

10.5 Waco and McLennan County ASR

10.5.1 Description of Option

The concept for the Waco and McLennan County ASR project is to:

- Utilize existing surface water rights in Lake Waco that are owned by the City of Waco (Waco). These water rights total 85,477 acft/yr.
- More fully utilize Waco's water treatment plant (WTP) capacity of 50,400 acft/yr.
- Install new Trinity Aquifer ASR wells that would be located in the vicinity of Waco's distribution system where there is sufficient capacity to deliver additional treated water to the ASR wells. Recovery of the water would be by participant's existing or new water wells at locations other than the ASR wells. This would be an indirectly transferred water from Waco to participants. Unlike traditional ASR projects where the recharged water would be recovered by the same well, the indirect transfer would involve an accounting process within McLennan County where water stored by Waco would be credited to a participant. The participants would pay Waco for the water right, water treatment, water transmission, recharge wells, and associated facilities and operations.
- Operate the recharge cycle of ASR would be from October to May which coincides when there is excess capacity in the Waco's WTP. Recovery could be at any time, but typically would be during the summer when demands are relatively high.

A schematic showing the location of the project is shown in Figure 10.5-1. New facilities required for this option are the ASR wells, well field distribution and collection pipelines and interconnects between the pipeline and ASR well fields.

The projected water supplies for Waco, unconstrained by water treatment capacity, and demands are illustrated in Figure 10.5-2. For purposes of this proposed ASR project, an assumed supply of 1,000 acft/mo would be made available to the ASR project during the months of October to May when Waco's demands are relatively low (see Figure 10.5-3). This 8,000 acft/yr supply is derived from an estimate of excess capacity in the Waco WTP during low water demand months and would not require an expansion of the WTP.

Figure 10.5-1 Location of Waco and McLennan County ASR Project.

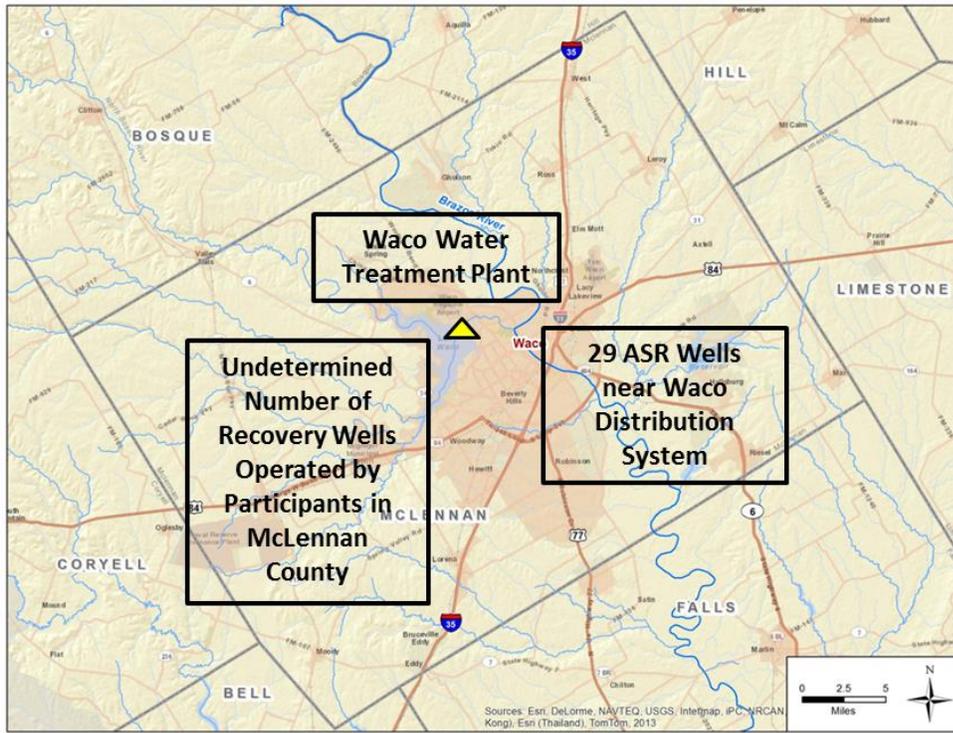


Figure 10.5-2 Water Supplies and Demand for City of Waco

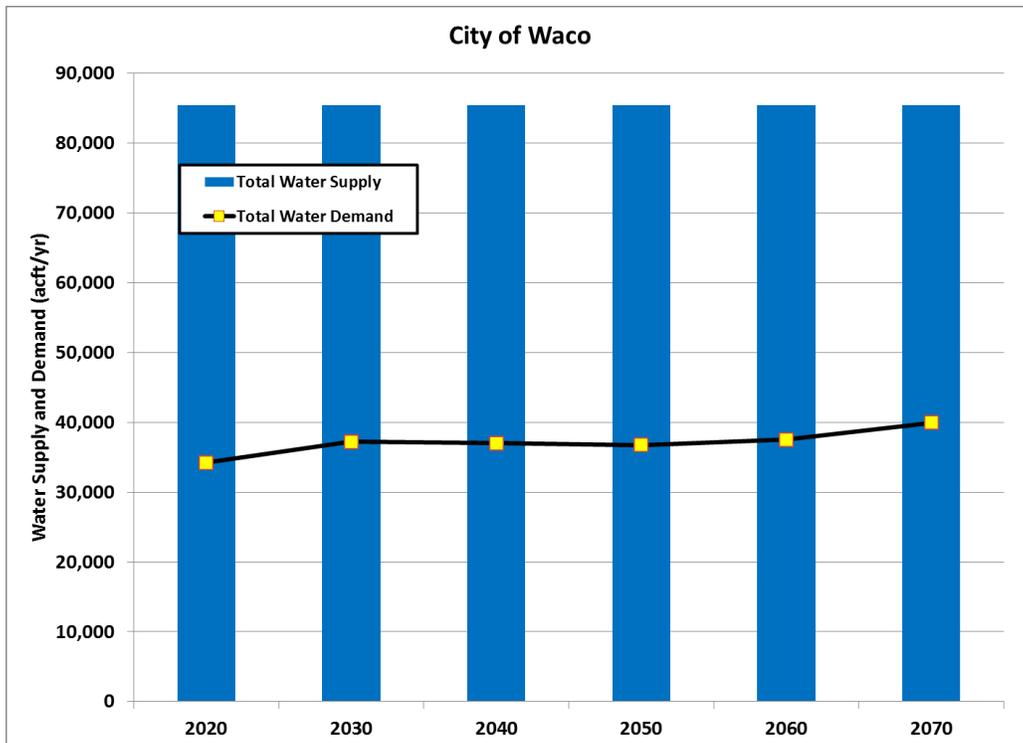
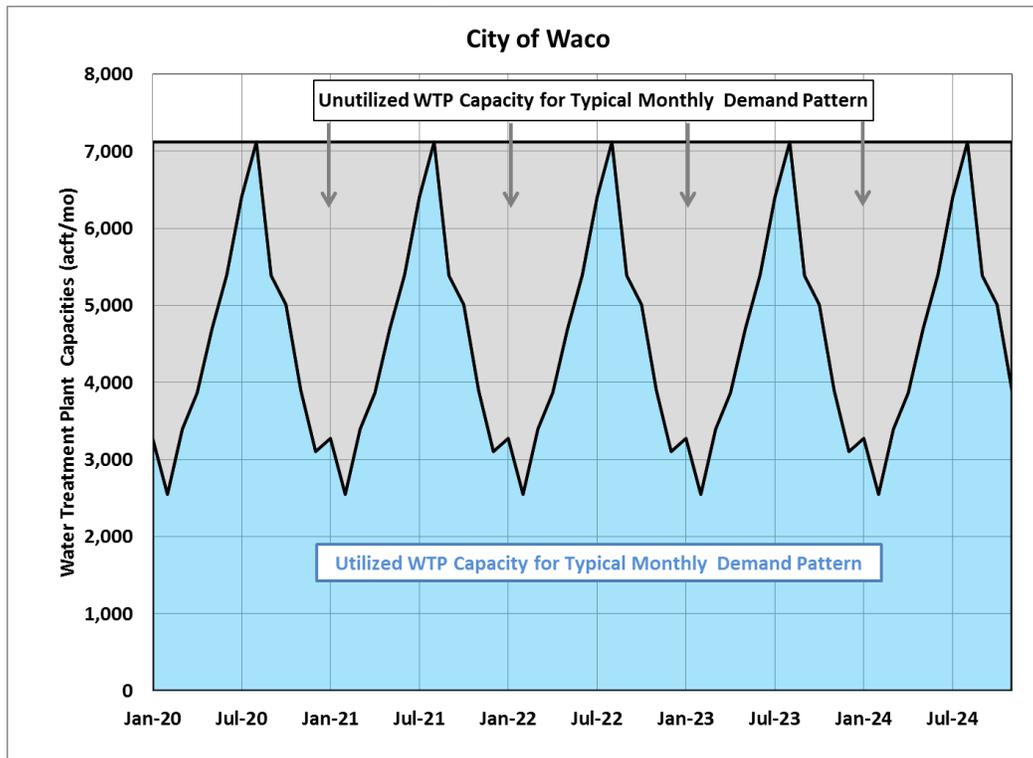


Figure 10.5-3 Water Treatment Capacity and Utilization of Waco’s WTP



10.5.2 Available Yield

In McLennan County, the Trinity Aquifer system is composed of three sandy aquifer units that are confined and separated by nearly impermeable clay units. These aquifer units include, from youngest to oldest: the Paluxy, Hensell, and Hosston. The target unit is the Hosston. In general, the most hydraulically transmissive (i.e., sand-rich) portions of the unit vary from 100-200 feet in thickness and high-capacity production wells typically have yields from 350-450 gpm.

The long-term impact on the Trinity Aquifer is considered to be insignificant on a county-wide basis because the strategy for this project is to balance the recharge and recovery of water. However, there is expected to be local variations in groundwater level changes due to varying locations of recharge and recovery.

10.5.3 Environmental Issues

Environmental issues for the proposed Waco and McLennan County ASR Project are described below. This project includes the development of an ASR well field and additional well field distribution and collection pipelines and interconnects to existing transmission pipelines. Additional wells would need to be developed by individuals intending to utilize the stored water if existing wells are not available. Implementation of this project would require field surveys by qualified professionals to document vegetation/habitat types, waters of the U.S. including wetlands, and cultural resources that may be impacted. Where impacts to protected species habitat or significant cultural resources cannot be avoided, additional studies would be necessary to evaluate habitat use and/or value, or eligibility for inclusion in the National Register of Historic Places,

respectively. The project sponsor would also be required to coordinate with the U.S. Army Corps of Engineers regarding impacts to wetland areas and compensation would be required for unavoidable adverse impacts involving net losses of wetlands.

The pipelines and wells needed for the Waco and McLennan County ASR project well field would occur in close proximity to the Brazos River. Coordination with the U.S. Army Corps of Engineers would be required for construction within any waters of the U.S. Any impacts from this proposed project which would result in a loss of less than 0.5 acres of waters of the U.S. could be covered under Nationwide Permit #12 for Utility Line Activities.

The project occurs within portions of the Central Oklahoma/Texas Plains, Texas Blackland Prairies and Edwards Plateau Ecoregions¹ and lies within the Texan Biotic Province.² Vegetation types within the Waco and McLennan County ASR well field area as described by the Texas Parks and Wildlife Department (TPWD)³ includes crops, and urban areas. The majority of these areas have been developed or disturbed and now include homes, business, and farms. Avoidance of riparian areas near the Brazos River and other relatively undisturbed natural habitats within the well field areas would help minimize potential impacts to existing area species.

Table 10.5-1 lists the state listed endangered or threatened species, and federally listed endangered or threatened species along with species of concern that may occur in McLennan County. This information comes from the county lists of rare species published online by the Texas Parks and Wildlife Department (TPWD). Inclusion in this table does not mean that a species will occur within the project area, but only acknowledges the potential for its occurrence in the project area county.

Because the project will result in an equal exchange of water to the aquifer, no significant impacts to existing stream flows or aquatic species are anticipated. Potential impacts to listed species within the project area are anticipated to include disturbance of existing habitat resulting from the construction of well fields and their associated pipelines. However these disturbances would be minimized by the small areas generally required for well field and pipeline construction. After construction is completed the majority of the disturbed areas will return to their previous habitat condition excluding areas where maintenance activities are required.

A survey of the project area would be required prior to well field and pipeline construction to determine whether populations of or potential habitats used by listed species occur in the area to be affected. Coordination with TPWD and USFWS regarding threatened and endangered species with potential to occur in the project area should be initiated early in project planning.

¹ Griffith Glenn, Sandy Bryce, James Omernik, and Anne Rogers. 2007. Ecoregions of Texas. Texas Commission on Environmental Quality.

² Blair, W. Frank. 1950. The Biotic Provinces of Texas. Texas Journal of Science 2(1):93-117.

³ McMahan, Craig A., Roy G. Frye and Kirby L. Brown. 1984. The Vegetation Types of Texas. Wildlife Division, Texas Parks and Wildlife Department, Austin, Texas.



Table 10.5-1 Endangered, Threatened, and Species of Concern for McLennan County

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
BIRDS					
American peregrine falcon	Falco peregrinus anatum	Resident and local breeder in West Texas. Migrant across the state.	DL	T	Possible Migrant
Arctic peregrine falcon	Falco peregrinus tundrius	Migrant throughout the state.	DL	--	Possible Migrant
Bald eagle	Haliaeetus leucocephalus	Found primarily near rivers and large lakes, migrant.	DL	T	Possible Migrant
Golden-cheeked warbler	Setophaga chrysoparia	Juniper-oak woodlands.	LE	E	Resident
Henslow's sparrow	Ammodramus henslowii	Wintering individuals found in weedy or cut-over areas.	--	--	Possible Migrant
Interior least tern	Sterna antillarum athalassos	Nests along sand and gravel bars in braided streams	LE	E	Resident
Sprague's pipit	Anthus spragueii	Migrant in Texas in winter. Strongly tied to native upland prairie.	C	--	Migrant
Western Burrowing owl	Athene cunicularia hypugaea	Open grasslands, especially prairie, plains and savanna	--	--	Resident
White-faced ibis	Plegadis chihi	Prefers freshwater marshes, sloughs, and irrigated rice fields.	--	T	Resident
Whooping crane	Grus americana	Potential migrant	LE	E	Potential Migrant
FISH					
Guadalupe bass	Micropterus treculii	Endemic to perennial streams of the Edward's Plateau region.	--	--	Resident
Sharptnose shiner	Notropis oxyrinchus	Endemic to Brazos River Drainage. Found in large rivers with a bottom of sand, gravel, and clay-mud.	LE	--	Resident
Smalleye shiner	Notropis buccula	Endemic to upper Brazos River system and its tributaries.	LE	--	Resident
MAMMALS					

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Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
Cave myotis bat	Myotis velifer	Colonial and cave-dwelling species that also roost in rock crevices, old buildings and under bridges.	--	--	Resident
Plains spotted skunk	Spilogale putorius interrupta	Prefers wooded, brushy areas.	--	--	Resident
Red wolf	Canis rufus	Extirpated.	LE	E	Historic Resident
MOLLUSKS					
False spike mussel	Quadrula mitchelli	Possibly extirpated in Texas, probably found in medium to large rivers.	--	T	Historic Resident
Smooth pimpleback	Quadrula houstonensis	Found in small to moderate streams and rivers and moderate size reservoirs.	--	--	Resident
Texas fawnsfoot	Truncilla macrodon	Possibly occurs in rivers and larger streams and is intolerant of impoundment. Brazos and Colorado River basins.	C	T	Resident
REPTILES					
Texas garter snake	Thamnophis sirtalis annectens	Wet or moist microhabitats	--	--	Resident
Texas horned lizard	Phrynosoma cornutum	Varied, sparsely vegetated uplands.	--	T	Resident
Timber rattlesnake	Crotalus horridus	Floodplains, upland pine, deciduous woodlands, riparian zones.	--	T	Resident

LE/LT=Federally Listed Endangered/Threatened

DL, PDL=Federally Delisted/Proposed for Delisting

T/SA=Listed as Threatened by Similarity of Appearance

E, T=State Listed Endangered/Threatened

Blank= Species of concern, but no regulatory listing status

Source: TPWD, 2014. Annotated County List of Rare Species – McLennan County revised 9/4/2014.

Cultural resources protection on public lands in Texas is afforded by the Antiquities Code of Texas (Title 9, Chapter 191, Texas Natural Resource Code of 1977), the National Historic Preservation Act (PL96-515), and the Archeological and Historic Preservation Act (PL93-291).

Based on the review of publically available Geographic Information System (GIS) records obtained from the Texas Historical Commission, there are no State Historic Sites, three National Register Properties, three National Register Districts, 24 cemeteries and 47 Historical Markers within the potential well field area. The National Register Properties and Districts occur within the northwest corner of the well field area within the City of Waco. Avoidance of these cultural resource areas should be possible by careful selection of the areas for well sites and their associated pipelines. A review of archaeological resources in the proposed project area should be conducted during the project planning phase. Because the owner or controller of the project will likely be a political subdivision of the State of Texas (i.e., river authority, municipality, county, etc.), they will be required to coordinate with the Texas Historical Commission prior to project construction

10.5.4 Engineering and Costing

Available records indicate that wells in central McLennan County average between 1,800 and 2,200 feet deep. A typical recharge rate is estimated to be 300 gpm and a recovery rate of 400 gpm. For an 8,000 acft/yr ASR system in McLennan County, 29 ASR wells are required.

The major facilities required for these projects include:

- ASR wells, and
- Interconnect.

Estimates were prepared for capital and project costs, annual debt service, operation and maintenance, power, land, and environmental mitigation. These costs are summarized in Table 10.5-2. The annual costs, including debt service, operation and maintenance, and power, are estimated to be \$752 per acft. The costs do not include any compensation to the City of Waco for use of their surface water right.

**Table 10.5-2 Cost Estimate Summary: McLennan County ASR Project Option
 (Sept 2013 Prices)**

Item	Estimated Costs for Facilities
Well Fields (Wells, Pumps, and Piping)	\$33,253,000
Integration, Relocations, & Other	\$2,900,000
TOTAL COST OF FACILITIES	\$36,153,000
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	\$12,654,000
Environmental & Archaeology Studies and Mitigation	\$0
Interest During Construction (4% for 1 years with a 1% ROI)	\$1,709,000
TOTAL COST OF PROJECT	\$50,516,000
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	\$4,227,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	\$362,000
Water Treatment Plant (2.5% of Cost of Facilities)	\$1,318,000
Pumping Energy Costs	\$110,000
Purchase of Water	\$0
TOTAL ANNUAL COST	\$6,017,000
Available Project Yield (acft/yr), based on a Peaking Factor of 1	8,000
Annual Cost of Water (\$ per acft)	\$752
Annual Cost of Water (\$ per 1,000 gallons)	\$2.31

10.5.5 Implementation

Implementation of the ASR water management strategy for Waco and McLennan County includes the following issues:

- Agreements between Waco and participants;
- Acquiring permits from the McLennan County Groundwater Conservation District;
- Acquiring permits from TCEQ for ASR construction and operations and for storage of surface water in the Trinity Aquifer;
- Chemical and geochemical compatibility of native aquifer water and materials and imported water are chemically compatible;



- Lack of experience to develop confidence in the ability to inject water from an aquifer, which includes the uncertainty about the compatibility of the injected water with native groundwater and aquifer materials and failure of the ASR well;
- Controlling the loss of the injected water to others;
- Initial cost;
- Experience in operating the facilities; and
- Development of a management plan to efficiently use the ASR wells.

This water supply option has been compared to the plan development criteria, as shown in Table 10.5-3, and the option meets each criterion.

Table 10.5-3 Comparison of Bryan ASR Option to Plan Development Criteria

Impact Category	Comment(s)
A. Water Supply	
1. Quantity	1. High
2. Reliability	2. High
3. Cost	3. Moderate
B. Environmental factors	
1. Environmental Water Needs	1. None
2. Habitat	2. None
3. Cultural Resources	3. None
4. Bays and Estuaries	4. None
5. Threatened and Endangered Species	5. Low impact
6. Wetlands	6. None
C. Impact on Other State Water Resources	None
D. Threats to Agriculture and Natural Resources	None
E. Equitable Comparison of Strategies Deemed Feasible	Option is considered in an attempt to meet municipal and industrial shortages
F. Requirements for Interbasin Transfers	Not applicable
G. Third Party Social and Economic Impacts from Voluntary Redistribution	None

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