



# Aquifer Storage and Recovery & Aquifer Recharge

Aquifer storage and recovery (ASR) is the use of an aquifer to store water from a different source or location for later use. Aquifer recharge (AR) is the intentional recharge of an aquifer by means of an injection well or other enhanced infiltration. There are more than 200 ASR or AR systems in 27 states across the United States, with one of the largest ASR systems located in San Antonio, Texas.

## ASR or AR in Texas

There are two municipal-scale ASR systems and one municipal-scale hybrid (ASR-AR) system in Texas. The City of Kerrville Plant became operational in 1998 and has two ASR wells and a recovery capacity of about 2.6 million gallons per day. They store surface water from the Guadalupe River in the lower Trinity Aquifer. The ASR facility at the H2Oaks Center, located south of San Antonio, became operational in 2004 and has 29 ASR wells and a recovery capacity of about 60 million gallons per day. They store groundwater from the Edwards Aquifer in the Carrizo-Wilcox Aquifer. The Fred Hervey Water Reclamation Plant in El Paso became operational in 1985 and has a spreading basin, recharge well field with one shallow vadose well, and a down-gradient Hueco Bolson Aquifer production well field. They recharge and store reclaimed water. There are also some smaller scale ASR projects, such as the Ruby Ranch Water Supply Corporation.

Pilot ASR facilities are being tested in Bryan, Buda, Corpus Christi, New Braunfels, and Victoria. AR infrastructure is being operated by the Barton Springs Edwards Aquifer Conservation District and Edwards Aquifer Authority.

## Can I do ASR or AR?

Your ability to use ASR or AR facilities depend on several factors, including: (1) a source of water to store or recharge, (2) an aquifer nearby that is physically able to store your desired volumes, and (3) capacity to treat the source water to ensure it is chemically compatible with the aquifer and does not degrade its quality.

Sources of water to store may include surface water, groundwater, or reclaimed water and may only be available seasonally. Ideally, your candidate aquifer is nearby to reduce pipeline costs. The aquifer must be able to physically receive the volume of water to be stored. Different aquifers can receive different amounts of water and infrastructure will need to be designed to meet the physical capabilities of the aquifer. Less

permeable aquifers or high demand projects may need many wells spread over a larger area to handle the desired volume.

The aquifer doesn't have to be fresh—brackish (and more saline) aquifers are also potential hosts for ASR. Water that is stored underground cannot degrade the native water in the aquifer. Chemical compatibility between the stored water and the aquifer— both the aquifer's water and the host rock— is necessary. Chemically incompatible water could cause clogging or liberate unwanted constituents, such as arsenic, iron, and manganese, into the water. Source water for an ASR or AR facility may need treatment to ensure compatibility with the aquifer and this pretreatment may increase project costs.

## ASR and AR in the State Water Plan

In the 2022 State Water Plan, 10 regional water planning groups (A, C, E, G, H, J, K, L, N, and O) recommend 27 ASR projects and four additional projects with an AR component. These 31 projects include 34 new or expanded well fields or infiltration basins. If implemented, ASR projects could create about 193,000 acre-feet of new water supply per year by decade 2070, constituting about 2.5 percent of all recommended water management strategies.

## State Regulations

Allocation of surface water for ASR was authorized in 1995 by the 74th Texas Legislature with House Bill 1989. In 2015, the 84th Texas Legislature passed House Bill 655 that amended the Texas Water Code to make the statute more conducive to implementing ASR projects. The act provides the Texas Commission on Environmental Quality with exclusive jurisdiction over the regulation and permitting of ASR wells. The act stipulates that groundwater conservation districts cannot require permits for the drilling and operation of aquifer injection or recovery wells for ASR except when the amount of groundwater recovered from the wells is greater than the amount authorized by the Commission.

In May 2016, the Commission adopted rules that amended the following sections in Title 30 of the Texas Administrative Code to incorporate requirements of House Bill 655: public notification for ASR projects (§39.651), source water permitting process (§§295.21, 295.22, 295.202), new definitions (§§297.1, 297.13, 297.19), and requirements of a Class V injection well for ASR projects (§§331.2, 331.7, 331.11, 331.181–331.186).

In 2019, the 86th Texas Legislature passed House Bill 721 directing the Texas Water Development Board (TWDB) to (1) conduct a statewide suitability survey of aquifers for ASR or AR projects, (2) perform studies for ASR or AR projects, (3) work with appropriate interested persons, and (4) share the results of these studies (Texas Water Code §11.155). Also in 2019, House Bill 720 passed allowing for unappropriated water, including stormwater and floodwater, to be appropriated for ASR and AR projects (Texas Water Code §11.023, 11.157, and 11.158).

### Feasibility and Demonstration Projects

The TWDB has supported the development of ASR projects since the early 1990s with feasibility studies and research. For example, we funded early feasibility studies for Kerrville and San Antonio and funded a study on impediments to ASR in Texas. We've provided funding to the Victoria County Groundwater Conservation District, the Edwards Aquifer Authority, and the Corpus Christi Aquifer Storage and Recovery Conservation District to acquire information about local aquifer properties, system design, and system operation and maintenance for possible ASR projects.

Most recently, staff have completed an aquifer characterization study that included geologic mapping and groundwater data collection and are working on a groundwater modeling study. Staff will continue to work with appropriate interested persons to conduct studies that are relevant to ASR and AR projects in Texas

### How We Can Help

Our experts are ready to discuss the potential for ASR or AR in your area. To determine how suitable ASR or AR may be for a specific area in Texas, visit the statewide survey at [www.twdb.texas.gov/innovativewater/asr/projects/Statewide/index.asp](http://www.twdb.texas.gov/innovativewater/asr/projects/Statewide/index.asp).

### More Information

To learn more about the TWDB's aquifer storage, recovery and recharge activities, please visit [www.twdb.texas.gov/innovativewater/asr](http://www.twdb.texas.gov/innovativewater/asr).

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