers and are relatively expensive sources of supply.

Ms. Johnson is misinformed regarding two of the recommended strategies in the plan:

- Purchasing additional water from Wright Patman Lake by raising the top of conservation storage to elevation 228.64 is a recommended strategy for Dallas. It is an alternative strategy for NTMWD, TRWD, UTRWD, and Irving.
- Purchasing water from Oklahoma is a recommended strategy for NTMWD, TRWD, and UTRWD. It is an alternative strategy for Dallas and Irving.

The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. The RCWPG included significant amounts of water conservation, reuse, and the use of existing supplies in its plan. No changes were made to the final report based on this comment.

8. Dan S. Petty, North Texas Commission

Mr. Petty spoke on behalf of the North Texas Commission in favor of the Region C plan. The North Texas Commission has had a representative at most of the Region C meeting since the planning group began meeting. They support the plan and appreciate the time and energy the planning group has put into the plan. He noted that the failure to meet the projected demands would result in reduced population, employment, and income. Such consequences should be unacceptable by all. The group supports RCWPG keeping all of their options *open. The Commission believes the Region C plan provides a reasonable balance of conservation, reuse, existing sources, and new supplies.*

Response: The RCWPG appreciates your participation in and support of the regional water planning process. One of the goals of the RCWPG is to meet the water needs for the next 50 years to support the expected growth in this area. No changes were made to the final report based on this comment.

9. George Frost, Region D Public

Mr. Frost is a member of the Region D Water Planning Group representing the public. He spoke today on behalf of the "common man". Mr. Frost read a statement from the Region D plan that the Marvin Nichols Reservoir should not be included in the regional water plan or the statewide water plan. Mr. Frost concluded that Region C's inclusion of the reservoir in their plan is inconsistent with the long-term protection of Region D. Mr. Frost told the group that all he had heard was the economic impact of not meeting Region C's water needs. He asked about the impact that developing Marvin Nichols would have on Region D. Mr. Frost asked why they were doing any planning in Region D if another region's plan could "trump" their plan. Mr. Frost told the planning group that his son Stephen Frost had sent several letters to the planning group opposing the Marvin Nichols Reservoir project. Region D understands that Region C is going to need water in the future and they would like to work with Region C to explore other options to meet these needs.

Response: We understand that the Region D Water Planning Group approved a statement that Marvin Nichols Reservoir should not be included in any regional plan or the State Water Plan. Marvin Nichols Reservoir is included in the current Region C plan and has been included in the State Water Plan since 1968, when it was called the Naples Reservoir.

In the first round of planning, Region C and Region D representatives formed a committee to work together on interregional issues. Region D told Region C to choose one of the four potential reservoirs (Marvin Nichols I North, Marvin Nichols II South, George Parkhouse II North, and George Parkhouse I South), and they would support the development of one project but not all four. The major water suppliers in Region C discussed the options and determined that Marvin Nichols I North (called Marvin Nichols Reservoir in this plan) was the best option for the entities to develop as a regional supply. Following the approval of the plans, Region D amended the 2001 Region D plan in December 2002 to change the designation of Marvin Nichols Reservoir from a proposed site to a potential site.

Region C is recommending that Marvin Nichols Reservoir be included in its plan, as well as the 2007 State Water Plan. Region C is also recommending George Parkhouse North and George Parkhouse South be included as alternative water management strategies in both plans. No changes were made to the final report based on this comment.

10. Martha Mason, UTRWD

Ms. Mason spoke on behalf of the Town of Argyle and the Upper Trinity Regional Water District. She is also a member of several environmental interest groups. She thanked the planning group for their work on the plan. She noted the emphasis on water conservation *and reuse. Ms. Mason described the Lake Ralph Hall project as having the least environmental impacts while helping the financial health of Fannin County.*

Response: The RCWPG appreciates your participation in and support of the regional water planning process. Lake Ralph Hall is a recommended strategy for the Upper Trinity Regional Water District and is expected to provide surface water supply to the Fannin and Denton County areas. No changes were made to the final report based on this comment.

11. Sharron Nabors, Landowner

Ms. Nabors is a resident of Paris, Texas. Ms. Nabors expressed her concern regarding the proposed new reservoirs. According to Ms. Nabors, developing the proposed new reservoirs will destroy one million acres of farmland and timberlands that will be needed for food and fiber. Ms. Nabors quoted the State Water Plan as showing 41 million acre-feet of water in 400 reservoirs, as well as groundwater supplies. Based on information from the State Water Plan, Ms. Nabors posed the question as to why more reservoirs are needed. Region C should look to existing sources for additional water supply. Ms. Nabors also referred to Governor Perry's desalination study and suggested that Region C obtain water from the Gulf of Mexico through that program. According to Ms. Nabors, increased water prices should be considered before building a new reservoir.

Response: The volume a reservoir can hold does not equate to the reservoir's ability to maintain its annual supply, or yield. The 41 million acre-feet of conservation storage quoted in the 2002 State Water Plan refers to storage capacity, not yield. The yield of a reservoir is based on rainfall, runoff, evaporation, and reliable use that would leave the reservoir essentially empty should the drought of record be repeated.

According to the groundwater availability models, the groundwater in much of Region C is already being used beyond the reliable supply. In many areas, water user groups have converted from groundwater to surface water because of declining water levels and/or decreased water quality. Many more entities are expected to convert from groundwater to surface water in Region C for these reasons.

The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The new reservoirs listed as recommended or alternative strategies in the Region C plan are reservoir projects that the water suppliers in Region C have asked the planning group to include in the plan. The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project. The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed.

The RCWPG looked at desalinating seawater and bringing it up from the coast. This project is cost prohibitive. No changes were made to the final report based on these comments.

12. Todd Madison, Town of Lincoln Park

Mr. Madison spoke on behalf of the Town of Lincoln Park. As the water demands increase in the future, the town will become less reliant on groundwater and more reliant on surface *water purchased from the Upper Trinity Regional Water District (UTRWDt. The UTRWD has included Lincoln Park's future needs in their long-range water supply plan. Lincoln Park supports the proposed Lake Ralph Hall Reservoir as a recommended strategy for UTRWD as a means to diversify their water supply. Mr. Madison believes that the strategies for the UTRWD are sound and encourages the planning group to keep the strategies in the plan.*

Response: The RCWPG appreciates your support of and participation in the regional water planning effort. The UTRWD requested that the Lake Ralph Hall project be included as a recommended strategy. The RCWPG has included Lake Ralph Hall as a recommended strategy. No changes were made to the final report based on this comment.

13. Tony Almeida, Dallas Chamber of Commerce, Halff Associates

Mr. Almeida spoke on behalf of Joe Novoa, Chairman of the Air Quality and Environmental Committee of the Dallas Chamber of Commerce. The North Texas area will have to have sufficient water supplies to support the projected population and business growth over the next 50 years. Successful economic development without water is not possible. The plan includes a wide variety of strategies, including conservation, reuse, connection of existing supplies, and development of new supplies. The Dallas Chamber supports the plan.

Response: The RCWPG thanks you for your support of and participation in the regional water planning effort. The RCWPG has included the strategies that the water suppliers in the area have asked the planning group to include. No changes were made to the final report based on this comment.

14. Janice Bezanson, Texas Committee on Natural Resources

Ms. Bezanson spoke on behalf of the Texas Committee on Natural Resources, the state affiliate of the National Wildlife Federation. Ms. Bezanson speculated on the projected water demand. She suggested that the water needs would be one million acre-feet per year less if the gpcd was assumed to be 160 instead of 225. Ms. Bezanson suggested that the planned reuse would be enough to meet this projected need. Ms. Bezanson recommended that the RCWPG include more reuse, using an ultra filtration process. Ms. Bezanson said that the cost for desalinating Lake Texoma water is competitive with other options but appears to be more expensive because the comparison is between treated water from Lake Texoma and raw water from other sources. Ms. Bezanson suggested that the western portion of Region C could get somewhat saline water from the Brazos River and desalinate it. She also suggested Lake Wright Patman as an existing source that could be utilized from the Sulphur Basin.

Ms. Bezanson told the group that it was not right to force people from their land or to drown a national wildlife refuge. She told the group that she did not understand why they were not following Connie Standridge's lead and putting existing water sources ahead of new reservoirs. Ms. Bezanson is opposed to all new reservoirs.

Response: The projections that have been developed are based on historical use and expected trends. The demands were developed according to the TWDB methodology. To expect the Region C area to have a decline of over 60 gpcd is unrealistic. The Region C plan includes recommendations for using water from Lake Texoma and Wright Patman Lake.

The RCWPG has recommended only four new reservoirs to be constructed over the next 50 years. Twenty-five reservoirs have been constructed in the last 55 years for water supply for Region C. The RCWPG is sympathetic to the landowners and businesses that would be impacted by the proposed projects. However, the Region C water suppliers have worked together to come up with regional supplies to decrease the impact of new reservoir development.

The national wildlife refuge that Ms. Bezanson mentions in her comments is a proposed site that would be inundated by Lake Fastrill. The refuge does not currently exist. The RCWPG has worked with the water suppliers in the area to develop the strategies and timing of those strategies. The recommended strategies represent the plans of the water suppliers and the timing of the needed supplies in Region C. No changes were made to the final report based on this comment.

15. Bill Madden

Mr. Madden spoke in support of the plan and the planning group's work. Mr. Madden compared water as being an asset and encouraged the planning group to keep their options open. He encouraged further study of the recommended strategies.

Response: The RCWPG supports the concept of a flexible water plan that allows for alternative strategies. However, the TWDB does not currently recognize alterative strategies. By including recommended and alternative strategies in the plan, the RCWPG hopes to keep all of the preferred water supply options available. The RCWPG appreciates your support of and participation in the regional water planning process. No changes were made to the final report based on this comment.

16. David Nabors, Landowner – Northeast Texas

Mr. Nabors accused the RCWPG of not protecting agricultural and natural resources in the plan. Mr. Nabors stated that proposing to build a new reservoir prior to using existing water supplies was equivalent to ignoring the agricultural industry. He asked when the planning group was going to look at the 35 percent contingency fee and ask if that was why FNI was pushing for the new reservoirs. Mr. Nabors listed existing projects that might have water available to sell to the DFW area, including Toledo Bend, Lake O' the Pines, and Lake Wright Patman. He asked why these sources were not being recommended ahead of Marvin Nichols. He suggested that water suppliers in Region C go in together and install a desalination plant. Mr. Nabors urged the planning group to leave the farmland alone and get water elsewhere so that Region D could provide food to the area.

Response: The Region C plan protects agricultural and natural resources by combining efforts to develop regional supplies instead of numerous individual new supplies.

The 35 percent engineering and contingency fees are based on the TWDB rules and regulations for developing cost estimates. In reality, the majority of that 35 percent goes towards contingencies and only 6-8 percent of that number goes towards the engineering fees.

FNI spoke with the Corps about raising the level of Wright Patman Lake. The Corps is willing to consider raising the lake level to 228.64 feet msl. The recommended strategy regarding additional supply from Wright Patman Lake for Dallas takes the lake level up to this new elevation. Additional water from Lake Texoma, Toledo Bend, and Lake O' the Pines has been evaluated in this study. All are recommended strategies, with the exception of Lake O' the Pines. Lake O' the Pines is not a recommended strategy because it has too little supply and is located too far away to be economical. No changes were made to the final report based on this comment.

17. Marc Maxwell, City of Sulphur Springs

Mr. Maxwell is the City Manager of Sulphur Springs and spoke on behalf of the City of Sulphur Springs. Mr. Maxwell noted that Sulphur Springs is located in Region D. However, Sulphur Springs supports the development of new reservoirs, particularly the Parkhouse reservoirs. Mr. Maxwell extended an invitation to the RCWPG that if they are ever interested in developing one or both of the Parkhouse reservoirs to give him a call.

Response: The Parkhouse North and South reservoirs are included as alternative strategies in the Region C plan. The North location is an alternative strategy for Dallas, NTMWD, TRWD, and UTRWD. The South location is an alternative strategy for NTMWD and UTRWD. The RCWPG appreciates your support of and participation in the planning process. No changes were made to the final report based on this comment.

18. Dolores Bryson, Friends of Texas State Railroad

Ms. Bryson is a resident of Cherokee County. She is opposed to the proposed Lake Fastrill. Ms. Bryson is concerned about the impacts of the reservoir on the Big Thicket. Ms. Bryson is associated with the Friends of Texas State Railroad. She claims that the railroad would be destroyed if Lake Fastrill were built. The replacement cost for the bridge is approximately $110 million. The railroad is the major tourist attraction in the area and it supports the local economy. The proposed lake would force unwilling sellers from their land.

Response: Dallas has included Lake Fastrill in its long-range water plan and has asked the RCWPG to include the proposed reservoir in the regional water plan. The RCWPG has worked with the water suppliers in Region C trying to develop a plan that represents the plans of the water providers. The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Mitigation of impacts of Lake Fastrill, including impacts on the Texas State Railroad, will certainly be required in the permitting process for the lake. The RCWPG has put forth a plan with an increased focus on water conservation and reuse, as well as a limited number of new reservoir projects.

The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. The RCWPG is not involved in the agreements between such parties. No changes were made to the final report based on this comment.

19. Jack C. Black, Self

Mr. Black is a resident of Garland. His wife inherited land in the Sulphur Basin in Bowie County. The land has not been altered and has plenty of game and hardwood trees. If Marvin Nichols is built, this land would be inundated. Despite all of the history, Mr. Black supports the Marvin Nichols project. Bowie County is a large county with a relatively small population. The people around the reservoir will benefit from the project.

Response: The RCWPG appreciates your support and participation in the regional planning efforts. Marvin Nichols Reservoir is included as a recommended strategy for NTMWD, TRWD, and UTRWD. Marvin Nichols Reservoir is an alternative strategy for Dallas and Irving. Marvin Nichols Reservoir was in the *2001 Region C Water Plan* and 2002 State Water Plan and has been in the State Water Plan since 1968. No changes were made to the final report based on this comment.

20. Eugene Decker, Landowner

Mr. Decker is a landowner and part-time resident in Cherokee County near the location of the proposed Lake Fastrill. Mr. Decker has worked in third world agriculture and has seen the damage in Haiti resulting from insufficient care of the environment. He noted that many of the large lakes in the U.S. are considerably low, including Lake Powell, Lake Mead, and the Great Lakes. Mr. Decker noted the loss of wetlands in Louisiana. He also mentioned the problems on the Neches River and Gulf Coast as a result of Lake Palestine. Mr. Decker asked if there was any foreign money involved in the water projects. He mentioned the TXDOT Trans-Texas Corridor being built and operated by a company in Spain and the water system in Atlanta belonging to a British company. Mr. Decker encouraged the press to visit the watch.org and polarisinstitute.org web sites.

Response: Dependable water supply is a concern throughout the world. The RCWPG has monitored media reports on water supply issues.

The RCWPG has worked diligently to recommend projects that would have the least impact on the environment. The RCWPG has recommended four new reservoirs to supply additional water in the next 50 years compared to 25 new reservoirs that were constructed in the previous 55 years. Considering the population projections, this is a considerable reduction in new reservoir development. During the permitting process, the responsible agencies will require appropriate steps to be taken to protect the environment.

The RCWPG is not responsible for the funding or permitting of water supply projects. The RCWPG is not aware of any foreign investments being discussed for water supply development in North Texas. The results of the infrastructure financing survey conducted this summer did not reveal any foreign investments for water supply development. No changes were made to the final report based on this comment.

21. Chip Perryman, Athens Municipal Water Authority

Mr. Perryman spoke on behalf of the Athens Municipal Water Authority (AMWA). AMWA provides water primarily to the City of Athens and the Texas Freshwater Fishery Center. He stated that the City of Athens is split between Regions C and I. AMWA sees itself in dire need of water by 2016. The strategies included in the plan are the answers to meeting these needs. Mr. Perryman thanked the RCWPG, officers, consultants, and TWDB for helping AMWA come up with answers to meet their water supply needs. Mr. Perryman offered his full support of the plan.

Response: The RCWPG amended the 2001 Plan to include additional strategies for AMWA. The RCWPG appreciates your support of and participation in the regional planning efforts. No changes were made to the final report based on this comment.

22. Rita Beving, Sierra Club

Ms. Beving spoke on behalf of the Dallas and Fort Worth Sierra Clubs. Ms. Beving spoke about the alignment of uncommon allies in opposition to new reservoirs, including the timber industry, ranchers, paper producers, environmental groups, and others. Ms. Beving requested that comments provided to the RCWPG from April through September 9 be included as public comment. Ms. Beving asked the planning group that if they held another public hearing to consider holding it at 7 PM to allow more of the public to attend. She also noted that some regions were having more than one public hearing. Ms. Beving mentioned that some people chose not to attend the public hearing because they were not allowed to speak at the previous planning group meeting. Ms. Beving spoke against the four new reservoirs recommended in the plan. She recommended additional supplies come from existing reservoirs instead of new ones.

Response: The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The new reservoirs listed as recommended or alternative strategies in the Region C plan are reservoir projects that the water suppliers in Region C have requested the planning group include in the plan. The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project. The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed.

The RCWPG held a public hearing at 1 PM on July 11, 1005, in accordance with TWDB guidelines. The RCWPG allows the public to comment on action items and during the general comment portion of each of their regular public meetings. At the RCWPG meeting held in May, a representative "for" and a representative "against" new reservoirs was asked to speak on the action item. Additional speakers could have provided comments during the general comment portion of the meeting. No changes were made based on these comments.

23. Jean Black, Self

Ms. Black is a property owner in Bowie County. Her property is located approximately three miles from the proposed dam. She stated that she supported the Marvin Nichols project and added that most of the timber has been cut in that area and a swampland is what remains.

Response: The RCWPG appreciates your support of and participation in the regional planning efforts. Marvin Nichols Reservoir is included as a recommended strategy for NTMWD, TRWD, and UTRWD. Marvin Nichols Reservoir is an alternative strategy for Dallas and Irving. Marvin Nichols Reservoir was in the *2001 Region C Water Plan* and 2002 State Water Plan and has been in the State Water Plan since 1968. No changes were made to the final report based on this comment.

24. Charles Allen, Trinity River Expeditions

Mr. Allen is a Dallas resident and earns a living as a guide for canoe trips in the Trinity watershed. He appreciates the conservation, reuse, and use of existing supplies included in the plan. However, he opposes the new reservoirs that are recommended in the plan. He noted that people in East Texas also make their living off the rivers and floodplains and that they should be allowed to continue to do so.

Response: The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The new reservoirs listed as recommended or alternative strategies in the Region C plan are reservoir projects that the water suppliers in Region C have asked the planning group to include. The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project. The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on this comment.

25. Ronda Visintainer, Fort Worth Branch, ASCE

Ms. Visintainer spoke on behalf of the Fort Worth Branch of the American Society of Civil Engineers. The Fort Worth Branch supports the conservation, reuse, expansion of existing supplies, and acquisition and connection to existing and proposed sources.

Response: The RCWPG appreciates your participation in and support of the regional water planning process. No changes were made to the final report based on this comment.

26. Becky Bornhorst, Self

Ms. Bornhorst is a DeSoto resident whose father owns land in Leon and Cherokee Counties. Ms. Bornhorst is opposed to the new reservoirs in the plan and asked the planning group to remove them. In her opinion, official policy should be to meet water needs with existing reservoirs, conservation, and reuse. She noted that the draft plan admits that building new reservoirs would have a negative impact on the environment, agriculture, and rural resources. She noted that the planning group would be confiscating homes and family farms, and that they had the moral obligation to exhaust all other possibilities first. The burden of *proof should be on the agency, not the public. Thus far, the new reservoirs included in the plan are unnecessary.*

Response: The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The new reservoirs listed as recommended or alternative strategies in the Region C plan are reservoir projects that the water suppliers in Region C have asked the planning group include.

The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project. The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on this comment.

27. James E. Gathings, Self

Mr. Gathings resides in Euless, Texas and spoke in support of the plan. Mr. Gathings encouraged the group to support a better public education program regarding water issues. He suggested forming a speakers' bureau to make presentations to various groups, focusing primarily on conservation and reuse.

Response: The RCWPG appreciates your participation in and support of the regional water planning process. Over the last several years, RCWPG members have made presentations to various organizations when asked. No changes were made to the final report based on this comment.

28. Robert Larson, Texas Committee on Natural Resources

Mr. Larson is a resident of Carrollton. He agreed with Mr. Frost's comments that building Marvin Nichols Reservoir would be inconsistent with protecting agricultural and natural resources of Region D. Mr. Larson also mentioned the impact on the proposed Neches River National Wildlife Refuge. Mr. Larson is opposed to new reservoir development and asked the RCWPG why they are choosing the most "high risk" plan.

Response: The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The new reservoirs listed as recommended or alternative strategies in the Region C plan are reservoir projects that the water suppliers in Region C have asked the planning group to include. The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project. The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on this comment.

29. Carol Nash

Ms. Nash is a science teacher at the Environmental Education Center in Dallas. She suggested that the RCWPG had not been educated on the topic of biodiversity and habitat loss. She noted that the areas for the proposed reservoirs are centers of biodiversity. Ms. Nash discussed the idea of reintroducing the Louisiana Black Bear into East Texas in the Neches River or Sulphur River areas. She gave the RCWPG three "homework" assignments: 1) study Beth Johnson's tables, 2) read and discuss Dr. Seuss' book the Lorax, and 3) visit the savetexasrivers.com web site.

Response: The RCWPG has taken into consideration the impact that the recommended strategies might have on the environment. The RCWPG has only recommended four new reservoirs to be constructed over the next 50 years, as opposed to the 25 constructed for water supply in the previous 55 years. Mitigation of impacts of these reservoirs, including impacts on the environment, will certainly be required in the permitting process for the recommended lakes.

The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. The RCWPG included significant amounts of water conservation, reuse, and the use of existing supplies in its plan. No changes were made to the final report based on this comment.

30. Jan Sanders, Self

Ms. Sanders questioned the "bottom up" process and its effectiveness in Region C. She opposes the new reservoirs recommended in the plan. She commented that the water would be cheaper in a new reservoir but claimed that the numbers didn't add up. She disagreed with the idea of keeping the new reservoirs in the plan to use in negotiations and allowing the people of East Texas to become "bargaining chips". She asked why the water supplier plans "trump" all of the other criteria in making decisions on recommended strategies. Ms. Sanders would like to see justification as to why these reservoirs are needed. She also told the RCWPG that it was wrong to dangle eminent domain power over the ranchers and farmers of East Texas.

Response: The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The new reservoirs listed as recommended or alternative strategies in the Region C plan are reservoir projects that the water suppliers in Region C have asked the planning group to include. The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project.

This plan represents the "bottom up" process intended by the Texas Legislature when it enacted Senate Bill One in 1997 by including the plans of local water suppliers. The water suppliers are the entities who will be developing the needed supplies.

The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. The RCWPG does not have the power of eminent domain. The RCWPG included significant amounts of water conservation, reuse, and the use of existing supplies in its plan. No changes were made to the final report based on this comment.

31. Molly Rooke, Sierra Club

Ms. Rooke spoke on behalf of the Dallas Sierra Club. Ms. Rooke offered comments on water conservation. She noted that the Sierra Club does not recognize reuse as a water conservation measure. Ms. Rooke asked the RCWPG to consider adopting overall water conservation goals and targets for municipal suppliers, similar to recommendations used in Region L. She asked that the projected water savings from conservation be adjusted to only reflect conservation and not include reuse. Ms. Rooke asked the RCWPG to review water conservation measures such as rain water harvesting and gray water systems. She also suggested that the RCWPG ought to anticipate reduction in industrial water use by a reasonable percentage. (Ms. Rooke ran out of time to finish reading the letter she provided.)

Response: See response to written comment number 22 in this appendix. Ms. Rooke provided a copy of her complete letter that she partially read to the planning group at the public hearing. The letter is included in Appendix AA as written comment #22.

32. Shelly Seymour, Self

Ms. Seymour is a Dallas resident and is opposed to new reservoirs. She believes that North Texans should learn to use water more wisely. Ms. Seymour refers to the water waste that she witnesses and what she sees as a lack of code enforcement. Ms. Seymour notes that North Texans use more water than people in other areas of the state, despite the higher rainfall. She would support new reservoirs if North Texans worked harder at conserving water and there was still a need.

Response: The RCWPG supports water conservation. The planning group has recommended conservation for every municipal water user group, whether or not they have water needs. Public education is a key element to water conservation. The TWDB has initiated a state-wide water conservation program. Individual cities and water suppliers also have water conservation programs. Enforcement of such programs is up to the responsible city/supplier. No changes were made to the final report based on this comment.

33. Gail Arbetter

Ms. Arbetter is a Dallas resident and a member of the Texas Committee on Natural Resources. Ms. Arbetter considers many of the projects in the plan to be "high risk" with a good chance of never being implemented. Marvin Nichols Reservoir has "unprecedented" opposition. The removal of timber and plants would impact the air quality, which is already problematic. Ms. Arbetter supports the proposed wildlife refuge in the Neches Basin. She recommends using existing sources with known water transmission costs to the prediction of costs for new reservoir construction.

Response: The RCWPG has analyzed hundreds of potentially feasible water management strategies. Cost is not the only criteria the RCWPG considered when recommending water management strategies. The RCWPG worked with water suppliers in the region to ensure that the strategies recommended in the plan were in line with the plans of the water providers. Any new reservoir project will have opposition. The opposition to the Marvin Nichols and Fastrill Reservoirs has been vocal at the Region C meetings. However, supporters for the proposed projects are also making their voices heard. The RCWPG included water conservation, reuse, and the connection of existing reservoirs as strategies to meet future needs, as well as new supplies. No changes were made to the final report based on this comment.

34. Michael Boydston, Self

Mr. Boydston is a Dallas resident and spoke on behalf of his family and himself. Mr. Boydston opposes any new reservoirs. He advocates water conservation and said that the conservation will be greater than what the plan anticipates. He quoted year 2001 per capita water use figures from the TWDB. He noted the water waste that he has witnessed. He questions the perpetual growth in Region C.

Response: The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The new reservoirs listed as recommended or alternative strategies in the Region C plan are reservoir projects that the water suppliers in Region C have asked the planning group to include.

The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project. The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed.

Water conservation codes and enforcement of those codes are left up to the cities that approve such measures. The RCWPG has no control over the implementation or enforcement of water conservation measures. No changes were made to the final report based on these comments.

35. Albert W. Holmes, Friends of Texas State Railroad

Mr. Holmes lives in Palestine, Texas. He is President of the Friends of the Texas State Railroad. The railroad is the largest tourist attraction in Anderson and Cherokee Counties. Building Lake Fastrill would destroy the railroad, the Big Thicket wetlands, and the habitat of endangered species. According to Mr. Holmes, the train would cease to exist as it would cost $105 million to replace three miles of track and trestle.

Response: The RCWPG is aware that the Texas State Railroad is located in the area of the proposed Lake Fastrill. The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Mitigation of impacts of Lake Fastrill, including impacts on the Texas State Railroad and the environment, will certainly be required in the permitting process for the lake. The RCWPG has put forth a plan with an increased focus on water conservation and reuse, as well as a limited number of new reservoir projects.

Dallas has included Lake Fastrill in its long-range water plan and has asked the RCWPG to include the proposed reservoir in the regional water plan. The RCWPG has worked with the water suppliers in Region C trying to develop a plan that represents the plans of the water providers. For any reservoir that is developed, landowners would have to be compensated for the loss of their land.

The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on this comment.

36. Brett Johnson, Texas Parks and Wildlife

Mr. Johnson is a wildlife biologist with the Texas Parks and Wildlife. He noted that reservoirs are artificial systems. Construction of the proposed reservoirs would remove bottomland hardwoods. Mr. Johnson commented that the proposed dams would impact flooding regimes and stream dynamics downstream. He asked the RCWPG to keep in mind that there are unknown ecological impacts associated with reservoirs.

Response: The RCWPG is aware that reservoir construction would impact the environment as it currently exists. While bottomland hardwoods would be impacted, development of mitigation lands would be required to account for this loss. The RCWPG is recommending four new reservoirs for the next 50 years, which is a considerable reduction in the development of reservoirs in the previous 50 years. The TCEQ would require a new reservoir to make releases to maintain flows for the health of the river downstream of the dam. No changes were made to the final report based on this comment.

37. David Dunnigan, Greater Dallas Planning Council

Mr. Dunnigan is the executive director of the Greater Dallas Planning Council and spoke on their behalf. The Council fully supports the Region C plan. The Council supports increased conservation and reuse. Additional supplies will be needed to meet the future water demands.

Response: The RCWPG appreciates your participation in and support of the regional water planning process. One of the goals of the RCWPG is to meet the water needs for the next 50 years in order to support the expected growth in this area. No changes were made to the final report based on this comment.

38. James H. Henderson, Self

Mr. Henderson is a Dallas resident and is a geologist involved in the oil and gas industry. He asked what was going to happen to the mineral estate underneath the proposed reservoirs.

Response: The RCWPG is not involved in the development of any of the recommended projects. The mineral rights will be handled by the owner of the development, likely in a manner similar to the surface land rights. The project owner will attempt to negotiate either a purchase of the mineral rights or an appropriate compensation for the incremental cost of accessing those mineral rights. If no agreement can be reached, the condemnation process can be utilized. With advanced drilling methods, it is likely that, in many cases, the owner of the mineral rights will still be able to produce oil or gas from under the reservoir and will only receive compensation for the incremental increase in the cost of doing so. No changes were made based on this comment.

Responses to Written Comments Received on the Initially Prepared Plan

1. *Tom Baker, June 22, 2005*

   The RCWPG appreciates your participation in and support of the regional water planning process. One of the goals of the RCWPG is to meet the water needs for the next 50 years in order to support the expected growth in this area. No changes were made to the final report based on this comment.

2. *Alan Walne, Co-Chair Water Leadership Committee of the Greater Dallas Chamber, June 22, 2005*

   The RCWPG appreciates your participation in and support of the regional water planning process. The plan includes water conservation, reuse, connection of existing supplies, and development of new reservoirs. No changes were made to the final report based on this comment.

3. *Albert Black, Co-Chair Water Leadership Committee of the Greater Dallas Chamber, June 22, 2005*

   The RCWPG appreciates your participation in and support of the regional water planning process. The plan includes water conservation, reuse, connection of existing supplies, and development of new reservoirs. No changes were made to the final report based on this comment.

4. *Charles L. Gummer, Comerica Bank, June 22, 2005*

   The RCWPG appreciates your participation in and support of the regional water planning process. The plan includes water conservation, reuse, connection of existing supplies, and development of new reservoirs. No changes were made to the final report based on this comment.

5. *Pedro Aguirre, President and CEO of Aguirre Corporation, June 22, 2005*

   The RCWPG appreciates your participation in and support of the regional water planning process. The plan includes water conservation, reuse, connection of existing supplies, and development of new reservoirs. No changes were made to the final report based on this comment.

6. *Thomas L. Leppert, Chairman and CEO of The Turner Corporation, June 22, 2005*

   The RCWPG appreciates your participation in and support of the regional water planning process. The plan includes water conservation, reuse, connection of existing supplies, and development of new reservoirs. No changes were made to the final report based on this comment.

7. *John Kessel, Executive Director of Development Services for City of McKinney, June 22, 2005*

   The RCWPG appreciates your participation in and support of the regional water planning process. The plan includes water conservation, reuse, connection of existing supplies, and development of new reservoirs. No changes were made to the final report based on this comment.

8. *Pat Boyle, Group V.P./General Manager of Schepps, June 22, 2005*

   The RCWPG appreciates your participation in and support of the regional water planning process. The plan includes water conservation, reuse, connection of existing supplies, and development of new reservoirs. No changes were made to the final report based on this comment.

9. *Craig Roberts, General Manager of Oak Farms Dairy, June 22, 2005*

   The RCWPG appreciates your participation in and support of the regional water planning process. The plan includes water conservation, reuse, connection of existing supplies, and development of new reservoirs. No changes were made to the final report based on this comment.

10. *H. Ralph Hawkins, President and CEO of HKS, Inc., June 23, 2005*

    The RCWPG appreciates your participation in and support of the regional water planning process. The plan includes water conservation, reuse, connection of existing supplies, and development of new reservoirs. No changes were made to the final report based on this comment.

11. *Frank M. Roby, CEO of Holmes Murphy, June 23, 2005*

    The RCWPG appreciates your participation in and support of the regional water planning process. The plan includes water conservation, reuse, connection of existing supplies, and development of new reservoirs. No changes were made to the final report based on this comment.

12. *Robert F. Murchison, Murchison Capital Partners, June 23, 2005*

    The RCWPG appreciates your participation in and support of the regional water planning process. The plan includes water conservation, reuse, connection of existing supplies, and development of new reservoirs. No changes were made to the final report based on this comment.

13. *Kathleen Mason, President & CEO of Tuesday Morning, June 25, 2005*

    The RCWPG appreciates your participation in and support of the regional water planning process. The plan includes water conservation, reuse, connection of existing supplies, and development of new reservoirs. No changes were made to the final report based on this comment.

14. *Louis J. Grabowsky, Managing Partner of Grant Thornton, June 28, 2005*

    The RCWPG appreciates your participation in and support of the regional water planning process. The plan includes water conservation, reuse, connection of existing supplies, and development of new reservoirs. No changes were made to the final report based on this comment.

15. *Joel Allison, Chairman of Greater Dallas Chamber, June 29, 2005*

    The RCWPG appreciates your participation in and support of the regional water planning process. The plan includes water conservation, reuse, connection of existing supplies, and development of new reservoirs. No changes were made to the final report based on this comment.

16. *City of Allen City Council Resolution endorsing the Region C plan, submitted by Stephen Massey, Community Services Director City of Allen, June 29, 2005*

    The RCWPG appreciates your participation in and support of the regional water planning process. One of the goals of the RCWPG is to meet the water needs for the next 50 years in order to support the expected growth in this area. No changes were made to the final report based on this comment.

17. *Ronda Visintainer, President of Fort Worth Branch of American Society of Civil Engineers, July 5, 2005*

    The RCWPG appreciates your participation in and support of the regional water planning process. One of the goals of the RCWPG is to meet the water needs for the next 50 years in order to support the expected growth in this area. No changes were made to the final report based on this comment.

18. *Brandt Mannchen, Chair of the Big Thicket Committee of the Lone Star Chapter of the Sierra Club, July 6, 2005*

    a. Lake Fastrill is a recommended strategy for Dallas in the Region C plan. The City of Dallas has included Lake Fastrill in their long-range water plans and asked the RCWPG to include the proposed reservoir in the *2006 Region C Water Plan*. The City of Dallas, in cooperation with the Upper Neches River Municipal Water Authority, is evaluating the Lake Fastrill project to determine if it can be developed in cooperation with the proposed

Neches River Wildlife Refuge. The Rockland Dam is not a recommended strategy in the Region C plan.

The RCWPG understands that new reservoir development will impact landowners, the environment, and others. The RCWPG has put forth a plan with an increased focus on water conservation, reuse, and connection of existing supplies, as well as a limited number of new reservoir projects.

The RCWPG has no position on the proposed wildlife refuge in the Neches Basin.

No changes were made to the final report based on this comment.

b. All of the stream segments listed are in Region I. The RCWPG did not recommend the designation of any unique stream segments in other regions. No changes were made to the final report based on this comment.

19. Albert H. Holmes, President of the Friends of the Texas State Railroad, June 8, 2005

The RCWPG is aware that the Texas State Railroad is located in the area of the proposed Lake Fastrill. Based on our understanding of state law, it is inconceivable that Lake Fastrill would be permitted unless the Texas State Railroad is protected, and the cost estimates for the lake include protection of the railroad. Mitigation of impacts of Lake Fastrill, including impacts on the Texas State Railroad and the environment, will be required in the permitting process for the lake. The RCWPG understands that new reservoir development will impact landowners, the environment, and others. The RCWPG has put forth a plan with an increased focus on water conservation and reuse, as well as a limited number of new reservoir projects.

Dallas has included Lake Fastrill in its long-range water plan and has asked the RCWPG to include the proposed reservoir in the regional water plan. The RCWPG has worked with the water suppliers in Region C trying to develop a plan that represents the plans of the water providers. For any reservoir that is developed, landowners would have to be compensated for the loss of their land.

The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on this comment.

20. Johnny D. Harris, General Manager Lake Cities MUA, July 8, 2005

The RCWPG appreciates your participation in and support of the regional water planning process. Lake Ralph Hall is a recommended strategy for the Upper Trinity Regional Water District and is expected to provide surface water supply to the Fannin and Denton County areas. No changes were made to the final report based on this comment.

21. *Karen Walz, President of Greater Dallas Planning Council, July 9, 2005*

The RCWPG appreciates your participation in and support of the regional water planning process. The plan includes water conservation, reuse, connection of existing supplies, and development of new reservoirs. No changes were made to the final report based on this comment.

22. *Molly Rooke, Dallas Regional Group of the Sierra Club, July 10, 2005*

The RCWPG has included water reuse as a part of water conservation per the recommendation of the State Water Conservation Implementation Task Force.

a. Water conservation targets and goals should be developed by the cities themselves, as a part of their water conservation plan. The projected conservation in Region C is based on specific conservation measures with quantifiable water supply savings. It is not realistic to expect every water user group in Region C to decrease their per capita water use to 125 to 140 gpcd. We do not believe that it is advisable to assume blanket conservation savings based on arbitrary gpcd goals without specific measures to achieve these savings.

   The Region C plan includes significant amounts of water conservation for each water user group, even those who are not expected to have any shortages during the planning period. No changes were made to the final report based on this comment.

b. The RCWPG included a variety of BMPs recommended by the Water Implementation Conservation Task Force. While the plan does not recommend rainwater harvesting or graywater systems for specific cities, individuals or areas that would like to pursue such projects are encouraged to do so. At the request of the Sierra Club, we did evaluate the unit cost of water supplied by these measures, and we found the cost to be quite high. No changes were made to the final report based on this comment.

   The RCWPG is <u>not</u> recommending a target of indoor per capita use of 50 gpcd. Such a recommendation is best determined by the individual cities. The same is true for the summer-to-winter ratio of 1.6. No changes were made to the final report based on this comment.

c. Section 4B.3 of the Initially Prepared Plan discusses the reasons the RCWPG did not recommend drought management as a strategy. No changes were made to the final report based on this comment.

d. The *2006 Region C Water Plan* recommends water conservation for manufacturing use through general rebates. Industry-specific conservation was not recommended because historical information on water use by industry is not public information and is not available to the RCWPG. Specific information on water use and processes are unique to each industry and must be reviewed on a case-by-case basis. Such a task is best left to the individual companies to determine how to save water in their operations. No changes were made to the final report based on this comment.

23. *Kent Rylander, July 10, 2005*

Dallas has included Lake Fastrill in its long-range water plan and has asked the RCWPG to include the proposed reservoir in the regional water plan. The RCWPG has worked with the water suppliers in Region C trying to develop a plan that represents the plans off the water providers. The City of Dallas, in cooperation with the Upper Neches River Municipal Water Authority, is evaluating the Lake Fastrill project to determine if it can be developed in cooperation with the proposed Neches River Wildlife Refuge.

The RCWPG understands that new reservoir development will impact landowners, the environment, and others. The RCWPG has put forth a plan with an increased focus on water conservation and reuse. The plan also includes the connection of existing supplies and the development of a limited number of new reservoir projects.

The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on this comment.

24. *Mack Turner, July 10, 2005*

The Region C plan includes additional water supplies from Lake Texoma and Toledo Bend. The plan also has an increased focus on water conservation and reuse. The RCWPG is not a regulatory agency and does not have the power to set or enforce conservation regulations for cities. Such tasks are left up to the individual cities. No changes were made to the final report based on this comment.

25. *Jose Novoa, Halff Associates, July 11, 2005*

The RCWPG appreciates your participation in and support of the regional water planning process. One of the goals of the RCWPG is to meet the water needs for the next 50 years in order to support the expected growth in this area. No changes were made to the final report based on this comment.

26. *mln1229@earthlink.com, July 11, 2005*

Region C does not include Van Zandt County. Comments on groundwater use in Van Zandt County should be addressed to Region D. Impacts on groundwater availability in Region C from the Ozarka court ruling is beyond the scope of regional water planning. The RCWPG has no regulatory authority to limit groundwater pumping. No changes were made to the final report based on this comment.

27. *Joe L. Buford, July 12, 2005*

The RCWPG appreciates your participation in and support of the regional water planning process. One of the goals of the RCWPG is to meet the water needs for the next 50 years in order to support the expected growth in this area. The RCWPG recommends meeting this goal with conservation, reuse, connection of existing supplies, and development of a limited number of new reservoirs. Marvin Nichols Reservoir is one of the recommended strategies in the plan. No changes were made to the final report based on this comment.

28. *Marilyn Smith, July 12, 2005*

The RCWPG appreciates your participation in and support of the regional water planning process. One of the goals of the RCWPG is to meet the water needs for the next 50 years in order to support the expected growth in this area. The RCWPG recommends meeting this goal with conservation, reuse, connection of existing supplies, and development of a limited number of new reservoirs. No changes were made to the final report based on this comment.

29. *Ann Rushing, Mayor for the City of Clarksville writing on behalf of herself, the City Council, City Manager, and the Economic Development Corporation, July 12, 2005*

The RCWPG appreciates your participation in and support of the regional water planning process. One of the goals of the RCWPG is to meet the water needs for the next 50 years in order to support the expected growth in this area. The RCWPG recommends meeting this goal with conservation, reuse, connection of existing supplies, and development of a limited number of new reservoirs. Marvin Nichols Reservoir is one of the recommended strategies in the plan. No changes were made to the final report based on this comment.

30. *Bruce Wilke, July 15, 2005*

The RCWPG appreciates your participation in and support of the regional water planning process. One of the goals of the RCWPG is to meet the water needs for the next 50 years in order to support the expected growth in this area. The RCWPG recommends meeting this goal with conservation, reuse, connection of existing supplies, and development of a limited number of new reservoirs. No changes were made to the final report based on this comment.

31. *John W. Burnett, City Commissioner for the City of Bonham, July 15, 2005*

The RCWPG appreciates your participation in and support of the regional water planning process. One of the goals of the RCWPG is to meet the water needs for the next 50 years in order to support the expected growth in this area. The RCWPG recommends meeting this goal with conservation, reuse, connection of existing supplies, and development of a limited number of new reservoirs. Lower Bois d'Arc Creek Reservoir is one of the recommended strategies in the plan. No changes were made to the final report based on this comment.

32. *Roy V. Floyd and family, Floyd Enterprises, July 18, 2005*

The RCWPG appreciates your participation in and support of the regional water planning process. One of the goals of the RCWPG is to meet the water needs for the next 50 years in order to support the expected growth in this area. The RCWPG recommends meeting this goal with conservation, reuse, connection of existing supplies, and development of a limited number of new reservoirs. Lower Bois d'Arc Creek Reservoir is one of the recommended strategies in the plan. No changes were made to the final report based on this comment.

33. *Ernest G. Farrow, July 18, 2005*

a. The City of Dallas currently has the capacity to reuse 561 acre-feet per year. The Region C plan includes an additional 203,912 acre-feet per year of reuse bringing the total reuse projected for Dallas to 204,473 acre-feet per year by 2060. The amount of proposed direct reuse planned for 2060, including the existing 561 acre-feet per year, is 21,019 acre-feet per year. This is equivalent to an average of 18.75 million gallons per day. No changes were made to the final report based on this comment.

b. Public education is a water conservation strategy that has been recommended as part of the "Basic Package" of water conservation measures for all water user groups in Region C. Region C agrees with the Water Conservation Implementation Task Force that water conservation and water reuse are related. Public education programs, including those for water conservation and reuse, are primarily the responsibility of the city and/or water supplier. Region C does not have funding to develop such a program. No changes were made to the final report based on this comment.

c. The Region C plan includes water conservation, reuse, connection of existing supplies, and development of new reservoirs. The proposed Lake Fastrill and Marvin Nichols Reservoir are recommended strategies in the Region C plan. These projects are included in the long-range water supply plans for Region C suppliers. No changes were made to the final report based on this comment.

d. The North Texas Municipal Water District (NTMWD) is pursuing a water right to indirectly reuse treated effluent through a system of constructed wetlands and pump it to Lake Lavon for additional mixing. This project is a recommended strategy for the NTMWD in the Region C plan. No changes were made to the final report based on this comment.

34. *Randall Davis, General Manager of the Argyle Water Supply Corporation, July 22, 2005*

The RCWPG appreciates your participation in and support of the regional water planning process. One of the goals of the RCWPG is to meet the water needs for the next 50 years in order to support the expected growth in this area. The RCWPG recommends meeting this goal with conservation, reuse, connection of existing supplies, and development of a limited number of new reservoirs.

The Region C Water Plan reflects increased purchases of water from the Upper Trinity River Water District by Argyle WSC. No changes were made to the final report based on this comment.

35. *Ann Rushing, Mayor for the City of Clarksville, July 24, 2005 and August 9, 2005*

The RCWPG received a copy of the resolution passed by the City of Clarksville City Council in support of the Marvin Nichols Reservoir (Resolutions 2002-33 and 2005-21). The RCWPG also received a copy of the letters dated July 21, 2005 written to Walt Sears of Region D and Kevin Ward of the Texas Water Development Board. The RCWPG appreciates your support of and participation in the regional water planning process. Marvin Nichols Reservoir is a recommended strategy in the Region C plan. No changes were made to the final report based on this comment.

36. Martha L. Mason, Argyle Representative to the Upper Trinity Regional Water District, (no date)

The RCWPG appreciates your participation in and support of the regional water planning process. Lake Ralph Hall is a recommended strategy for the Upper Trinity Regional Water District and is expected to provide surface water supply to the Fannin and Denton County areas. No changes were made to the final report based on this comment.

37. Kimberly Westmoreland, July 29, 2005

The new reservoirs listed as recommended or alternative strategies in the Region C plan are reservoir projects that the water suppliers in Region C have asked the planning group to include. The regional water planning process has brought water suppliers together to develop regional supplies as opposed to numerous individual supplies that would require more natural resources to develop. The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The City of Dallas, in cooperation with the Upper Neches River Municipal Water Authority, is evaluating the Lake Fastrill project to determine if it can be developed in cooperation with the proposed Neches River Wildlife Refuge. No changes were made to the final report based on this comment.

38. Mayor Jody Smith and City Council, City of Flower Mound, August 1, 2005 and August 26, 2005

The Upper Trinity Regional Water District (UTRWD) is a major wholesale water provider in Region C. While UTRWD does purchase water from Dallas as a part of their water supply, Dallas has assumed in their own long-range water planning that UTRWD will seek other water supplies beyond their current contractual amount, specifically Lake Ralph Hall. If Lake Ralph Hall is changed from a recommended strategy to an alternative strategy, then another water management strategy providing additional water supply will need to be developed to make up the difference. The RCWPG has included Lake Ralph Hall as a recommended strategy as it represents the future plans of both the UTRWD and Dallas. No changes were made to the final report based on this comment.

The RCWPG received a copy of the resolution passed by the City of Flower Mound with regards to the timing of Lake Ralph Hall. No changes were made to the final report based on this comment.

39. Jim D. Bush, August 2, 2005

a. The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The new reservoirs listed as recommended or alternative strategies in the Region C plan are reservoir projects that the water suppliers in Region C have asked the planning group to include. The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project. The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on this comment.

b. The RCWPG is aware that the proposed Lake Fastrill is in the same area as the proposed Neches River National Wildlife Refuge. The City of Dallas, in cooperation with the Upper Neches River Municipal Water Authority, is evaluating the Lake Fastrill project to determine if it can be developed in cooperation with the proposed Neches River Wildlife Refuge. Dallas has included Lake Fastrill in its long-range water plan and has asked the RCWPG to include the proposed reservoir in the regional water plan. The RCWPG has worked with the water suppliers in Region C trying to develop a plan that represents the projects that the entities plan to pursue. No changes were made to the final report based on this comment.

c. The RCWPG is aware of the opposition to the Marvin Nichols Reservoir by the Region D Regional Water Planning Group. The RCWPG has also heard from supporters of the reservoir who live or have land in the area of the proposed site. The Marvin Nichols Reservoir is a recommended strategy for the North Texas Municipal Water District, the Tarrant Regional Water District, and the Upper Trinity Regional Water District. Marvin Nichols Reservoir is an alternative strategy Dallas and Irving.

   The Ivorybill Woodpecker has not been spotted at the Marvin Nichols or Fastrill Reservoir sites. The Texas Parks and Wildlife Department does not list the Ivorybill Woodpecker as an endangered or threatened species in those areas. No changes were made to the final report based on these comments.

d. At the May meeting, the RCWPG agreed to review the timing of the recommended new reservoirs. The planning group discussed this at the October meeting.

e. Mitigation land will be required for any future reservoir. Mitigation land will provide and preserve habitat for wildlife. No changes were made to the final report based on this comment.

40. Nan Moss, August 4, 2005

The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The RCWPG has recommended only four new reservoirs to be constructed over the next 50 years. Twenty-five reservoirs have been constructed in the last 55 years for water supply for Region C. The RCWPG is sympathetic to the landowners and businesses that would be impacted by the proposed projects. The Region C water suppliers have worked together to come up with regional supplies to decrease the impact of reservoir development.

The RCWPG is aware that the proposed Lake Fastrill is in the same area as the proposed Neches River National Wildlife Refuge. The City of Dallas, in cooperation with the Upper Neches River Municipal Water Authority, is evaluating the Lake Fastrill project to determine if it can be developed in cooperation with the proposed Neches River Wildlife Refuge. Dallas has included Lake Fastrill in its long-range water plan and has asked the RCWPG to include the proposed reservoir in the regional water plan. The RCWPG has worked with the water suppliers in Region C trying to develop a plan that represents the projects that the entities have asked the planning group to include.

The RCWPG has no regulatory authority and does not have the power to close golf courses. No changes were made to the final report based on this comment.

41. A. G. Swan, Chairman of the Parker County Utility District #1, August 6, 2005

The RCWPG appreciates your support of and participation in the regional planning process. As you noted, financial programming is beyond the scope of the regional water planning group. During the next 50 years, many water user groups are expected to convert from groundwater to surface water due to declining water levels and/or water quality concerns. The RCWPG conducted an infrastructure financing survey during the summer of 2005. The majority of the smaller water suppliers responding indicated that they expect to seek state funding to aid in the financing of the recommended strategies. One of the policy recommendations in Section 8.3 encourages the continuation and expansion of funding programs to assist in the development of the recommended strategies. No changes were made to the final report based on this comment.

42. Lori Periche and George Misium, August 8, 2005

The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The RCWPG has recommended only four new reservoirs to be constructed over the next 50 years. Twenty-five reservoirs have been constructed in the last 55 years for water supply for Region C. The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project. The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed.

The RCWPG supports the inclusion of water conservation and reuse as strategies to meet projected water needs for the region. This is evidenced with the recommendation of water savings of over 1.2 million acre-feet per year by 2060 attributed to conservation and reuse. The implementation of the conservation measures to achieve these savings is the responsibilities of the individual cities or suppliers. The RCWPG does not have the authority to set water rates or enforce water conservation strategies. No changes were made to the final report based on this comment.

43. Wendy I. Ledbetter, Southeast Texas Projects Director of The Nature Conservancy, August 9, 2005

The Rockland Dam is not a strategy included in the Region C report. Lake Fastrill is a recommended strategy for Dallas in the Region C plan. The City of Dallas has included Lake Fastrill in their long-range water plans and asked the RCWPG to include the proposed reservoir in the Region C plan. The City of Dallas, in cooperation with the Upper Neches River Municipal Water Authority, is evaluating the Lake Fastrill project to determine if it can be developed in cooperation with the proposed Neches River Wildlife Refuge. The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of the Lake Fastrill project will be addressed during the permitting process for the project.

The RCWPG has put forth a plan with an increased focus on water conservation, reuse, and connection of existing supplies, as well as a limited number of new reservoir projects. No changes were made to the final report based on this comment.

44. *Renee Solinger Audette, August 14, 2005*

The RCWPG supports the inclusion of water conservation and reuse as strategies to meet projected water needs for the region. This is evidenced with the recommendation of water savings of over 1.2 million acre-feet per year by 2060 attributed to conservation and reuse. The implementation of the conservation measures to achieve these savings is the responsibilities of the individual cities or suppliers. The RCWPG does not have the authority to set water rates or enforce water conservation strategies. No changes were made to the final report based on this comment.

45. *Thomas E. Taylor, Executive Director of Upper Trinity Regional Water District, August 15, 2005*

The RCWPG appreciates your support of and participation in the regional water planning process.

a. Pages 1.53 and 1.54 refer to the 2001 Region C plan. In that plan, the Upper Trinity Regional Water District (UTRWD) did not meet the definition of "major water supplier" nor did UTRWD choose to individually participate in the Marvin Nichols Reservoir project. No changes were made to the final report based on this comment.

b. Page 3.5, Table 3.2 shows the supply available from Lake Chapman for Upper Trinity Regional Water District as 14,068. This amount is based on the Trinity WAM analysis. The contracts in Lake Chapman exceed the available yield (based on the WAM). Therefore, everyone's supply available to all users of the lake was decreased by the same percentage. No changes were made to the final report based on this comment.

c. Page 3.5, Table 3.2 was corrected to read "Chapman (UTRWD)" in the final report.

d. See response to 45.b.

e. Page 3.24, the 8th bullet was corrected to read "Lake Cities Municipal Utility Authority" in the final report.

f. Page 4C.4, Table 4C.1 – See response to 45.a.

g. Page 4C.7, Table 4C.2 was adjusted to include "UTRWD" as a Potential Sponsor for Oklahoma water and Wright Patman water.

h. Page 4C.7, Table 4C.2 was adjusted to include Upper Trinity Regional Water District as a Potential Sponsor of the Lake Texoma Not Yet Authorized Blend and Toledo Bend.

i. Page 4C.14, the second bullet in recent developments was adjusted to remove the reference to Irving studying and seeking a permit for Lake Ralph Hall.

j. Page 4C.22, Table 4C.6 – The sponsors have been changed to be consistent in both tables.

k. Page 4C.23, Table 4C.6 was adjusted to show that Lake Ralph Hall was "No (Alternate)" in the 2001 Plan in the final version of this report.

l. Page 4C.23, Table 4C.6 – Changes were made to be consistent.

m. Page 4D.4, Table 4D.2 – Changes were made.

n. Page 4F.18, Table 4F.8 – Trophy Club's current and future source was listed as Fort Worth rather than Upper Trinity Regional Water District in the final plan.

o. Page 4F.27 the text was updated to reflect that 90 percent of the yield of Lake Ralph Hall will be transported to Denton County and 10 percent will remain in Fannin County.

p. Page 6.18, Table 6.4 was adjusted to include reuse from Lake Ralph Hall.

q. "Ralph Hall Lake" was replaced with "Lake Ralph Hall" throughout the final report.

r. Page T-3, Table 1, Row 10 was corrected to say "UTRWD" in the comment column.

s. Page T-3, Table 1, Row 14 – The table was changed as requested.

t. Page T-11, Table 2, Row 4 – The table was changed as requested.

u. Table U-17 –Toledo Bend was added to Table U-95 as an alternative strategy for Upper Trinity Regional Water District.

46. Martha Davis and Charles C. Davis, August 16, 2005

The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The RCWPG has recommended only four new reservoirs to be constructed over the next 50 years. Twenty-five reservoirs have been constructed in the last 55 years for water supply for Region C. The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project. The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on this comment.

47. Kirk Miller, August 21, 2005

The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The RCWPG has recommended only four new reservoirs to be constructed over the next 50 years. Twenty-five reservoirs have been constructed in the last 55 years for water supply for Region C. The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project. The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed.

At the May meeting, the RCWPG agreed to review the timing of the recommended new reservoirs. They reviewed the timing of the recommended new reservoir projects at their October meeting. No changes were made to the final report based on this comment.

48. *Sandra Minatra, August 22, 2005*

The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The RCWPG has recommended only four new reservoirs to be constructed over the next 50 years. Twenty-five reservoirs have been constructed in the last 55 years for water supply for Region C. The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project. The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed.

At the May meeting, the RCWPG agreed to review the timing of the recommended new reservoirs. They will review the timing at their October meeting. No changes were made to the final report based on this comment.

49. *Virginia Blevins, Asst. City Administrator/City Secretary for the City of Justin (Included Resolution), August 26, 2005*

The RCWPG appreciates your participation in and support of the regional water planning process. Lake Ralph Hall is a recommended strategy for the Upper Trinity Regional Water District and is expected to provide surface water supply to the Fannin and Denton County areas. No changes were made to the final report based on this comment.

50. *Bruce Walker, Chair of the Golden Triangle Group Sierra Club, letter sent to Kevin Ward on August 2, 2005, who forwarded it to Jim Parks on August 29, 2005*

a. Lake Fastrill is a recommended strategy for Dallas and is included in the Region C plan. The Rockland Dam is not included in the Region C plan. No changes were made to the final report based on this comment.

b. The City of Dallas requested that Lake Fastrill be included as a recommended water management strategy in the Region C plan, as it is part of the City's long-range water plan. The RCWPG has worked with the Region C suppliers to include the plans of that the water suppliers have requested to be included in the regional water plan. Dallas has increased water conservation efforts in recent years. The City of Dallas does not have the highest per capita water use in Texas, nor does Region C have the highest per capita consumption in the state. No changes were made to the final report based on this comment.

c. Assuming the comment refers to potentially available water in Toledo Bend Reservoir in Region I, the Region C plan includes this as a recommended strategy for several of the larger water suppliers. The plan includes significant amounts of water conservation. No changes were made to the final report based on this comment.

d. The RCWPG is aware that reservoir development will impact landowners, businesses, the environment, and others. The RCWPG only recommended that four new reservoirs be developed over the next 50 years, a significant reduction in reservoir development from the previous 55 years. Reservoir development would also have a positive impact on the economy in the area with tourism and recreational opportunities. No changes were made to the final report based on this comment.

e. Comment noted. No changes were made to the final report based on this comment.

f. Lake Fastrill is far upstream from the Big Thicket, and flow impacts to the Big Thicket will be limited. Any new reservoir will have to obtain permits from the Texas Commission on Environmental Quality and impacts to streamflows and natural resources will be analyzed as part of the permitting process. No changes were made to the final report based on this comment.

g. Comment noted. See response to 51.f (above). No changes were made to the final report based on this comment.

h. The Region C plan has an increased focus on water conservation. However, the RCWPG does not have the authority to implement or enforce water conservation measures. Such a task is left to the cities themselves. No changes were made to the final report based on this comment.

51. *Leon Hurse, Mayor for the City of Ladonia, August 30, 2005*

The RCWPG appreciates your participation in and support of the regional water planning process. Lake Ralph Hall is a recommended strategy for the Upper Trinity Regional Water District and is expected to provide surface water supply to the Fannin and Denton County areas. No changes were made to the final report based on this comment.

52. *Jack Smith, City Manager for the City of Sanger (Included Resolution), August 30, 2005*

The RCWPG appreciates your participation in and support of the regional water planning process. Lake Ralph Hall is a recommended strategy for the Upper Trinity Regional Water District and is expected to provide surface water supply to the Fannin and Denton County areas. No changes were made to the final report based on this comment.

53. *M. Lynn Chapman, August 31, 2005*

The two Parkhouse reservoir sites have a total combined yield of 227,440 acre-feet per year. This is less than half of the supply available from Marvin Nichols Reservir to North Texas and 37 percent of the total yield of the project. Marvin Nichols Reservoir is a recommended strategy in the Region C plan for North Texas Municipal Water District (NTMWD), Tarrant Regional Water District (TRWD), and Upper Trinity Regional Water District (UTRWD) and is an alternative strategy for Dallas and Irving. The Parkhouse North and South reservoirs are included as alternative strategies in the Region C plan. The Parkhouse North location is an alternative strategy for Dallas, NTMWD, TRWD, and UTRWD. The Parkhouse South location is an alternative strategy for NTMWD and UTRWD. These sites are viable alternatives. The RCWPG appreciates your support of and participation in the planning process. No changes were made to the final report based on this comment.

54. *Vicki Baggett, (no date)*

The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The RCWPG has recommended only four new reservoirs to be constructed over the next 50 years. Twenty-five reservoirs have been constructed in the last 55 years for water supply for Region C. The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project. The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on this comment.

55. *Kevin Mercer, General Manager of Denton County FWSD 7 (Lantana) (Included Resolution), September 1, 2005*

The RCWPG appreciates your participation in and support of the regional water planning process. Lake Ralph Hall is a recommended strategy for the Upper Trinity Regional Water District and is expected to provide surface water supply to the Fannin and Denton County areas. No changes were made to the final report based on this comment.

56. *Bessie Neal Heath, September 2, 2005*

The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The RCWPG has recommended only four new reservoirs to be constructed over the next 50 years. Twenty-five reservoirs have been constructed in the last 55 years for water supply for Region C. The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project. The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on this comment.

57. *Ferrin H. Holcomb, D.D.S., Dentistry for Infants Children and Teenagers, September 2, 2005*

The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The RCWPG has recommended only four new reservoirs to be constructed over the next 50 years. Twenty-five reservoirs have been constructed in the last 55 years for water supply for Region C. The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project. The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on this comment.

58. *S. Frank Crumb, Acting Director for the City of Fort Worth, September 6, 2005*

The RCWPG added the four direct reuse projects as recommended strategies for the City of Fort Worth.

59. *Campbell B. Read, Wildlife Task Force Chair of the Texas Committee on Natural Resources, September 6, 2005*

The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project. The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on this comment.

60. *Julie L. Gaylord, September 7, 2005*

The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project. The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on this comment.

61. *Byron Gaines, General Manager of Mustang SUD (Included Resolution), September 7, 2005*

The RCWPG appreciates your participation in and support of the regional water planning process. Lake Ralph Hall is a recommended strategy for the Upper Trinity Regional Water District and is expected to provide surface water supply to the Fannin and Denton County areas. No changes were made to the final report based on this comment.

62. *Thomas E. Taylor, Executive Director of Upper Trinity Regional Water District, September 7, 2005 and September 9, 2005 (Included Resolutions)*

The RCWPG appreciates your participation in and support of the regional water planning process. One of the goals of the RCWPG is to meet the water needs for the next 50 years in order to support the expected growth in this area. Lake Ralph Hall is a recommended strategy for UTRWD and is expected to provide water supply to Fannin and Denton Counties. No changes were made to the final report based on this comment.

63. *Myron Hess of National Wildlife Federation, Mary Kelly of Environmental Defense, and Ken Kramer of Lone Star Chapter of Sierra Club, September 7, 2005*

Summary Table of Key Comments

a. While the amount of supply exceeds demand in 2060, the surplus does not apply uniformly to all users and does not all stem from one project. Removing one project from the plan could leave an area of the region short of water supply. The development of these projects is sized for economic and efficient use of available water resources. This provides some water for unforeseen conditions and growth beyond the planning period. No changes were made to the final report based on this comment.

b. The Region C plan includes water conservation strategies for all municipal water user groups, even those without shortages. The RCWPG has met the Texas Water Development Board requirements regarding water conservation analysis. The plan includes supplies totaling more than 1.2 million acre-feet per year for conservation, reuse, and increased efficiency. No changes were made to the final report based on this comment.

c. Drought contingency strategies are short-term solutions to water shortages caused by drought or other emergencies. The RCWPG does not include drought management strategies as a reliable long-term water supply. No changes were made to the final report based on this comment.

d. The plan does include quantitative analysis of the impacts of proposed water management strategies. In accordance with Texas Water Development Board guidelines, new reservoirs include streamflow releases using the consensus method. No changes were made to the final report based on this comment.

e. No springs in Region C are currently used as a significant source of water supply. Groundwater availability in the plan was set at levels that minimize drawdowns to area aquifers, thus minimizing impacts on springs in the region. This is discussed in Section 1.7. No changes were made to the final report based on this comment.

f. The *2006 Region C Water Plan* included the use of existing supplies with at least 25,000 acre-feet per year from 22 sources of supply as potentially feasible strategies and evaluated every credible existing supply as suggested by the public. No changes were made to the final report based on this comment.

Key Principles

A. The RCWPG agrees with the Water Conservation Implementation Task Force and current state law that water conservation includes water reuse. The RCWPG considered and recommended significant amounts of water conservation and reuse in the plan. In adoption of the water conservation recommendations, the RCWPG believes the strategies represent an economically achievable level of conservation. No changes were made to the final report based on this comment.

B. The RCWPG considered drought management measures. See response to #63.c. No changes were made to the final report based on this comment.

C. Texas Water Development Board regulations governing regional water planning do not require designation of environmental flows. No changes were made to the final report based on this comment.

D. The Region C plan recommends water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The new reservoirs listed as recommended or alternative strategies in the Region C plan are reservoir projects that the water suppliers in Region C have asked the planning group to include. The regional water planning process has brought water suppliers together to develop regional supplies as opposed to numerous individual supplies that would require more natural resources to develop. No changes were made to the final report based on this comment.

E. Comment noted. No changes were made to the final report based on this comment.

F. Voluntary redistribution of water resources is discussed in Section 4C.1. Existing supplies available for transfer are discussed in Section 4C under "Connection of Existing Supplies" and "Interbasin Transfers". Connection of existing supplies often involves a voluntary redistribution of water resources. In general, the RCWPG supports voluntary redistribution of water resources and supports such redistributions on a willing buyer/willing seller basis. Emergency transfers are considered short-term strategies and are not appropriate for long-range water supply planning. No changes were made to the final report based on this comment.

<u>Page-Specific Comments</u>

[1] Figure ES.4 shows the municipal per capita water use accounting for the conservation and reuse recommended in the plan. This meets with the Water Conservation Implementation Task Force definition for determining per capita water use. By 2020, the region is below the 140 gpcd recommendation by the Task Force. As clearly shown in the figure, per capita water use in 2060 is much less than current levels.

[2] Comment noted. See response to written comment #63 Key Principles A above. Most of the recommended reuse in Region C is indirect reuse, which is placed back into the reservoir or stream before being re-diverted. There are no direct reuse projects recommended for potable use.

[3] Figure 4B.2 in Section 4B of the final report shows that the projected level of reuse proposed in the Region C plan will result in new return flows remaining near historical levels through 2030 and increasing substantially from 2040 on. No changes were made to the final report based on this comment.

[4] The reserve supplies are not contrary to the Texas Water Development Board regulations. No changes were made to the final report based on this comment.

[5] The plan does not "assume 20% more water demand." No changes were made to the final report based on this comment.

[5A] The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The new reservoirs listed as recommended or alternative strategies in the Region C plan are reservoir projects that the water suppliers in Region C have asked the planning group to include. The RCWPG understands that new reservoir development will impact landowners, the environment, and others.

Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project. The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on this comment.

[6] The RCWPG did consider drought management measures but did not adopt them as long-term water supply strategies. No changes were made to the final report based on this comment.

[7] The management strategies proposed for Region C do not use supplies needed to meet the needs in other regions. No changes were made to the final report based on this comment.

[8] Comment noted. No changes were made to the final report based on this comment.

[9] Comment noted. No changes were made to the final report based on this comment.

[10] Comment noted. No changes were made to the final report based on this comment.

[11] The figures are accurately described in the report. No changes were made to the final report based on this comment.

[12] The values in the text and table match in the final version of the report.

[13] The current round of regional water planning is based on the Texas Water Code that was in effect at the time the Texas Water Development Board signed contracts with the administrative entity. The current regulations require that the water conservation plans be updated by May 1, 2009 and every five years after that. No changes were made to the final report based on this comment.

[14] The second bullet on page 1.56 in the IPP was adjusted to reflect the Task Force definition of per capita water use accounting for indirect reuse, not direct and indirect reuse.

[15] Comment noted. No changes were made to the final report based on this comment.

[16] The Region C plan meets the Texas Water Development Board requirements. No changes were made to the final report based on this comment.

[17] Comment noted. No changes were made to the final report based on this comment.

[18] Comment noted. No changes were made to the final report based on this comment.

[19] Comment noted. No changes were made to the final report based on this comment.

[20] Comment noted. No changes were made to the final report based on this comment.

[21] Comment noted. No changes were made to the final report based on this comment.

[22] Comment noted. No changes were made to the final report based on this comment.

[23] Figure 4B.2 in Section 4B of the final report shows that return flows in the Trinity River will increase significantly in Region C, even after development of all planned reuse projects.

[24] Comment noted. No changes were made to the final report based on this comment.

[25] Section 1 is a general description of Region C. More specific quantitative information in the discussion of the individual reservoir project. No changes were made to the final report based on this comment.

[26] The RCWPG considers reuse to be an element of water conservation, per the Water Conservation Implementation Task Force recommendation and state law. No changes were made to the final report based on this comment.

[27] Table 4B.1 is a summary of water conservation strategies that have been implemented. Additional water savings from recommended water conservation strategies are shown in Table 4B.7. No changes were made to the final report based on this comment.

[28] The RCWPG supports individuals who would like to develop rainwater harvesting. The RCWPG supports those who are interested in pursuing condensate reuse. However, these two BMPs are not appropriate at the regional level in Region C. At the request of the Sierra Club, Region C developed a cost estimate for rainwater harvesting. At $2,263 per acre-foot assuming the supplier provided the tank and the customer installed it, rainwater harvesting was not an economical source of supply. No changes were made to the final report based on this comment.

[29] For a toilet replacement program, the GDS report makes the following assumptions that lead to underestimation of unit cost:

- 1 percent per year natural replacement rate and 25 year toilet life
- 10 percent current market penetration
- Amortization of costs over the 25-year toilet life
- 5 percent interest rate for financing
- No toilets provided to freeriders (users who would implement the measure with or without the rebate)
- Measure cost of $85 per unit (including a $60 rebate and $25 for processing, inspection, and marketing).

The cost for a toilet replacement program in the Initially Prepared Plan is based on the following assumptions, which are more appropriate to regional planning in Region C:

- 3.3 percent per year natural replacement rate and 30 year toilet life
- 33 percent current market penetration for housing units constructed before 1995 and 100 percent current market penetration for housing units constructed in 1995 or later
- Amortization of costs over the duration of the projected water savings
- 6 percent interest rate for financing
- 10 percent of toilets provided to freeriders
- Measure cost of $120 per unit
- Toilet replacement program implemented in 2010

These assumptions result in a reduced amount and duration of projected water savings, because some of the reduction in water use would eventually be realized through natural replacement without a toilet replacement program. The greater measure cost (consistent with rebates offered by the City of Austin) is amortized over a shorter period of time and applied to lesser water savings, leading to higher unit costs.

For a clothes washer rebate program, the GDS report makes the following assumptions that lead to underestimation of unit cost:

- Amortization of costs over the 13-year clothes washer life
- 5 percent interest rate for financing
- No clothes washers provided to freeriders
- Measure cost of $120 per unit (including a $100 rebate and $20 for processing, inspection, and marketing).

The consultants used the following assumptions, which are more appropriate to regional planning in Region C:

- Federal energy standards will limit new clothes washers to water-efficient models by 2007.
- 7.7 percent per year natural replacement rate and 13 year clothes washer life
- Amortization of costs over the duration of the projected water savings
- 6 percent interest rate for financing
- 10 percent of clothes washers provided to freeriders
- Measure cost of $150 per unit
- Clothes washer rebate program implemented in 2010

These assumptions result in a reduced amount and duration of projected water savings, because some of the reduction in water use would eventually be realized through natural replacement without a clothes washer rebate program. The greater measure cost (which is less than the rebate offered by El Paso Water Utilities) is amortized over a shorter period of time and applied to lesser water savings, leading to higher unit costs.

It should be noted that savings associated with Federal energy standards for clothes washers are included in the Region C plan at no cost. No changes were made to the final report based on this comment.

[30] Supply amounts and opinions of probable cost for this strategy were reviewed and revised in the final plan. This strategy was added to the expanded water conservation package in the final plan.

[31] Comment noted. No changes were made to the final report based on this comment.

[32] The savings from the low-flow plumbing fixtures were already included in the demand projections. Region C has documented the amount of water that strategy saves. No changes were made to the final report based on this comment.

[33] Water use reduction due to increasing water prices is a reflection of the fact that water is going to cost more in the future and a reduction in water usage will result from that

fact. This is a separate strategy from increasing water rates. No changes were made to the final report based on this comment.

[34] Entities will have to take the necessary steps to implement the water system audit, leak detection and repair, and pressure control strategies. This strategy quantifies the water savings that result from these measures. The savings were included into the plan in response to a request from the Sierra Club. No changes were made to the final report based on this comment.

[35] Comment noted. No changes were made to the final report based on this comment.

[36] Comment noted. No changes were made to the final report based on this comment.

[37] "Prohibition of Water Waste" requires an entity to pass a code or resolution and have the staff to enforce the measure. The RCWPG does not have the authority to implement or enforce water conservation measures. Such actions are left to the cities and water suppliers. No changes were made to the final report based on this comment.

[38] Comment noted. No changes were made to the final report based on this comment.

[39] In the final report, water conservation pricing was added to the "expanded package" list shown on page 4B.15 of the IPP.

[40] See response to [26].

[41] Water conservation is discussed in great detail in Section 4B.1 and Chapter 6. Section 4C discusses the methodology for evaluation and selection of water management strategies. No changes were made to the final report based on this comment.

[42] Water conservation targets and goals should be developed by the cities themselves, as a part of their water conservation plan. To expect every water user group in Region C to decrease their per capita water use to 140 gpcd is not realistic. The Region C plan includes water conservation strategies for all municipal water user groups, even those without shortages. The RCWPG has met the Texas Water Development Board requirements regarding water conservation analysis. The plan includes supplies totaling more than 1.2 million acre-feet per year for conservation, reuse, and increased efficiency. The Conservation Implementation Task Force suggested a voluntary target of 140 gpcd after credits for reuse. As shown in Figures 6.5 and 6.6, Region C as a whole will meet this target. No changes were made to the final report based on this comment.

[43] Comment noted. No changes were made to the final report based on this comment.

[44] See response to [42] above. A large part of the savings achieved by San Antonio came by reductions in exceedingly high water losses in the water distribution system (approaching 30 percent). Since no major Region C suppliers have distribution losses nearly this high, similar savings are not available in Region C.

[45] Comment noted. No changes were made to the final report based on this comment.

[46] Lawn irrigation savings make up some of the assumed savings from the following strategies that are recommended for many water user groups:

- Public and school education;

- Water use reduction due to increasing water prices;
- Pressure control;
- Water conservation pricing structure;
- Water waste prohibition; and
- ICI water audit, water waste reduction, and site-specific conservation program.

The cost cited in the comment is for conservation savings through rebates on irrigation equipment and rebates on installation of water-wise landscaping. These costs should not be compared to the cost of conservation savings through irrigation water audits, because the programs are quite different.

No changes were made to the final report based on this comment.

[47] The comment is in error with respect to the screening of industrial water conservation strategies and with respect to water conservation included in the plan for industrial users. Several industrial strategies were deemed infeasible for regional planning (Table 4B.3 on Page 4B.5) because there is no identified authority or sponsor to implement these specific programs. Instead, these strategies were included as elements of potentially feasible municipal water conservation strategies for industrial, commercial, and institutional (ICI) customers and for the manufacturing general rebate strategy.

In addition to ICI customers of municipal water user groups, three categories of water user groups can be classified as industrial: steam electric power, manufacturing, and mining. Significant water conservation is included in the plan for each of these categories. The projected water demands for steam electric power water user groups include approximately 65,619 ac-ft/yr of water conservation by 2060 by assuming that future power plants will be more efficient than plants currently in operation. The manufacturing general rebate strategy is projected to supply an additional 2,618 ac-ft/yr by 2060. Finally, indirect reuse, direct reuse, and recycling of water in mining operations are projected to provide an additional 2060 supply of 30,784 ac-ft/yr for mining water user groups.

No changes were made to the final report based on this comment.

[48] The text on page 4B.13 of the IPP was reworded in the final plan.

[49] The Water Conservation Implementation Task Force recommended that the BMPs be considered for all water users and only those that are appropriate be adopted for individual entities. No changes were made to the final report based on this comment.

[50] Water conservation at the industrial level is very much a site specific analysis. The RCWPG does not have site specific information for the industrial companies within the region. Thus, reuse is the only conservation strategy that could be applied to the industrial category across the region. A detailed study of water conservation for industrial users is beyond the scope of work for the regional water planning effort. No changes were made to the final report based on this comment.

[51] See response to [48] above.

[52] Comment noted. The Region C plan includes practicable water conservation measures, including reuse. No changes were made to the final report based on this comment.

[53] See response to [42] above.

[54] Chapter 357.7 (a)(7)(B) says, "The regional water planning group must consider drought management measures…" The Region C plan considered drought management measures but did not recommend any as a long-term, dependable water supply strategy. Section 11.1272 of the Texas Water Code simply says that the applicant shall develop a drought contingency plan that is "consistent" with the regional water plan. Appendix R includes the drought contingency plans for which Region C has received a copy and included in the plan. No changes were made to the final report based on this comment.

[55] See response to [54] above.

[56] Comment noted. No changes were made to the final report based on this comment.

[57] See response to [54] above.

[58] See response to [54] above.

[59] Footnote "a" on Table 4B.7 is listed with both the low-flow plumbing fixture rules and efficient new steam power electric plants. Therefore this estimate of savings is correct. No changes were made to the final report based on this comment.

[60] Figure 4D.1 was updated to reflect that the proposed Lower Bois d'Arc Creek Reservoir and Lake Ralph Hall are not overlapping federal lands.

[61] Table 4D.2 and Figure 4D.2 do not include water conservation and drought management measures. Water conservation is discussed in detail in Section 4B and Chapter 6. Drought management measures were not adopted as water supply strategies and are therefore not included in the table or figure. No changes were made to the final report based on this comment.

[62] Water conservation is discussed in detail in Section 4B and Chapter 6. Drought management measures were not adopted as water supply strategies and are therefore not included in the table or figure. No changes were made to the final report based on this comment.

[63] Water treatment plant costs are included in Appendix U. Because a new treatment plant or expansion is not necessarily needed at the same time a new source is added, the treatment plant costs were developed as a separate category. The comment column in Table 4D.2 addresses whether the strategy delivers raw or treated water. No changes were made to the final report based on this comment.

[64] The comment column in Table 4D.2 addresses whether the strategy delivers raw or treated water. No changes were made to the final report based on this comment.

[65] Water conservation is discussed in detail in Section 4B and Chapter 6. Drought management measures were not adopted as water supply strategies and are therefore not included in the table or figure. No changes were made to the final report based on this comment.

[66] Tables 4E.2 and 4E.8 do not include capital costs water conservation for the wholesale water provider because the capital costs, if any, would be associated with the customer

and not the wholesaler. Very few conservation strategies involve capital costs. No changes were made to the final report based on this comment.

[67] Water treatment plant costs are included in Appendix U. Because a new treatment plant or expansion is not necessarily needed at the same time a new source is added, the treatment plant costs were developed as a separate category. No changes were made to the final report based on this comment.

[68] None of the wholesalers in Tables 4E.2, 4E.5, 4E.8, and 4E.12 have capital costs associated with the water conservation strategies. The conservation strategies are to be implemented by their customers and the wholesaler will have a reduction in demand. A footnote was added to these tables explaining that the entities have no capital costs for water conservation. Table 4E.11 does not include information regarding capital costs. The footnote was not added to this table.

[69] The RCWPG adopted the Water Conservation Task Force definition of per capita water use and has shown water conservation and reuse as a combined entry in the table. No changes were made to the final report based on this comment.

[70] Comment noted. No changes were made to the final report based on this comment.

[71] See response to [69] above.

[72] Drought management measures are not required to be recommended. The cost per acre-foot of water is correct because it is based on the amount of water made available by the project, not the demand placed on the project. Unit costs for all supply strategies are evaluated on this basis. No changes were made to the final report based on this comment.

[73] The legend for Figure 4E.4 was adjusted to print correctly in the final report.

[74] The supply for North Texas Municipal Water District allows for a reasonable excess amount to provide for any unforeseen circumstances. No changes were made to the final report based on this comment.

[75] Any new reservoir will involve controversy. The North Texas Municipal Water District plans to pursue Marvin Nichols Reservoir and has requested that it be included in the Region C plan. The per capita water use is calculated correctly based on the supply made available by the project, not the demand on the project. Unit costs for all supply strategies are evaluated on this basis. No changes were made to the final report based on this comment.

[76] The gpcd for each WUG can be calculated from the information provided in the report. The RCWPG agrees that the gpcd is a measure of an individual city's water usage. However, the RCWPG does not agree that comparing cities based solely on gpcd is appropriate. No changes were made to the final report based on this comment.

[77] Comment noted. It should be noted that the gpcd figures in the comment are inconsistent with the definition in the Water Conservation Implementation Task Force report because no credit for reuse is included. No changes were made to the final report based on this comment.

[78] Discussions of the development of conservation savings were presented at several RCWPG meetings. A synopsis of the assumptions for water efficiency savings and costs is included as Appendix M in the final plan.

[79] Water conservation was added to the discussion of impacts to key water quality parameters in Section 5.1.

[80] The impacts of proposed diversions on water quality downstream of the diversion have been considered. Proposed reservoirs assumed that releases would be made to maintain streamflows according to the consensus method. The final report will include an analysis showing that return flow based on flows in Region C will increase during the planning period, even with implementation of the recommended reuse projects.

[81] One of the selection criteria for key water quality parameters (Page 5.2 of the IPP) is that selected parameters should be representative of water quality conditions that may be impacted on a regional scale and should be likely to be impacted by multiple water management strategies within the region. Dissolved oxygen is directly impacted through the discharge of oxygen-demanding substances, which are generally associated with discharges of wastewater. Indirect reuse is the lone type of management strategy that would involve a discharge of treated wastewater. To obtain a discharge permit, dischargers must show that they will meet dissolved oxygen criteria in the Texas Surface Water Quality Standards. It has been assumed that these regulations will continue to be effective in the future. Therefore, it is not anticipated that proposed water management strategies will impact dissolved oxygen concentrations on a regional scale. No changes were made to the Region C plan.

[82] Comment noted. No changes were made to the final report based on this comment.

[83] The text in the third paragraph on page 6.27 of the IPP reads as follows in the final report, "…1,000 acre-feet of water per year or more. According to the regulations, water conservation plans are a requirement for anyone entering into or renewing a water supply contract. Until such time, these water users are not required…"

[84] All savings due to conservation are included in the Region C plan for <u>all</u> water suppliers. Entities that receive surface water pursuant to wholesale contracts are only required to develop water conservation plans upon contract renewal or expansion, unless the provider requests the plans be developed sooner. No changes were made to the final report based on this comment. Dallas and the Trinity River Authority have water rights and were added to Table 6.8 in the final report.

[85] Comment noted. No changes were made to the final report based on this comment.

[86] The water conservation and drought contingency plans included as Appendices N and O in the final report are <u>model</u> plans. The models are designed for the entities to choose the measures that are appropriate for their situation. No changes were made to the final report based on this comment.

[87] Comment noted. No changes were made to the final report based on this comment.

[88] Comment noted. No changes were made to the final report based on this comment.

[89] Figure 4B.2 in Section 4B of the final report includes an analysis showing that return flows in Region C will increase during the planning period, even with the implementation of the recommended reuse projects.

[90] Section 7.3 was modified to address protection of resources outside the region that may be impacted by recommended strategies in Region C.

[91] See response to [90] above.

[92] Comment noted. No changes were made to the final report based on this comment.

[93] Section 7.4 was modified to include discussions of protection of significant wetland habitats.

[94] The quantification of environmental impacts in the Region C Water Plan is appropriate for a planning level report. Quantifications are based on available data from previous studies and desktop analyses. Impacts from water management strategies were assessed following guidelines developed by the Texas Water Development Board. No changes were made to the final report based on this comment.

[95] Evaluation of changes in streamflow as a result of increased water use is beyond the scope of the regional water planning group. Such analysis would likely be included as part of the permitting process, to which the RCWPG is not a party. No changes were made to the final report based on this comment.

[96] No changes were made to the final report based on this comment.

[97] The implications of recommending a unique reservoir site are clearer than those of unique stream segments. The issue of private property rights with regards to unique stream segments was only one of the reasons the RCWPG tabled the issue. In October, the RCWPG took action on unique streams segments, but the motion to recommend any stream segments as unique failed. No changes were made to the final report based on this comment.

[98] Comment noted. No changes were made to the final report based on this comment.

[99] The Muenster Reservoir site is recommended as a unique reservoir site. The reservoir is almost complete. Reservoir construction relies on federal funding. The designation is intended to protect the reservoir so that it may be completed. No changes were made to the final report based on this comment.

[100] Comment noted. No changes were made to the final report based on this comment.

[101] Comment noted. No changes were made to the final report based on this comment.

[102] Comment noted. No changes were made to the final report based on this comment.

[103] Comment noted. No changes were made to the final report based on this comment.

[104] Alternative strategies are intended to provide some flexibility to the water suppliers, should a recommended strategy prove to be unworkable. No changes were made to the final report based on this comment.

[105] Comment noted. No changes were made to the final report based on this comment.

[106] The RCWPG recommends that the two state agencies work together to determine what model would be most appropriate for water supply planning. No changes were made to the final report based on this comment.

[107] Comment noted. No changes were made to the final report based on this comment.

64. *Robert M. Johnson, Assistant Director of Dallas Water Utilities, September 7, 2005 and September 9, 2005*

a. The data listed in Tables 1.14 and 1.15 are based on calendar year sales. The data have been corrected to reflect the most recent water use and sales information from Dallas Water Utilities. The corrected data and sources of data are shown below.

Data	Source	Amount (AF/Y)
Total water use	DWU Water Use Surveys	548,950
Wholesale Municipal Sales	DWU data files[1]	182,026
Wholesale Other Sales	DWU data files[1]	1,721
Industrial Sales	TWDB (WUGSUMM.xls)	16,543
Power Sales	TWDB (WUGSUMM.xls)	5,923
Net Municipal Retail Sales	Calculation	342,737

1. DWU Trtd Wtr CY 97-02 cons.xls and DWU Untrtd Wtr CY 97-02 cons.xls

b. Correction was made.

c. Footnote with the source information was added.

d. The demands on Dallas Water Utilities in the Region C Water Plan are based on the water demand projections approved by the Regional Water Planning Group and the Texas Water Development Board. These values reflect demands on the City of Dallas and its customers. The list of customers is based on correspondence with Dallas Water Utilities and the Dallas Long-Range Water Supply Plan. The demands on Dallas Water Utilities shown in Table 2.21 match the demands shown in Table 4E.1.

   Texas Water Development Board (TWDB) planning guidelines do not allow these demands to be changed at this time. As required by TWDB regulations, the demands in the Region C Water Plan represent dry year conditions. Demands used in the Dallas Long-Range Water Supply Plan represent the average usage during an extended drought, which would be lower than use in a single dry year. We will note in the report that Dallas requests that lower population and water demands projections be considered in the next round of planning.

e. The yield of Lake Palestine was adjusted to decline over time. The revised yield is based on the supplies from this source in the Dallas Long-Range Water Plan. This adjustment was made to all references to the supply from Lake Palestine to Dallas Water Utilities.

f. The area-capacity data available for White Rock Lake are from 1993. The lake was dredged after 1993, but there are no published area-capacity data. The water availability estimates are based on sedimentation using the 1993 data. This lake is not used for current or future supply for planning purposes. Dallas Water Utilities has the right to use the permitted amount of water from this source for emergency or other purposes. If Dallas Water Utilities provides the RCWPG with updated area-capacity data, the water availability estimates can be re-evaluated.

g. The total current supply for Dallas Water Utilities was adjusted to match values throughout the report.

h. Per capita water use calculation is based on municipal water sources. Water used for irrigation is not included in the per capita calculation regardless of source. The credit for reuse is not considered if the reuse is used for wholesale sales, irrigation, power or livestock. Generally, direct reuse is only used for these purposes. Therefore, this water source is not double counted in the per capita analysis. No changes were made to the final report based on this comment.

i. Dallas Water Utilities has a contract with Sabine River Authority for 131,860 acre-feet per year from Lake Fork. Of this amount, 120,000 can be transported to the Trinity River Basin. The remaining 11,860 acre-feet per year must remain in the Sabine River Basin. Analysis of the water availability of Lake Fork shows a reliable supply that is less than the total contracted amounts. In accordance with Texas law, the supply available to each customer was shorted equally in the water availability evaluations. This results in a total reliable supply of 120,791 acre-feet per year from Lake Fork to Dallas Water Utilities in 2010. Of this amount 120,000 acre-feet per year may be transported to the Trinity River Basin, leaving 791 acre-feet per year in the Sabine River Basin. The Sabine River Authority plans to conduct a new volumetric survey, which may modify the long-term available supply from Lake Fork. If the re-analysis indicates the supply from Lake Fork is greater than reported in the Region C Water Plan, then the supply to Dallas Water Utilities should be adjusted accordingly. No changes were made to the supplies from Lake Fork to Dallas Water Utilities.

j. Supplies were adjusted to be consistent.

k. The list of strategies in Table 4C.2 are the potentially feasible strategies considered for suppliers in Region C. It would be premature to add footnotes regarding decisions as a recommended or alternative strategy in this section. We added a footnote stating that recommended and alternative strategies for major water suppliers are discussed in Section 4E.

l. Figure 4C.1 was added.

m. The demands shown in Table 4E.1 are based on the Texas Water Development Board-approved demands for Dallas and its customers. These demands differ slightly from the Dallas Long-Range Water Supply Plan values, which were developed using different assumptions. The Region C demands are generally lower than the demands in the Long-Range Water Supply Plan for most decades. The differences range from less than 1 percent to 8 percent and are within an expected margin of error over the 60-year planning period. We added a note in the report that Dallas Water Utilities has independently developed long-range water supply demands, and these demands differ slightly from the Region C water demands. Table 4E.1 was changed to reflect Conservation for Dallas Water Utilities' Wholesale Customers. Available supply values were changed to be consistent throughout the report.

n. Figure 4E.2 was adjusted to reflect the changes in available supply from Lake Palestine. No changes were made to the projected demands on Dallas Water Utilities.

o. The cost estimates for the Toledo Bend Project listed in tables 4E.3 (Dallas Water Utilities) and 4E.7 (North Texas Municipal Water District) are from two different cost estimates with different assumptions and pipeline routes. The cost for Dallas Water Utilities assumes a total project supply of 700,000 acre-feet per year, with each of the major suppliers in Region C receiving 200,000 acre-feet per year. Without Dallas Water Utilities' participation, the project supply is a total of 500,000 acre-feet per year. The lower total delivery increases the capital costs for the remaining participants of the project as reflected in Table 4E.7. Discussions of the Toledo Bend Project are contained in Sections 4D (page 4D.1) and Section 4E (page 4E.2). A footnote was added to the cost tables in Section 4E for clarification.

p. A paragraph describing the continuing studies and cooperation with the proposed Neches Wildlife Refuge was added.

q. The supplies allocated to Dallas Water Utilities from Lake Fork follow Texas law when distributing shortages of water. See response to comment (i). No changes were made.

65. James E. Smith, September 8, 2005

The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The RCWPG has recommended only four new reservoirs to be constructed over the next 50 years. Twenty-five reservoirs have been constructed in the last 55 years for water supply for Region C. The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project.

The RCWPG has put forth a plan with an increased focus on water conservation, reuse, and connection of existing supplies, as well as a limited number of new reservoir projects. The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on this comment.

66. Red Birdsong, September 8, 2005

The RCWPG consultant conferred with John Jones of the Texas Parks and Wildlife Department. Mr. Jones indicated that the lowest point in the White Oak Mitigation Area is approximately elevation 230.0 ft. msl. Mr. Jones supports raising Wright Patman Lake to elevation 228.64 ft. msl, the elevation considered by Region C.

The yield of Wright Patman Lake and additional storage available by raising the pool level included in the comment are incorrect. The RCWPG evaluated increased water supplies from Wright Patman Lake. Only one water supplier in Region C plans to pursue the water in Wright Patman Lake, while the other suppliers prefer to keep this as an alternate strategy. No changes were made to the final report based on this comment.

67. Barry Blackmon, President of Friends United for a Safe Environment, September 8, 2005

The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The RCWPG has recommended only four new reservoirs to be constructed over the next 50 years. Twenty-five reservoirs have been constructed in the last 55 years for water supply for Region C. The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project.

The RCWPG has put forth a plan with an increased focus on water conservation, reuse, and connection of existing supplies, as well as a limited number of new reservoir projects. The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on this comment.

68. Grayson Garner, September 8, 2005

The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The RCWPG has recommended only four new reservoirs to be constructed over the next 50 years. Twenty-five reservoirs have been constructed in the last 55 years for water supply for Region C. The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project.

The RCWPG has put forth a plan with an increased focus on water conservation, reuse, and connection of existing supplies, as well as a limited number of new reservoir projects. The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on this comment.

69. Lloyd P. Jones, September 8, 2005

The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The RCWPG has recommended only four new reservoirs to be constructed over the next 50 years. Twenty-five reservoirs have been constructed in the last 55 years for water supply for Region C. The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project.

The RCWPG has put forth a plan with an increased focus on water conservation, reuse, and connection of existing supplies, as well as a limited number of new reservoir projects. The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on this comment.

70. *Mary Gail Gilbreath Vincent, September 8, 2005*

The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The RCWPG has recommended only four new reservoirs to be constructed over the next 50 years. Twenty-five reservoirs have been constructed in the last 55 years for water supply for Region C. The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project.

Lower Bois d'Arc Creek Lake is a recommended project for the North Texas Municipal Water District. This project is expected to supply water primarily to Collin, Dallas, Kaufman, Rockwall and Fannin Counties.

The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on this comment.

71. *Steve Snyder, Opinion Article in Today Newspapers Online, September 8, 2005*

The RCWPG was tasked to develop water management strategies to meet the needs of the region for the next 50 years. The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The new reservoirs listed as recommended or alternative strategies in the Region C plan are reservoir projects that the water suppliers in Region C requested the planning group to include.

a. One of the recommended reservoir projects is the proposed Lower Bois d'Arc Creek Reservoir that would be located in Fannin County. Water from this recommended strategy would supply the needs for residents located in Fannin and Collin Counties and other customers of North Texas Municipal Water District. The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project.

b. Per capita water use varies across the state for a variety of reasons, including rainfall and evaporation. The municipal per capita water use calculated for Senate Bill One planning includes commercial, institutional, and some industrial water use. The quantities of these other demands can vary significantly between cities. Thus, comparing cities to one another on a per capita basis is not necessarily a fair comparison. Figure 1.12 shows a comparison of total per capita water use among all 16 regions. This figure shows that Region C has the lowest total per capita water use of all the regions in Texas.

c. The population projections for Region C were developed by the Texas Water Development Board. Currently, the State of Texas does not have any mechanism in place to restrict population. This is an issue beyond the purview of the RCWPG. The RCWPG was tasked with meeting the future water needs for the area.

d. See response to a.

The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on these comments.

72. *Ken Kramer, Janice Bezanson, and 13 Other Environmental Group Representatives, September 2, 2005*

a. The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The selection of recommended strategies is based on many factors, including cost, quantity and reliability of the water supply as well as potential impacts. The new reservoirs listed as recommended or alternative strategies in the Region C plan are reservoir projects that the water suppliers in Region C requested the planning group to include.

   The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project. The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on this comment.

b. The RCWPG is aware that the Region D Water Planning Group approved a statement that Marvin Nichols Reservoir should not be included in any regional plan or the State Water Plan. Marvin Nichols Reservoir is included in the current Region C plan and has been included in the State Water Plan since 1968, when it was called the Naples Reservoir.

   Region C is recommending that Marvin Nichols Reservoir be included in its plan, as well as the 2007 State Water Plan. Region C is also recommending George Parkhouse North and George Parkhouse South be included as alternative water management strategies in both plans. Compliance with requirements for interbasin transfers will be evaluated by the appropriate regulatory agencies during the permitting process. No changes were made to the final report based on this comment.

c. At the May meeting, the RCWPG agreed to review the timing of the recommended new reservoirs. The planning group discussed this topic at the October meeting.

73. *Janice Bezanson, Texas Committee on Natural Resources, September 9, 2005*

a. The year 2000 water use data is based on Texas Water Development Board data. The RCWPG checked with the water providers and corrected the Texas Water Development Board data. The water use in the year 2000 was:

Dallas Water Utilities	458,648
North Texas Municipal Water District	251,495
Tarrant Regional Water District	323,462
Self Supplied and Other Region C Water Providers	346,852
Total	1,380,556

   The 346,852 acre-feet shown above includes water use for livestock, irrigated agriculture, steam electric power, manufacturing, and municipal water use <u>not</u> provided by the three major providers.

   It is unrealistic to use incorrect numbers when the correct numbers are available. Year 2000 was a dry year for much of the area within Region C, leading to high water use.

Since Texas Water Development Board regulations require planning for dry year water use, the use of actual year 2000 data is appropriate.

It should be noted that the Region C per capita use of 235 gpcd cited by Ms. Bezanson is total per capita use considering all types of water use (municipal, manufacturing, steam-electric, mining, livestock, and irrigation). The statewide average total per capita water use is 717 gpcd. As noted in Figure 1.12 of the report and discussed in Section 1.4, Region C has the lowest total per capita use of any region in the state. No changes were made to the final report based on this comment.

b. The recommended reuse projects in the Region C plan are consistent with prudent planning and considerations of public health. The RCWPG considered in-stream flow and protection of downstream water right holders in determining the amount of reuse water to recommend in the plan. No changes were made to the final report based on this comment.

c. The Tarrant Regional Water District has studied the possibility of obtaining water from the Brazos River Basin. However, the amount of water available is limited and the District is not pursuing Brazos River water. Thus, the strategy was not adopted by the RCWPG.

The RCWPG notes other comments. No changes were made to the final report.

d. The fees included in the cost estimates are based on discussion with the suppliers. Voluntary transfers of water require equitable compensation to current owners. No changes were made to the final report based on this comment.

e. The comment is correct in that bringing water from east Texas to Tarrant Regional Water District is more expensive than supplying the eastern part of the Metroplex. The Tarrant Regional Water District and the RCWPG have considered this fact. No changes were made to the final report based on this comment.

Providing water from Lake Texoma to Tarrant Regional Water District would require Congressional authorization and reallocation studies. The Texoma Blended alternative requires other new supplies of fresh water to blend with it. Without these new sources, the amount of water that could be blended is limited. Texoma Desalinated is problematic for the following reasons:

- Large scale supplies for Region C would require facilities far larger than any currently operating for this type of application. (The largest inland desalination project in the world is the El Paso-Fort Bliss joint facility currently under construction with a peak day treatment plant capacity of 27.5 MGD.)
- Brine disposal is a major concern, especially for multiple large desalination plants. It is also a significant operational cost as options are limited for large-scale disposal.
- Blending saline water with fresh water from other sources is much more cost effective but care must be taken to protect the receiving source.

Tarrant Regional Water District is currently not pursuing water from Lake Texoma, and it is not a recommended strategy for the District in the regional plan. No changes were made to the final report based on this comment.

74. *Beth Johnson, Consultant to Texas Committee on Natural Resources and the Sierra Club, September 9, 2005*

Introduction

[1] The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The selection of recommended strategies is based on many factors, including cost, quantity and reliability of the water supply as well as potential impacts. The new reservoirs listed as recommended or alternative strategies in the Region C plan are reservoir projects that the water suppliers in Region C requested the planning group include. No changes were made to the final report based on this comment.

[2] The Region C plan includes alternative strategies. The alternative strategies are intended to be implemented if a recommended strategy cannot be developed. No changes were made to the final report based on this comment.

[3] The Region C plan recommends four new reservoirs. The total recommended strategies in the Region C plan will have a surplus of approximately 20 percent in the year 2060, assuming that all of the strategies are implemented, not three times the projected need for supply. No changes were made to the final report based on this comment.

Specific Comments

[1]

a. Table 4D.2 is ordered based on the potential supply to Region C in descending order. The descriptions of the projects are included in Section 4D, which identifies new reservoir projects. No changes were made to the final report based on this comment.

b. Table 4D.2 is ordered based on the potential supply to Region C in descending order. The descriptions of the projects are included in Section 4D, which identifies new reservoir projects. No changes were made to the final report based on this comment.

c. The potential number of acres impacted by the potentially feasible strategies is shown in Appendix T, Table 2. No changes were made to the final report based on this comment.

d. Impacts for strategies that use existing sources are not always low. The inclusion of this statement for specific strategies where it applies is appropriate. No changes were made to the final report based on this comment.

e. The text was adjusted in Section 4D of the final report to reflect the impacts from the respective strategies.

f. The RCWPG reviewed the materials and comments provided by the public at each Region C meeting. The RCWPG considered the written and oral comments provided before making a decision on each action item on the agenda at each RCWPG meeting during the second round of Senate Bill One planning. No changes were made to the final report based on this comment.

[2] While the amount of supply exceeds demand in 2060, the surplus does not apply uniformly to all users and does not all stem from one project. Removing one project from the plan could leave an area of the region short of water supply. The development of these projects is sized for economic and efficient use of available water resources. This provides some water for unforeseen conditions and growth beyond the planning period.

a. Of the 31 wholesale water providers with summary tables depicting demands and supplies, three were missing the line showing the surplus/(shortage). This line was added to the final report for Tarrant Regional Water District, North Texas Municipal Water District, and Greater Texoma Utility Authority.

b. State regulations (TAC §291.93(3)) require public water utilities to submit a report to the state identifying how the utility intends to meet the projected demands of its service area when the utility reaches 85 percent of its capacity. The regulations also require public water suppliers and wholesale water suppliers to have sufficient supplies to meet the maximum day and/or contractual demands of all their customers. Planning for a surplus of 15 to 20 percent above the demand projections is within reasonable planning guidelines for long-range water supply planning. No changes were made to the final report based on this comment.

c. The RCWPG discussed a 10 percent supply in excess of demand at a regular RCWPG meeting. However, the group decided not to try to meet a certain percentage of excess supply in every decade as that could require additional supplies to be added prior to the need. The 20 percent excess supply above demand occurs in 2060, not in every decade. The 20 percent excess supply is due in part to the timing of supplies. Although an entity may be short a small amount of water in that year, the entity must develop the entire source to get any of its needed water. This tends to be the case for several entities, which is the driving force behind bringing supplies online by 2060 to meet the demand. Once the supply is developed, the entire amount of that supply is then available to the user. No changes were made to the final report based on this comment.

d. The recommended strategies are those that the water suppliers are planning to pursue. The amount associated with each strategy is the amount that the entity plans to pursue based on the economics of the project. No changes were made to the final report based on this comment.

e. The RCWPG has worked with the City of Dallas to ensure that the regional plan matches the City's long-range water plan. The City of Dallas requested that the RCWPG include Lake Fastrill as a recommended strategy in the plan. The recommended strategies included in the Region C plan reflect the plans for the City of Dallas in their long-range water plan. The City of Dallas, in cooperation with the Upper Neches River Municipal Water Authority, is evaluating the Lake Fastrill project to determine if it can be developed in cooperation with the proposed Neches River Wildlife Refuge. No changes were made to the final report based on this comment.

[3] The Senate Bill One regional water planning process has put into place a mechanism for local and regional water providers to work together to identify regional projects. Each of these providers will be the sponsors and developers of these projects. As such, the RCWPG has worked with the water suppliers within the region to assure that the suppliers' plans are reflected in the regional plan. This is the RCWPG's understanding of the "bottom up" process – the local suppliers determine the projects they would like to pursue instead of the Texas Water Development Board telling them what to pursue. No changes were made to the final report based on this comment.

[4] The statement that Marvin Nichols Reservoir is "not inconsistent" with Region D's plan is a correct statement for this round of Senate Bill One planning. Region D amended their 2001 Plan to change the status of Marvin Nichols Reservoir from "a proposed site to a potential site". The Texas Water Development Board considered that change to not cause the two plans to be inconsistent. Region D did not provide any other information to Region C regarding the proposed reservoir prior to the IPPs being approved for submittal to the Texas Water Development Board. No changes were made to the final report based on this comment.

[5] While the RCWPG has received numerous letters expressing opposition to reservoirs, there are also numerous supporters of these strategies. To be consistent, the reference "known public opposition" was removed from the table.

[6] The statement in the report is accurate.

a. The Corps has signed a Feasibility Cost Sharing Agreement with the Sulphur River Basin Authority as the local sponsor to pursue the basin-wide study. This is supported financially by the Metroplex entities, as they have agreed to fund portions of the study as in-kind efforts to receive federal appropriations. Though Congress did not appropriate funds, the Corps has offered to redirect $87,000 of available money to the Sulphur River Basin study. No changes were made to the final report based on this comment.

b. The Sulphur Basin study is a basin-wide study that includes Marvin Nichols and other potential water supplies. Without federal authorization, only portions of the initial phase of the work can be pursued. The portions of the basin-wide study proposed to be done as initial work in-kind includes all of the hydrologic modeling originally planned; virtually all of the mapping and data gathering originally planned, assuming the Corps' $87,000 is utilized; and environmental baseline data development for the middle third of the basin, which includes the "logjam", the areas affected by the logjam, as well as the proposed Marvin Nichols Reservoir. This data is to be combined with existing data for Lake Texarkana and the White Oak Creek Mitigation Area in order to cover most of the basin. No changes were made to the final report based on this comment.

c. The Sulphur Basin study is a basin-wide study that involves the potentially feasible water supplies in the basin, including supply from the system operation of Wright

Patman Lake and Lake Chapman, raising the lake elevation in Wright Patman Lake, new reservoir sites, and other potential sources. The term "proposed" on page 4D.13 was removed in the final report.

[7] The Texas Water Development Board provided the socio-economic report to the RCWPG. The RCWPG did not develop the socio-economic report. The socio-economic report is based on currently available supplies. Supplies that have been permitted but are not yet connected are considered to be future water management strategies according to the Texas Water Development Board regulations. No changes were made to the final report based on this comment.

[8] The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The selection of recommended strategies is based on many factors, including cost, quantity and reliability of the water supply, as well as potential impacts. The new reservoirs listed as recommended or alternative strategies in the Region C plan are reservoir projects that the water suppliers in Region C have asked the planning group to include. Thus, the plan represents the "bottom-up" process intended by the legislature.

The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project. The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on this comment.

a. All strategies evaluated in the Region C plan are considered potentially feasible future water supplies. Recommended strategies are listed in Sections 4E and 4F. The rationale for choosing the recommended strategies is discussed in Section 4C. No changes were made to the final report based on this comment.

[9] No change was made based on this comment.

[10] The amount of supply in Lake Texoma that is currently authorized and not yet permitted is 150,000 acre-feet of storage, which was reallocated from hydropower to municipal use. The North Texas Municipal Water District (NTMWD) is negotiating to purchase 100,000 acre-feet of this amount, leaving 50,000 that has been reserved by Congress for the Greater Texoma Utility Authority. The additional 220,000 acre-feet per year of yield that is discussed in the next paragraph has not been reallocated from hydropower to municipal use and will require Congressional authorization to do so.

The commenter appears to have misunderstood Jim Parks' remarks regarding the Lake Texoma strategy that the NTMWD is pursuing. The NTMWD is pursuing 100,000 acre-feet of storage that was previously reallocated from hydropower to municipal use. The NTMWD is <u>not</u> pursuing the 220,000 acre-feet of storage that will require Congressional authorization to reallocate. No changes were made to the final report based on this comment.

a. The strategies for Dallas Water Utilities to use water from Lake Texoma assume the water will be obtained from a new re-allocation that will need to be authorized by Congress. Discussions of the Lake Texoma strategies are included in Section 4D of the Region C plan. No changes were made to the final report based on this comment.

[11] The report summarizes the larger potentially feasible projects that the RCWPG considered in Section 4D. The report discusses the recommended water management strategies in Sections 4E and 4F. The methodology and criteria for evaluating and selecting recommended water management strategies are discussed in Section 4C. A summary of the strategy evaluations is included in Appendix T. The RCWPG does not keep a record of how individuals vote on any topic. No changes were made to the final report based on this comment.

[12]

a. Additional water conservation was included as an alternative supply at the request of the Dallas City Council. No specific quantities were provided. Specific measures and approaches will presumably be developed as Dallas pursues its water conservation program. No changes were made to the final report based on this comment.

b. All water user groups have conservation incorporated into their recommended strategies. Dallas Water Utilities requested that the strategy "additional water conservation" be included as one of their alternatives. Water conservation strategies are described in Section 4B.1. No changes were made to the final report based on this comment.

c. Table 4B.2 lists the 23 BMPs that the RCWPG considered. This table includes a column that explains why seven of the BMPs were not considered potentially feasible in Region C. The basic and expanded water conservation packages are explained on pages 4B.14-15. No changes were made to the final report based on this comment.

[13]

a. The U.S. Fish and Wildlife Service has considered two different footprints for the Neches Wildlife Refuge. Portions of both sites would be inundated by the proposed Lake Fastrill. The City of Dallas, in cooperation with the Upper Neches River Municipal Water Authority, is evaluating the Lake Fastrill project to determine if it can be developed in cooperation with the proposed Neches River Wildlife Refuge. Based on these studies, the footprint of the proposed refuge may change. No changes were made to the final report based on this comment.

b. The proposed wildlife refuge remains a potential project until such time that it is established by the U.S. Fish and Wildlife Service. Therefore, the term "potential" is correct. The U.S. Fish and Wildlife Service has not informed the RCWPG that the study for the proposed refuge has been completed. Thus, "currently under study" is still appropriate language. No changes were made to the final report based on this comment.

[14] Dallas Water Utilities requested that 112,000 acre-feet per year be the amount of water used in the Dallas Water Utilities strategy from Wright Patman Lake. No changes were made to the final report based on this comment.

a. See [14] above.

b. The RCWPG worked with Dallas Water Utilities regarding projects the entity plans to pursue. Dallas Water Utilities is planning to develop 112,000 acre-feet per year of water from Wright Patman Lake. The plan reflects the strategies that Dallas Water Utilities asked the planning group to include. No changes were made to the final report based on this comment.

c. Comment noted. No changes were made to the final report based on this comment.

d. The capital costs were developed according to the Texas Water Development Board regulations. No changes were made to the final report based on this comment.

e. Dallas Water Utilities does not plan to pursue the entire amount of water that might be available by raising the lake level at Wright Patman Lake. No changes were made to the final report based on this comment.

f. Developing the additional water in Wright Patman Lake as a regional supply is a less cost effective strategy for the regional suppliers than other recommended strategies. Also, there is greater supply available to the North Texas region from Toledo Bend Reservoir, which is a recommended strategy. No changes were made to the final report based on this comment.

[15] The cost comparison bar chart was prepared for Dallas Water Utilities, North Texas Municipal Water District and Tarrant Regional Water District. These charts were not prepared for each wholesale water provider. Capital costs for recommended projects for Upper Trinity Regional Water District are shown in Table 4E.14. No changes were made to the final report based on this comment.

[16] The population and demand projections were approved by the Texas Water Development Board (TWDB) two years ago. The TWDB required that the regional population projections remain unchanged from the values they provided. Thus, decreasing the population for one city would require increasing it for another to maintain the required regional total. The RCWPG found that many entities felt that their population and demand projections were underestimated, as shown in Table 2.20. Overall, more entities believed their population projections were underestimated than overestimated.

No one can determine the exact number of people who will be in the region at any given time in the future. No one included the recent natural disaster in our neighboring states (Hurricane Katrina) that has sent a large number of people to live in Region C, some temporarily and others permanently, in their population projections. Today, the population projections may look very different than they did a couple of years ago due to our recent increase in population this fall. No changes were made to the final report based on this comment.

[17] The table in question is included as Table 2 in Appendix T. The proposed Lower Bois d'Arc Creek Reservoir would inundate 16,358 acres. The Lower Bois d'Arc project would impact 16,558 acres, which includes 200 acres for pipeline right-of-way. The amount of land impacted was updated in the IPP from the draft information provided previously. No changes were made to the final report based on this comment.

75. Ty Abston, President of Guaranty Bond Bank, September 9, 2005

The RCWPG appreciates your participation in and support of the regional water planning process. Marvin Nichols Reservoir is one of the recommended strategies in the plan. No changes were made to the final report based on this comment.

76. Kerry Wootten, President of the Mount Pleasant Industrial Foundation (Resolution), (no date)

The RCWPG appreciates your participation in and support of the regional water planning process. Marvin Nichols Reservoir is one of the recommended strategies in the plan. No changes were made to the final report based on this comment.

77. Adrian F. Van Dellen, DVM, September 9, 2005

The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The RCWPG has recommended only four new reservoirs to be constructed over the next 50 years. Twenty-five reservoirs have been constructed in the last 55 years for water supply for Region C. The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project.

The RCWPG has put forth a plan with an increased focus on water conservation, reuse, and connection of existing supplies, as well as a limited number of new reservoir projects. The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on this comment.

78. LauJrv@aol.com, September 9, 2005

The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The RCWPG has recommended only four new reservoirs to be constructed over the next 50 years. Twenty-five reservoirs have been constructed in the last 55 years for water supply for Region C. The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project.

The RCWPG has put forth a plan with an increased focus on water conservation, reuse, and connection of existing supplies, as well as a limited number of new reservoir projects. The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on this comment.

79. Ann Rushing, City of Clarksville, September 9, 2005

The RCWPG appreciates your support of and participation in the regional water planning effort. No changes were made to the final report based on this comment.

80. Blaine Hinds, City Manager of the City of Bonham, September 9, 2005

The RCWPG appreciates your support of and participation in the regional water planning effort. Lower Bois d'Arc Creek Reservoir is a recommended strategy in the Region C plan. No changes were made to the final report based on this comment.

81. Bill Yoss, Mayor of the City of Leonard, September 8, 2005

The RCWPG appreciates your participation in and support of the regional water planning process. Lake Ralph Hall is a recommended strategy for the Upper Trinity Regional Water District and is expected to provide surface water supply to the Fannin and Denton County areas. Lower Bois d'Arc Creek Lake is a recommended strategy for the North Texas Municipal Water District and is expect to provide water to Collin, Dallas, Fannin, Kaufman and Rockwall Counties. No changes were made to the final report based on this comment.

82. Sherry G. Lundberg, September 8, 2005

The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The new reservoirs listed as recommended or alternative strategies in the Region C plan are reservoir projects that the water suppliers in Region C have asked the planning group to include. The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project. The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on this comment.

83. Anne Olden, September 9, 2005

The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The new reservoirs listed as recommended or alternative strategies in the Region C plan are reservoir projects that the water suppliers in Region C have asked the planning group to include. The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project. The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on this comment.

84. Rita Beving, Dallas Sierra Club, September 8, 2005

The RCWPG included a copy of the form letter and the list of people who submitted copies of the form letter, as well as a copy of the first form email and a list of people who submitted copies prior to June 1, 2005. See "Response to Form Emails and Form Letters Received from Sierra Club". No changes were made to the final report based on this comment.

Responses to Emails Received at regionc@freese.com

1. *Norma Brock, July 12, 2005*

   The RCWPG appreciates your participation in and support of the regional water planning process. One of the goals of the RCWPG is to meet the water needs for the next 50 years in order to support the expected growth in this area. One of the strategies to meet these needs is developing new reservoirs. No changes were made to the final report based on this comment.

2. *Scott Jones, July 12, 2005*

   The RCWPG was charged with developing water management strategies to meet the projected water needs for the next 50 years. The RCWPG has no authority to dictate or regulate population. No changes were made to the final report based on this comment.

3. *Ross Canant, L-3 Communications Integrated Systems, July 12, 2005*

   The RCWPG population projections do not assume unlimited growth. City build out information was included in the analysis of population projections. People will move to the areas that have jobs. Region C is one area that has a strong job market that is expected to grow. Thus, water will be needed to meet this expected growth. The RCWPG has no authority to dictate population limits for cities. No changes were made to the final report based on this comment.

4. *Ken Lawson, July 12, 2005*

   The RCWPG understands that new reservoir development will impact landowners, the environment, and others. The RCWPG has put forth a plan with an increased focus on water conservation, reuse and connection of existing sources, as well as a limited number of new reservoir projects.

   The RCWPG does not have the authority to set water rates or to enforce water conservation codes. Those decisions are up to the individual cities.

   The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on this comment.

5. *Susan Candy, July 12, 2005*

   The RCWPG has put forth a plan with an emphasis on water conservation and reuse. The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. The RCWPG has no authority to mandate water conservation measures for cities. No changes were made to the final report based on this comment.

6. *kirbyword@hillsboro.net, July 12, 2005*

   It is not feasible or practical to increase water supplies by raising the water level by 15 feet in every reservoir. Many reservoirs are designed with flood control storage. By raising the level of the lake, the ability of the reservoir to hold back flood waters would be greatly diminished if not erased. The volume of storage a reservoir can hold does not equate to the reliable yield the reservoir can supply. No changes were made to the final report based on this comment.

7. *Max Shumake, July 13, 2005*

   The Region C plan includes water conservation, reuse, connection of existing supplies, and development of new reservoirs. The proposed Marvin Nichols Reservoir is a recommended strategy in the Region C plan. This project is included in the long-range water supply plans for Region C suppliers. No changes were made to the final report based on this comment.

8. *Marcus Wood, Marcus Wood & Co., July 14, 2005*

   The RCWPG appreciates your participation in and support of the regional water planning process. One of the goals of the RCWPG is to meet the water needs for the next 50 years in order to support the expected growth in this area. No changes were made to the final report based on this comment.

9. *Ann Rushing, Mayor of the City of Clarksville, September 9, 2005*

   The RCWPG received a copy of the City's resolution supporting the Marvin Nichols Reservoir and future studies. No changes were made to the final report based on this comment.

10. *Wendell Davis (forwarded by Ann Rushing), Red River Co. WCID #1 – Langford Lake, September 9, 2005*

    The RCWPG appreciates your participation in and support of the regional water planning process. One of the goals of the RCWPG is to meet the water needs for the next 50 years in order to support the expected growth in this area. No changes were made to the final report based on this comment.

11. *Charlotte Connelly, September 9, 2005*

    The RCWPG understands that new reservoir development will impact landowners, the environment, and others. The RCWPG has put forth a plan with an increased focus on water conservation, reuse and connection of existing sources, as well as a limited number of new reservoir projects.

The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on this comment.

12. *Kathy Pruitt, September 9, 2005*

    The RCWPG is concerned with water quality and the protection of current water supplies. The RCWPG is not associated with landfill or power plant development. Landfills must meet specific standards set by the state. The entity developing the proposed landfill is responsible for site selection and should be contacted regarding your concerns with their development. No changes were made to the final report based on this comment.

13. *unknown, September 9, 2005*

    The RCWPG is concerned with water quality and the protection of current water supplies. The RCWPG is not associated with landfill or power plant development. Landfills must meet specific standards set by the state. The entity developing the proposed landfill is responsible for site selection and should be contacted regarding your concerns with their development. No changes were made to the final report based on this comment.

14. *Todd K. Madison, Town of Lincoln Park, September 9, 2005*

    The RCWPG appreciates your participation in and support of the regional water planning process. No changes were made to the final report based on this comment.

15. *Clay E. Crawford, Law Offices of Clay E. Crawford, P.C. on behalf of Denton County FWSD 8A, 8B, 9, 10, 11A, and 11B, , September 9, 2005*

    The RCWPG appreciates your participation in and support of the regional water planning process. One of the goals of the RCWPG is to meet the water needs for the next 50 years in order to support the expected growth in this area. One of the strategies to meet these needs is developing new reservoirs. No changes were made to the final report based on this comment.

Response to Form Emails and Form Letters Received from Sierra Club

The RCWPG received a form letter and two form emails commenting on the Region C Water Plan. A sample copy of each form letter is included in Appendix AA with written comment #84 and with other email comments. For the two emails, commenters were allowed to add a leading paragraph to the form email. The RCWPG received 111 copies of the form letter. The RCWPG received 286 copies of the first form email, of which 19 were received after the completion of the Initially Prepared Plan. The RCWPG received 134 copies of the second form email prior to September 9, 2005. Tables listing the names of those sending the letter and the emails are included. The response to all three is included below.

The Region C plan recommends water conservation, reuse, and connection of existing supplies, as well as a limited number of new reservoir projects. The new reservoirs listed as recommended and alternative strategies in the Region C plan are reservoir projects that the water suppliers in Region C have asked the planning group to include. The regional water planning process has brought water suppliers together to develop regional supplies as opposed to numerous individual supplies that would require more natural resources to develop.

The RCWPG has no regulatory authority, and including a project in the plan does not guarantee that it will be permitted, funded, or developed. No changes were made to the final report based on this comment.

Responses to Letters from State and Federal Agencies

1. *Larry D. McKinney, PhD., Director of Coastal Fisheries of the Texas Parks and Wildlife Department, September 8, 2005*

   a. The quantification of environmental impacts in the Region C Water Plan is appropriate for a planning level report. Quantifications are based on available data from previous studies and desktop analyses. Impacts from water management strategies were assessed following guidelines developed by the Texas Water Development Board. Water supply yields from new reservoir projects were determined assuming streamflow releases based on the Consensus method, which is designed to mitigate impacts to downstream flows. Further quantifications of potential impacts of recommended water management strategies will be required by the entity pursuing the supply during the permitting process. No changes were made to the final report based on this comment.

   b. No springs supply significant amounts of water for use in Region C. Groundwater availability in the plan was set at levels that minimize drawdowns to area aquifers, thus minimizing impacts on springs in the region. No changes were made to the final report based on this comment.

   c. The RCWPG supports the inclusion of water conservation and reuse as strategies to meet projected water needs for the region. This is evidenced with the recommendation of water savings of over 1.2 million acre-feet per year by 2060 attributed to conservation and reuse. The Water Conservation Implementation Task Force goal of 140 gpcd is calculated with credit for reuse, which is the method used by Region C.

      The RCWPG supports brush control/management at the local level. However, brush control at the regional level is not appropriate considering that only a small amount of water could be conserved through such a program. There are currently no proposed state-supported brush control studies or projects planned in Region C. As stated in Section 4C, any such projects in the future would be considered consistent with the plan. No changes were made to the final report based on this comment.

   d. There remains some uncertainty regarding the designation of unique stream segments. As discussed in Section 8.2, the Texas Legislature clarified that designating a stream segment as unique would prevent reservoir development by a political subdivision of the state. However, the Texas Water Development Board regulations require additional analysis of impacts of water management strategies on recommended stream segments, which implies some level of protection beyond the prevention of reservoir development. Private property rights are only one of the RCWPG's concerns for designation.

      The impacts of recommending a unique reservoir site are clearer than the impacts of a unique stream segment designation. Designating a unique reservoir site only prohibits state agencies and political subdivisions from acquiring easements that would prohibit reservoir development.

   e. While the amount of supply exceeds demand in 2060, the surplus does not apply uniformly to all users and does not all stem from one project. Removing one project from the plan could leave an area of the region short of water supply. The development of these projects is sized for economic and efficient use of available water resources.

This provides some water for unforeseen conditions and growth beyond the planning period.

The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The new reservoirs listed as recommended or alternative strategies in the Region C plan are reservoir projects that the water suppliers in Region C have asked the planning group to include. The RCWPG understands that new reservoir development will impact the state's natural resources. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project. No changes were made to the final report based on this comment.

f. The quantification of environmental impacts in the Region C Water Plan is appropriate for a planning level report. Quantifications are based on available data from previous studies and desktop analyses. Impacts from water management strategies were assessed following guidelines developed by the Texas Water Development Board. Water supply yields from new reservoir projects were determined assuming streamflow releases based on the Consensus method, which is designed to mitigate impacts to downstream flows. Further quantifications of potential impacts of recommended water management strategies will be required by the entity pursuing the supply during the permitting process. No changes were made to the final report based on this comment.

g. No springs supply significant amounts of water for use in Region C. See response to written comment #71.b. No changes were made to the final report based on this comment. Chapter 1 is a description of Region C. State and federal lands in Region D are described in the Region D Water Plan. The Region C plan addresses potential impacts from recommended Region C water management strategies on Region D resources, including state and federal lands, in Chapters 4 and 7. The final report includes updated information on species that are no longer included as state species of concern.

h. Consideration of environmental concerns and mitigation are necessities. They are also constraints on the development of new supplies. No changes were made to the final report based on this comment.

i. Chapter 1 is a general description of the region. Impacts from recommended water management strategies are addressed in Chapters 4 and 7, including impacts from reservoirs in adjacent regions. No changes were made to the final report based on this comment.

j. Region C has considered the impacts that Marvin Nichols Reservoir and Lake Fastrill would have on the regions in which they would be located. Designation of mitigation lands is beyond the scope of the regional water planning groups. Mitigation will be determined during the permitting process. No changes were made to the final report based on this comment.

k. The RCWPG supports the inclusion of water conservation and reuse as strategies to meet projected water needs for the region. This is evidenced with the recommendation of water savings of over 1.2 million acre-feet per year by 2060 attributed to conservation and reuse. The Water Conservation Implementation Task Force goal of 140 gpcd is calculated with credit for reuse, which is the method used by Region C. The proposed reduction to less than 100 gpcd is beyond the intent of the Water Conservation Implementation Task Force.

The RCWPG supports brush control/management at the local level. However, brush control at the regional level is not appropriate in Region C considering that only a small amount of water could be conserved through such a program. There are currently no proposed state-supported brush control studies or projects planned in Region C. As stated in Section 4C, any such projects in the future would be considered consistent with the plan. No changes were made to the final report based on this comment.

l. There remains some uncertainty regarding the designation of unique stream segments. As discussed in Section 8.2, the Texas Legislature clarified that designating a stream segment as unique would prevent reservoir development by a political subdivision on the state. However, the Texas Water Development Board regulations require additional analysis of impacts of water management strategies on recommended stream segments, which implies some level of protection beyond the prevention of reservoir development. Private property rights are only one of the RCWPG's concerns for designation.

m. While the amount of supply exceeds demand in 2060, the surplus does not apply uniformly to all users and does not all stem from one project. Removing one project from the plan could leave an area of the region short of water supply. The development of these projects is sized for economic and efficient use of available water resources. This provides some water for unforeseen conditions and growth beyond the planning period.

   The Region C plan includes water conservation, reuse, connection of existing supplies, and a limited number of new reservoirs. The new reservoirs listed as recommended or alternative strategies in the Region C plan are reservoir projects that the water suppliers in Region C have asked the planning group to include. The RCWPG understands that new reservoir development will impact the state's natural resources. Further quantification and mitigation of impacts of a reservoir project will be addressed during the permitting process for the project. No changes were made to the final report based on this comment.

n. The RCWPG is aware that the Texas State Railroad is located in the area of the proposed Lake Fastrill. Based on our understanding of state law, it is inconceivable that Lake Fastrill would be permitted unless the Texas State Railroad is protected, and the cost estimates for the lake include protection of the railroad. Mitigation of impacts of Lake Fastrill, including impacts on the Texas State Railroad and the environment, will be required in the permitting process for the lake. A statement regarding the presence of the Texas State Railroad was added to Section 4D.

o. Chapter 1 is a description of Region C. A table summarizing recreational opportunities at reservoirs in Region C was added to Chapter 1. Impacts from Region C recommended strategies on water sources outside the region are discussed in Chapters 4 and 7.

p. The Region C Water Plan recommends the Marvin Nichols Reservoir for meeting water needs in Region C. The potential impacts associated with this project are discussed in Appendix T. No changes were made to the final report based on this comment.

q. Operating Wright Patman Lake and Chapman Lake as a system is not a recommended strategy for Region C. If this strategy is recommended in future water plans, a detailed study of environmental impacts and stream flows will likely be required as part of the permitting process. No changes were made to the final report based on this comment.

r. The potential impacts to the Caddo National Grasslands are included in Table T-2 in Appendix T. An on-site wetlands delineation and habitat study will be conducted as part of the permitting process. The acreage of Priority 4 bottomland hardwoods in the area is not readily available at this time. Analyses of potential downstream impacts will be evaluated during the permitting process.

s. The RCWPG is aware that the Texas State Railroad is located in the area of the proposed Lake Fastrill. Based on our understanding of state law, it is inconceivable that Lake Fastrill would be permitted unless the Texas State Railroad is protected, and the cost estimates for the lake include protection of the railroad. The RCWPG understands that new reservoir development will impact landowners, the environment, and others. Mitigation of impacts of Lake Fastrill, including impacts on the Texas State Railroad and the environment, will be required in the permitting process for the lake. A statement regarding the presence of the Texas State Railroad was added to Section 4D.

t. Potential impacts of moving waters from one basin to another were evaluated in Chapter 5, under key water quality parameters. The potential to import toxic algal blooms is a concern that will be addressed during the permitting process. No changes were made to the final report based on this comment.

2. *William F. Mullican, III, Deputy Executive Administrator of the Office of Planning at the Texas Water Development Board, September 29, 2005*

   <u>Level 1 Comments</u>

   1. We added a statement on the impacts of the Region C water plan on navigation to Chapter 7. A statement describing navigation activities in Region C was added to Chapter 1.
   2. After conferring with TWDB staff, this information is included in the TWDB database and no changes were made to the report.
   3. Groundwater availability estimates for the Trinity aquifer in Kaufman and Rockwall Counties and the Woodbine aquifer in Tarrant County are zero (0). This was added to Table 3.5. This information is also included in Appendix I.
   4. We changed Table F-2 in Appendix F to reflect a demand of "1" acre-foot per year for the city of Lewisville in Dallas County.
   5. This information is contained in Appendix I.
   6. The impacts of water management strategies on environmental flows were assessed as part of the strategy evaluations and the findings are contained in Appendix T. The results of the supplemental studies regarding the potential impacts of the recommended Region C water plan on flows in the Trinity River Basin were added to the final report.
   7. An appendix describing the assumptions used in developing the conservation savings and costs were added to the final report as Appendix M.

8. An assessment of water needs for interbasin transfers was added to Section 4C as Table 4C.5.
9. This appendix is included in the final report.
10. The percent calculation line in Table 6.6 of the final report has been labeled as "Percent of Demand met through Conservation and Reuse Strategies." The report was reviewed to clarify that the RCWPG regards reuse as one component of conservation, and all tables and figures were reviewed and labeled in this context.
11. Exhibit B, Section 3.1.1, states that water sources that are available for use within the region are to be identified and quantified by basin and county. This information is included in Appendix I. Appendix V is a summary of information by water user group and is not intended to meet this requirement.
12. The population for Bridgeport was added to Appendix V.
13. Comment noted.

<u>Level 2 Comments</u>

14. Year 2000 is the base year for the Region C plan. The final version of the report does not say that year 2000 is the "most current available" data.
15. Section 1.8 of the IPP was corrected to say "Texas Commission on Environmental Quality" in the final report.
16. Figures 4A.4 and 4A.5 were converted into bar charts. A note was added below the charts to indicate that the data for each decade is assumed to be independent.
17. The phrase "Groundwater Management Districts" was replaced with "Groundwater Conservation Districts" in the final report.
18. The text on page 4D.15 of the IPP was adjusted to clarify ownership of the water rights with regards to the Roberts County Groundwater Project in the final report.
19. The phrase "Mesa Groundwater" was replaced with "Roberts County Groundwater" in the final report.
20. Figure 4E.10 included a legend entry in the final report indicating that the red dashed line is "Currently Available Supply".
21. The introduction on page 4E.4 of the IPP was adjusted in the final report to read as follows, "The conservation savings for DWU retail customers are based on DWU's recent conservation plan. The savings for DWU's wholesale customers are based on the Region C recommended water conservation program."
22. The figure number on page 4E.17 of the IPP was corrected to read "Figure 4E.5" in the final report.
23. The note at the end of the bullet on page 6.3 of the IPP was adjusted to read "[Note that the Task Force also recommended the water supplied by indirect reuse should be credited against total diversion volumes when computing per capita water use.]" in the final report.

24. The discussion under "Drought Management" on page 6.6 of the IPP was corrected to refer to the appropriate appendix in the final report.

25. The text on pages 6.20 and 6.21 of the IPP was adjusted to read "After crediting for indirect reuse as recommended by the Water Conservation Implementation Task Force…" in the final report.

26. The text on page 6.19 of the IPP referring to the five-year rolling average was adjusted in the final report to read "Because the per capita use goal is based on a five-year moving average, it is more applicable to normal-year water use than to dry-year water use."

    The text on page 6.23 of the IPP was adjusted to read "The goal is based on a five-year rolling average, which dampens the impact of particularly dry or wet years and is more applicable to normal-year water use than to dry-year water use." in the final report.

27. A footnote was added to Table 6.5 in the final report explaining the term "without conservation" as follows, "* The "Total Region C Demands" on the line above includes projected conservation savings from low-flow plumbing fixtures rules and efficient new steam electric power plants. These projected savings have been added to the "Total Region C Demands" to obtain "Total Demand without Conservation", a projection of total Region C demand without any water conservation."

28. The sentence in question on page 7.3 of the IPP was reworded in the final report as follows "The new reservoirs will make releases for environmental water needs in accordance with environmental regulations and permit conditions."

29. The phrase "their organizations" was removed from the text referring to Table 10.1 in the final report.

30. The model municipal water conservation plan was updated to include the newer version of TCEQ's Water Utility Profile in Appendix N of the final report.

31. Units were included in appropriate tables in the final report.