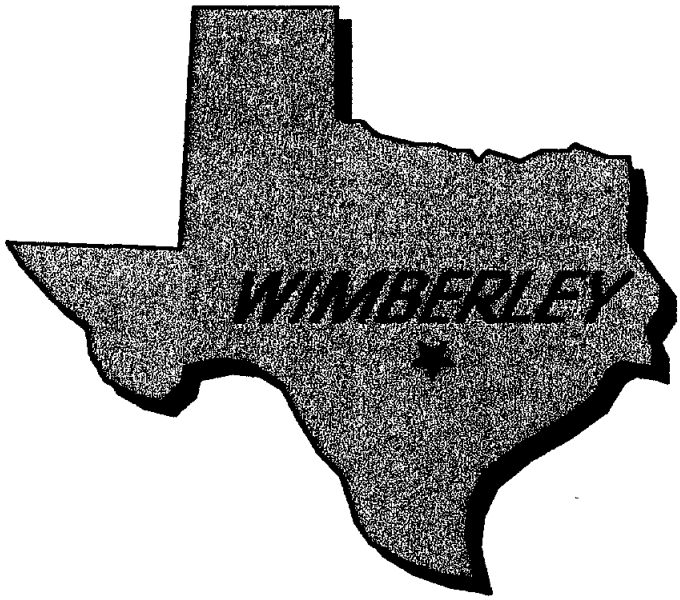
WIMBERLEY REGIONAL WASTEWATER PLANNING STUDY



TEXAS WATER DEVELOPMENT BOARD
Research and Planning Fund

prepared by

GUADALUPE-BLANCO RIVER AUTHORITY
Seguin, Texas
and
R. J. BRANDES COMPANY
Austin, Texas

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PREFACE

This Regional Wastewater Planning Study for the community of Wimberley, Texas and the surrounding area has been conducted by the Guadalupe-Blanco River Authority, with technical consulting assistance from R. J. Brandes Company and funding support from the Texas Water Development Board through its Research and Planning Grant program. To support this study, basic data and information have been compiled and provided by various study participants, including Hays County, the City of Woodcreek, the Wimberley Independent School District, the Wimberley Water Supply Corporation, and the Wimberley Citizens Water Resources Group.

This planning report includes both technical and institutional alternatives for wastewater management that should assist officials of local entities and the public in making decisions regarding the protection of water quality in the Wimberley area of Hays County. The alternatives discussed in this report incorporate information relating to regional wastewater and water quality issues and may or may not represent individual views or present plans of specific entities.

The next important step is for local entities and the public to consider these alternatives and to develop specific action plans.

TABLE OF CONTENTS

TABLE OF CONTENTS

cont'd.

TABLE OF CONTENTS

cont'd.

TABLE OF CONTENTS

cont'd.

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

1.1 STUDY PARTICIPANTS

This Regional Wastewater Planning Study for the community of Wimberley and the surrounding area has been prepared by the Guadalupe-Blanco River Authority under contract to the Texas Water Development Board with funding assistance through the its Research and Planning Grant program. Participants in the study include Hays County, the Wimberley Independent School District, the City of Woodcreek, the Wimberley Water Supply Corporation, and the Wimberley Citizens Water Resources Group.

The Guadalupe-Blanco River Authority (GBRA) is a political subdivision of the State of Texas, established to develop, conserve and protect the water resources of the Guadalupe River Basin. Hays County is one of the ten counties within the GBRA district. Specific to the GBRA enabling act is the charge "to develop the collection, transportation, treatment, disposal and handling of any waste".

GBRA presently operates twelve divisions which provide water supply and delivery, water and wastewater treatment services, hydroelectric generation and other water related services. Present operations include the General, Guadalupe Valley Hydroelectric, Rural Utilities, Water Supply, Calhoun Canal, Port Lavaca Water Treatment Plant, Calhoun County Rural Water Supply, Victoria Regional Waste Disposal, Coleto Creek, Luling Water Treatment Plant, Canyon Hydroelectric, and Lockhart Wastewater Treatment Divisions.

1.2 PLANNING AREA

The community of Wimberley is located in southcentral Hays County, approximately 12 miles northwest of the City of San Marcos and about 30 miles southwest of the State Capitol in the City of Austin in Travis County. The map of the region in Figure 1-1 identifies the general location of Wimberley and the planning area for this Regional Wastewater Planning Study. Ranch Road 12 runs generally north-south through the community of Wimberley and the planning area, and the Blanco River crosses the planning area from west to east. Cypress Creek flows southeastward from the northwest corner of the planning area through the City of Woodcreek and through the downtown area of Wimberley to the Blanco River near the Ranch Road 12 crossing.

This planning area encompasses approximately 32 square miles surrounding the downtown "square" of the community of Wimberley. Other recognized entities or features included in the planning area that are of significance with regard to the study

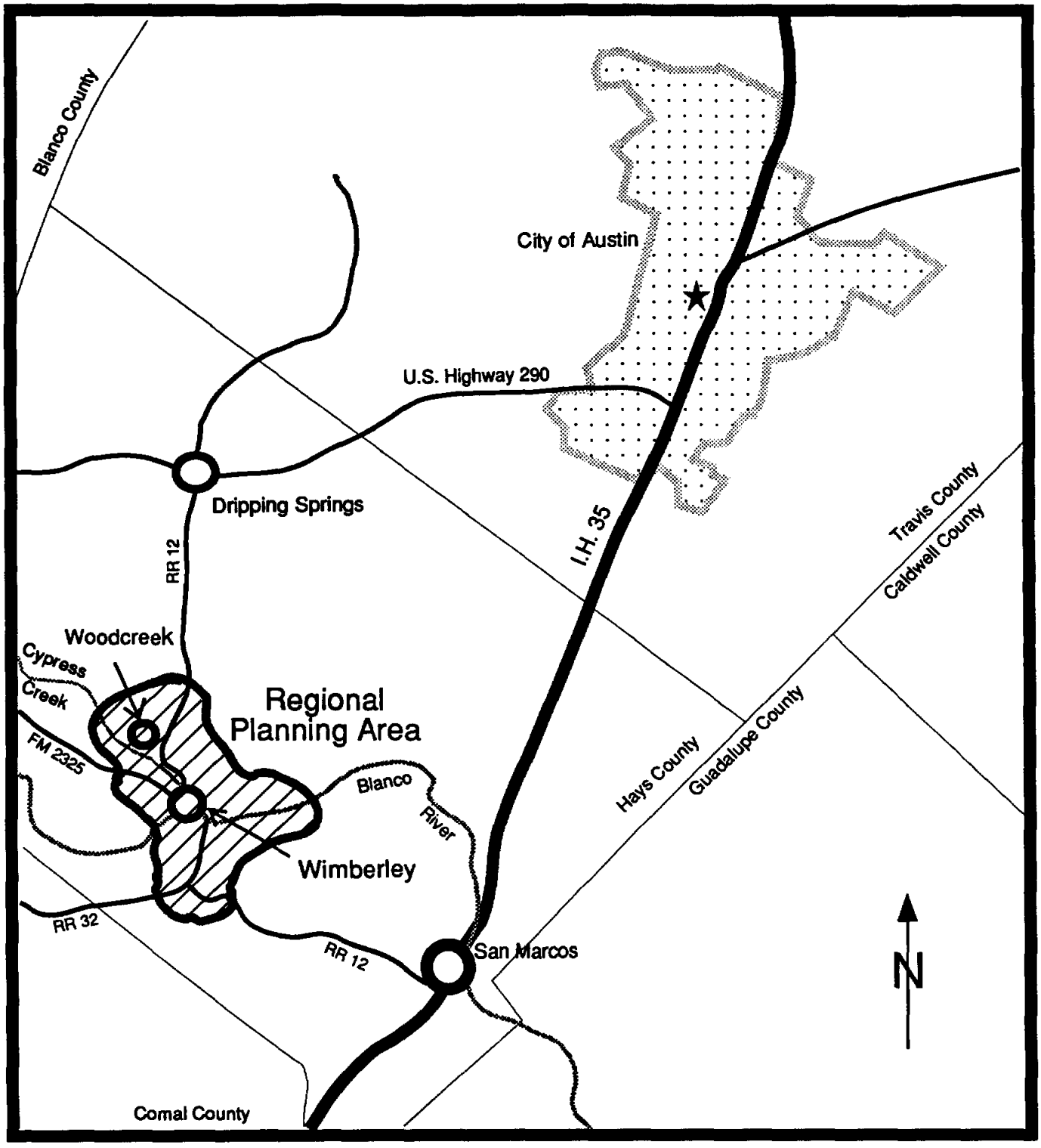


FIGURE 1-1
GENERAL LOCATION MAP SHOWING
WIMBERLEY REGIONAL PLANNING AREA

are the City of Woodcreek and Woodcreek Resort, the schools within the Wimberley Independent School District, the Blue Hole recreational area and its potential development, and the Living Centers of America Nursing Home. The planning area has been defined so as to include those facilities and activities that generate significant quantities of wastewater loadings which presently, or potentially could, adversely impact water quality and the environment in the vicinity of the community of Wimberley. The boundary of the planning area and relevant study entities and features are identified on the topographic map of the region in Figure 1-2.

1.3 STUDY OVERVIEW

This Regional Wastewater Planning Study has been undertaken to provide an evaluation of the specific problem areas within the Wimberley region regarding water pollution control and wastewater treatment facility needs. The study considers structural and nonstructural alternatives for wastewater disposal and water quality protection, and reviews institutional alternatives involving existing and/or new governmental entities that can assume the responsibility for wastewater management in the region. The costs associated with implementing various wastewater collection, treatment and disposal options for different portions of the planning area also are presented.

1.4 STUDY BACKGROUND

Wimberley was founded in the 1850's by Will Winters who settled on Cypress Creek where he constructed a small water mill. A later owner of the mill, Pleasant Wimberley, established a permanent residence and the community became known as Wimberley.

While early occupations focused primarily on ranching and related agricultural activities, today's vocations support a large retirement community and are concentrated on the arts and crafts trade, including painting and writing. The downtown area includes galleries and shops, and for over thirty years, Market Days have been held the first Saturday of each month from April through December.

The Wimberley area has grown rapidly in the past fifteen years. The population has increased from about 1,000 to 1,500 people around 1980 to over 6,000 at the present time. Although many of the new residents of the Wimberley area are retirees, numerous working families with children also are moving into the region to establish permanent residences away from the highly urbanized and more densely populated

Austin area. Presently, there are approximately 90 residential subdivisions in the vicinity of Wimberley, with the City of Woodcreek having the most concentrated residential development. Waterfront properties are especially desirable for recreational and permanent housing in the area, with access available to the Blanco River, Cypress Creek, Lone Man/Smith Creeks, and Wilson Creek.

With the rapid growth of the Wimberley area, the rural and environmentally-sensitive character of the region has undergone significant physical change. Certainly, there are many more houses and businesses in the area, with attendant streets, schools and infrastructure. Except for those residences located within the Woodcreek Utilities service area, which presently serves about 475 residences, wastewater from practically all homes and businesses is treated and disposed of by individual onsite septic tank systems. Given the increased volumes of wastewater being generated, the shallow nature of the soils in the region and their limitations for effectively supporting septic tank operations, and recent observations of degraded water quality in creeks and streams, local residents are becoming increasingly concerned about potential serious problems involving immediate and long-term impacts on water and land resources in the Wimberley area. Without action by local interests in the near future, the management and control of wastewater within the region could be assumed by the County, or some state or federal entity, if necessary for the protection of public health and welfare and the environment.

Although there is a natural reluctance on the part of local citizens to implement increased governmental controls and regulations, effective planning is necessary to identify the available options. Presently, no local governmental entity exists with the authority for implementing water quality management and control measures in the region. If the quality of life as it exists today throughout the area is to be preserved in the future, it is imperative that a plan for effective management and control of the region's wastewater be devised and implemented as soon as possible.

1.5 PUBLIC INFORMATION AND PARTICIPATION

This Regional Wastewater Planning Study has been conducted with a directed goal of providing ample opportunities for public input and participation, as well as opportunities for providing information to the public.

Regular meetings have been held with representatives of local public entities and also with a group of local citizens, identified herein as the Wimberley Citizens Water Resources Group. Discussions also have been held on numerous occasions with

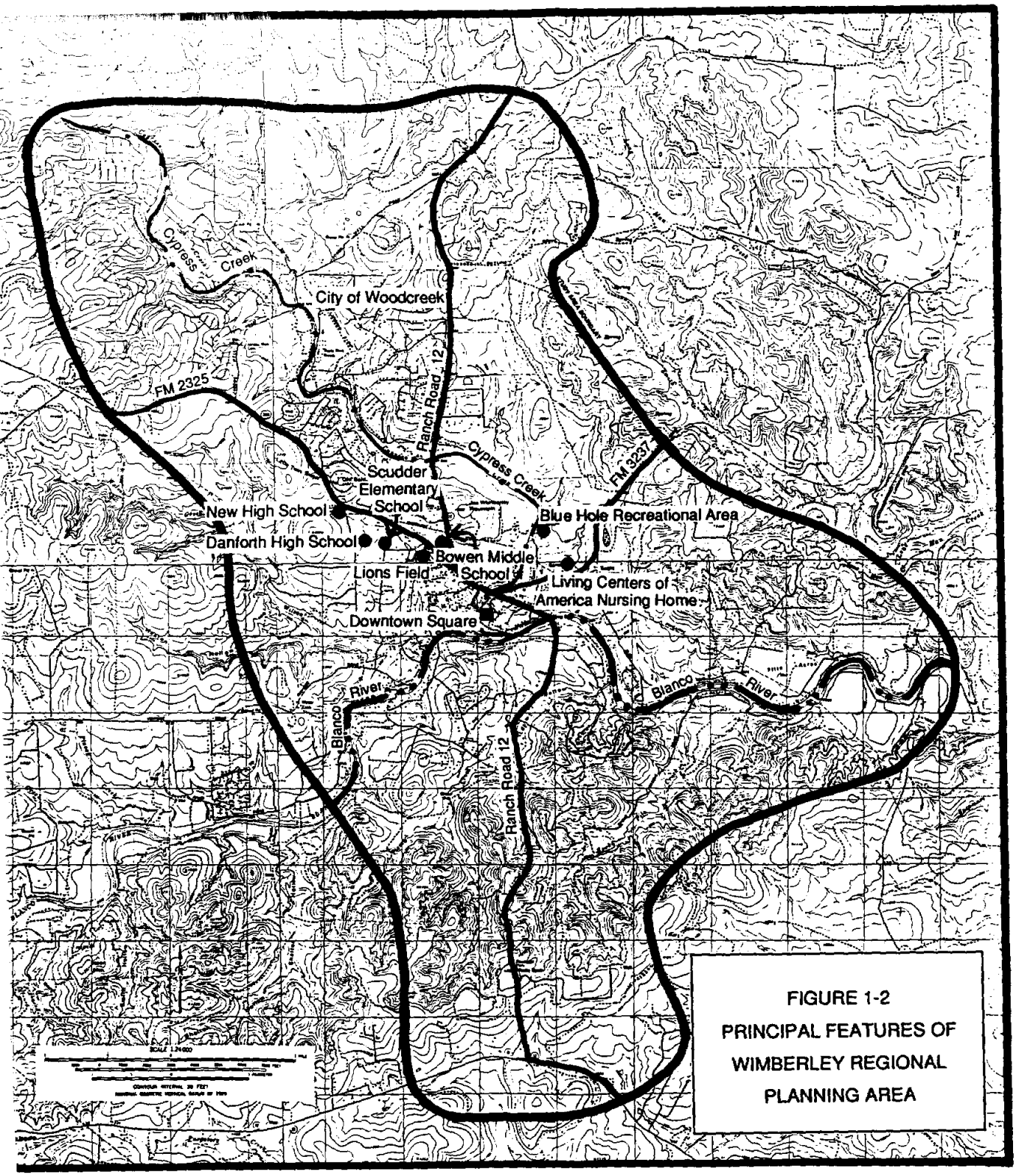


FIGURE 1-2
PRINCIPAL FEATURES OF
WIMBERLEY REGIONAL
PLANNING AREA

representatives of the City of Woodcreek, Woodcreek Utilities, the Wimberley Independent School District, the Wimberley Water Supply Corporation, the Living Centers of America nursing home and others in the planning area to obtain information relating to the overall wastewater management effort.

Formal public meetings for the purpose of presenting information regarding the status and findings of the study and obtaining public input were advertised in the local newspaper and held on March 2, 1995 and on September 7, 1995. At both meetings, attendance was good, with active participation from the public.

Copies of media coverage of local water and wastewater related issues and articles pertaining to this Regional Wastewater Planning Study are contained in the Appendix of this report.

2.0 REGIONAL PLANNING AREA

2.1 PLANNING SUBAREAS

To facilitate the analyses and calculations required for this regional wastewater planning study, the planning area has been divided into 31 subareas as shown in Figure 2-1. A larger version of this planning area map is contained in Attachment 1 at the end of this report.

The downtown "square" of Wimberley and the central business area along Ranch Road 12 are included within Subarea 8. The corporate area of the City of Woodcreek is represented by Subarea 47. Subareas 1 through 13 encompass the approximate boundaries of the Wimberley Water Supply Corporation.

2.2 LOCAL GOVERNMENTAL JURISDICTIONS

Represented within the Wimberley region are the following governmental entities with various levels and forms of jurisdiction. All of these entities have contributed to this wastewater planning effort by providing valuable information required for the analyses and investigations.

Hays County - Created by the Texas Legislature, 1843.

Guadalupe-Blanco River Authority - Created under Article XVI, Section 59 of the Texas Constitution, Article 8280-106, Vernon's Texas Statutes.

City of Woodcreek - Created by order of the Hays County Commissioner's Court of August 11, 1984, calling for an election of incorporation of Woodcreek.

Wimberley Water Supply Corporation - Created under the Water Supply/Sewer Service Corporations Act, Article 1434a., Texas Revised Civil Statutes (West 1980, Vernon Supp. 1993)

Wimberley Independent School District - Created by the Texas Education Code, Section 19.024.

Additionally, the Wimberley Citizens Water Resources Group, comprised of local citizens who have given their time to assist in the development of information necessary to conduct this Regional Wastewater Planning Study, has been a key participant in this overall effort.

2.3 PHYSICAL FEATURES

2.3.1 Generalized Land Use

The Wimberley community is located west of the Balcones Escarpment on the Edwards Plateau land resource area. Most of the planning area is characterized as rural residential, with some range land. Existing range land is continuously being converted to more urbanized development comprised primarily of low density single family residences, retirement housing, and recreational or weekend homes. Much of the bank area along the Blanco River and Cypress Creek within the planning area is utilized for single family residential and recreational homes, including small cabins and camp ground facilities. Outside of the Woodcreek Utilities service area, the density of residential development presently is limited to one house per one-half acre because of septic tank restrictions imposed by Hays County, with some areas limited to one house per acre depending on soils and percolation characteristics. Furthermore, in areas that are not served by public or community water supply systems, e. g., lots outside the service areas of the Wimberley Water Supply Corporation and Woodcreek Utilities, development densities are limited by the County to one single-family residence or one living unit equivalent per acre.

The general distribution of existing (1995) residential housing throughout the planning area is illustrated by the individual structures identified on the map of the planning area in Attachment 1.

The vicinity of the downtown "square" is the most densely-developed commercial area, with various businesses, stores, shops and restaurants. To the north along Ranch Road 12, particularly in the area of its intersection with FM Road 2325 and FM Road 3237, additional relatively-dense commercial development has occurred. Subarea 8 in Figure 2-1 encompasses most of the commercial development within the Wimberley community.

2.3.2 Soil Types and Characteristics

The U. S. Soil Conservation Service (SCS) has prepared a soil survey for Hays County that provides detailed information on soil characteristics. The General Soil Map for Hays County, as prepared by the SCS, is presented in Figure 2-2. The planning area boundary for this study has been delineated on the map. As indicated, there are two general types of soil within the planning area. The Lewisville-Gruene-

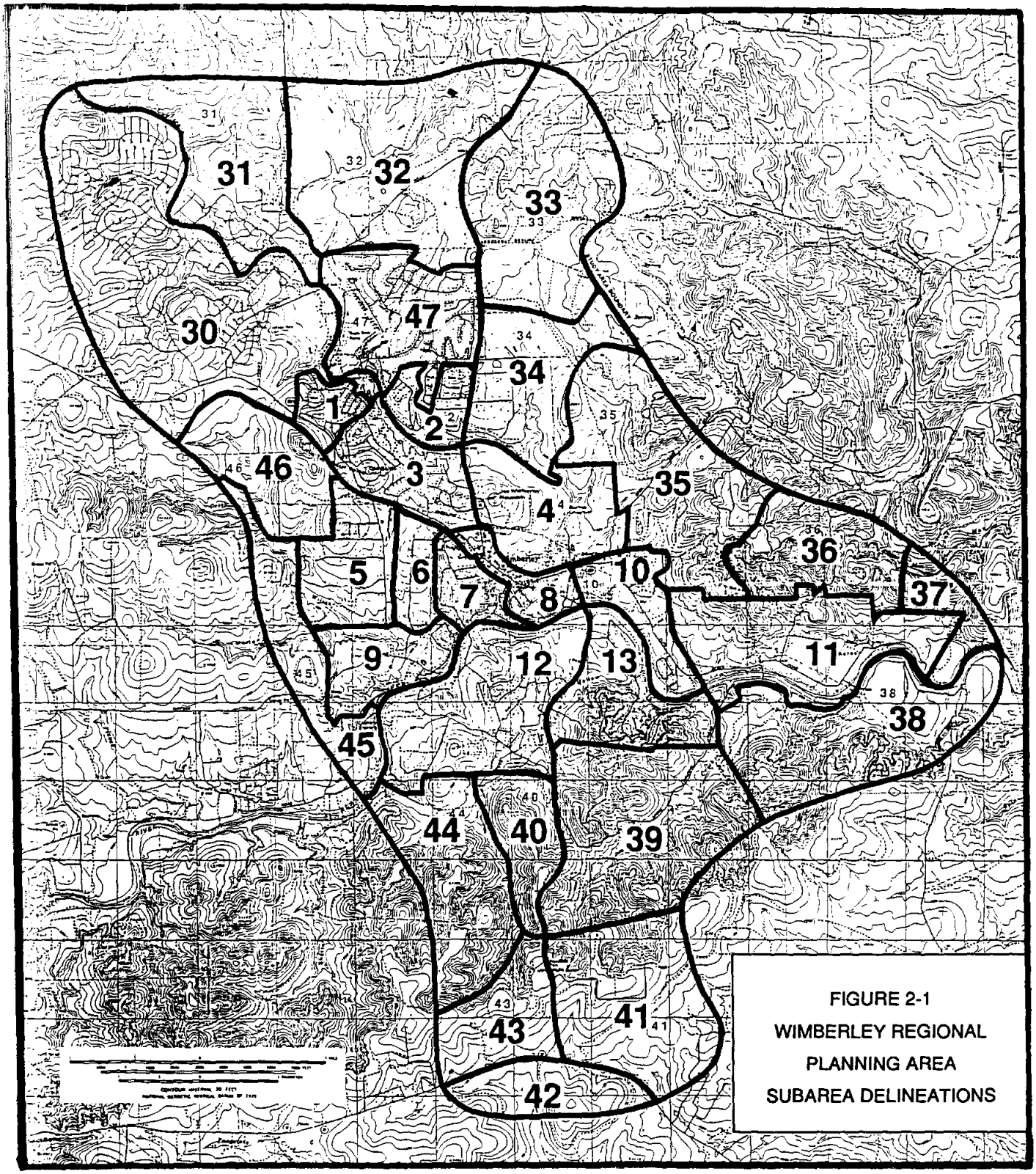
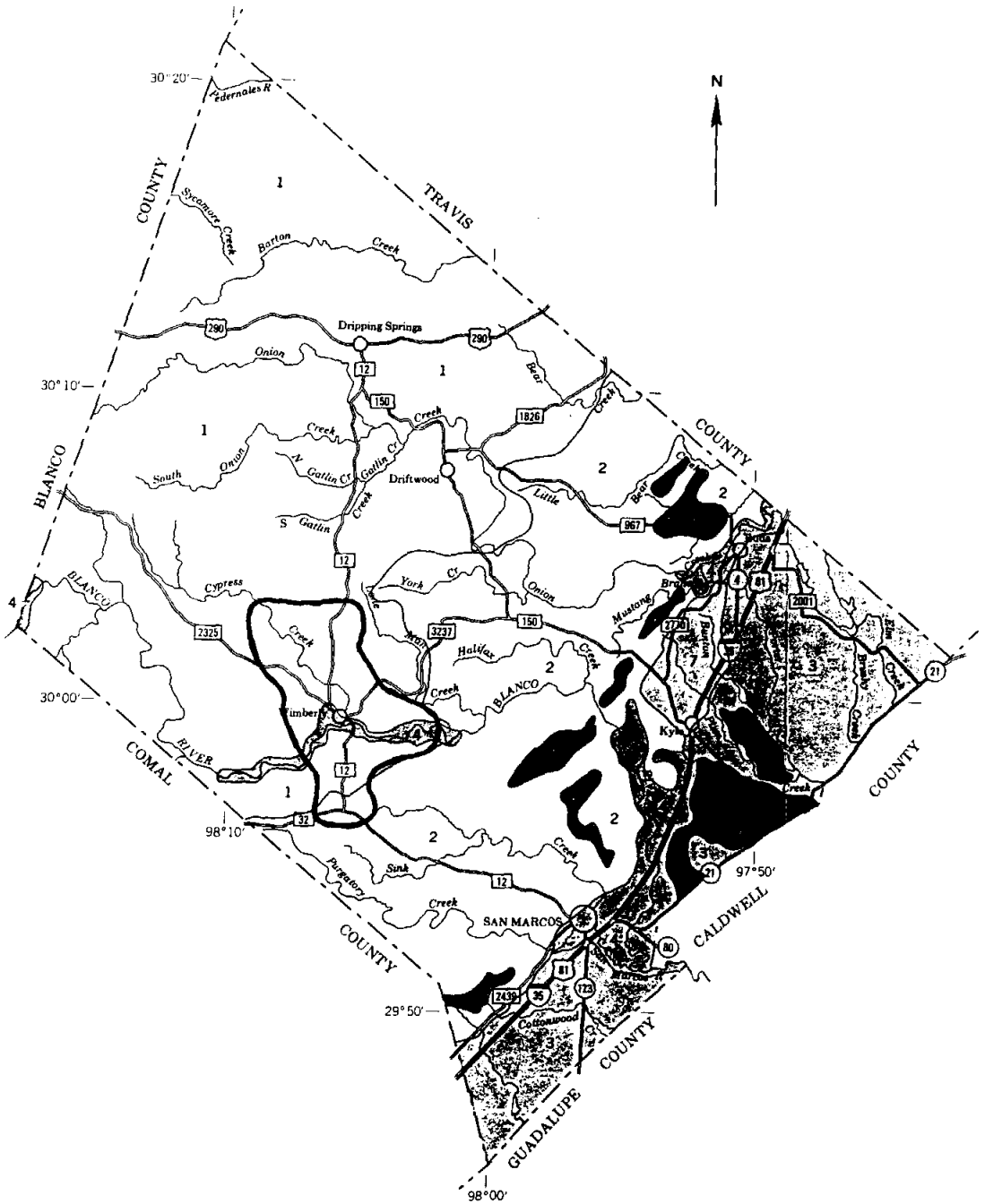


FIGURE 2-1
WIMBERLEY REGIONAL
PLANNING AREA
SUBAREA DELINEATIONS



LEGEND

- 1 — BRACKETT-COMFORT-REAL: Shallow, undulating to steep soils over limestone or strongly cemented chalk; on uplands of Edwards Plateau
- 2 — COMFORT-RUMPLE-ECKRANT: Very shallow to moderately deep, undulating to steep and hilly soils over indurated limestone; on uplands of Edwards Plateau
- 3 — HEIDEN-HOUSTON BLACK: Deep, gently sloping to sloping soils over clay and shale; on uplands of Blackland Prairie
- LEWISVILLE-GRUENE-KRUM: Deep, shallow, and very shallow, nearly level to gently sloping soils over loamy, clayey, and gravelly sediments; on stream terraces and valley fills of Blackland Prairie and Edwards Plateau
- BRANYON-KRUM: Deep, nearly level to gently sloping soils over clayey sediments; on ancient stream terraces and valley fills of Blackland Prairie
- KRUM-MEDLIN-ECKRANT: Deep, very shallow, and shallow, undulating to steep and hilly soils over clay, shaley clay, and limestone; on stream terraces, valley fills, and uplands of Edwards Plateau
- 7 — AUSTIN-CASTEPHEN-HOUSTON BLACK: Shallow to deep, gently sloping to sloping soils over chalk or marly clay; on uplands of Blackland Prairie

Compiled 1982

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
TEXAS AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

HAYS COUNTY, TEXAS

Scale 1:316,800

1 0 1 2 3 4 5 Miles

1 0 5 10 Km

Reproduced from "Soil Survey of Comal and Hays Counties Texas", United States Department of Agriculture, Soil Conservation Service, 1981.

FIGURE 2-2
GENERAL SOIL MAP FOR HAYS COUNTY

Krum soils lie primarily along and adjacent to the Blanco River. They are described as nearly level to gently sloping soils lying over stream terraces of the Edwards Plateau. The Brackett-Comfort-Real soils lie on the uplands of the Edwards Plateau, and they are characterized as shallow, undulating to steep soils over limestone or strongly cemented chalk.

All of the soils in the planning area are characterized by the SCS as having "severe" limitations for use as septic tank absorption fields, except for the Lewisville soil series, which is rated as "moderate". These limitations have been noted because most of these soils are very shallow and underlain by bedrock. The Lewisville series is clayey, and thus has a very low permeability. Table 2-1, which is a reproduction of Table 10 from the Hays County Soil Survey, highlights specific features of these soils relating to their limitations for use as septic tank absorption fields and sewage lagoon areas. Based on this information, it is readily apparent that none of the soils in the Wimberley area are suited for wastewater disposal using septic tank systems.

2.3.3 Geologic Conditions

During the Cretaceous period, sediments now known as the Trinity Group were deposited in a shallow sea over much of central Texas. In this region, there are three clastic/carbonate sequences of alternating marine carbonates and near shore clastic deposits, formed by the advancing and transgressing sea. The Trinity Group consists of the Glen Rose Limestone and the Travis Peak Formation. The Glen Rose Limestone is subdivided into upper and lower members. The Travis Peak Formation includes five distinct geologic units or members: the Hensell Sand; the Cow Creek Limestone; the Hammett Shale; the Sligo Limestone; and the Hosston Sand. Locally, the surface exposure of the Hosston Sand is known as the Sycamore Sand.

These formations serve as the major hydrogeologic units and/or aquifers in the planning area. Together, the Glen Rose and Travis Peak Formations comprise the Trinity Aquifer. The Upper Trinity Aquifer corresponds to the Upper Glen Rose Limestone member. The Lower Glen Rose Limestone member, the Hensell Sand, and the Cow Creek Limestone together are classified as the Middle Trinity Aquifer. The Sligo Limestone and the Hosston Sand are classified as the Lower Trinity Aquifer.

Both the Upper and Lower Glen Rose Limestone members cropout in the planning area. The Upper Glen Rose is exposed primarily in the Cypress Creek watershed. The Lower Glen Rose Limestone member outcrops over much of the rest of the

TABLE 2-1
LIMITATIONS OF SOILS IN THE WIMBERLEY AREA

TABLE 10.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AgC3, AgD3 Altoga	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, excess lime.
AnA, AnB Anhalt	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
AuB,* AuC3:* Austin	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
Castephen	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
BoB Boerne	Moderate: flooding.	Severe: seepage, flooding.	Severe: seepage.	Severe: seepage.	Fair: excess lime.
BrB Bolar	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
BtD:* Brackett	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
Rock outcrop.					
Comfort	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: too clayey, large stones, thin layer.
BtG:* Brackett	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
Rock outcrop.					
Real	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
ByA Branyon	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
ByB Branyon	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
CaC3 Castephen	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.

See footnote at end of table.

* Reproduced from "Soil Survey of Comal and Hays Counties Texas", United States Department of Agriculture, Soil Conservation Service, 1981.

TABLE 2-1, cont'd.

TABLE 10.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CrD:* Comfort	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: too clayey, large stones, thin layer.
Rock outcrop.					
DeB, DeC3 Denton	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
DoC Doss	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
ErG:* Eckrant	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: area reclaim, large stones, slope.
Rock outcrop.					
FeF4 Ferris	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
GrC Gruene	Severe: cemented pan.	Severe: cemented pan.	Moderate: cemented pan.	Severe: cemented pan.	Poor: area reclaim, thin layer.
HeB, HeC3, HeD3 Heiden	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
HgD Heiden	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
HoB, HvB, HvD Houston Black	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
KrA Krum	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
KrB, KrC Krum	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
LeA Lewisville	Moderate: percs slowly.	Moderate: seepage.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
LeB Lewisville	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
MEC:* Medlin	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.

See footnote at end of table.

TABLE 2-1, cont'd.

TABLE 10.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
MEC:*					
Eckrant	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: area reclaim, large stones, thin layer.
MED:*					
Medlin	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
Eckrant	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: area reclaim, large stones, slope.
Oa Oakalla	Moderate: flooding.	Moderate: seepage.	Moderate: flooding, too clayey.	Moderate: flooding.	Fair: too clayey, excess lime.
Ok* Oakalla	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: too clayey, excess lime.
Or* Orif	Severe: flooding, poor filter.	Severe: seepage, flooding, too sandy.	Severe: flooding, seepage.	Severe: flooding, seepage.	Poor: seepage, too sandy, small stones.
PdB Pedernales	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Pt. Pits					
PuC Purves	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
RaD Real	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
RcD:*					
Real	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
Comfort	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: too clayey, large stones, thin layer.
Doss	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
RUD:*					
Rumple	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, small stones, thin layer.

See footnote at end of table.

TABLE 2-1, cont'd.

TABLE 10.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
RUD:* Comfort	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: too clayey, large stones, thin layer.
SeB, SeD Seawillow	Slight	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, excess lime.
SuA Sunev	Slight	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey, excess lime.
SuB Sunev	Slight	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, excess lime.
TaB Tarpley	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, too clayey, thin layer.
Tn Tinn	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

planning area. The Upper Glen Rose is characterized by a distinctive "stair-step" topography. This is caused by alternating beds of resistant limestone or dolomite and less resistant marl or shale. The Lower Glen Rose Limestone member is generally more massive and does not weather to the distinctive stair-step topography.

The Edwards Limestone also outcrops within the planning area, but only in relatively small and isolated areas. The recharge zone of the Edwards Aquifer (San Antonio Region) covers the extreme southern end of the planning area near the intersection of Ranch Road 12 and Ranch Road 32. Another small, narrow strip of the Edwards recharge zone exists in the extreme northeastern portion of the planning area. Development in these areas is subject to the rules and regulations of the Texas Natural Resource Conservation Commission that relate to the Edwards Aquifer and water pollution abatement.

2.3.4 Topographic Features

The planning area is characterized by topographic features that are typical of the Texas Hill Country. Generally, the terrain is undulating to steep, with some relatively flat areas along some reaches of the Blanco River and Cypress Creek and in some upland areas. Ground elevations across the planning area range from around 800 feet above mean sea level (msl) along the Blanco River to about 1,200 feet msl at the top of the highest hills. Distinct topographic features in the region include the incised Blanco River channel and floodplain, Joe Wimberley Mountain just north of downtown Wimberley, Old Baldy Mountain near FM Road 2325 towards Woodcreek, and Eagle Mountain east of downtown Wimberley.

2.3.5 Climate

The climate of the Wimberley region is classified as temperate. Summers are hot, with winters being fairly warm. Cold spells are of short duration, and the occurrence of snowfall is rare. The average annual temperature is 67 °F, with summer temperatures usually in the 90's, although a few days with temperatures over 100 °F are not uncommon. Daytime winter temperatures normally are in the 50's and 60's, with below freezing temperatures occurring during the passage of arctic cold fronts. The average relative humidity is 60 percent.

Information in the Texas Climatic Atlas indicates that the average annual precipitation for the Wimberley area, based on the 1951-1980 period, is approximately 33 inches, with the highest rainfall amounts occurring during the month of September. The

lowest rainfall month is July, but the winter months from December to March also experience low precipitation. Extremes in the annual rainfall range from about 20 inches during extended droughts, such as that of the 1950's, up to over 50 inches during very wet years.

2.4 REGIONAL SURFACE WATER SYSTEM

2.4.1 Primary Surface Water Bodies

The Blanco River is the dominant surface water feature within the planning area. This watercourse originates to the west in Kendall County and drains approximately 355 square miles of watershed above Wimberley. The Ranch Road 12 crossing of the Blanco River near Wimberley is 29 river miles upstream from the mouth of the river where it discharges into the San Marcos River. The San Marcos River is a tributary of the Guadalupe River, which flows to the Gulf of Mexico. The Blanco River in the vicinity of Wimberley supports a wide variety of recreational uses, including swimming, wading, tubing, rafting, fishing, hunting and aesthetics. Although there are many small lakes and stock tanks in the region, there are no major impoundments on the Blanco River. The nearest major reservoir is Canyon Lake, which is located ten miles southwest of Wimberley on the Guadalupe River. The Upper Blanco River segment (No. 1813) of the Texas Stream Monitoring Network, which is the system used for water quality monitoring and management programs of the Texas Natural Resource Conservation Commission, is 71 miles long, with seven miles of this segment crossing the planning area.

Cypress Creek is the major tributary to the Blanco River within the planning area. This creek follows a meandering path from the northwest corner of the planning area toward the southeast, through the City of Woodcreek, across Ranch Road 12 twice, and finally through the downtown Wimberley area to its confluence with the Blanco River just upstream of the Ranch Road 12 bridge. The Cypress Creek channel is characterized by riffle and pool areas, with fast-flowing rapids through some reaches, and, as its name would imply, most of the creek is lined with cypress trees. Jacobs Well, a flowing moderately large spring located about three miles north-northwest of downtown Wimberley, is the primary source of flow in Cypress Creek. Woodcreek Resort maintains a small reservoir on a branch of Cypress Creek, and another small impoundment is located on Eagle Rock Ranch on another branch of Cypress Creek further downstream. The Blue Hole recreational area, which a long-established campground with swimming and tubing, is located along a deep-pooled, springfed reach of Cypress Creek about one-half mile northeast of downtown Wimberley. The

Cypress Creek segment (No. 1815) of the Texas Stream Monitoring Network is 14 miles long, with approximately eight miles within the planning area.

Other tributaries of the Blanco River that flow through the planning area include Wilson Creek, with its primary branch Heaton Hollow, from the north, and Spoke Pile Creek and Leath Hollow, with its tributary Pierce Creek, from the south. Pin Oak Creek from the north and Shelton Hollow from the south enter the Blanco River just upstream of the planning area to the west. Smith Creek and Lone Man Creek from the north and Sycamore Creek from the south flow into the Blanco River east of the planning area.

2.4.2 Streamflow Conditions

2.4.2.1 Average and Normal Flows

Flows in the creeks and streams in the Wimberley region generally are erratic in response to rainfall events, but available spring discharges do tend to sustain baseflows during normal, non-runoff periods. The normal flow in the Blanco River and Cypress Creek is characterized by shallow, fast moving reaches with some rapids and some relatively deep, sluggish pool areas. Other smaller creeks and streams without the benefit of springflows typically are dry, except during rainfall events.

The U. S. Geological Survey maintains a streamflow gaging station on the Blanco River at Wimberley. This gage is located on the downstream face of the Ranch Road 12 bridge, which is about 2,200 feet downstream from the mouth of Cypress Creek. Continuous records from this gage are available since June, 1928. Through October, 1994, the mean daily streamflow at this gage is reported to be 132 cubic feet per second (cfs). The normal flow of the Blanco River, based on mean daily records from this gage for the same period, is greater than 52 cfs half the time (median flow condition). Ninety percent of the time, the flow is greater than 12 cfs, and ten percent of the time is the flow greater than 274 cfs.

There are no streamflow gages located on Cypress Creek and, therefore, no long term records are available. However, measurements of the discharge from Jacobs Well on six different occasions between the period 1924 and 1974 indicate that this springflow has ranged from a low of 68 cfs in 1955 up to a high of 170 cfs in 1924 and 1937. Typically, this springflow, coupled with others downstream, maintains a continuous flow in Cypress Creek to its confluence with the Blanco River; however, observations by local citizens in the area during recent dry periods when groundwater pumpage

has been at its peak suggest that the discharges from Jacobs Well and other springs have been significantly reduced, even to the point where flows in Cypress Creek appear to have ceased.

2.4.2.2 Flood Flows and Floodplains

The greatest flood on the Blanco River since the Wimberley streamflow gage has been in operation occurred in May of 1929. On May 28, the peak flow in the river reached 113,000 cfs, and the stage of the river rose about 33 feet to a peak level at elevation 831.13 feet msl. Based on ground elevations shown on current U. S. Geological Survey topographic maps of the area, this flood level appears to be about five to eight feet below the Wimberley downtown area. The December 1991 flood, which is the largest flood on the river in the last five years, reached a peak flow of 32,900 cfs on December 21, which corresponds to a peak flood stage of 818.33 feet msl at the gage site. This flood level reflects a rise in the water surface of the river of about 20 feet.

Two different Flood Insurance Studies for unincorporated areas of Hays County, which include the planning area for this regional wastewater planning study, have been published by the Federal Emergency Management Agency (FEMA). One was in 1978, and then a revised study was published in 1990. Because of concerns by local citizens and Hays County officials regarding the extensive floodplain areas delineated on maps in the 1990 Flood Insurance Study, a restudy of Hays County was commissioned by FEMA. This restudy recently has been completed by the Fort Worth District of the U. S. Army Corps of Engineers, and the revised results, which apparently indicate somewhat lower flood levels and reduced floodplain areas than the original 1990 study, presently are being used by Hays County for land development evaluations and permitting. The revised 100-year flood elevations and floodplain delineations will be effective for flood insurance purposes some time in the latter part of 1996.

The revised flood boundary maps do indicate that portions of the overbank areas adjacent to the Blanco River and Cypress Creek within the planning area lie within the delineated 100-year floodplains. The 100-year flood flow for the Blanco River at Wimberley, as determined and used in the recently completed restudy of Hays County, is approximately 115,000 cubic feet per second (cfs). The corresponding 100-year flood flow for Cypress Creek at its confluence with the Blanco River is approximately 25,500 cfs.

2.4.2.3 Low Flows and Droughts

The most critical drought of record in Texas occurred during the period 1952-1957. Based on streamflow records for the Blanco River at the Wimberley gage, this critical low-flow period lasted from October of 1953 until February of 1957. The daily mean flow of the river during this period was 19.5 cfs. The lowest seven-day annual minimum flow of the river occurred in August of 1956, with less than 0.8 cfs of flow passing the gage. The lowest flow of the Blanco River ever recorded is 0.6 cfs, which occurred on August 16, 1956.

Other extended periods of low flows on the Blanco River include August 1931 through April 1935, July 1937 through October 1940, June 1947 through August 1951, and October 1961 through January 1965.

2.4.3 Surface Water Usage

Only limited consumptive use of surface water occurs within the planning area. According to records of the Texas Natural Resource Conservation Commission (TNRCC), there are two existing surface water rights along the Blanco River and Cypress Creek in the planning area. One is owned by Woodcreek Resort and authorizes the impoundment of 118 acre-feet of water for recreational use on an unnamed tributary of Cypress Creek. The second surface water right is owned by Bruce Collie, et al, and it is located on the Blanco River downstream of Wimberley near the eastern boundary of the planning area. This water right authorizes diversions from the river for irrigation purposes at three different locations in the amounts of 110, 8 and 5 acre-feet per year.

There are four other water rights that authorize surface water diversions from the mainstem of the Blanco River downstream of the planning area. These water rights and the two described above, and their authorized annual withdrawals, are listed by river order number in Table 2-2. As indicated, some of the existing water rights permits are only for recreational impoundments, with no authorization for diversions.

2.4.4 Surface Water Quality

2.4.4.1 Classified Stream Segments

Within the planning area, the TNRCC has identified two classified stream segments for purposes of evaluating water quality and establishing water quality standards.

TABLE 2-2
SUMMARY OF EXISTING WATER RIGHTS
IN THE VICINITY OF THE WIMBERLEY REGIONAL PLANNING AREA

CERT. NO.	TYPE	RIVER ORDER NO.	PERMIT NO.	NAME OF OWNER	STREAM NAME	PURPOSE OF USE	ANNUAL AUTH. DIVERS. Ac-Ft/Yr
003887	CA	440000	-	Green Valley Farms	Blanco River	Irrigation	792
003886	CA	440505	-	Hays Co. Recreat'l. Assoc.	Blanco River	Irrigation	150
004027	P	452500	003731	Jess Webb et al	Blanco River	Irrigation	120
004551	P	453000	004231	Emmett & Miriam McCoy	Blanco River	Irrigation	160
004388	P	456000	004170	Wm. J. Gebhard Jr.	Lone Man Ck	Recreation	-
003884A	CA	460000	-	Bruce Collie, et al	Blanco River	Irrigation	110
003884A	CA	460000	-	Bruce Collie, et al	Blanco River	Irrigation	8
003884A	CA	460000	-	Bruce Collie, et al	Blanco River	Irrigation	5
003883	CA	466051	-	Woodcreek Resort	Cypress Ck Trib	Recreation	-

Segment 1813 is referred to as the Upper Blanco River, and it extends for 71 river miles from a point 0.2 miles upstream of Limekiln Road in Hays County upstream to the headwaters of the river at the mouth of Meier Creek in Kendall County. This segment includes the reach of the river through Wimberley. Cypress Creek is designated as Segment 1815, and it extends for 14 miles from the mouth of Cypress Creek at the Blanco River upstream to a point 4.0 miles above the most upstream unnamed county road crossing in Hays County.

There are three permitted wastewater treatment facilities in the Cypress Creek basin and two in the Upper Blanco River basin. All of these facilities provide treatment for domestic wastewater, and their combined permitted effluent amounts are 0.09 million gallons per day (MGD) for those in the Cypress Creek watershed and 0.20 MGD for those in the Upper Blanco River watershed. None of these wastewater treatment facilities actually discharge effluent into the surface waters of Cypress Creek or the Blanco River; instead, they dispose of their treated effluent either through irrigation operations or septic tank systems.

Both Segment 1813 (Upper Blanco River) and Segment 1815 (Cypress Creek) have been designated by the TNRCC to have the following uses: Contact Recreation, Exceptional Quality Aquatic Habitat, and Public Water Supply. In addition, Segment 1813, the Upper Blanco River, is designated for Aquifer Protection because it crosses the recharge zone of the Edwards Aquifer about seven miles downstream from the Ranch Road 12 bridge at Wimberley.

2.4.4.2 Surface Water Standards

The TNRCC has established certain numerical water quality standards for Segment 1813 (Upper Blanco River) and Segment 1815 (Cypress Creek). These numerical standards, along with other general criteria, provide for water quality that is considered to be sufficient for supporting the designated stream uses identified above. Specific numerical water quality standards for these segments are listed in Table 2-3. As indicated, both of these watercourses have a dissolved oxygen standard equal to 6.0 mg/L. This is the highest standard for dissolved oxygen required in the State, and it reflects the designated use of these surface waters for "exceptional quality aquatic habitat". Because both of these streams are used extensively for swimming, wading, tubing and rafting, the fecal coliform bacteria criterion is set equal to 200 colonies per 100 milliliters (geometric mean of at least five samples per 30-day period), which is the adopted criterion for contact recreation in the surface waters of the State.

TABLE 2-3
NUMERICAL WATER QUALITY STANDARDS FOR THE GUADALUPE RIVER BASIN INCLUDING SEGMENTS 1813 AND 1815

GUADALUPE RIVER BASIN		USES				CRITERIA						
Segment No.	SEGMENT NAME	Recreation	Aquatic Life	Domestic Water Supply	Other	Cl^{-1} (mg/L)	SO_4^{-2} (mg/L)	TDS (mg/L)	Dissolved Oxygen (mg/L)	pH Range (SU)	Fecal Coliform #/100ml	Temperature (°F)
1801	Guadalupe River Tidal	CR	E						5.0	6.5-9.0	200	95
1803	Guadalupe River Below San Marcos River	CR	H	PS		100	50	400	5.0	6.5-9.0	200	93
1804	Guadalupe River Below Comal River	CR	H	PS		80	50	400	5.0	6.5-9.0	200	90
1805	Canyon Lake	CR	E	PS/AP		40	40	400	6.0	6.5-9.0	200	90
1806	Guadalupe River Above Canyon Lake	CR	E	PS		35	30	375	6.0	6.5-9.0	200	90
1807	Coleto Creek	CR	H	PS		250	100	500	5.0	6.5-9.0	200	93
1808	Lower San Marcos River	CR	H	PS		60	50	400	5.0	6.5-9.0	200	90
1809	Lower Blanco River	CR	H	PS		40	50	400	5.0	6.5-9.0	200	92
1810	Plum Creek	CR	H			350	150	1,120	5.0	6.5-9.0	200	90
1811	Comal River	CR	H	PS		25	30	400	5.0	6.5-9.0	200	90
1812	Guadalupe River Below Canyon Dam	CR	E	PS/AP		40	40	400	6.0	6.5-9.0	200	90
1813	Upper Blanco River	CR	E	PS/AP		30	35	400	6.0	6.5-9.0	200	92
1814	Upper San Marcos River *	CR	E			25	25	380	6.0	6.5-9.0	200	80
1815	Cypress Creek	CR	E	PS		20	20	350	6.0	6.5-9.0	200	86
1816	Johnson Creek	CR	E	PS		40	20	350	6.0	6.5-9.0	200	86
1817	North Fork Guadalupe River	CR	E	PS		20	20	350	6.0	6.5-9.0	200	86
1818	South Fork Guadalupe River	CR	E	PS		20	20	350	6.0	6.5-9.0	200	86

* Segment 1814 - Upper San Marcos River is assigned a low-flow criterion of 58 ft^3/sec for the application of water quality standards criteria in the same manner as a 7Q2 critical low-flow.

REF: "Texas Surface Water Quality Standards"; Texas Natural Resource Conservation Commission; Permanent Rule Changes; June, 1995.

Printed: June 23, 1995

Both Segment 1813 (Upper Blanco River) and Segment 1815 (Cypress Creek) are classified by the TNRCC as being "effluent limited". This means that the water quality standards for these segments are being maintained and that conventional wastewater treatment is adequate to protect existing conditions and uses. Conversely, when segments are classified by the TNRCC as "water quality limited", it means that one or more of the following conditions are applicable: (1) surface water quality monitoring data indicate significant violations of adopted water quality criteria that are protective of aquatic life, contact recreation or public water supply uses; (2) advanced waste treatment for point source wastewater discharges is required to meet water quality standards (advanced waste treatment is defined as treatment equal to or more stringent than a 30-day average concentration of 10 mg/L for five-day carbonaceous biochemical oxygen demand and 15 mg/L for ammonia nitrogen); or (3) the segment is a public water supply reservoir. Since both Segment 1813 and Segment 1815 are classified as effluent limited, none of these conditions are applicable.

2.4.4.2 Surface Water Quality Conditions

The most recent Texas Water Quality Inventory, prepared by the TNRCC in 1994, indicates that, based on data available through the TNRCC Surface Water Quality Monitoring Program, there are no known water quality problems in Segment 1813 (Upper Blanco River) or Segment 1815 (Cypress Creek). During the last four years, water quality data compiled by the TNRCC are available from two monitoring stations on Segment 1813 (Upper Blanco River) and from one monitoring station on Segment 1815 (Cypress Creek). One of the stations for Segment 1813 is located on the Blanco River at Wimberley, and it is monitored quarterly. The Segment 1815 station is located at the upper Ranch Road 12 crossing on Cypress Creek, and it is monitored as time permits. Historical water quality data collected at these stations over the past four years are summarized in Table 2-4 for Segment 1813 and in Table 2-5 for Segment 1815. According to TNRCC, no intensive water quality monitoring surveys have been conducted for any portions of the Cypress Creek or the Upper Blanco River segments.

The TNRCC has instituted a priority ranking system for all of the classified stream and reservoir segments in the state. This system takes into account existing water quality conditions and other factors, such as toxicity, fish kills, and nonpoint source pollution. Points are awarded depending on the severity of local problems for each of these factors. Segments with the higher rankings, with "one" being the highest ranking, are those with poorer water quality, and these segments receive higher priorities for pollution control action. Of the 366 classified stream and reservoir segments

TABLE 2-4
WATER QUALITY DATA FOR THE UPPER BLANCO RIVER (SEGMENT 1813)

SEGMENT 1813 Upper Blanco River

FIELD MEASUREMENTS AND WATER CHEMISTRY

Parameter	Standards Criteria	Screening Levels	Number of Samples	Number of Detects	Minimum	Maximum	Mean	Number of Values Outside Criteria or Screening Levels	Mean of Values Outside Criteria or Screening Levels	Percent of Values Outside Criteria or Screening Levels
WATER TEMP (C)	33.33		19	19	10.00	30.60	21.99	0	0.0	0.0%
DISSOLVED OXYGEN (MG/L)	6.00		19	19	7.00	10.80	9.04	0	0.0	0.0%
PH (SU)	6.50- 9.00		19	19	7.00	8.30	7.92	0	0.0	0.0%
CHLORIDE (MG/L)	30.00		19	19	4.00	16.00	11.47	0	0.0	0.0%
SULFATE (MG/L)	35.00		19	19	3.00	45.00	27.26	3	40.7	16%
CONDUCTIVITY FIELD UMHOS			8	8	400.00	475.00	436.62	0	0.0	0.0%
TOTAL DISS SOLIDS (MG/L)	400.0		8	8	260.00	308.75	283.81	0	0.0	0.0%
AMMONIA (MG/L)		1.00	19	18	0.01	0.50	0.06	0	0.0	0.0%
NTRATES&NTRITES (MG/L)		1.00	19	18	0.10	1.90	0.43	1	1.9	5.26%
ORTHOPHOS (MG/L)		0.10	8	5	0.01	0.04	0.02	0	0.0	0.0%
TOTAL PHOSPHORUS (MG/L)		0.20	19	11	0.01	0.51	0.05	1	0.5	5.26%
CHLOROPHYL A (UG/L)		30.00	8	1	1.00	1.60	0.64	0	0.0	0.0%
FECAL COL (#/100 ML)	400.0		19	19	2.00	180.00	38.00	0	0.0	0.0%

REF: "The State of Texas Water Quality Inventory"; 12th Edition, Vol. 3; Texas Natural Resource Conservation Commission; November, 1994.

TABLE 2-5
WATER QUALITY DATA FOR CYPRESS CREEK (SEGMENT 1815)

SEGMENT 1815 Cypress Creek

FIELD MEASUREMENTS AND WATER CHEMISTRY

Parameter	Standards Criteria	Screening Levels	Number of Samples	Number of Detects	Minimum	Maximum	Mean	Number of Values Outside Criteria or Screening Levels	Mean of Values Outside Criteria or Screening Levels	Percent of Values Outside Criteria or Screening Levels
WATER TEMP (C)	30.00		5	5	15.50	25.70	20.90	0	0.0	0.0%
DISSOLVED OXYGEN (MG/L)	6.00		5	5	7.00	9.30	8.24	0	0.0	0.0%
PH (SU)	6.50- 9.00		5	5	7.00	8.10	7.66	0	0.0	0.0%
CHLORIDE (MG/L)	20.00		5	5	7.00	14.00	11.00	0	0.0	0.0%
SULFATE (MG/L)	20.00		5	4	1.00	21.00	12.50	1	21.0	20%
CONDUCTIVITY FIELD UMHOS			5	5	430.00	500.00	468.00	0	0.0	0.0%
TOTAL DISS SOLIDS (MG/L)	350.0		5	5	279.50	325.00	304.20	0	0.0	0.0%
AMMONIA (MG/L)		1.00	5	5	0.01	0.33	0.10	0	0.0	0.0%
NTRATES&NTRITES (MG/L)		1.00	5	5	0.05	0.24	0.14	0	0.0	0.0%
ORTHOPHOS (MG/L)		0.10	5	3	0.01	0.06	0.03	0	0.0	0.0%
TOTAL PHOSPHORUS (MG/L)		0.20	5	3	0.01	0.10	0.05	0	0.0	0.0%
CHLOROPHYL A (UG/L)		30.00	5	0	1.00	1.00	0.50	0	0.0	0.0%
FECAL COL (#/100 ML)	400.0		5	4	2.00	220.00	113.80	0	0.0	0.0%

REF: "The State of Texas Water Quality Inventory"; 12th Edition, Vol. 3; Texas Natural Resource Conservation Commission; November, 1994.

considered in the 1994 Water Quality Inventory, the Upper Blanco River is ranked 333rd, and Cypress Creek ranked 364th. Based on these rankings, both of these stream segments are in the top ten percent in the state, meaning that their overall water quality, as measured at the selected monitoring sites, is very good.

In addition to the water quality monitoring performed by the TNRCC as described above, there also are three local organizations that participate in the Texas Watch Environmental Monitoring program. The Rancho Cima Boy Scout Camp, Wimberley High School and Burnett Ranches Homeowners are volunteer groups that assist the TNRCC with environmental data collection on waterbodies where official TNRCC monitoring stations do not exist. The Texas Watch program was officially established in 1991 and now serves as an important link between the public and the State in environmental quality matters.

The Wimberley Citizens Group, which is comprised of local residents with strong concerns for protection of water quality and the overall environment in the Wimberley area, is another organization that has been active in monitoring water quality conditions in the region. This group has collected periodic water samples on Cypress Creek and the Blanco River at ten stations since about 1984 and, with the assistance of the Guadalupe-Blanco River Authority, has analyzed these samples for fecal and streptococcus coliform bacteria. These data are useful for evaluating the potential contamination of the streams over time by domestic and municipal wastewater sources, such as seepage or overflows from local septic tank systems, sewer line leakage, or runoff from fields where treated wastewaters are irrigated.

Summary plots of these data are presented in Figures 2-3 through 2-12. As illustrated by these data, at least some violations of the fecal coliform standard for these streams (200 colonies per 100 milliliters) have been detected at all of the sampling stations, and numerous violations have occurred at several of the stations. Stations 1 through 5, all of which are located on Cypress Creek beginning at Jacob's Well Road and continuing downstream to near the downtown square, all indicate periodic to regular violations of the fecal coliform standard. The most violations, with concentrations in the 200 to 500 colonies per 100 milliliters range, have occurred at the station near the square (Station 5), which probably reflects contaminants introduced into the stream from sources upstream, as well as from around the square area. Septic tank seepage is likely to be the most prevalent source of these contaminants. Data for the Blanco River in the vicinity of the Wimberley area also indicate elevated concentrations of fecal coliform bacteria. While the overall data set for Cypress Creek and the Blanco River do not indicate significant increases in fecal coliform levels during the past ten

FIGURE 2-3

HISTORICAL FECAL COLIFORM AND STREPTOCOCCUS CONCENTRATIONS AT STATION NO. 1
CYPRESS CREEK AT JACOB'S WELL ROAD

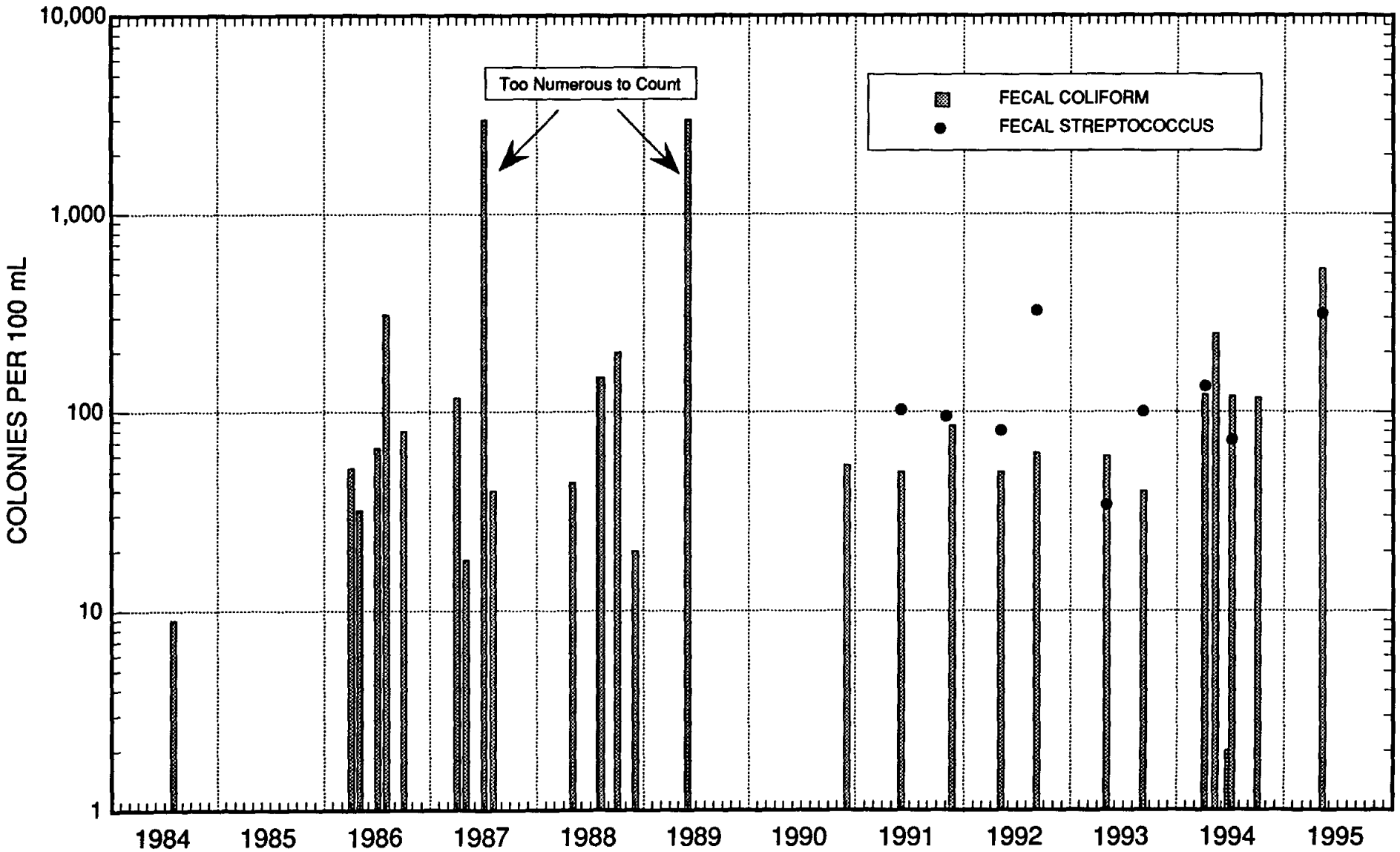


FIGURE 2-4

HISTORICAL FECAL COLIFORM AND STREPTOCOCCUS CONCENTRATIONS AT STATION NO. 2
CYPRESS CREEK AT WOODCREEK, AT LOW WATER BRIDGE NEAR LODGE

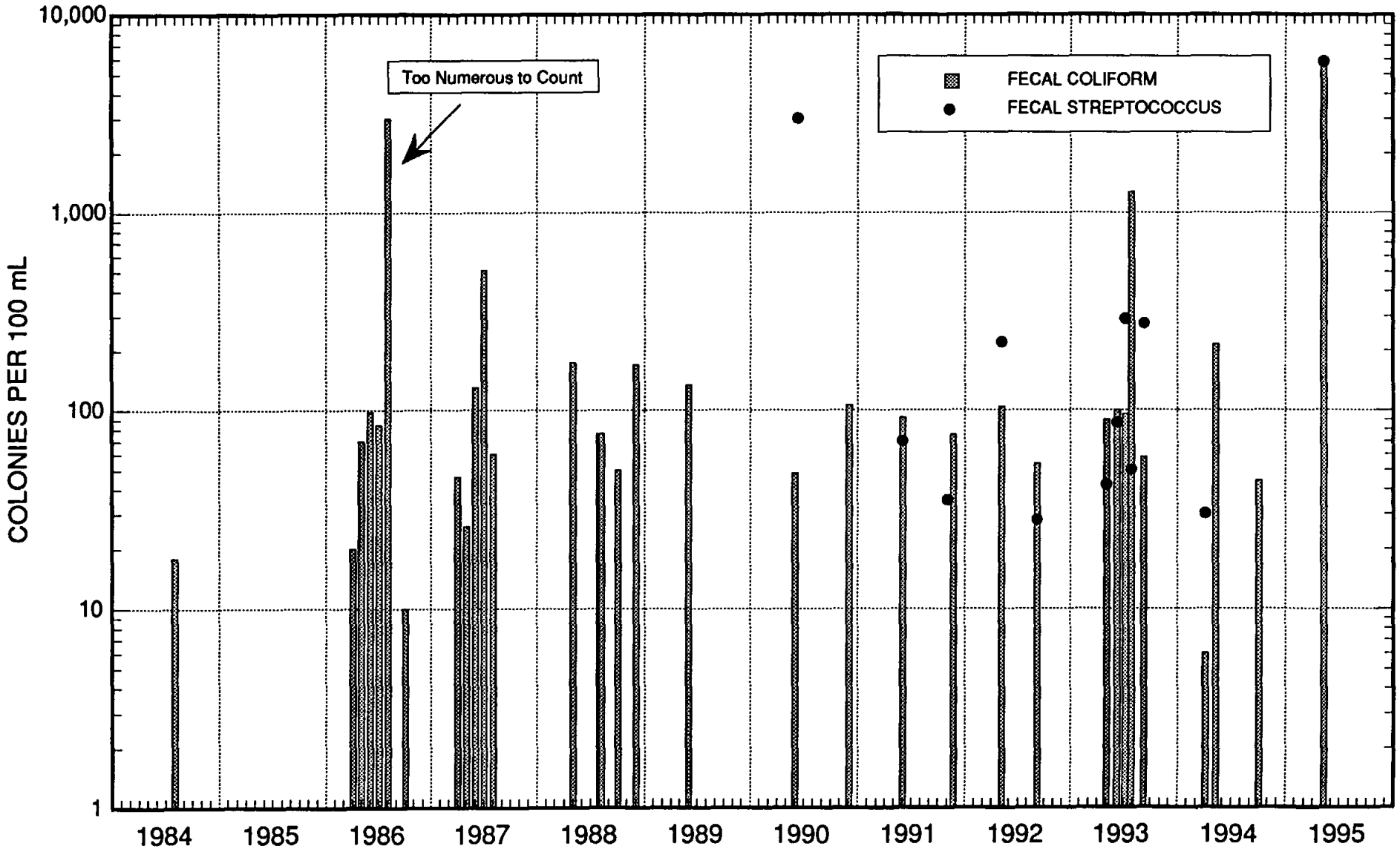


FIGURE 2-5

HISTORICAL FECAL COLIFORM AND STREPTOCOCCUS CONCENTRATIONS AT STATION NO. 3
CYPRESS CREEK, EAST OF NORTHERN BRIDGE ON RANCH ROAD 12

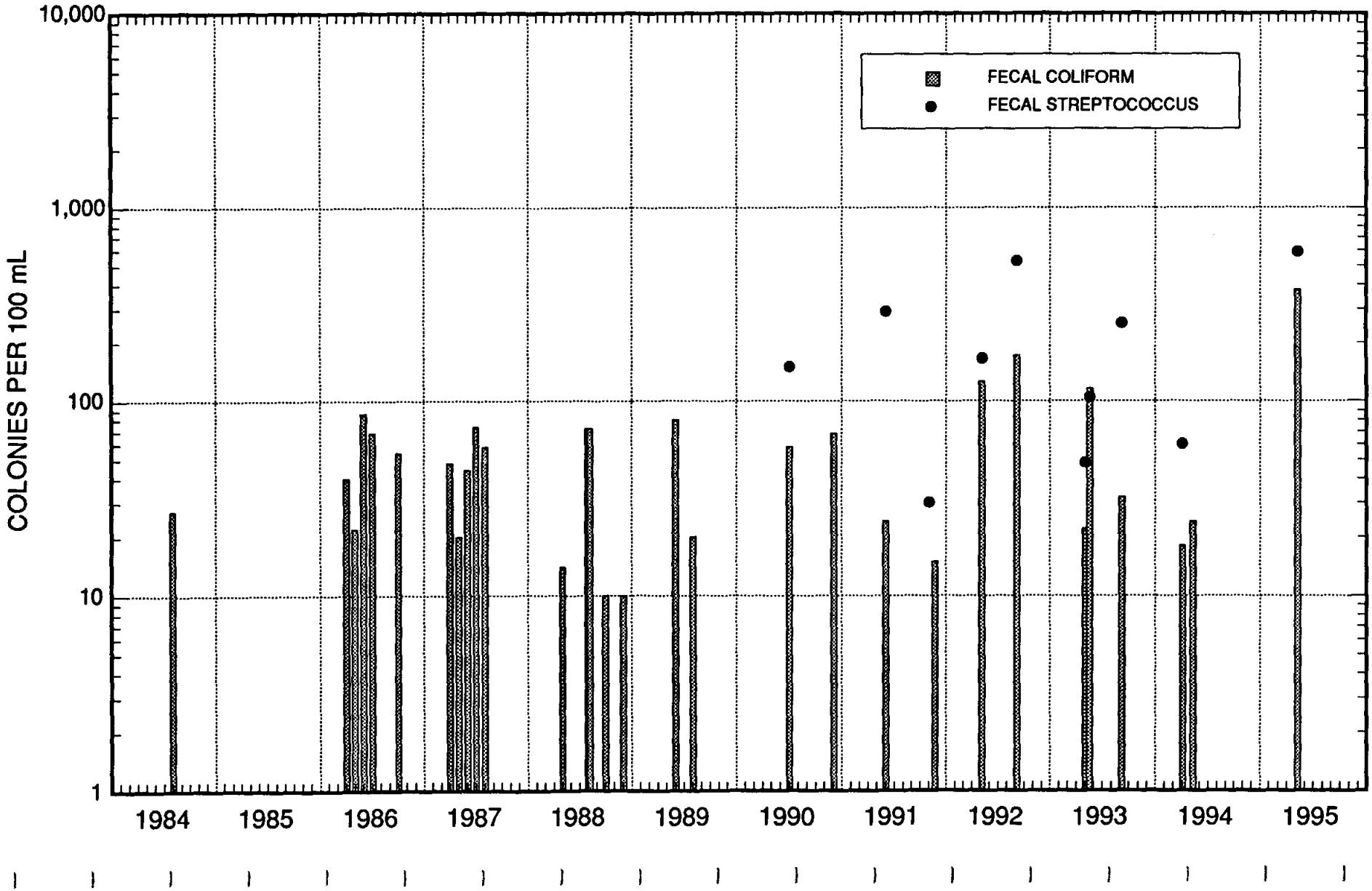


FIGURE 2-6

HISTORICAL FECAL COLIFORM AND STREPTOCOCCUS CONCENTRATIONS AT STATION NO. 4
CYPRESS CREEK AT SABINO RANCH, BELOW BLUE HOLE

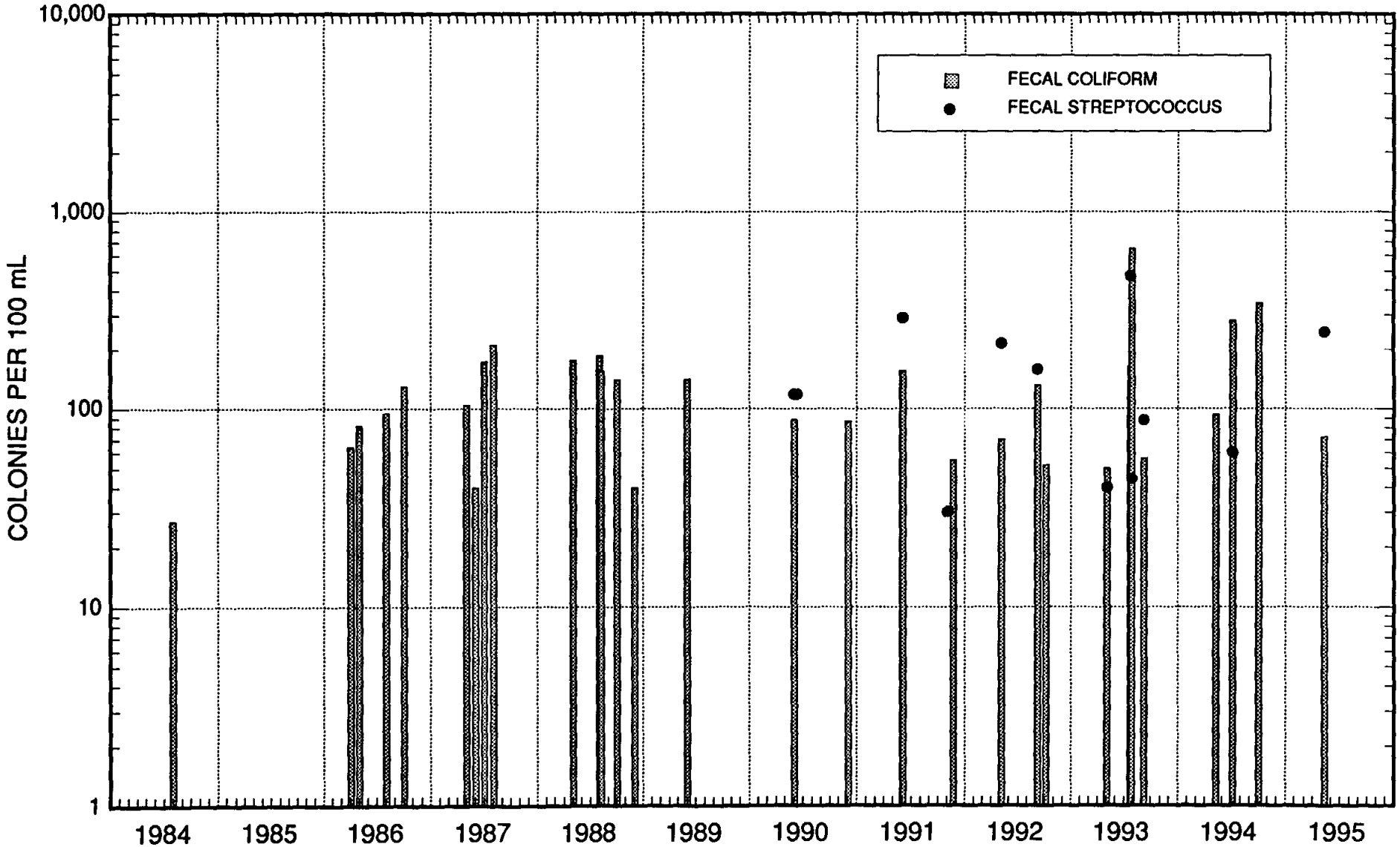


FIGURE 2-7

HISTORICAL FECAL COLIFORM AND STREPTOCOCCUS CONCENTRATIONS AT STATION NO. 5
CYPRESS CREEK, WEST SIDE OF RANCH ROAD 12 BRIDGE AT SQUARE

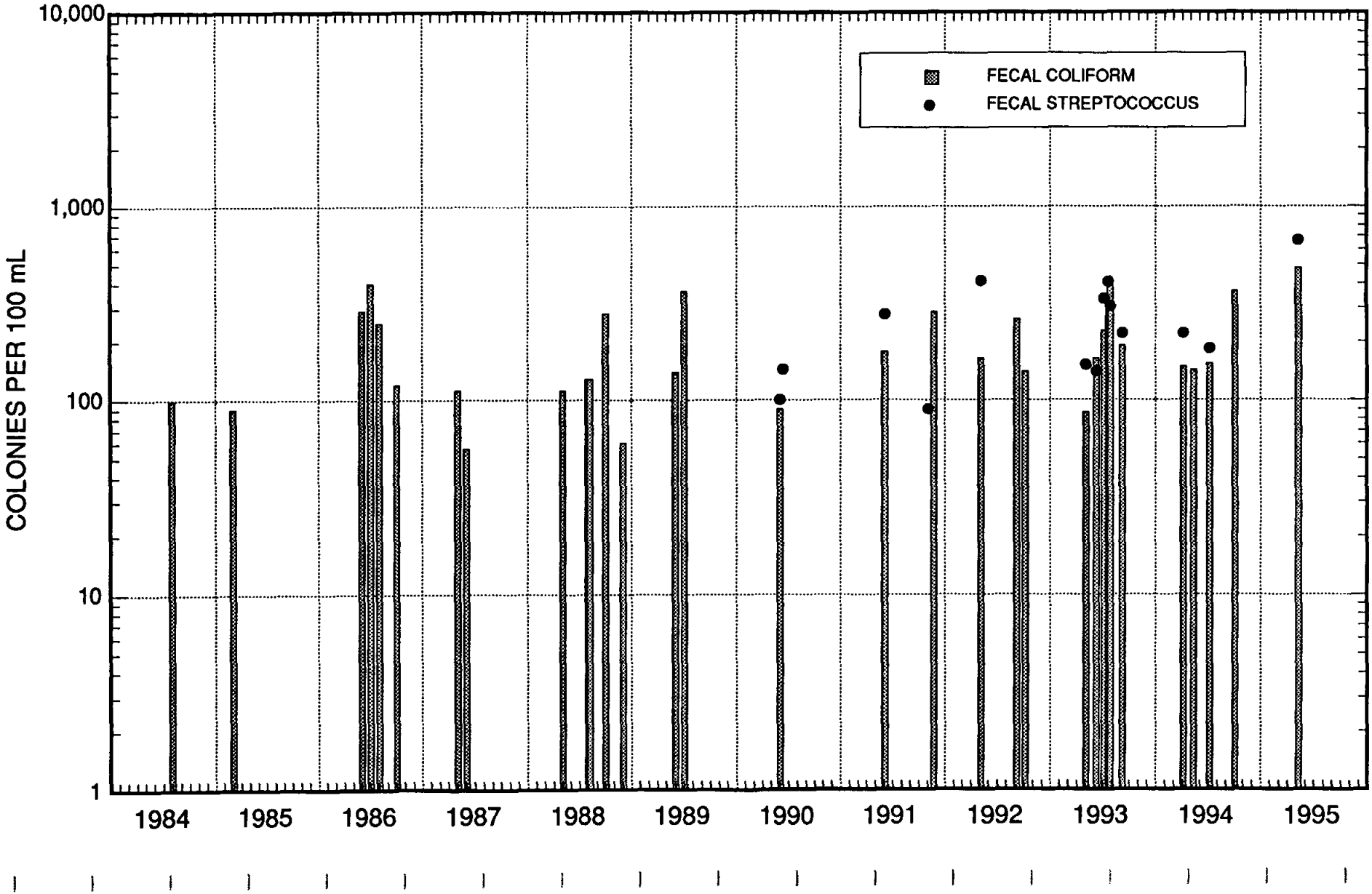


FIGURE 2-8

HISTORICAL FECAL COLIFORM AND STREPTOCOCCUS CONCENTRATIONS AT STATION NO. 6
BLANCO RIVER, RAPIDS IN PARADISE VALLEY

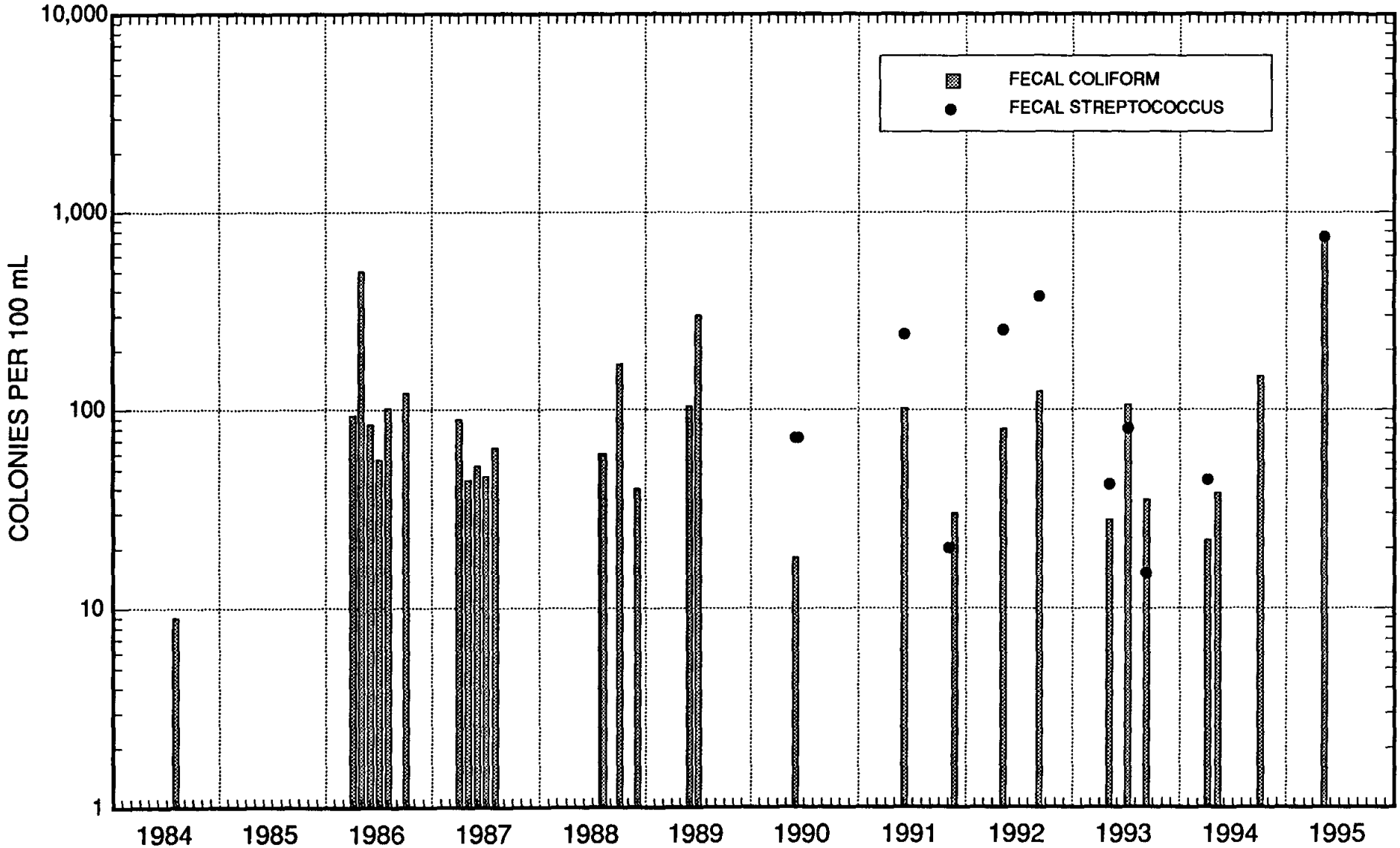


FIGURE 2-9

HISTORICAL FECAL COLIFORM AND STREPTOCOCCUS CONCENTRATIONS AT STATION NO. 7
BLANCO RIVER AT LOW WATER BRIDGE SOUTH OF RANCH ROAD 12

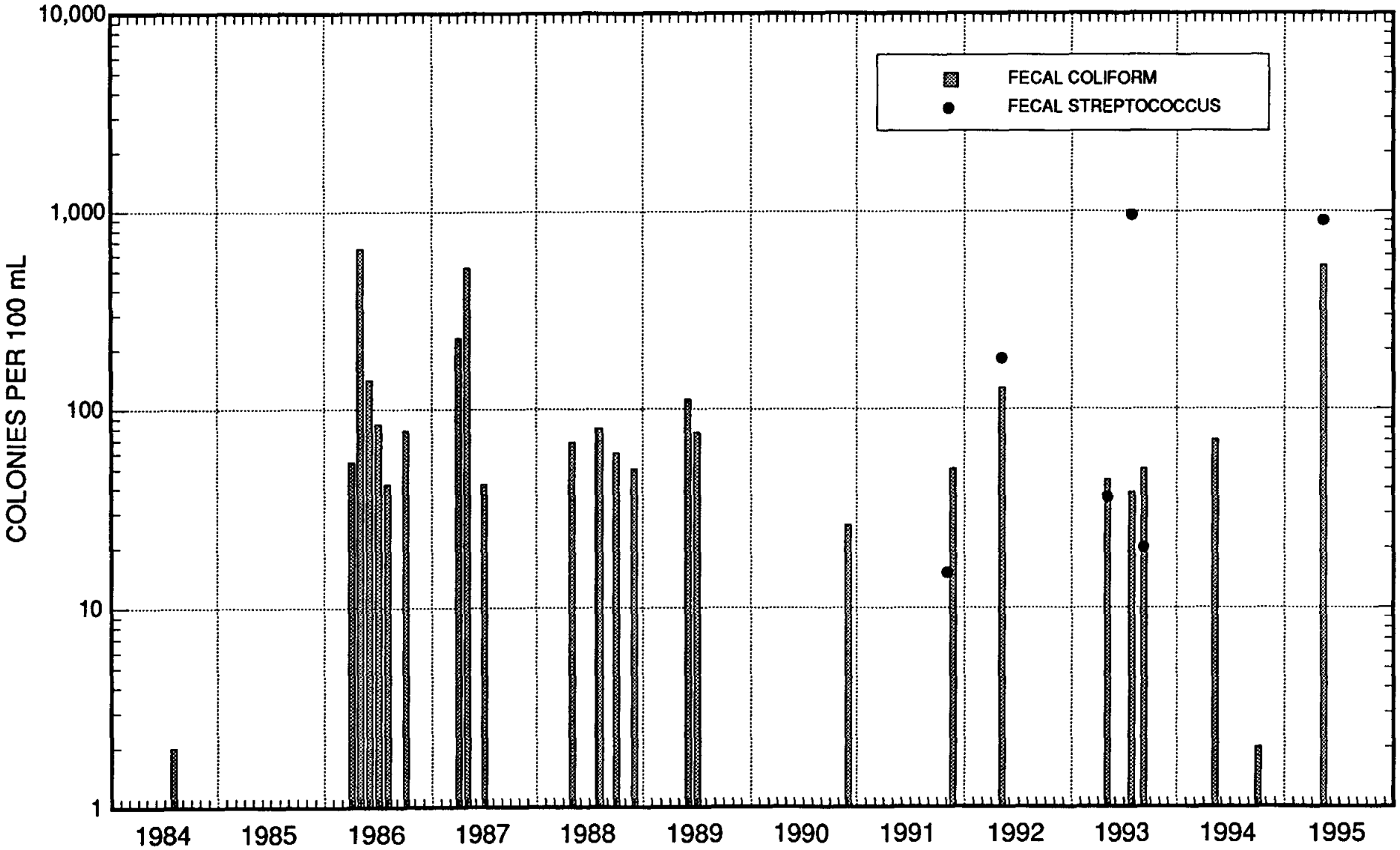


FIGURE 2-10

HISTORICAL FECAL COLIFORM AND STREPTOCOCCUS CONCENTRATIONS AT STATION NO. 8
BLANCO RIVER JUST ABOVE CONFLUENCE WITH CYPRESS CREEK

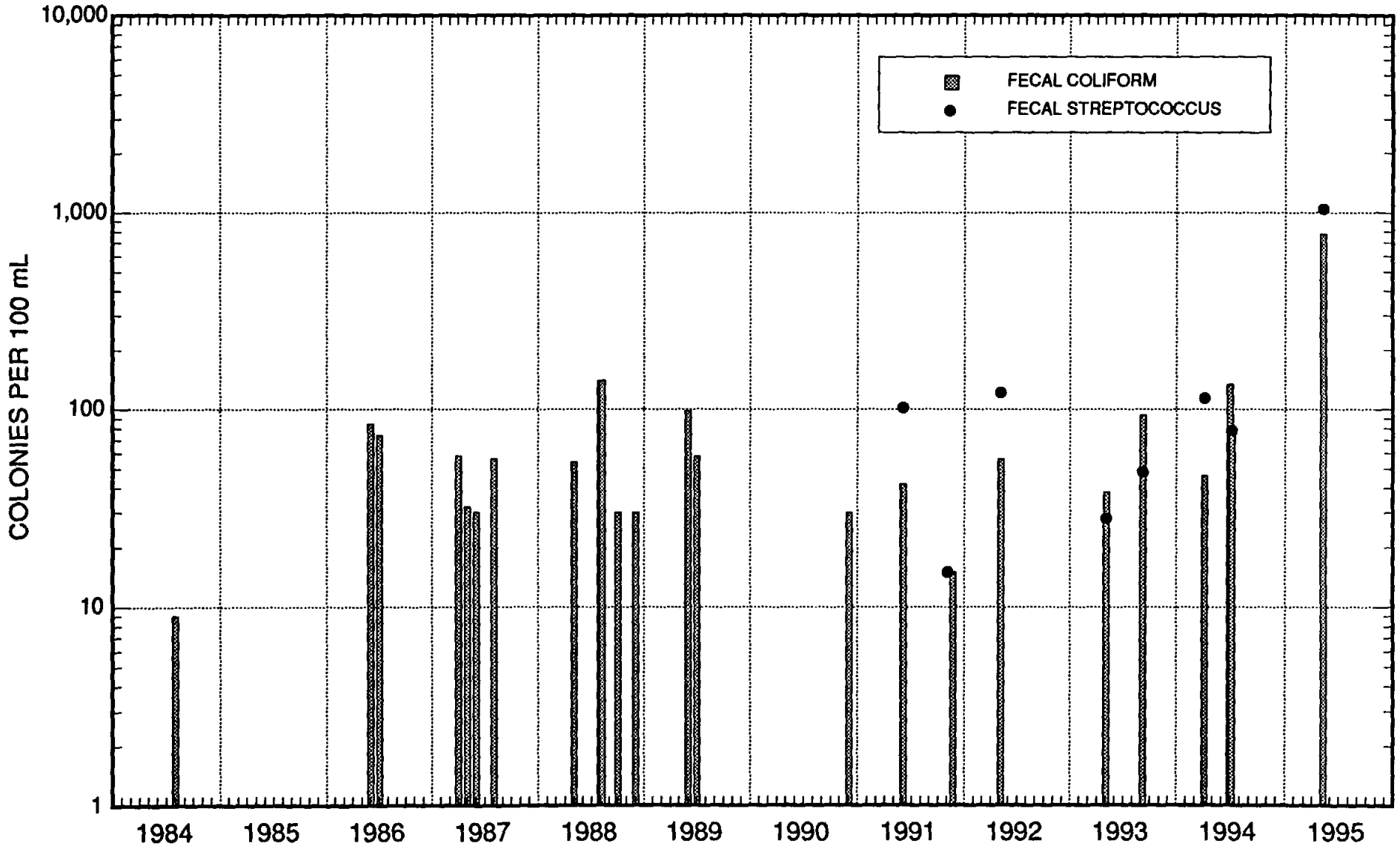


FIGURE 2-11

HISTORICAL FECAL COLIFORM AND STREPTOCOCCUS CONCENTRATIONS AT STATION NO. 9
BLANCO RIVER, BELOW LOW WATER CROSSING AT 7A RANCH

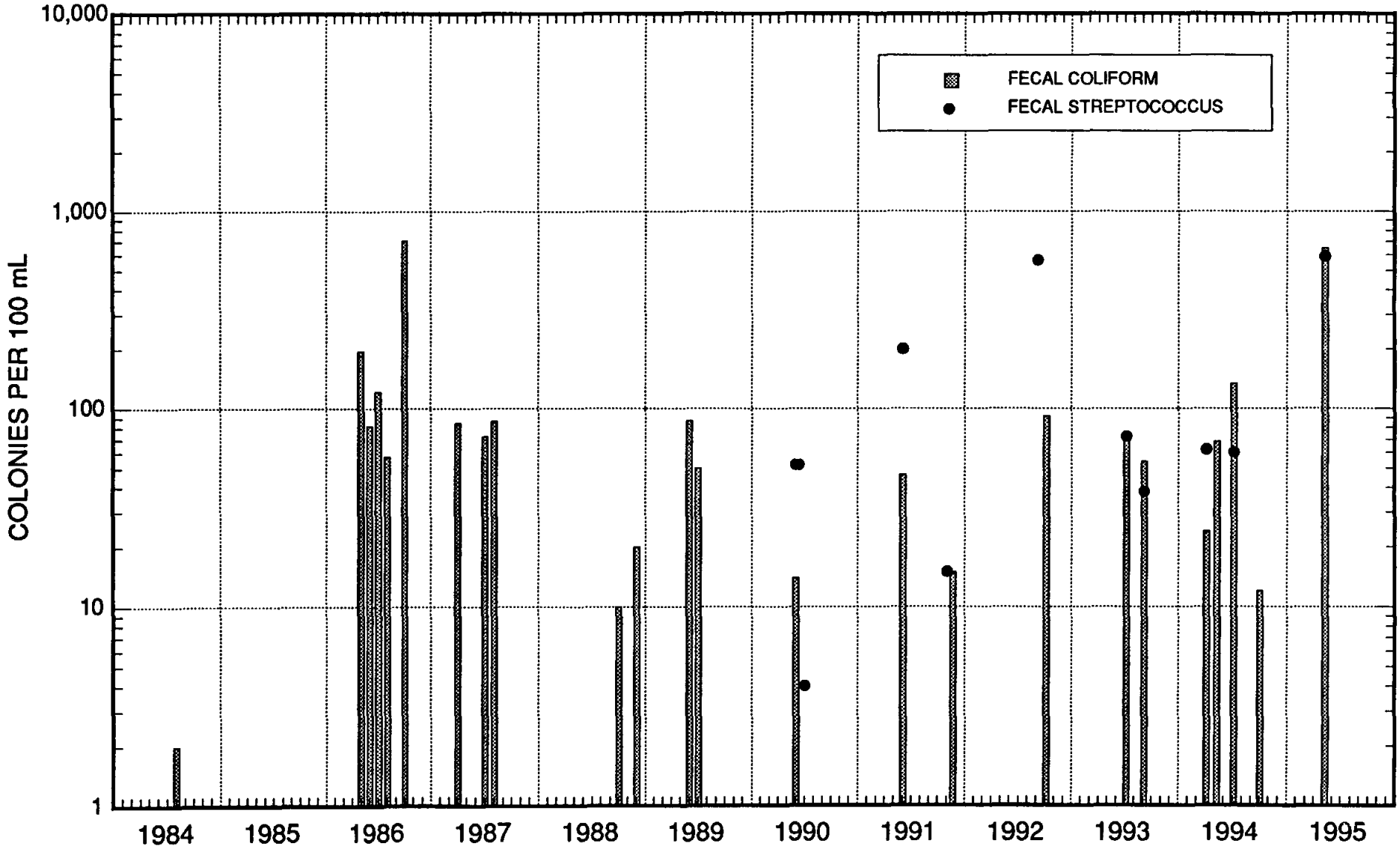
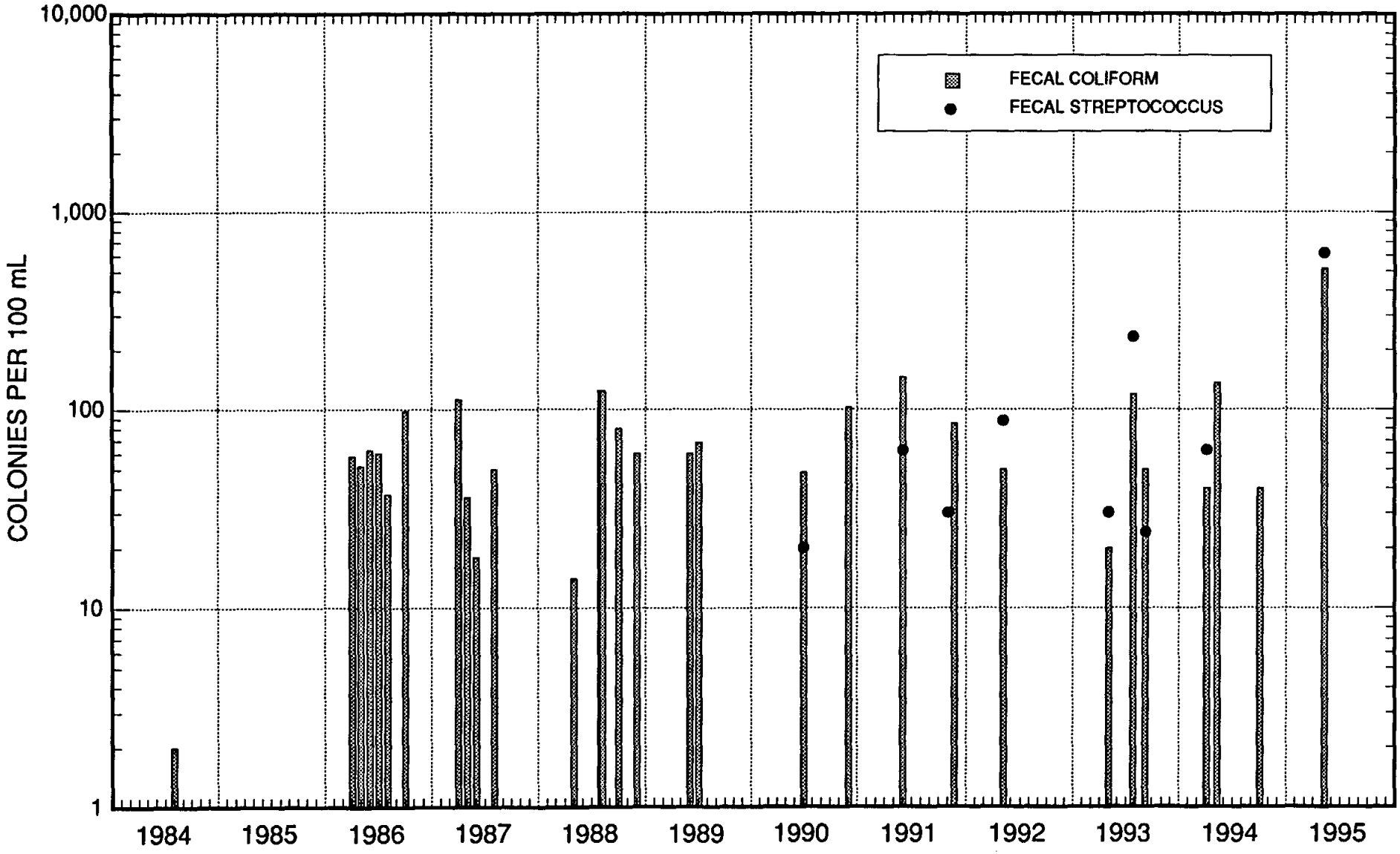


FIGURE 2-12

HISTORICAL FECAL COLIFORM AND STREPTOCOCCUS CONCENTRATIONS AT STATION NO. 10
BLANCO RIVER, RAPIDS AT RIVER MEADOWS, SECTION 3



years, there have been recent measurements during 1994 and 1995 that suggest the quality of these waterbodies certainly is not improving and, indeed, probably is being further degraded.

2.5 REGIONAL GROUND WATER SYSTEM

2.5.1 Aquifers and Ground Water Bodies

Groundwater is the primary source of water for domestic, municipal and agricultural uses in the Wimberley area. The most productive of the water bearing geologic units in the Wimberley region include the Upper Glen Rose Limestone, the Lower Glen Rose Limestone and the Cow Creek Limestone. The principal aquifer utilized in the Wimberley area is referred to as the Glen Rose Limestone.

There are 23 wells listed as "located" by the Texas Water Development Board's (TWDB) Hydrologic Monitoring Section that lie within the boundaries of the planning area. Table 2-6 presents a summary of the principal characteristics of these wells. As indicated, nineteen of these wells withdraw water from the Upper and Lower Glen Rose formations. Ten of the nineteen wells that pump from the Glen Rose are also completed in the Cow Creek Limestone of the Travis Peak Formation. Two other wells pump exclusively from the Cow Creek Limestone. Seven wells are owned by the Wimberley Water Supply Corporation, which serves as the municipal water purveyor for all of the Wimberley area, except for the Woodcreek Utilities service area. The Woodcreek Utilities wells also are identified in Table 2-6.

In addition to the "located" wells listed by the TWDB, there also are other water wells that are known to exist in the planning area. Some of these wells have been abandoned. Several are shallow wells that were constructed near watercourses such as near Cypress Creek in the downtown Wimberley area. These wells rely on subsurface alluvial groundwater for their water supply.

2.5.2 Ground Water Conditions

As indicated in Table 2-6, the depth of the existing wells throughout the planning area generally is in the range of 300 to 400 feet below the ground surface; although, one of the wells is as shallow as 120 feet. Some of the deeper wells extend to levels greater than 500 feet, with one well extending down 1,165 feet. The depth to ground water typically is on the order of 50 to 150 feet below the ground surface.

TABLE 2-6

GENERAL INFORMATION REGARDING TWDB-LISTED WATER WELLS IN THE PLANNING AREA

WELL NO.	AQUIFER	DEPTH Feet	WELL OWNER	YEAR DRILLED	USE
57-63-901	Glen Rose, Cow Creek	300	Woodcreek	1976	Irrigation
57-63-902	Glen Rose, Cow Creek	370	Woodcreek	1976	Irrigation
57-63-904	Cow Creek	400	Woodcreek	1976	Public Water Supply, Irrigation
57-63-905	Cow Creek	--	Woodcreek	--	Public Water Supply
57-63-906	Glen Rose, Cow Creek	340	Woodcreek	1976	Public Water Supply
57-64-401	Glen Rose	280	VFW Post 6441	1985	Public Water Supply, Irrigation, Stock
57-64-701	Glen Rose	287	J.M. Redinger	1974	Industrial
57-64-702	Glen Rose, Cow Creek	400	Woodcreek	1974	Irrigation
57-64-703	Glen Rose, Cow Creek	460	Woodcreek	--	Irrigation
57-64-704	Glen Rose, Cow Creek	450	Woodcreek	--	Irrigation
57-64-705	Glen Rose, Cow Creek	400	WWSC	1975	Public Water Supply
57-64-706	Glen Rose, Cow Creek	415	WWSC	1966	Public Water Supply
57-64-707	Glen Rose, Cow Creek	400	WWSC	1974	Public Water Supply
57-64-708	Glen Rose, Cow Creek	620	WWSC	1954	Public Water Supply
57-64-709	Glen Rose	120	R.A. Maltsberger	1971	Domestic Water Supply, Stock
57-64-710	Glen Rose	200	R.A. Maltsberger	1982	Irrigation
57-74-711	Glen Rose Limestone	590	Woodcreek	1989	Public Water Supply
57-64-801	Glen Rose	--	Skyline Acres Estates	--	Public Water Supply
68-08-101	Trinity Group	1165	WWSC	1968	Public Water Supply
68-08-102	Glen Rose, Cow Creek	555	--	1978	Public Water Supply
68-08-103	Glen Rose	500	WWSC	1984	Public Water Supply
68-08-201	Blanco River Alluvium	--	Miguel Hernandez	--	Stock
68-08-202	Glen Rose	319	WWSC	1987	Public Water Supply

While the levels of water supply aquifers in the vicinity of many growing communities in the Hill Country are experiencing significant declines due to pumping, the municipal wells in the Wimberley area have exhibited only moderate rates of decline. Furthermore, the quality of the ground water in these wells has remained satisfactory for domestic and municipal uses.

It has been noted, however, that shallow ground water in some portions of the planning area exhibits poor quality conditions due to the influence of effluent seepage from poorly-operating septic tank systems. This very likely is the case with regard to the several shallow wells in the vicinity of downtown Wimberley where the effluent disposal capacity of some of the existing septic tank systems has been exceeded. Fortunately, most of these wells are not used as a source of potable water; instead, they are used only for irrigation purposes.

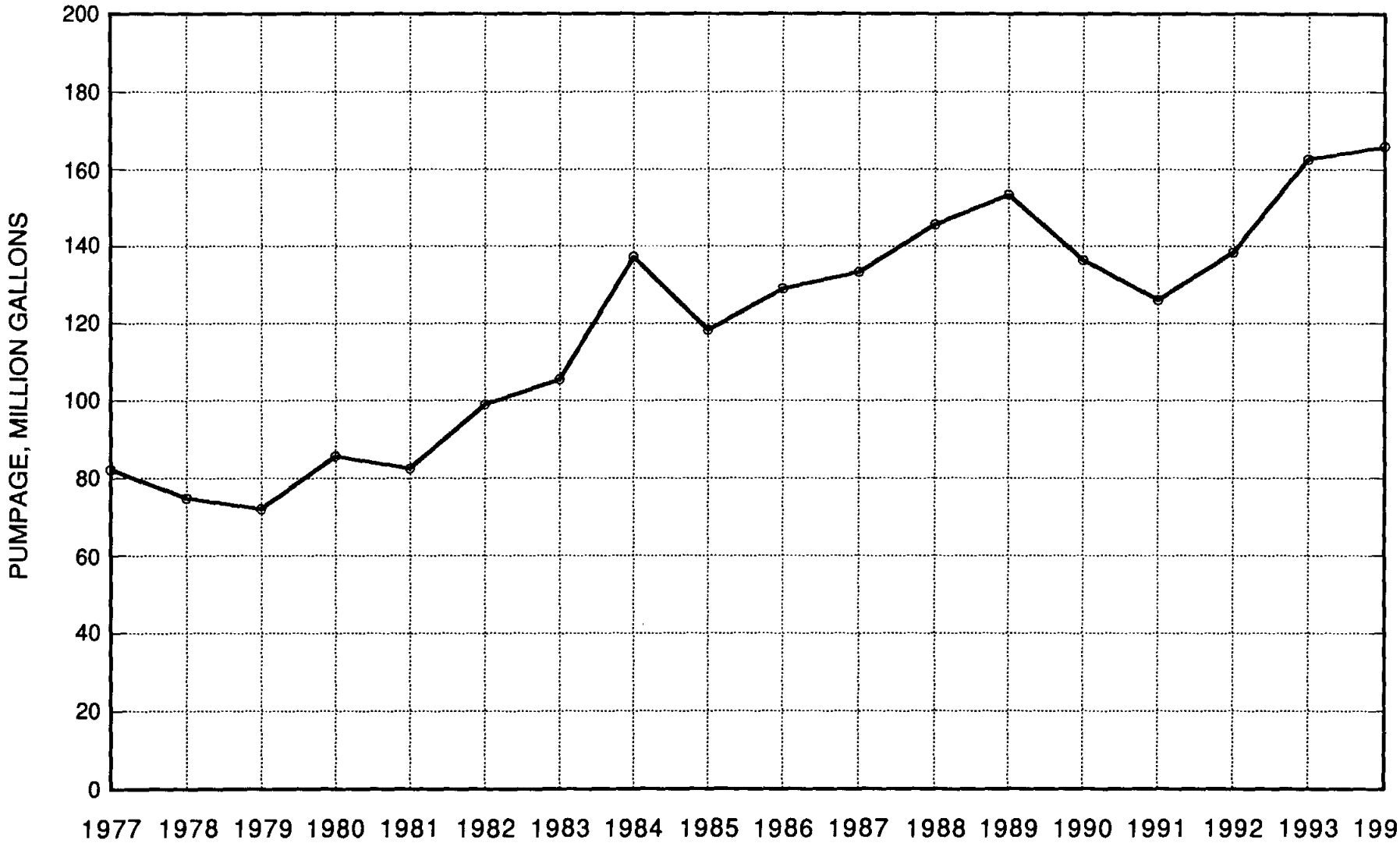
2.5.3 Ground Water Usage

A discussed above, ground water provides the primary water source for the Wimberley area and serves domestic, municipal and agricultural uses. Municipal use represents the vast majority of the water demand in the planning area. The municipal supply for the region is provided by large capacity wells (300 gallons per minute) that are owned and operated by either the Wimberley Water Supply Corporation (WSC) or Woodcreek Utilities, Inc. The boundaries of the Wimberley WSC encompass Subareas 1 through 13 of the planning area, as delineated on the map of the area in Figure 2-1. Woodcreek Utilities provides water primarily to residents in the City of Woodcreek (Subarea 47) and to other residential subdivisions in Subareas 1, 2 and 3.

The Wimberley WSC has four wells in operation at the present time. Three are operated as the primary source of supply for the water distribution system, and the fourth serves as a backup well. Records of monthly and annual ground water pumpage by the Wimberley WSC for the period 1977-1994 have been obtained and analyzed with regard to historical growth in terms of water usage and seasonal trends within the Wimberley WSC service area. Figure 2-13 is a plot of the annual groundwater pumpage over the same period. As shown, water demands in the Wimberley WSC service area have increased dramatically, actually doubling, during the 18-year period since 1977. The past two years, 1993 and 1994, have experienced particularly high water usage. Obviously, these trends in water use are indicative of the growth of the planning area and the overall Wimberley region.

FIGURE 2-13

WIMBERLEY WATER SUPPLY CORPORATION ANNUAL GROUNDWATER PUMPAGE



For the one-year period ending in May of 1995, Figure 2-14 illustrates seasonal water use patterns for the Wimberley area. This graph shows plots of monthly ground water pumpage, total monthly retail deliveries at the meter, monthly residential deliveries, and monthly commercial deliveries within the Wimberley WSC service area. As expected, the higher use periods occur during the summer months when demands are greatest because of lawn watering and tourist and other visitor activity in the Wimberley region.

2.6 REGIONAL ENVIRONMENTAL AND CULTURAL FEATURES

2.6.1 General Overview

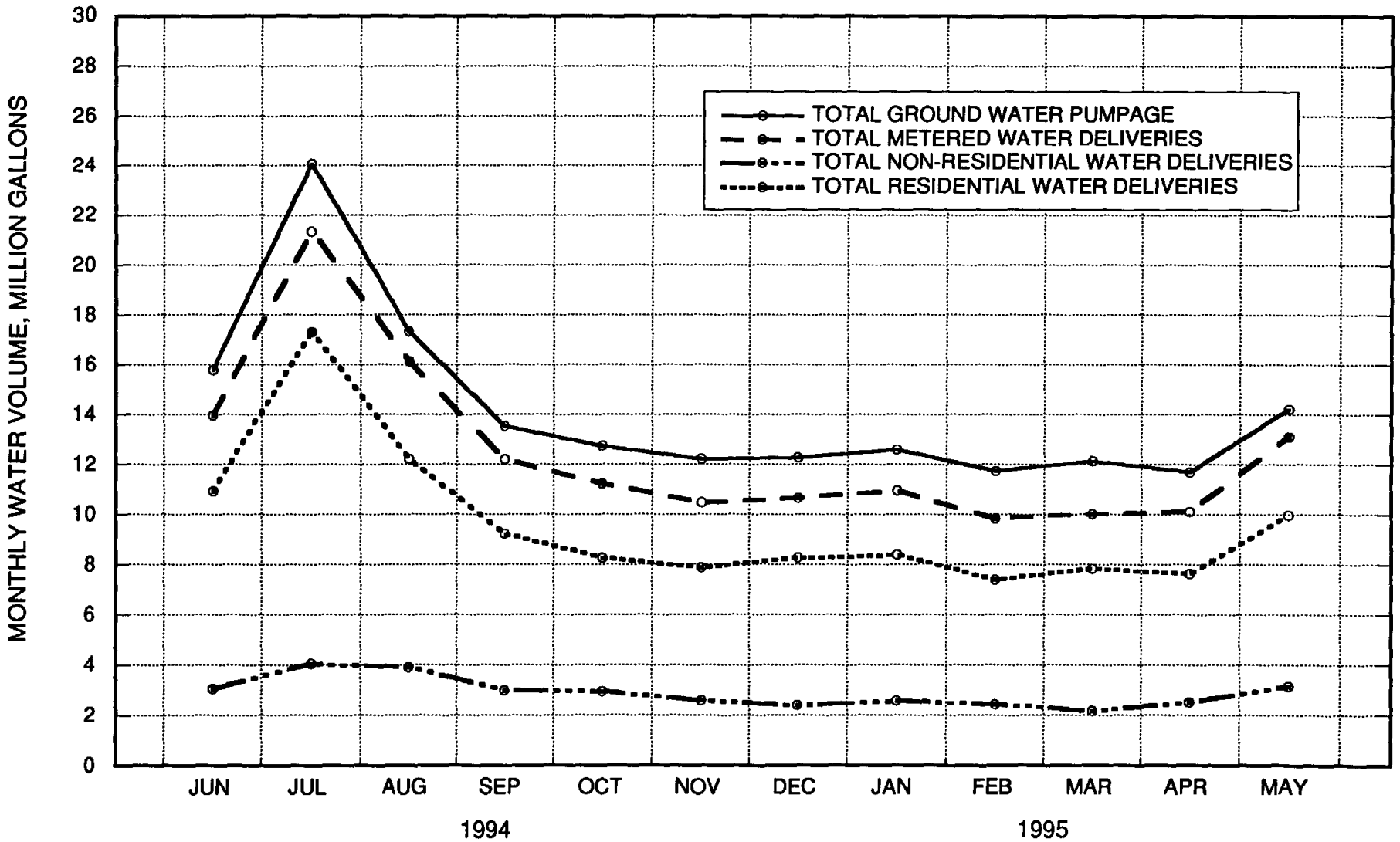
The Wimberley region is blessed with an abundance of natural beauty ranging from tree-covered hills and landscapes to crystal-clear streams with cypress-lined banks. Springfed creeks characterized by reaches of fast moving rapids followed by deep, blue pools have been a major attraction of the area for hundreds of years. The natural environmental setting of the Wimberley region, coupled with the community's rural, laidback lifestyle, has enticed new residents to move from the more densely-populated urban centers to the planning area. The unique water features of the area and the sense of open space also have been instrumental in supporting and developing a wide range of recreational activities that draw weekend visitors and seasonal residents to the area.

2.6.2 Regional Wildlife and Plants

Portions of the planning area provide habitat for a plentiful and varied wildlife population. The principal species are deer, turkey, squirrel, bobwhite quail, dove, rabbit, and many nongame birds and animals. Furbearing species include fox, raccoon, ringtail cat, skunk, opossum, bobcat, beaver, nutria and coyote. Several exotic big game species, for example, axis deer, sika deer, fallow deer, red deer, black buck, barbados sheep and mouflon sheep, have been introduced into the region by ranchers.

Fish and waterfowl are also resources of economic importance. Water is impounded in Canyon Lake on the Guadalupe River about ten miles southwest of Wimberley and elsewhere by flood retarding structures built by the Soil Conservation Service. These waterbodies, as well as numerous farm and ranch ponds and many miles of creeks and streams, are used by migrating ducks and geese. Most of the ponds are stocked with fish, and all of the lakes and rivers provide fishing. Black and white bass, channel

FIGURE 2-14
SEASONAL WATER USAGE VARIATIONS
FOR WIMBERLEY WATER SUPPLY CORPORATION DURING JUNE 1994 - MAY 1995



and yellow catfish, crappie and sunfish are important fish species.

Birds found in the region include such species as the western scrub jay, eastern blue jay, ash-throated flycatcher and the great-crested flycatcher. Others include the ruby-throated hummingbird, Carolina wren, eastern bluebird, barred owl, black-chinned hummingbird, canyon wren, roadrunner, verdin, green kingfisher and black-bellied whistling duck.

Plant species include the live oak, bald cypress, dwarf palmetto, yaupon, ashe juniper, cedar elm, Mexican buckeye, persimmon and mesquite. Others include silk tassle, mock orange and bracted twist flowers.

2.6.3 Threatened and Endangered Species

Important species that must be considered when evaluating the impacts of major construction projects such as wastewater collection, treatment and disposal facilities include the local dominant (most abundant) species, species having some economic or recreational importance, those exerting disproportionate habitat impacts (habitat formers), and protected (threatened or endangered) species listed, or proposed for listing, by either the State of Texas (Texas Parks and Wildlife Department) or the federal government (U. S. Fish and Wildlife Service). The numerous unlisted species that are nevertheless of concern because of rarity, restricted distribution, direct exploitation or habitat vulnerability have not been included in this discussion because the level of effort required to obtain the detailed distributional and life history information necessary to any meaningful evaluation is beyond that appropriate for this planning level study. These species will be addressed in subsequent phases of implementing the adopted Wimberley wastewater management program, particularly as site specific environmental evaluations become necessary.

Important protected species known to occur in Hays County and likely to have habitat within the planning area are listed in Table 2-7. Although, the species listed in the table do not necessarily occur at the specific location of the alternative wastewater collection, treatment and disposal facilities, this is a list of species and their preferred habitats that would need to be investigated, along with others known to Hays County, or considered in a field survey program. In the case of migratory or transient species, the field survey would attempt to identify and evaluate habitat that may be attractive to these wandering species.

The golden-cheeked warbler and black-capped vireo, both listed as

TABLE 2-7

IMPORTANT SPECIES KNOWN TO OCCUR IN THE WIMBERLEY REGIONAL PLANNING AREA

COMMON NAME	SCIENTIFIC NAME	SUMMARY OF HABITAT PREFERENCE	LISTING AGENCY [2]		Potential Occurrence in County
			USFWS	TPWD	
Black-capped Vireo	*Vireo atricapillus*	Semi-open broad-leaved shrublands	E	E	nesting/ migrant
Golden-cheeked Warbler	*Dendroica chrysoparia*	Woodlands with oaks and old juniper	E	E	nesting/ migrant
Blanco blind salamander	*Typhlomolge*	Troglobitic; Stream bed of the Blanco River	E	NL	resident
Texas Horned Lizard	*Phrynosoma cornutum*	Varied, sparsely vegetated uplands	C2	T	resident
Texas Salamander	*Eurycea neotenes*	Edwards Aquifer creek gravel bottoms, emergent vegetation; underground & rocks, ledges	C2	T	resident
Cagle's Map Turtle	*Graptemys caglei*	Waters of the Guadalupe River	C1	NL	resident
Guadalupe Bass	*Micropterus terculi*	Streams of eastern Edwards Plateau	C2	NL	resident
Canyon Mock-Orange	*Philadelphus ernestii*	Edwards Plateau	C2	NL	resident

NOTES:

Texas Parks and Wildlife Department. Unpublished 1994. September, 1994, Data and map files of the Natural Heritage Program, Resource Protection Division, Austin, Texas.

USFWS - U. S. Fish and Wildlife Service

TPWD - Texas Parks and Wildlife Department

E - Endangered

T - Threatened

3C - No Longer a Candidate for Protection

C2 - Candidate Category

C1 - Candidate Category, Substantial Information

NL - Not Listed

endangered by the U. S. Fish and Wildlife Service (USFWS), are known to nest in Hays County in areas with appropriate habitat. The golden-cheeked warbler and black-capped vireo are upland woodland/brushland species. Endemic species such as the Texas salamander are known to occur in springs along the Blanco River drainage basin. Cagle's map turtle and the Guadalupe bass are found in the Blanco River and throughout the upper Guadalupe Basin. Texas horned lizard is a denizen of open, well-drained habitats with sparse cover. The decline of Texas horned lizard populations is associated with the invasion of fireants (*Solenopsis invicta*), agricultural practices and urbanization, all of which are present in the Wimberley area.

The Blanco blind salamander is a troglobitic salamander found once in the Blanco River stream bed. Other populations of this little known troglobitic may be present in the Blanco River basin. The hill country wild-mercury, a plant, is listed in Hays County based on historic occurrence reports from before 1900.

2.6.4 Sensitive Natural Features

Included within the planning area are numerous natural features that must be identified and protected when considering the location of proposed wastewater collection, treatment and disposal facilities. These include the bed and banks of the Blanco River, Cypress Creek and other streams and watercourses within the planning area, springs, waterfalls, other scenic water features, escarpments, bluffs, caves, significant hills and mountains, lakes, impoundments, wetlands, large and old trees, and other sensitive ecological features. The recharge zone for the Edwards Aquifer (San Antonio Region) also is an important natural feature that must be considered with regard to siting proposed wastewater control facilities within the planning area.

Within the limited scope and timeframe of this regional wastewater planning study, the Wimberley Citizens Water Resources Group has identified various sensitive natural features throughout the region, and these, along with the Edwards Aquifer recharge zone, are denoted on the map of the planning area in Attachment 2. To the extent that plans for wastewater management and control for the region are further refined and ultimately adopted, additional studies and detailed surveys of sensitive natural features in the impacted areas will need to be conducted, with appropriate mitigation measures developed.

2.6.5 Cultural and Historical Resources

There also are various cultural and historical resources within the planning area that

must be located and designated for protection. These include such features as cemeteries, individual grave sites, Indian grounds and mounds, historical homes and structures, special architectural features, and other similar sites. These types of cultural and historical resources also have been identified by the Wimberley Citizens Water Resources Group and are located on the map of the planning area in Attachment 2. Again, as wastewater management options for the planning area are further refined and a final plan adopted, additional and more detailed studies and surveys will be performed to identify specific cultural and historical features that potentially could be impacted.

3.0 REGIONAL POPULATION

3.1 POPULATION GEOGRAPHICAL DISTRIBUTION

The distribution of the population throughout the planning area for the Wimberley Regional Wastewater Planning Study is depicted by the density and distribution of residential structures shown on the map in Attachment 1. This map has been prepared beginning with the U. S. Geological Survey (USGS) topographic maps of the area as a basemap. For the planning area, the most recent USGS maps are photo-revised based on 1986 aerial photographs of the region. To update these maps to 1995 conditions, the Wimberley Citizens Water Resources Group and Hays County representatives performed detailed examinations of the maps and conducted on-the-ground surveys in order to identify changes in residential development and structure and street locations that have occurred since 1986. These changes then were made to the USGS basemap to produce the updated and current map of the planning area presented in Attachment 1.

As shown on the planning area map, the most concentrated areas of residential development occur in Subareas 1, 2, 3, 4, 7, 8 and 10, with somewhat less dense housing in Subareas 9, 11, 12 and 13. Subarea 8 includes the Wimberley downtown square and represents the central hub of commercial activity in the area. The City of Woodcreek is included in Subarea 47, and it, along with portions of Subareas 30 and 31, also is characterized by relatively dense residential development.

Areas with expanding residential development include Subarea 30, which is referred to as Phase II of Woodcreek, Subareas 5 and 6 immediately west of downtown Wimberley where subdivisions already are platted, and Subarea 12, which is developing south of the Blanco River. The Blue Hole property, which comprises about 150 acres located in the eastern half of Subarea 4, also represents land that is well suited for residential development, and preliminary plans apparently are being considered by the property owners.

The locations of the three existing school campuses of the Wimberley Independent School District (Wimberley ISD) are shown on the planning area map in Attachment 1. The fourth campus for a proposed new high school also is identified.

3.2 CURRENT POPULATION ESTIMATES

Estimates of current and future population throughout the planning area are essential factors that must be incorporated into the planning and design of any proposed wastewater management program. For estimating the current population, the

numbers of residential structures in each planning subarea, with appropriate adjustments for multi-family housing and apartments, have been extrapolated to numbers of residents using a characteristic persons-per-household factor for the region. This factor has been derived based on actual census data for the Wimberley region for 1990 and discussions with local citizens and officials that are familiar with recent housing and development trends in the Wimberley area. The Wimberley Census Designated Place (CDP) is a census data compilation area smaller than the planning area, but which includes most of the more densely populated subdivisions of the Wimberley community, excluding the City of Woodcreek. The 1990 census figures for the Wimberley CDP indicate there were 2,399 persons living in 1,063 households in 1990. This is equal to a persons-per-household factor of 2.26; hence, for this analysis of current population, a value of 2.3 has been adopted for estimating population.

Applying this factor to the numbers of residential structures in each of the planning subareas results in a total population figure of 6,012 for the overall planning area. These calculations are summarized in Table 3-1. The land area, number of residences and number of persons for each subarea are listed in the table, along with the residential housing and population densities. It is interesting to note that the overall residential housing density for the entire planning area is indicated to be only 0.13 structures per acre, which is indicative of the generally rural nature of the region. Housing densities for Subarea 1 (Eagle Rock Heights), Subareas 7 and 8 (near downtown Wimberley) and Subarea 47 (City of Woodcreek) reflect the most concentrated areas of residential development.

3.3 SCHOOL ENROLLMENTS

Information from the Wimberley ISD regarding historical and projected school enrollments is presented graphically in Figure 3-1. The historical enrollment figures in this plot represent the sum of the numbers of students enrolled at Danforth High School, Bowen Middle School and Scudder Elementary School. The projections also include students to be enrolled at the new high school.

As illustrated by the annual rate of increase in enrollment, the Wimberley ISD has experienced substantial growth since about 1991, with enrollments increasing at about ten percent per year during the 1993 to 1995 period. Although the rate of growth is projected to decrease to about five percent per year, the total student enrollment is expected to continue to increase for at least the next five years. This growth, of course, is indicative of the overall growth of the Wimberley region, and it

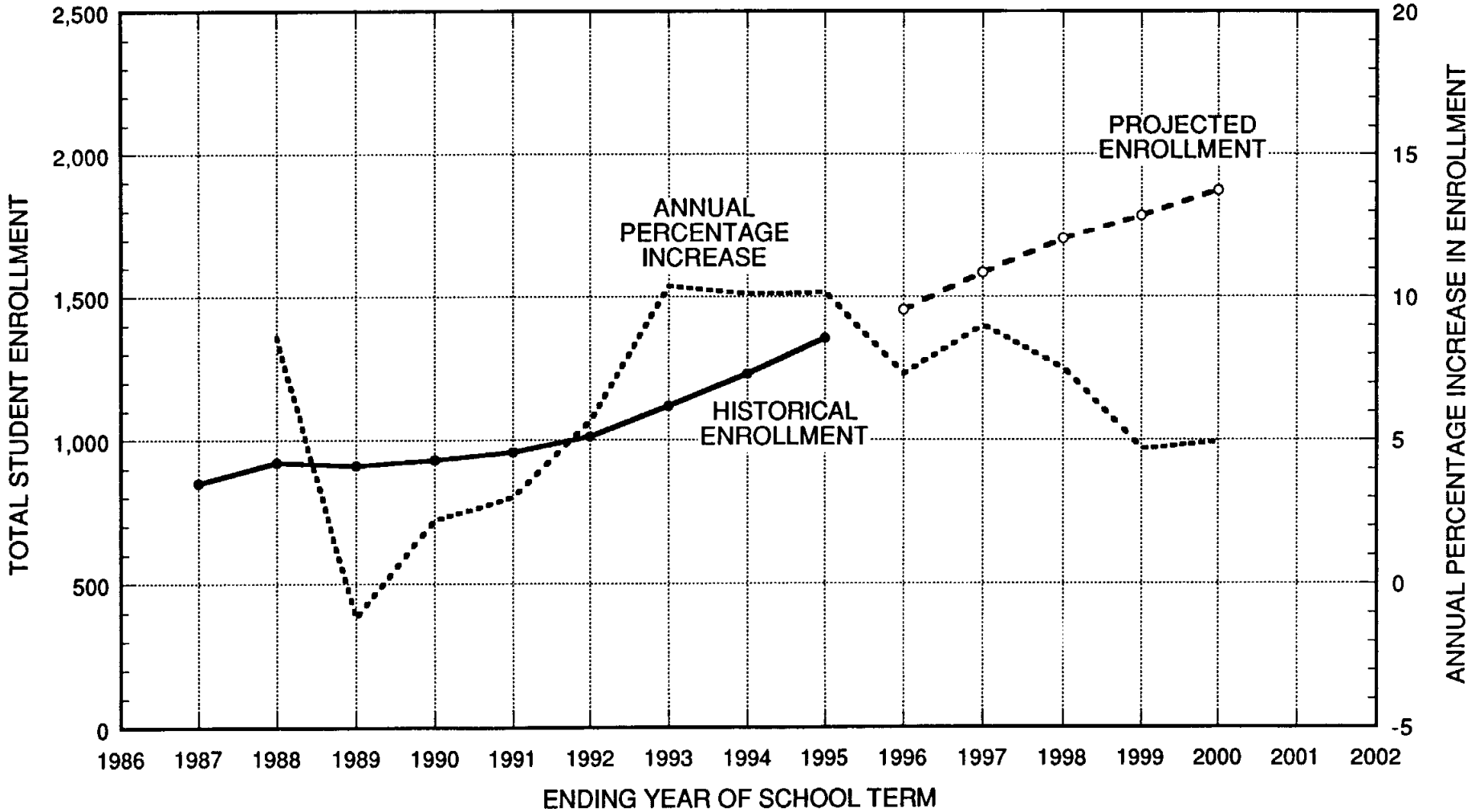
TABLE 3-1
POPULATION ANALYSIS FOR WIMBERLEY REGIONAL PLANNING AREA UNDER 1995 DEVELOPMENT CONDITIONS

ASSUMED PERSONS / RESIDENCE* : 2.30

PLANNING SUBAREA	LAND SURFACE AREA Acres	NUMBER OF RESIDENCES	RESIDENTIAL HOUSING DENSITY Per Acre	NUMBER OF PERSONS	POPULATION DENSITY Per Acre
1	141.6	114	0.80	262	1.85
2	211.2	109	0.52	251	1.19
3	415.3	175	0.42	403	0.97
4	587.7	61	0.10	140	0.24
5	465.6	35	0.08	81	0.17
6	193.8	26	0.13	60	0.31
7	207.3	181	0.87	416	2.01
8	212.8	110	0.52	253	1.19
9	381.5	107	0.28	246	0.65
10	339.3	105	0.31	242	0.71
11	940.5	167	0.18	384	0.41
12	950.0	239	0.25	550	0.58
13	565.9	141	0.25	324	0.57
30	2,213.5	94	0.04	216	0.10
31	916.0	41	0.04	94	0.10
32	1,413.5	13	0.01	30	0.02
33	1,160.0	69	0.06	159	0.14
34	655.4	54	0.08	124	0.19
35	1,069.3	41	0.04	94	0.09
36	598.9	25	0.04	58	0.10
37	235.3	2	0.01	5	0.02
38	1,084.5	4	0.00	9	0.01
39	1,171.5	46	0.04	106	0.09
40	353.8	6	0.02	14	0.04
41	973.6	13	0.01	30	0.03
42	364.8	7	0.02	16	0.04
43	436.9	9	0.02	21	0.05
44	798.2	2	0.00	5	0.01
45	503.4	27	0.05	62	0.12
46	562.2	7	0.01	16	0.03
47	686.4	584	0.85	1,343	1.96
TOTALS	20,809.7	2,614	0.13	6,012	0.29

* Based on examination of 1990 census information and discussions with area citizens.

FIGURE 3-1
HISTORICAL AND PROJECTED TOTAL ENROLLMENT
FOR WIMBERLEY INDEPENDENT SCHOOL DISTRICT



particularly demonstrates that this growth is not only due to retirees moving into the area, but also families with children.

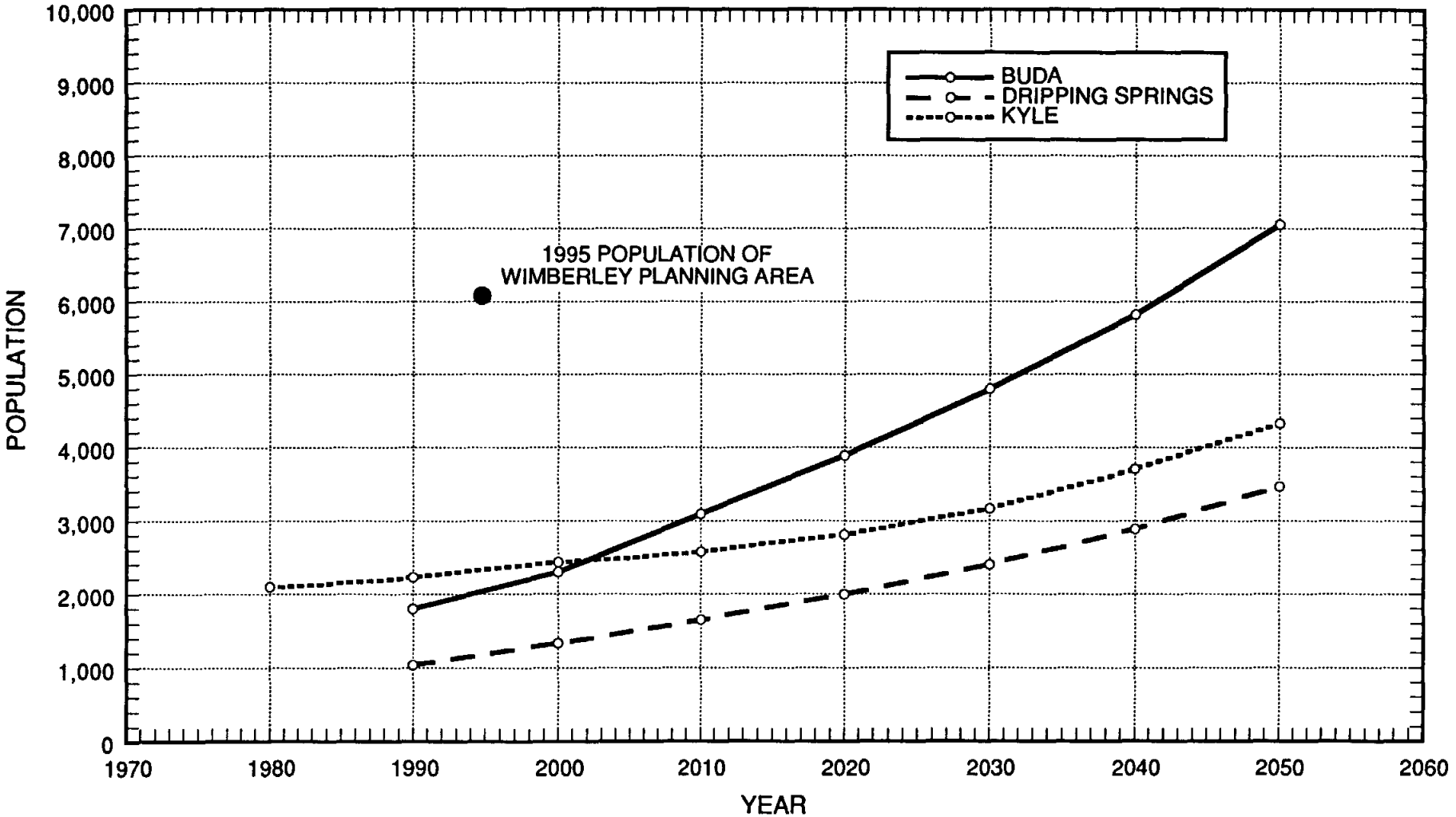
3.4 PROJECTED POPULATION ESTIMATES

As noted above, census data are available for the Wimberley CDP for 1990; however, no data have been identified for this same CDP area for prior census years. Even if these data were available, they would not be very useful for making future population projections because of the recent (since 1985) significant growth of the Wimberley region.

Probably the most useful and reliable source of future population information is available from the Texas Water Development Board (TWDB). The TWDB regularly prepares population projections for counties and incorporated communities throughout the State for purposes of water resources planning. For analyzing the potential future population growth of the Wimberley regional wastewater planning area, projected population figures from the TWDB for the cities of Buda, Dripping Springs and Kyle have been examined. This population information has been used since no population data are available from the TWDB for the Wimberley community because it is not incorporated. With these cities all located within Hays County, all being small communities similar in size to Wimberley, and all experiencing accelerated growth characteristics typical of the region, the general nature of their future population trends is considered to be representative of what the Wimberley area also is likely to experience during the next 20 to 30 years.

The TWDB projected populations for Buda, Dripping Springs and Kyle to the year 2050 are plotted on the graph in Figure 3-2. These population estimates correspond to the TWDB's "most likely" series of projections for these cities. For the 1995-2015 period, the indicated average annual rates of growth are equal to 3.5 percent for Buda, 2.7 percent for Dripping Springs and 0.8 percent for Kyle. The overall average of these annual growth rates for the three cities over the next 20 years is 2.3 percent. This level of average annual growth rate for the Wimberley planning area may be low, considering the present level of development activity and interest in the community. Futhermore, if a wastewater management plan is implemented that provides wastewater service to major portions of the area, it is very likely that the rate of growth of the region with regard to wastewater system connections will be even higher. Hence, for purposes of this Regional Wastewater Planning Study, an average annual growth rate of 4.0 percent has been adopted as being representative and appropriate for the planning area. Applying this growth factor to the 1995 population estimate, the

FIGURE 3-2
POPULATION PROJECTIONS FOR HAYS COUNTY COMMUNITIES
Based on Texas Water Development Board Most Likely Series



projected population of the planning area by the year 2015 is estimated to be about 13,200.

Table 3-2 summarizes the projected population estimates for each of the planning subareas for the year 2015 based on the assumed 4.0-percent average annual growth rate. It should be recognized that the 4.0-percent annual growth rate is an average figure for the region, and it does not necessarily reflect the actual growth characteristics that might be expected for each of the individual planning subareas. Certainly, some of the subareas already are more densely populated than others and some are comprised of more commercial development than residential housing. Obviously, these types of factors will dictate varying patterns of population growth throughout the planning area and among the planning subareas. However, for purposes of this wastewater planning effort, application of the average annual growth rate to all of the subareas is considered to be a reasonable approach and generally representative of future population growth conditions across the planning area.

3.5 POPULATION VARIATIONS

The Wimberley region periodically experiences substantial increases in its normal population due to vacation residents, seasonal tourism and weekend shopping. In addition to the everyday tourism and shopping, several local organizations also host special events that draw thousands of people to the area. These include the Lions Club's Market Days the first saturday of each month during April through December, the Crawfish Festival each year in May, Gospel music concerts in October, the Hillaceous bicycle race in October, and the Rodeo in July. The additional people that visit the area to participate in these events, as well as, the normal vacation and tourist traffic and weekend shoppers represent additional wastewater loadings that must be taken into account in planning for future wastewater management facilities.

With the assistance of the Wimberley Citizens Water Resources Group, data and information have been compiled that provide some insight to the numbers of outside tourists, shoppers and other vacation visitors that spend time in the Wimberley area. For example, based on information from local law enforcement personnel, it is estimated that Market Days typically draws an average of 6,000 to 10,000 people to the community, with as many as 15,000 to 20,000 visitors on exceptionally busy weekends. For the Crawfish Festival, which is a one-day event held in the vicinity of the downtown square, the normal range of visitors is estimated to be between 2,000 and 2,500. On the order of 500 to 750 people participate in the three-day Gospel music concerts and the Hillaceous bicycle race. On a normal weekend during the

TABLE 3-2
PROJECTED POPULATION FOR WIMBERLEY REGIONAL PLANNING AREA
FOR THE YEAR 2015

ASSUMED AVERAGE ANNUAL GROWTH RATE* : 4.00%

PLANNING SUBAREA	LAND SURFACE AREA Acres	NUMBER OF PERSONS	POPULATION DENSITY Per Acre
1	141.6	575	4.06
2	211.2	549	2.60
3	415.3	882	2.12
4	587.7	307	0.52
5	465.6	176	0.38
6	193.8	131	0.68
7	207.3	912	4.40
8	212.8	554	2.60
9	381.5	539	1.41
10	339.3	529	1.56
11	940.5	842	0.89
12	950.0	1,204	1.27
13	565.9	711	1.26
30	2,213.5	474	0.21
31	916.0	207	0.23
32	1,413.5	66	0.05
33	1,160.0	348	0.30
34	655.4	272	0.42
35	1,069.3	207	0.19
36	598.9	126	0.21
37	235.3	10	0.04
38	1,084.5	20	0.02
39	1,171.5	232	0.20
40	353.8	30	0.09
41	973.6	66	0.07
42	364.8	35	0.10
43	436.9	45	0.10
44	798.2	10	0.01
45	503.4	136	0.27
46	562.2	35	0.06
47	686.4	2,943	4.29
TOTALS	20,809.7	13,173	0.63

* Based on Texas Water Development Board's most-likely series of population projections for Buda, Dripping Springs and Kyle and expected trends in Wimberley growth and development.

summer, it is estimated that approximately 1,500 to 2,000 tourists and shoppers visit the Wimberley downtown square area.

Data reflecting restaurant use provide a meaningful indicator of seasonal trends in the numbers of outside visitors to the Wimberley area. Figure 3-3 is a plot of the monthly customers and the monthly water usage for a restaurant in Wimberley during 1994. Clearly, this graph illustrates the increased numbers of tourists, shoppers and other vacation visitors that come into the area beginning in the springtime, peaking in the summer months and continuing into the fall. Similar trends are indicated by the water usage associated with other commercial and trade businesses that serve the area. The combined water usage of all identifiable restaurants, shops, guest houses, lodges, resorts and other service and trade businesses in the Wimberley region that are directly involved in or influenced by the tourism industry is plotted by month for the period June 1994 through May 1995 in Figure 3-4. Again, the increased visitor activity during the spring, summer and fall seasons is clearly demonstrated by this plot.

Assuming that wastewater collection, treatment and disposal facilities are to be provided in the Wimberley community to serve the increased numbers of visitors to the area during busy shopping and festival weekends, particularly in the peak summer months, it is apparent that the design capacity of these facilities will have to accomodate the additional wastewater loadings. Based on examination of the increased water usage during these peak load periods, the additional volume of wastewater that must be handled appears to be on the order of 1,000,000 to 1,500,000 gallons during the peak months (July and August), which is equivalent to about 30,000 to 50,000 gallons per day.

FIGURE 3-3
1994 MONTHLY TRENDS IN RESTAURANT CUSTOMERS AND WATER USE

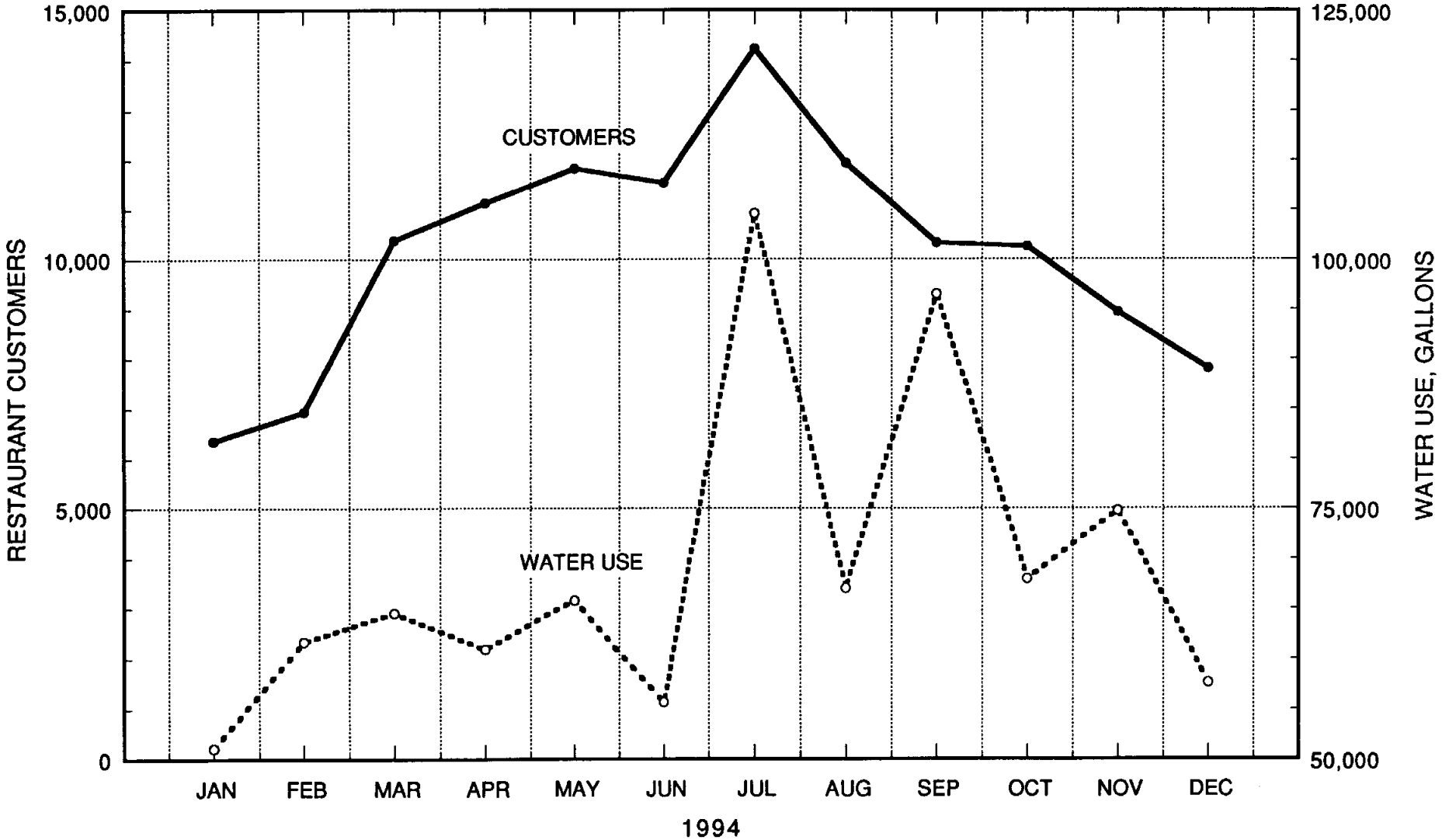
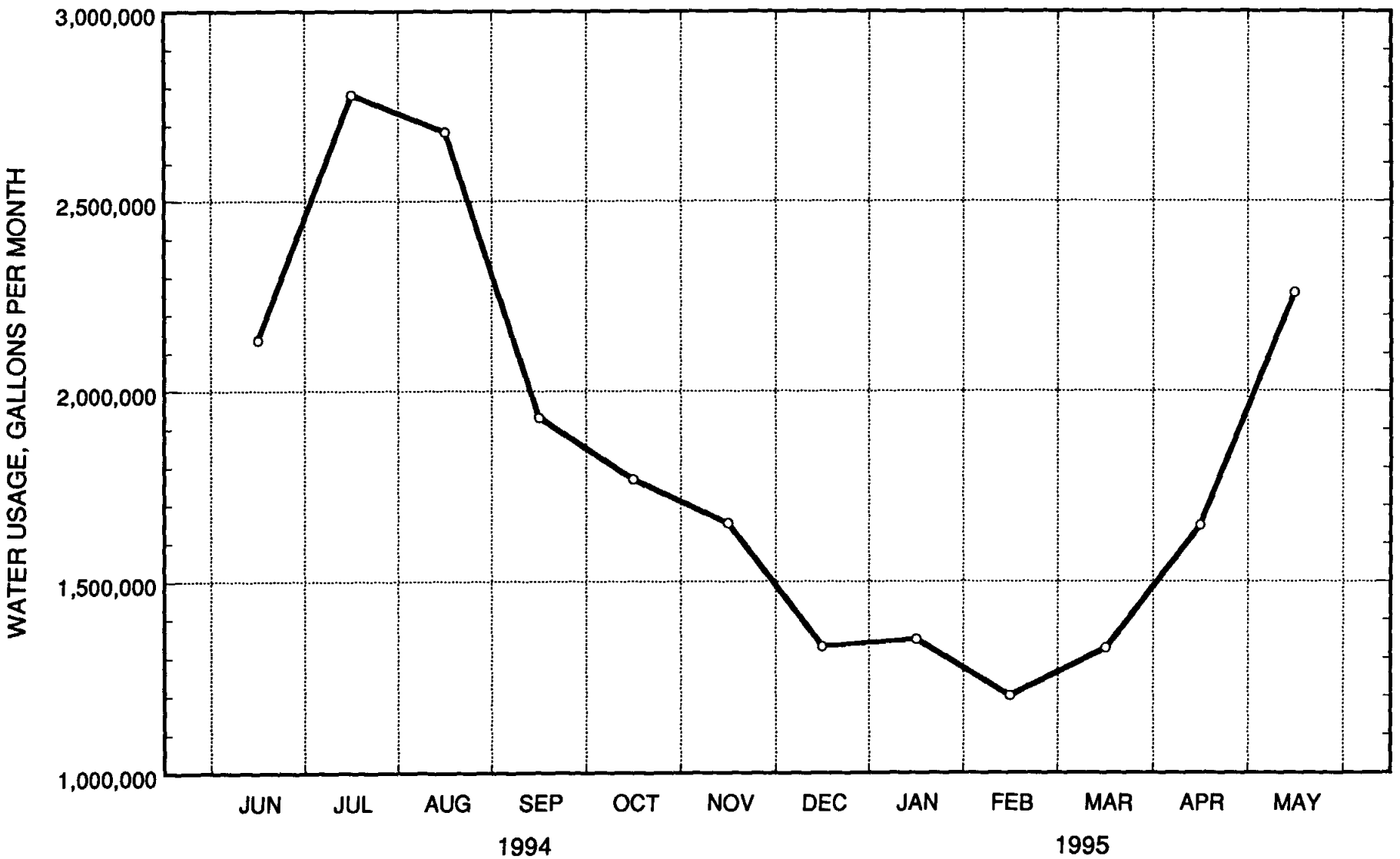


FIGURE 3-4
1994-1995 MONTHLY TRENDS IN COMMERCIAL WATER USAGE
BY BUSINESSES INVOLVED IN TOURISM AND RELATED TRADE ACTIVITIES



4.0 CURRENT AND PROJECTED WASTEWATER FLOWS

4.1 DOMESTIC AND MUNICIPAL WASTEWATER FLOWS

Estimates of domestic and municipal wastewater flows generated in residential areas typically are made by applying per capita wastewater generation factors to population figures. The factor typically used for this purpose is 100 gallons of wastewater per person per day. For purposes of this Regional Wastewater Planning Study for the Wimberley area, this factor has been applied to the population estimates corresponding to 1995 conditions and the year 2015, which reflects a 20-year planning horizon. The resulting wastewater loadings, expressed in gallons per day, are listed by planning subarea in Table 4-1.

As indicated by these figures, the total volume of wastewater that presently is generated by domestic and municipal water users in the planning area is estimated to be approximately 600,000 gallons per day. With the anticipated growth in population over the next 20 years, the volume of domestic and municipal wastewater loadings will be increased to approximately 1,300,000 gallons per day. To provide a basis for comparison, a flow rate of 600,000 gallons per day is approximately equivalent to the combined discharge from two fire hydrants flowing continuously for 24 hours. It is also equal to about one cubic foot per second (cfs). The normal (median) flow of the Blanco River at Wimberley is on the order of 50 cfs.

4.2 COMMERCIAL WASTEWATER FLOWS

Wastewater flows from commercial businesses in the planning area in most cases can be directly related to water usage as indicated by meter readings of water deliveries. For purposes of this planning study, the commercial-based wastewater flows have been assumed to be equal to the commercial water usage. Data and information describing the water deliveries to all commercial users in the planning area have been obtained from the Wimberley Water Supply Corporation for the period June 1994 through May 1995. These data have been reviewed and analyzed and then combined into total commercial water deliveries for each planning subarea, and they are summarized in Table 4-2.

As indicated by the water use figures in the table, the largest potential sources of commercial-based wastewater flows within the planning area are in Subarea 8 and Subarea 10. Subarea 8 includes all of the downtown central business district of Wimberley and the commercial development along Ranch Road 12 to the north. Subarea 10 includes businesses just east of the downtown area and the Living Centers of America nursing home just off of FM Road 3237 northeast of downtown.

TABLE 4-1
CURRENT AND PROJECTED WASTEWATER LOADINGS
FOR WIMBERLEY REGIONAL PLANNING AREA

ASSUMED PER CAPITA WASTEWATER LOADING RATE (GALLONS/DAY): 100

PLANNING SUBAREA	1995 POPULATION	1995 WASTEWATER LOADINGS Gallons/Day	2015 POPULATION	2015 WASTEWATER LOADINGS Gallons/Day
1	262	26,220	575	57,451
2	251	25,070	549	54,931
3	403	40,250	882	88,193
4	140	14,030	307	30,741
5	81	8,050	176	17,639
6	60	5,980	131	13,103
7	416	41,630	912	91,216
8	253	25,300	554	55,435
9	246	24,610	539	53,924
10	242	24,150	529	52,916
11	384	38,410	842	84,161
12	550	54,970	1,204	120,446
13	324	32,430	711	71,058
30	216	21,620	474	47,372
31	94	9,430	207	20,662
32	30	2,990	66	6,551
33	159	15,870	348	34,773
34	124	12,420	272	27,214
35	94	9,430	207	20,662
36	58	5,750	126	12,599
37	5	460	10	1,008
38	9	920	20	2,016
39	106	10,580	232	23,182
40	14	1,380	30	3,024
41	30	2,990	66	6,551
42	16	1,610	35	3,528
43	21	2,070	45	4,536
44	5	460	10	1,008
45	62	6,210	136	13,607
46	16	1,610	35	3,528
47	1,343	134,320	2,943	294,312
TOTALS	6,012	601,220	13,173	1,317,347

TABLE 4-2
CURRENT COMMERCIAL WATER USAGE
IN THE WIMBERLEY REGIONAL PLANNING AREA

PLANNING SUBAREA	JUNE 1994 - MAY 1995 COMMERCIAL WATER USAGE	
	Gallons/Year	Gallons/Day
2	452,260	1,239
3	1,704,040	4,669
4	1,613,515	4,421
5	223,460	612
7	2,779,430	7,615
8	12,872,804	35,268
9	3,205,380	8,782
10	7,560,190	20,713
12	1,091,990	2,992
TOTALS	31,503,069	86,310

The commercial water use in other subareas generally is relatively minor compared to the domestic and municipal wastewater flows listed previously in Table 4-1.

4.3 SCHOOL WASTEWATER FLOWS

Water usage as indicated by meter readings of water deliveries also provides a means for estimating the wastewater flows from the school campuses of the Wimberley Independent School District. The metered water deliveries to the three existing school campuses during the period June 1994 through May 1995 are summarized below, along with the equivalent average annual daily flows.

Danforth High School	1,642,300 Gallons	5,500 Gallons/Day
Bowen Middle School	972,700 Gallons	3,200 Gallons/Day
Scudder Elementary School	502,700 Gallons	1,700 Gallons/Day
Totals	3,117,700 Gallons	10,400 Gallons/Day

These figures exclude water used for irrigation of grounds and sports fields and at the bus maintenance barn. For planning purposes, the current annual wastewater flows for the schools have been assumed to be equal to the metered water use amounts.

Assuming that water usage at the schools increases in proportion to the growth in student enrollment as depicted on the graph in Figure 3-1, the projected annual water usage, and wastewater flows, for the year 2015 have been estimated. An average annual growth factor of 5.0 percent has been applied to the above figures over the next 20 years. The following estimates of future annual and average daily water usage and wastewater flows have been determined.

Danforth High School	4,360,000 Gallons	14,500 Gallons/Day
Bowen Middle School	2,580,000 Gallons	8,600 Gallons/Day
Scudder Elementary School	1,330,000 Gallons	4,400 Gallons/Day
Totals	8,270,000 Gallons	27,500 Gallons/Day

When the new high school is in operation, a portion of these flows will be removed from these school campuses and generated at the new school site.

4.4 BLUE HOLE DEVELOPMENT

One of the tracts of land that is being strongly considered for residential and commercial development is the property adjacent to the Blue Hole recreational area on the south side of Cypress Creek just northeast of downtown Wimberley. This tract encompasses about 150 acres of land along FM Road 3237, and it is included within Subarea 4. Based on preliminary development plans, it is anticipated that 40,000 gallons per day of wastewater flows will be generated by the proposed development.

5.0 WASTEWATER PLANNING CONSIDERATIONS

5.1 WIMBERLEY DOWNTOWN SQUARE

The highest concentration of commercial businesses and shops are located in the vicinity of the downtown square. This includes primarily retail stores and a few restaurants and other specialty shops. A number of these commercial structures are located on the banks of Cypress Creek, with individual septic tank systems for wastewater disposal. Several of the businesses are connected to small, shared septic tank systems.

During the peak tourist season in the summer and during festival periods, as well as on most weekends, the downtown square area is heavily utilized by tourists, shoppers and other vacation visitors. With the concentration of businesses in this small area, substantial wastewater loadings are generated. Surface seepage from septic tank systems in this area has been observed in the past, and, as noted previously, elevated pollution levels in Cypress Creek have been measured. Because of the types of soils in the area and the shallow depth to subsurface rocky conditions, it is likely that the effluent disposal capacity of some of the existing septic tank systems is being exceeded, particularly during heavy use periods on summer weekends. Ground water in the shallow wells in the area probably exhibits varying degrees of contamination due to the percolation of the septic tank effluent. Fortunately, most of these wells are not used as a source of potable water; instead, they are used only for irrigation purposes.

The downtown square and central business district is one of the principal areas where wastewater collection and treatment facilities are needed, not only to take care of existing wastewater and water quality problems, but also to allow present activities to continue in the future. Based on past experience, it is not likely that any additional growth of the downtown area that generates increased wastewater loadings can be sustained without significant problems occurring. The shallowness of the soils and the limited available space will not support additional septic tank systems for wastewater treatment and disposal. Without action by local interests in the near future regarding the management and control of wastewater, these functions could be assumed by the County, or some state or federal entity, if deemed necessary for the protection of public health and welfare and the environment.

5.2 RANCH ROAD 12 COMMERCIAL AREA

Substantial commercial development also has taken place along both sides of Ranch Road 12 north of the downtown area. Shopping centers, professional office buildings

and retail stores have located along this principal roadway through the Wimberley community. While all of these businesses are served by septic tank systems for wastewater treatment and disposal, most of these facilities have been constructed since the adoption of onsite sewage regulations by Hays County. Consequently, pollution problems have not been particularly noticeable. However, it is the concentration of these facilities in a relatively small area that causes concern with regard to potential pollution problems in the future, particularly if the area continues to grow and expand. Again, soil conditions and available open space are limited to the extent that additional wastewater loadings from septic tank systems may not be able to be effectively treated and disposed of.

5.3 WIMBERLEY ISD SCHOOLS

The Wimberley Independent School District presently has three campuses within the Wimberley community (Scudder Elementary School on Green Acres Drive in Subarea 6, Bowen Middle School on Ranch Road 12 in Subarea 8 and the Danforth High School and athletic complex on Carney Lane in Subarea 5) and is constructing a fourth (new high school on FM 2325 in Subarea 5). Onsite wastewater treatment and disposal systems are used at each of the existing campuses; however, with the significant growth in school enrollments during the past few years, the volumes of wastewater generated at the schools has approached and, in some cases, exceeded the design capacities of these facilities.

The Wimberley ISD presently is evaluating various alternatives for dealing with its present and future wastewater problems, including such options as upgrading the individual onsite wastewater systems, constructing its own central wastewater treatment plant and obtaining a permit from the Texas Natural Resource Conservation Commission for land disposal of the effluent, and entering into an arrangement with Woodcreek Utilities to treat and dispose of the schools' wastewaters. The costs and long-term commitments and consequences associated with each of these alternatives are major issues being considered by the Wimberley ISD.

Certainly, a centralized wastewater treatment plant in the Wimberley area, as might be constructed pursuant to the wastewater management plan resulting from this regional planning effort, could be a viable alternative for the Wimberley ISD. All of the wastewater treatment plant options considered in this planning study include handling the present and future wastewater loadings from all of the existing and presently planned Wimberley ISD school campuses.

5.4 WOODCREEK DEVELOPMENT

Most of the developed portions of the City of Woodcreek (Subarea 47), Woodcreek Resort (Subarea 30), the Woodcreek Phase II development to the west (Subarea 30), and the Brookmeadow development to the north (Subarea 47) presently are provided water and wastewater service by Woodcreek Utilities, Inc., a private utility company. Approximately 475 residences presently are served by two independently-operated wastewater collection and treatment systems. One wastewater treatment plant is located approximately in the center of the City of Woodcreek corporate area (referred to as the Phase I plant), and the other treatment plant is located on Jacobs Well Road in the Woodcreek Phase II subdivision (called the Phase II plant).

The Phase I treatment plant is permitted at a maximum capacity of 0.050 million gallons per day (MGD), with effluent limits of 30 mg/L for both five-day biochemical oxygen demand and total suspended solids. The permitted capacity of the Phase II plant is 0.033 MGD, with an effluent limit of 65 mg/L for five-day biochemical oxygen demand. Treated effluent from these plants is piped to earth-lined holding ponds (one for each plant), from which it is pumped to golf course irrigation systems. The irrigable area of the dedicated golf course land is 55.2 acres for the Phase I plant and 59.5 acres for the Phase II plant. The Phase I golf course disposal system is operational, while the disposal system for Phase II is only partially developed because the Phase II golf course is not completed. The irrigation disposal systems are owned and operated by Woodcreek Resort, the owner of the golf courses.

In issuing the existing wastewater disposal permits for the two Woodcreek treatment plants, the Texas Water Commission, now the Texas Natural Resource Conservation Commission, recognized the possibility of eventually needing to include the Woodcreek wastewater facilities in a larger areawide system by specifying in the permits the following provision.

> "This permit is granted subject to the policy of the Commission to encourage the development of areawide waste collection, treatment and disposal systems. The Commission reserves the right to amend this permit in accordance with applicable procedural requirements to require the system covered by this permit to be integrated into an areawide system, should such be developed; to require the delivery of the wastes authorized to be collected in, treated by or discharged from said system, to such areawide system; or to amend this permit in any other particular to effectuate the Commission's policy. Such amendments may be made when the changes required are advisable for water quality control

purposes and are feasible on the basis of waste treatment technology, engineering, financial, and related considerations existing at the time the changes are required, exclusive of the loss of investment in or revenues from any then existing or proposed waste collection, treatment or disposal system."

Present wastewater loadings from the Woodcreek Utilities service area are approaching the design capacities of the Woodcreek wastewater treatment plants and their present permitted discharge limits. Modifications to these plants, the effluent holding ponds and the irrigation disposal systems presently are being considered by Woodcreek Utilities in order to accommodate larger wastewater flows in the future in compliance with their discharge permits. Again, a centralized wastewater treatment plant for the Wimberley area that is located in the vicinity of Woodcreek, as might be constructed pursuant to the wastewater management plan resulting from this regional planning effort, could be a viable alternative for providing the additional wastewater capacity needed for serving the Woodcreek area. For this reason, several of the wastewater treatment plant options considered in this planning study include handling the present and future wastewater loadings from all of the existing Woodcreek Utilities service area.

5.5 LIVING CENTERS OF AMERICA NURSING HOME

The Living Centers of America nursing home, also known as the Deer Creek nursing home, is located in Subarea 10 on FM Road 3237 about three-fourths of a mile northeast of downtown Wimberley. This facility presently is being operated at near its maximum capacity of 115 residents, with 95 employees. The wastewater generated at this nursing home is treated by a TNRCC-permitted wastewater treatment facility that is owned and operated by the owners of the Blue Hole recreational property. This treatment plant has a permitted and design capacity of 12,000 gallons per day, and it utilizes an Imhoff tank for wastewater treatment and a low pressure dosing field for effluent disposal on the Blue Hole tract. Complaints of odors from the plant by neighboring land owners and visual observations of the facility indicate that it is operating at full capacity and may be in need of repair and/or expansion.

With the nursing home and the associated wastewater treatment and disposal system presently operating at near full capacity, consideration has been given in this planning study to diverting the wastewater flows from the nursing home to a new centralized wastewater treatment plant in the Wimberley area. Several of the wastewater treatment plant options considered in this planning study include handling the present and future wastewater loadings from the nursing home in conjunction with those from

Subarea 10 and from any potential development of the Blue Hole property.

5.6 LIONS FIELD MARKET DAYS

As discussed previously, the Market Days festival at Lions Field (Subarea 6) on the first Saturday of each month during April through December draws 6,000 to 10,000 visitors to the Wimberley area. The additional wastewater flows generated by these visitors are handled by onsite septic tank systems at Lions Field and portable restroom facilities. The wastewater treatment plant options considered in this planning study include treating and disposing of the wastewater loadings from Lions Field during Market Days and other high use periods in conjunction with those from Subarea 8.

6.0 WASTEWATER MANAGEMENT ALTERNATIVES

6.1 OVERVIEW

The growth and development of the Wimberley area has progressed to the point where alternatives to individual onsite septic tank systems for wastewater treatment and disposal must be given serious consideration. From a technological viewpoint, one or more centralized wastewater treatment plants capable of handling the wastewater loadings from the more densely developed portions of the planning area probably represent the most effective wastewater management alternative for the region. However, implementation of these types of structural control measures typically is expensive, and the impacts and disruption associated with installing miles of wastewater lines in developed areas and the environmental consequences of disposing of the treated effluent must be carefully evaluated.

In the absence of implementing such structural measures, the region is faced with employing various forms of regulatory and nonstructural controls to assure that future onsite wastewater treatment and disposal systems are properly installed and operated and/or that future development in the area is undertaken so as to minimize the potential environmental impacts and risks. This option does not address existing wastewater problem areas, and it requires a governmental entity to assume a continuing regulatory responsibility to assure that construction and operation rules are enforced.

6.2 WASTEWATER TREATMENT PLANT ALTERNATIVES

The nature and scope of the planning options for using conventional, centralized wastewater treatment facilities to treat and dispose of existing and future wastewater loadings generated within the Wimberley planning area are dictated, to a large part, by the existing distribution of population and the anticipated patterns of development. The extent to which sources of the wastewater are concentrated in smaller areas plays a major role in determining cost effectiveness. As illustrated by the planning area map in Attachment 1, which identifies 1995 residential and commercial structures, there are certain more-densely populated and intensely developed subareas within the overall planning area that offer the most potential for implementing wastewater collection and treatment alternatives. As would be expected, this includes the subarea that encompasses the Wimberley central business district, Subarea 8, and the subarea(s) where established residential subdivisions have evolved, such as Subarea 7. In addition, portions of those subareas that lie along the potential routes of major wastewater transmission lines for conveying raw wastewater to the treatment plant sites, even though they may not be densely populated, can be effectively included in

the overall wastewater collection system.

6.2.1 Locations and Service Area Options

For purposes of this wastewater planning effort, new centralized wastewater treatment plants have been considered at two different locations within the planning area. One plant is located northwest of downtown Wimberley off of FM Road 2325 in the vicinity of Old Baldy Mountain. The effluent from this plant is disposed of by irrigation of pasture and meadow lands in the vicinity of the plant site. This wastewater treatment plant is referred to as the "Northwest" plant. The other treatment plant is located southeast of downtown Wimberley near the Blanco River in the vicinity of the Flite Acres development. Two options for disposal of the effluent from this plant have been considered; discharge into the Blanco River and irrigation of pasture and meadow lands in the vicinity of the plant site. This wastewater treatment plant is referred to as the "Southeast" plant.

Considering the two wastewater treatment plant locations and the different methods of effluent disposal, several options for wastewater service areas have been defined for purposes of facility costing and economic evaluations. These options are listed and described in terms of their individual service areas in Table 6-1. The overall area represented by these service area options and the specific entities served are indicated on the map of the planning area in Figure 6-1.

The general location of the Northwest wastewater treatment plant has been considered as a potential plant site because of the possibility of constructing a regional plant in this area that ultimately might provide service to all or portions of the Woodcreek development, as well as the residential and commercial areas near downtown Wimberley and the developments in between. This plant site potentially could treat wastewater collected from near downtown in Subareas 7 and 8 (Option I-A), from Subareas 1, 2 and 3 in the vicinity of the plant site (Option I-B), and from the corporate area of the City of Woodcreek in Subarea 47 and the Woodcreek Phase II development in Subarea 30 (Option I-C). Wastewater from any future development of the Blue Hole tract just northeast of the downtown area also could be transported to the plant along with wastewater from the central business district (Option I-D). It has been assumed that the effluent from this wastewater treatment plant would be disposed of by irrigation on land in the general vicinity of the plant site. A disadvantage of this plant site is that it is located considerably higher in elevation than the downtown Wimberley area, thus requiring raw wastewater from the downtown area to be pumped and lifted to the plant site for treatment. Consequently, if the plant

TABLE 6-1
SUMMARY OF WASTEWATER COLLECTION, TREATMENT AND DISPOSAL OPTIONS
FOR WIMBERLEY REGIONAL PLANNING AREA

OPTION DESIGNATION	PLANNING SUBAREAS SERVED	OTHER AREAS SERVED
NORTHWEST PLANT WITH EFFLUENT IRRIGATION		
I-A	7 & 8	Wimberley ISD Schools
I-B	1, 2, 3, 7 & 8	Wimberley ISD Schools
I-C	1, 2, 3, 7 & 8	Wimberley ISD Schools & Woodcreek
I-D	1, 2, 3, 7 & 8	Wimberley ISD Schools, Woodcreek & Blue Hole Tract
SOUTHEAST PLANT WITH EFFLUENT DISCHARGE		
II-A *	8, 10 & 11	Wimberley ISD Schools & Blue Hole Tract
II-B	7, 8, 10 & 11	Wimberley ISD Schools & Blue Hole Tract
II-C	1, 2, 3, 7, 8, 10 & 11	Wimberley ISD Schools & Blue Hole Tract
II-D	1, 2, 3, 7, 8, 10 & 11	Wimberley ISD Schools, Woodcreek & Blue Hole Tract
SOUTHEAST PLANT WITH EFFLUENT IRRIGATION		
III-A *	8, 10 & 11	Wimberley ISD Schools & Blue Hole Tract
III-B	7, 8, 10 & 11	Wimberley ISD Schools & Blue Hole Tract
III-C	1, 2, 3, 7, 8, 10 & 11	Wimberley ISD Schools & Blue Hole Tract
III-D	1, 2, 3, 7, 8, 10 & 11	Wimberley ISD Schools, Woodcreek & Blue Hole Tract

* Options II-A and III-A include only part of Subarea 8, excluding most of the residences along the Blanco River. Presently, there are 16 residences along the Blanco River in this subarea that are excluded in these options.

at this site does not provide wastewater treatment service for a significant portion of the City of Woodcreek and adjacent developments, in addition to the Wimberley downtown area, it is not likely that this plant location will represent a feasible alternative for wastewater treatment in the region.

The Southeast plant site is more suitably located to serve the downtown Wimberley area and other concentrated residential and commercial developments in the region. Being located downstream near the Blanco River, this site is lower in elevation than practically all of the potential service areas within the regional planning area. Certainly, with raw wastewater lines extending from the central business district, including the commercial areas along Ranch Road 12 north of downtown (Subarea 8), to this plant site, wastewater service could easily be provided to residents in Subareas 10 and 11, including any future development of the Blue Hole tract (Options II-A and III-A). The relatively-concentrated residential development in Subarea 7 just west of the downtown area also could be served with appropriate extensions of wastewater lines from Ranch Road 12 (Options II-B and III-B), and then it might also be possible to connect the system to subdivisions in Subareas 1, 2 and 3 just south of Woodcreek (Options II-C and III-C) and ultimately to all or portions of the City of Woodcreek and the Woodcreek Phase II development (Options II-D and III-D). For this plant site, two means for disposing of the treated effluent have been considered; discharge into the Blanco River and irrigation of fields and pastures in the area. The irrigation areas could be located across the Blanco River in Subarea 9.

It should be pointed out that the specific planning subareas that have been included in the various wastewater management alternatives have been selected either because they presently are relatively densely developed with residential subdivisions and housing and/or commercial establishments or because they lie adjacent to such areas or lie along the routes of major wastewater collection lines and facilities. Other developed subareas within the planning area also could have been included in the various project alternatives because of comparable existing development densities; however, for purposes of this planning exercise, they have been excluded. Certainly, these other developed subareas could be easily incorporated into the final adopted wastewater management plan for the region without any appreciable changes in treatment plant locations or unit project costs. Decisions regarding the areal extent of the final service area for the adopted wastewater management plan as it is to be initially implemented can be made after an overall approach for proceeding with the plan has been selected. In effect, the scope of the final plan can be made to fit the specific needs and desires of the citizens and the project participants.

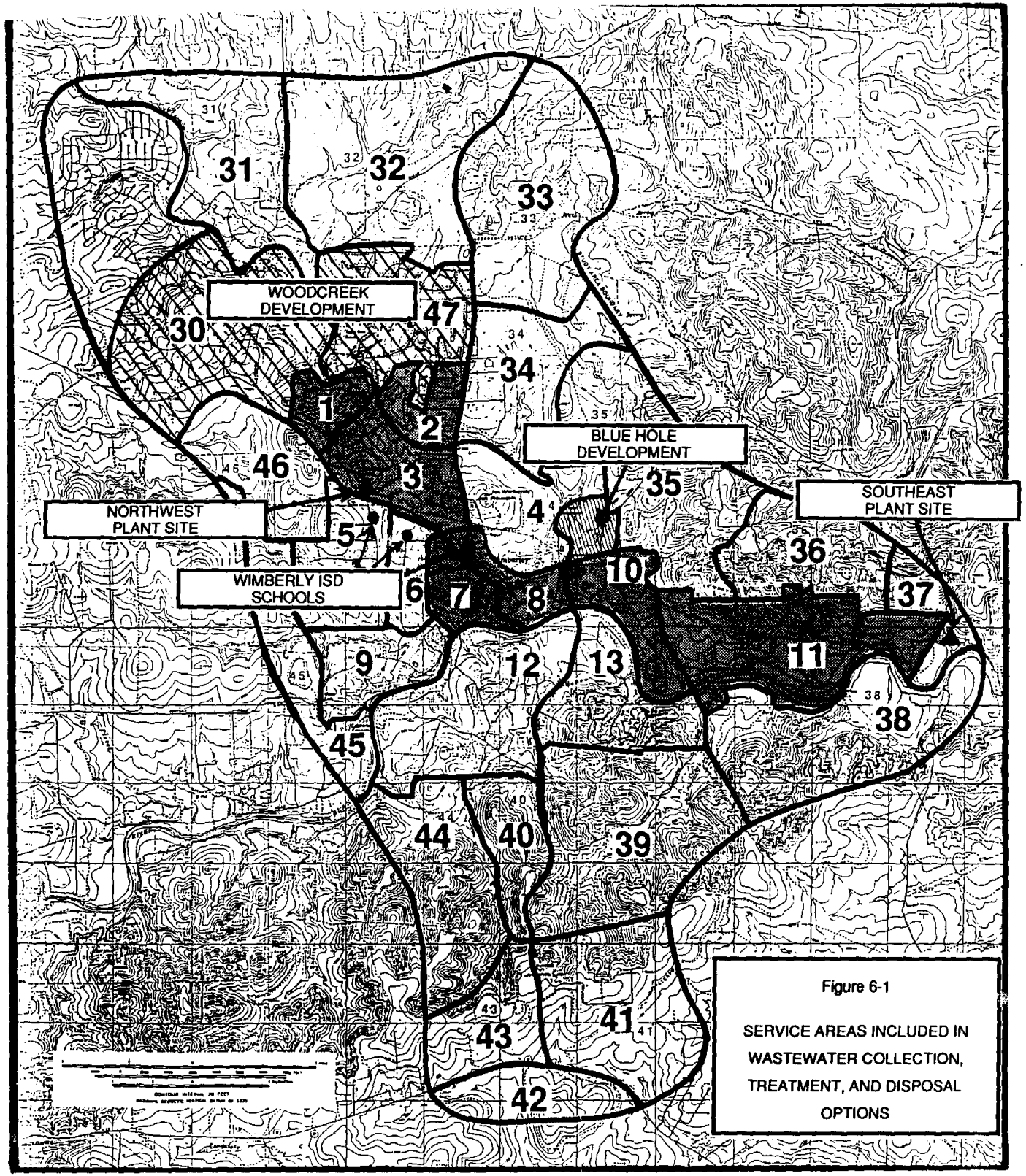


Figure 6-1

SERVICE AREAS INCLUDED IN WASTEWATER COLLECTION, TREATMENT, AND DISPOSAL OPTIONS

6.2.2 Projected Wastewater Flows

For each of the treatment plant and service area options identified in Table 6-1, analyses and projections of wastewater flows have been made for the purpose of establishing design flows for the treatment facilities. For these projections, a twenty-year planning horizon, year 2015, has been used. This is consistent with the period of time over which financing typically is available for construction of these types of wastewater collection and treatment facilities.

The procedures used in projecting the wastewater flows for the various service area options generally are the same as those described previously for estimating the future wastewater flows from each of the planning subareas. The fundamental difference is that only those portions of the planning subarea that reasonably can be provided with wastewater service, considering such factors as distance to the treatment plant site, housing density and topography, have been considered for a particular service area option. The individual residential and commercial structures shown on the planning subarea map in Attachment 1 have served as the primary guide for delineating the specific boundaries and limits of individual service areas. The structures shown on this map correspond to 1995 conditions.

The number of residences in a given service area has been used as the basis for projecting residential wastewater flows. As described earlier, a value of 2.3 for the Persons-Per-Household factor has been used to estimate current population within the service area, and this current population has been projected to the year 2015 using the assumed average annual growth rate of 4.0 percent. As described previously, this growth rate is considered to be representative and appropriate for the Wimberley planning area because of the present level of development activity and interest in the community. Furthermore, if a wastewater management plan is implemented that provides wastewater service to major portions of the area, it is very likely that the rate of growth throughout the region with regard to wastewater system connections will be accelerated.

A summary of the present and projected population estimates for the portions of the planning subareas included within the individual wastewater service areas is presented in Table 6-2. The associated residential wastewater flows, based on the per capita flow rate of 100 gallons per day, also are listed. The present commercial wastewater flows for each subarea are based on the actual water deliveries to individual businesses within each of the service areas during the period June 1994 through May 1995. Again, the projected commercial wastewater flows reflect an

TABLE 6-2
PRESENT AND PROJECTED WASTEWATER FLOWS FOR WIMBERLEY REGIONAL PLANNING AREA

SERVICE AREA	PRESENT RESIDENTIAL STRUCTURES (POTENTIAL CONNECTIONS) [1]	PRESENT RESIDENTIAL POPULATION (Year 1995) [2]	PROJECTED RESIDENTIAL POPULATION (Year 2015) [3]	PROJECTED RESIDENTIAL WASTEWATER FLOW Gallons/Day [4]	PRESENT COMMERCIAL WASTEWATER FLOW Gallons/Day [5]	PROJECTED COMMERCIAL WASTEWATER FLOW Gallons/Day [6]	TOTAL PROJECTED WASTEWATER FLOW Gallons/Day [7]
SUBAREA 1	114	262	575	57,500	0	0	57,500
SUBAREA 2	61	140	307	30,700	1,239	2,715	33,415
SUBAREA 3	109	251	549	54,900	4,669	10,230	65,130
SUBAREA 7	181	416	912	91,200	7,615	16,685	107,885
SUBAREA 8	99	228	499	49,900	35,268	77,277	127,177
SUBAREA 10	70	161	353	35,300	20,713	31,091	66,391
SUBAREA 11	100	230	504	50,400	0	0	50,400
WIMBERLEY ISD SCHOOLS	3	-	-	-	-	-	27,500
WOODCREEK AREA	475	1,093	2,394	239,400	0	0	239,400
BLUE HOLE DEVELOPMENT	174	-	-	40,000	-	-	40,000

NOTES:

[1] Based on present number of residences capable of being served with proposed collection system.

[2] Based on Persons-Per-Household Factor equal to 2.30.

[3] Based on assumed average annual growth rate of 4.0 % for 20 years through the Year 2015.

[4] Based on an average per capita wastewater flow rate of 100 gallons/day.

[5] From Table 4-2.

[6] Based on assumed average annual growth rate of 4.0 % for 20 years through the Year 2015, except for the wastewater flow from the Living Centers of America nursing home in Subarea 10, which presently is at capacity with a flow equal to 12,000 gallon/day.

[7] Equal to sum of Projected Residential Wastewater Flow and Projected Commercial Wastewater Flow; for Wimberley ISD Schools, see Section 4.3 and for Blue Hole Development, see Section 4.4.

average annual growth rate of 4.0 percent over the next twenty years. The projected wastewater flows listed in Table 6-2 for the Wimberley ISD schools and for the potential Blue Hole development are the same as those previously discussed and derived in Chapter 4.

The numbers of connections associated with the estimates of wastewater flows in Table 6-2 are summarized in Table 6-3. Also shown are the numbers of "living unit equivalents" reflected by these flows. A living unit equivalent (LUE) represents the equivalent of a single typical household in terms of the volume of wastewater generated. In this planning study, a typical household is comprised of 2.3 persons, with each generating 100 gallons of wastewater per day. The LUE concept is useful when comparing and examining the relative volumes of wastewater generated by individual connections because of the disparity between typical residential water use and the quantities used and discharged as wastewater by commercial businesses and other non-residential entities. The number of LUEs for a given subarea is higher than the total number of residential and commercial connections because each of the commercial connections typically represents several LUEs with respect to wastewater volume generated.

The design wastewater flows for the treatment plants corresponding to each of the options identified in Table 6-1 have been determined by combining certain of the projected wastewater flows listed in Table 6-2. These resulting design flows are summarized in Table 6-4, and they reflect specific combinations of the projected flow values for residential and commercial sources, the Wimberley ISD schools, the Woodcreek development, the potential Blue Hole development, and seasonal tourism. As shown, an amount equal to 50,000 gallons per day has been added to the projected flows to account for the increased wastewater generated by tourists, shoppers and other vacation visitors that are in the area during the peak summer season. This additional flow has been determined from the seasonal plot of tourist-related commercial water use shown in Figure 3-4, taking into consideration the 4.0-percent average annual growth rate for the region.

As indicated by the figures in Table 6-4, the design flows for the alternative wastewater treatment plant configurations and service areas range from around 350,000 gallons per day for the concentrated residential and commercial area in the vicinity of downtown Wimberley and the schools (Options I-A, II-A and III-A) up to almost 900,000 gallons per day for the more extensive plans that include the downtown area, as well as, outlying areas as far away as the Woodcreek Phase II development to the northwest and portions of Flite Acres to the southeast (Options II-D

TABLE 6-3
PRESENT AND PROJECTED WASTEWATER SYSTEM CONNECTIONS
FOR WIMBERLEY REGIONAL PLANNING AREA

SERVICE AREA	PRESENT RESIDENTIAL CONNECTIONS (Year 1995) [1]	PROJECTED RESIDENTIAL CONNECTIONS (Year 2015) [2]	PRESENT COMMERCIAL CONNECTIONS (Year 1995) [3]	PROJECTED COMMERCIAL CONNECTIONS (Year 2015) [4]	PRESENT LIVING UNIT EQUIVALENTS (Year 1995) [5]	PROJECTED LIVING UNIT EQUIVALENTS (Year 2015) [6]
SUBAREA 1	114	250	0	0	114	250
SUBAREA 2	61	134	2	4	66	145
SUBAREA 3	109	239	11	24	129	283
SUBAREA 7	181	397	9	20	214	469
SUBAREA 8	99	217	74	162	252	553
SUBAREA 10	70	153	6	12	160	289
SUBAREA 11	100	219	0	0	100	219
WIMBERLEY ISD SCHOOLS	-	-	-	-	45	120
WOODCREEK AREA	475	1,041	-	-	475	1,041
BLUE HOLE DEVELOPMENT	-	174	-	-	-	174

NOTES:

[1] Based on present number of residences capable of being served with proposed collection system.

[2] Based on assumed average annual growth rate for residential connections of 4.0 % for 20 years through the Year 2015.

[3] Based on present number of commercial businesses capable of being served with proposed collection system.

[4] Based on assumed average annual growth rate for commercial connections of 4.0 % for 20 years through the Year 2015.

[5] Based on sum of PRESENT RESIDENTIAL CONNECTIONS and Commercial/School Living Unit Equivalents as determined by dividing the PRESENT COMMERCIAL WASTEWATER FLOW in Table 6-2 and the present wastewater flow for Wimberley ISD Schools in Section 4.3 by 100 gallons/capita/day and then by 2.3 persons/household.

[6] Based on sum of PROJECTED RESIDENTIAL CONNECTIONS and Commercial/Schools/Blue Hole Living Unit Equivalents as determined by dividing the PROJECTED COMMERCIAL WASTEWATER FLOW and the TOTAL DESIGN WASTEWATER FLOW for Wimberley ISD Schools and the Blue Hole Development in Table 6-2 by 100 gallons/capita/day and then by 2.3 persons/household.

TABLE 6-4
SUMMARY OF DESIGN WASTEWATER FLOWS
FOR COLLECTION, TREATMENT AND DISPOSAL OPTIONS
FOR WIMBERLEY REGIONAL PLANNING AREA

OPTION DESIGNATION	PROJECTED PLANNING SUBAREA WASTEWATER FLOWS Gallons/Day	PROJECTED WIMBERLEY ISD SCHOOL WASTEWATER FLOWS Gallons/Day	PROJECTED WOODCREEK UTILITIES WASTEWATER FLOWS Gallons/Day	PROJECTED BLUE HOLE DEVELOPMENT WASTEWATER FLOWS Gallons/Day	PROJECTED SEASONAL TOURISM WASTEWATER FLOWS Gallons/Day	TOTAL DESIGN WASTEWATER FLOWS Gallons/Day
NORTHWEST PLANT WITH EFFLUENT IRRIGATION						
I-A	235,062	27,500	N/A	N/A	50,000	315,000
I-B	391,107	27,500	N/A	N/A	50,000	470,000
I-C	391,107	27,500	239,400	N/A	50,000	710,000
I-D	391,107	27,500	239,400	40,000	50,000	750,000
SOUTHEAST PLANT WITH EFFLUENT DISCHARGE						
II-A *	235,905	27,500	N/A	40,000	50,000	355,000
II-B	351,853	27,500	N/A	40,000	50,000	470,000
II-C	507,898	27,500	N/A	40,000	50,000	625,000
II-D	507,898	27,500	239,400	40,000	50,000	865,000
SOUTHEAST PLANT WITH EFFLUENT IRRIGATION						
III-A *	235,905	27,500	N/A	40,000	50,000	355,000
III-B	351,853	27,500	N/A	40,000	50,000	470,000
III-C	507,898	27,500	N/A	40,000	50,000	625,000
III-D	507,898	27,500	239,400	40,000	50,000	865,000

* Options II-A and III-A include only part of Subarea 8, excluding most of the residences along the Blanco River. Presently, there are 16 residences along the Blanco River in this subarea that are excluded in these options.

and III-D).

6.2.3 Wastewater Treatment Facilities

The wastewater treatment plants that have been considered in this planning study are all based on the extended aeration mode of the activated sludge process. This type of treatment process has the advantage of being very stable operationally, with the ability to handle both fluctuating and shock wastewater loadings. In addition, this process is effective for reducing nitrogen in the effluent. The treatment plant sites themselves will occupy a few acres of land, with as much as ten acres needed for effluent storage ponds for those plants utilizing irrigation disposal.

The required quality of the effluent from the wastewater treatment plants is dependent on the means of effluent disposal. For irrigation of effluent on golf courses, pastures and/or meadows subject to public access, the level of treatment, as required by the Texas Natural Resource Conservation Commission (TNRCC), must produce effluent quality that exhibits concentrations of five-day biochemical oxygen demand (BOD-5) no greater than 65 mg/L. However, in areas where the effluent might ultimately recharge the Edwards Aquifer or where there might be potential for subsurface seepage of the effluent into streams or creeks (i. e., shallow-soil areas), more stringent levels of treatment are likely to be necessary. For the Wimberley area, this probably would mean treatment to a secondary level with maximum concentrations of 20 mg/L for BOD-5 and 20 mg/L for total suspended solids (TSS). This is the level of treatment assumed for the treatment facilities utilizing land disposal methods.

The treatment level required by the TNRCC rules for discharge of the effluent into the Blanco River is dependent on the distance that the outfall is located upstream of the Edwards Aquifer recharge zone. It appears that the proposed outfall site near Flite Acres is about five miles upstream of the recharge zone; therefore, the quality of the effluent must satisfy the following maximum constituent concentrations:

Carbonaceous BOD-5	5.0 mg/L
Total Suspended Solids	5.0 mg/L
Ammonia Nitrogen	2.0 mg/L
Phosphorus	1.0 mg/L

For purposes of this regional wastewater planning study, this effluent quality condition has been assumed for the design and cost of the proposed wastewater treatment facilities that discharge effluent into the Blanco River.

For achieving the effluent quality required for the irrigation disposal options (Options I and III), the treatment process initially would consist of an influent measuring device and pretreatment facilities, including a bar screen and a grit chamber. The wastewater then would flow through an aeration unit, where it would be combined with activated sludge. The aeration unit would be designed for a spacial loading of 15-pounds of biochemical oxygen demand (BOD) per 1,000 cubic feet of aeration volume and a minimum hydraulic retention time of 20 hours at the design flow condition. The mixed liquor, consisting of waste and return sludge, would flow to a final clarifier where liquids and solids would be separated, with the clarified effluent flowing to a disinfection unit (chlorination basin) and finally to a storage lagoon for holding for irrigation. The solids from the final clarifier would be returned to the aeration basin. Periodically, solids would be wasted to a sludge thickener, and then to wedge-wire type sludge drying beds. Dried sludge would be hauled to an approved landfill site for disposal. The treated effluent would be ultimately disposed of by irrigation on an approved site.

For the wastewater treatment options using discharge to the Blanco River for effluent disposal (Option II), the general treatment process would be the same as that described above, except that the effluent would receive additional (tertiary) treatment. The additional treatment of the effluent would be provided by a tertiary clarifier installed downstream of the final clarifier. Chemicals, probably alum and/or a polymer, would be added to the clarified effluent to enhance phosphorous removal through flocculation. The chemical clarifier effluent would then be disinfected and filtered. The filtered effluent would flow through a final basin for possible de-chlorination and post aeration, if needed, prior to being discharged into the Blanco River.

6.2.4 Wastewater Collection Systems

For each of the service area options identified in Table 6-1 for the two treatment plant locations, the required wastewater collection facilities have been identified and preliminarily sized. These facilities begin at individual residences or commercial businesses with service lines and grinder pumps, if needed, and extend along streets and easements to the treatment plant locations. The facility information developed for each service area option includes the numbers of required gravity connections and grinder pumps; the lengths and sizes of raw wastewater collection and transmission lines; the numbers of required manholes, junction boxes and cleanouts; the locations and capacities of lift stations; the sizes and lengths of force mains where the terrain

necessitates pumping of raw wastewater; the locations and lengths of roadway borings and casings; the locations and lengths of concrete encasements for creek crossings; and the lengths of street repair associated with the wastewater line construction.

In developing the layouts and components of the wastewater collection systems associated with the various options listed in Table 6-1 and in considering the costs associated with constructing these systems, a number of assumptions and policies have been incorporated into the plans. These are summarized and described below.

- The proposed wastewater collection systems extend primarily to existing developed areas, assuming that these areas and properties adjacent to them will continue to develop and ultimately be connected to the systems.

- Because of existing wastewater and water quality problems, all of the wastewater service area options include the existing Wimberley downtown central business district and the commercial development along Ranch Road 12 to the north, i. e., Subarea 8.

- Because of the significant growth of the Wimberley ISD and the stressed condition of existing onsite wastewater treatment and disposal facilities, all of the service area options include handling wastewater flows from all of the existing and proposed school campuses.

- To the extent practical, each of the wastewater service area options encompasses all developed or developing areas along the routes of major wastewater collection lines.

- To the extent practical, the Blue Hole tract located northeast of the Wimberley downtown area is included in the wastewater service options because of the immediate potential for development of this property in the future and because of the immediate financial assistance such development could provide for any proposed regional wastewater system.

- The Woodcreek Utilities service area is included in certain service area options only because of the potential cost savings that might be realized by constructing and operating a larger regional wastewater treatment facility that could serve the existing Woodcreek area, as well as the Wimberley

downtown central business district and other developed areas.

- Wastewater lines, force mains, manholes, lift stations and other facilities are located away from creek channels and stream beds to eliminate the possibility of direct discharges of raw wastewater into surface waters; however, this prevents the use of gravity service connections and wastewater collection lines in some areas, thus increasing the system costs.

- To the extent possible, the wastewater collection systems are configured so as to locate wastewater lines, force mains, manholes, lift stations and other facilities on existing public rights-of-way and publicly-owned properties, such as along roads and streets and in parks and open areas, for the following reasons:

  1. It minimizes the need for acquiring easements across private property and additional right-of-way for the construction and maintenance of the wastewater facilities, which translates to lower costs and less project implementation time.

  2. It provides better wastewater system control in the event of line breaks, leaks or system mechanical failures because such conditions can be more readily noticed in traveled areas and can be more easily responded to.

  3. It removes wastewater collection facilities farther away from streams and creeks, which minimizes the possibility for pollution of surface waters in the event of line breaks, leaks or system mechanical failures.

- Gravity connections and grinder pumps, where needed, for existing private residential and commercial structures are assumed to be installed as part of wastewater collection system projects, and these costs are included in the estimated construction costs for each of the service area options; gravity connections and grinder pumps, where needed, for new (beyond 1995) residential and commercial developments are assumed to be installed and paid for by future property owners.

- Land required for easements across private property, for additional rights-of-way for the construction and maintenance of the wastewater facilities, and for construction of treatment facilities will have to be purchased from

landowners in the area; land required for irrigation disposal of treated effluent will acquired through long-term lease arrangements with local landowners at not cost to the wastewater utility.

6.2.5 Wastewater Effluent Disposal

As indicated above, the methods that have been considered for disposing of the treated effluent from the wastewater treatment plants include irrigation (no discharge) and discharge into the Blanco River. Only minimal land is required for the discharge option; however, between 50 and 100 acres of pasture and/or meadow land would be needed for disposal of the effluent by irrigation. For planning purposes, it has been assumed that arrangements could be made with local farmers and ranchers in the area, or possibly with the Woodcreek golf courses, to dispose of the effluent at no cost to the wastewater utility. The irrigation disposal areas ideally should be located in the immediate vicinity of the treatment plants, but transport of treated effluent through pressure mains over several miles to the disposal sites certainly is possible. For example, if irrigation land for the Southeast Plant cannot be acquired adjacent to the plant, the effluent might be piped across the Blanco River to existing agricultural lands for disposal.

6.2.6 Facilities Capital Costs

The costs associated with constructing and installing the wastewater collection and treatment facilities that comprise each of the options identified in Table 6-1 have been estimated. Quantities of materials needed for the wastewater collection systems, such as lengths of pipes, numbers of manholes and grinder pumps, and area of street repair, have been estimated, and unit prices covering the cost of the materials and their installation have been applied to estimate total construction costs. These unit prices reflect current experience with similar construction activities in the region. The costs for constructing wastewater treatment plants have been estimated using flow-based unit costs derived from other similar-size facilities. Costs for administrative, legal, financial, surveying and engineering services, plus costs for bond sales, land and right-of-way acquisition for collection systems, and regulatory permitting activities also have been estimated for each of the treatment plant options. All of these costs represent capital costs that will be encumbered by the wastewater utility at the outset of implementing the adopted wastewater management plan.

The resulting capital cost estimates are summarized in Table 6-5. These costs are categorized according to collection system costs, treatment facilities costs and

TABLE 6-5
SUMMARY OF CAPITAL COSTS
FOR WASTEWATER COLLECTION, TREATMENT AND DISPOSAL OPTIONS
FOR WIMBERLEY REGIONAL PLANNING AREA

OPTION DESIGNATION	COLLECTION FACILITIES COST $	TREATMENT FACILITIES COST $	ADMIN. & OTHER COST * $	TOTAL CAPITAL COST $
NORTHWEST PLANT WITH EFFLUENT IRRIGATION				
I-A	$2,567,154	$1,346,400	$1,102,278	$5,015,832
I-B	$5,070,056	$2,085,050	$1,966,797	$9,121,903
I-C	$5,520,572	$3,241,480	$2,296,221	$11,058,273
I-D	$5,722,413	$3,433,650	$2,376,993	$11,533,056
SOUTHEAST PLANT WITH EFFLUENT DISCHARGE				
II-A	$4,077,789	$1,937,430	$1,903,424	$7,918,643
II-B	$4,347,756	$2,538,250	$2,099,351	$8,985,357
II-C	$6,850,659	$3,348,180	$3,044,739	$13,243,578
II-D	$7,301,176	$4,602,180	$3,428,255	$15,331,611
SOUTHEAST PLANT WITH EFFLUENT IRRIGATION				
III-A	$4,077,789	$1,793,000	$1,540,871	$7,411,660
III-B	$4,347,756	$2,346,960	$1,806,311	$8,501,027
III-C	$6,850,659	$3,093,860	$2,987,517	$12,932,036
III-D	$7,301,176	$4,250,180	$3,349,055	$14,900,411

* Includes estimated costs for administrative, legal, financial, surveying and engineering services, plus costs for bond sales, land and right-of-way acquisition for collection system, and regulatory permitting activities.

administrative and other costs. As indicated, the total capital cost of the various wastewater collection, treatment and disposal options range from about $5,000,000 for Option I-A, which encompasses the downtown Wimberley area and adjacent commercial areas (Subareas 7 and 8) and utilizes irrigation to dispose of treated effluent from the Northwest plant, up to around $15,000,000 for Options II-D and III-D, both of which involve construction of the Southeast plant for treating wastewater from a service area that extends from the Woodcreek Phase II development southeastward across the planning area, through the downtown central business district and out to Flite Acres. The trend in these cost capital figures, of course, is from lower to higher costs with increasing service area size and wastewater flow volume.

6.3 NONSTRUCTURAL WASTEWATER CONTROL ALTERNATIVES

There are certain regulatory and nonstructural controls that can be effective for assuring that future onsite wastewater treatment and disposal systems are properly installed and operated and/or that future development in the area will be undertaken so as to minimize the potential environmental impacts and risks. While implementation of such measures typically does not address existing wastewater problem areas and requires a governmental entity to assume a continuing regulatory responsibility to assure that future construction and development complies with the adopted rules, the nonstructural approach can be effective and certainly does not carry with it the substantial financial burdens of implementing comprehensive programs involving the construction of major wastewater collection, treatment and disposal facilities.

Hays County has established Rules for On-Site Sewage Facilities under the authority of Section 26.032 of the Texas Water Code. These rules were adopted in 1984, and they apply to all areas of Hays County that are not within an incorporated city. Hence, these rules have been used to regulate the installation and operation of onsite septic tank systems in the Wimberley area for the past ten years or so.

As stated, the Hays County rules for onsite wastewater treatment and disposal systems are intended to provide a reasonable level of protection for water supplies, water quality and public health and to avoid the threat of pollution or nuisance conditions. Among these rules are requirements for:

- Inspections of individual onsite wastewater systems and facilities as required for repairs and new construction.

- Minimum lot sizes and criteria for all lots consistent with the suitability of soils and other conditions for onsite wastewater systems.

- Evaluations of new development to determine wastewater treatment and disposal requirements.

- Criteria to protect the Edwards Aquifer from pollution by effluent from onsite wastewater systems.

- Prohibiting the installation of private onsite wastewater systems and facilities that are within 300 feet of an organized wastewater disposal system, unless certain requirements are met.

- Criteria for construction of private onsite wastewater systems and facilities for new subdivisions.

- Criteria for institutional or non-residential private onsite wastewater systems and facilities.

- Criteria to protect existing and future individual and community water supplies.

Under the Hays County rules for private onsite wastewater systems and facilities, the minimum lot size in all cases is established at one-half acre, with larger minimum lot sizes up to one acre being required depending on local soil and percolation conditions. In some particularly sensitive areas within the Wimberley region, it may be that the even the one-acre lot restriction may not be adequate to provide effective protection of existing water courses and resources. Some additional provisions and requirements that should be considered either by Hays County or, possibly, by some other new wastewater utility for the Wimberley area, include the following:

- Increased distances for off-sets of private onsite wastewater systems and facilities from watercourses.

- Required annual inspections of private onsite wastewater systems and facilities,

- Required inspections and upgrading of private onsite wastewater systems and facilities whenever properties are sold.

- Possibly with new Legislative authority, creation and adoption of watershed management ordinances that include specific regulations for land development that provide protection of surface and ground water systems.

In addition, those onsite wastewater systems in the vicinity of creeks and streams might be required to provide additional treatment, above that provided by a standard septic tank system. Such treatment could include aerobic treatment, rock filters, stacked disc filters (Zabel filter), slow sand filters and other treatment methods designed for reduction of biochemical oxygen demand and suspended solids. Effluent disposal systems that provide a uniform distribution of effluent over a large area, such as low pressure dose trench systems and drip irrigation systems, should be considered. These types of disposal systems distribute the wastewater effluent over a larger area than a conventional absorption bed or step-down trench system. This eliminates a concentrated loading in a small area, which reduces the potential for system failure.

7.0 INSTITUTIONAL AND FINANCIAL OPTIONS

7.1 INSTITUTIONAL ALTERNATIVES FOR PLAN IMPLEMENTATION

Various forms of governmental or institutional entities may be created by the Wimberley community for purposes of financing, creating, operating and maintaining a regional wastewater system in the Wimberley area. A brief summary of each alternative, along with the advantages and disadvantages of such alternative, is set forth below. The feasibility of the respective alternatives will depend, to a great extent, upon political considerations (i.e., the perception of the public) and economic considerations (i.e., the number of persons who will connect to the proposed wastewater system).

7.1.1 Fresh Water Supply District

The 1959 Texas Legislature created a conservation and reclamation district to be known as the Hays County Wimberley Water Supply District. This district was vested with all of the rights, powers and duties of fresh water supply districts, which includes the power to finance, construct, own and operate a sanitary sewer system. The district was never activated, however, and in 1991, the Texas Legislature dissolved the district, reasoning that the district had been "inactive for five consecutive years, [is] no longer performing any of the functions for which [it] was created, [and has] no outstanding bonded or other indebtedness. . . ." See Chapter 189, page 814, Acts of the 72nd Legislature, 1991.

As a result, it is no longer feasible to activate the fresh water supply district that was authorized by the 1959 Legislature in order to finance and operate the proposed wastewater system. It is not recommended that a new fresh water supply district be created for purposes of providing wastewater service to the Wimberley area, since a fresh water supply district has fewer powers than certain other districts, primarily municipal utility districts and water control and improvement districts, which are discussed below.

7.1.2 Water Supply Corporation

The Wimberley Water Supply Corporation (the Wimberley WSC) currently provides water service to much of the Wimberley area. It is assumed that the Wimberley WSC is a non-profit WSC operating pursuant to art. 1434a, V.T.C.A. A WSC is authorized to furnish a water supply or sewer service, or both, and to provide a flood control and drainage system. In addition, WSCs are vested with the power to contract with other political subdivisions for the acquisition, construction, and/or maintenance of projects

and improvements; to obtain money for the purpose of financing such acquisitions (and encumbering the properties acquired) and to evidence the transaction by the issuance of bonds, notes or warrants to secure funds so obtained. Any such bonds, notes or warrants may not constitute general obligations or indebtedness of the WSC. Instead, such indebtedness must represent a charge upon specifically encumbered WSC properties and the revenue therefrom. In other words, a WSC may issue bonds for financing purposes, but such bonds are payable from operating revenues only; a WSC does not have authority to levy and collect taxes.

In order for the Wimberley WSC or another WSC to provide wastewater service to the Wimberley area, the WSC will have to obtain a sewer "Certificate of Convenience and Necessity" (CCN). The service area can be defined to include only those areas which will receive wastewater service. However, since a WSC has no taxing power and only users of the service pay for it, the CCN could cover a larger area, including potential development areas in the vicinity, so that as these areas are developed, service could be provided where feasible (and desired). The CCN process occurs before the Texas Natural Resource Conservation Commission (TNRCC). The WSC would have to submit an application to obtain a sewer CCN to the TNRCC and would have to provide notice of the application to all persons within the proposed service area and to neighboring utilities. If no persons protest the application, the CCN would be granted by the TNRCC without a formal hearing after a relatively short time. If persons do protest the application, however, a hearing would be held before the TNRCC, which could delay the time for issuance of the CCN.

As noted, a WSC is not authorized by law to levy a property tax and revenues from the system must be used to finance the costs of acquiring, constructing, operating and maintaining the system. To finance the construction of the treatment plant and service lines, the WSC would in all likelihood have to obtain a loan (possibly from Farmers Home Administration or the Texas Water Development Board) or issue revenue bonds.

A WSC is authorized by law to contract with other governmental entities and could therefore provide wastewater service to Woodcreek on either a wholesale or retail basis. That is, the WSC could contract to provide wholesale service to Woodcreek, which would consist of treating and disposing of the wastewater collected in a collection system constructed by Woodcreek or others and piped to a delivery point in the WSC. Woodcreek or others would be responsible for maintaining the collection facilities and billing and collecting for the service. Or, the WSC could contract to provide retail service to individual customers in Woodcreek and be responsible for all of the foregoing functions.

Another option available pursuant to a WSC's contracting authority would be for the Wimberley community to incorporate and obtain either wholesale or retail wastewater service from a WSC (or of course, provide such service itself). The option in which a WSC would provide wastewater service to a municipality could be structured so that those residents who do not want or need wastewater service would pay taxes only for those municipal services from which they benefit.

7.1.3 Municipal Utility District and Water Control & Improvement District

The residents in the Wimberley area may also create a municipal utility district (MUD). A MUD is a governmental subdivision of the state that may include all or part of a county or counties and may include all or part of one or more cities. No land within the corporate limits of a city or within the extraterritorial jurisdiction of a city may be included within a MUD, however, unless the city grants its written consent. The land composing a MUD need not be contiguous.

A MUD only has the powers that are expressly granted by statute. Although a MUD's powers are greater than other kinds of districts, its authority is more limited than that of a municipality. In general, a MUD has the following powers: supply water for municipal, commercial and domestic uses; collect, transport, process and dispose of all domestic, industrial, or communal wastes (including wastewater); drainage control; and provide parks and recreational facilities. A MUD has eminent domain powers and is authorized to enter into contracts to accomplish any of the purposes for which it is created.

In order to create a MUD to serve the Wimberley area, a petition must be filed with the TNRCC. The petition must be signed by a majority in value of the holders of title of the land within the proposed district. If there are more than 50 persons holding title to the land in the proposed district, then the petition is sufficient if it is signed by 50 holders of title to the land. The petition must also describe the proposed boundaries of the district.

After receipt of the petition, the TNRCC will call a hearing where all interested persons may present evidence and testify for or against the proposed district. If the TNRCC finds that the project is feasible, practicable, necessary and would be a benefit to the land to be included in the district, the TNRCC must grant the petition. In making its decision, the TNRCC would consider the availability of comparable services from other utilities, the reasonableness of the projected construction costs, tax rates, sewer rates and other matters. The TNRCC may also exclude land it finds will not be

benefited by inclusion in the proposed district and the boundaries would be redefined accordingly.

Another possibility available to the Wimberley community would be to create a water control and improvement district (WCID) which is similar to but has fewer powers than a MUD. Both districts have the authority to levy and collect ad valorem taxes on all taxable property within its boundaries and there is no maximum tax rate. As a result, both operating revenues and tax proceeds could be used to finance the construction, operation and maintenance of the proposed wastewater system. The ability to obtain tax revenues is the most obvious advantage to the creation of a district. On the other hand, this same factor may cause objections to be raised by those persons who will not receive wastewater service but who are within a district's boundaries. In order to address these concerns, a district's boundaries could be defined to include only those areas that will receive service. Alternatively, a district could issue revenue notes to pay for the cost of constructing the system so that tax revenues are not used for wastewater purposes. Also, a WCID may fund the construction of a wastewater system in limited areas of the district where wastewater service is desired through the issuance of so-called "defined-area tax bonds", payable by an ad valorem tax only on the property within the defined area. A MUD does not have this authority. The feasibility of these options will depend upon the costs of the proposed system, as well as the desires of the residents of the district.

Neither a MUD nor a WCID has the authority to require persons on septic tank systems to convert to a sewer system. With respect to Woodcreek, both types of districts could provide wastewater service to the community on an out-of-district basis. Alternatively, the district's boundaries could include areas within Woodcreek, provided consent by the city was received. Service to Woodcreek by a district could be provided on a wholesale or retail basis, as is the case with a WSC.

It would be possible to create a municipality in addition to a district. The district or its operations could be structured in a manner so that only those persons who receive wastewater service would be subject to taxation for the cost of providing those services. All persons subject to the municipality's zoning and police powers, however, would be taxed for these services by the municipality, exclusive of the wastewater services.

7.1.4 Municipality

Residents in the Wimberley area may also incorporate as a municipality. We understand that certain citizens desire that a municipality be created because of its

zoning and police authority. There are three types of general law municipalities that could be created to serve the Wimberley area, depending upon the number of citizens who would reside in the municipality and the amount of land within the municipality. In general, a Type A general law municipality may be incorporated if there are 600 or more inhabitants in the area to be incorporated and the municipality meets the following territorial requirements: (1) if it has fewer than 2000 inhabitants, it must not have more than 2 square miles of surface area; (2) if there are between 2001 to 4999 inhabitants, it must have not more than 4 square miles of surface area; and (3) if there are 5001 to 9999 inhabitants, it must have not more than 9 square miles of surface area. A Type B general law municipality has the same territorial requirements, but must contain between 201 and 9999 inhabitants.

In order to incorporate as a Type A or B general law municipality, residents must file an application to incorporate with the county judge, to be signed by at least 50 qualified voters. The application must state the proposed boundaries and name of the municipality and must be accompanied by a plat of the proposed municipality. The county judge must then order an incorporation election to be held on a specified date and at a designated place in the community. If a majority of the votes cast at the election are for incorporation, the county judge will make an entry in the records of the commissioners court that the community is incorporated.

In order to incorporate a Type C general law municipality, the proposed territory must contain between 201 and 4999 inhabitants and must meet the square mileage requirements described above. Residents must file a written petition signed by at least 10 percent of the qualified voters of the community with the county judge. The petition must request the county judge to order an election to determine whether the community will incorporate as a Type C general-law municipality. If the majority of the votes cast in the election are for incorporation, then the county judge must enter an order in the minutes of the commissioners court that the community is incorporated. The incorporation is effective on the date the order is entered.

Most new municipalities begin as Type B general law municipalities. Later, as the population of these municipalities grow to 600 or more, most municipalities convert into Type A municipalities. A general law municipality operates under an aldermanic, commission, city council or city manager form of government, depending upon which type of municipality exists and the population of the municipality. General law municipalities may only exercise those powers authorized by law. In the event the Wimberley community chooses to incorporate, we recommend that the powers of municipalities, and alternative forms of government, be reviewed in more detail.

All general law municipalities are authorized to provide for a sanitary sewer system. Significantly, municipalities are specifically authorized to require property owners to connect to a sewer system. A district and WSC do not have such authority. A municipality may construct or operate a utility system inside or outside the municipal boundaries and may own land inside or outside its boundaries for purposes of owning, operating and regulating the utility system. A municipality has the power of eminent domain to acquire property inside or outside its boundaries for this purpose. A municipality may extend sewer lines outside the municipal boundaries and may provide wastewater service to any person outside its boundaries. Thus, a municipality could provide wastewater service to Woodcreek on a wholesale or retail basis, as discussed above.

Municipalities are authorized to enter into a contract with a district or water supply corporation under which the district or corporation will acquire for the benefit of and convey to the municipality a water system or sanitary sewage collection and treatment system. Such a contract need only be approved by the governing body of the municipality, rather than by the voters at an election. The contract can also provide that the municipality assumes ownership of the utility system upon completion of construction of the system or at the time that all debt incurred by the district or corporation is paid in full. A contract of this nature may appeal to the Wimberley area since a water supply corporation or district could be formed to construct and finance the acquisition of a system (by revenues or taxes paid by those persons who receive wastewater service) and upon satisfaction of all outstanding debt, the system could then be conveyed to the municipality.

A municipality has the power to levy and collect ad valorem taxes from all property within its boundaries, but such taxes cannot be used to retire general obligation bonds without the approval of the voters of the city. This taxing authority may raise objections from those persons who will not receive wastewater service from the municipality. On the other hand, these persons probably do desire the police protection, zoning and other services which a municipality may provide. The concerns of these individuals may be resolved by utilizing a separate water supply corporation or district to finance a wastewater system, as described above. Alternatively, the municipality could own the system but could assess up to nine-tenths of the cost of constructing the system to those persons benefited by the system, pursuant to §404.064 of the Texas Local Government Code. To utilize this power, the municipality would have to issue certificates in evidence of assessments levied upon the benefited property (which constitute liens). By ordinance, the municipality would determine the time and terms of payment of the assessments. The assessments may be made only after a hearing and may not exceed the enhancement of value to the property resulting from the

improvements.

A final option would be to create a public improvement district (PID) within a municipality and/or use tax increment financing in the area to be benefited by the sewer system. A PID represents a defined area of a municipality in which an improvement project is undertaken that benefits that part of the municipality. One of the improvement projects for which PIDs may be created is the acquisition, construction or improvement of wastewater facilities. A PID is normally created so that the costs of infrastructure may be financed in part by the municipality and in part by the owners of property within the PID. The owners of property within the PID are required by law to pay at least 10 percent of the total costs of the improvements, but they may pay the entire costs of the improvements, if so required by the municipality. The debt is amortized through the payment in annual installments by individual property owners of an assessment against each property based upon the benefits each property owner receives as a result of the construction of the improvements. The municipality pays its portion (if any) of the costs of the improvements by issuing bonds or setting aside revenues for such purpose.

Although a PID is identified as a "district", it should not be confused with municipal utility districts and other special districts which are local governmental entities. A PID is not a separate governmental entity and the municipality may retain as much control over the management and creation of the PID as it desires.

In order to create a PID, a petition must be submitted to the municipality by the owners of at least 50 percent of the value of real property in the proposed district and either the majority of owners of real property in the proposed district or the owners of the majority in area of land in the district. After feasibility studies are conducted and an assessment method is determined, a public hearing is held. Based on the public hearing, the municipality must make findings as to the advisability of the proposed improvements, their estimated costs, the method of assessment and the apportionment of costs between the proposed improvement district and the municipality as a whole. After the hearing is held, the municipality may order the creation of the PID; an election is not necessary.

Tax-increment financing is a method of financing "urban renewal projects". An election must be held to determine if the majority of qualified voters approve the method of financing. Typically, a municipality would issue tax increment bonds, the proceeds of which would be used to pay for the costs of constructing the wastewater system. The tax increment bonds would be payable only from the increase in tax revenues received from the property benefited as a result of the improvement project.

Tax increment financing or the creation of a PID within a municipality in the Wimberley area would obviously be an appealing solution to address the concerns of those persons who do not desire to pay taxes for a sewer system from which they will not receive service. However, whether these financing vehicles will be feasible will depend upon the cost of the system, the number of persons who will connect to the system and whether they are willing to bear such costs.

7.1.5 Summary

It is apparent that a number of different entities may be created for purposes of providing wastewater service to the Wimberley community. The most expedient way for wastewater services to be provided would probably be through the existing water supply corporation. Unlike the other options, a separate entity would not have to be created. No incorporation elections would be required and petitions from landowners would not have to be completed. Instead, the existing water supply corporation would merely have to apply for a sewer CCN through an administrative process at the TNRCC. The certificated area of service for the corporation could be defined to include only those areas that will receive wastewater service or could include a larger area to cover potential development.

There are a number of drawbacks to this alternative. First, the water supply corporation may not be willing to provide wastewater service. In addition, such a corporation cannot compel its members to connect to a sewer system. It also has no statutory authority to levy taxes. As a result, depending upon the number of persons who connect to the system, it may not be economically feasible to pay for the construction and operation of a wastewater system through operating revenues alone.

It is known that a number of residents in the Wimberley area desire that a municipality be created for zoning and police purposes, regardless of whether a wastewater system is constructed. If a municipality is created, it could own and operate a wastewater system or could obtain wastewater service from another entity created to finance and operate the system.

A municipal form of government for the Wimberley area would require that an incorporation election first take place for purposes of creating the city. Certainly, the potential tax liability associated with a new wastewater system could be an issue in such an election. To address this concern, the municipality may be able to provide wastewater service for only portions of the incorporated area, or it could obtain wastewater service from the water supply corporation or another entity that may be

created to finance and operate the system. The system could then be conveyed to the municipality after all indebtedness has been satisfied. Alternatively, the municipality could create a PID so that only the property benefited by the system will pay for the cost of the system. The total number of persons that potentially could be served by the proposed system and the cost of the system would have to be evaluated to determine whether it is financially feasible to create a PID or to utilize tax-increment financing.

7.2 FINANCIAL CONSIDERATIONS OF PLAN IMPLEMENTATION

7.2.1 Financing Alternatives

The magnitude of the capital investment required for implementing any one of the structural wastewater collection, treatment and disposal options described in Chapter 6 represents a substantial financial burden for any small community, let alone a new incorporated city, district or authority as would likely be the case in the Wimberley area. With anticipated capital costs ranging from $5,000,000 to $13,000,000 for the various options, long-term financing will be essential for effective plan implementation. Such financing can be provided through local bond sales, commercial lending institutions, private enterprises, and/or certain federal and state governmental organizations. This includes such entities as banks, bond companies, privatization companies engaged in owning and operating public utilities, the Farmers Home Administration, and the Texas Water Development Board. Certainly, all available financing alternatives for the proposed wastewater management plan should be thoroughly investigated as part of the final project planning and implementation phase.

7.2.2 Plan Implementation Costs

The ultimate implementation costs for any form of wastewater management plan that includes construction of wastewater collection, treatment and disposal facilities must take into consideration financing costs and costs for operation and maintenance. For purposes of this planning study, the current financing terms offered by the Texas Water Development Board through its Development Fund have been used to estimate financing costs and the ultimate system costs to individual wastewater system customers. These terms, 5.75-percent annual interest rate over 20 years, are considered to be very reasonable in the current financial market and appropriate for purposes of this planning effort.

Costs associated with operation and maintenance of treatment facilities have been estimated based on the actual experience of the Guadalupe-Blanco River Authority

with owning and operating several small wastewater treatment plants in the region. These plants range in size, or treatment capacity, from about 0.050 million gallons per day (MGD) up to about 7.0 MGD, which encompasses the range of wastewater design flows being considered in this study, i. e., 0.315 to 0.865 MGD as listed in Table 6-4.

The total capital costs of the several structural options for wastewater collection, treatment and disposal summarized in Table 6-5 have been extended to total implementation costs by adding costs for financing and for operation and maintenance of the wastewater treatment facilities. These costs are presented in Table 7-1 in terms of annual costs and monthly costs per living unit equivalent connection. The living unit equivalents (LUEs) used to establish the connection costs for each of the options have been derived from those listed in Table 6-3 for the individual subareas and other service areas that are included within the various options.

As shown in Table 7-1, the estimated Year-1995 monthly costs per LUE connection are in the $75 to $105 range. These cost figures are based on the assumption that the entire cost of the various wastewater collection, treatment and disposal alternatives would be borne solely by the initial customers that currently could be connected to the alternate wastewater systems because of their proximity to these systems. This is not a very likely scenario in that it assumes there will be no other customers added to the systems in the future, even though the systems are designed with capacity to handle about twice the volume of existing wastewater flows. Obviously, the Year-1995 costs per LUE connections are artificially high, but they do serve to reflect an absolute upper limit on the monthly cost of the various wastewater systems to existing customers.

The Year-2015 monthly costs per LUE connection (approximately $34 to $54) provide a more reasonable indication of the actual wastewater system costs to individual customers. These monthly connection cost figures reflect spreading the total costs of the wastewater systems among all potential customers within the service areas of each of the different options. These are the costs associated with operating the wastewater systems at their design capacity with all anticipated customers within the service areas connected to the systems beginning in 1995. Creative financing of the wastewater projects involving early interest-only payments and other techniques can be helpful in achieving these levels of monthly connection costs (approximately $34 to $54) throughout the financing periods of the wastewater options.

It is important to recognize that all of the capital costs and the monthly costs per LUE connection presented in Table 7-1 include the costs associated with installing customer gravity service connections ($800 per connection) and grinder pumps

TABLE 7-1
SUMMARY OF TOTAL COSTS AND LIVING-UNIT-EQUIVALENT COSTS
FOR COLLECTION, TREATMENT AND DISPOSAL OPTIONS
FOR WIMBERLEY REGIONAL PLANNING AREA

OPTION DESIGNATION	TOTAL DESIGN FLOWS Gallons/Day	TOTAL CAPITAL COST	ANNUAL CAPITAL RECOVERY COST [1]	ANNUAL O & M COSTS [2]	TOTAL ANNUAL COST	YEAR-1995 COST PER LUE		YEAR-2015 COST PER LUE	
						LIVING UNIT EQUIVALENT [3]	MONTHLY COST PER LUE	LIVING UNIT EQUIVALENT [3]	MONTHLY COST PER LUE
NORTHWEST PLANT WITH EFFLUENT IRRIGATION									
I-A	315,000	$5,015,832	$428,470	$172,463	$600,932	511	$98.00	1,142	$43.85
I-B	470,000	$9,121,903	$779,225	$257,325	$1,036,550	820	$105.34	1,820	$47.46
I-C	710,000	$11,058,273	$944,636	$259,150	$1,203,786	1,295	$77.46	2,861	$35.06
I-D	750,000	$11,533,056	$985,194	$273,750	$1,258,944	1,469	$71.42	3,035	$34.57
SOUTHEAST PLANT WITH EFFLUENT DISCHARGE									
II-A	355,000	$7,918,643	$676,438	$194,363	$870,801	715	$101.49	1,355	$53.55
II-B	470,000	$8,985,357	$767,561	$257,325	$1,024,886	945	$90.38	1,824	$46.82
II-C	625,000	$13,243,577	$1,131,313	$228,125	$1,359,438	1,254	$90.34	2,502	$45.28
II-D	865,000	$15,331,611	$1,309,680	$315,725	$1,625,405	1,729	$78.34	3,543	$38.23
SOUTHEAST PLANT WITH EFFLUENT IRRIGATION									
III-A	355,000	$7,411,660	$633,130	$194,363	$827,492	715	$96.44	1,355	$50.89
III-B	470,000	$8,501,027	$726,187	$257,325	$983,512	945	$86.73	1,824	$44.93
III-C	625,000	$12,932,035	$1,104,700	$228,125	$1,332,825	1,254	$88.57	2,502	$44.39
III-D	865,000	$14,900,411	$1,272,845	$315,725	$1,588,570	1,729	$76.56	3,543	$37.36

NOTES:

[1] Based on financing at an annual interest rate of 5.75% over 20 years.

[2] Based on GBRA actual experience and an annual cost factor of $1.50/1,000 gallons of wastewater treated for all A & B Options; and $1.00/1,000 gallons of wastewater treated for all C & D Options.

[3] Based on Living Unit Equivalents listed in Table 6-3 for specific subareas and service areas.

($3,000 per connection), where needed, for all existing private residential and commercial customers within the service areas of each of the wastewater collection, treatment and disposal options. As an alternative, the cost of installing private service connections and gravity pumps, where needed, could, and probably should, be borne by the individual customers. In addition, a connection fee, say $1,000 per connection, could be charged to the individual customers for the priviledge of obtaining wastewater service. Assuming these cost and fee policies are adopted, then the capital costs for each of the planning options will be reduced, as will the total annual costs and the monthly costs per LUE connection. Table 7-2 presents these adjusted costs. As indicated, the effect of transferring some of the initial cost burden for implementing the wastewater collection, treatment and disposal options from the wastewater utility to the individual customers results in noticeable reductions in the monthly costs per LUE connection. These adjusted monthly costs per LUE connection range from about $30 to $41 for the Year-2015 condition, which reflects a reduction of about ten to twenty-five percent of the corresponding monthly costs presented in Table 7-1 for the case with the wastewater utility paying the entire amount of the construction and connection costs.

TABLE 7-2
SUMMARY OF TOTAL COSTS AND COSTS-PER-CONNECTION
FOR COLLECTION, TREATMENT AND DISPOSAL OPTIONS
FOR WIMBERLEY REGIONAL PLANNING AREA
WITH SERVICE CONNECTION CHARGES

OPTION DESIGNATION	TOTAL CAPITAL COST	ANNUAL CAPITAL RECOVERY COST [1]	ANNUAL OPERATIONS & MAINTENANCE COST [2]	TOTAL ANNUAL COST	YEAR-1995 COST PER LUE		YEAR-2015 COST PER LUE	
					LIVING UNIT EQUIVALENT CONNECTIONS [3]	MONTHLY COST PER LUE CONNECTION	LIVING UNIT EQUIVALENT CONNECTIONS [3]	MONTHLY COST PER LUE CONNECTION
NORTHWEST PLANT WITH EFFLUENT IRRIGATION								
I-A	$3,977,435	$339,766	$114,975	$454,741	511	$74.16	1,142	$33.18
I-B	$7,336,985	$626,751	$171,550	$798,301	820	$81.13	1,820	$36.55
I-C	$9,273,354	$792,162	$259,150	$1,051,312	1,295	$67.65	2,861	$30.62
I-D	$9,748,138	$832,720	$273,750	$1,106,470	1,295	$71.20	3,035	$30.38
SOUTHEAST PLANT WITH EFFLUENT DISCHARGE								
II-A	$6,607,535	$564,439	$129,575	$694,014	541	$106.90	1,355	$42.68
II-B	$7,215,006	$616,331	$171,550	$787,881	771	$85.16	1,824	$36.00
II-C	$9,444,093	$806,747	$228,125	$1,034,872	1,080	$79.85	2,502	$34.47
II-D	$11,532,126	$985,115	$315,725	$1,300,840	1,555	$69.71	3,543	$30.60
SOUTHEAST PLANT WITH EFFLUENT IRRIGATION								
III-A	$6,115,147	$522,377	$129,575	$651,952	541	$100.42	1,355	$40.10
III-B	$6,730,676	$574,958	$171,550	$746,508	771	$80.69	1,824	$34.11
III-C	$9,132,551	$780,134	$228,125	$1,008,259	1,080	$77.80	2,502	$33.58
III-D	$11,100,926	$948,280	$315,725	$1,264,005	1,555	$67.74	3,543	$29.73

NOTES:

[1] Based on financing at an annual interest rate of 5.75% over 20 years.

[2] Based on GBRA actual experience and an annual cost factor of $1.00/1,000 gallons of wastewater treated.

[3] Based on Living Unit Equivalents listed in Table 6-3 for specific subareas and service areas.

8.0 REGIONAL WASTEWATER MANAGEMENT PLAN

8.1 TECHNOLOGICAL ASPECTS

8.1.1 Wastewater Treatment Plant Alternatives

As noted previously, the growth and development of the Wimberley area has progressed to the point where alternatives to individual onsite septic tank systems for wastewater treatment and disposal must be given serious consideration. From a technological viewpoint, one or more centralized wastewater treatment plants capable of handling the wastewater loadings from major portions of the planning area probably represent the most effective wastewater management alternative. Several options for implementing wastewater management plans comprised of collection, treatment and disposal facilities have been identified, with differences among these options being the size and location of the service areas, and hence the volumes of wastewater treated, and the means for disposing of the treated effluent.

The collection systems all have been preliminarily located and sized using a set of prescribed standards and criteria, and therefore, the individual collection systems are compatible with regard to their general features and configurations. Some result in more disruption of existing infrastructure and property than others and possibly greater environmental impacts. These disruptions and impacts are directly related to the size of the service areas of the individual options.

With regard to treatment levels, the assumed effluent quality for the different treatment plant options reflect the requirements of the Texas Natural Resource Conservation Commission with regard to effluent disposal, i. e., irrigation of golf courses and pastures or discharge to the Blanco River. The proposed treatment levels and the resulting water quality are fully consistent with the uses of the surface water bodies in the region. The type of effluent disposal used does impact land requirements for the treatment plant sites and effluent disposal facilities. The irrigation options require more land at the treatment plant sites to store effluent before it is irrigated, and, of course, land is required for the irrigation operations. It has been assumed, however, that the irrigation land can be readily obtained through long-term lease arrangements with local farmers and ranchers or golf course operators.

In essence, any of the structural alternatives for collecting, treating and disposing of wastewater from the different service areas within the planning area can be implemented with few differences regarding technological factors. The primary issues to be addressed relate to the size of the desired service area and the generally proportionate disruptions in existing infrastructure and life activities and impacts on

the environment.

8.1.2 Nonstructural Wastewater Control Alternatives

In the absence of implementing structural wastewater collection, treatment and disposal measures, the region is faced with employing various forms of regulatory and nonstructural controls to assure that future onsite wastewater treatment and disposal systems are properly installed and operated and/or that future development in the area is undertaken so as to minimize the potential environmental impacts and risks. The existing Hays County rules for onsite wastewater treatment and disposal systems are intended to provide a reasonable level of protection for water supplies, water quality and public health and to avoid the threat of pollution or nuisance conditions. These rules provide a solid framework for establishing more stringent regulations for controlling septic tank installations and operations in the event that appropriate structural wastewater management measures are not implemented or in unsewered areas in general. Additional provisions that should be considered for incorporation in these rules include:

- Increased distances for off-sets of private onsite wastewater systems and facilities from watercourses.

- Required annual inspections of private onsite wastewater systems and facilities,

- Required inspections and upgrading of private onsite wastewater systems and facilities whenever properties are sold.

- Possibly with new Legislative authority, creation and adoption of watershed management ordinances that include specific regulations for land development that provide protection of surface and ground water systems.

- Requirements for more sophisticated onsite wastewater treatment and disposal processes and systems.

8.2 INSTITUTIONAL ASPECTS

The most expedient way for wastewater services to be provided within the planning area would probably be through the existing water supply corporation. Unlike other

options, a separate entity would not have to be created. No incorporation elections would be required and petitions from landowners would not have to be completed. Instead, the existing water supply corporation would merely have to apply for a sewer CCN through an administrative process at the TNRCC. The certificated area of service for the corporation could be defined to include only those areas that will receive wastewater service or could include a larger area to cover potential development.

There are a number of drawbacks to this alternative. First, the water supply corporation may not be willing to provide wastewater service. In addition, such a corporation cannot compel its members to connect to a sewer system. It also has no statutory authority to levy taxes. As a result, depending upon the number of persons who connect to the system, it may not be economically feasible to pay for the construction and operation of a wastewater system through operating revenues alone.

It is known that a number of residents in the Wimberley area desire that a municipality be created for zoning and police purposes, regardless of whether a wastewater system is constructed. If a municipality is created, it could own and operate a wastewater system or could obtain wastewater service from another entity created to finance and operate the system.

A municipal form of government for the Wimberley area would require that an incorporation election first take place for purposes of creating the city. Certainly, the potential tax liability associated with a new wastewater system could be an issue in such an election. To address this concern, the municipality may be able to provide wastewater service for only portions of the incorporated area, or it could obtain wastewater service from the water supply corporation or another entity that may be created to finance and operate the system. The system could then be conveyed to the municipality after all indebtedness has been satisfied. Alternatively, the municipality could create a PID so that only the property benefited by the system will pay for the cost of the system. The total number of persons that potentially could be served by the proposed system and the cost of the system would have to be evaluated to determine whether it is financially feasible to create a PID or to utilize tax-increment financing.

8.3 FNANCIAL ASPECTS

The Year-2015 monthly costs per living unit equivalent (LUE) connection presented in Tables 7-1 and 7-2 for the structural wastewater managment options (ranging between approximately $34 and $54 without customer service connection charges

9.0 WATER CONSERVATION AND DROUGHT CONTINGENCY PLANS

9.1 PLANNING AREA

For purposes of these Water Conservation and Drought Contingency Plans, the planning area includes the area of southwestern Hays County that surrounds the downtown square in the community of Wimberley, including the Woodcreek corporate area and adjacent residential developments, the Living Centers of America nursing home, local recreational areas and the Wimberley ISD schools.

9.2 GOALS AND OBJECTIVES

The objective of the Water Conservation Plan is to reduce the quantity of water required for specific activities, where practical, through implementation of efficient water use practices. The Drought Contingency Plan provides procedures for both voluntary and mandatory actions to temporarily reduce water usage during a water shortage crisis.

Drought contingency procedures may include water conservation practices and prohibition of certain uses. Both are tools that water managers have available to effectively employ during a wide range of water demand and supply conditions within the public water supply service area.

The average daily water use in the area approaches 140 to 150 gallons per person during the summer months, but typically is less than 100 gallons per person during the winter. The statewide average daily water consumption is in the range of 150 to 190 gallons per capita. It is the goal to adopt a Water Conservation Plan for the Wimberley area that will reduce daily water use per connection by ten percent. Achieving this goal would in effect, increase the customer service capacity of the water facilities by an equivalent quantity.

The Drought Contingency Plan includes those measures that can significantly reduce water use on a temporary basis. These measures involve voluntary reductions, and water rationing. Because the onset of an emergency condition is often rapid, it is important the plans be prepared in advance. Further, the citizen and/or customer must know that certain measures not used in the water conservation plan may be necessary if a drought or other emergency condition occurs. It is the goal of the Drought Contingency Plan to reduce water used during an emergency situation or prolonged drought by five percent.

The Wimberley Water Supply Corporation (WSC), which supplies water to those

and between about $30 and $41 with customer service connection charges) provide a meaningful indication of the actual wastewater system costs to individual customers. These monthly connection cost figures reflect spreading the total costs of the wastewater systems among all potential customers within the service areas of each of the different options. These are the costs associated with operating the wastewater systems at their design capacity with all anticipated customers within the service areas connected to the systems. Creative financing of the wastewater projects involving early interest-only payments and other techniques can be helpful in achieving these levels of monthly connection costs throughout the financing periods of the facilities.

Based on the costs per LUE connection as summarized in Tables 7-1 and 7-2, the least expensive options typically are those handling the higher wastewater volumes; however, the actual cost differences in terms of the monthly costs per LUE connection are not appreciable among the various alternatives. Probably the most effective approach would be to implement one of the smaller-scale options initially in order to obtain wastewater service for the downtown central business district and adjacent commercial areas and the Wimberley ISD schools. This system then could be expanded to other areas over time.

9.0 WATER CONSERVATION AND DROUGHT CONTINGENCY PLANS

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The Wimberley Water Supply Corporation (WSC), which supplies water to those

residential and commercial users in the planning area that are not in the Woodcreek Utilities service area, has adopted a Drought Contingency Plan that generally conforms to the recommended Drought Contingency Plan presented herein. The Wimberley WSC does not have a Water Conservation Plan, and it is recommended that the draft Water Conservation Plan presented in this planning report be adopted by local water purveyors in the planning area.

9.3 WATER CONSERVATION PLAN

The Water Conservation Plan addresses all aspects of water conservation, including public information and education, water conserving plumbing codes, water conservation retrofit programs, water conservation-oriented rate structures, universal metering and meter repair and replacement, water conserving landscaping, leak detection and water audits, and wastewater reuse and recycling. The following is a summary of each of these items.

9.3.1 Public Information And Education

Water conservation practices will be promoted by informing the public of methods to conserve water. Information and educational programs that are on-going and will be incorporated into this plan include distribution of educational packages developed by the State and GBRA through area schools and posting of information sources for available water conservation literature (see Addendum A). Information pertaining to water conservation techniques also can be made available to customers every month as part of the billing process (bill stuffers and fliers), as well as, to new customers who are tying into the system.

The overall public education effort will be divided into three segments: a first-year program, a long-term program, and a new customer program.

First-Year Program - the first-year program will include the distribution of educational material, including brochures and newsletters or news releases, to initially explain the program. Material will be provided at least two times during this first year. This initial effort will be followed by helpful hints on ways to save water inside and outside the home (see Addendum B).

Long-Term Program - the long-term program will include news releases to provide information on water conserving practices. Mail outs will be utilized during extremely stressful periods.

New Customer Program - all new customers will be informed of the water conservation program by a special information packet or document. The packet will describe the conservation program and explain its goals and solicit the help and participation of the new customers.

9.3.2 Water Conserving Plumbing Codes

The use of water saving fixtures will be required for all new construction and for replacement of plumbing in existing structures (remodeling). Following is a summary of the standards required for residential and commercial fixtures.

Toilets:	The maximum use will not exceed 2.2 gallons of water per flush.
Flush toilets:	The maximum use will not exceed 2.0 gallons of water per flush.
Tank-type urinal:	The maximum use will not exceed 1.6 gallons of water per flush.
Flush valve urinal:	The maximum use will not exceed 1.6 gallons of water per flush.
Shower Head:	The maximum use will not exceed 2.75 gallons of water per minute.
Faucets:	The maximum use will not exceed 2.2 gallons of water minute.
Hot Water Piping:	All hot water lines will be insulated.
Swimming Pools:	New pools must have recirculation filtration equipment.
Drinking Water Fountains:	Must be self-closing.

9.3.3 Water Conservation Retrofit Program

Retrofit of existing plumbing fixtures will be accomplished through the voluntary efforts of individual water users for their homes and businesses.

9.3.4 Water Conservation-Oriented Rate Structure

The rate charged customers for water supply and delivery can have an important influence on water use. Rate changes may be implemented to establish an increasing block rate structure to incourage reductions in water use.

9.3.5 Universal Metering and Meter Repair and Replacement

All water service connections should be metered. A schedule for testing meters is established as follows:

Production, master meters or meters greater than 1.5"	Test once per year
Meters larger than 1" up to 1.5"	Test once every three years
Meters 1" or less	Test once every ten years

9.3.6 Water Conserving Landscaping

Water conserving landscaping practices will be initiated through public information and educational programs. Builders, developers, nurseries and other businesses involved in outdoor landscaping will be encouraged to provide products that conserve water.

9.3.7 Leak Detection and Water Audits

The existing water supply system currently has a leak detection program which will be maintained. The program includes:

- Identification of high water use areas and potential leaks based on monthly water use accounting by the billing computer and readings from master meters.
- Constant monitoring of meters and storage tanks in order to identify major watermain breaks.
- Visual inspections by meter readers and system employees to provide a constant watch for abnormal conditions indicating leaks.
- An adequate maintenance staff which is available to repair any leaks.

9.3.8 Recycling and Reuse

There are no customers at this time that would be able to recycle water.

9.5.9 Means of Implementation and Enforcement

The Water Conservation Plan will be voluntary and will be implemented and enforced (though compliance is encouraged) by the following methods:

- Service tap applicants will be encouraged to utilize water conservation plumbing fixtures. Water system staff will be used to encourage the installation of water saving plumbing devices in new buildings.

- The rate structure will encourage retrofitting of old plumbing fixtures which are using large amounts of water.

- Adoption of new plumbing regulations regarding water conserving plumbing fixtures will be strongly considered.

9.3.10 Annual Reporting

Annual reports will be made to the Texas Water Development Board within 60 days of the anniversary date of the loan closing throughout the life of the loan. The report will include the water conservation activities during the previous year relative to this plan and will include:

- Progress made in the implementation of the program

- Public response

- Effectiveness of plan in reducing water use

9.4 DROUGHT CONTINGENCY PLAN

Droughts and other uncontrollable circumstances can disrupt the normal availability of water supplies. During drought periods, consumer demand is typically higher than under normal conditions. The lack of adequate system treatment and storage and distribution system failures can also present emergency water demand and management situations.

It is important to distinguish drought contingency planning from water conservation planning. While water conservation involves implementing permanent water use efficiency and/or reuse practices, drought contingency planning establishes temporary methods or techniques designed to be used only as long as the emergency exists.

The key elements of the Drought Contingency Plan are identified and described in the following sections.

9.4.1 Drought Trigger Conditions

Mild Drought - Mild drought conditions and contingency measures will be in effect when the daily water use equals or exceeds 90% of treatment or pumping capacity for three (3) consecutive days.

Moderate Drought - Moderate drought conditions and contingencies will be in effect when the daily water use equals or exceeds 95% of treatment or pumping capacity for three (3) consecutive days.

Severe Drought - Severe drought or system limitation conditions will be in effect when daily use equals or exceeds 110% of treatment or pumping capacity for three (3) consecutive days or if failure of any system component results in diminished treatment or distribution capacity.

Critical Conditions - Critical drought or system limitation conditions will be in effect when the public water supply is not dependable and/or may not be suitable for human consumption because of natural or other disasters.

9.4.2 Drought Contingency Measures

Mild Condition - Under mild drought conditions, the citizens will be notified that a trigger condition has been reached and will be asked to reduce water use and to otherwise conserve water.

Moderate Drought - Citizens will be asked to continue implementation of water conservation measures. In addition, a mandatory lawn watering schedule will be publicized. The mandatory lawn watering schedule will permit watering only between the hours of 8 pm and 10 am.

Severe Drought - Outside water use, which includes car washing, window washing and pavement washing, will not be permitted except when a bucket is used. A mandatory lawn watering schedule will be implemented. Watering will occur only between the hours of 8 pm and 10 am.

Critical Conditions - All uses of the public water supply will be banned except in cases of emergency.

9.4.3 Education and Information

The purpose and desired effects of the Drought Contingency Plan will be communicated to the public through articles in local newspapers and supplemented by pamphlets and notices. When trigger conditions appear to be approaching, the public will be notified through publication of articles in local newspapers, with information on water conserving methods.

Throughout the duration of drought contingency measure implementation, regular articles will appear to explain and educate the public on the purpose, cause and methods of conservation for that condition.

9.4.4 Initiation Procedures

Prior to formal notification of a drought condition, a statement will be issued to all media sources warning that a potential drought condition is approaching. Once a trigger condition is reached, a formal notification will be made that a particular drought condition is in effect.

9.4.5 Termination Notification

Termination of the drought contingency measures will take place when the trigger conditions which initiated the contingency measures have subsided. The news media will be notified that the emergency condition has passed.

9.4.6 Means of Implementation

The Drought Contingency Plan will be implemented through a resolution by the appropriate legal entity.

Addendum A

Water Conservation Literature

Single copies of all of Water Conservation publications and materials can be obtained at no charge. Larger quantities can be obtained through special arrangement or at the cost of printing. To make a request, write: CONSERVATION, Texas Water Development Board, Capitol Station, Austin, Texas 78711-3231. Examples of available literature include: agricultural conservation, municipal conservation, water resource planning, and audio visuals.

Addendum B

Water Saving Methods That Can Be Practiced By The Individual Water User

In-home water use accounts for an average of 65 percent of total residential use, while the remaining 35 percent is used for exterior residential purposes such as lawn watering and car washing. Average residential in-home water use data indicate that about 40 percent is used for toilet flushing, 35 percent for bathing, 11 percent for kitchen uses, and 14 percent for clothes washing. Water saving methods that can be practiced by the individual water user are listed below.

A. BATHROOM

1. Take a shower instead of filling the tub and taking a bath. Showers usually use less water than tub baths.

2. Install a low-flow shower head which restricts the quantity of flow at 60 psi to no more than 3.0 gallons per minute.

3. Take short showers and install a cutoff valve or turn the water off while soaping and back on again only to rinse.

4. Do not use hot water when cold will do. Water and energy can be saved by washing hands with soap and cold water. Hot water should only be added when hands are especially dirty.

5. Reduce the level of the water being used in a bath tub by one or two inches if a shower is not available.

6. Turn water off when brushing teeth until it is time to rinse.

7. Do not let water run when washing hands. Instead, hands should be wet and water should be turned off while soaping and scrubbing and turned on again to rinse. A cutoff valve may also be installed on the faucet.

8. Shampoo hair in the shower. Shampooing in the shower takes only a little more water than is used to shampoo hair during a bath and much less than shampooing and bathing separately.

9. Hold hot water in the basin when shaving instead of letting the faucet continue to run.

10. Test toilets for leaks. To test for a leak, a few drops of food coloring can be added to the water in the tank. The toilet should not be flushed. The customer can then watch to see if the coloring appears in the bowl within a few minutes. If it does, the fixture needs adjustment or repair.

11. Use a toilet tank displacement device. A one-gallon plastic milk bottle can be filled with stones or with water, recapped, and placed in the toilet tank. This will reduce the amount of water in the tank but still providing enough for flushing. (Bricks which some people use for this purpose are not recommended since they crumble eventually and could damage

the working mechanism, necessitating a call to the plumber).

12. Install faucet aerators to reduce water consumption.

13. Never use the toilet to dispose of cleaning tissues, cigarette butts, or other trash. This can waste a great deal of water and also places an unnecessary load the sewage treatment plant or septic tank.

14. Install a new low-volume flush toilet that uses 3.5 gallons or less per flush when building a new home or remodeling a bathroom.

B. KITCHEN

1. Use a pan of water (or place a stopper in the sink) for rinsing pots and pans and cooking implements when cooking rather than turning on the water faucet each time a rinse is needed.

2. Never run the dishwasher without a full load. In addition to saving water, expensive detergent will last longer and a significant energy saving will appear on the utility bill.

3. Use the sink disposal sparingly, and never use it for just a few scraps.

4. Keep a container of drinking water in the refrigerator. Running water from the tap until it is cool is wasteful. Better still, both water and energy can be saved by keeping cold water in a picnic jug on a kitchen counter to avoid opening the refrigerator door frequently.

5. Use a small pan of cold water when cleaning vegetables rather than letting the faucet run.

6. Use only a little water in the pot and put a lid on it for cooking most food. Not only does this method save water, but food is more nutritious since vitamins and minerals are not poured down the drain with the extra cooking water.

7. Use a pan of water for rinsing when hand washing dishes rather than a running faucet.

8. Always keep water conservation in mind, and think of other ways to save in the kitchen. Small kitchen savings from not making too much coffee or letting ice cubes melt in a sink can add up in a year's time.

C. LAUNDRY

1. Wash only a full load when using an automatic washing machine (32 to 59 gallons are required per load).

2. Use the lowest water level setting on the washing machine for light loads whenever possible.

3. Use cold water as often as possible to save energy and to conserve the hot water for uses which cold water cannot serve. (This is also better for clothing made of today's synthetic fabrics.)

D. APPLIANCES AND PLUMBING

1. Check water requirements of various models and brands when considering purchasing any new appliance that uses water. Some use less water than others.

2. Check all water line connections and faucets for leaks. If the cost of water is $1.00 per 1,000 gallons, one could be paying a large bill for water that simply goes down the drain because of leakage. A slow drip can waste as much as 170 gallons of water EACH DAY, or 5,000 gallons per month, and can add as much as $10.00 per month to the water bill.

3. Learn to replace faucet washers so that drips can be corrected promptly. It is easy to do, costs very little, and can represent a substantial amount save in plumbing and water bills.

4. Check for water leakage that the customer may be entirely unaware of, such as a leak between the water meter and the house. To check, all indoor and outdoor faucets should be turned off, and the water meter should be checked. If it continues to run or turn, a leak probably exists and needs to be located.

5. Insulate all hot water pipes to avoid the delays (and wasted water) experience while waiting for the water to "run hot".

6. Be sure the hot water heater thermostat is not set high. Extremely hot setting waste water and energy because the water often has to be cooled with cold water before it can be used.

7. Use a moisture meter to determine when house plants need water. More plants die from over-watering than from being too dry.

E. OUT-OF-DOOR USES

1. Water lawns early in the morning during the hotter summer months. Much of the water used on the lawn can simply evaporate between the sprinkler and the grass.

2. Use a sprinkler that produces large drops of water, rather than a fine mist, to avoid evaporation.

3. Turn soaker hoses so the holes are on the bottom to avoid evaporation.

4. Water slowly for better absorption, and never water on windy days.

5. Forget about watering the street or walks or driveways. They will never grow a thing.

6. Condition the soil with compost before planting grass or flower beds so that water will soak in rather than run off.

7. Fertilize lawns at least twice a year for root stimulation. Grass with a good root system makes better use of less water.

8. Learn to know when grass needs watering. If it has turned a dull grey-green or if footprints remain visible. It is time to water.

9. Not water too frequently. Too much water can overload the soil so that air cannot get to the roots and can encourage plant diseases.

10. Not over-water. Soil can absorb only so much moisture and the rest simply runs off. A timer will help, and either a kitchen timer or an alarm clock will do. An inch and one-half of water applied once a week will keep most Texas grasses alive and healthy.

11. Operate automatic sprinkler systems only when the demand on the town's water supply is lowest. Set the system to operate between four and six a.m.

12. Not scalp lawns when mowing during hot weather. Taller grass holds moisture better. Rather, grass should be cut fairly often, so that only 1/2 to 3/4 inch is trimmed off. A better looking lawn will result.

13. Use a watering can or hand water with the hose in small areas of the lawn that need more frequent watering (those near walks or driveways or in especially hot, sunny spots.)

14. Learn what types of grass, shrubbery, and plants do best in the area and in which parts of the lawn, and then plant accordingly. If one has a heavily shaded yard, no amount of water will make roses bloom. In especially dry sections of the state, attractive arrangements of plants that are adapted to arid or semi-arid climates should be chosen.

15. Consider decorating areas of the lawn with rocks, gravel, wood chips, or other materials now available that require no water at all.

16. Not "sweep" walks and driveways with the hose. Use a broom or rake instead.

17. Use a bucket of soapy water and use the hose only for rinsing when washing the car.

APPENDIX

COPIES OF MEDIA COVERAGE

Wimberley View - July 20

County addresses on-site wastewater

By Harrell King
Staff Writer

Hays County Commissioners Monday addressed a problem they had been waiting approximately two years for the State of Texas to resolve. The issue involved regulations dealing with the proper installation, maintenance and discharge of on-site wastewater systems.

The issue was brought to the attention of the court by Director Allan Walthers, of the Environmental Health Department who told commissioners it was time to stop waiting for the Texas Natural Resource Conservation Commission (TNRCC) to finish revising its regulations. That process could take another year or longer, he explained.

Meanwhile, the director and commissioners agreed the county's regulatory system needed an overhaul.

Walthers said he was seeing the introduction of a number of new types of wastewater systems, designed by professionals. The nature of these designs could affect the way in which the county has traditionally looked at small lot sizes for home sites.

Revising the regulations would also provide an opportunity to address sites over the recharge zone. The county also could encourage certain types of fine treatment through the development of new rules.

Precinct 2 Commissioner Jeff Barton agreed, "There are things we can do to enhance our position in negotiating with agencies such as the EPA."

With the recent increase in environmental action through the Endangered Species Act and the Outstanding National Resource Waters proposal, Hays County Judge Eddy Etheredge said the issues "brought home some shortcomings that we have."

He added, "We're going to have to take a little different view of how the Health Department treats septic systems."

The judge also acknowledged that the county could not make much headway with federal agencies if they told them Hays County could take care of its own problems "and then we turn around and ignore the problem."

In negotiating over federal regulation of local areas, Etheredge said county officials would only be taken seriously if they provide alternatives to ONRW's. This could be done by "keeping our rules current and strict."

Perhaps seeking to enlist the aid of local school districts in holding off such federal intervention, Etheredge said if the imposition of the proposed non-degradation standards were to lower property values, "it will also affect school districts."

Moving specifically back to the subject of wastewater, commissioners discussed some additional options if new design and technology were recognized.

By setting specific standards, the county could encourage some actions, deemed as desirable, and discourage others.

Among those which could be encouraged, if the proper standards were in place, were cluster developments with contained or planned open spaces for more efficient land use.

Barton suggested that such plans might be "more effective if we let the market dictate that." He did acknowledge the possibility of creating incentives for more efficient systems and land use by "knocking down bureaucratic barriers."

Discussion included the possibility of developing a regional wastewater system, though it was agreed that no funding was available from CAPCO.

The ONRW once again creeped back into the discussion, as Etheredge told commissioners if the designation were implemented "we would be prohibited from collective systems which would have any kind of discharge."

Walthers said most agencies, at every level of government favor subsurface discharge.

Commissioners asked Walthers to begin working on a draft revision of wastewater regulations in preparation for a detailed workshop on the subject.

They also asked him to prepare an instructional program for the court, to bring them up to speed on the different types of systems available, both innovative and conventional.

Day's use approaches 1 million gallons

Water use at record high as wells go dry

By DB Bearden
Staff Writer

Water usage at the Wimberley Water Supply reached an all time high with 982,000 gallons recorded on Sunday. The reading was for the previous days use so last Saturday Wimberley residents were doing everything they could to keep cool or to keep their yards green. Water utility manager Lanny Montague issued a warning last week that the community must voluntarily limit outside watering to once every five days.

Montague said, "Daily usage should be limited to drinking, cooking and bathrooms. If this doesn't work, we'll have to put a total ban on all outside watering.

An audit of Wimberley Water Supply daily usage since May indicates that water use has doubled or tripled. On Sunday May 1 a total of 378,000 gallons were recorded from the previous days usage. One week later usage leaped to 448,000 gallons. By the last Sunday in May usage recorded had increased to 568,000 gallons.

During the month of June usage crept up to breach the 600,000 gallon mark and then on July 5, 871,000 holiday gallons were recorded.

The box above shows the most recent week's water usage that is averaging almost 870,000 gallons a day.

There have been reports of many water wells in Wimberley going dry. Montague said they have added 63 feet of pipe to one well to keep the pump below the water line.

On Monday the Barton Springs/Edwards Aquifer Conservation District issued a Drought Alarm due to dropping water levels and a forecast for continued hot, dry weather. Board president Patrick Cox said, "Water levels in key monitor wells have dropped below the established trigger points and have remained there for at least 14 days."

Persons holding pumping permits from the district are required to begin conservation measures with a goal of a 20 percent reduction in monthly water use. The district has been under a Drought Alert since August 1993.

According to the conservation district water levels in some locations in western Hays County are approaching lows last seen in the drought of the 1950s.

Wimberley Water Supply Well Pumpage

Date of reading	gallons
Thursday July 21	782,000
Friday July 22	815,000
Saturday July 23	872,000
Sunday July 24	982,000
Monday July 25	955,000
Tuesday July 26	818,000

County okays GBRA attempt at regional wastewater study

By Harrell King
Staff Writer

Addressing the Hays County Commissioners Court Monday, Precinct 3 Commissioner Craig Payne said, "As most of us are aware, Wimberley, the City of Woodcreek and the school district in Wimberley... all of us have some sort of sewer problems."

He said Wimberley has had these problems for years. In addition, the City of Woodcreek is overloaded and the school district is having problems dealing with growth in the area, Payne related.

In an effort to encourage the finding of a solution to these problems, Payne suggested that the court compose a letter of support, acknowledging the need for regional wastewater study.

The letter would accompany a grant request by the Guadalupe/Blanco River Authority (GBRA) to the Texas Water Development Board. "This is actually going to be just a letter of support and sponsorship for this application by GBRA," Payne emphasized.

Additional letters of support would be forthcoming from the City of Woodcreek and the Wimberley Independent School District, the commissioner added.

With Payne's motion receiving a second from County Judge Eddy Etheredge, approval was unanimous.

Payne said he would be drafting the letter immediately and would release additional information once it was complete.

Wastewater treatment object of future study

By DB Bearden
Holly Media Group

"We're one of the players making a proposal," said David Welch, Director of Planning and Development for the Guadalupe Blanco River Authority.

After months of discussion by the Wimberley Study Group about water quality problems facing the community, the GBRA is looking at alternatives and making cost estimates for developing a regional waste water treatment plant for the Wimberley Valley.

"Wimberley is a challenge due to the soil conditions and because it is a growing area with new people moving in, you need some form of wastewater treatment. We're trying to see what kind of facility is feasible there," said Welch.

Welch said that while GBRA does operate wastewater treatment plants elsewhere, a facility in Wimberley could be operated by a Municipal Utility District or a Water Conservation and Improvement District as well.

"We have had some experience. We operate four rural plants at Canyon Lake, Lake Dunlap, Northcliff and Springs Hill. In addition we have operated a large plant in Victoria since 1972 and will be building a new one at Lockhart," he said.

Development in Wimberley has been restricted by county health officials who are reluctant to permit new septic systems. In addition the Wimberley school district and Woodcreek Utilities have systems that have been declared beyond their permitted capacity.

Welch said that the GBRA was involved in discussions with the City of San Marcos, which is seeking a new permit for its wastewater treatment plant. The San Marcos River Foundation is asking the city to reduce

See GBRA, page 9

the amount of pollutants released into the river beyond what they have requested. San Marcos is currently permitted at 20-20 — Biological Oxygen Demand and Total Suspended Solids.

While the treatment level is determined by the stream and it is difficult to compare treatment permits, Welch cited the following permits for GBRA operated plants: Dunlap — 10-15; Springshill — 2.5-3; Northcrest — 20-2.5; and Canyon Park — 10-15.

Plans underway for a possible Wimberley plant involve meetings at the Water Development Board to develop a study grant. Welch said the grant proposal would be completed and submitted in the next two weeks. He said a population study with an ability to pay analysis plus a system cost and design would be included. He said there is a lot of support for the study from the people in Wimberley.

Mayor of Woodcreek Jeannine Pool said she had attended meetings at the Water Development Board but that the City of Woodcreek has not discussed participation in a regional wastewater treatment plant. The council has discussed possible purchase of Woodcreek Utilities from the resort.

The GBRA is looking at all of Hays County. "There are a lot of small communities that need water," said Welch.

The GBRA recently participated in the discussions that might lead to the purchase of Blue Hole by the Texas Nature Conservancy. The river authority operates parks in locations where there is compatibility for recreation and dedication. In Seguin they operate Nolte Island in conjunction with a power plant and at Cleto Creek there is a cooling pond with 3,100 surface acres and a dam that is also used for recreation.

Welch said the river authority would probably not be interested in acquiring park land that is not in conjunction with a utility service.

Wimberley View – Saturday, October 22, 1994

Texas Water Board awards grant for wastewater plan

By Harrell King
View Staff

An effort initiated one and a half years ago, involving an examination of surface and well water problems in the Wimberley area, Thursday culminated with a grant award to the Guadalupe-Blanco River Authority (GBRA) in the amount of $43,785. The grant, awarded by the Texas Water Development Board (TWDB), was approved "to develop a comprehensive regional wastewater planning and management program to protect Wimberley's resources by preventing continued deterioration of land and water quality," according to a press release.

At a total cost of $87,570, the balance of project funding will be shared by GBRA, Hays County and the Wimberley Study Group. Much of the financing by the various entities, in addition to cash funds, will involve 'in-kind services,' which are tasks performed by the personnel, consulting agencies and/or equipment of the individuals organizations.

Matching funds will be provided by GBRA, at the level of $15,000, and Hays County, with a contribution of $1,985.

According to the grant application, filed by GBRA the responsibility "for the overall administrative and fiscal management of the project, including coordination of the various technical activities undertaken by the different study participants."

"I'm just super delighted," said Jene Williams, chairperson of the Wimberley Study Group. "We've been moving in this direction every since that first meeting," held in August, 1993. David Welsh, with TWDB said the "fairly comprehensive study" will be coordinated on a local level with Williams.

The group met in August with Carolyn Briton, head of the regional planning division of the TWDB to coordinate the funding request. Present at the meeting were WISD Superintendent of Schools Vernon Newsom, Eddie Gumbert, City of Woodcreek Mayor Jeanine Pool and Tony McGee.

When contacted Thursday, Hays County Commissioner Craig Payne said, "I'm very happy about it." However, he noted that the performance of the study was "the tip of the iceberg." By way of the study, the community would need to "look at and digest the overall environmental financial impacts."

Completion of the study was estimated at approximately one year.

Wimberley View - October 26, 1994

Wastewater study spurred by Wimberley area growth

By Harrell King
View Staff

With nearly every community in the central Texas area wrestling with what many are calling uncontrollable growth, it should come as no surprise that the Wimberley community is no immune.

Organizing an effort one and a half years ago, concerned citizens in the Wimberley area sought out a method with which they could examine problems connected with surface and well water.

With the awarding of a grant last week by the Texas Water Development Board, those who helped to initiate the drive for assistance reveled in the fruition of their goals.

The result of an application by the Guadalupe-Blanco River Authority, the grant will provide $43,875 for the primary funding of the study.

Matching funds were prov ided by GBRA and Hays County, totaling $1,685. In kind services will be provided by each participating group, with the GBRA providing the majority, Hays County about half of that amount and the Wimberley Citizens Group matching the county.

Local participation will be primarily in the form of coordination and information compiling.

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Completion of the study was estimated at approximately one year.

According to the application submitted by the GBRA, the need for the funding assistance is based on the fact that "no single governmental entity exists with the authority or resources for planning, implementing, funding or operating an overall wastewater management program that can effectively address present and future water pollution problems throughout the area."

The planning is needed, according to the proposal, because "The wimberley Region has grown so rapidly over the past two decades."

The environmentally sensitive nature of its rural terrain has "undergone significant physical change and experienced a variety of adverse impacts."

As a result of the population growth, due to a "spillover from the high-tech development along the I-35 Corridor," the absence of organizational management and planning and the "reluctance of local residents to submit themselves to local governmental planning and regulatory restrictions," serious problems with water and land resources in the area have occurred.

The planning will focus on overall wastewater facility and water pollution control needs.

11-30-94 Austin-American

County quits negotiations to purchase the Blue Hole

Officials say $2 million price for swim area too high

By Zeke MacCormack
American-Statesman Staff

WIMBERLEY

Sticker shock prompted Hays County to drop negotiations for the purchase of the Blue Hole, a favorite swimming hole considered for use as a county park.

The 125-acre parcel along Cypress Creek is now being considered for use as a mobile home park, said Kirby Perry, general partner for Blue Hole Management Ltd.

He said the asking price is $2 million for the property off RM 3237 near Wimberley but that it might be leased to mobile home park operators if no sale agreement can be reached.

In negotiations with the county, Perry said, the partners dropped the price to $1.5 million, but the negotiator for the county topped out at $1.1 million.

Commissioners voted last summer to have Jim Fries of the Texas Nature Conservancy negotiate for them.

If terms had been reached, plans called for the Nature Conservancy to buy the property and hold it until funding was available for purchase by the county.

Hays County Judge Eddy Etheredge last week called Blue Hole negotiations "a dead issue."

"They weren't willing to come down (enough), and there was way too much money in between," Etheredge said.

Commissioner Craig Payne, who represents the Wimberley area, agreed with decision not to raise the county's offer, but said, "I wish we could have come to terms because it's an ideal piece of property for a park.

"If it falls into hands of a private developer it could be gone," he said.

The county's proposal to buy the Blue Hole drew mixed reactions from patrons of the swimming hole that has been operated as a private club since Perry's group bought it in 1973.

Perry said that he doubts a mobile home park will be received any more favorably by surrounding property owners but that the partners are intent on generating revenue from the property.

The mobile homes would be on a bluff overlooking the swimming hole area, which would remain open for swimming and camping, Perry said.

He said the property could handle 100 mobile homes, which would be connected to the wastewater treatment plant that currently serves the Deer Creek Nursing Home.

1994 staff file photo

The Blue Hole has been a favorite swimming area for people living in and around Wimberley for years. Hays County officials have pulled out of negotiations to buy the site, saying the asking price was too high.

DAILY RECORD, San Marcos, TX., Tuesday, December 6, 1994

Consultant discusses development options with Hays County officials

By SCOTT MAIER
Staff Reporter

The president of Olson Policy Consulting of California met with the Hays County Commissioners Court Monday to discuss a development plan for the county.

Last month, commissioners hired the environmental planning specialist firm to help create a development plan for the county.

At a cost of $9,000, it will work with local officials and the local community to develop a plan protecting the environment and satisfying federal agencies without infringing on private property rights.

An approach in meeting these objectives is the "Habitat Transaction Method" (HTM), designed by Olson Policy Consulting and its president Todd Olson.

As proposed, conservation credits would be given to landowners who voluntarily conserve land in certain ways. Credits also would be required of landowners developing land.

These created credits then are freely bought and sold, enabling a landowner to conserve habitat and sell the resulting credits to fellow landowners who desire to develop their land.

Further, by paying a certain number of credits, land developers could receive a permit stating requirements of the federal Endangered Species Act and other conservation laws have been satisfied. Other benefits, like density increases, could be given for paying the required credits.

Presently, Olson said San Diego and Riverside counties are undergoing a similar introductory process, while an HTM plan is well along in the development process in Kern County. All three counties are located in California.

"It's important to emphasize this is not a cookie-cutter approach," he said. The program must be designed to meet the specific needs of Hays County, as the resources are different. Water is key to the whole program here, while Kern County has a more land-oriented plan. The philosophy to be applied, though, would be the same.

Following these community meetings, Olson will piece together a proposal suitable for the county. Work would culminate in a 25-30 page discussion paper that would be distributed to the community for public comment probably in late January.

There is no specific plan right now," said Commissioner Jeff Barton. "If and when the proposal is completed and the Court decides to move forward, then I'm sure we'll have numerous public hearings on it."

Beginning Monday night, Olson participated

(See County, page 2)

in small group discussions with landowners, environmentalists, property rights organizations and other stakeholders.

"I think the meetings have been very productive, and I've learned a lot about what people in Hays County want in a plan like this," he said. "...(I)t's clear there's strong local concern over water and quality of life issues, and a plan that focuses on those things rather than relief from federal regulation has received a lot of support."

Some county residents and property rights' groups are concerned about the process being expedited too quickly and involving the use of an out-of-state agency.

Moreover, a new plan to help protect endangered species in Central Texas is expected momentarily from Interior Secretary Bruce Babbitt. The centerpiece of the proposal apparently will be a revolving fund for land acquisition.

The U.S. Interior Department plan could be unveiled this month, with its approval coming in the spring.

"The Endangered Species Act is law, and it must be dealt with," said County Judge Eddy Etheredge. "They're going to have to make some decisions regarding endangered species, and those decisions will affect Hays County.

"With that, the intent is to come up with an alternative for locally-generated program to take the place of federal mandates. We've got a lot of work to do, and a fairly short amount of time to get it done."

Further, environmentalists are under some of the sharpest attacks in years from conservatives in Congress, property-rights advocates and commercial interests that see environmental regulation as the enemy of economic growth.

For instance, a growing number of legislators want to toughen risk assessment requirements and protect property owners from intrusive environmental regulations.

"The local community has an interest in endangered species protection if for no other reason than to prevent the federal government from taking over land development from the county," Olson said. "That's been a real problem in California."

"The important thing as a Court is to stay focused on our intentions," Etheredge said. "Those intentions are to put in place a mechanism providing for the protection of endangered species and conservation of our natural resources, while at the same time allowing continued growth to go on in the county without dealing with daily federal bureaucracy."

As a related discussion item, Chuck McKinney made a presentation to the Court concerning the Sustainable Development Workshop conducted Nov. 18-19.

McKinney, workshop coordinator and facilitator, said the two-day event was a great success, and participants would like additional meetings to be scheduled.

"This is one step in a process that could be tremendous for the county," he said. "Everyone's eager to continue what we've started."

One of its goals was to bring together a diversified group of stakeholders. That was reached through the presence of city officials, representatives of chambers of commerce and environmental groups, and others who spoke about a variety of topics affecting the county.

Other goals involved maintaining the county's beauty, improving its quality of life, and projecting its appearance in the year 2025.

In addition, the participants suggested areas of improvement to better facilitate county changes and growth. More accountability by the county is needed, along with the establishment of plans for specific projects and issues. Also, enhanced communication and cooperation was suggested.

1-4-95 Wimberly View

GBRA receives grants from TWDB

GBRA has received approval from the Texas Water Development Board (TWDB) for three grant applications to study water supply and wastewater treatment needs in the Guadalupe River Basin.

TWDB will contribute $20,230 toward a $40,460 grant to fund a cooperative study by GBRA, and Caldwell, Comal, Guadalupe, and Hays Counties. The study will evaluate the benefits of developing and operating a regional wastewater sludge disposal facility. Municipalities currently operating wastewater treatment plants in these areas spend more than $550,000 annually to dispose of sludge byproducts generated by the treatment process. By combining their resources, they can more effectively process and dispose of domestic sludge, utilize new composting techniques, and comply with future disposal and environmental regulations using the most cost-effective procedures.

Another TWDB grant in the amount of $43,785 will fund an $87,570 regional wastewater study of the Village of Wimberley and surrounding areas by GBRA and Hays County. The County is experiencing rapid residential growth, resulting in a large number of new septic tank installations. This study will examine the potential for a regional facility to serve present and future wastewater treatment needs, as well as protect the water resources of Cypress Creek, the Blanco River, and the Edwards Aquifer which underlies much of Hays County.

A $22,000 grant from TWDB will fund a $46,000 feasibility study to plan, construct and operate a regional water treatment facility to benefit rural communities and water systems in the Hays County and San Marcos area. Participating in the study with GBRA are the cities of San Marcos and Kyle, and nine rural water supply corporations. Most of these systems rely totally on groundwater, either from the Edwards Aquifer or from a small aquifer along the San Marcos River. By combining their resources, they can more effectively investigate alternative water sources, additional treatment methods, and address future water supply needs.

The TWDB administers financial assistance funds dedicated to funding water-related or municipal solid waste management projects. Political subdivisions of the state, or nonprofit water supply corporations, may apply for planning grants like those mentioned in this article, to help communities pay the cost of developing regional facility planning feasibility studies for alternative water supply, wastewater treatment, and flood control projects.

March 1, 1995 – Wednesday Wimberley View

Community meeting scheduled

Officials discuss wastewater study

By Harrell King
View Staff

In an effort to keep the local area informed and involved, a community meeting is scheduled for 7 p.m. Thursday at the Chapel in the Hills to allow representatives of the groups participating in the Wimberley Regional Wastewater Planning Study to discuss their interest in the project and how the study will be conducted.

Representing the Texas Water Development Board, David Welch will discuss his organization's interest in clean water and the general management philosophy toward a regional approach. The importance of protecting area rivers and creeks for the future of Wimberley will be explained by David Welch, of the Guadalupe/Blanco River Authority. Bob Brandes, project director of the study will outline the study and explain how the community can participate.

Wimberley View – Saturday, March 4, 1995

Regional wastewater study gathers momentum

By Harrell King
View Staff

Local citizens and representatives of organizations participating in the Regional Wastewater Planning Study for the Wimberley area met Thursday at Chapel in the Hills as a preliminary to initiating the first stage of the project.

Funded by a grant from the Texas Water Development Board, represented at the meeting by Gordon Thorn, the purpose of the study is to develop solutions to problems, both immediate and those associated with future growth, involving regional water and land resources caused by ineffective control of wastewater.

Approximately 35 citizens attended the meeting to discuss not only the goals of the study, but also the role community members will play in the gathering of information on which the final options or proposals will be based.

Representing other organizations involved as participants in the study were Craig Payne, Hays County Commissioner for Precinct 3, David Welsh, of the Guadalupe-Blanco River Authority (GBRA), Mayor Jeanine Pool, of the City of Woodcreek, and Bob Brandes, of R.J. Brandes & Company (an engineering consultant firm hired by GBRA).

In addition to redefining the purpose of the planning study and displaying a map of the study perimeters, officials fielded questions and explained the schedules of events which would lead to a final proposal by the group.

A schedule of 'Stage 1 Activity Assignments' was introduced, which designated the responsibility of the tasks involved in the study to each of the groups.

While overall management and coordination of the project was listed as the responsibility of the GBRA, Brandes' company shouldered the responsibility of organizing the tasks of the study and making assignments to the participants.

Commissioner Payne suggested that those citizens who were interested in participating in the project should check the list of tasks and activities assigned to the community and contact Al Sanders for inclusion in that portion of the process.

While completion of the planning study is not expected until November, Brandes told the audience another meeting was scheduled for early September to assess the information on hand at that time and to begin the formulation of preliminary alternative solutions.

Welsh noted that the quantity of information gathered by late August, including population figures, projections on growth, sources of water supply and septic system totals, would provide a base for the development of a rough draft report. From this report, the group could further refine options and alternatives until a final proposal was developed.

Brandes said several options existed to fund and control whatever plan developed as a result of the study. "I don't think it's going to be an easy problem to solve," he observed. He said the engineering alone presented a stiff challenge.

One member of the audience asked if future growth would be taken into consideration in the project. Brandes noted, "The plan as it evolves has to focus on existing development and existing property... as new development occurs there are opportunities for a developer, for instance, to foot the bill on his portion of the system."

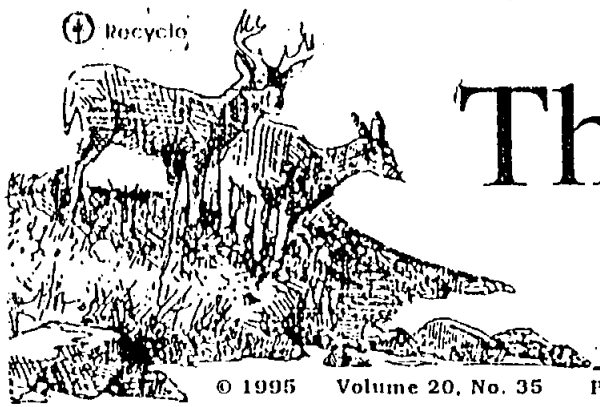
While he did acknowledge growth as an issue, the consultant said he could not imagine the entire study area being serviced by whatever plan resulted from the study. This, he related, was primarily due to the amount of financing available and "what we can afford to do."

Other concerns included whether connection to a area system would be voluntary or if recently purchased independent systems would be required to connect.

Welsh informed the audience that many of those questions would be ironed out in the final stages of the study. Brandes said he did-not think the system would work well if a large number of residents resisted connection.

In consideration of the final proposal, Welsh said structural and non-structural solutions would be explored. Examples of non-structural solutions included regulations, such as expansion of lot size requirements, phosphate bans or pay toilets and 'honeywagons' in high-traffic public areas.

In County Subscriptions: Wednesday or Saturday
Wednesday and Saturday



The Wimberley View

50¢

"A Nice Place To Visit ... A Great Place To Live"

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Wastewater System Options

The Guadalupe Blanco River Authority, the Texas Water Development Board, Brandes engineering consultants, Hays County and the Wimberley volunteer citizen's group will present the wastewater system options for the community that have been developed during the Wimberley Wastewater Planning Study which began early this year. The presentation will be made at a meeting the public is urged to attend at 7:00 p.m. September 7, 1995 at Bowen Intermediate School Cafeteria.

Those attending will be invited to ask questions, make comments and present alternative approaches. These views will be studied before a final recommendation is presented to the public later in September.

GBRA presents initial wastewater study results

By Harrell King
View Staff

Approximately 30 citizens of the Wimberley community were on hand at Bowen Intermediate School Thursday to hear initial results of a wastewater study, sponsored by the Guadalupe-Blanco River Authority (GBRA).

Representing the GBRA, David Welsh explained the steps taken in the study, how the information was categorized and what kind of options the community would be presented with when the final reports were compiled.

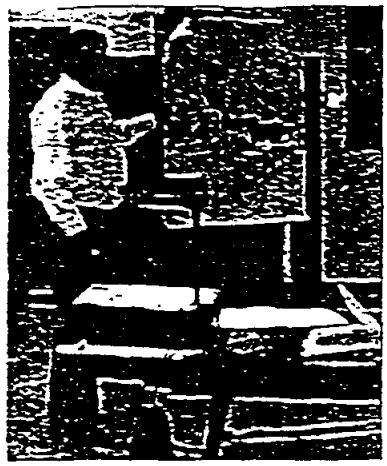
In addition to gathering information about the number of wastewater systems currently in the defined area, Welsh said population played a key role in the study. Current population as well as accurate projections of growth for the next 20 to 25 year were vital keys to planning effective alternatives.

Those alternatives fell into two general categories, the GBRA official said, one involving structural options and the other institutional.

Robert Brandes, an engineering consultant specializing in water resources, explained that structural alternatives also fell into two categories, one involving different types of facilities and the other dealing with rules and regulations.

To determine what type of facilities would be appropriate for the area, Brandes said, "We need to know how much wastewater we're actually dealing with."

Breaking the area down into subsections, the group researched population, estimated at 4,600, and the number and types of structures, including residential and commercial.



Engineer Robert Brandes explained various options available to the Wimberley community for the disposal of wastewater.

Taking into account soil types and terrain, Brandes said the options presented involved both irrigation and discharge for the disposal of treated wastewater. Leased tracts of land would be required for drainage fields if the irrigation method were chosen. The Blanco River, downstream from the densely populated areas, would be used for the discharge method.

Of the two disposal methods, Brandes said the discharge method "has a higher level of treatment."

Examples of the options presented included II-A, servicing the WISD schools, the downtown area and future development of the Blue Hole tract.

The treatment plant for this option would be located near Flite Acres. This method would utilize the discharge method of disposal and handle a capacity of 200,000 gallons per day. Including collection, treatment and administration, total capital cost were estimated at $4.4 million.

Another option, I-D, involved the same area plus the addition of the Woodcreek Utility District, locating the treatment

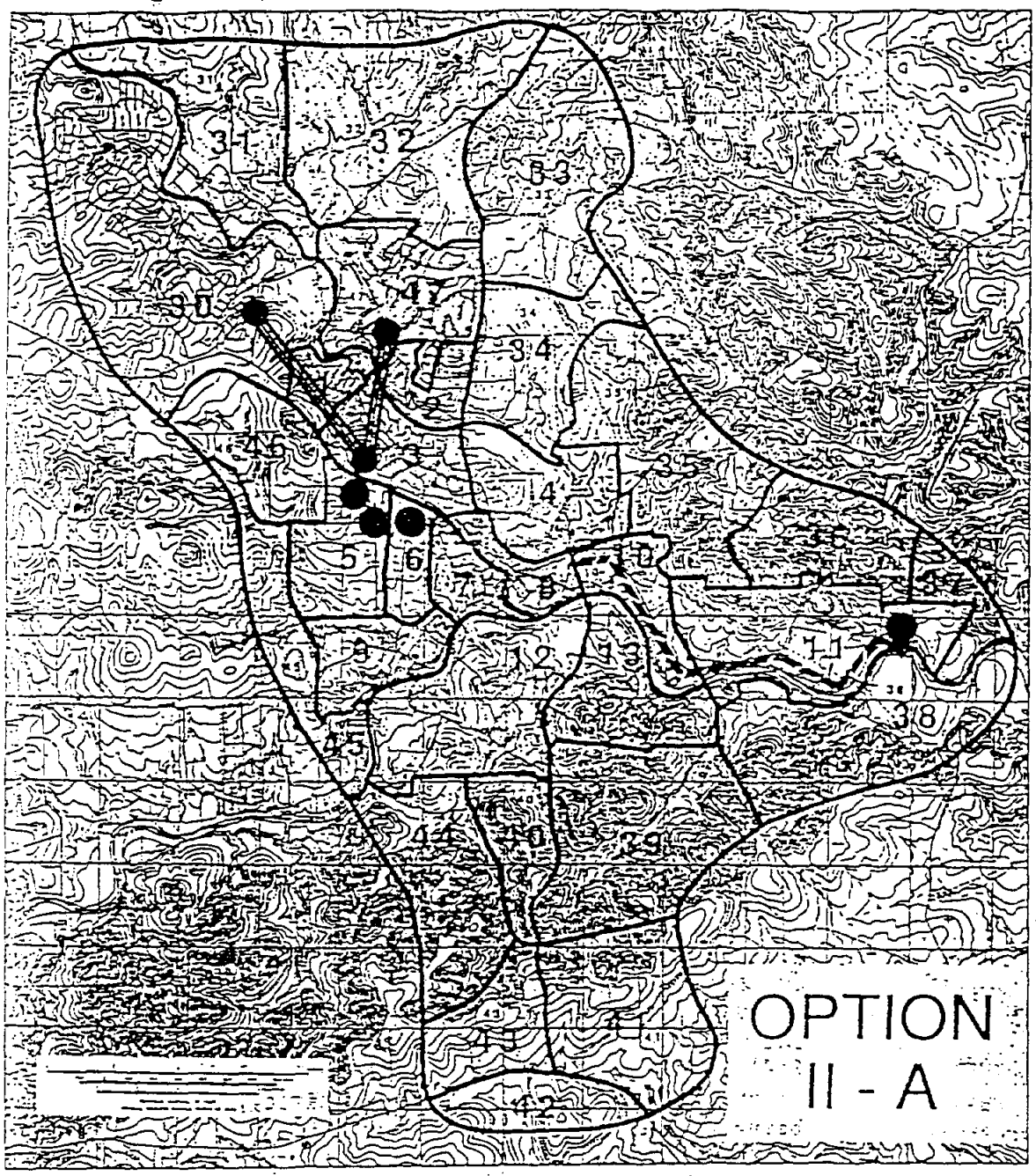
community. In this scenario, the irrigation method would be used, with capacity of 620,000 gallons per day. Total cost was estimated at more than $11 million. (see map, page 8)

Estimating a 30-year financing package, Brandes provided some estimates of monthly payments for service for each connection. For the 10 options presented, estimated payments ranged from a low of $47.32 per month to a high of $91.05.

involved collection, rather than treatment. "It costs you more to pick it and move it, than to treat it," he explained. "You have a lot of hills," he observed.

Informing the audience that "you need something in place so you can achieve financing, Welsh supported attorney Bert Hooper's explaination that one of four types of organizations have to exist to administer the system.

Either an existing or new wa supply corporation, MUD, WC& municipality must administer t wastewater system to comply wi Water Development Board rules.



Wastewater-structural alternatives

As part of a wastewater study of the Wimberley area, sponsored by the Guadalupe-Blanco River Authority, several maps were presented Thursday to illustrate structural alternatives for the disposal of wastewater. This illustration is a combination of two of those maps, provided by Engineer Robert Brandes. The two circles in sections 30 & 47, with lines connecting to section 3, illustrate Option 1-D. Both routes illustrate potential locations for treatment plants, one northwest of Wimberley and the other near Flite Acres, and the collection lines which would supply them.

4-11-95 Austin-Amer

Community at a Crossroads

Rebecca McEntee/AA-S

Dorothy Wimberley Kerbow says the main forces behind the drive to incorporate the community her great-grandfather founded are businesses that don't want to pay for their own sewage system. 'We don't think it's fair for them to expect us to pay for it,' she says.

Wimberley cityhood question resurfaces

BY ENEDELIA J. OBREGÓN
American-Statesman Staff

In the 121 years since Dorothy Wimberley Kerbow's great-grandfather founded the community of Wimberley, no one has paid a dime in city taxes.

Kerbow hopes it will stay that way.

For the third time in 12 years, a campaign is under way to incorporate the town, long known as a summer destination and artists' colony. Proponents have hired a consultant with no ties to the Hays County community southwest of Austin to hear residents' fears and concerns at a series of town meetings that begins next month.

Campbell

Kerbow, perhaps the highest-profile opponent of incorporation efforts in 1984 and 1987, is skeptical.

"This time I'm going to listen and attend (the meetings) to see if they have any — and you can quote me — new tricks," she said.

Although proponents through the years have touted the benefits of incorporation, such as control of land use, residents were suspicious of the messengers, usually business owners and the Wimberley Chamber of Commerce. Opponents have countered that incorporation would benefit only a few business owners, saddling the rest of the community with another layer of

government and more taxes.

This time, however, an advisory committee on incorporation, headed by Wimberley resident and business owner Dave Campbell and Wimberley Chamber of Commerce President Leslie Howe, has hired a firm, Reed Planning Investments of Belton, to help determine whether Wimberley residents are ready to vote on the issue again.

Jim Reed, a community planner, will solicit public comments on the issue in meetings at the Wimberley High School gymnasium at 7 p.m. on Oct. 17, Nov. 20 and Dec. 11. Residents also will be asked whether they think the issue should be put to a vote.

"I don't bring any Wimberley baggage with me," he said. "They get an unbiased product."

To avoid any perception of bias, the meetings will be moderated by the Civitas Project of Southwest Texas State University. The project, funded by a grant from the Texas Commission for the Humanities, allows students to study why many U.S. residents are disenchanted with civic life.

"I keep my mouth shut and let citizens give me their fears, questions, hopes and concerns about the topic of incorporation," said Reed, who also is leading Salado — located about 60 miles north of Austin along Interstate 35 — through a similar process.

As part of the study, Reed will publish a newsletter in the local newspaper or mail it to registered voters in the community. The newsletter will include an unofficial ballot for residents to state their preference on incorporation.

Later, he will present a final report, ballot results and his recommendation on whether to incorporate.

"The ... ballot is not scientific, but it gives me a feel for what citizens want," Reed said. "Sometimes civic leaders want the community to go in a certain direction, but that isn't the direction citizens want."

Wimberley is growing

Hays County Precinct 3 Commissioner Craig Payne said although Wimberley residents have voted against incorporation in the past, the time has come for this scenic hamlet by the Blanco River to incorporate. Payne used $3,200 from his precinct's special project budget to finance Reed's study.

"Times change and demographics change," Payne said. "The county is growing."

And so is Wimberley. When voters in Wimberley went to the polls in 1984, the community had a little more than 2,000 people. It now has about 8,000 residents. Construction is booming and traffic has increased.

More people means more septic tanks. Hays County commissioners, worried about pollution to Cypress Creek and the Blanco River, asked the Guadalupe-Blanco River Authority to study bringing a wastewater system to Wimberley.

Payne said while people complain about county government, they don't want another layer to duplicate services. But county government is limited in its powers to adopt ordinances on land management and planning, he said.

Campbell said that if Reed recommends against voting on incorporation at this time, then the committee will drop the issue. But Campbell said he feels it is time for Wimberley to consider incorporation.

"The other option is to let someone else determine what our environment will be five to 10 years down the road," Campbell said.

Campbell pointed to San Marcos' five-year master plan, which includes annexing the Freeman Ranch, owned by Southwest Texas State University. The ranch lies between Wimberley and San Marcos.

"That will put them two miles from our closest point (in the city) if we incorporate," Campbell said. "That means their (extraterritorial jurisdiction) extends toward us."

"Incorporation will allow us to have ordinances for controlled use of land, improvement of streets and highways and police protection," Campbell said. "If people say we shouldn't incorporate, what do you think it will be like in five years compared to now?"

If Wimberley had been incorporated, Campbell said, the city would have been notified when the Pedernales Electric Cooperative decided to locate a 138,000-volt power line through the community.

Many prefer status quo

But residents like Kerbow may be hard to persuade.

Kerbow said she has opposed incorporation in the past for three reasons:

First, she said, the issue is raised by people who moved to Wimberley because they like the way it is, but then they decide they want to change it.

Second, those who work hardest to incorporate don't live within the boundaries they are drawing up for incorporation, she said.

Third, Kerbow said, the main reason business people and the chamber want to incorporate is so they can get a wastewater system for downtown businesses.

"The (river authority) has offered to build a sewer system for the business area, but they've turned it down," Kerbow said. "That's because the ones that needed the service would have had to pay for it. We don't think it's fair for them to expect us to pay for it."

Kerbow said the septic tanks in place "are working just fine," and residents don't need another taxing entity. The Hays County sheriff's department patrols the area. Residents already have a county government that "spends money and raises taxes beyond reason," she said.

Wimberley Regional Wastewate Planning Study

march -1996

Contract # 95-483-023

The following maps are not attached to this report. may be copied upon request.

Attachment-1 -Planning Area

Attachment-2 -map of Sensitive Natural Features And Cultural And Historical Resources

Please Contact Research and Planning Funds Grant management Division at (512) 463-7926 for copies.