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Chapter 5B: Evaluation of Potential Feasible, Recommended, and Alternative Water Management Strategies and Projects

2026 Initially Prepared Plan

[Editorial Updates Pending]

Prepared for:

East Texas Regional Water Planning Group

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LIST OF ABBREVIATIONS [PENDING EDITORIAL REVIEW]

ABBREVIATION	DESCRIPTION
AFY	acre-feet
AMWA	Athens Municipal Water Authority
ANRA	Angelina & Neches River Authority
BMPs	best management practices
cfs	cubic feet per second
CWA	Clean Water Act
ETRWPA	East Texas Regional Water Planning Area
ETRWPG	East Texas Regional Water Planning Group
ft	foot
ft/yr	foot per year
GPCPD	gallons per connection per day
GCDs	Groundwater Conservation Districts
GMAs	groundwater management areas
GPCD	gallons per capita daily
LNG	liquefied natural gas
LNVA	Lower Neches Valley Authority
MSA	Metropolitan Statistical Areas
MUD	Municipal Utility District
MWA	Municipal Water Authority
MWP	Major Water Provider
NRCS	National Resources Conservation Service
PC FWSD	Panola County Fresh Water Supply District
RWP	Regional Water Plan
RWPA	Regional Water Planning Area
RWPG	Regional Water Planning Group
SRA	Sabine River Authority
TAC	Texas Administrative Code
TBCD	Trinity Bay Conservation District
TCEQ	Texas Commission on Environmental Quality
TCF	trillion cubic feet
TPWD	Texas Parks and Wildlife Department
TTWP	Trans-Texas Water Program
TWDB	the Texas Water Development Board
UNRMWA	Upper Neches River Municipal Water Authority
USA	United States
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WMSs	Water Management Strategies
WUG	Water User Group
WWP	Wholesale Water Provider

5B EVALUATION OF POTENTIALLY FEASIBLE, RECOMMENDED, AND ALTERNATIVE WATER MANAGEMENT STRATEGIES AND PROJECTS

Water management strategies (WMSs) and water management strategy projects (WMSPs) evaluated for the East Texas Regional Water Planning Area (ETRWPA) are outlined for each water user group (WUG) by county and for each major water provider (MWP). For each WUG with one or more identified WMSs or WMSPs, a summary table is provided to summarize their projected need (if any) and the supply delivered by the WMSs and WMSPs. A second summary table provides an evaluation of the cost (capital, annual, and unit) to deliver water to the user for the various WMSs and WMSPs that were considered. Appendix 5B-A contains technical memoranda for each WMS/WMSP developed by the East Texas Regional Water Planning Group (ETRWPG), which include a summary of the project, estimated supply quantities and costs, permitting and environmental considerations, and evaluations across various criteria. Appendix 5B-B includes a memorandum summarizing the evaluation criteria and assigned scores for each WMS and WMSP and the quantification of environmental impacts of WMSs and WMSPs.

Generally, four major categories of WMS are recommended in the ETRWP: (1) water conservation and drought management, (2) wastewater reuse, (3) expanded use of existing supplies (voluntary redistribution, groundwater, local supplies), and (4) new supply development. Further discussion of how the strategies were identified and evaluated in the ETRWPA is provided in Chapter 5A.

Any needs that remain unmet after implementation of recommended WMSs included in this chapter are summarized and discussed in Chapter 6, Section 6.3 Unmet Water Need.

5B.1 WATER MANAGEMENT STRATEGY EVALUATION

Water management strategies identified to meet water needs during the planning period were evaluated based on the following criteria:

(1) Evaluation of the quantity, reliability, and cost of water delivered and treated for the end user's requirements, incorporating factors to be used in the calculation of costs as required by regional water planning;

(2) Environmental factors including the effects of the proposed water management strategy on environmental water needs, wildlife habitat, cultural resources, water quality and effect of upstream development on bays, estuaries, and arms of the Gulf of Mexico;

(3) Impacts on other water resources of the state including other WMSs and groundwater surface water interrelationships;

(4) Impacts of WMSs on threats to agricultural and natural resources of the regional water planning area;

(5) Impacts of the strategy on key water quality parameters;

(6) Any other factors as deemed relevant by the regional water planning group including political feasibility, implementation issues, and potential recreational impacts;

(7) Equitable comparison and consistent application of all WMSs the regional water planning groups determines to be potentially feasible for each water supply need;

(8) Consideration of the provisions in Texas Water Code § 11.085(k)(1) for interbasin transfers; and

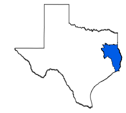
(9) Consideration of third party social and economic impacts resulting from voluntary redistribution of water.

(10) Water losses associated with transmission were assumed to be negligible for regional planning purposes.

The evaluation was undertaken through the development of a matrix to rate the above consideration from most desirable (1) to least desirable (5). Rating of the Environmental Factors (item 2 above) was evaluated using a separate matrix with consideration of nine factors; total acres impacted, wetland acres, environmental water needs, habitat, threatened and endangered species, cultural resources, bays and estuaries, environmental water quality, and other noted factors. The evaluation matrices are included in Appendix 5B-A.

5B.2 WATER USER GROUPS WITH WATER MANAGEMENT STRATEGIES AND PROJECTS

WMSs were identified for WUGs in all 20 counties of the ETRWPA. Following is a county-by-county review of the WMSs evaluated for the 2026 Plan.



5B.2.1 Anderson County

Figure 1 Anderson County

Anderson County, as shown in Figure 1, is located in the northern end of the ETRWPA. It is bordered by the Trinity River on the west side and the Neches River on the east side. The county covers an area of approximately 1,000 square miles. Palestine is the county seat of Anderson County. The largest cities in Anderson County are Palestine, Elkhart, and Frankston. Oil and gas production is a significant component of the local economy.

Most of the WUG demands in Anderson County are supplied from the Carrizo-Wilcox Aquifer. Minor amounts of supplies are taken from the other aquifers, including the Sparta and Queen City aquifers. The City of Palestine's demands are supplied from Lake Palestine and the Carrizo-Wilcox Aquifer.

The total demand in Anderson County, including both municipal and non-municipal WUGs, is 21,680 ac-ft per year in 2030 and decreases slightly to 21,663 ac-ft per year in 2080. Most of these demands are municipal. During the planning period (2030-2080), only the steam electric power WUG in Anderson County has an identified need (2,296 ac-ft per year) starting in 2030 due to two new proposed power generation facilities.

5B.2.1.1 B C Y WSC

There is no identified need for B C Y WSC across the planning period (2030–2080) based on their projected demands and currently available supply. However, during WUG outreach efforts, B C Y WSC indicated to the ETRWPG that they are considering developing an additional groundwater well and associated infrastructure to provide supply to potential future water demands. Thus, a strategy is recommended for B C Y WSC that involves the development of approximately 170 acre-feet per year from the Carrizo-Wilcox Aquifer in Anderson County. The conceptual design for this strategy involves one public supply well (capacity of 200 gpm) that produces groundwater from the Carrizo-Wilcox Aquifer, conveyance infrastructure (e.g., well collection piping, transmission pipeline, pump station, and storage tank), and a groundwater treatment system. In addition, municipal conservation is also a recommended strategy for the B C Y WSC. Municipal conservation is discussed further in Chapter 5C. Table 5B.1 and Table 5B.2 summarize the yield and cost information associated with those strategies.

Table 5B.1 Recommended Water Management Strategies/Projects for B C Y WSC – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	0	0	0	0	0
Recommended Water Management Strategies/Projects						
Municipal Conservation	5	7	8	8	8	9
New Well(s) in Carrizo-Wilcox Aquifer	0	170	170	170	170	170
TOTAL	**5**	**177**	**178**	**178**	**178**	**179**

Table 5B.2 Recommended Water Management Strategies/Projects for B C Y WSC – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Municipal Conservation	5 - 9	$310,000	$24,200	$4,500	$13.81
New Well(s) in Carrizo-Wilcox Aquifer	170	$4,254,000	$525,000	$3,088	$9.48

5B.2.1.2 Anderson County Steam Electric Power

Two new power generation facilities with water demands have been identified in Anderson County: the Palestine Power Peaking Facility (PPPF), which is located approximately eight miles northeast of the City of Palestine, and the Apex Bethel Energy Center (ABEC), located approximately 17 miles northwest of Palestine. These plants are not constructed at this time and therefore, do not use any existing water supply (groundwater, surface water, etc.). Most groundwater use in the areas around these facilities rely on groundwater from the Carrizo-Wilcox Aquifer in Anderson County. The PPPF has an identified need of 890 acre-feet per year beginning in 2030, and the ABEC has an identified need of 1,410 acre-feet per year beginning in 2030 (approximately 2,300 ac-ft per year total in 2030). To meet these projected needs, a strategy is recommended for steam-electric power users in Anderson County that involves the development of two well fields (one at each facility) that produce groundwater from the Carrizo-Wilcox Aquifer. Table 5B.3 and Table 5B.4 summarize the need and cost information associated with those strategies.

Table 5B.3 Recommended Strategies/Projects for Anderson County Steam Electric Power – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	(2,296)	(2,296)	(2,296)	(2,296)	(2,296)	(2,296)
Recommended Water Management Strategies/Projects						
New Well(s) in Carrizo-Wilcox Aquifer	2,300	2,300	2,300	2,300	2,300	2,300
TOTAL	**2,300**	**2,300**	**2,300**	**2,300**	**2,300**	**2,300**

Table 5B.4 Recommended Strategies/Projects for Anderson County Steam Electric Power – Cost Summary

Water Management Strategy	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
New Well(s) in Carrizo-Wilcox Aquifer	2,300	$21,908,000	$1,834,000	$757	$2.45

5B.2.1.3 County Summary

The only identified needs in Anderson County are associated with steam electric power water users. Development of groundwater supplies is recommended to meet these needs. In addition, a strategy is recommended for B C Y WSC to develop additional groundwater supplies to meet projected future demands. Although no shortages were identified for municipal WUGs in Anderson County, conservation strategies were recommended for all municipal WUGs in the ETRWPA. Further discussion of these conservation strategies is provided in Chapter 5C. Table 5B.5 provides a summary of WUGs in Anderson County, including their current water supply source(s), maximum need identified across the planning horizon (2030-2080), and recommended WMSs and WMSPs (if any).

Table 5B.5 Anderson County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Anderson County Cedar Creek WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
B B S WSC [a, b]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
B C Y WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation; New Wells (Carrizo-Wilcox Aquifer)
Brushy Creek WSC [a, b]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
The Consolidated WSC [a]	Carrizo-Wilcox Aquifer, Houston County Lake (Houston Co. WCID 1)	0	Municipal Conservation
Elkhart	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Four Pines WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Frankston [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Frankston Rural WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Neches WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Norwood WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Palestine	Carrizo-Wilcox Aquifer, Lake Palestine (UNRMWA)	0	Municipal Conservation
Pleasant Springs WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Slocum WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
TDCJ Beto Gurney & Powledge Units	Carrizo-Wilcox Aquifer	0	Municipal Conservation
TDCJ Coffield Michael	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Tucker WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Walston Springs WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
County Other	Carrizo-Wilcox Aquifer, Other Aquifers	0	Municipal Conservation
Manufacturing	Carrizo-Wilcox Aquifer	0	None
Irrigation	Carrizo-Wilcox Aquifer, Other Aquifers, Run-of-River Supplies	0	None
Livestock	Carrizo-Wilcox Aquifer, Other Aquifers, Local Supplies	0	None
Mining	Carrizo-Wilcox Aquifer, Other Aquifers	0	None
Steam Electric Power	----	2,296	New Wells (Carrizo-Wilcox Aquifer)

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

[b] WUG spans multiple regions, and the maximum need shown reflects the combined needs across these regions. The water management strategies for these WUGs are discussed in their respective primary region plans.

5B.2.2 Angelina County

Figure 2 Angelina County

Angelina County, as shown in Figure 2, is bounded by the Angelina River on the North and the Neches River on the South, in the central portion of the ETRWPA. The largest water body in the County is Sam Rayburn Reservoir, which extends into neighboring counties. Lufkin is the largest city and the County seat. Other major communities include Diboll, Burke, Hudson, and Huntington.

Angelina County is currently dependent on groundwater supplies for water supply; every WUG in Angelina County gets a portion, if not all, of their water from groundwater supplies. However, both the Yegua and Carrizo-Wilcox aquifers have limited capacity for expanded development. Although several rural communities and non-municipal water users will continue to rely on groundwater to meet their demands, the proposed construction of transmission lines and a surface water treatment plant at Lake Kurth by Lufkin will create a reliable surface water supply in the county. Manufacturing and Mining are the two WUGs with needs in Angelina County. Below is a discussion of WMSs identified for these WUGs.

5B.2.2.1 <u>Manufacturing</u>

Current supplies for manufacturing water users include City of Lufkin and groundwater from the Yegua-Jackson and Other-Undifferentiated aquifers. The current supplies are sufficient to meet about half of the 2080 demand. It is anticipated that growth in manufacturing will be supplied by Lufkin. Raw surface water is currently available from Lake Kurth for manufacturing use, but there is limited infrastructure.

The recommended strategy to meet the projected needs of Manufacturing in Angelina County is to contract for purchase of water from Lufkin. Lufkin's current supplies in Lake Kurth can only meet part of the demands. However, once Lufkin develops the supply from Sam Rayburn Reservoir to Lake Kurth, there would be enough supplies to meet the manufacturing demand in Angelina County. The strategy development and planning level cost estimate associated with development of the supply from Sam Rayburn Reservoir to Lufkin is discussed in the strategies for major water provider Lufkin. It should be noted that the Sam Rayburn supplies are available by 2040 and the current surplus from Lufkin are more than three times higher than the needs from Angelina County Manufacturing customers in 2030. Table 5B.6 and Table 5B.7 summarize the need and cost information associated with those strategies.

Table 5B.6 Recommended Water Management Strategies/Projects for Angelina County Manufacturing – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	(2,145)	(2,314)	(2,488)	(2,671)	(2,859)	(3,055)
Recommended Water Management Strategies/Projects						
Purchase from Lufkin (Sam Rayburn)	2,150	2,320	2,490	2,680	2,860	3,060

TOTAL	**2,150**	**2,320**	**2,490**	**2,680**	**2,860**	**3,060**

The cost estimates for this strategy represent raw water purchase costs as well as the necessary conveyance infrastructure including a 5-mile water main, storage tanks and pump stations. Purchased water costs for this strategy were established at a regional rate chosen for the anticipated category of use within the region. Actual purchased water costs will be determined during contract negotiations between provider and prospective buyers.

Table 5B.7 Recommended Water Management Strategies/Projects for Angelina County Manufacturing – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Purchase from Lufkin (Sam Rayburn)	2,150 - 3,060	$90,393,000	$8,493,000	$1,379	$4.2

5B.2.2.2 Mining

Current supplies are from Sparta (50% of current wells from desktop analysis), Yegua-Jackson (20%), and other-undifferentiated (30%) aquifers. Several private industries are under contract to purchase enough water from Angelina & Neches River Authority to meet their projected demand. Therefore, the recommended strategy for meeting the mining need projected in 2030 is to purchase raw water from Angelina & Neches River Authority.

The cost estimates for this strategy represent raw water purchase costs as well as the necessary conveyance infrastructure including a 5-mile water main, storage tanks and pump stations. Purchased water costs for this strategy were established at a regional rate chosen for the anticipated category of use within the region. Actual purchased water costs will be determined during contract negotiations between provider and prospective buyers. Table 5B.8 and Table 5B.9 summarize the need and cost information associated with those strategies.

Table 5B.8 Recommended Water Management Strategies/Projects for Angelina County Mining – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	(373)	(412)	(448)	(480)	(508)	(533)
Recommended Water Management Strategies/Projects						
Purchase from ANRA (Run of River, Angelina)	380	420	450	480	510	540
TOTAL	**380**	**420**	**450**	**480**	**510**	**540**

Table 5B.9 Recommended Water Management Strategies/Projects for Angelina County Mining – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Purchase from ANRA (Run of River, Angelina)	380 - 540	$13,921,000	$1,702,000	$3,152	$9.7

5B.2.2.3 County Summary

See Section 5B.3.10 for City of Lufkin.

Table 5B.10 is a summary of WUGs in Angelina County, their current water source(s), maximum shortages (if any), and recommended WMSs (if any).

Table 5B.10 Angelina County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Angelina WSC	Other Aquifer	0	Municipal Conservation
Central WCID of Angelina County	Carrizo-Wilcox Aquifer	0	Municipal Conservation
County-Other, Angelina	Carrizo-Wilcox Aquifer, Other Aquifer, Sparta Aquifer, Yegua-Jackson Aquifer, Purchase from City of Lufkin	0	Municipal Conservation
Diboll	Yegua-Jackson Aquifer, Purchase from City of Lufkin	0	Municipal Conservation
Hudson WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Huntington	Carrizo-Wilcox Aquifer, Yegua-Jackson Aquifer, Purchase from City of Lufkin	0	Municipal Conservation
Lufkin	Carrizo-Wilcox Aquifer, Kurth Lake/Reservoir, Sam Rayburn-Steinhagen Lake/Reservoir System	0	Municipal Conservation
M & M WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Pollok-Redtown WSC [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Redland WSC	Carrizo-Wilcox Aquifer, Purchase from City of Lufkin	0	Municipal Conservation
Woodlawn WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Zavalla	Yegua-Jackson Aquifer	0	Municipal Conservation
Irrigation	Yegua-Jackson Aquifer, Purchase from City of Lufkin	0	none
Livestock	Neches Livestock Local Supply	0	none
Manufacturing	Other Aquifer, Yegua-Jackson Aquifer, Purchase from City of Lufkin and Four Way SUD	3,055	Purchase from Lufkin (Sam Rayburn)
Mining	Other Aquifer, Sparta Aquifer, Yegua-Jackson Aquifer,	533	Purchase from ANRA (Run of River, Angelina)

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

5B.2.3 Cherokee County

Figure 3 Cherokee County

Cherokee County, as shown in Figure 3, is located in the northern portion of the ETRWPA. The county seat is Rusk. The county encompasses an area of approximately 1,049 square miles. Lake Jacksonville, Lake Palestine, and Lake Striker are located wholly or partially in the County. The larger municipal WUGs in the County are New Summerfield, Rusk, Rusk Rural WSC, Alto, Alto Rural WSC, and North Cherokee WSC. The Carrizo-Wilcox aquifer is the primary source of supply for the needs in Cherokee County. Some WUGs in the County also receive supplies from Lake Jacksonville and Lake Acker. There are two WUGs with shortages in Cherokee County; Alto Rural WSC and Mining. The WMSs for these WUGs are discussed below. There are approximately 10,000 ac-ft/year of supplies in Carrizo Wilcox in 2030 that are available for WMSs. Water is also available from the Queen City aquifer and a small amount available from the Sparta aquifer, but these aquifers do not cover the entire county. Water obtained from the Queen City aquifer may be acidic and may have levels of iron and manganese greater than TCEQ secondary drinking water standards. Water obtained from the Sparta aquifer may have levels of sulfates greater than the TCEQ secondary drinking water standards, especially in far southern Cherokee County. Water quality in the Sparta aquifer is best on the outcrop. However, for planning purposes, water from the Queen City and Sparta aquifers will be allocated primarily for livestock and irrigation uses because of the unreliable supply and quantity. No proposed strategies for municipal water shortages involve the Queen City and Sparta aquifers.

5B.2.3.1 <u>Alto Rural WSC</u>

The WUG currently obtains water supply from the Carrizo-Wilcox aquifer. The recommended strategy is to increase its supply from the Carrizo-Wilcox aquifer. Municipal conservation is the other recommended strategy for Alto Rural WSC. Table 5B.11 and Table 5B.12 summarize the need and cost information associated with those strategies.

Table 5B.11 Recommended Water Management Strategies/Projects for Alto Rural WSC – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	(124)	(209)	(306)	(414)	(533)	(665)
Recommended Water Management Strategies/Projects						
New Wells (Carrizo-Wilcox)	670	670	670	670	670	670
Municipal Conservation	**18**	**29**	**34**	**38**	**45**	**51**
TOTAL	**688**	**699**	**704**	**708**	**715**	**721**
	Quantity (ac-ft/year)					

	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	(124)	(209)	(306)	(414)	(533)	(665)
Recommended Water Management Strategies/Projects						
New Wells (Carrizo-Wilcox)	670	670	670	670	670	670
Municipal Conservation	**18**	**29**	**34**	**38**	**45**	**51**
TOTAL	**688**	**699**	**704**	**708**	**715**	**721**

Table 5B.12 Recommended Water Management Strategies/Projects for Alto Rural WSC – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
New Wells (Carrizo-Wilcox)	670	$7,612,000	$970,000	$1,448	$4.4
Municipal Conservation	18 - 51	$97,000	$14,300	$800	$2.5

5B.2.3.2 <u>County Summary</u>

Table 5B.13 is a summary of WUGs in Cherokee County, their current water source(s), maximum shortages (if any), and recommended WMSs (if any).

Table 5B.13 Cherokee County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Afton Grove WSC	Carrizo-Wilcox Aquifer (City of Jacksonville), Jacksonville Lake/Reservoir (City of Jacksonville)	0	Municipal Conservation
Alto	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Alto Rural WSC	Carrizo-Wilcox Aquifer	665	New Wells (Carrizo-Wilcox), Municipal Conservation
Blackjack WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
County-Other, Cherokee	Carrizo-Wilcox Aquifer, Carrizo-Wilcox Aquifer (Rusk Rural WSC), Other Aquifer, Queen City Aquifer, Sparta Aquifer	0	Municipal Conservation
Craft Turney WSC	Jacksonville Lake/Reservoir (City of Jacksonville), Carrizo-Wilcox Aquifer (City of Jacksonville)	0	Municipal Conservation
Gum Creek WSC	Carrizo-Wilcox Aquifer (City of Jacksonville), Jacksonville Lake/Reservoir (City of Jacksonville)	0	Municipal Conservation
Jacksonville	Carrizo-Wilcox Aquifer, Jacksonville Lake/Reservoir	0	Municipal Conservation

New Summerfield	Carrizo-Wilcox Aquifer	0	Municipal Conservation
North Cherokee WSC	Carrizo-Wilcox Aquifer (City of Jacksonville), Jacksonville Lake/Reservoir (City of Jacksonville)	0	Municipal Conservation
Rusk	Carrizo-Wilcox Aquifer, Rusk City Lake/Reservoir	0	Municipal Conservation
Rusk Rural WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Wells	Carrizo-Wilcox Aquifer	0	Municipal Conservation
West Jacksonville WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Irrigation	Carrizo-Wilcox Aquifer, Neches Run-of-River, Queen City Aquifer, Palestine Lake/Reservoir (Upper Neches River Municipal Water Authority), Sparta Aquifer	0	None
Livestock	Carrizo-Wilcox Aquifer, Neches Livestock Local Supply, Queen City Aquifer	0	None
Manufacturing	Carrizo-Wilcox Aquifer (City of Jacksonville), Jacksonville Lake/Reservoir (City of Jacksonville)	0	None
Mining	Neches Other Local Supply, Other Aquifer	0	None
Steam-Electric Power	Striker Lake/Reservoir (Angelina Nacogdoches WCID 1)	0	None

5B.2.4 Hardin County

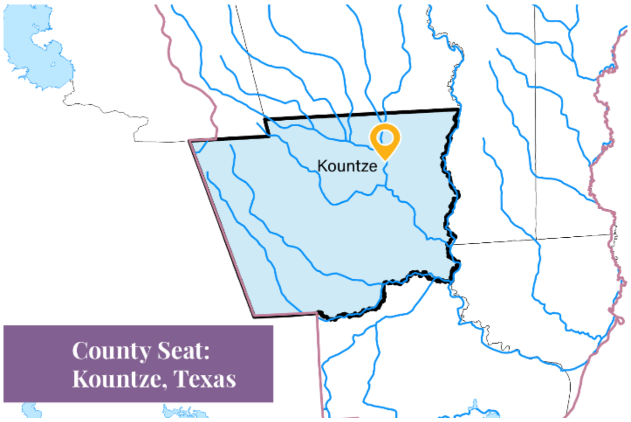


Figure 4 Hardin County

Hardin County, as shown in Figure 4, is located in the southern portion of the ETRWPA and is part of the timberlands region in East Texas. The county covers an area of approximately 900 square miles. The county seat is Kountze and other major cities in the county are Lumberton, Sour Lake, and Silsbee.

WUGs in Hardin County obtain the majority of their water supply from groundwater supplies produced from the Gulf Coast aquifer. Based on the Modeled Available Groundwater (MAG) used in this round of planning, the Gulf Coast aquifer supplies in Hardin County are limited to approximately 37,700 ac-ft per year. Other sources of supply in this county include Neches River run-of-river supplies, and local supplies.

The total demand in Hardin County, including both municipal and non-municipal, is 8,422 ac-ft per year in 2030 growing to a maximum of 9,726 ac-ft per year in 2050 and decreasing slightly to 9,130 ac-ft per year in 2080. The majority of these demands are municipal. There is no projected need for any WUG located within Hardin County across the planning period.

5B.2.4.1 County Summary

Although no WUGs with needs were identified in Hardin County, conservation strategies were recommended for all municipal WUGs in the ETRWPA. Further discussion of these conservation strategies is provided in Chapter 5C. Table 5B.14 provides a summary of WUGs in Hardin County, including their current water supply source(s), maximum need identified across the planning horizon (2030-2080), and recommended WMSs and WMSPs (if any).

Table 5B.14 Hardin County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
County Other	Gulf Coast Aquifer	0	Municipal Conservation
Hardin County WCID #1	Gulf Coast Aquifer	0	Municipal Conservation
Kountze	Gulf Coast Aquifer	0	Municipal Conservation
Lake Livingston WSC [a, b]	Gulf Coast Aquifer	0	Region H WMS/WMSP
Lumberton MUD	Gulf Coast Aquifer	0	Municipal Conservation
North Hardin WSC	Gulf Coast Aquifer	0	Municipal Conservation
Silsbee	Gulf Coast Aquifer	0	Municipal Conservation
Sour Lake	Gulf Coast Aquifer	0	Municipal Conservation
West Hardin WSC [a, b]	Gulf Coast Aquifer	0	Municipal Conservation
Wildwood POA [a]	Gulf Coast Aquifer	0	Municipal Conservation
Manufacturing	Gulf Coast Aquifer	0	None
Mining	Gulf Coast Aquifer, Sam Rayburn Reservoir (LNVA)	0	None
Irrigation	Gulf Coast Aquifer, Run-of-River	0	None

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Livestock	Gulf Coast Aquifer, Local Supply	0	None
Steam Electric Power	----	0	None

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

[b] WUG spans multiple regions, and the maximum need shown reflects the combined needs across these regions. The water management strategies for these WUGs are discussed in their respective primary region plans.

5B.2.5 Henderson County

Figure 5 Henderson County

Henderson County, as shown in Figure 5, is located between the Neches and Trinity Rivers in the northern end of the region. Henderson County is split between both Region C and the ETRWPA. The portion of the county in the Neches River Basin is in the ETRWPA. Lake Palestine is located partially within the county. Athens Lake is also located within Henderson County.

Athens is the largest city and also the county seat for Henderson County. The county encompasses approximately 950 square miles. Athens, Bethel Ash WSC, Brownsboro, Chandler, and Berryville are the largest WUGs in the County. Much of the water supplied to users in the ETRWPA is obtained from groundwater, with water also supplied from Lake Athens and Lake Palestine.

In the ETRWPA, water supply needs are identified for municipal WUGs including the cities of Athens and Chandler, and Edom WSC. Water supply needs are also identified for mining, livestock, and steam electric power WUGs in Henderson County.

5B.2.5.1 Athens

The City of Athens is supplied water by Athens Municipal Water Authority (MWA) from Lake Athens and groundwater from the Carrizo-Wilcox Aquifer. Additionally, the City of Athens has some self-supplied groundwater from the Carrizo-Wilcox Aquifer. Athens is identified to have water supply needs across both Region C and I, particularly in later decades, due to growing demands and existing water supply infrastructure constraints. Needs will be met through municipal conservation for the City of Athens and WMSs/WMSPs sponsored by Athens MWA, including reuse of fish hatchery return flows to Lake Athens and upgrades to the booster pump station at Athens MWA's water treatment plant. A WMS/WMSP is also identified for Athens MWA to develop additional Carrizo-Wilcox groundwater supplies in Henderson County; however, due to MAG limitations, this is included as an alternative WMS/WMSP. The WMSs and WMSPs included for Athens MWA and Athens are discussed in further detail under the Athens MWA major water provider (MWP) section of Chapter 5B and in the 2026 Region C regional water plan. Table 5B.15 and Table 5B.16 summarize the need and cost information associated with those strategies.

Table 5B.15 Recommended Water Management Strategies/Projects for Athens – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	0	(364)	(1,053)	(2,076)	(2,701)
Recommended Water Management Strategies/Projects						
Municipal Conservation	122	325	687	904	1,112	1,226
Athens MWA Strategies & Projects	0	0	364	1,222	2,055	1,989
TOTAL	**122**	**325**	**1,051**	**2,126**	**3,167**	**3,215**

Table 5B.16 Recommended Water Management Strategies/Projects Athens – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Municipal Conservation	122 - 1,226	$310,000	$24,200	$4,500	$13.81
Athens MWA Strategies/Projects	364 - 2,055	Discussed under Athens MWA section			

5B.2.5.2 Chandler

The City of Chandler is currently supplied solely by groundwater from the Carrizo-Wilcox Aquifer. Beginning in the 2050 decade, the City is projected to have a need of approximately 43 ac-ft per year that increases to 934 ac-ft per year by 2080. In order to meet this need, a recommended WMS and WMSP for the City of Chandler is to purchase treated water from the City of Tyler and develop associated conveyance infrastructure (e.g., transmission pipeline, pump station, storage) to deliver water to their service area. In addition, municipal conservation is also a recommended strategy for the City of Chandler. Municipal conservation is discussed further in Chapter 5C. A WMS/WMSP is also identified for Chandler to develop additional Carrizo-Wilcox groundwater supplies in Henderson County; however, due to MAG limitations, this is included as an alternative WMS/WMSP. Table 5B.17 and Table 5B.18 summarize the need and cost information associated with those strategies.

Table 5B.17 Recommended Water Management Strategies/Projects for Chandler – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	0	(43)	(281)	(573)	(934)
Recommended Water Management Strategies/Projects						
Municipal Conservation	13	23	30	40	52	77
Purchase from Tyler (Lake Palestine)	0	0	50	290	580	940
*New Well(s) in Carrizo-Wilcox Aquifer**	*0*	*0*	*50*	*290*	*580*	*940*
TOTAL	**13**	**23**	**80**	**330**	**632**	**1,017**

*Alternative water management strategy/project. Supply quantity not included in total.

Table 5B.18 Recommended Water Management Strategies/Projects Chandler – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Municipal Conservation	13 - 77	$38,000	$9,700	$700	$2.15
Purchase from Tyler (Lake Palestine)	50 - 940	$15,028,000	$2,774,000	$3,000	$9.06
*New Well(s) in Carrizo-Wilcox Aquifer**	*50 - 940*	*$10,727,000*	*$1,387,000*	*$1,476*	*$4.53*

*Alternative water management strategy/project.

5B.2.5.3 County-Other

There are no identified needs for the County-Other WUG in Henderson County in Region I, but there are some needs identified in the Region C portion of the Henderson County. A discussion of the WMSs and WMSPs developed to meet this need is included in the 2026 Region C Regional Water Plan.

5B.2.5.4 Edom WSC

Edom WSC is located in both Region D and the ETRWPA. Edom WSC provides water service in Van Zandt and Henderson Counties. Edom WSC supplies its customers with groundwater from the Carrizo-Wilcox Aquifer in Van Zandt County. Across both Region D and the ETRWPA, Edom WSC is projected to have a need of 67 ac-ft per year in 2030 and 87 ac-ft per year by 2080. To meet this need, a WMS and WMSP for Edom WSC was developed by Region D. A discussion of the WMS and WMSP developed to meet this need is included in the 2026 Region D regional water plan. The ETRWPG supports and approves the WMS and WMSP developed to meet the water supply need in both regions.

5B.2.5.5 R P M WSC

R P M WSC is located in both Region D and the ETRWPA. There are no identified needs for this WUG located in ETRWPA, but there are some needs identified in the Region D portion. A discussion of the WMS and WMSP developed to meet this need is included in the Region D regional water plan.

5B.2.5.6 Henderson County Mining

Mining users in Henderson County primarily use groundwater from the Carrizo-Wilcox aquifer or other undifferentiated aquifers for their water supply. A water supply need is identified for mining water users in Henderson County ranging from 15 to 143 ac-ft per year from 2030 through 2080. A recommended strategy to meet these needs is to develop new wells that produce groundwater from the Queen City Aquifer in Henderson County. Table 5B.19 and Table 5B.20 summarize the need and cost information associated with those strategies.

Table 5B.19 Recommended Water Management Strategies/Projects for Henderson County Mining – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	(15)	(16)	(17)	(19)	(47)	(143)
Recommended Water Management Strategies/Projects						
New Well(s) in Queen City Aquifer	150	150	150	150	150	150
TOTAL	**150**	**150**	**150**	**150**	**150**	**150**

Table 5B.20 Recommended Water Management Strategies/Projects Henderson County Mining – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
New Well(s) in Queen City Aquifer	150	$471,000	$40,000	$267	$0.82

5B.2.5.7 Henderson County Livestock

Livestock water users in Henderson County are identified to have a need of 321 ac-ft per year beginning in 2070, which increases to 490 acre-feet per year by 2080. Current supplies for livestock users in Henderson County (Region I portion) include surface water from Lake Athens, groundwater from the Carrizo-Wilcox and Queen City Aquifers, and other local supplies. The recommended strategy to meet the livestock water user needs in Henderson County is to use supply from the indirect reuse WMS in Lake

Athens through Athens MWA. Table 5B.21 and Table 5B.22 summarize the need and cost information associated with those strategies.

Table 5B.21 Recommended Water Management Strategies/Projects for Henderson County Livestock – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	0	0	0	(321)	(490)
Recommended Water Management Strategies/Projects						
Athens MWA Indirect Reuse WMS	0	0	507	884	1,216	1,385
TOTAL	**0**	**0**	**507**	**884**	**1,216**	**1,385**

Table 5B.22 Recommended Water Management Strategies/Projects Henderson County Mining – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Athens MWA Indirect Reuse WMS	1,385	$0	$0	$0	$0

5B.2.5.8 Henderson County Steam Electric Power

During the development of water demand projections for the 2026 regional water plans, water demands were included for a proposed power generation facility in the Region I portion of Henderson County: the Halyard Henderson Energy Center. This facility had a projected demand of 2,061 ac-ft per year from 2030 to 2080. This plant has not been constructed and does not use any existing water supply (groundwater, surface water, etc.), so it is shown to have a need of 2,061 ac-ft per year in the ETRWP across the planning horizon. Since water demand projections were adopted for the 2026 regional water plans, the U.S. Energy Information Administration (EIA) annual database, EIA-860, indicated that plans to develop the Halyard Henderson Energy Center were cancelled. Therefore, there is no water demand and need associated with this facility and no WMS and/or WMSP were identified for this WUG. The most recent version of the U.S. EIA-860 database (2023) indicates that there may be other proposed power generation facilities in Henderson County; however, their locations and potential water demands were not evaluated as part of the 2026 regional water plans.

5B.2.5.9 County Summary

Water supply needs in Henderson County were identified for the cities of Athens and Chandler, Edom WSC, and livestock, mining, and steam electric power WUGs. Various WMSs and WMSPs are recommended to meet these needs, including expanded use of surface water, groundwater, and reuse. Additionally, conservation strategies were recommended for all municipal WUGs. Further discussion of these conservation strategies is provided in Chapter 5C. Table 5B.23 provides a summary of WUGs in Henderson County, including their current water supply source(s), maximum need identified across the planning horizon (2030-2080), and recommended WMSs and WMSPs.

Table 5B.23 Henderson County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Athens [a]	Carrizo-Wilcox Aquifer, Lake Athens (Athens MWA)	2,701	Municipal Conservation, Athens MWA WMS/WMSPs (discussed under Athens MWA WWP section)
Berryville [b]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Bethel Ash WSC [a, b]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Brownsboro	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Brushy Creek WSC [a, b]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Chandler	Carrizo-Wilcox Aquifer	934	Municipal Conservation, New Wells (Carrizo-Wilcox), Municipal Conservation
County-Other [a]	Carrizo-Wilcox, Other Undifferentiated Aquifer	0	Region C WMS/WMSP
Edom WSC [a, b]	Carrizo-Wilcox Aquifer	87	Region D WMS/WMSP
Frankston [b]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Moore Station WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Murchison	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Leagueville WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
R P M WSC [a, b]	Carrizo-Wilcox Aquifer	0	Region D WMS/WMSP
Virginia Hill WSC [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Manufacturing [a]	Carrizo-Wilcox Aquifer	0	Region C WMS/WMSP
Mining	Carrizo-Wilcox, Other Undifferentiated Aquifer	143	New Wells (Queen City)
Livestock	Carrizo-Wilcox Aquifer, Local Supply, Lake Athens (Athens MWA)	490	Athens MWA indirect reuse WMS
Irrigation [a]	Carrizo-Wilcox Aquifer, Lake Athens (Athens MWA), Lake Palestine (UNRMWA), Run-of-River	0	Region C WMS/WMSP
Steam Electric Power [a, c]	None	2,061	None

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

[b] WUG spans multiple regions, and the maximum need shown reflects the combined needs across these regions. The water management strategies for these WUGs are discussed in their respective primary region plans.

[c] This WUG demand no longer valid and therefore, no strategies were evaluated in the 2026 East Texas Regional Water Plan.

5B.2.6 Houston County

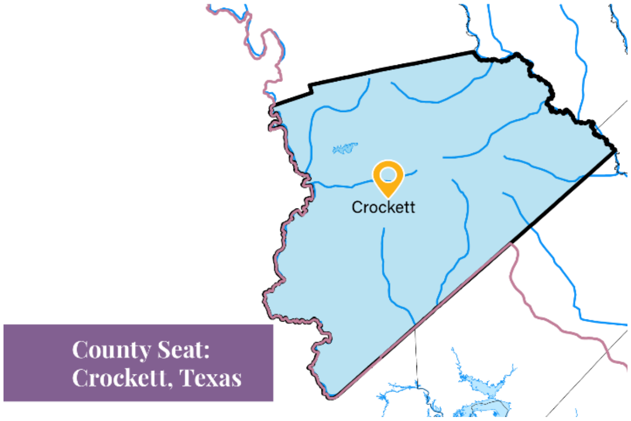


Figure 6 Houston County

Water supplies in Houston County, as shown in Figure 6, include surface water from Houston County Lake (through Houston County WCID #1), run-of-river supplies for irrigation, and groundwater from the Carrizo-Wilcox, Yegua-Jackson, Sparta, Queen City and Other-Undifferentiated aquifers. There are projected water shortages in Houston County for irrigation use. The Carrizo-Wilcox and Yegua-Jackson aquifers have adequate capacity for expanded development in this county.

5B.2.6.1 <u>TDCJ Eastham Unit</u>

The TDCJ Eastham Unit is a Texas Department of Criminal Justice (TDCJ) prison facility located near Lovelady, in Houston County, East Texas. Their current water supply source is the groundwater from Sparta Aquifer, with limited groundwater availability in the next 50-year planning horizon. The WMS to meet its need is to install a new well in the Carrizo-Wilcox Aquifer. Table 5B.24 and Table 5B.25 summarize the need and cost information associated with those strategies.

Table 5B.24 Recommended Water Management Strategies/Projects for TDCJ Eastham Unit – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	(113)	(111)	(111)	(111)	(111)	(111)
Recommended Water Management Strategies/Projects						
New Wells (Carrizo-Wilcox)	120	120	120	120	120	120
Municipal Conservation	**20**	**30**	**32**	**34**	**36**	**37**
TOTAL	**140**	**150**	**152**	**154**	**156**	**157**

Table 5B.25 Recommended Water Management Strategies/Projects for TDCJ Eastham Unit – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
New Wells (Carrizo-Wilcox)	120	$5,018,000	$583,000	$4,858	$14.9
Municipal Conservation	20 - 37	$134,000	$15,100	$700	$2.1

5B.2.6.2 <u>Livestock</u>

The demand for Livestock is met from local supply, groundwater supplies from Carrizo Wilcox aquifer, Sparta aquifer, Queen City aquifer, and Other-Undifferentiated aquifer. The shortages are met by developing a groundwater supply strategy in the Yegua-Jackson aquifer. Table 5B.26 and Table 5B.27 summarize the need and cost information associated with those strategies.

Table 5B.26 Recommended Water Management Strategies/Projects for Houston County Livestock – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	0	0	(59)	(285)	(285)
Recommended Water Management Strategies/Projects						
New Wells (Carrizo-Wilcox)	0	0	0	290	290	290
TOTAL	**0**	**0**	**0**	**290**	**290**	**290**

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	0	0	(59)	(285)	(285)
Recommended Water Management Strategies/Projects						
New Wells (Carrizo-Wilcox)	0	0	0	290	290	290
TOTAL	**0**	**0**	**0**	**290**	**290**	**290**

Table 5B.27 Recommended Water Management Strategies/Projects for Houston County Livestock– Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
New Wells (Carrizo-Wilcox)	290	$969,000	$87,000	$300	$0.9

5B.2.6.3 County Summary

Table 5B.28 is a summary of WUGs in Houston County, their current water source(s), maximum shortages (if any), and recommended WMSs (if any).

Table 5B.28 Houston County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
County-Other, Houston	Carrizo-Wilcox Aquifer, Sparta Aquifer, Other Aquifer, Queen City Aquifer, Yegua-Jackson Aquifer	0	Municipal Conservation
Crockett	Carrizo-Wilcox Aquifer,Houston County Lake/Reservoir (Houston County WCID 1)	0	Municipal Conservation

Grapeland	Carrizo-Wilcox Aquifer, Houston County Lake/Reservoir (Houston County WCID 1)	0	Municipal Conservation
Lovelady	Houston County Lake/Reservoir (Houston County WCID 1), Yegua-Jackson Aquifer	0	Municipal Conservation
TDCJ Eastham Unit	Sparta Aquifer	113	New Wells (Carrizo-Wilcox); Municipal Conservation
The Consolidated WSC [a]	Carrizo-Wilcox Aquifer, Houston County Lake/Reservoir (Houston County WCID 1)	0	Municipal Conservation
Irrigation, Houston	Neches Run-of-River, Trinity Run-of-River	0	None
Livestock, Houston	Carrizo-Wilcox Aquifer, Neches Livestock Local Supply, Queen City Aquifer, Trinity Livestock Local Supply, Sparta Aquifer	285	New Wells (Carrizo-Wilcox)
Manufacturing, Houston	Carrizo-Wilcox Aquifer, Houston County Lake/Reservoir (Houston County WCID 1)	0	None
Mining, Houston	Other Aquifer	0	None

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

5B.2.7 Jasper County

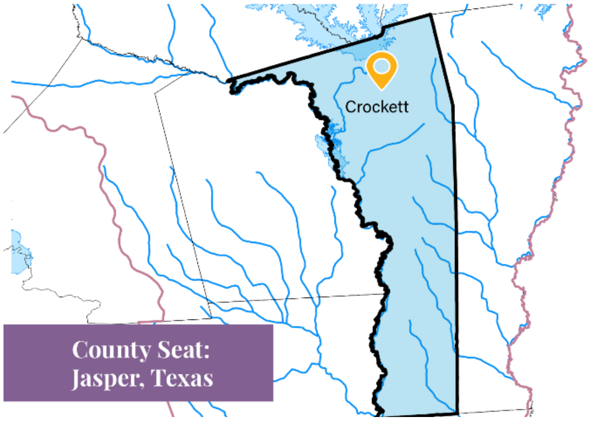


Figure 7 Jasper County

Jasper County, as shown in Figure 7, is located in the southeastern portion of the ETRWPA. The county covers approximately 970 miles and is divided between the Neches and Sabine River Basins. The largest cities in Jasper County include the cities of Jasper, Buna, and Kirbyville.

WUGs in Jasper County utilize surface water from the Sam Rayburn Reservoir, Neches River, and/or local supplies. Water demands are also met with groundwater from the Gulf Coast Aquifer. The Gulf Coast Aquifer has adequate capacity for expanded development in this county. During the planning period, only manufacturing water users in Jasper County have an identified water supply need across the planning horizon, with a need of 460 ac-ft per year beginning in 2030 and growing to nearly 12,000 ac-ft per year by 2080.

5B.2.7.1 South Jasper County WSC

There is no identified need for South Jasper County WSC across the planning period (2030–2080) based on their projected demands and currently available supply. However, during WUG outreach efforts, South Jasper County WSC indicated to the ETRWPG that they are considering developing an additional groundwater well and associated infrastructure to provide supply to potential future water demands. Thus, a strategy is recommended for South Jasper County WSC that involves the development of approximately 330 acre-feet per year from the Gulf Coast Aquifer in Jasper County. The conceptual design for this strategy involves one public supply well (capacity of 400 gpm) that produces groundwater from the Gulf Coast Aquifer, conveyance infrastructure (e.g., well collection piping, transmission pipeline, pump station, and storage tank), and a groundwater treatment system. In addition, municipal conservation is also a recommended strategy for the South Jasper County WSC. Municipal conservation is discussed further in Chapter 5C. Table 5B.29 and Table 5B.30 summarize the need and cost information associated with those strategies.

Table 5B.29 Recommended Water Management Strategies/Projects for South Jasper County WSC – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	0	0	0	0	0
Recommended Water Management Strategies/Projects						
Municipal Conservation	1	1	1	1	1	1
New Well(s) in Gulf Coast Aquifer	0	330	330	330	330	330
TOTAL	**1**	**331**	**331**	**331**	**331**	**331**

Table 5B.30 Recommended Water Management Strategies/Projects for South Jasper County WSC – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Municipal Conservation	1	$14,000	$1,300	$1,200	$3.68
New Well(s) in Gulf Coast Aquifer	330	$6,553,000	$812,000	$2,461	$7.55

5B.2.7.2 Jasper County Manufacturing

Manufacturing demands are projected to grow across the planning horizon (2030-2080). As a result, manufacturing is shown to have a water supply need of 447 ac-ft per year in 2030 and 11,935 ac-ft per year by 2080. Current water supplies used by manufacturing users in Jasper County include groundwater from the Gulf Coast Aquifer and surface water from the Sam Rayburn Reservoir (purchased from the Lower Neches Valley Authority [LNVA]) and Neches River. To meet their identified need, a recommended WMS and WMSP is included for individual manufacturers to enter into a contract with the Lower Neches Valley Authority (LNVA) for raw water from their Sam Rayburn Reservoir system, as their permit allows. Generalized estimates of infrastructure needed to access supplies from LNVA are included as part of this WMS and WMSP. Purchased water costs for this strategy were established at a regional rate chosen for the anticipated category of use within the region. Actual purchased water costs will be determined during contract negotiations between the provider and prospective buyers. Table 5B.31 and Table 5B.32 summarize the need and cost information associated with those strategies.

Table 5B.31 Recommended Strategies/Projects for Jasper County Manufacturing – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	(455)	(2,589)	(4,802)	(7,097)	(9,476)	(11,943)
Recommended Water Management Strategies/Projects						
Purchase Water from LNVA (Sam Rayburn)	460	2,590	4,810	7,100	9,480	11,950
TOTAL	**460**	**2,590**	**4,810**	**7,100**	**9,480**	**11,950**

Table 5B.32 Recommended Strategies/Projects for Jasper County Manufacturing – Cost Summary

Water Management Strategy	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Purchase Water from LNVA (Sam Rayburn)	460 – 11,950	$159,597,000	$17,386,000	$1,074	$3.30

5B.2.7.3 County Summary

The only identified needs in Jasper County are associated with manufacturing water users. To meet these needs, a WMS and WMSP is recommended for these manufacturers to purchase water from LNVA. In addition, a WMS and WMSP is recommended for South Jasper County WSC to develop additional groundwater supplies to meet projected future demands. Although no shortages were identified for municipal WUGs in Jasper County, conservation strategies were recommended for all municipal WUGs in the ETRWPA. Further discussion of these conservation strategies is provided in Chapter 5C. Table 5B.33 provides a summary of WUGs in Jasper County, including their current water supply source(s), maximum need identified across the planning horizon (2030-2080), and recommended WMSs and WMSPs (if any).

Table 5B.33 Jasper County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Brookeland FWSD [a]	Gulf Coast Aquifer	0	Municipal Conservation
County Other	Gulf Coast Aquifer	0	Municipal Conservation
Jasper	Gulf Coast Aquifer	0	Municipal Conservation
Jasper County WCID 1	Gulf Coast Aquifer	0	Municipal Conservation
Kirbyville	Gulf Coast Aquifer	0	Municipal Conservation
Mauriceville SUD [a]	Gulf Coast Aquifer	0	Municipal Conservation
Rayburn Country MUD	Yegua-Jackson Aquifer	0	Municipal Conservation
Rural WSC	Gulf Coast Aquifer	0	Municipal Conservation
South Jasper County WSC	Gulf Coast Aquifer	0	Municipal Conservation, New Wells (Gulf Coast Aquifer)
South Kirbyville Rural WSC [a]	Gulf Coast Aquifer	0	Municipal Conservation
Upper Jasper County Water Authority [a]	Gulf Coast Aquifer	0	Municipal Conservation
Irrigation	Gulf Coast Aquifer, Run-of-River	0	None
Livestock	Gulf Coast Aquifer, Local Supply, Rayburn/Steinhagen Reservoir System (LNVA)	0	None
Manufacturing	Gulf Coast Aquifer, Neches Run-of-River, Rayburn/Steinhagen Reservoir System (LNVA)	11,935	Purchase from LNVA (Sam Rayburn)
Mining	Gulf Coast Aquifer	0	None
Steam Electric Power	None	0	None

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

5B.2.8 Jefferson County

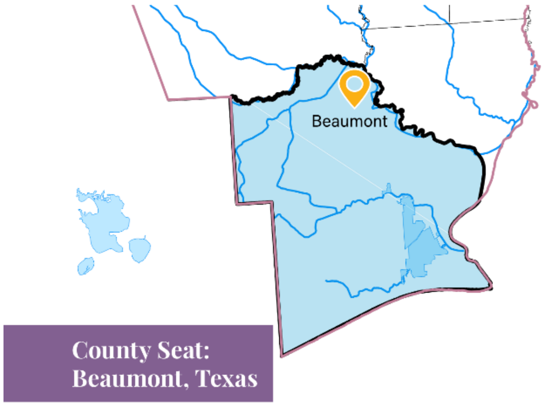


Figure 8 Jefferson County

Jefferson County, as shown in Figure 8, is located in the southern portion of the ETRWPA. The northeastern border of the county is the Neches River. Jefferson County has the second largest population of the twenty counties in the ETRPWA. The largest cities in the county include Beaumont, Port Arthur, Nederland, Groves, and Port Neches. In addition to their municipal water demands, Jefferson County contains a wide range of industries that use a substantial volume of water supply. Water demands from industry are anticipated to grow as industries continue to target development of their facilities in Jefferson County and the economic base diversifies.

Water supply in Jefferson County is largely provided by the Lower Neches Valley Authority (LNVA) with surface water from the Sam Rayburn/BA Steinhagen system and the Neches River. The exception to this is Beaumont, which has a supply from their own water rights on the Neches River in Jefferson County and Hardin County groundwater wells in the Gulf Coast Aquifer. There are three WUGs with a projected need during the planning period: Beaumont, Trinity Bay Conservation District, and manufacturing water users. Beaumont's needs are anticipated to be met through conservation, groundwater, and additional surface water from LNVA, which will require new infrastructure projects. Needs for Trinity Bay Conservation District, which is located largely in Region H, are anticipated to be met through water conservation. Manufacturing water needs are anticipated to be met through purchasing water from LNVA.

5B.2.8.1 Beaumont

The current supply sources for the City of Beaumont are self-supplied surface water from the Neches River, self-supplied groundwater from the Gulf Coast Aquifer, and purchased surface water from the Sam Rayburn/BA Steinhagen system (LNVA). Beaumont's supply is constrained by several infrastructure limitations, including their canal conveyance capacity, surface water treatment plant capacity, and groundwater well field capacity. As a result of these infrastructure constraints, Beaumont has an identified need across the planning horizon (2030-2080) of approximately 9,500 ac-ft per year by 2030, which grows to nearly 11,400 ac-ft per year by 2070. To meet this need, several WMSs were recommended for Beaumont, including water conservation, improvements to their well field, and amending their contract with LNVA for additional surface water supply. To access the additional supply from LNVA, recommended WMSPs for Beaumont include rehabilitation of one of their surface water conveyance canals and a new water treatment plant on the west side of their system.

Beaumont is a Major Water Provider (MWP) in the ETRWP. Section 5B.3 contains a more detailed summary of each MWP in the ETRWPA and their recommended WMSs and WMSPs. Beaumont is discussed in more detail in Section 5B.3.4.

5B.2.8.2 China

There is no identified need for China across the planning period (2030–2080) based on their projected demands and currently available supply. However, during WUG outreach efforts, China indicated to the ETRWPG that they are considering developing an additional groundwater well and associated infrastructure to provide supply to potential future water demands. Thus, a strategy is recommended for

China that involves the development of approximately 250 acre-feet per year from the Gulf Coast Aquifer in Jefferson County. The conceptual design for this strategy involves one public supply well (capacity of 300 gpm) that produces groundwater from the Gulf Coast Aquifer, conveyance infrastructure (e.g., well collection piping, transmission pipeline, pump station, and storage tank), and a groundwater treatment system. In addition, municipal conservation is also a recommended strategy for China. Municipal conservation is discussed further in Chapter 5C. Table 5B.34 and Table 5B.35 summarize the need and cost information associated with those strategies.

Table 5B.34 Recommended Water Management Strategies/Projects for China – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	0	0	0	0	0
Recommended Water Management Strategies/Projects						
Municipal Conservation	3	5	6	6	6	7
New Well(s) in Gulf Coast Aquifer	0	250	250	250	250	250
TOTAL	3	255	256	256	256	257

Table 5B.35 Recommended Water Management Strategies/Projects for China – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Municipal Conservation	3 – 7	$13,000	$2,200	$800	$2.46
New Well(s) in Gulf Coast Aquifer	250	$6,182,000	$525,000	$2,967	$9.09

5B.2.8.3 Port Arthur

Port Arthur is a MWP in the ETRWP. Based on their projected demands and existing supplies, Port Arthur has no identified needs across the planning horizon (2030-2080). However, conservation strategies are recommended for Port Arthur.

Section 5B.3 contains a more detailed summary of each MWP in the ETRWPA and their recommended WMSs and WMSPs. Port Arthur is discussed in more detail in Section 5B.3.13.

5B.2.8.4 Trinity Bay Conservation District

Trinity Bay Conservation District (TBCD) is a WUG located in both Region H and the ETRWPA. Trinity Bay Conservation provides water service in both Chambers and Jefferson counties. They obtain their supply from LNVA and the Chambers-Liberty Counties Navigation District (CLCND). Across both Region H and the ETRWPA, Trinity Bay Conservation District is projected to have a need of 71 ac-ft per year in 2070 and 207 ac-ft per year by 2080. To meet this need, the recommended WMS/WMSP by Region H is municipal conservation. A discussion of this WMS and WMSP is included in the 2026 Region H regional water plan. The ETRWPG supports and approves the WMS and WMSP developed to meet the water supply need in both regions.

5B.2.8.5 Jefferson County Manufacturing

Manufacturing demands in Jefferson County are projected to grow substantially across the planning horizon (2030-2080). As a result, manufacturing is shown to have a water supply need of 6,037 ac-ft per year in 2030 and 175,165 ac-ft per year by 2080. Current water supplies used by manufacturing users in Jasper County include groundwater from the Gulf Coast Aquifer and surface water from the Sam Rayburn

Reservoir (purchased from the Lower Neches Valley Authority [LNVA]) and Neches River. To meet their identified need, a recommended WMS and WMSP is included for individual manufacturers to enter into a contract with the Lower Neches Valley Authority (LNVA) for raw water from their Sam Rayburn Reservoir system, as their permit allows. Generalized estimates of infrastructure needed to access supplies from LNVA are included as part of this WMS and WMSP. Purchased water costs for this strategy were established at a regional rate chosen for the anticipated category of use within the region. Actual purchased water costs will be determined during contract negotiations between the provider and prospective buyers. Table 5B.36 and Table 5B.37 summarize the need and cost information associated with those strategies.

Table 5B.36 Recommended Strategies/Projects for Jefferson County Manufacturing – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	(6,037)	(36,896)	(71,613)	(106,146)	(140,665)	(175,165)
Recommended Water Management Strategies/Projects						
Purchase Water from LNVA (Sam Rayburn)	6,100	36,900	71,700	106,200	140,700	175,200
TOTAL	**6,100**	**36,900**	**71,700**	**106,200**	**140,700**	**175,200**

Table 5B.37 Recommended Strategies/Projects for Jefferson County Manufacturing – Cost Summary

Water Management Strategy	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Purchase Water from LNVA (Sam Rayburn)	6,100 – 175,200	$698,989,000	$117,584,000	$558	$1.71

5B.2.8.6 County Summary

Water supply needs in Jefferson County are identified for the City of Beaumont, Trinity Bay Conservation District, and manufacturing water users. Various WMSs and WMSPs (e.g., conservation, groundwater, surface water, infrastructure expansions) are recommended to address these needs. A WMS and WMSP is also recommended for China to develop additional groundwater supplies to meet projected future demands. Additionally, conservation strategies were recommended for all municipal WUGs in the ETRWPA. Further discussion of these conservation strategies is provided in Chapter 5C. Table 5B.38 provides a summary of WUGs in Jefferson County, including their current water supply source(s), maximum need identified across the planning horizon (2030-2080), and recommended WMSs and WMSPs (if any).

Table 5B.38 Jefferson County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Beaumont	Gulf Coast Aquifer, Run-of-River, Rayburn/Steinhagen Reservoir System (LNVA)	9,648	Municipal Conservation, Well Field Infrastructure Improvements, Amendment to Supplemental Contract with LNVA, Bunn's Canal Rehabilitation, New Westside Surface Water Treatment Plant

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Bevil Oaks	Gulf Coast Aquifer	0	Municipal Conservation
China	Gulf Coast Aquifer	0	Municipal Conservation, New Well(s) in Gulf Coast Aquifer
County Other	Gulf Coast Aquifer, Run-of-River, Rayburn/Steinhagen Reservoir System (LNVA)	0	Municipal Conservation
Groves	Rayburn/Steinhagen Reservoir System (LNVA)	0	Municipal Conservation
Federal Correctional Complex Beaumont	Sales from Beaumont	0	Municipal Conservation
Jefferson County WCID 10	Carrizo-Wilcox, Houston County Lake	0	Municipal Conservation
Meeker MWD	Run-of-River, Gulf Coast Aquifer	0	Municipal Conservation
Nederland	Rayburn/Steinhagen Reservoir System (LNVA)	0	Municipal Conservation
Nome	Rayburn/Steinhagen Reservoir System (LNVA)	0	Municipal Conservation
Port Arthur	Rayburn/Steinhagen Reservoir System (LNVA)	0	Municipal Conservation
Port Neches	Rayburn/Steinhagen Reservoir System (LNVA)	0	Municipal Conservation
Trinity Bay Conservation District [a, b]	Rayburn/Steinhagen Reservoir System (LNVA), Trinity Run-of-River (CLCND)	207	Region H WMS/WMSP
West Jefferson County MWD	Rayburn/Steinhagen Reservoir System (LNVA), Sales from Beaumont	0	Municipal Conservation
Irrigation	Gulf Coast Aquifer, Run-of-River, Rayburn/Steinhagen Reservoir System (LNVA)	0	None
Livestock	Gulf Coast Aquifer, Local Supply	0	None
Manufacturing	Rayburn/Steinhagen Reservoir System (LNVA), Gulf Coast Aquifer, Run-of-River, Toledo Bend Reservoir (SRA)	175,165	Purchase from LNVA (Sam Rayburn)
Mining	Gulf Coast Aquifer, Local Supply, Run-of-River	0	None

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Steam Electric Power	None	0	None

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

[b] WUG spans multiple regions, and the maximum need shown reflects the combined needs across these regions. The water management strategies for these WUGs are discussed in their respective primary region plans.

5B.2.9 Nacogdoches County

Figure 9 Nacogdoches County

Surface water, groundwater and local livestock supplies provide water to users in Nacogdoches County, as shown in Figure 9. Lake Nacogdoches and Striker Lake provide the majority of surface water, while groundwater is the primary source for rural water supplies. Lake Naconiche has recently been completed. This lake was built by NRCS for flood storage and recreation, but there are plans to develop water supply from the lake for rural communities. A 1992 study evaluated a potential regional water system using water from Lake Naconiche. This regional system is a recommended strategy to provide water to Nacogdoches County-Other users and several rural WSCs. A brief description of the proposed strategy is presented below.

5B.2.10 County Other – Lake Naconiche Regional Water Supply System

Lake Naconiche is located in northeast Nacogdoches County on Naconiche Creek. The lake is permitted to store 9,072 ac-ft of water. To use water from Lake Naconiche for water supply, the County must seek a permit amendment to allow diversions for municipal use. It is assumed that the regional water system would serve Appleby WSC, Lily Grove WSC, Swift WSC, and County-Other entities in Nacogdoches County (including Caro WSC, Lilbert-Looneyville WSC, Libby WSC, and others). Nacogdoches County is the current sponsor of this water management strategy.

The project is initially sized for 3.0 MGD and an average yield of 1,700 ac-ft/yr. This includes a lake intake, new water treatment plant located near Lake Naconiche, pump station and a distribution system of pipelines in the northeast part of the county. Costs are summarized below. The costs for each participant are based on the unit cost of water for the strategy and capital costs are proportioned by strategy amounts. Actual costs would be negotiated as the project is developed. Table 5B.39 and Table 5B.40 summarize the need and cost information associated with those strategies.

Table 5B.39 Recommended Water Management Strategies/Projects for Couty Other, Nacogdoches County – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	0	0	0	0	0
Recommended Water Management Strategies/Projects						
Lake Naconiche Regional Water Supply System	0	1,700	1,700	1,700	1,700	1,700
TOTAL	**0**	**1,700**	**1,700**	**1,700**	**1,700**	**1,700**

Table 5B.40 Recommended Water Management Strategies/Projects for Couty Other, Nacogdoches County– Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Lake Naconiche Regional Water Supply System	1700	$105,317,000	$8,346,000	$4,909	$15.1

5B.2.11 D & M WSCI

D & M WSC currently relies on groundwater from the Carrizo-Wilcox aquifer. The recommended strategy is to expand development of supplies from Carrizo-Wilcox and municipal conservation. Table 5B.41 and Table 5B.42 summarize the need and cost information associated with those strategies.

Table 5B.41 Recommended Water Management Strategies/Projects for D & M WSC – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	(30)	(62)	(115)	(167)	(218)
Recommended Water Management Strategies/Projects						
New Wells (Carrizo-Wilcox)	0	220	220	220	220	220
Municipal Conservation	**20**	**30**	**34**	**38**	**40**	**44**
TOTAL	**20**	**250**	**254**	**258**	**260**	**264**

Table 5B.42 Recommended Water Management Strategies/Projects for D & M WSC – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
New Wells (Carrizo-Wilcox)	220	$5,542,000	$652,000	$2,964	$9.1
Municipal Conservation	20 - 44	$131,000	$21,800	$1,100	$3.4

5B.2.11.1 County Summary

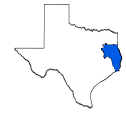
Table 5B.43 is a summary of WUGs in Nacogdoches County, current water supply sources, and recommended WMSs (if any).

Table 5B.43 Nacogdoches County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects

Appleby WSC	Carrizo-Wilcox Aquifer, Carrizo-Wilcox Aquifer (City of Nacogdoches), Nacogdoches Lake/Reservoir (City of Nacogdoches)	0	Municipal Conservation
Caro WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
County-Other, Nacogdoches	Carrizo-Wilcox Aquifer, Carrizo-Wilcox Aquifer (City of Nacogdoches), Nacogdoches Lake/Reservoir (City of Nacogdoches), Other Aquifer, Queen City Aquifer, Sparta Aquifer, Yegua-Jackson Aquifer	0	Municipal Conservation, Lake Naconiche Regional Water Supply System
Cushing	Carrizo-Wilcox Aquifer	0	Municipal Conservation
D & M WSC	Carrizo-Wilcox Aquifer, Carrizo-Wilcox Aquifer (City of Nacogdoches), Nacogdoches Lake/Reservoir (City of Nacogdoches)	218	New Wells (Carrizo-Wilcox), Municipal Conservation
Etoile WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Garrison [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Lilly Grove SUD	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Melrose WSC	Carrizo-Wilcox Aquifer, Carrizo-Wilcox Aquifer (City of Nacogdoches), Nacogdoches Lake/Reservoir (City of Nacogdoches)	0	Municipal Conservation
Nacogdoches	Carrizo-Wilcox Aquifer, Lake/Reservoir	0	Municipal Conservation
Swift WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Woden WSC	Carrizo-Wilcox Aquifer (City of Nacogdoches), Carrizo-Wilcox Aquifer, Nacogdoches Lake/Reservoir (City of Nacogdoches)	0	Municipal Conservation
Irrigation	Carrizo-Wilcox Aquifer, Neches Run-of-River	0	None
Livestock	Carrizo-Wilcox Aquifer, Neches Livestock Local Supply, Other Aquifer, Queen City Aquifer, Sparta Aquifer	0	None
Mining	Neches Other Local Supply, Other Aquifer	0	None
Steam-Electric Power	Striker Lake/Reservoir (Angelina Nacogdoches WCID 1)	0	None

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.



5B.2.12 Newton County

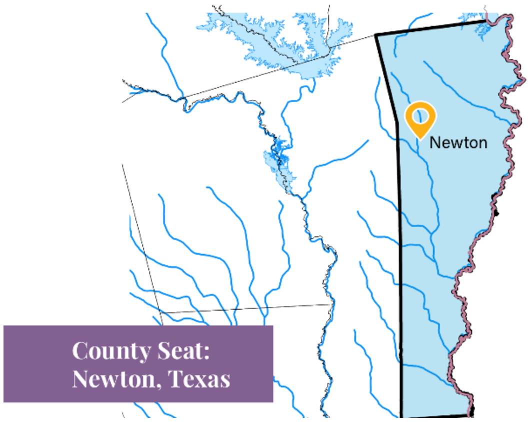


Figure 11 Newton County

Newton County, as shown in Figure 11, is located on the eastern side of the ETRWPA. The county has a total area of approximately 940 square miles. The County seat and largest city is Newton.

Most of the municipal WUGs in Newton County use localized groundwater from the Gulf Coast Aquifer. According to the Groundwater Availability Model estimates, there is approximately 37,500 ac-ft/year of groundwater available from the Gulf Coast Aquifer in Newton County. As a part of this round of planning, approximately 2,500 ac-ft per year has been allocated to WUGs in Newton County in 2030. There is also a significant amount of surface water available from the SRA through the Toledo Bend Reservoir and Sabine run-of-river supplies. Some of this water is contracted for steam electric power. Based on the available groundwater and proximity of surface water to users in Newton County, there is substantial water available for development to meet projected demands. There is no projected need for any WUG located within Newton County throughout the planning period (2030-2080).

5B.2.12.1 County Summary

Although no WUGs with needs were identified, conservation strategies were recommended for all municipal WUGs in Newton County. Further discussion of these conservation strategies is provided in Chapter 5C. Table 5B.44 provides a summary of WUGs in Newton County, including their current water supply source(s), maximum need identified across the planning horizon (2030-2080), and recommended WMSs and WMSPs (if any).

Table 5B.44 Newton County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Bon Wier WSC	Gulf Coast Aquifer	0	Municipal Conservation
Brookeland FWSD [a]	Gulf Coast Aquifer	0	Municipal Conservation
County Other	Gulf Coast Aquifer	0	Municipal Conservation
Mauriceville SUD [a]	Gulf Coast Aquifer	0	Municipal Conservation
Newton	Gulf Coast Aquifer	0	Municipal Conservation
South Kirbyville Rural WSC [a]	Gulf Coast Aquifer	0	Municipal Conservation
South Newton WSC [a]	Gulf Coast Aquifer	0	Municipal Conservation
Irrigation	Gulf Coast Aquifer, Run-of-River	0	None
Manufacturing	Gulf Coast Aquifer, Run-of-River	0	None
Livestock	Gulf Coast Aquifer, Local Supplies	0	None
Mining	Gulf Coast Aquifer, Local Supplies	0	None
Steam Electric Power	SRA Canal System	0	None

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

5B.2.13 Orange County

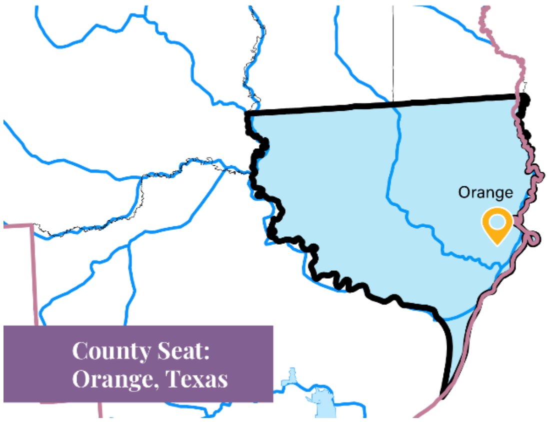


Figure 12 Orange County

Orange County, as shown in Figure 12, is located in the very southeastern corner of the ETRWPA bordering Louisiana. The county seat and largest city, Orange, forms the eastern corner of the Golden Triangle with Beaumont and Port Arthur (located in Jefferson County). The county is bordered on the west by the Neches River, on the east by the Sabine River, and on the southeast by Sabine Lake.

The majority of the water currently used in Orange County comes from the Gulf Coast Aquifer and the Sabine River, with a very small portion coming from the Neches River. According to the Groundwater Availability Model estimates, the total long-term sustainable groundwater availability from the Gulf Coast Aquifer in Orange County is estimated at approximately 25,000 ac-ft per year. Considering historical use, existing infrastructure, and projected demands, projected groundwater use in Orange County is estimated to between 22,000 to 22,500 acre-ft per year across the planning horizon (2030-2080). Considering existing supplies and projected demands, there is no projected need for any WUG located within Orange County across the planning period.

Due to most of the long-term sustainable groundwater availability being used in Orange County, it is recommended that any new large-scale water needs in the county be met with surface water supplies. Otherwise, it is recommended that entities currently using groundwater be allowed to remain on groundwater to meet their future growth, until such a time that a salt-water intrusion or subsidence problem is encountered.

There is a significant amount of surface water available in the Sabine River in Orange County. The SRA canal system, which is located in Orange County, has a conveyance capacity of 346,000 ac-ft per year. SRA has water rights of 147,100 ac-ft per year associated with the canal system (100,400 ac-ft per year for municipal and industrial use and 46,700 ac-ft per year for irrigation). There is a significant amount of supplies in the canal system available for future demands. SRA also has a large amount of uncontracted water in Toledo Bend Reservoir that could potentially be released through the dam and carried by the Sabine River for downstream use from the canal.

5B.2.13.1 <u>Orange County WCID 1</u>

There is no identified need for Orange County WCID 1 across the planning period (2030–2080) based on their projected demands and currently available supply. However, during WUG outreach efforts, South Orange County WCID 1 indicated to the ETRWPG that they are considering developing an additional groundwater well and associated infrastructure to provide supply to potential future water demands. Thus, a strategy is recommended for Orange County WCID 1 that involves the development of approximately 1,610 acre-feet per year from the Gulf Coast Aquifer in Jasper County. The conceptual design for this strategy involves one public supply well (capacity of 2,000 gpm) that produces groundwater from the Gulf Coast Aquifer, conveyance infrastructure (e.g., well collection piping, transmission pipeline, pump station, and storage tank), and a groundwater treatment system. In addition, municipal conservation is also a recommended strategy for the Orange County WCID 1. Municipal conservation is discussed further in Chapter 5C. Table 5B.45 and Table 5B.46 summarize the need and cost information associated with those strategies.

Table 5B.45 Recommended Water Management Strategies/Projects for Orange County WCID 1 – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	0	0	0	0	0
Recommended Water Management Strategies/Projects						
Municipal Conservation	53	118	148	141	134	122
New Well(s) in Gulf Coast Aquifer	1,610	1,610	1,610	1,610	1,610	1,610
TOTAL	**1,663**	**1,728**	**1,758**	**1,751**	**1,744**	**1,732**

Table 5B.46 Recommended Water Management Strategies/Projects for Orange County WCID 1 – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Municipal Conservation	53 - 148	$212,000	$41,500	$800	$2.46
New Well(s) in Gulf Coast Aquifer	1,610	$9,364,000	$1,512,000	$939	$2.88

5B.2.13.2 County Summary

No WUGs with needs were identified in Orange County. However, a strategy is recommended for Orange County WCID 1 to develop additional groundwater supplies to meet projected future demands. Additionally, conservation strategies were recommended for all municipal WUGs in the ETRWPA. Further discussion of these conservation strategies is provided in Chapter 5C. Table 5B.47 provides a summary of WUGs in Orange County, including their current water supply source(s), maximum need identified across the planning horizon (2030-2080), and recommended WMSs and WMSPs (if any).

Table 5B.47 Orange County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Bridge City	Gulf Coast Aquifer	0	Municipal Conservation
County Other	Gulf Coast Aquifer	0	Municipal Conservation
Kelly G Brewer	Gulf Coast Aquifer	0	Municipal Conservation
Mauriceville SUD [a]	Gulf Coast Aquifer	0	Municipal Conservation
Orange	Gulf Coast Aquifer	0	Municipal Conservation
Orange County WCID 1	Gulf Coast Aquifer	0	Municipal Conservation; New Wells (Gulf Coast Aquifer)
Orange County WCID 2	Gulf Coast Aquifer	0	Municipal Conservation
Orangefield WSC	Gulf Coast Aquifer	0	Municipal Conservation
Pinehurst	Gulf Coast Aquifer	0	Municipal Conservation
South Newton WSC [a]	Gulf Coast Aquifer	0	Municipal Conservation
Irrigation	Run-of-River, SRA Canal	0	None

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Livestock	Local Supply, Gulf Coast Aquifer	0	None
Manufacturing	Run-of-River, Gulf Coast Aquifer	0	None
Mining	Local Supply, Gulf Coast Aquifer	0	None
Steam Electric Power	SRA Canal, Gulf Coast Aquifer	0	None

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

5B.2.14 Panola County

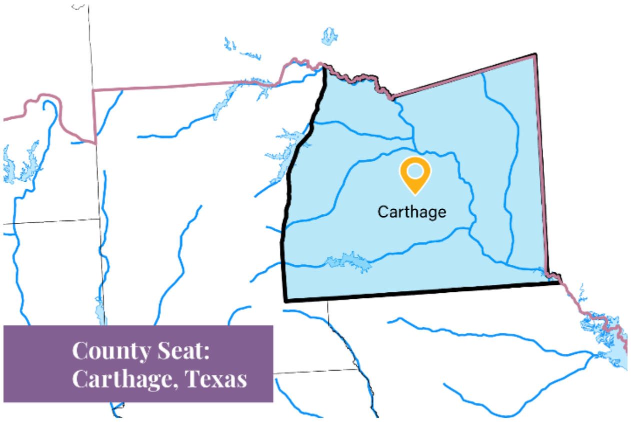


Figure 13 Panonla County

Panola County, as shown in Figure 13, is located in the far northeastern corner of the ETRWPA. The county has a total area of approximately 820 square miles. The County seat and largest city is Carthage.

Demands in Panola County are projected to be relatively consistent across the planning horizon (9,436 ac-ft per year in 2030 and 9,191 ac-ft per year by 2080) and can be met through existing supplies. Both groundwater from the Carrizo-Wilcox Aquifer and surface water supplies, mostly from Lake Murvaul, are used in Panola County. According to the Groundwater Availability Model estimates, the Carrizo-Wilcox Aquifer has a long-term availability of approximately 5,000 ac-ft/year in Panola County. Considering existing supplies and projected demands, there is no projected need for any WUG located within Panola County across the planning period.

Considering historical use, existing infrastructure, and projected demands, fresh groundwater supplies from the Carrizo-Wilcox Aquifer in the county are mostly developed. Because the long-term sustainable availability of the Carrizo-Wilcox Aquifer in Panola County has largely been reached, it is recommended that any new (not currently identified) large-scale water needs be met with surface water. It is recommended that entities that currently use groundwater remain on groundwater to meet their future growth until such time as groundwater is no longer a reliable supply. Any entities that are willing to convert to surface water should be encouraged to do so.

5B.2.14.1 County Summary.

Although no WUGs with needs were identified in Panola County, conservation strategies were recommended for all municipal WUGs in the ETRWPA. Further discussion of these conservation strategies is provided in Chapter 5C. Table 5B.48 provides a summary of WUGs in Panola County, including their current water supply source(s), maximum need identified across the planning horizon (2030-2080), and recommended WMSs and WMSPs (if any).

Table 5B.48 Panola County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Beckville	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Carthage	Carrizo-Wilcox Aquifer, Lake Murvaul (Panola Co. FWSD)	0	Municipal Conservation
Clayton WSC	Carrizo-Wilcox Aquifer, Sales from Carthage	0	Municipal Conservation
County Other	Carrizo-Wilcox Aquifer, Sales from Carthage	0	Municipal Conservation
Deberry WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Elysian Fields WSC [a, b]	Carrizo-Wilcox Aquifer	0	Region D WMS/WMSP

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Gill WSC [a, b]	Carrizo-Wilcox Aquifer, Sales from Marshall	0	Region D WMS/WMSP
Hollands Quarter WSC	Carrizo-Wilcox Aquifer, Sales from Carthage	0	Municipal Conservation
Minden Brachfield WSC [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Panola-Bethany WSC [a, b]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Rehobeth WSC	Sales from Carthage	0	Municipal Conservation
Tatum [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Irrigation	Carrizo-Wilcox Aquifer, Run-of-River	0	None
Livestock	Local Supply, Carrizo-Wilcox Aquifer	0	None
Manufacturing	Run-of-River, Carrizo-Wilcox Aquifer, Sales from Carthage	0	None
Mining	Run-of-River, Carrizo-Wilcox Aquifer, Lake Murvaul (Panola Co. FWSD), Toledo Bend Reservoir (SRA)	0	None
Steam Electric Power	None	0	None

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

[b] WUG spans multiple regions, and the maximum need shown reflects the combined needs across these regions. The water management strategies for these WUGs are discussed in their respective primary region plans.

5B.2.15 Polk County

Figure 14 Polk County

Polk County, as shown in Figure 14, is partially located in the ETRWPA and partially in Region H. Every WUG in the county uses water from groundwater supplies. The groundwater supplies are from the Gulf Coast, Yegua-Jackson, and Other-Undifferentiated aquifers. Local surface water supplies are also used to meet demands in Polk County. There is no projected need for any WUG located within Polk County during the planning period. Based on the groundwater availability estimates included in this plan, the Gulf Coast aquifer is sufficient to provide water to future demands that are expected to develop in Polk County.

5B.2.15.1 County Summary

Although no WUGs with needs were identified in Polk County, conservation strategies were recommended for all municipal WUGs in the ETRWPA. Further discussion of these conservation strategies is provided in Chapter 5C. Table 5B.49 provides a summary of WUGs in Polk County, including their current water supply source(s), maximum need identified across the planning horizon (2030-2080), and recommended WMSs and WMSPs (if any).

Table 5B.49 Polk County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
County-Other [b]	Other Aquifer, Golf Coast Aquifer System, Yegua-Jackson Aquifer	0	Region H WMS/WMSP
Lake Livingston WSC [b]	Other Aquifer, Golf Coast Aquifer System	0	Region H WMS/WMSP
Leggett WSC [b]	Region H RWP	0	Region H WMS/WMSP
Soda WSC [b]	Golf Coast Aquifer System	0	Region H WMS/WMSP
Corrigan	Gulf Coast Aquifer System	0	Municipal Conservation
Damascus-Stryker WSC	Yegua-Jackson Aquifer	0	Municipal Conservation
Moscow WSC [a,b]	Gulf Coast Aquifer System	0	Municipal Conservation
Manufacturing [b]	Gulf Coast Aquifer System (City of Corrigan), Gulf Coast Aquifer System	0	None

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

[b] WUG spans multiple regions, and the maximum need shown reflects the combined needs across these regions. The water management strategies for these WUGs are discussed in their respective primary region plans.

5B.2.16 Rusk County

Figure 15 Rusk County

Rusk County, as shown in Figure 15, is located in the northern end of the ETRWPA and is split between the Neches and Sabine River Basins. The county has a total area of approximately 920 square miles. The county seat and largest city in the county is Henderson.

Surface water and groundwater are used for water supply in Rusk County. The water sources used by most WUGs in Rusk County include the Neches and Sabine Rivers, the Carrizo-Wilcox, Queen City, and Other-Undifferentiated aquifers, and local supplies. Otherwise, the City of Henderson receives water from Lake Fork (SRA), while steam electric power users have a permit to use Martin Lake and receive water from the Toledo Bend Reservoir (SRA). During the duration of the planning horizon, there are projected water needs identified for Jacobs WSC; however, there are sufficient supplies available to meet these identified needs.

Rusk County Refinery is a potential manufacturing water user that has approached Angelina & Neches River Authority for a water supply contract. The contract amount for this entity is approximately 5,600 ac-ft/year. It should be noted that the overall projections for manufacturing demand in Rusk County are at a maximum amount of 34 ac-ft/year. It is believed that the Rusk County Refinery demands were not accounted for the regional water planning demand projections. WMSs for Rusk County Refinery are not discussed in this section because the demand is not included in the regional water planning demand projections. However, Angelina & Neches River Authority is identified as the seller to this entity and a WMS is discussed in the WMS discussion for major water providers.

5B.2.16.1 Jacobs WSC

All current water supplies for Jacobs WSC are from groundwater in the Carrizo-Wilcox Aquifer. Beginning in 2070, there is an identified need of 26 ac-ft/year shown due to slightly increasing demands over the planning horizon compared to their existing infrastructure constraints. The recommended strategy for Jacobs WSC to meet its need is to develop additional groundwater in the Carrizo-Wilcox Aquifer. Since the need is relatively minimal (less than 10 percent of demand), rather than drilling new wells, this WUG could also consider increasing the pumping rate of their current well system to meet their future demands if there are no infrastructure limitations. Table 5B.50 and Table 5B.51 summarize the need and cost information associated with those strategies.

Table 5B.50 Recommended Water Management Strategies/Projects for Jacobs WSC – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	0	0	0	(26)	(58)
Recommended Water Management Strategies/Projects						
Municipal Conservation	2	2	2	2	2	2
New Well(s) in Carrizo-Wilcox Aquifer	0	0	0	0	60	60

TOTAL	**2**	**2**	**2**	**2**	**62**	**62**

Table 5B.51 Recommended Water Management Strategies/Projects for Jacobs WSC – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Municipal Conservation	2	$24,000	$2,200	$1,400	$4.30
New Well(s) in Carrizo-Wilcox Aquifer	60	$5,975,000	$738,000	$12,300	$37.74

5B.2.16.2 Gaston WSC

There is no identified need for Gaston WSC across the planning period (2030–2080) based on their projected demands and currently available supply. However, during WUG outreach efforts, Gaston WSC indicated to the ETRWPG that they are considering developing an additional groundwater well and associated infrastructure to provide supply to potential future water demands. Thus, a strategy is recommended for Gaston WSC that involves the development of approximately 130 acre-feet per year from the Carrizo-Wilcox Aquifer in Rusk County. The conceptual design for this strategy involves one public supply well (capacity of 150 gpm) that produces groundwater from the Carrizo-Wilcox Aquifer, conveyance infrastructure (e.g., well collection piping, transmission pipeline, pump station, and storage tank), and a groundwater treatment system. In addition, municipal conservation is also a recommended strategy for the Gaston WSC. Municipal conservation is discussed further in Chapter 5C. Table 5B.52 and Table 5B.53 summarize the need and cost information associated with those strategies.

Table 5B.52 Recommended Water Management Strategies/Projects for Gaston WSC – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	0	0	0	0	0
Recommended Water Management Strategies/Projects						
Municipal Conservation	1	1	1	1	1	1
New Well(s) in Carrizo-Wilcox Aquifer	0	130	130	130	130	130
TOTAL	**1**	**131**	**131**	**131**	**131**	**131**

Table 5B.53 Recommended Water Management Strategies/Projects for Gaston WSC – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Municipal Conservation	1	$10,000	$900	$1,200	$3.68
New Well(s) in Carrizo-Wilcox Aquifer	130	$3,700,000	$525,000	$3,492	$10.72

5B.2.16.3 Southern Utilities

There are no identified needs for Southern Utilities in the Rusk County portion of the WUG in Region I, but there are some needs identified in the portion in Smith County. A discussion of the WMSs and WMSPs developed to meet this need is described in the Smith County section of this chapter (Section 5B.2.18).

5B.2.16.4 County Summary

The only identified needs in Rusk County are associated with Jacobs WSC. Development of additional groundwater supplies is recommended to meet these needs. A strategy is also recommended for Gaston WSC to develop additional groundwater supplies to meet projected future demands. Additionally, conservation strategies were recommended for all municipal WUGs in the 2026 ETRWP. Further discussion of these conservation strategies is provided in Chapter 5C. Table 5B.54 provides a summary of WUGs in Rusk County, including their current water supply source(s), maximum need identified across the planning horizon (2030-2080), and recommended WMSs and WMSPs (if any).

Table 5B.54 Rusk County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Chalk Hill SUD [a, b]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
County Other	Carrizo-Wilcox, Other Undifferentiated Aquifers	0	Municipal Conservation
Cross Roads SUD [a, b]	Carrizo-Wilcox Aquifer, Sales from Kilgore	0	Municipal Conservation
Crystal Farms WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Ebenezer WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Elderville WSC [a,b]	Carrizo-Wilcox Aquifer, Sales from Longview	0	Region D WMS/WMSP
Gaston WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation, New Wells (Carrizo-Wilcox Aquifer)
Goodsprings WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Henderson	Carrizo-Wilcox Aquifer, Sales from SRA (Lake Fork) and AN WCID 1 (Striker Lake)	0	Municipal Conservation
Jacobs WSC	Carrizo-Wilcox Aquifer	58	Municipal Conservation, New Wells (Carrizo-Wilcox Aquifer)
Kilgore [a, b]	Carrizo-Wilcox Aquifer, Sales from SRA (Lake Fork)	0	Region D WMS/WMSP
Minden Brachfield WSC [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
MT Enterprise WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
New London	Carrizo-Wilcox Aquifer	0	Municipal Conservation
New Prospect WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Overton [a, b]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
South Rusk County WSC [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Southern Utilities Inc. [a, b]	Carrizo-Wilcox Aquifer, Sales from Tyler (Carrizo-Wilcox Aquifer, Lake Tyler, Lake Palestine)	0	Municipal Conservation
Tatum [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
West Gregg SUD [a, b]	Carrizo-Wilcox Aquifer	0	Region D WMS/WMSP
Wright City WSC [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Irrigation	Carrizo-Wilcox Aquifer, Run-of-River, Other Undifferentiated	0	None
Manufacturing	Carrizo-Wilcox Aquifer, Run-of-River	0	None
Livestock	Carrizo-Wilcox, Queen City Aquifers, Local Supply	0	None
Mining	Carrizo-Wilcox, Other Undifferentiated Aquifers, Run-of-River	0	None
Steam Electric Power	Carrizo-Wilcox, Martin Lake, Toledo Bend Reservoir (SRA)	1,103	None

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

[b] WUG spans multiple regions, and the maximum need shown reflects the combined needs across these regions. The water management strategies for these WUGs are discussed in their respective primary region plans.

5B.2.17 Sabine County

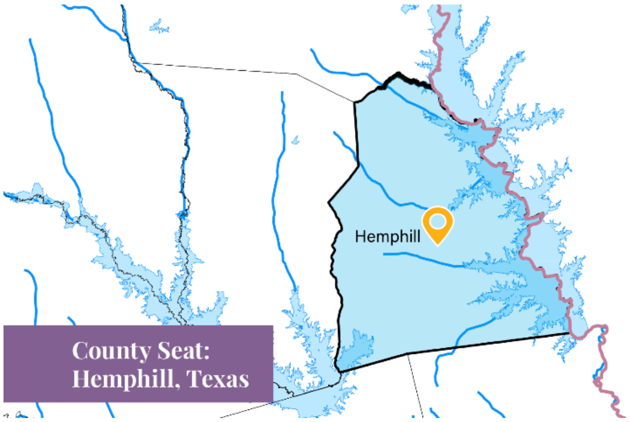


Figure 16 Sabine County

Water supply sources currently used in Sabine County, shown in Figure 16, include the Carrizo-Wilcox, Yegua-Jackson and Other-Undifferentiated aquifers, Toledo Bend Reservoir, and local surface supplies. The total available supply from groundwater in Sabine County is 6,100 ac-ft/year. Of this amount, about 1,400 ac-ft/year is currently being used. This leaves considerable groundwater for future supplies. In addition, Toledo Bend Reservoir, which is located along the eastern border of Sabine County, has available supply (through contracts with SRA). Currently, there are no shortages for WUGs in Sabine County.

5B.2.17.1 <u>Livestock</u>

The current water supply sources for livestock in Sabine County are local surface water supply and groundwater from Yegua-Jackson, Carrizo-Wilcox, Sparta, and Other-undifferentiated aquifers. The needs are stem from increasing demand. The WMS recommended to meet the needs is to install new wells at Yegua-Jackson Aquifer. Table 5B.55 and Table 5B.56 summarize the need and cost information associated with those strategies.

Table 5B.55 Recommended Water Management Strategies/Projects for Sabine County Livestock – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	0	0	(97)	(96)	(96)
Recommended Water Management Strategies/Projects						
New Wells (Yegua-Jackson)	0	0	0	100	100	100
TOTAL	**0**	**0**	**0**	**100**	**100**	**100**

Table 5B.56 Recommended Water Management Strategies/Projects for Sabine County Livestock – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
New Wells (Yegua-Jackson)	100	$601,000	$47,000	$470	$1.44

5B.2.17.2 <u>County Summary</u>

Although no WUGs with needs were identified in Polk County, conservation strategies were recommended for all municipal WUGs in the ETRWPA. Further discussion of these conservation strategies is provided in Chapter 5C. Table 5B.57 provides a summary of WUGs in Polk County, including their current water supply source(s), maximum need identified across the planning horizon (2030-2080), and recommended WMSs and WMSPs (if any).

Table 5B.57 Sabine County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Brookeland FWSD [a]	Carrizo-Wilcox Aquifer, Gulf Coast Aquifer System, Yegua-Jackson Aquifer	0	Municipal Conservation
County-Other, Sabine	Carrizo-Wilcox Aquifer, Carrizo-Wilcox Aquifer (County-Other, Shelby), Other Aquifer, Sparta Aquifer, Toledo Bend Lake/Reservoir (Sabine River Authority)	0	Municipal Conservation
G M WSC [a]	Carrizo-Wilcox Aquife, Toledo Bend Lake/Reservoir (Sabine River Authority), Yegua-Jackson Aquifer (City of Pineland)	0	Municipal Conservation
Hemphill	Toledo Bend Lake/Reservoir (Sabine River Authority)	0	Municipal Conservation
Pineland	Yegua-Jackson Aquifer	0	Municipal Conservation
Livestock, Sabine	Carrizo-Wilcox Aquifer, Neches Livestock Local Supply, Sabine Livestock Local Supply, Sparta Aquifer, Yegua-Jackson Aquifer	97	New Wells (Yegua-Jackson)
Manufacturing, Sabine	Direct Reuse, Neches Run-of-River, Other Aquifer, Yegua-Jackson Aquifer (City of Pineland)	0	None
Mining, Sabine	Other Aquifer, Toledo Bend Lake/Reservoir (Sabine River Authority)	0	None

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

5B.2.18 San Augustine County

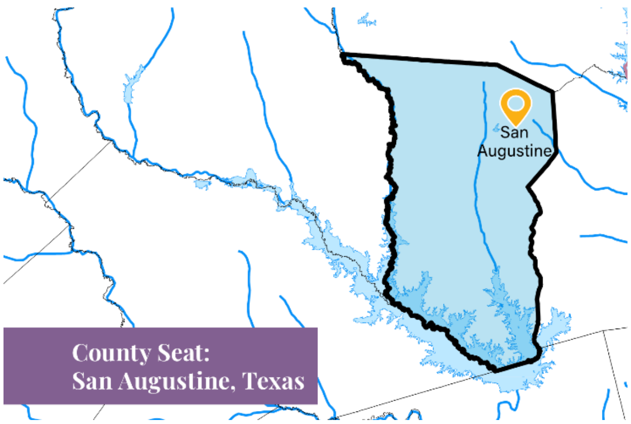


Figure 17 San Augustine County

San Augustine County, as shown in Figure 17, is located in the northeast of the ETRWPA and is split between the Neches and Sabine River Basins. The county has a total area of approximately 590 square miles. The County seat and largest city is San Augustine.

Current water supplies for the county include groundwater from the Carrizo-Wilcox, Sparta, and Yegua-Jackson aquifers and surface water from San Augustine Lake and local supplies. Considering existing supplies and projected demands, there is no projected need for any WUG located within Panola County across the planning period.

5B.2.18.1 County Summary

Although no WUGs with needs were identified in San Augustine County, conservation strategies were recommended for all municipal WUGs in the ETRWPA. Further discussion of these conservation strategies is provided in Chapter 5C. Table 5B.58 provides a summary of WUGs in San Austine County, including their current water supply source(s), maximum need identified across the planning horizon (2030-2080), and recommended WMSs and WMSPs (if any).

Table 5B.58 San Augustine County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
County Other	All Aquifers, San Augustine Lake	0	Municipal Conservation
Denning WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
G-M WSC [a]	Carrizo-Wilcox Aquifer, Toledo Bend Reservoir (SRA)	0	Municipal Conservation
New WSC [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
San Augustine	Carrizo-Wilcox Aquifer, San Augustine Lake	0	Municipal Conservation
San Augustine Rural WSC	Carrizo-Wilcox Aquifer, Sales from San Augustine	0	Municipal Conservation
Irrigation	Carrizo-Wilcox Aquifer	0	None
Livestock	Carrizo-Wilcox Aquifer	0	None
Manufacturing	Carrizo-Wilcox Aquifer	0	None
Mining	All Aquifers, San Augustine Lake (San Augustine)	0	None
Steam Electric Power	None	0	None

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

5B.2.19 Shelby County

Figure 18 Shelby County

Shelby County, which is located in the northeastern part of the region and shown in Figure 18, uses groundwater from the Carrizo-Wilcox aquifer and surface water from Toledo Bend Reservoir, Lake Pinkston, and Center Lake. The two largest water use categories in the county are municipal and livestock, and this livestock demand is expected to nearly double by 2080 with a projected growth rate less than the projected growth rate from the 2026 RWP. The other major demand center is the City of Center and its customers. The only WUG wih a projected need is the manufacturing water users. The Carrizo-Wilcox aquifer has a long-term availability of 6,300 ac-ft/year, and its estimated current use is approximately 5,200 ac-ft/year. There is some groundwater available for development and considerable supply available from Toledo Bend Reservoir. However, a Toledo Bend Reservoir strategy would require infrastructure development to treat and deliver the water to areas with needs. A long-term shift of water supply to surface water may be needed to address future water needs.

5B.2.19.1 <u>Manufacturing</u>

Current supplies for manufacturing water users include City of Center and groundwater from the Carrizo-Wilcox and Tenaha aquifers. The current supplies are insufficient to meet the projected demand in 2030. It is anticipated that growth in manufacturing will be supplied by City of Center. The recommended strategy to meet the projected needs of Manufacturing in Shelby County is to contract for purchase water from Center. Table 5B.59 and Table 5B.60 summarize the need and cost information associated with those strategies.

Table 5B.59 Recommended Water Management Strategies/Projects for Shelby County Manufacturing – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	(841)	(934)	(1,053)	(1,148)	(1,239)	(1,325)
Recommended Water Management Strategies/Projects						
Purchase from Center	850	940	1060	1150	1240	1330
TOTAL	**850**	**940**	**1060**	**1150**	**1240**	**1330**

The cost estimates for this strategy represent raw water purchase costs as well as the necessary conveyance infrastructure including a 5-mile water main, storage tanks and pump stations. Purchased water costs for this strategy were established at a regional rate chosen for the anticipated category of use within the region. Actual purchased water costs will be determined during contract negotiations between provider and prospective buyers.

Table 5B.60 Recommended Water Management Strategies/Projects for Shebly County Manufacturing – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Purchase from Center	850 - 1,330	$13,000	$2,200	$800	$2.46

5B.2.19.2 County Summary

Table 5B.61 is a summary of WUGs in Shelby County, current water supply sources, and recommended WMSs (if any).

Table 5B.61 Shelby County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Center	Center Lake/Reservoir, Pinkston Lake/Reservoir	0	Municipal Conservation
Choice WSC [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
County-Other, Shelby	Carrizo-Wilcox Aquifer, Center Lake/Reservoir (City of Center), Pinkston Lake/Reservoir (City of Center), Timpson Lake/Reservoir, Toledo Bend Lake/Reservoir (City of Joaquin)	0	Municipal Conservation
East Lamar WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Flat Fork WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Huxley	Toledo Bend Lake/Reservoir (Sabine River Authority)	0	Municipal Conservation
Joaquin	Toledo Bend Lake/Reservoir (Joaquin)	0	Municipal Conservation
McClelland WSC	Carrizo-Wilcox Aquifer (McClelland WSC)	0	Municipal Conservation
Sand Hills WSC [a]	Carrizo-Wilcox Aquifer (Sand Hills WSC), Center Lake/Reservoir (City of Center), Pinkston Lake/Reservoir (City ofCenter)	0	Municipal Conservation
Tenaha	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Timpson	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Irrigation	Carrizo-Wilcox Aquifer	0	None
Livestock	Carrizo-Wilcox Aquifer, Neches Livestock Local Supply, Sabine Livestock Local Supply	0	None

Manufacturing	Carrizo-Wilcox Aquifer, Carrizo-Wilcox Aquifer (City of Tenaha), Center Lake/Reservoir (City of Center), Direct Reuse, Pinkston Lake/Reservoir (City of Center)	1,325	Purchase from Center
Mining	Carrizo-Wilcox Aquifer, Toledo Bend Lake/Reservoir (Sabine River Authority)	0	None

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

5B.2.20 Smith County

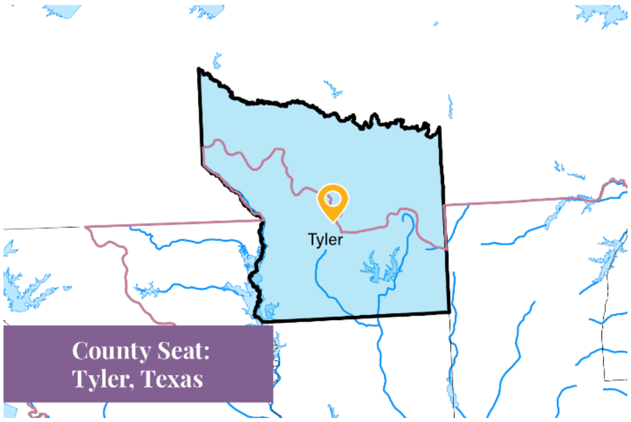


Figure 19 Smith County

Smith County, as shown in Figure 19, is located partially in the ETRWPA and partially in Region D. Almost all of the supplies in Smith County in the ETRWPA come from City of Tyler sources and from groundwater supplies. A small amount of water is supplied from Lake Jacksonville through the Cherokee WSC. The City of Tyler currently utilizes surface water from Lakes Tyler and Tyler East, Bellwood Lake and Lake Palestine. About half of Tyler's current supply is from the Carrizo-Wilcox aquifer.

The groundwater in Smith County is heavily used for water supply. Current combined well capacity from the Carrizo-Wilcox aquifer, the county's largest groundwater supply, is about 96% to 98% the Modeled Available Groundwater (MAG).

5B.2.20.1 County Other

The County-other entities in Smith County are currently supplied with groundwater from the Carrizo-Wilcox and Queen City aquifers and the City of Tyler. Based on available data, it is estimated that there is not sufficient water to meet the demand of these entities in 2030, though the demand projection is decreasing in the 50-year planning horizon. The WMS to close the supply gap is to increase the supply contract with the City of Tyler. Table 5B.62 and Table 5B.63 summarize the need and cost information associated with those strategies.

Table 5B.62 Recommended Water Management Strategies/Projects for County Other, Smith County – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	(273)	(143)	(33)	0	0	0
Recommended Water Management Strategies/Projects						
Purchase from Tyler	280	150	40	0	0	0
Municipal Conservation	7	6	6	5	5	4
TOTAL	**287**	**156**	**46**	**5**	**5**	**4**

The cost estimates for this strategy represent raw water purchase costs as well as the necessary conveyance infrastructure including a 10-mile water main, storage tanks and pump stations. Purchased water costs for this strategy were established at a regional rate chosen for the anticipated category of use within the region. Actual purchased water costs will be determined during contract negotiations between provider and prospective buyers.

Table 5B.63 Recommended Water Management Strategies/Projects for County Other, Smith County – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Municipal Conservation	40 - 280	$16,362,000	$1,615,000	$5,768	$17.70
Purchase from Tyler (Lake Palestine)	4 - 7	$216,000	$17,400	$2,400	$7.37

5B.2.20.2 LIBERTY UTILITIES SILVERLEAF WATER

Liberty Utilities Silverleaf Water is primary located in Region D with maximum projected needs of 524 ac-ft. Refer to the Region D RWP for WMSs to meet its needs.

5B.2.21 Southern Utilities

The current supply for the Southern Utilities is the Carrizo-Wilcox aquifer and Lake Tyler. The City's supply is limited by well capacities and MAG limit, and water shortages are projected to begin in 2030. The recommended WMSs for Southern Utilities are amendment to supplemental contract with City of Tyler and municipal conservation. Notably, Southern Utilities has a recent real water loss of 31%, thus, it is highly economical and effective for Southern Utilities to manage its real water loss through main replacement and ongoing leak detection and management. See Chapter 5C for additional information on water conservation. Table 5B.64 and Table 5B.65 summarize the need and cost information associated with those strategies.

Table 5B.64 Recommended Water Management Strategies/Projects for Southern Utilities – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	0	0	0	68	401
Recommended Water Management Strategies/Projects						
Amendment to Supplemental Contract with City of Tyler	0	0	0	0	70	410
Municipal Conservation	680	1,815	2,438	2,552	2,668	2,786
TOTAL	**680**	**1,815**	**2,438**	**2,552**	**2,738**	**3,196**

The cost estimates for the contract amendment represent raw water purchase costs only. Purchased water costs for this strategy were established at a regional rate chosen for the anticipated category of use within the region. Actual purchased water costs will be determined during contract negotiations between provider and prospective buyers.

Table 5B.65 Recommended Water Management Strategies/Projects for Southern Utilities– Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Amendment to Supplemental Contract with City of Tyler	70 - 410	$0	$670,000	$1,634	$5.02
Municipal Conservation	680 - 2,786	$931,000	$313,100	$500	$1.53

5B.2.21.1 Manufacturing

Manufacturing water users in Smith County, which are located in both Region D and I Regional Water Planning Areas, is expected to have shortages beginning in 2050 at 43 ac-ft/year and increasing to 567 ac-ft/year by 2080. It is recommended that the manufacturing shortage be met through the purchase of additional supplies from the City of Tyler. This strategy will address the shortages for the manufacturing WUG both in ETRWPA and Region D Regional Water Planning Area.

Purchased water costs for this strategy were established at a regional rate chosen for the anticipated category of use within the region. Actual purchased water costs will be determined during contract negotiations between provider and prospective buyers. It is assumed that the potential manufacturing customers will construct a raw water transmission system to transfer supplies from the City of Tyler supply sources. Cost estimates include capital cost for a 5-mile pipeline, pump stations, and storage tanks. Table 5B.66 and Table 5B.67 summarize the need and cost information associated with those strategies.

Table 5B.66 Recommended Water Management Strategies/Projects for Smith County Manufacturing – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	0	0	(43)	(413)	(497)	(567)
Recommended Water Management Strategies/Projects						
Purchase from Tyler	0	0	50	420	500	570
TOTAL	**0**	**0**	**50**	**420**	**500**	**570**

Table 5B.67 Recommended Water Management Strategies/Projects for Smith County Manufacturing – Supply Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Purchase from Tyler	50 - 570	$50,202,000	$4,295,000	$5,461	$16.76

5B.2.21.2 Mining

Mining water users in Smith County, which are located in both Region D and I Regional Water Planning Areas, is expected to have shortages beginning in 2030 at 314 ac-ft/year and increasing to 421 ac-ft/year by 2080. It is recommended that the mining shortage be met through the purchase of additional supplies from the City of Tyler. This strategy will address the shortages for the mining WUG both in ETRWPA and Region D Regional Water Planning Area.

Purchased water costs for this strategy were established at a regional rate chosen for the anticipated category of use within the region. Actual purchased water costs will be determined during contract negotiations between provider and prospective buyers. It is assumed that the potential manufacturing customers will construct a raw water transmission system to transfer supplies from the City of Tyler supply sources. Cost estimates include capital cost for a 10-mile pipeline, pump stations, and storage tanks. Table 5B.68 and Table 5B.69 summarize the need and cost information associated with those strategies.

Table 5B.68 Recommended Water Management Strategies/Projects for Smith County Mining – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	(314)	(333)	(353)	(374)	(397)	(421)
Recommended Water Management Strategies/Projects						
Purchase from Tyler	320	340	360	380	400	430
TOTAL	**320**	**340**	**360**	**380**	**400**	**430**

Table 5B.69 Recommended Water Management Strategies/Projects for Smith County Mining – Supply Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Purchase from Tyler	320 - 430	$17,996,000	$1,890,000	$4,395	$13.49

5B.2.21.3 County Summary

Table 5B.70 is a summary of WUGs in Shelby County, current water supply sources, and recommended WMSs (if any).

Table 5B.70 Smith County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Carroll WSC [a, b]	Refer to the Region D RWP	98	Region D WMS/WMSP
Crystal Systems Texas [b]	Refer to the Region D RWP	443	Region D WMS/WMSP
Lindale [b]	Refer to the Region D RWP	158	Region D WMS/WMSP
Lindale Rural WSC [b]	Refer to the Region D RWP	756	Region D WMS/WMSP
Arp	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Bullard [a]	Carrizo-Wilcox Aquifer, Carrizo-Wilcox Aquifer	0	Municipal Conservation

	(City of Jacksonville), Jacksonville Lake/Reservoir (City of Jacksonville)		
County-Other, Smith [a]	Carrizo-Wilcox Aquifer, Gladewater Lake/Reservoir (City of Gladewater), Palestine Lake/Reservoir (Upper Neches River Municipal Water Authority), Queen City Aquifer, Tyler Lake/Reservoir (City of Tyler)	273	Purchase from Tyler (Lake Palestine); Municipal Conservation
Dean WSC	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Emerald Bay MUD	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Jackson WSC b	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Southern Utilities [a,b]	Carrizo-Wilcox Aquifer, Palestine Lake/Reservoir (Upper Neches River Municipal Water Authority), Tyler Lake/Reservoir (City of Tyler)	401	Amendment to Supplemental Contract with City of Tyler; Municipal Conservation
Troup [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Tyler [b]	Palestine Lake/Reservoir (Upper Neches River Municipal Water Authority), Tyler Lake/Reservoir	0	Municipal Conservation
Walnut Grove WSC [a]	Carrizo-Wilcox Aquifer, Palestine Lake/Reservoir (Upper Neches River Municipal Water Authority), Tyler Lake/Reservoir (City of Tyler)	0	Municipal Conservation
Whitehouse	Carrizo-Wilcox Aquifer, Palestine Lake/Reservoir (Upper Neches River Municipal Water Authority), Tyler Lake/Reservoir (City of Tyler)	0	Municipal Conservation
Wright City WSC [a]	Carrizo-Wilcox Aquifer	0	Municipal Conservation
Irrigation, Smith	Bellwood Lake/Reservoir (City of Tyler), Carrizo-Wilcox Aquifer, Neches Run-of-River, Palestine Lake/Reservoir (Upper Neches River Municipal	0	None

	Water Authority), Queen City Aquifer		
Livestock, Smith	Neches Livestock Local Supply, Queen City Aquifer	0	None
Manufacturing, Smith	Carrizo-Wilcox Aquifer, Carrizo-Wilcox Aquifer (Southern Utilities), Other Aquifer , Palestine Lake/Reservoir (Upper Neches River Municipal Water Authority), Queen City Aquifer, Tyler Lake/Reservoir (City of Tyler)	567	Purchase from Tyler
Mining, Smith	Carrizo-Wilcox Aquifer, Other Aquifer	421	Purchase from Tyler

[b] WUG spans multiple regions, and the maximum need shown reflects the combined needs across these regions. The water management strategies for these WUGs are discussed in their respective primary region plans.

5B.2.22 Trinity County

Figure 20 Trinity County

The county, as shown in Figure 20, is partially located in the ETRWPA and partially in Region H. Supplies include surface water from local supplies and the Neches River as well as groundwater from the Carrizo-Wilcox, Queen City, Sparta, Yegua-Jackson, and Other-Undifferentiated aquifers. Municipal demands in Trinity County are less than a tenth of one percent of the ETRWPA's total municipal demand. There is only one non-municipal WUG with a projected shortage, which is irrigation WUG.

5B.2.22.1 Irrigation

Irrigation water users in Smith County, located in both Region H and I Regional Water Planning Areas, are expected to have shortages beginning in 2030 at 215 ac-ft/year. It is recommended that the mining shortage be met through installing new wells in the Yegua-Jackson aquifer. This strategy will address the shortages for the irrigation WUG both in ETRWPA and Region H Regional Water Planning Area.

The cost of this strategy includes the construction of well fields and the necessary conveyance infrastructure. Table 5B.71 and Table 5B.72 summarize the need and cost information associated with those strategies.

Table 5B.71 Recommended Water Management Strategies/Projects for Trinity County Irrigation – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	(215)	(215)	(215)	(215)	(215)	(215)
Recommended Water Management Strategies/Projects						
New Wells (Yegua-Jackson)	220	220	220	220	220	220
TOTAL	**220**	**220**	**220**	**220**	**220**	**220**

Table 5B.72 Recommended Water Management Strategies/Projects for Trinity County Irrigation – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
New Wells (Yegua-Jackson)	220	$646,000	$52,000	$236	$0.73

5B.2.22.2 County Summary

Table 5B.73 is a summary of WUGs in Trinity County, current water supply sources, and recommended WMSs (if any).

Table 5B.73 Trinity County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Groveton [b]	Yegua-Jackson Aquifer	0	Region H WMS/WMSP
Centerville WSC	Yegua-Jackson Aquifer (Centerville WSC)	0	Municipal Conservation
County-Other, Trinity	Gulf Coast Aquifer System (County-Other, Trinity), Livingston-Wallisville Lake/Reservoir System (Trinity River Authority), Other Aquifer (County-Other, Trinity), Yegua-Jackson Aquifer (County-Other, Trinity)	0	Municipal Conservation
Pennington WSC [a, b]	Yegua-Jackson Aquifer (Pennington WSC)	0	Municipal Conservation
Irrigation	Neches Run-of-River (Irrigation, Trinity), Yegua-Jackson Aquifer (Irrigation, Trinity)	215	New Wells (Yegua-Jackson)
Livestock	Neches Livestock Local Supply (Livestock, Trinity), Yegua-Jackson Aquifer (Livestock, Trinity)	0	None
Mining	Yegua-Jackson Aquifer (Mining, Trinity)	0	None

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

[b] WUG spans multiple regions, and the maximum need shown reflects the combined needs across these regions. The water management strategies for these WUGs are discussed in their respective primary region plans.

5B.2.23 Tyler County

Figure 21 Tyler County

Current supplies in Tyler County, shown in Figure 21, include groundwater from the Gulf Coast aquifer and surface water from Sam Rayburn Reservoir (LNVA), the Neches River, and local supplies. Tyler County represents approximately one percent of the total municipal demand in the ETRWPA and has a total county demand of approximately 4,000 ac-ft/year IN 2030. There is no projected need for any WUG located within Tyler County during the planning period except the manufacturing water users. Based on the water availability estimates included in this plan, there is sufficient water to provide expected future demands in Tyler County with the recommended WMS.

5B.2.23.1 Manufacturing

The current supplies of manufacturing water users is the Gulf Coast aquifer, and the projected shortage is due to well capacity. The projected shortage is expected to begin in 2030 at 78 ac-ft/year. It is recommended that the mining shortage be met through installing new wells in the Gulf Coast aquifer.

The cost of this strategy includes the construction of well fields and the necessary conveyance infrastructure. Table 5B.74 and Table 5B.75 summarize the need and cost information associated with those strategies.

Table 5B.74 Recommended Water Management Strategies/Projects for Tyler County Manufacturing – Supply Summary

	Quantity (ac-ft/year)					
	2030	2040	2050	2060	2070	2080
Need (Demand – Supply)	(78)	(82)	(87)	(92)	(97)	(102)
Recommended Water Management Strategies/Projects						
New Wells (Gulf Coast)	110	110	110	110	110	110
TOTAL	**110**	**110**	**110**	**110**	**110**	**110**

Table 5B.75 Recommended Water Management Strategies/Projects for Tyler County Manufacturing – Cost Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
New Wells (Gulf Coast)	110	$607,000	$49,000	$445	$1.37

5B.2.23.2 County Summary

Table 5B.76 is a summary of WUGs in Tyler County, current water supply sources, and recommended WMSs (if any).

Table 5B.76 Tyler County Summary

Water User Group	Current Water Supply Source(s)	Maximum Need (ac-ft/year)	Recommended Water Management Strategies/Projects
Chester WSC [a]	Gulf Coast Aquifer System	0	Municipal Conservation
Colmesneil	Gulf Coast Aquifer System	0	Municipal Conservation
County-Other, Tyler	Gulf Coast Aquifer System	0	Municipal Conservation
Cypress Creek WSC	Gulf Coast Aquifer System	0	Municipal Conservation
Seneca WSC	Gulf Coast Aquifer System	0	Municipal Conservation
Tyler County SUD	Gulf Coast Aquifer System	0	Municipal Conservation
Warren WSC	Gulf Coast Aquifer System	0	Municipal Conservation
Woodville	Gulf Coast Aquifer System, Sam Rayburn-Steinhagen Lake/Reservoir System (Lower Neches Valley Authority)	0	Municipal Conservation
Irrigation	Gulf Coast Aquifer System, Neches Run-of-River	0	Municipal Conservation
Livestock	Gulf Coast Aquifer System, Neches Livestock Local Supply	0	Municipal Conservation
Manufacturing	Gulf Coast Aquifer System	102	New Wells (Gulf Coast)
Mining	Gulf Coast Aquifer System, Neches Other Local Supply	0	None
Steam-Electric Power	Gulf Coast Aquifer System	0	None

[a] WUG spans multiple counties, and the maximum need shown reflects the combined needs for across all counties.

5B.3 MAJOR WATER PROVIDERS

This section provides discussions for Major Water Providers (MWPs) located in the ETRWPA that meet one of the following criteria:

- The entity has a projected shortage in supplies based on either demands or contracts of current customers and current reliable supplies. These MWPs include Athens MWA, Beaumont, Center, and Upper Neches River Municipal Water Authority (UNRMWA).

- The entity has supply sources in the ETRWPA that are listed as WMSs for WUGs outside the Region. LNVA and UNRMWA are included under this criterion.

- The entity is currently pursuing WMSs to increase the reliability and/or distribution of their supplies. These include Athens MWA, Beaumont, Center, Houston County WCID #1, Jacksonville, LNVA, Lufkin, Nacogdoches, and Tyler.

A management supply factor (MSF) is the ratio of an entities total volume of existing water supplies plus total volume of recommended WMS supplies to the total decadal water demand. A value over 1.0 represents an entity with a surplus of projected supplies while a value less than 1.0 represents an entity with a deficit of projected supplies, or an unmet need. Appendix 5B-C presents the MSF for each MWP for each decade in the planning period. All MWPs have an MSF of at least 1.0 with values ranging from 1.0 for the City of Beaumont in 2060 to 10.63 for Sabine River Authority in every decade.

5B.3.1 Angelina & Neches River Authority

Angelina & Neches River Authority is the sponsor for the Lake Columbia project on Mud Creek in Cherokee and Rusk Counties. Lake Columbia is a recommended strategy in the 2021 and 2026 Plan. Angelina & Neches River Authority has been granted a water right permit (Permit No. 4228) by the TCEQ to impound 195,500 ac-ft and to divert 85,507 ac-ft/yr (76.3 MGD) for municipal and industrial purposes. Angelina & Neches River Authority currently has contracted customers for 53 percent of the 85,507 ac-ft/yr permitted supply of the proposed Lake Columbia. In addition, Angelina & Neches River Authority has been approached to supply water for mining purposes in Nacogdoches and San Augustine counties. The mining demand will be met with run-of-the-river diversions.

The water suppliers currently under contract with Angelina & Neches River Authority for water from Lake Columbia are listed with current participation percentage in Table 5B.77. Also included is Table 5B.78 showing additional contracted customers Angelina & Neches River Authority and the corresponding demand. The WMSs for Angelina & Neches River Authority were developed to address the total customer demand.

There are two recommended strategies for Angelina & Neches River Authority in the 2026 Plan. They are 1) construction of Lake Columbia and 2) Angelina & Neches River Authority treatment plant and distribution system.

5B.3.1.1 Construction of Lake Columbia (Recommended)

Lake Columbia is currently projected to be online by 2040. Angelina & Neches River Authority has a water right for Lake Columbia and is currently seeking a 404 permit for construction. [To be updated]

Angelina & Neches River Authority and participating entities will share in the costs associated with the Lake Columbia water management strategy. For reservoir construction, unit costs are based on the WAM Run 3 yield estimate of 75,700 ac-ft/yr.

5B.3.1.2 Angelina & Neches River Authority Treatment Plant and Distribution System (Recommended)

The cities of Nacogdoches, Jacksonville, and Rusk are assumed to purchase raw water from Lake Columbia and develop their own raw water transmission and treatment facilities. Most of the municipal water users (and current customers of Angelina & Neches River Authority) in Cherokee, Rusk, and Smith Counties will be purchasing treated water from Angelina & Neches River Authority. Costs for water treatment and the transmission system are shared among currently contracted entities that are assumed to buy treated water from Angelina & Neches River Authority. This project will not supply any additional raw water. Rather, this project will provide treatment capacity for 22,232 ac-ft/yr of raw water from Lake Columbia.[To verify how the capacity is determined.]

A comparison of the water supplies versus the demands and the recommended strategies to be implemented is shown in Table 5B.79. A summary of the strategy costs is also provided below. The cost estimate reported in this section is the cost for developing the total yield of Lake Columbia, 75,720 ac-ft/yr. It is assumed that Dallas will be responsible for 70 percent of the cost for the dam, relocations, and reservoir land acquisitions and Angelina & Neches River Authority will be responsible for the remaining 30 percent. Capital costs for the dam and relocations were extracted from the cost estimates developed for the EIS (based on March 2012 dollars) and updated to reflect September 2023 dollars. Included in the relocation costs are estimates for relocating the four state highways and one railway that will be impacted by the reservoir. Annual costs for the reservoir were developed assuming a 40-year debt service with 3.5% interest rate. Annual costs for the non-reservoir infrastructure was developed for a 20-year debt service with 3.5% interest rate. [Cost to be updated.]

5B.3.1.3 Angelina & Neches River Authority Summary

A summary of existing supplies, projected demands, and WMSs/WMSPs for Athens MWA is presented in **Table** 5B.83Table 5B.79, Table 5B.80, and Figure 5B. 22.

Table 5B.77 Customers for Lake Columbia

Recipient	County	Basin	Percent Participation in Columbia	Contract Amount (ac-ft/yr)
Current Contracted Customers				
Afton Grove WSC, Stryker Lake WSC	Cherokee	Neches	4.5%	3,848
Jacksonville	Cherokee	Neches	5.0%	4,275
New Summerfield	Cherokee	Neches	3.0%	2,565
North Cherokee WSC	Cherokee	Neches	5.0%	4,275
Rusk	Cherokee	Neches	5.0%	4,275
Rusk Rural WSC	Cherokee	Neches	1.0%	855
City of Alto	Cherokee	Neches	0.5%	428
Caro WSC	Nacogdoches	Neches	0.5%	428
Nacogdoches	Nacogdoches	Neches	10%	8,551
New London	Rusk	Sabine	1.0%	855
Troup	Smith	Neches	5.0%	4,275
Arp	Smith	Neches	0.5%	428
Blackjack WSC	Smith	Neches	1.0%	855
Jackson WSC	Smith	Neches	1.0%	855
Whitehouse	Smith	Neches	10%	8,551
Potential Customers				
City of Dallas (Region C)	Dallas	Trinity	Up to 70%	Up to 56,050
NTMWD (Region C)	N/A	N/A		
San Jacinto River Authority (Region H)	N/A	N/A		

Table 5B.78 Additional Customer Demand for ANRA

Recipient	2030	2040	2050	2060	2070	2080
Holmwood Utility (a)	1,137	1,049	948	851	748	636
Angelina County Fresh Water Supply District #1 (b)	47	47	47	47	47	47
Central Heights Utilities (c)	81	81	81	81	81	81
Prairie Grove Water Supply Corporation (d)	39	39	39	39	39	39
Mining - Nacogdoches	891	891	891	891	891	891
Mining – San Augustine	1,411	1,411	1,411	1,411	1,411	1,411
Total Current Customer Demand	**3,606**	**3,518**	**3,417**	**3,320**	**3,217**	**3,105**

Notes:

(a) Assume to be the demand from County Other, Jasper.

(b) Demand data is based on the 2022 Water Use Survey, which also indicates that Angelina County Fresh Water Supply District #1 is served by the City of Lufkin, drawing from the Carrizo-Wilcox Aquifer.

(c) ANRA acquired Central Heights Utilities in September 2023. Recent data shows an average monthly demand of

2.2 million gallons, with Central Heights Utilities sourcing its water from the City of Nacogdoches.

(d) Data from September 2023 through July 2024 indicates an average monthly demand of 1.06 million gallons. Prairie Grove WSC sources approximately half of its water from the City of Diboll, with the remaining portion supplied by groundwater from the Other Aquifer in Angelina County.

Table 5B.79 ANRA – Summary of Existing Supplies, Demands, and Water Management)Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Jasper Aquifer, Angelina County	1,137	1,049	948	851	748	636
City of Lufkin	47	47	47	47	47	47
Purchase from City of Nacogdoches	81	81	81	81	81	81
Purchase from City of Diboll	20	20	20	20	20	20
Other Aquifer, Angelina County	20	20	20	20	20	20
ROR (Nacogdoches County)	891	891	891	891	891	891
ROR (San Augustine)	1,411	1,411	1,411	1,411	1,411	1,411
Total Existing Supplies	**3,607**	**3,519**	**3,418**	**3,321**	**3,218**	**3,106**
Demands (ac-ft per year)						
Total Existing Demands	3,606	3,518	3,417	3,320	3,217	3,105
Total Future Contracted Demand	0	45,235	45,235	45,235	45,235	45,235
Total Projected Demand	**3,606**	**48,753**	**48,652**	**48,555**	**48,452**	**48,340**
Total Future Demand Outside of Region I	0	56,050	56,050	56,050	56,050	56,050
Surplus or (Shortage) with Existing Supplies	**1**	**(101,284)**	**(101,284)**	**(101,284)**	**(101,284)**	**(101,284)**
Recommended Water Management Strategies/Projects (ac-ft per year)						
Lake Columbia	0	75,720	75,640	75,560	75,480	75,400
ANRA Treatment and Distribution System (a)	0	22,232	22,232	22,232	22,232	22,232
Total Increase in Supplies from Recommended WMSs/WMSPs	**0**	**97,952**	**97,872**	**97,792**	**97,712**	**97,632**
Surplus or (Shortage) with Recommended WMSs/WMSPs without Non-Region I Demand	**1**	**52,718**	**52,638**	**52,558**	**52,478**	**52,398**
Surplus or (Shortage) with Recommended WMSs/WMSPs	**1**	**(3,332)**	**(3,412)**	**(3,492)**	**(3,572)**	**(3,652)**

a. Gray indicates a strategy that involves expansion of infrastructure to access existing and/or future supplies. These should not be included in the total to avoid double counting.

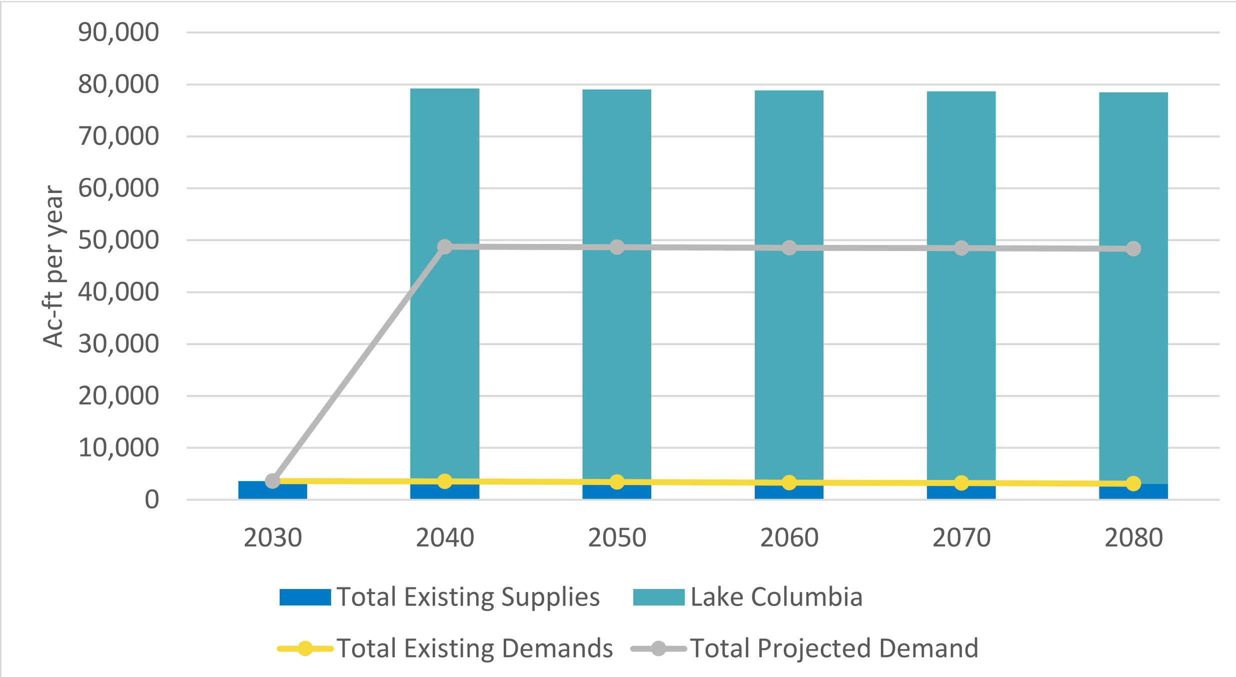


Figure 5B. 22 ANRA – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

Table 5B.80 ANRA – Water Management Strategies/Projects Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Lake Columbia	75,400	$486,368,000	$28,382,000	$375	$1
ANRA Treatment and Distribution System	22,232	$455,353,000	$84,250,000	$3,790	$12

5B.3.2 Angelina Nacogdoches WCID #1

Angelina Nacogdoches WCID#1 (AN WCID #1) is a major water provider to Steam Electric Power demands for Luminant and Nacogdoches Power in Cherokee and Nacogdoches counties, respectively. In addition to these customers, Angelina Nacogdoches WCID#1 has a contract with Henderson in Rusk County for future use. The demand for wholesale customers is supplied from Lake Striker. Angelina Nacogdoches WCID#1 owns a water right for 20,600 ac-ft/yr from Lake Striker. The entity's supplies are sufficient to meet the contracted demands. Table 5B.81 includes a summary of demands and supplies for Angelina Nacogdoches WCID#1, which is also shown in Figure 5B. 23. The following recommended strategies were proposed by Angelina Nacogdoches WCID#1 for inclusion in the 2026 Plan.

5B.3.2.1 Hydraulic Dredging Operation (Recommended)

Angelina Nacogdoches WCID#1 believes that the volumetric survey will result in an additional yield that will address shortages in the first two decades. To address the shortages in the later decades, a second recommended strategy was proposed. The strategy is to conduct hydraulic dredging of Lake Striker to address the Lake sedimentation issues and increase Lake yield. The timing for the dredging operation is expected to be in 2040. Angelina Nacogdoches WCID#1 provided an estimate of the total cost for this strategy. Angelina Nacogdoches WCID#1 also plans to work with TWDB on the adjustment of the normal pool elevation of Lake Striker. The additional yield associated with the normal pool elevation adjustment is not clear at this point; however, it is assumed to yield an approximate amount of 3,500 ac-ft/yr.

Internal studies conducted by Angelina Nacogdoches WCID#1 resulted in higher yield estimates for Lake Striker than those obtained from the Water Availability Model. Angelina Nacogdoches WCID#1 believes that the additional yield in Lake Striker is sufficient to meet the shortages manifested for this entity in this planning cycle. To address this inconsistency, Angelina Nacogdoches WCID #1 is considering conducting volumetric survey of Lake Striker to determine the capacity of the lake and the resulting yield. Angelina Nacogdoches WCID#1 will coordinate with TWDB to schedule the volumetric survey. TWDB will charge a fee for conducting volumetric surveys. A cost estimate is not included for this strategy since this cost will be determined by Angelina Nacogdoches WCID#1 during their negotiations with TWDB.

A summary of the cost estimates for the recommended strategy is provided in Table 5B.82. The demands for Angelina Nacogdoches WCID#1 also include a contract with City of Henderson for 8,280 acre-feet per year. While water management strategies are proposed to meet this demand, it was also noted that the contract for City of Henderson is a future demand and the supply to meet this contract is not required in the early decades of the planning cycles.

Table 5B.81 AN WCID #1– Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Lake Striker	10,500	9,990	9,480	8,970	8,460	7,950
Total Existing Supplies	**10,500**	**9,990**	**9,480**	**8,970**	**8,460**	**7,950**
Demands (ac-ft per year)						
Total Existing Demands	2,078	2,285	2,513	2,765	3,041	3,345
Surplus or (Shortage) with Existing Supplies	**8,422**	**7,705**	**6,967**	**6,205**	**5,419**	**4,605**
Recommended Water Management Strategies/Projects (ac-ft per year)						
Hydraulic Dredging (Includes Volumetric Survey and Normal Pool Elevation Adjustment)	0	5,600	5,600	5,600	5,600	5,600
Total Increase in Supplies from Recommended WMSs/WMSPs	**0**	**5,600**	**5,600**	**5,600**	**5,600**	**5,600**
Surplus or (Shortage) with Recommended WMSs/WMSPs	**8,422**	**13,305**	**12,567**	**11,805**	**11,019**	**10,205**

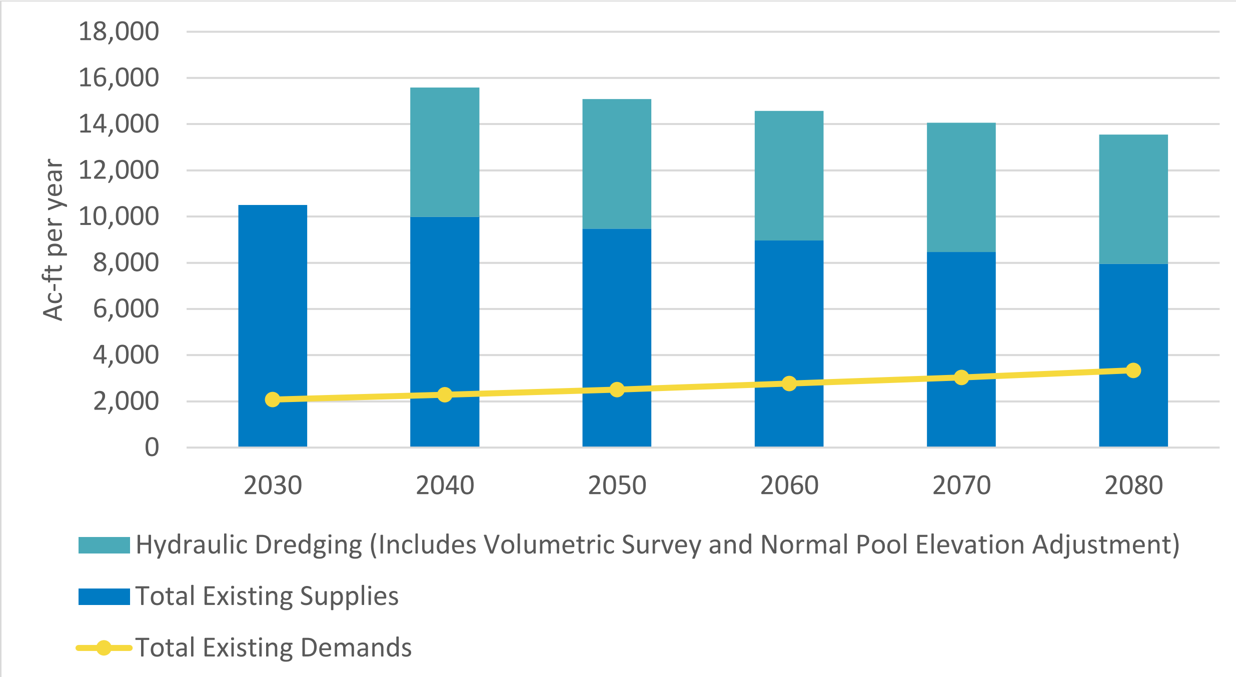


Figure 5B. 23 AN WCID#1 – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

Table 5B.82 A AN WCID#1 – Water Management Strategies/Projects Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Hydraulic Dredging (Includes Volumetric Survey and Normal Pool Elevation Adjustment)	5,600	$27,980,652	$1,399,033	$4,997	$15

5B.3.3 Athens Municipal Water Authority

Athens MWA (AMWA) is a wholesale provider that provides treated water to the City of Athens (Region C and ETRWPA). The City of Athens demands are projected to grow from 2,633 ac-ft per in 2030 to 6,649 ac-ft per year by 2080. The City provides a small volume of supply to local manufacturing demands (estimated 20 ac-ft per year). In addition, AMWA provides raw water lakeside for lawn irrigation around Lake Athens (projected demand estimated of around 85 to 110 ac-ft per year) and the Texas Freshwater Fisheries Center (TFFC), which is captured under the livestock WUG in Henderson County. The TFFC, located at the lake, has a contract with AMWA to divert 3,023 ac-ft per year from Lake Athens for their fish hatchery.

AMWA owns and operates Lake Athens and has a water right to divert 8,500 ac-ft per year from Lake Athens. In the 2026 ETRWP, the firm yield of Lake Athens is estimated to be approximately 4,500 ac-ft per year in 2030 and reduces to approximately 4,200 ac-ft per year in 2080 due to sedimentation. AMWA also owns two groundwater wells. One groundwater well is next to the property of their existing water treatment plant (WTP). Groundwater supply from this well is blended with Lake Athens surface water at the WTP and distributed to City of Athens. The second well, known as the Powder River Well, was constructed in 2023. The City of Athens operates and maintains the WTP and groundwater wells owned by AMWA. In addition, the City of Athens owns three groundwater wells within their City limits.

AMWA's existing WTP has a capacity of 8.0 MGD; however, the existing AMWA high service pump station (HSPS) that is used to deliver treated water supply to the City of Athens has a firm capacity of 4.9 MGD. Based on the projected treated demands for the City of Athens, this pump station will need to be upgraded in the future.

A summary of supplies and demands for AMWA included in Table 5B.83.The total projected water supply needs associated with AMWA and their customers is projected to be approximately 890 ac-ft per year by 2050 and 4,145 ac-ft per year by 2080. Based on the water supply needs identified, the following WMSs and WMSPs related to AMWA are recommended.

5B.3.3.1 City of Athens Municipal Conservation (Recommended)

Municipal conservation is a recommended WMS and WMSP for the City of Athens. Municipal conservation efforts from the City will reduce the future supply needed from AMWA. The projected savings from municipal conservation for the City (across both Region C and the ETRWPA) are 122 ac-ft per year in 2030 and 1,226 ac-ft per year by 2080. The City is located predominantly in Region C, so the recommended municipal WMS and WMSP described was developed by the Region C Water Planning Group consultant. A more detailed discussion of this WMS and WMSP is included in the 2026 Region C regional water plan. The ETRWPG supports and approves the WMS and WMSP developed to reduce the water supply need in both regions.

5B.3.3.2 Reuse of Fish Hatchery Return Flows (Recommended)

A recommended WMS for Athens MWA is the indirect reuse of flows returned from the TFFC fish hatchery to Lake Athens**.** Currently, approximately 95 to 100 percent of the water diverted for the fish hatchery is returned to Lake Athens; however, the fish hatchery is under no contractual obligation to continue this practice. To assure adequate supplies for the fish hatchery and other uses, Athens MWA should work with the fish hatchery to assure that the hatchery continues to return diverted water to Lake Athens for subsequent reuse. For purposes of this plan, it is assumed that 95 percent of the contracted water will be returned. This equates to 2,872 ac-ft/year of additional supply.

5B.3.3.3 WTP Pump Station Expansion (Recommended).

A recommended WMS/WMSP is included for AMWA to expand their existing high service pump station (HSPS) to be able to deliver sufficient supply from their water sources to meet the projected demands of their treated water customer: the City of Athens. The firm capacity of AMWA's existing WTP high service pump station, which is operated by the City of Athens, is 4.9 MGD. Based on the projected treated demands for the City of Athens, this pump station will need to be upgraded in the future. Based on the projected peak treated water demands of the City (assuming a peaking factor of 2.1 based on historical use), this pump station will need to be upgraded to a firm capacity of approximately 5.6 MGD by 2050 (0.70 MGD increase compared to existing) and 9.0 MGD (4.1 MGD increase compared to existing) by 2070. This infrastructure expansion will ensure that AMWA is able to distribute treated water supply from their existing treated sources (Lake Athens, AMWA WTP groundwater well) and potential future sources (indirect reuse of fish hatchery flows from Lake Athens) to meet projected demands from the City of Athens.

5B.3.3.4 New Well(s) in Carrizo-Wilcox Aquifer (Alternative)

Since 2015, AMWA has constructed two new groundwater wells to provide additional supply to their customers. Additional development of groundwater supplies could be a viable option for AMWA as their customers' demands continue to grow. However, the Carrizo-Wilcox Aquifer Modeled Available Groundwater (MAG) in Henderson County (both in Region C and I) has very limited availability beyond what is currently being used. Due to these MAG limitations, this WMS and WMSP is included as an alternative for AMWA. In the future, this could be changed to a recommended WMS and WMSP if the MAG volumes increase. Even with the MAG limitations for this strategy, there are no unmet needs throughout the planning horizon for Athens MWA considering their other recommended options.

This alternative strategy assumes the development of approximately 720 acre-feet per year from the Carrizo-Wilcox Aquifer in Henderson County by 2070. The conceptual design for this strategy involves three public supply wells (capacities of 250 gpm each) located within the Carrizo-Wilcox Aquifer, conveyance infrastructure (e.g., well collection piping, transmission pipeline, pump station, and storage tank), and a groundwater treatment system.

5B.3.3.5 Other Considered Strategies and Projects

Another alternative water management strategy considered for Athens MWA was the reuse of City of Athens wastewater discharges. Recognizing the limitation of its existing supplies, Athens MWA received a reuse permit for 2,677 ac-ft per year that allows the City of Athens to discharge its wastewater effluent to Lake Athens and divert it from the lake for use. However, a study by Region C for the 2011 Regional Plan showed that this strategy was less economically feasible than other alternatives. At this time, Athens MWA and the City of Athens are not pursuing reuse of Athens wastewater discharges.

5B.3.3.6 Athens MWA Summary

A summary of existing supplies, projected demands, and WMSs/WMSPs for Athens MWA is presented in Table 5B.83, Table 5B.84, and Figure 5B.24.

Table 5B.83 Athens MWA – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Lake Athens (Firm Yield)	4,540	4,480	4,420	4,360	4,300	4,240
Lake Athens Supply Constrained by AMWA WTP HSPS Capacity [a]	4,540	4,480	4,420	4,191	3,851	3,679
Groundwater Wells (AMWA)	1,487	1,487	1,487	1,487	1,487	1,487
Groundwater Wells (City of Athens)	491	491	491	491	491	491
Total Existing Supplies	**6,518**	**6,458**	**6,398**	**6,169**	**5,829**	**5,657**
Demands (ac-ft per year)						
Total Demands	**5,761**	**6,294**	**7,288**	**8,141**	**9,171**	**9,802**
Surplus or (Shortage) with Existing Supplies	**757**	**164**	**(890)**	**(1,972)**	**(3,342)**	**(4,145)**
Recommended Water Management Strategies/Projects (ac-ft per year)						
Municipal Conservation [b]	122	325	687	904	1,112	1,226
Reuse of Fish Hatchery Return Flows	2,872	2,872	2,872	2,872	2,872	2,872
Booster PS Improvements at WTP [c]	0	0	4,592	4,592	4,592	4,592
Additional Treated Water Supply Accessible with Booster PS Improvements at WTP	0	0	0	169	449	561
New Well(s) in Carrizo-Wilcox Aquifer [d]	*0*	*0*	*0*	*0*	*30*	*720*
Total Increase in Supplies from Recommended WMSs/WMSPs	**2,994**	**3,197**	**3,559**	**3,945**	**4,433**	**4,659**
Surplus or (Shortage) with Recommended WMSs/WMSPs	**3,751**	**3,361**	**2,669**	**1,973**	**1,091**	**514**

a. This volume reflects the treated water supply that can be delivered from Lake Athens considering AMWA's existing WTP HSPS capacity. This volume assumes that supply from Lake Athens is distributed proportionally based on AMWA's customer demands in each decade (2030-2080) and supply from AMWA's groundwater well that is blended and treated with Lake Athens supply at the WTP is not constrained.

b. Includes the municipal conservation savings across both Region C and the ETRWPA.

c. Gray indicates a WMS/WMSP that involves expansion of infrastructure to access existing and/or future supplies. These should not be included in the total to avoid double counting.

d. Italics indicate an alternative WMS/WMSP.

Table 5B.84 Athens MWA – Water Management Strategies/Projects Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
City of Athens Municipal Conservation (Region C/I)	122 - 1,226	$157,000	$101,500	$800	$2.46
Reuse of Fish Hatchery Return Flows	2,872	$0	$0	$0	$0.00
WTP Pump Station Expansion [a]	4,596	$3,116,000	$308,000	$67	$0.21
New Well(s) in Carrizo-Wilcox Aquifer [b]	*720*	*$10,270,000*	*$1,286,000*	*$1,786*	*$5.48*

a. Gray indicates a WMS/WMSP that involves expansion of infrastructure to access existing and/or future supplies. These should not be included in the total to avoid double counting.

b. Italics indicate an alternative WMS/WMSP.

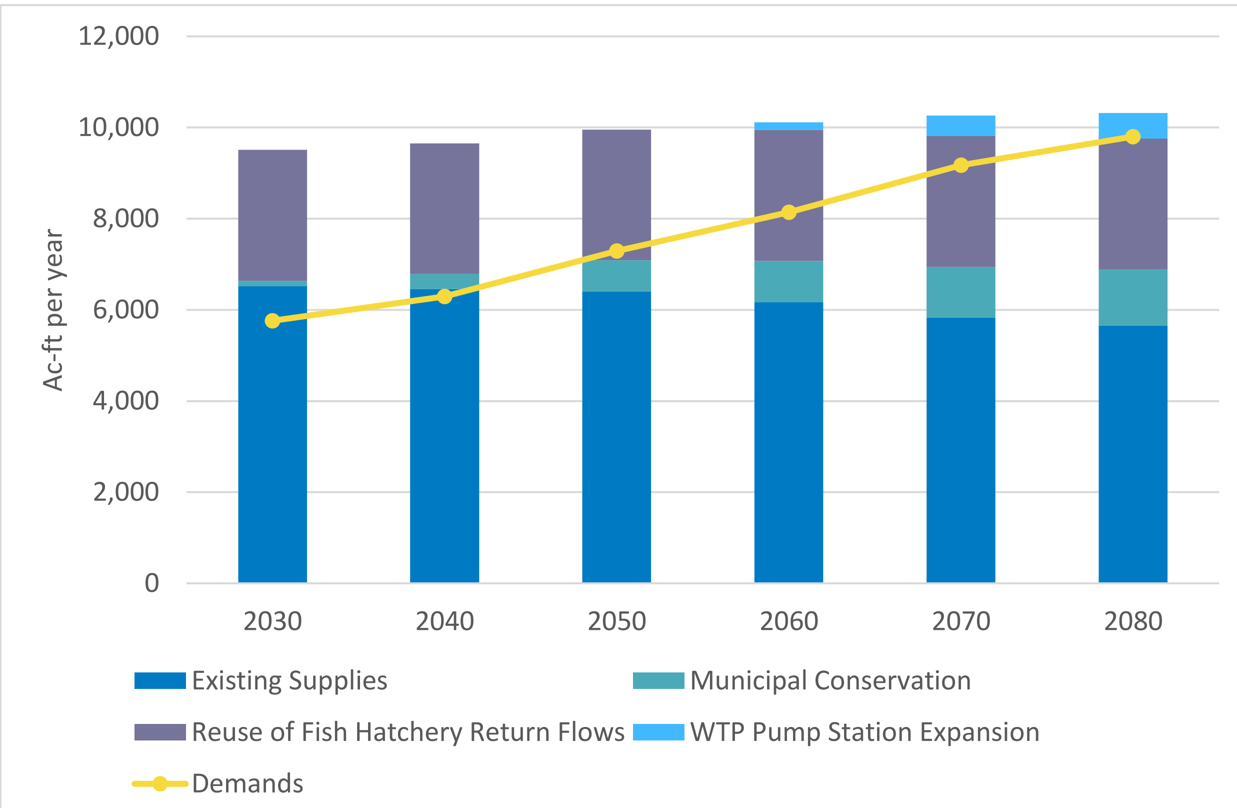


Figure 5B.24 Athens MWA – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

5B.3.4 City of Beaumont

The City of Beaumont is a wholesale water provider in Jefferson County. In addition to demands in the City's water service area, Beaumont supplies water to meet the demands of several municipal entities in Jefferson County-Other, the Beaumont Federal Correction Complex, Meeker MUD, and several manufacturing facilities in Jefferson County. Over the planning period (2030-2080), Beaumont and their customers' demands are projected to increase from approximately 33,256 ac-ft per year in 2030 to 35,904 ac-ft per year in 2080.

Current water supply sources for the City of Beaumont include self-supplied surface water from the Neches River, self-supplied groundwater from the Gulf Coast Aquifer, and purchased surface water from the Sam Rayburn/BA Steinhagen system (LNVA). Beaumont's supply is constrained by several infrastructure limitations, including their canal conveyance capacity, surface water treatment plant capacity, and groundwater well field capacity. The City's existing Pine Street surface water treatment plant (WTP) has a capacity of 45 MGD; however, one of the conveyance canals that delivers water from their surface intake to the WTP is estimated to only be able deliver around 37 MGD due to damage from recent storm events. sedimentation. Additionally, the City has three groundwater wells at its Loeb Groundwater Facility in south Hardin County that are each permitted to produce at a maximum rate of 3,500 gallons per minute (approximately 5 MGD each). One of these wells is currently out of service due to its condition. Furthermore, there are other substantial improvements necessary to upgrade and restore the Loeb Groundwater Facility to be able to produce at its full capacity.

As a result of their various infrastructure constraints, Beaumont has an identified need across the planning horizon (2030-2080) of approximately 9,500 ac-ft per year by 2030, which grows to nearly 11,400 ac-ft per year by 2070. To meet this need, several WMSs were recommended for Beaumont, including water conservation, improvements to their well field, and amending their contract with LNVA for additional surface water supply. To access the additional supply from LNVA, recommended WMSPs for Beaumont include rehabilitation of one of their surface water conveyance canals and a new water treatment plant on the westside of their system. The information below summarizes the existing supplies, demands, and recommended WMSs/WSMPs for Beaumont in the 2026 ETRWP.

5B.3.4.1 Municipal Conservation (Recommended)

The City of Beaumont is projected to have a water supply need beginning in 2030. Municipal conservation by the City and their customers could reduce the additional supply they would need from either their self-supplied sources and/or water purchased from LNVA. Conservation strategies were recommended for all municipal WUGs in the ETRWPA. The municipal water conservation strategy includes estimates of potential water savings and cost estimates related to enhanced education and public awareness, water conservation pricing implementation, and a system water audit and water loss control program. Further discussion of these conservation strategies is provided in Chapter 5C.

5B.3.4.2 Well Field Infrastructure Improvements (Recommended)

A recommended WMS/WMSP for the City of Beaumont is to upgrade facilities at their Loeb Groundwater Facility to allow the City to fully utilize their permitted groundwater supply at a sustainable level. The estimated annual supply from this strategy is assumed to be equal to half of the permitted volume of one of the wells at the City's Loeb Groundwater Facility (2.5 MGD or 2,803 ac-ft per year). This WMS/WMSP includes construction of a new well, well collection piping, transmission pipelines, pumping facilities, storage tanks, chemical treatment systems, and other supporting infrastructure.

5B.3.4.3 Amend Supplemental Contract with LNVA (Recommended)

The City of Beaumont has an existing contractual agreement to purchase supply from LNVA for up to 6,000 ac-ft per year. A recommended strategy is included for Beaumont to amend their existing supplement contract with LNVA for additional water supply to meet their projected needs. Based on their existing supplies and potential supplies from their well field infrastructure improvement strategy, the City of Beaumont will need approximately 6,700 ac-ft per year of additional supply from LNVA in 2030. The City's need for additional water supply from LNVA increases across the planning horizon, with a maximum need of approximately 8,600 ac-ft per year in 2070. The City of Beaumont has existing infrastructure and transmission lines to access supply from the LNVA; however, there are some infrastructure constraints that may limit their ability to access the full supply from this strategy. Other recommended projects are included for the City to upgrade the capacity of their infrastructure to fully access this supply, including a new surface water treatment plant and rehabilitating (dredging) one of their canals. These projects are discussed in subsequent sections.

5B.3.4.4 Bunn's Canal Rehabilitation (Recommended)

A recommended project for the City of Beaumont is to rehabilitate one of their conveyance canals (Bunn's Canal) to its pre-storm condition so that it can convey water supply diverted from the Neches River at its full capacity. The City of Beaumont estimates that the canal is only able to convey 38 MGD, which is less than the capacity of Beaumont's Pine Street surface WTP (45 MGD). The purpose of this project is to improve canal access, stabilize the bank canal through levee restoration, and remove sediment to increase the canal's carrying capacity.

5B.3.4.5 New Westside Surface Water Treatment Plant (Recommended)

A recommended project for the City of Beaumont is to construct a new 11 MGD surface water treatment facility. Based on Beaumont's projected water demands coupled with impacts coupled with impacts on the City's potable water system during storm events, the City's existing system may not be sufficient long-term. The new surface WTP will be able to treat 11 MGD of surface water and would be located on the west side of the City, thereby providing flexibility to the City to meet the needs of its customers in conjunction with the City's existing surface WTP. The new SWTP could treat surface water diverted using Beaumont's existing run-of-river rights and/or backup water supplied through the City's contractual agreement with LNVA.

5B.3.4.6 Beaumont Summary

A summary of existing supplies, projected demands, and WMSs/WMSPs for Beaumont is presented in Table 5B.85, Table 5B.86, and Figure 5B.25.

Table 5B.85 Beaumont – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Municipal Run-of-River	11,266	11,555	11,809	11,481	11,327	11,310
Industrial Run-of-River	836	1,005	1,168	1,314	1,477	1,659
Gulf Coast Aquifer	5,646	5,646	5,646	5,646	5,646	5,646
Sam Rayburn (LNVA) - Current Base Contract	6,000	6,000	6,000	6,000	6,000	6,000
Total Existing Supplies	**23,748**	**24,206**	**24,623**	**24,441**	**24,450**	**24,615**
Demands (ac-ft per year)						
Total Demands	33,256	34,427	35,719	35,777	35,838	35,904
Surplus or (Shortage) with Existing Supplies	**(9,508)**	**(10,221)**	**(11,096)**	**(11,336)**	**(11,388)**	**(11,289)**
Recommended Water Management Strategies/Projects (ac-ft per year)						
Municipal Conservation	2,094	5,506	7,320	7,327	7,332	7,336
Well Field Infrastructure Improvements	2,872	2,872	2,872	2,872	2,872	2,872
Amend Supplemental Contract with LNVA	6,636	7,349	8,224	8,464	8,516	8,417
Bunn's Canal Rehabilitation [a]	8,968	8,968	8,968	8,968	8,968	8,968
New Westside Surface Water Treatment Plant [a]	0	12,331	12,331	12,331	12,331	12,331
Total Increase in Supplies from Recommended WMSs/WMSPs	**11,602**	**15,727**	**18,416**	**18,663**	**18,720**	**18,625**
Surplus or (Shortage) with Recommended WMSs/WMSPs	**2,094**	**5,506**	**7,320**	**7,327**	**7,332**	**7,336**

a. Gray indicates a strategy that involves expansion of infrastructure to access existing and/or future supplies. These should not be included in the total to avoid double counting.

Table 5B.86 Beaumont – Water Management Strategies/Projects Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Municipal Conservation	2,094 - 7,336	$1,679,000	$858,400	$410	$1.26
Well Field Infrastructure Improvements	2,872	$97,980,000	$8,074,000	$2,860	$8.78
Amend Supplemental Contract with LNVA	6,636 - 8,516	$0	$2,803,000	$326	$1.00
Bunn's Canal Rehabilitation [b]	8,968	$1,139,000	$91,000	$10	$0.03
New Westside Surface Water Treatment Plant [b]	12,331	$202,160,000	$16,324,000	$1,316	$4.04

a. The annual and unit cost use an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water. Ultimately, this cost will need to be negotiated between Beaumont and LNVA and will reflect their wholesale water rates at that time.
b. Gray indicates a strategy that involves expansion of infrastructure to access existing and/or future supplies. These should not be included in the total to avoid double counting.

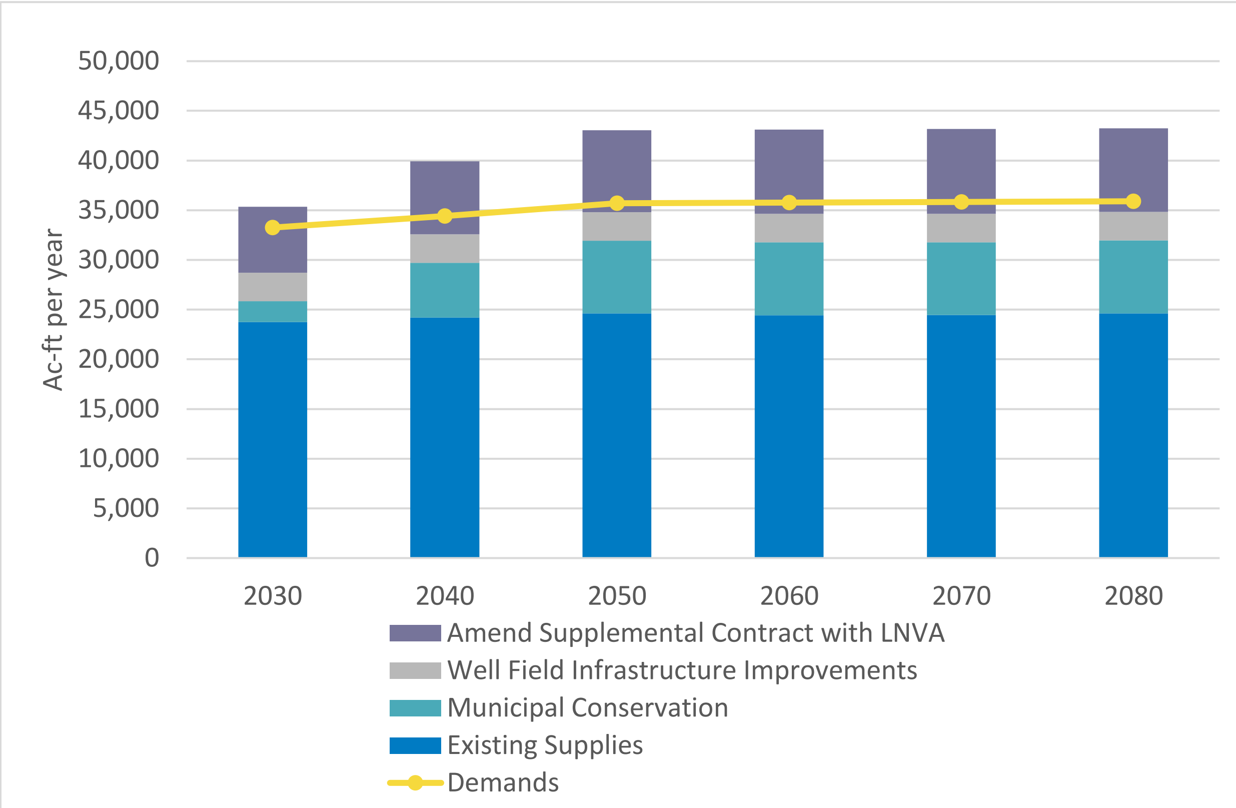


Figure 5B.25 Beaumont – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

5B.3.5 City of Carthage

The City of Carthage is a wholesale water provider in Panola County. In addition to the City's demands, Carthage provides wholesale water supply to other municipal and manufacturing users in Panola County. The City owns two groundwater wells that have a combined rated capacity of 410 gallons per minute (gpm). It is estimated that these wells could produce, on average, 411 ac-ft per year. The City also has a contract with Panola County Fresh Water Supply District (FWSD) for 12 MGD (13,452 ac-ft per year) of water from Lake Murvaul. The City's supplies are limited by their water treatment plant, which has a capacity of 8 MGD. In this round of planning, the City of Carthage has enough supplies to meet the demands of the City and its customers. Currently, the only WMS/WMSP identified for the City is municipal conservation. The information below summarizes the existing supplies, demands, and recommended WMSs and WMSPs for Carthage in the 2026 ETRWP.

5B.3.5.1 Municipal Conservation (Recommended)

Carthage is not projected to have a water supply need within the planning period. However, conservation strategies were recommended for all municipal WUGs in the ETRWPA. The municipal water conservation strategy includes estimates of potential water savings and cost estimates related to enhanced education and public awareness, water conservation pricing implementation, and a system water audit and water loss control program. Further discussion of these conservation strategies is provided in Chapter 5C.

5B.3.5.2 Carthage Summary

A summary of existing supplies, projected demands, and WMSs/WMSPs for Carthage is presented in Table 5B.87, Table 5B.88, and Figure 5B.26.

Table 5B.87 Carthage – Summary of Existing Supplies, Demand, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Groundwater Wells (Carrizo-Wilcox Aquifer)	411	411	411	411	411	411
Lake Murvaul (PC FWSD)	13,452	13,452	13,452	13,452	13,452	13,452
Total Existing Supplies	**13,863**	**13,863**	**13,863**	**13,863**	**13,863**	**13,863**
Total Existing Supplies Limited by Treatment Capacity	**4,891**	**4,891**	**4,891**	**4,891**	**4,891**	**4,891**
Demands (ac-ft per year)						
Total Demands	**3,037**	**3,051**	**3,059**	**3,065**	**3,074**	**3,085**
Surplus or (Shortage) with Existing Supplies	**1,854**	**1,840**	**1,832**	**1,826**	**1,817**	**1,806**
Recommended Water Management Strategies/Projects (ac-ft per year)						
Municipal Conservation	31	46	48	50	52	54
Total Increase in Supplies from Recommended WMSs/WMSPs	**31**	**46**	**48**	**50**	**52**	**54**
Surplus or (Shortage) with Recommended WMSs/WMSPs	**1,885**	**1,886**	**1,880**	**1,876**	**1,869**	**1,860**

Table 5B.88 Carthage – Water Management Strategies/Projects Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Municipal Conservation	31 - 54	$173,000	$23,600	$755	$2.32

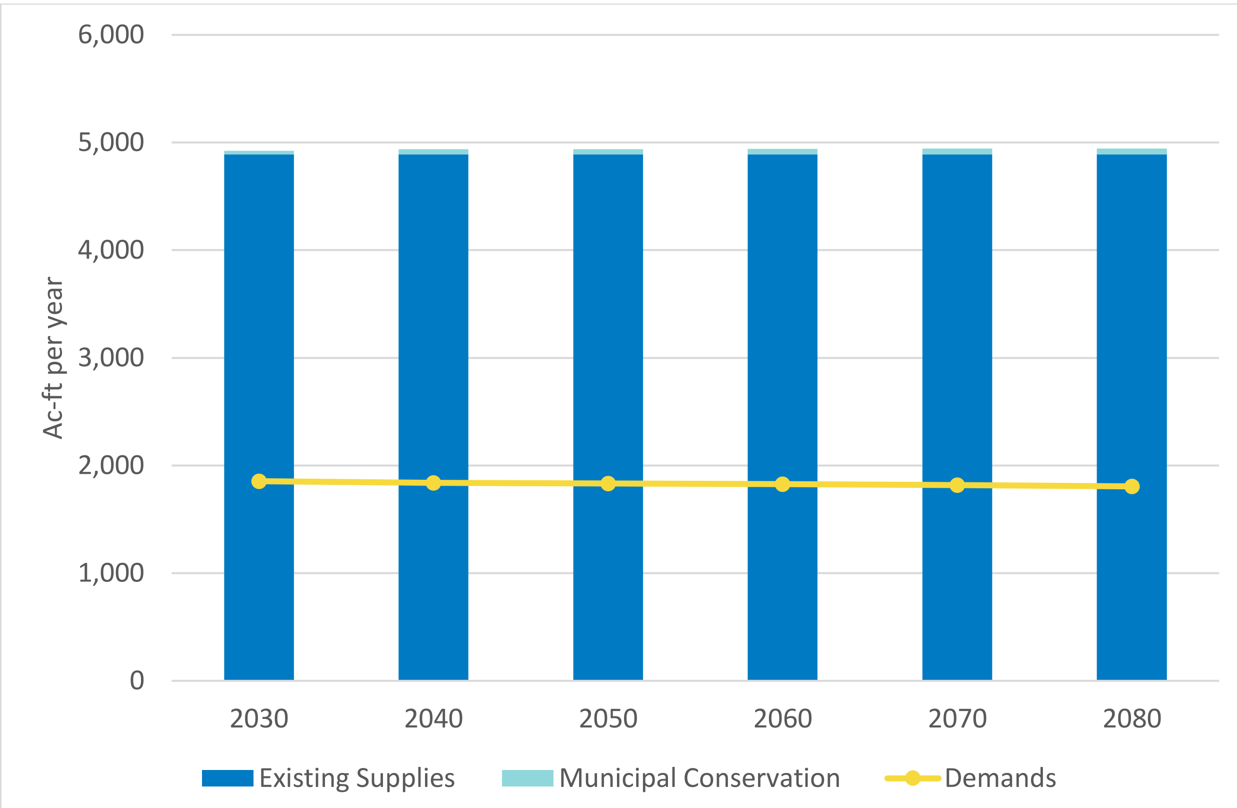


Figure 5B.26 Carthage – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

5B.3.6 City of Center

The City of Center provides water to meet a portion of the demand from Sand Hills WSC in Shelby County. The City also provides water to retail customers in the City of Center and most of the manufacturing demand in Shelby County. City of Center serves as emergency interconnect to Shelbyville WSC, Flat Fork WSC, and East Lamar WSC.

City of Center owns water rights for supplies in Lake Center and Lake Pinkston. Currently the City has sufficient supplies to meet the demand in decades 2030 to 2080 despite what the 2026 demand projection shows. The City is planning WMSs to proactively prepare for satisfying the additional demand in the decades. Tyson is one of the major manufacturing demand users in Shelby County.

To meet the current demands and higher expected future demands, the City has proposed four WMSs for the planning period, and they are discussed below.

5B.3.6.1 Reuse (Recommended)

The City is permitted to use the return flows from the East Bank WWTP. The City is planning a direct reuse project by means of a reuse pipeline from East Bank WWTP to serve the City's industrial customers. The total capacity for the indirect reuse project will be approximately 1 MGD (1,121 ac-ft/yr) and the project will be online in 2030. The project is currently in TCEQ study phase, and the City anticipates the plant will be in operation in the next 2 to 5 years.

5B.3.6.2 Municipal Conservation (Recommended)

The City of Center has a baseline per capita demand of 405 gpcd, which is likely reflective of the demand from municipal customers and manufacturing customers. Conservation strategies were recommended for all municipal WUGs in the ETRWPA, including the City of Center. The municipal water conservation strategy includes estimates of potential water savings and cost estimates related to enhanced education and public awareness, water conservation pricing implementation, and a system water audit and water loss control program. Further discussion of these conservation strategies is provided in Chapter 5C.

5B.3.6.3 Volumetric Survey of Lake Center and Pinkston Reservoir (Alternative)

The City of Center is considering a strategy to conduct volumetric surveys of Lake Center and Pinkston Reservoir to develop an accurate estimate of the capacity of the lakes and thus the yields. The City of Center will coordinate with Texas Water Development Board to get on a schedule for the lake volumetric survey. Texas Water Development Board will charge a fee for conducting volumetric surveys, which is a variable depending on the size of the Lake. This is not proposed as a recommended strategy for City of Center in the 2026 RWP but listed as one of the alternative strategies that the City is considering implementing. The estimated timeline of this strategy is 2050**.**

5B.3.6.4 Toledo Bend to Lake Center (Alternative)

The City is also planning to purchase water from Sabine River Authority and to transfer water from Toledo Bend Reservoir to Lake Center. The City will construct the raw water transmission pipeline from Toledo Bend Reservoir to Lake Center. The City anticipates the yield from this supply will be 1 to 2 MGD by 2060. For the planning purposes, 2 MGD is assumed.

5B.3.6.5 City of Center Summary

A summary of existing supplies, projected demands, and WMSs/WMSPs for Athens MWA is presented in Table 5B.89, Table 5B.90, and Figure 5B. 27.

Table 5B.89 City of Center – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Lake Center	500	500	500	500	500	500
Lake Pinkston	3,612	3,600	3,587	3,575	3,562	3,550
Total Existing Supplies	**4,112**	**4,100**	**4,087**	**4,075**	**4,062**	**4,050**
Demands (ac-ft per year)						
Total Existing Demands (a)	5,251	5,361	5,467	5,550	5,628	5,702
Surplus or (Shortage) with Existing Supplies	**(1,139)**	**(1,261)**	**(1,380)**	**(1,475)**	**(1,566)**	**(1,652)**
Recommended Water Management Strategies/Projects (ac-ft per year)						
Municipal Conservation	176	80	194	241	238	236
Reuse Pipeline to Industrial Customer	1,121	1,121	1,121	1,121	1,121	1,121
Pipeline from Toledo Bend (b)	*0*	*0*	*2,242*	*2,242*	*2,242*	*2,242*
Total Increase in Supplies from Recommended WMSs/WMSPs	**1,297**	**1,201**	**1,315**	**1,362**	**1,359**	**1,357**
Surplus or (Shortage) with Recommended WMSs/WMSPs	**158**	**(60)**	**(65)**	**(113)**	**(207)**	**(295)**

a. The City of Center noted that their demand projection is likely overestimated, and they have sufficient supply to meet the anticipated demand.

b. Italics indicate an alternative WMS/WMSP.

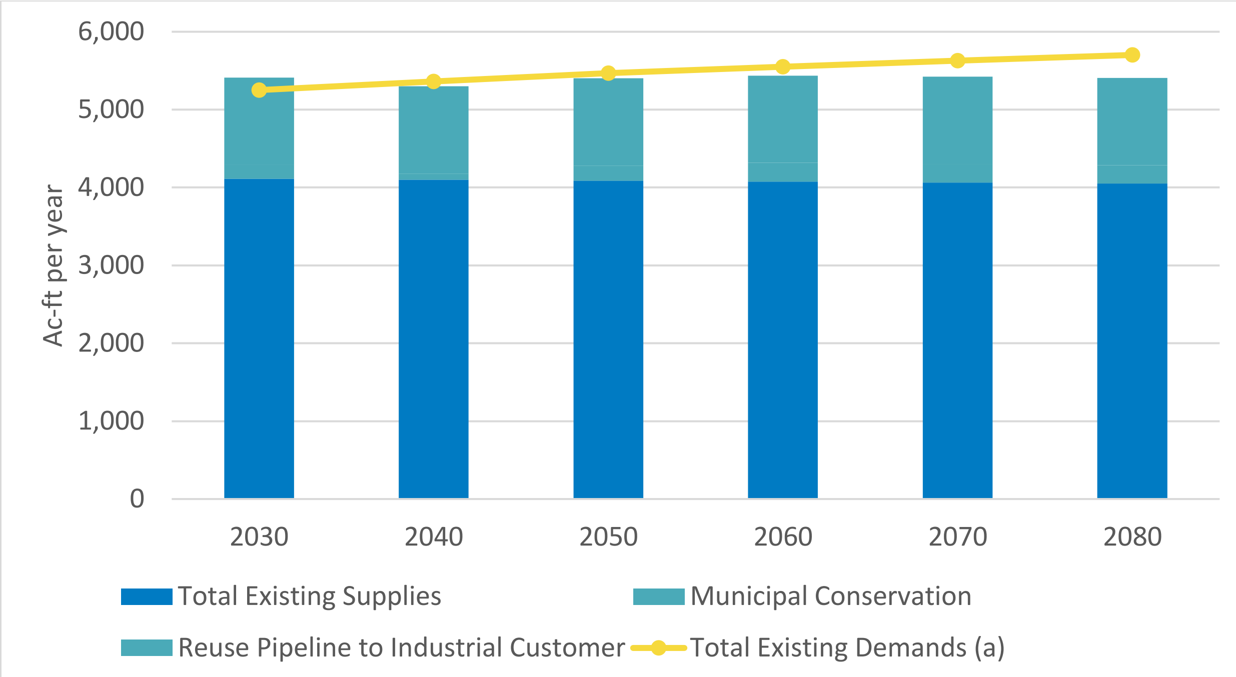


Figure 5B. 27 City of Center – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

Table 5B.90 City of Center – Water Management Strategies/Projects Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Municipal Conservation	236	$125,000	$39,300	$200	$1
Reuse Pipeline to Industrial Customer	1,121	$25,824,000	$2,608,000	$2,326	$7
Pipeline from Toledo Bend (b)	2,242	$70,786,000	$6,486,000	$2,893	$9

5B.3.7 Houston County WCID #1

Houston County WCID #1 owns and operates Houston County Lake in the Trinity River Basin in Houston County. This reservoir was originally permitted for 7,000 ac-ft/yr; however, the TCEQ reduced the permitted diversion to 3,500 ac-ft/yr in 1987. In 2009, Houston County WCID #1 applied to the TCEQ for a permit amendment to return their permitted diversion to the firm yield of the lake and add industrial use to the permit. However, the application is denied by TCEQ. Houston County WCID #1 upgraded their water treatment plant capacity from 3.1 MGD to 6.2 MGD in 2010.

5B.3.7.1 Groundwater Supplies (Recommended)

Houston County WCID #1 plans to develop new wells in the Carrizo-Wilcox aquifer when a demand shortage is anticipated. However, as the entity currently project a demand surplus, the entity does not have information regarding the number of wells or their associated capacities. A summary of existing supplies, projected demands, and WMSs/WMSPs for Houston County WCID #1 is presented in Table 5B.91, Table 5B.92, and Figure 5B. 28.

Table 5B.91 Houston County WCID #1 – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Houston County Lake	3,500	3,500	3,500	3,500	3,500	3,500
Total Existing Supplies	**3,500**	**3,500**	**3,500**	**3,500**	**3,500**	**3,500**
Demands (ac-ft per year)						
Total Existing Demands	3,178	3,167	3,134	3,151	3,154	3,150
Surplus or (Shortage) with Existing Supplies	**322**	**333**	**366**	**349**	**346**	**350**
Recommended Water Management Strategies/Projects (ac-ft per year)						
New Wells (Carrizo-Wilcox)	3500	3500	3500	3500	3500	3500
Total Increase in Supplies from Recommended WMSs/WMSPs	**3,500**	**3,500**	**3,500**	**3,500**	**3,500**	**3,500**
Surplus or (Shortage) with Recommended WMSs/WMSPs	**3,822**	**3,833**	**3,866**	**3,849**	**3,846**	**3,850**

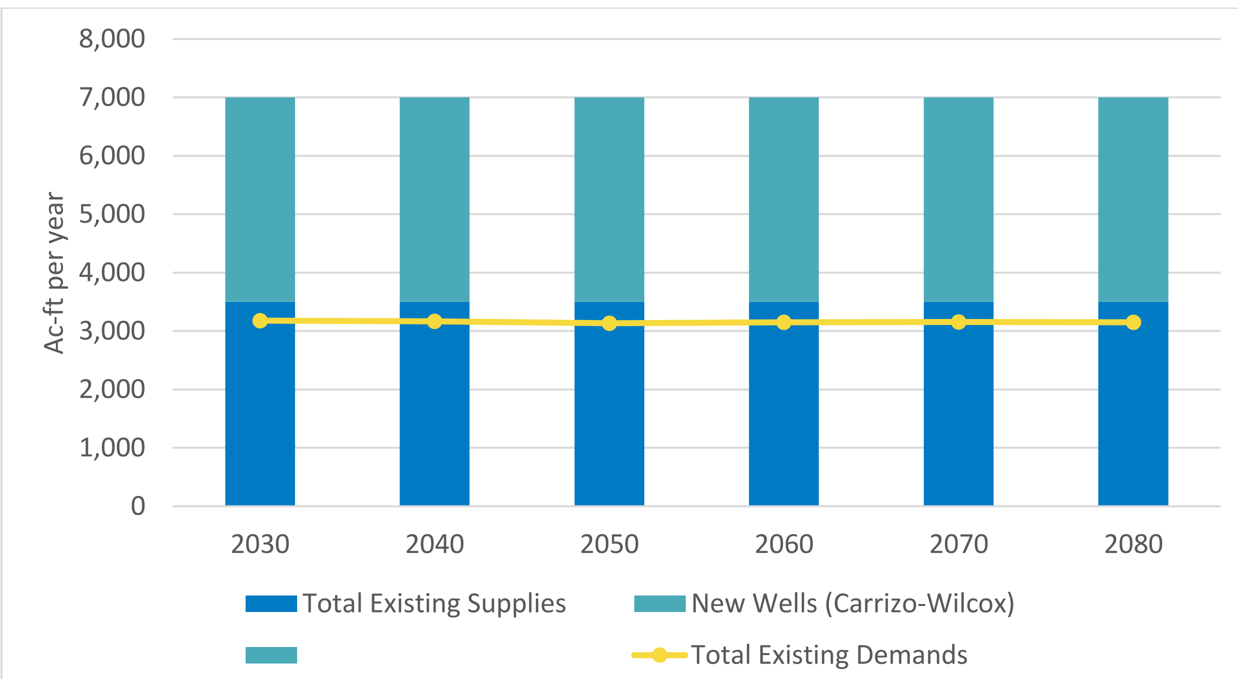


Figure 5B. 28 Houston County WCID #1 – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

Table 5B.92 Houston County WCID #1 – Water Management Strategies/Projects Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
New Wells (Carrizo-Wilcox)	3,500	$40,283,000	$3,697,000	$1,056	$3

5B.3.8 City of Jacksonville

The City of Jacksonville has sufficient raw water and treatment capacity to meet its projected customer demands for the planning period. Jacksonville has a water right to use 6,200 ac-ft/year from Lake Jacksonville, but available supply is limited treatment plant capacity. The City has several constraints to providing treated surface water to all its customers. The City's existing surface water treatment plant is currently underutilized and could provide more surface water with the necessary infrastructure improvements. Currently, the City operates the treatment plant for only part of the day. The City may be able to treat more raw water either by implementing infrastructure improvements to the treatment system or by operating the plant for longer time each day. It is recommended that the City of Jacksonville implement infrastructure improvements to fully utilize its existing water sources. City of Jacksonville has chosen to not implement this strategy at this time.

5B.3.8.1 Raw Water Transmission System from Lake Columbia (Recommended)

The recommended strategy for City of Jacksonville is a transmission and treatment system to access City's contracted supplies from Lake Columbia. The City of Jacksonville is a participant in the Lake Columbia project. Jacksonville has a contract with Angelina & Neches River Authority for 4,275 ac-ft/year from Lake Columbia. Lake Columbia will provide a source of additional raw water for Jacksonville beyond this planning period or sooner if the City grows faster than projected. This strategy assumes that water would be diverted at Lake Columbia and transported to Jacksonville for treatment and distribution. It is assumed that the first phase of this project would develop 1,700 ac-ft/year (1.6 MGD). Subsequent phases would fully develop the City's contracted amount.

5B.3.8.2 Municipal Conservation (Recommended)

The City of Jacksonville has a baseline per capita demand of 177 gpcd. Conservation strategies were recommended for all municipal WUGs in the ETRWPA, including the City of Jacksonville. The municipal water conservation strategy includes estimates of potential water savings and cost estimates related to enhanced education and public awareness, water conservation pricing implementation, and a system water audit and water loss control program. Further discussion of these conservation strategies is provided in Chapter 5C.

The Columbia to Jacksonville Raw Water Transmission System and Municipal Conservation are the recommended WMSs for City of Jacksonville. Owing to the lack of shortages in supplies to current contracted customers and the low projected growth, the transmission system from Lake Columbia is assumed to be a long-term future strategy and not current.

5B.3.8.3 City of Jacksonville Summary

A summary of current contracted customer demands, existing supplies, and additional supplies from future WMS is summarized in Table 5B.93 and Figure 5B. 29. A summary of cost estimates for the recommended WMS is listed in Table 5B.94. A detailed project summary is included in each WMS technical memorandum in Appendix 5B-A.

Table 5B.93 City of Jacksonville – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Lake Jacksonville	5,173	5,173	5,173	5,173	5,173	5,173
Lake Acker	0	0	0	0	0	0
Carrizo Wilcox Aquifer	2,218	2,218	2,218	2,218	2,218	2,218
Total Existing Supplies	**7,391**	**7,391**	**7,391**	**7,391**	**7,391**	**7,391**
Demands (ac-ft per year)						
Total Existing Demands	5,170	5,279	5,324	5,356	5,386	5,411
Surplus or (Shortage) with Existing Supplies	**2,221**	**2,112**	**2,067**	**2,035**	**2,005**	**1,980**
Recommended Water Management Strategies/Projects (ac-ft per year)						
Supply from Lake Columbia	0	0	1700	1700	1700	1700
Municipal Conservation	261	114	279	349	348	345
Total Increase in Supplies from Recommended WMSs/WMSPs	**261**	**114**	**1,979**	**2,049**	**2,048**	**2,045**
Surplus or (Shortage) with Recommended WMSs/WMSPs	**2,482**	**2,226**	**4,046**	**4,084**	**4,053**	**4,025**

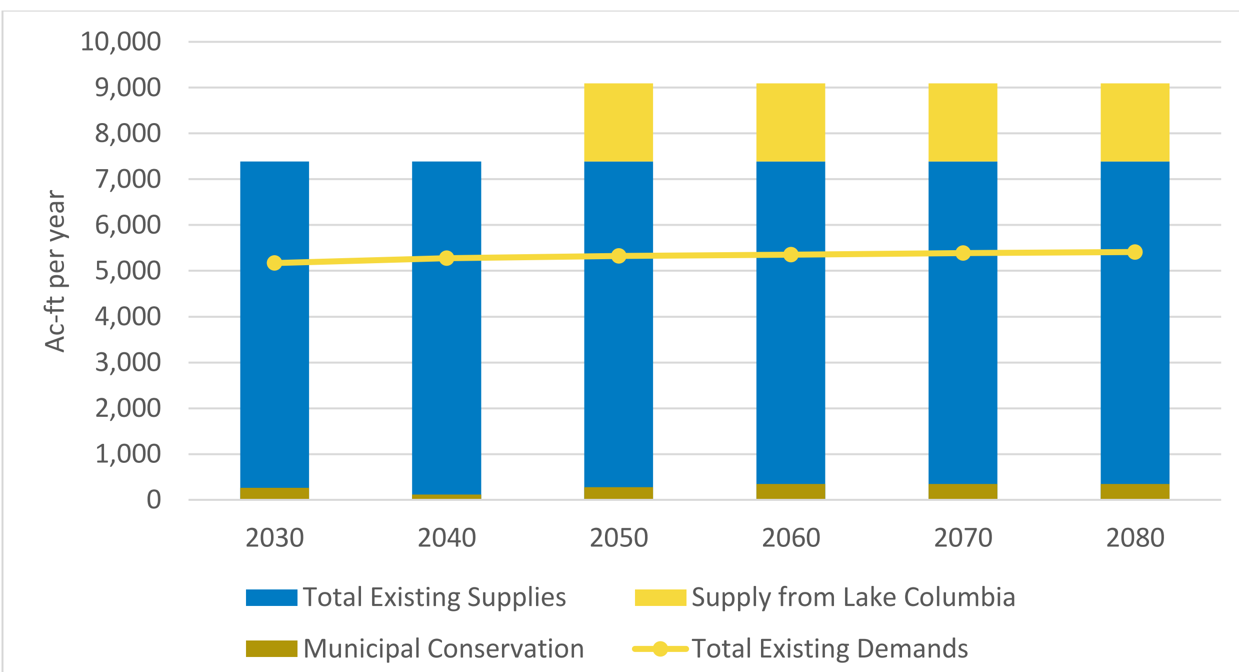


Figure 5B. 29 City of Jacksonville – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

Table 5B.94 City of Jacksonville – Water Management Strategies/Projects Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Supply from Lake Columbia	1,700	$67,185,000	$6,428,000	$3,781	$12
Municipal Conservation	345	$257,000	$68,700	$300	$1

5B.3.9 Lower Neches Valley Authority

Current supplies for the Lower Neches Valley Authority (LNVA) include the B.A. Steinhagen Lake/Sam Rayburn Reservoir system (Sam Rayburn Reservoir), Neches run-of-river, and a run-of-the-river diversion from the Trinity River in Region H. LNVA provides water to several water user groups (WUGs) in the ETRWPA and Region H, including municipal, industrial (manufacturing), irrigation, and livestock demands. The projected water demands from existing customers supplied by LNVA total over 440,000 ac-ft per year from 2030 to 2080. In addition to these demands, there are nearly 200,000 ac-ft per year in potential future demands from existing and future customers projected by 2080, largely from manufacturing water users.

LNVA is pursuing several water management strategies and projects to increase its reliable water supplies and to increase its infrastructure to provide conveyance to future customers. These WMSs and WMSPs include:

- Devers Pump Station Relocation (Region H)
- Neches Pump Station Upgrade and Fuel Diversification
- West Beaumont Reservoir
- Neches-Trinity Interconnect (Region H)
- Purchase from SRA (Toledo Bend Reservoir)

In addition to these strategies, the construction of Rockland Reservoir is an alternative water management strategy considered. A brief discussion of each WMS and WMSP for LNVA in the 2026 ETRWP is presented below.

5B.3.9.1 Devers Pump Station Relocation (Recommended).

LNVA provides a substantial portion of supply to irrigators in the eastern portion of Region H (Chambers and Liberty counties) through its Devers Canal System, which diverts water from the Trinity River at Devers 1st Pump Station. In order to meet the needs of current and future customers and increase deliverable supply, LNVA has identified the need to develop a new Devers 1st Pump Station. Major infrastructure components associated with this strategy include a new intake structure, high-capacity pump station, and discharge structures to connect the pump station to the Devers Canal System. The new facility has a planned capacity of 200,000 gpm, resulting in an additional 55,000 gpm (88,704 ac-ft/yr) of reliable pumping capacity. The new pump station will be located adjacent to the current pump station, limiting the required permitting and the need for development of additional conveyance to connect to existing canal infrastructure. This project will not require a new water right appropriation because it is associated with infrastructure capacity related to the use of existing rights.

5B.3.9.2 Neches Pump Station Upgrades and Fuel Diversification (Recommended)

This recommended WMS/WMSP includes improvements to LNVA pump stations on the Neches River canal system in Jefferson County. LNVA serves municipal, agricultural, and industrial customers in Jefferson County through their canal systems. These canal systems are fed by intake pump stations. This project includes constructing a new 200,000 gpm pump station at the Neches First Lift Pump Station with new pumps driven by electric motors with back-up diesel generators at a location that is less susceptible to flooding events. LNVA's existing 1930's pump station at Neches First Lift is driven only by natural gas engines and is within a building that is not able to be flood-proofed against the flood of record. In addition, this project involves a new 100,000 gpm pump and electric motor installed at the Neches Second Lift Pump Station, as well as a diesel generator for backup power. In addition to floodproofing their 1930's pump station, this project will diversify LNVA's fuel needs and provide back-up pumping capacity in case there is loss of natural gas to the facility. These upgrades will add a total capacity of 300,000 gpm at LNVA's Neches First and Second Lift Pump Stations, resulting in an additional 100,000 gpm (approximately 161,500 ac ft/yr) of firm pumping capacity.

5B.3.9.3 Beaumont West Regional Reservoir (Recommended)

This recommended WMS/WMSP involves the construction of an approximate 1,100-acre reservoir on the northwest end of Beaumont. The reservoir is anticipated to have an approximate capacity of 7,700 acre-feet, which is equivalent to approximately three (3) weeks of water supply to meet municipal and industrial demands downstream. This reservoir is located so that stored water can be sent to all industrial and municipal customers on the LNVA system. In addition, the location of the reservoir provides a significant advantage to provide water in case of an emergency fire water demand, source pollution in the Neches River or Pine Island Bayou, or losses of either of the LNVA pumping stations in severe events, such as what occurred during Hurricane Harvey.

5B.3.9.4 Neches-Trinity Basin Interconnect (Recommended)

LNVA is planning to construct an approximate 13-mile, single 84-inch pipeline that runs in an east-west direction, as well as a 62,000 gpm pump station. The proposed pipeline enables the movement of Neches River water westward toward the upper reaches of the Devers Canal system and potentially back into the Trinity River. The water from this strategy will enable LNVA to provide water for irrigation customers in Region H, as well as to serve new industries as they emerge along the IH-10 corridor.

5B.3.9.5 Purchase from Sabine River Authority (Toledo Bend Reservoir) (Recommended)

The proximity of the Sabine River Basin to the Neches River Basin could make the transfer of water from the Sabine River a feasible strategy for LNVA. A WMS/WMSP is recommended for LNVA to purchase water supply from SRA and transfer it to the Neches River Basin. The strategy would require a contract with SRA, approximately 13 miles of pipeline, 17 miles of open canals, and 2 pump stations.

5B.3.9.6 Rockland Reservoir (Alternative)

Rockland Reservoir was authorized for construction, as a federal facility, in 1945 along with Sam Rayburn Reservoir, Lake B. A. Steinhagen and Dam A Lake. A 1947 report recommended construction of Sam Rayburn Reservoir and Lake B.A. Steinhagen with deferral of Rockland Reservoir and Dam A until such time the need develops. The Rockland Reservoir site is located on the Neches River at River Mile 160.4. The top of the flood pool would be at elevation 174 ft. msl with the conservation pool at 165 ft. msl. The Reservoir Site Protection Study updated the yield and costs for the Rockland Reservoir using ENR indexing (TWDB, 2007). No recent detailed yield analysis or cost data has been developed for Rockland Reservoir. Based on the TWDB study, the estimated yield of Rockland is 614,400 ac-ft per year and the unit cost of water is $198 per acre-feet (scaled to September 2023 dollars). More detailed studies are needed to confirm the yield and costs for this project.

5B.3.9.7 LNVA Summary

A summary of existing supplies, projected demands, and WMSs/WMSPs for LNVA is presented in Table 5B.95 and Figure 5B.30. A summary of cost estimates for the recommended WMS is listed in Table 5B.96.

Table 5B.95 LNVA – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Sam Rayburn / B.A. Steinhagen System	792,000	820,000	820,000	820,000	820,000	820,000
Neches Run-of-River	381,876	381,876	381,876	381,876	381,876	381,876
Trinity Run-of-River (Region H)	2,173	2,173	2,173	2,173	2,173	2,173
Lufkin (Sam Rayburn)	28,000	0	0	0	0	0
Total Existing Supplies	**1,204,049**	**1,204,049**	**1,204,049**	**1,204,049**	**1,204,049**	**1,204,049**
Demands (ac-ft per year)						
Demand from Existing Customers	441,125	445,170	445,165	445,120	445,075	445,032
Demand from Potential Future Customers [a]	13,169	46,875	84,680	121,748	158,698	195,566
Total Demand from Existing and Potential Future Customers	**454,294**	**492,045**	**529,845**	**566,868**	**603,773**	**640,598**
Surplus or (Shortage) with Existing Supplies	**749,755**	**712,004**	**674,204**	**637,181**	**600,276**	**563,451**
Recommended Water Management Strategies/Projects (ac-ft per year)						
Devers Pump Station Relocation (Region H) [b]	88,704	88,704	88,704	88,704	88,704	88,704
Neches Pump Station Upgrades and Fuel Diversification [b]	161,420	161,420	161,420	161,420	161,420	161,420
West Beaumont Reservoir	7,700	7,700	7,700	7,700	7,700	7,700
Neches-Trinity Basin Interconnect (Region H) [b]	0	67,000	67,000	67,000	67,000	67,000
Purchase from SRA (Toledo Bend)	0	0	200,000	200,000	200,000	200,000
Total Increase in Supplies from Recommended WMSs/WMSPs	**7,700**	**7,700**	**207,700**	**207,700**	**207,700**	**207,700**
Surplus or (Shortage) with Recommended WMSs/WMSPs	**757,455**	**719,704**	**881,904**	**844,881**	**807,976**	**771,151**

a. Includes projected demands from the City of Beaumont (beyond their existing contract with LNVA) and projected needs for manufacturing water users in Jasper and Jefferson counties.

b. Gray indicates a strategy that involves development or expansion of infrastructure to access existing and/or future supplies. These should not be included in the total to avoid double counting.

Table 5B.96 LNVA – Water Management Strategies/Projects Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Devers Pump Station Relocation (Region H) [a]	88,704	$21,338,000	$1,883,000	$21	$0.07

Neches Pump Station Upgrades and Fuel Diversification [a]	161,420	$66,948,000	$5,681,000	$35	$0.11
West Beaumont Reservoir	7,700	$110,438,000	$6,084,000	$790	$2.42
Neches-Trinity Basin Interconnect (Region H) [a]	67,000	$127,826,000	$11,065,000	$165	$0.51
Purchase from SRA (Toledo Bend)	200,000	$451,797,000	$102,526,000	$513	$1.57

a. Gray indicates a strategy that involves development or expansion of infrastructure to access existing and/or future supplies. These should not be included in the total to avoid double counting.

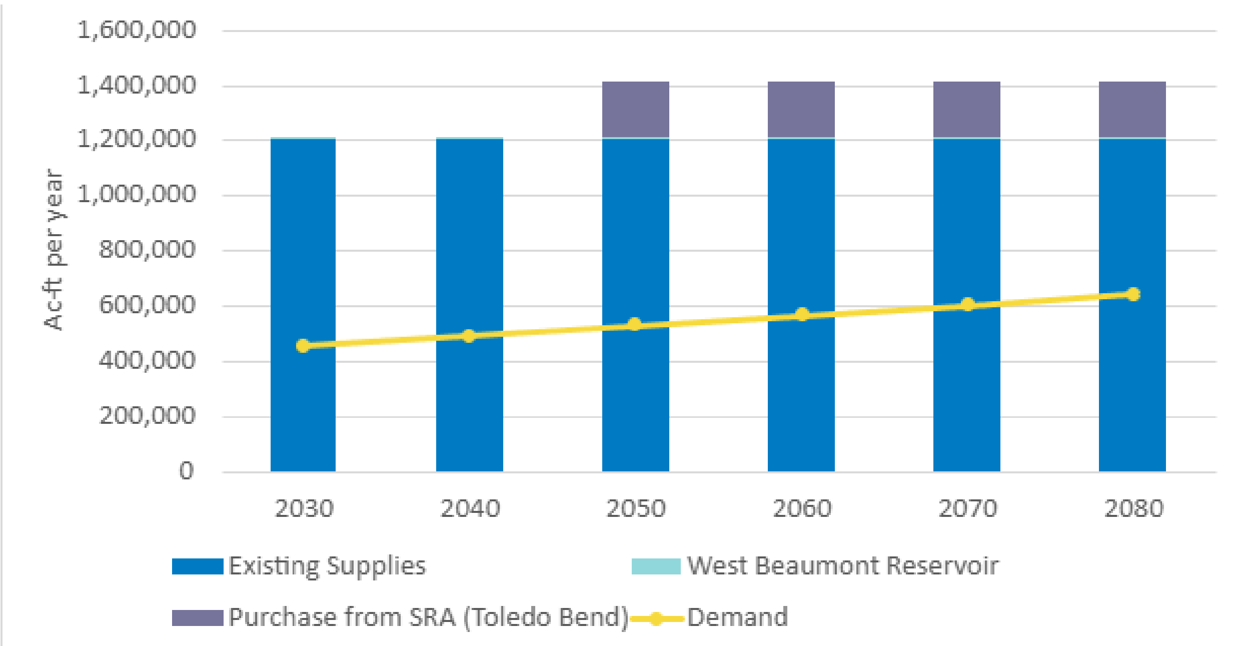


Figure 5B.30 LNVA – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

5B.3.10 City of Lufkin

The City of Lufkin currently relies on groundwater from the Carrizo-Wilcox aquifer and surface water from Lake Kurth and Sam Rayburn Reservoir. The City's groundwater infrastructure includes 15 active wells, including XX wells acquired from the Abitibi Bowater Corporation. Currently, twelve of the wells provide potable water. Two additional wells have been upgraded to provide potable water, but they are currently permitted for Industrial use and are being re-permitted for Municipal use. The City plans to convert two non-potable wells per year to provide potable water; these upgrades will be completed by 2030. The City provides water to Diboll, Huntington, Redland WSC, Angelina County-Other (Burke, Angelina Freshwater Supply, and Woodlawn WSC) and Manufacturing, Steam Electric Power, and Irrigation demands in Angelina County. Lufkin has a recommended WMS to expand their developed supplies and provide conveyance from Sam Rayburn Reservoir to Lake Kurth. With additional groundwater and surface water supplies, the City expects to provide up to an additional 16 MGD of water to meet industrial demands in Angelina County. In addition, municipal conservation is considered as a recommended WMS from 2020 to 2040 for the City to reduce municipal demands. [Pending information]

5B.3.10.1 Develop Sam Rayburn Reservoir Water Rights (Recommended)

To meet the City of Lufkin's long-term water needs, Lufkin is continuing to plan and develop a water management strategy to utilize its surface water rights in Sam Rayburn Reservoir. In the late 1960's, the City of Lufkin purchased storage and water production rights for surface water from Sam Rayburn Reservoir through contracts with the LNVA and the U.S. Army Corp of Engineers. The City has a water right to divert up to 28,000 ac-ft annually of surface water from the reservoir. This equates to an average withdrawal rate of 25 MGD.

With the acquisition of Lake Kurth, the long-range plan is to expand the surface water treatment plant near Lake Kurth and treat raw water from Sam Rayburn Reservoir at the expanded facility. For planning purposes, it is assumed that water from Sam Rayburn Reservoir will be diverted from the northern end of the Lake and transported through a 36-inch pipeline. The treatment plant proposed at Lake Kurth will be initially expanded from 16 MGD to 25 MGD with the potential for further expansions beyond this planning period. This strategy is expected to be developed in three phases, with the first phase to develop access to 10 MGD of Sam Rayburn supplies by 2040, second phase with an additional 10 MGD capacity expansion by 2050, and the final phase of 5 MGD capacity expansion by 2060. The initial size of the treatment facility will depend on the projected needs at the time.

5B.3.10.2 Municipal Conservation (Recommended)

The City of Lufkin has a baseline demand of 149 gpcd. After performing a conservation cost analysis, the ETRWPG believes that a water conservation strategy for the City is economically achievable. This recommended strategy includes cost estimates related to enhanced public and school education, water conservation pricing implementation, and a water loss mitigation strategy. The proposed municipal conservation strategy would reduce the City's demand, increasing the surplus supply available for the City.

5B.3.10.3 City of Lufkin Summary

The supplies and demands associated with the City of Lufkin are shown in Table 5B.97 and Figure 5B. 31. A summary of cost estimates for the recommended WMS is listed in Table 5B.98.

Table 5B.97 City of Lufkin – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Carrizo-Wilcox	17,888	17,888	17,888	17,888	17,888	17,888
Lake Kurth	17,425	17,448	17,471	17,494	17,517	17,540
Sam Rayburn Reservoir (to LNVA)	0	0	0	0	0	0
Total Existing Supplies	**35,313**	**35,336**	**35,359**	**35,382**	**35,405**	**35,428**
Demands (ac-ft per year)						
Total Existing Demands	28,285	28,408	28,503	28,614	28,725	28,838
Surplus or (Shortage) with Existing Supplies	**7,028**	**6,928**	**6,856**	**6,768**	**6,680**	**6,590**
Recommended Water Management Strategies/Projects (ac-ft per year)						
Municipal Conservation	298	208	427	526	553	582
Transfer from Rayburn to Lake Kurth – Phase I (2040)	0	11,210	11,210	11,210	11,210	11,210
Transfer from Rayburn to Lake Kurth – Phase II (2050)	0	0	11,210	11,210	11,210	11,210
Transfer from Rayburn to Lake Kurth – Phase III (2060)	0	0	0	5,580	5,580	5,580
Total Increase in Supplies from Recommended WMSs/WMSPs	**298**	**11,418**	**22,847**	**28,526**	**28,553**	**28,582**
Surplus or (Shortage) with Recommended WMSs/WMSPs	**7,326**	**18,346**	**29,703**	**35,294**	**35,233**	**35,172**

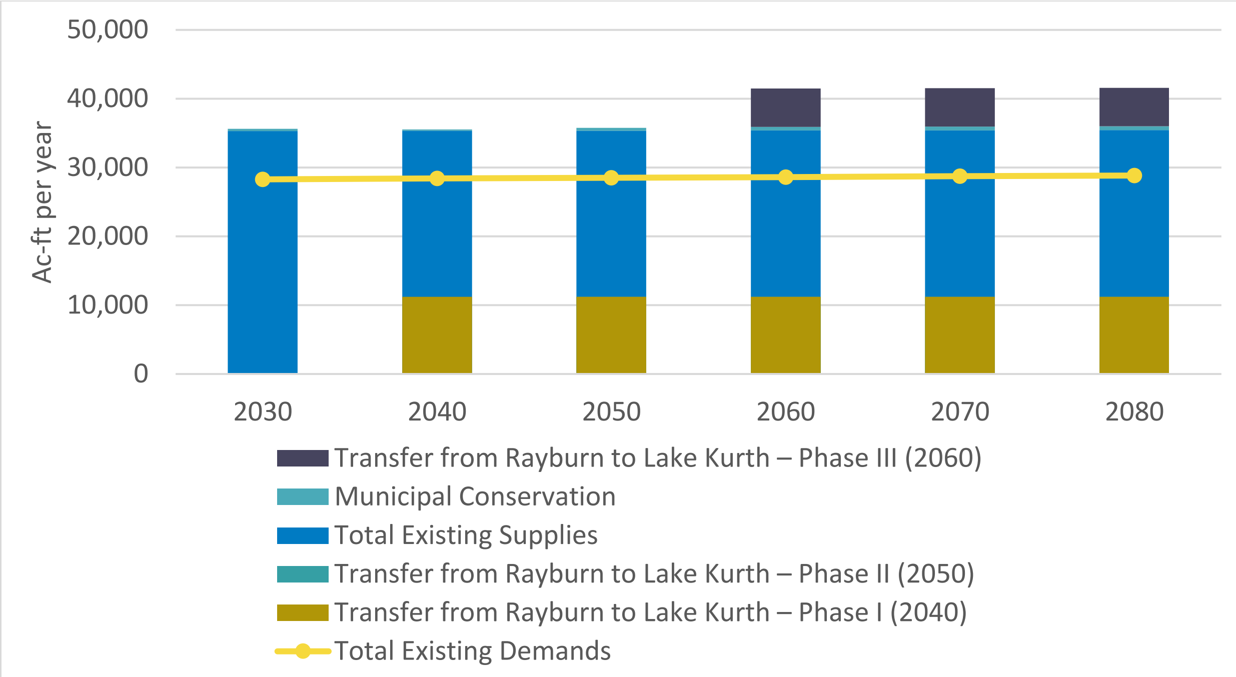


Figure 5B. 31 City of Lufkin – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

Table 5B.98 City of Lufkin – Water Management Strategies/Projects Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Municipal Conservation	582	$740,000	$133,400	$447	$1
Transfer from Rayburn to Lake Kurth – Phase I (2040)	11,210	$136,547,000	$15,519,000	$1,384	$4
Transfer from Rayburn to Lake Kurth – Phase II (2050)	11,210	$125,310,000	$28,432,000	$1,278	$4
Transfer from Rayburn to Lake Kurth – Phase III (2060)	5,580	$24,037,000	$20,419,000	$729	$2

5B.3.11 City of Nacogdoches

The City of Nacogdoches utilizes groundwater from the Carrizo-Wilcox aquifer and surface water from Lake Nacogdoches. In addition to the City of Nacogdoches retail customers, the City is a major water provider to Appleby WSC, D & M WSC, Nacogdoches MUD#1, Lily Grove SUD, and Melrose WSC. Most, if not all, of the manufacturing demands in the county are also supplied by the City. The Neches WAM shows the firm yield of Lake Nacogdoches to be approximately 16,200 ac-ft/year by 2020, reducing to

14,200 ac-ft/year by 2070. Groundwater from the Carrizo-Wilcox aquifer is used to supply much of the southern part of the city, and the City of Nacogdoches has been increasing its groundwater supplies to better serve this section of the city. The City has also developed two new wells, rehabilitated two existing wells, and is in the process of developing another new well. With the City's existing groundwater supplies, Nacogdoches has a reliable supply of approximately 21,000 ac-ft/year. This supply is sufficient to meet the projected demands in this plan, but the City's current water planning efforts indicate greater population growth and higher demands by the commercial and manufacturing sectors than projected by the TWDB. Therefore, the City has two recommended strategies in the 2026 Regional Water Plan. [to be updated.]

5B.3.11.1 Raw Water Transmission System to Lake Columbia (Recommended)

The City of Nacogdoches is pursuing one recommended WMS to increase the reliability of its supplies and provide for projected growth using surface water from Lake Columbia. The City of Nacogdoches is also among those contracted for participation in the Lake Columbia project. The City proposes to obtain raw water from Lake Columbia to transmit to Lake Nacogdoches. The existing treatment plant would be expanded to treat the additional water. Currently, there are no alternative strategies proposed for City of Nacogdoches. A summary of demands, existing supplies, and increased supplies from WMSs is provided in Table 5B.99 City of Nacogdoches – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects. Cost estimates were developed for the raw water transmission system from Lake Columbia to City of Nacogdoches. A summary of cost estimates is included in Table 5B.100.

5B.3.11.2 Municipal Conservation (Recommended)

The City of Nacogdoches has a baseline per capita demand of 187 gpcd. Conservation strategies were recommended for all municipal WUGs in the ETRWPA, including the City of Nacogdoches. The municipal water conservation strategy includes estimates of potential water savings and cost estimates related to enhanced education and public awareness, water conservation pricing implementation, and a system water audit and water loss control program. Further discussion of these conservation strategies is provided in Chapter 5C.

5B.3.11.3 City of Nacogdoches Summary

The supplies and demands associated with the City of Nacogdoches are shown in Table 5B.99 and Figure 5B. 32. A summary of cost estimates for the recommended WMS is listed in Table 5B.100.

Table 5B.99 City of Nacogdoches – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Carrizo-Wilcox	6,492	6,492	6,492	6,492	6,492	6,492
Lake Nacogdoches	14,335	13,973	13,611	13,249	12,887	12,525
Total Existing Supplies	**20,827**	**20,465**	**20,103**	**19,741**	**19,379**	**19,017**
Demands (ac-ft per year)						
Total Existing Demands	11,030	11,337	11,650	12,073	12,498	12,928
Surplus or (Shortage) with Existing Supplies	**9,797**	**9,128**	**8,453**	**7,668**	**6,881**	**6,089**
Recommended Water Management Strategies/Projects (ac-ft per year)						

Supply from Lake Columbia	0	8,551	8,551	8,551	8,551	8,551
Municipal Conservation	364	884	1,152	1,223	1,295	1,369
Total Increase in Supplies from Recommended WMSs/WMSPs	**364**	**9,435**	**9,703**	**9,774**	**9,846**	**9,920**
Surplus or (Shortage) with Recommended WMSs/WMSPs	**10,161**	**18,563**	**18,156**	**17,442**	**16,727**	**16,009**

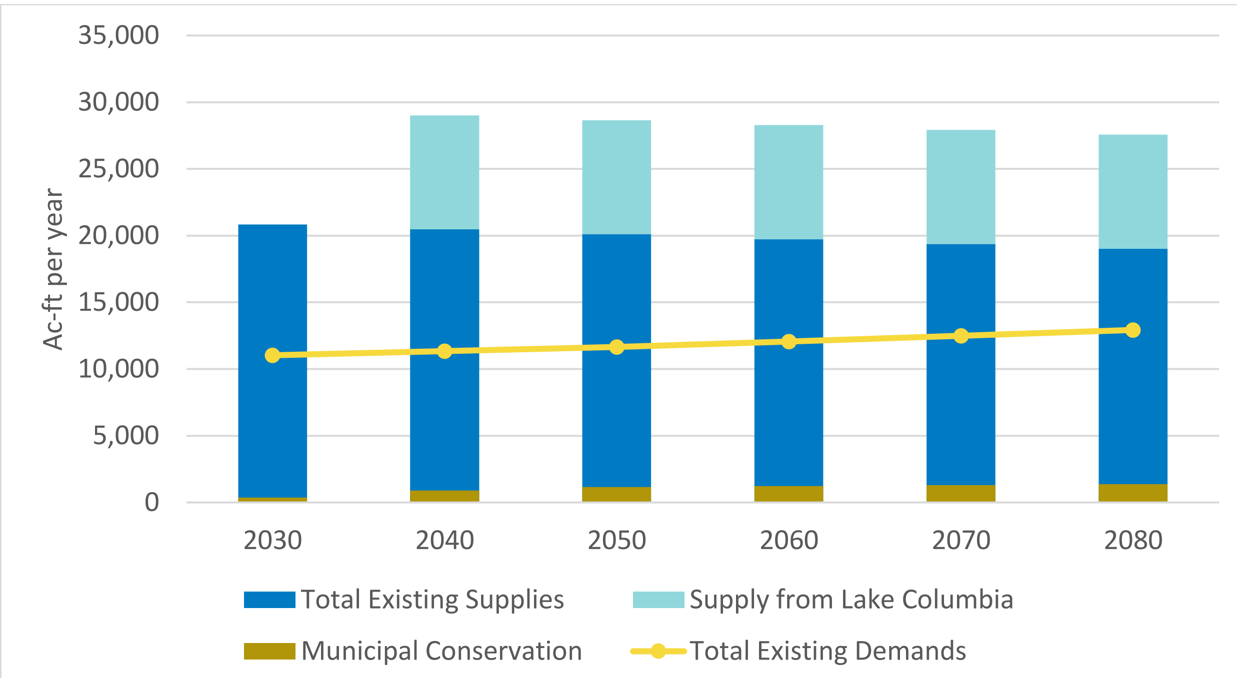


Figure 5B. 32 City of Nacogdoches – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

Table 5B.100 City of Nacogdoches – Water Management Strategies/Projects Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Supply from Lake Columbia	8,551	$82,440,000	$9,278,000	$1,085	$3
Municipal Conservation	1,369	$652,000	$188,100	$517	$2

5B.3.12 Panola County Fresh Water Supply District

Panola County Fresh Water Supply District (PC FWSD) is a wholesale water provider in Panola County. PC FWSD is the wholesale provider to City of Carthage and Mining demands in Panola County. PC FWSD owns and operates Lake Murvaul and has a water right for 22,400 ac-ft per year. In this round of planning, PC FWSD has enough supplies to meet the projected customer demand for the planning period 2030-2080.

Currently, no WMSs or WMSPs were identified for this entity. Conservation was recommended for all municipal WUGs in the ETRWPA, including some of PC FWSD's customers. Potential future reductions in water demands due to conservation would reduce demands on PC FWSD's supplies.

5B.3.12.1 Panola County FWSD Summary

A summary of existing supplies, projected demands, and WMSs/WMSPs for PC FWSD (if any) is presented in Table 5B.101 and Figure 5B.33.

Table 5B.101 PC FWSD – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Lake Murvaul (Firm Yield)	20,800	20,016	19,482	18,448	17,664	16,880
Total Existing Supplies	**20,800**	**20,016**	**19,482**	**18,448**	**17,664**	**16,880**
Demands (ac-ft per year)						
Total Demands	**14,820**	**14,820**	**14,820**	**14,820**	**14,820**	**14,820**
Surplus or (Shortage) with Existing Supplies	**5,980**	**5,196**	**4,662**	**3,628**	**2,844**	**2,060**

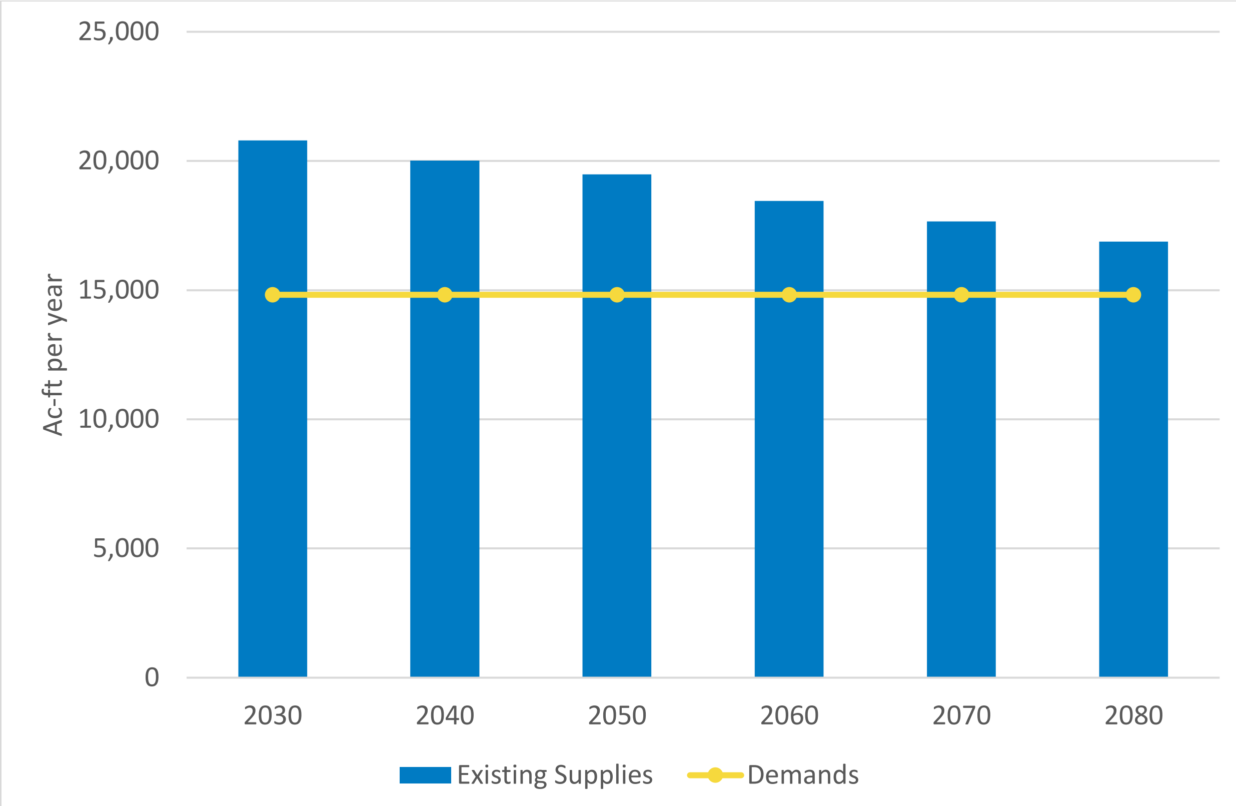


Figure 5B.33 PC FWSD – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

5B.3.13 City of Port Arthur

The City of Port Arthur provides treated water to municipal users both inside and outside the city limits and to several industrial facilities in Jefferson County. Current water supplies for the City of Port Arthur include raw surface water from the Sam Rayburn/B.A. Steinhagen Reservoir System (LNVA). LNVA provides 100 percent of the City's supply to meet their demands. This supply is limited by Port Arthur's water treatment plant capacity of 40 MGD. Currently, the only WMS/WMSP identified for the City is municipal conservation. The information below summarizes the existing supplies, demands, and recommended WMSs and WMSPs for Port Arthur in the 2026 ETRWP.

5B.3.13.1 Municipal Conservation (Recommended)

Port Arthur is not projected to have a water supply need within the planning period. However, conservation strategies were recommended for all municipal WUGs in the ETRWPA. The municipal water conservation strategy includes estimates of potential water savings and cost estimates related to enhanced education and public awareness, water conservation pricing implementation, and a system water audit and water loss control program. Further discussion of these conservation strategies is provided in Chapter 5C.

5B.3.13.2 Port Arthur Summary

A summary of existing supplies, projected demands, and WMSs/WMSPs for Port Arthur is presented in Table 5B.102 and Figure 5B.34. A summary of cost estimates for the recommended WMS is listed in Table 5B.103.

Table 5B.102 Port Arthur – Summary of Existing Supplies, Demand, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Sam Rayburn/B.A. Steinhagen Reservoir System (LNVA)	33,955	37,990	37,990	37,990	37,990	37,990
Total Existing Supplies	**33,955**	**37,990**	**37,990**	**37,990**	**37,990**	**37,990**
Demands (ac-ft per year)						
Total Demands	33,955	37,990	37,990	37,990	37,990	37,990
Surplus or (Shortage) with Existing Supplies	**0**	**0**	**0**	**0**	**0**	**0**
Recommended Water Management Strategies/Projects (ac-ft per year)						
Municipal Conservation	473	677	736	788	838	887
Total Increase in Supplies from Recommended WMSs/WMSPs	**473**	**677**	**736**	**788**	**838**	**887**
Surplus or (Shortage) with Recommended WMSs/WMSPs	**473**	**677**	**736**	**788**	**838**	**887**

Table 5B.103 Port Arthur – Water Management Strategies/Projects Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Municipal Conservation	473 - 887	$1,518,000	$194,300	$411	$1.26

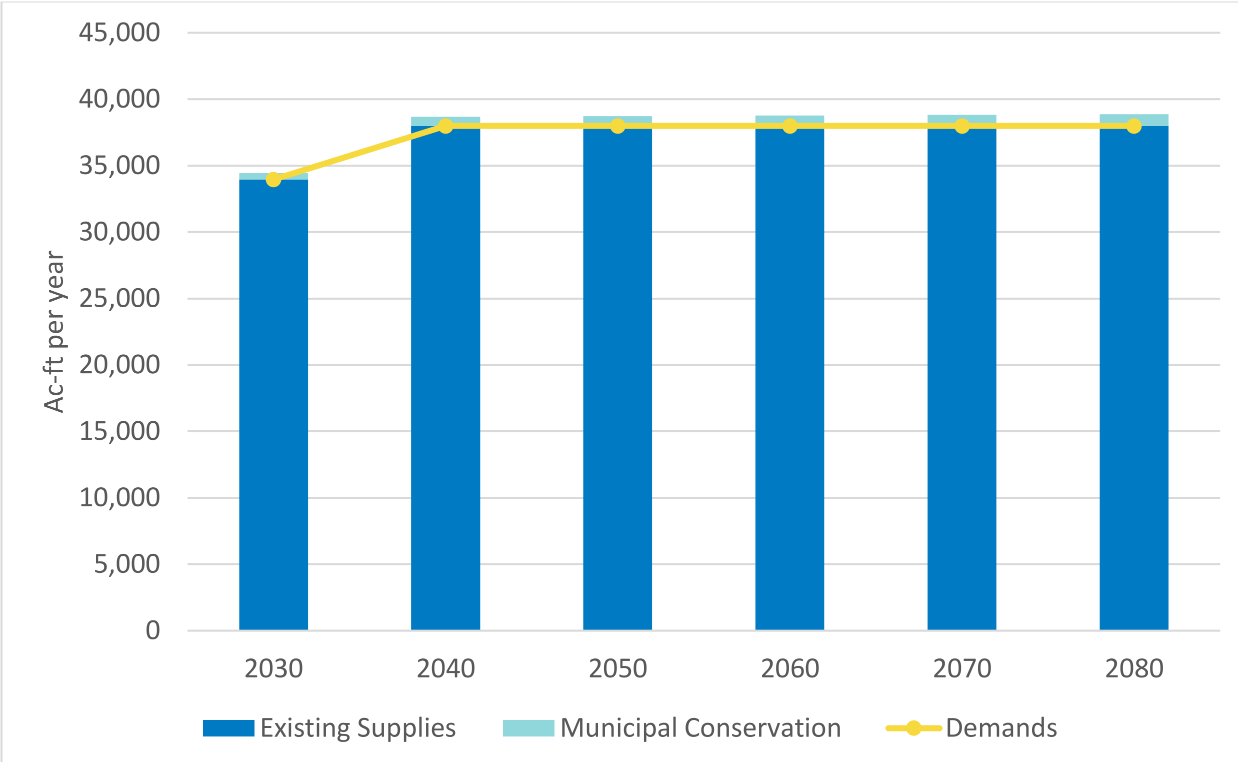


Figure 5B.34 Port Arthur – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

5B.3.14 Sabine River Authority

The Sabine River Authority of Texas (SRA) is based in the ETRWPA (Region I) and the North East Texas Regional Water Planning Area (Region D). SRA currently provides water supply from its Lower Basin system (Toledo Bend Reservoir and the canal system) to water users in the ETRWPA. SRA provides water supply from its Upper Basin system (Lake Tawakoni and Lake Fork) to water users in Regions C and D. SRA's Upper Basin system water supply sources are nearly fully contracted, and SRA is currently exploring opportunities for additional water supply in their Upper Basin. This section describes the supply and demand evaluation for SRA's Lower Basin located in the ETRWPA. The supply, demand, and strategy evaluation for SRA's Upper Basin is not included in this plan. Instead, discussion regarding SRA's Upper Basin is included in the Region C and Region D regional water plans.

SRA supplies wholesale water to several customers in the ETRPWA from its Lower Basin supplies: the Toledo Bend Reservoir and the canal system. Municipal customers in SRA's Lower Basin currently include the cities of Hemphill, Huxley, and Rose City, and El Camino WSC and G-M WSC. In addition to municipal customers, SRA also currently supplies steam electric power users in Orange, Newton, and Rusk Counties, manufacturing users in Orange and Jefferson Counties, and irrigation users in Orange County. There are additional demands projected for manufacturing users in Orange and Newton Counties that are assumed to be supplied by SRA from their Lower Basin sources.

SRA has sufficient supplies in its Lower Basin to meet current contracted customer demands and has substantial surplus supplies for potential future buyers. In addition to the current customers, some ETRWPA water suppliers have water management strategies (WMSs) and/or projects (WMSPs) that use SRA's Toledo Bend Reservoir supplies. The ETRWPA WMSs and WMSPs that use supplies from Toledo Bend Reservoir include: 1) Pipeline from Toledo Bend to City of Center; and 2) Transfer from Toledo Bend to LNVA. It should be noted that the strategies listed were identified as recommended WMSs and WMSPs for these entities by the ETRWPG. None of these entities have yet contracted with SRA regarding these potential WMSs. For the successful implementation of these strategies, these users will have to contract with SRA for supplies. Additional discussion of these WMSs and WMSPs, including cost estimates are included in the write-up for the specific entities and are not included here as they are not sponsored by SRA. It should be noted that the cost estimates for these strategies include a placeholder cost for purchasing water, which is applied consistently across all strategies in the 2026 ETRWP. Purchase water costs will ultimately be subject to negotiation between the seller (SRA) and future buyers.

In addition to the recommended WMSs and WMSs for ETRPWA water suppliers, there may potentially be future WMSs and WMSPs to use and transfer SRA's Toledo Bend Reservoir supplies outside of the ETRWPA. These are not discussed in the ETRWP and are instead discussed in the respective regional water plans where those WMSs/WMSPs would be developed. Development of these WMSs/WMSPs would be subject to negotiation between the sponsors and SRA.

5B.3.14.1 SRA Summary

A summary of the total demands, existing supplies, and surpluses for the SRA Lower Basin within the ETRWPA is included in Table 5B.104 and Figure 5B.35. No WMSs or WMSPs sponsored by SRA in the ETRWPA were identified in this cycle of regional water planning.

Table 5B.104 SRA (Lower Basin) – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Toledo Bend Reservoir	941,900	941,583	941,230	940,949	940,632	940,315
Canal System	129,961	129,961	129,961	129,961	129,961	129,961
Total Existing Supplies	**1,071,861**	**1,071,544**	**1,071,191**	**1,070,910**	**1,070,593**	**1,070,276**
Demands (ac-ft per year)						
Toledo Bend Reservoir Current Customer Contracts	26,806	26,806	26,806	26,806	26,806	26,806
Canal System Current Customer Contracts	106,635	106,635	106,635	106,635	106,635	106,635
Potential Future Lower Basin Customer Demands	34,728	34,955	35,191	37,847	42,384	47,090
Total Demands (Current Contracts and Potential Future Customers)	**168,169**	**168,396**	**168,632**	**171,288**	**175,825**	**180,531**
Surplus or (Shortage) with Existing Supplies	**903,692**	**903,148**	**902,559**	**899,622**	**894,768**	**889,745**

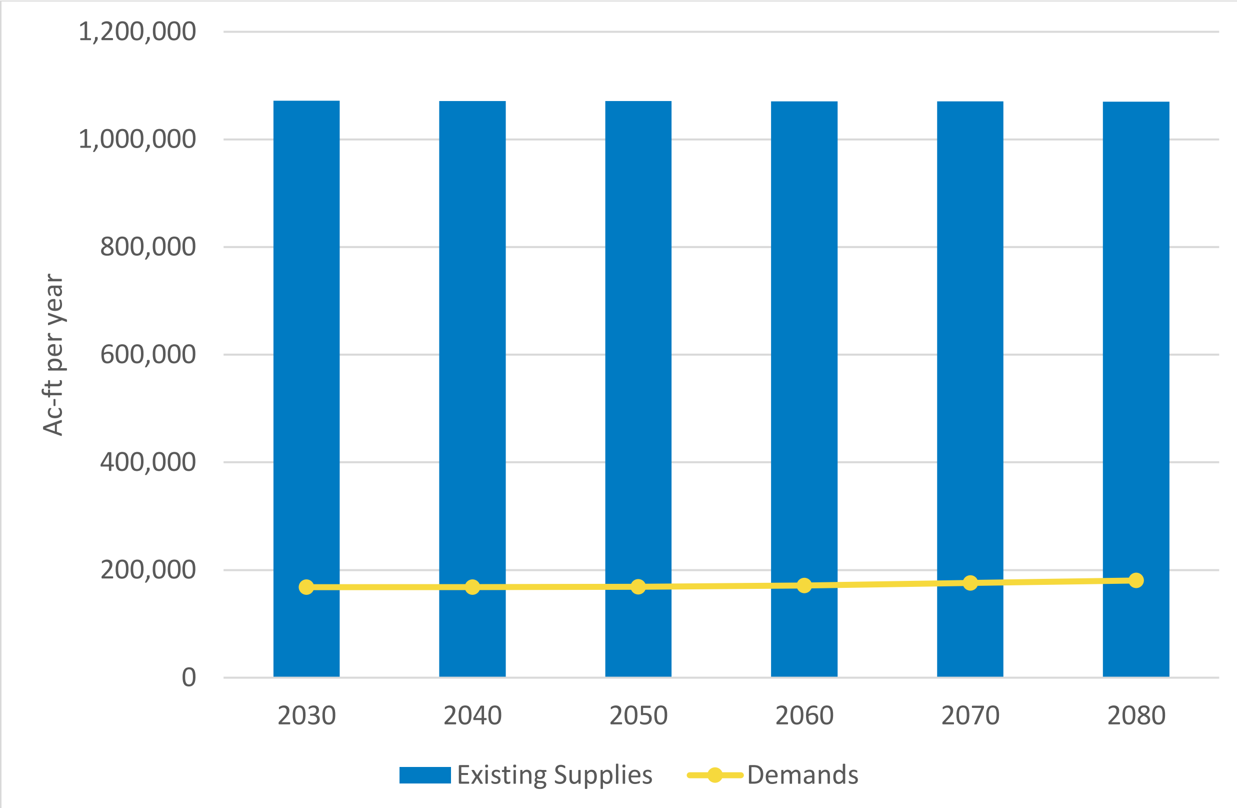


Figure 5B.35 SRA (Lower Basin) – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

5B.3.15 City of Tyler

The City of Tyler currently provides wholesale supplies to retail customers, irrigation, and manufacturing demands within the City limits. The City is the wholesale provider for Whitehouse, Southern Utilities, Walnut Grove WSC, and Community Water Company. The current supplies for the City include 34 MGD from Lake Tyler, 30 MGD from Lake Palestine, 0.4 MGD from Bellwood Lake, and 12 groundwater wells in Carrizo Wilcox aquifer producing approximately 8 MGD. However, the City has not been using groundwater to meet its demand for seven years. The City also plans to plug the existing wells starting in 2024, in accordance with the TCEQ requirements. The City of Tyler is shown to have sufficient supplies through the planning period using the TWDB approved demand projections.

In addition, there is considerable interest from other users in Smith County in contracting with the City of Tyler for water supplies. There are recommended strategies for Tyler to provide additional water to Bullard, White House, and Manufacturing in Smith County. The City of Tyler has sufficient supplies to meet the proposed demands for the potential future customers throughout the planning horizon.

The City of Tyler has recommended strategies to develop infrastructure to develop the rest of Lake Palestine and for municipal conservation. The City's supplies, customer demands, and WMSs are summarized in the Table 5B.105. Summary of the cost estimates for the recommended strategies are included in Table 5B.106.

5B.3.15.1 <u>Lake Palestine Infrastructure (Recommended)</u>

The City of Tyler proposed the following recommended strategy for the 2026 Plan. This strategy involved the City developing the additional 30 MGD of Lake Palestine water. The City has developed about half of its contracted supply in Lake Palestine and plans to develop the remaining supply (i.e., 30 MGD) by 2060 as part of its long-term water supply plan. This development will be executed in two stages, with the initial phase bringing 15 MGD into operation by 2040, and the subsequent phase will introduce the remaining 15 MGD.

5B.3.15.2 Municipal Conservation (Recommended)

City of Tyler has a per capita demand of 255 gpcd. Conservation strategies were recommended for all municipal WUGs in the ETRWPA, including the City of Tylor. The municipal water conservation strategy includes estimates of potential water savings and cost estimates related to enhanced education and public awareness, water conservation pricing implementation, and a system water audit and water loss control program. Further discussion of these conservation strategies is provided in Chapter 5C.

5B.3.15.3 City of Tyler Summary

The supplies and demands associated with the City of Tyler are shown in Table 5B.105 and Figure 5B. 36.

Table 5B.105 City of Tyler – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Lake Tyler (a)	32,900	32,665	32,430	32,203	31,977	31,750
Bellwood Lake (b)	400	400	400	400	400	400
Lake Palestine (c)	33,630	33,630	33,630	33,630	33,630	33,630
Total Existing Supplies	**66,930**	**66,695**	**66,460**	**66,233**	**66,007**	**65,780**
Demands (ac-ft per year)						
Total Existing Demands	39,975	44,121	48,862	51,474	54,240	57,165
Surplus or (Shortage) with Existing Supplies	**26,955**	**22,574**	**17,598**	**14,759**	**11,767**	**8,615**
Recommended Water Management Strategies/Projects (ac-ft per year)						
Municipal Conservation	1,556	991	2,115	2,842	3,161	3,507
Lake Palestine Infrastructure Expansion	0	16,815	16,815	16,815	16,815	16,815
Total Increase in Supplies from Recommended WMSs/WMSPs	**1,556**	**17,806**	**18,930**	**19,657**	**19,976**	**20,322**
Surplus or (Shortage) with Recommended WMSs/WMSPs	**28,511**	**40,380**	**36,528**	**34,416**	**31,743**	**28,937**

(a) The capacity of the City's WTP is 34 MGD (or 38,114 ac-ft/yr), but the supply is limited by the firm yield from 2026 RWP RAM model.
(b) Assume 400 ac-ft/yr of raw water is used for irrigation in Smith County, but it is not used for municipal purposes.
(c) Limited to infrastructure constraint (30 mgd).

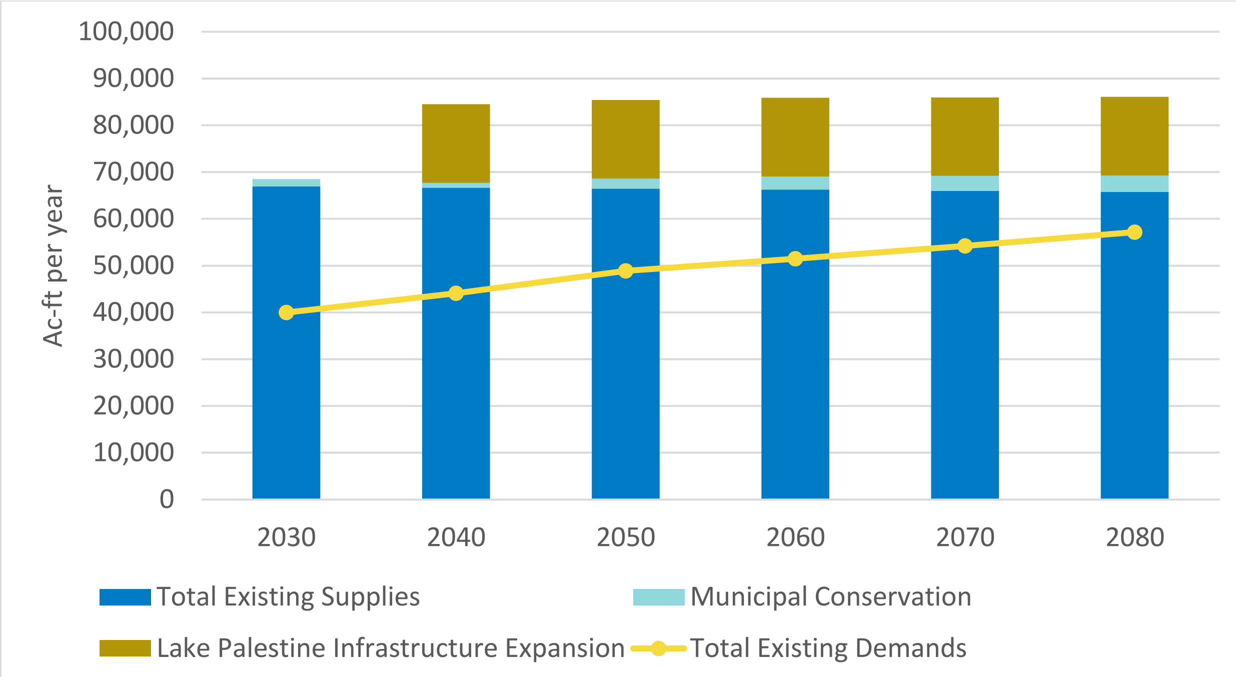


Figure 5B. 36 City of Tyler – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

Table 5B.106 City of Tyler – Water Management Strategies/Projects Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Municipal Conservation	3,507	$6,731,000	$613,000	$400	$1
Lake Palestine Infrastructure Expansion	16,815	$252,305,000	$27,852,000	$1,656	$5

5B.3.16 Upper Neches River Municipal Authority

The Upper Neches River Municipal Water Authority (UNRMWA) owns and operates Lake Palestine in the Neches River Basin. UNRMWA has a water right for 238,110 ac-ft per year from Lake Palestine and a downstream run-of-river diversion. The City of Palestine, City of Tyler, and City of Dallas have contracts for supplies from Lake Palestine for amounts of 28,000 ac-ft per year, 67,200 ac-ft per year, and 114,337 ac-ft per year, respectively. In addition to these three cities, UNRMWA is expected to have small needs from local irrigation and manufacturing users taking supplies from around the lake.

The yield for Lake Palestine was estimated using the Neches River Basin Water Availability Model (Neches WAM) adapted for the 2026 ETRWP. Based on the yield analysis from the ETRWP, the Lake Palestine system is projected to have a yield of 177,110 ac-ft per year in 2030, reducing to 166,910 ac-ft per year by 2080 due to sedimentation. When comparing current contracts for Lake Palestine supply and the projected yield of the Lake Palestine system, the UNRMWA shows a water supply need during the planning period for Lake Palestine supplies. However, when comparing the projected demands for UNRMWA's contracted customers to the yield, there is no shortage for Lake Palestine supplies.

UNRMWA does not think the contractual shortages to be real as the shortage is primarily associated with the reduced firm yield of Lake Palestine due to projected sediment accumulation in the lake. UNRMWA believes that the storage-area-elevation curves used in the Water Availability Models are severely under-predicting the storage volumes available in various parts of the lake. Therefore, UNRMWA believes that the lake yield is larger than what is projected by the Water Availability Models. UNRMWA is currently working with the TWDB to develop revised and refined volumetric information for Lake Palestine, but this information is not available for the 2026 regional planning cycle. The lake yield may be recomputed in the next planning cycle.

To address potential contractual shortages identified over the planning period, UNRMWA has evaluated multiple potentially feasible water management strategies. UNRMWA was the sponsor of the proposed Lake Fastrill project. With the uncertainties surrounding this project, the UNRMWA in conjunction with the City of Dallas has identified the need for a Lake Fastrill replacement project.

In 2013, UNRMWA and Dallas initiated the Upper Neches River Water Supply Project Feasibility Study (HDR, 2014) to evaluate potential water supply strategies to replace the Lake Fastrill project. These strategies included Neches run-of-river diversions of unappropriated water from the Upper Neches River operated in system with Lake Palestine, tributary storage, and/or operated conjunctively with groundwater. The additional water supply provided by these strategies could be used to supplement existing water supplies available to Dallas and potentially other UNRMWA customers. Compared to the Lake Fastrill project, all run-of-river diversion strategies provide lesser firm yield but avoid environmental impacts and some of the permitting challenges associated with a large, main-stem reservoir on the Neches River.

Based on this study, the preferred (recommended) strategy was the Neches run-of-river diversion operated as a system with Palestine. This was included as a recommended WMS/WMSP for UNRMWA and Dallas in the 2021 regional water plans. The Draft 2024 Dallas Long Range Water Supply Plan (LRWSP; Dallas Water Utilities, 2024) re-evaluated this strategy and again designated the Neches run-of-river diversion operated as a system with Lake Palestine as a recommended strategy. The re-evaluated configuration of this strategy from the Draft 2024 Dallas LRWSP is included as a recommended WMS/WMSP for UNRMWA and Dallas in the 2026 regional water plans.

5B.3.16.1 Neches Run-of-River with Lake Palestine (Recommended)

The Draft 2024 Dallas LRWSP outlines the infrastructure associated with this WMS/WMSP. UNRMWA is considered as the project sponsor for this WMS/WMSP in the regional water plans. This recommended project includes a new river intake and pump station for run-of-river diversions from the Neches River. The run-of-river diversions will be taken from the river segment between the existing Rocky Point diversion and the Weches Dam site below the SH 21 crossing, between the Neches River National Wildlife Refuge, and upstream of the Weches Dam site. Diversions would be conveyed through a 42-mile pipeline (23 miles of 72-inch diameter pipeline and 19 miles of 66-inch pipeline) to Dallas' pump station located at Lake Palestine. This water supply would then be delivered to Dallas through their integrated pipeline project (IPL). New facilities required for this project include a small diversion dam on the Neches River, a river intake and pump station, and a transmission pipeline and booster pump station supporting transmission to Lake Palestine.

Run-of-the-river diversions will be authorized under a new appropriation of surface water, subject to senior water rights, drought conditions, and TCEQ environmental flows restrictions, and drought conditions. Water availability at the designated diversion point was calculated based on a maximum diversion rate of 141 cfs (91 MGD). The estimated firm yield from this strategy is approximately 82,900 ac-ft per year (74 MGD). The run-of-river diversions are an interruptible supply, and the firm yield associated with the WMS is the incremental increase in the firm yield of Lake Palestine resulting from the system operation of the new diversions and the transmission facilities with Lake Palestine. This firm yield was computed using a 2021 version of TCEQ's Neches River WAM, which includes hydrology from 1940 to 2018.

Although the additional system firm yield from this WMS/WMSP is approximately 82,900 ac-ft per year, the water available from this strategy is limited to the available capacity in Dallas' IPL, which is approximately 53,800 ac-ft per year (48 MGD).

For regional planning purposes, the WMS/WMSP is expected to be online in 2070 when the City of Dallas is expected to use its share of supplies from this WMS/WMSP. The timing can be changed to an earlier or later date if the timing of needs for this WMS/WMSP changes.

The supply generated from the recommended Neches run-of-river strategy is potentially susceptible to risks associated with a drought worse than the historical record, which could reduce water availability. Alternative variations of this project could help address the potential risks. In addition to the run-of-the-river strategy described above, other strategies were mentioned (but not evaluated) in the Draft 2024 Dallas LRWSP. One approach considered an off-channel reservoir (OCR) to provide storage for the run-of-river water, while another explored using local groundwater conjunctively to firm up the run-of-river flow. These two alternative strategies were evaluated in the Upper Neches River Water Supply Project Feasibility Study (HDR, 2014).

5B.3.16.2 UNRMWA Summary

A summary of existing water supplies, demands, surplus/shortages, and recommended WMSs/WMSPs for UNRMWA in the 2026 ETRWP are described in Table 5B.107 and Figure 5B.37. Planning-level opinion of probable construction costs were obtained from the Draft 2024 Dallas LRWSP for inclusion in Table 5B.108.

Table 5B.107 UNRMWA – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

	2030	2040	2050	2060	2070	2080
Existing Supplies (ac-ft per year)						
Lake Palestine System (Firm Yield)	177,110	175,040	172,970	170,950	168,930	166,910
Total Existing Supplies	**177,110**	**175,040**	**172,970**	**170,950**	**168,930**	**166,910**
Demands (ac-ft per year)						
Lake Palestine Contracted Customer Demands [a]	154,565	154,542	154,520	154,502	154,487	154,487
Surplus or (Shortage) Compared to Contracted Customer Demands	**22,545**	**20,498**	**18,450**	**16,448**	**14,443**	**12,423**
Lake Palestine Contracts	210,247	210,224	210,202	210,184	210,169	210,169
Surplus or (Shortage) Compared to Contracts	**(33,137)**	**(35,184)**	**(37,232)**	**(39,234)**	**(41,239)**	**(43,259)**
Water Management Strategies/Projects (ac-ft per year)						
Neches Run-of-River with Lake Palestine [c]	0	0	0	0	82,900	82,900
Surplus or (Shortage) with	**22,545**	**20,498**	**18,450**	**16,448**	**97,343**	**95,323**

WMSs/WMSPs Compared to Contracted Customer Demands						
Surplus or (Shortage) with WMSs/WMSPs Compared to Contracts	**(33,137)**	**(35,184)**	**(37,232)**	**(39,234)**	**41,661**	**39,641**

a. Total assumes the full contracted volume to City of Dallas (114,338 ac-ft/year) and other lakeside customers, and projected demands on Lake Palestine for the City of Tyler and City of Palestine.

b. The yield shown is based on information from the Draft 2024 Dallas LRWSP (DWU, 2024). According to the Draft LRWSP, the total available yield from this strategy is 82,900 ac-ft/year, while only 53,800 ac-ft/year is accessible through Dallas' integrated pipeline project (IPL).

Table 5B.108 UNRMWA – Water Management Strategies/Projects Summary

Water Management Strategy/Project	Supply Quantity (ac-ft/year)	Capital Cost ($)	Annualized Cost ($)	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Neches Run-of-River with Lake Palestine (Recommended)[a]	53,800	$719,027,000	$69,397,000	$1,290	$3.96

a. The supply quantity shown is based on information from the Draft 2024 Dallas LRWSP (DWU, 2024). According to the Draft LRWSP, the total available yield from this strategy is 82,900 ac-ft/year, while only 53,800 ac-ft/year is accessible through Dallas' integrated pipeline project (IPL). Costs shown are representative of the supply accessible through the Dallas IPL.

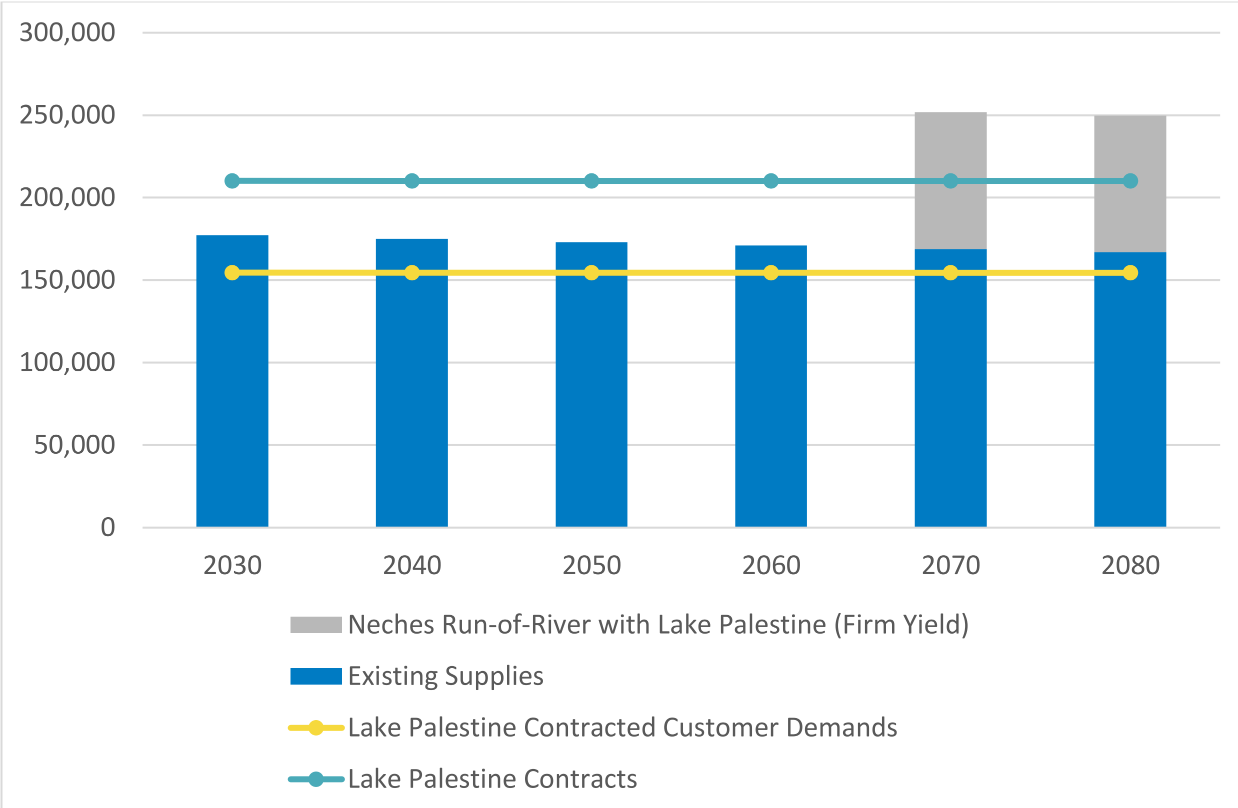


Figure 5B.37 UNRMWA – Summary of Existing Supplies, Demands, and Water Management Strategies/Projects

5B.4 TEXAS WATER DEVELOPMENT BOARD DATABASE

The 2027 Texas Water Development Board Database (DB27) is an electronic database provided by the Texas Water Development Board which collects, maintains, and analyzes water planning data. The Regional Water Planning Groups and their contracted consultants may enter data for their respective regions in order to facilitate development of useful and relevant regional and state water plans. The DB27 Reports required by the TWDB are included as an Appendix ES-A, Report 13.

5B.5 DOCUMENTATION OF IMPLEMENTATION STATUS AND ANTICIPATED TIMELINE FOR CERTAIN TYPES OF RECOMMENDED WMSS

The 2026 regional water plans must include a new sub-section documenting the implementation status of certain water management strategies that are recommended in the plan. The implementation status must be provided for the following types of recommended WMSs with any online decade:

- All reservoir strategies (including major and minor reservoirs)
- All seawater desalination strategies
- Direct potable reuse strategies that provide greater than 5,000 acre-feet per year (AFY) of supply in any planning decade
- Brackish groundwater strategies that provide greater than 10,000 AFY of supply in any planning decade
- Aquifer storage and recovery strategies that provide greater than 10,000 AFY in any decade
- All water transfers from out of state
- Any other innovative technology projects the RWPG considers appropriate

Two WMSs from the 2026 ETRWP meet the criteria above: Lake Columbia Reservoir and the West Beaumont Reservoir.

Table XX includes a summary of key milestones associated with these two WMSs, including when the sponsor took an affirmative vote or other action to make expenditures to construct or file applications for permits, the status of permits (e.g., state water right, diversion, discharge, federal 404), planning, design and construction status, and expenditures to date.

Figure 5B.38 and Figure 5B.39 illustrate the estimated project timeline and estimated schedule of key milestones (e.g., feasibility, design, permitting, acquisition, construction) for these two reservoir WMSs, respectively.

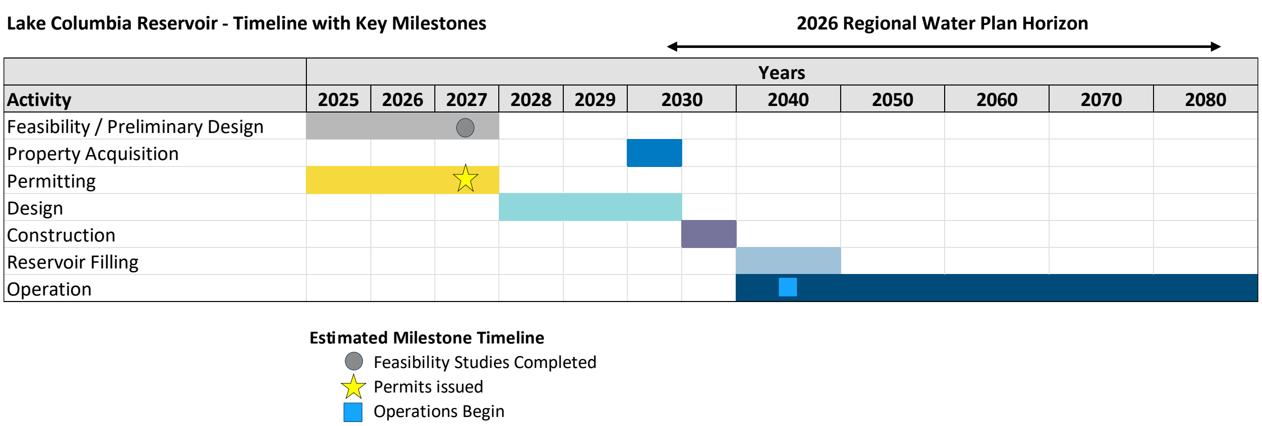


Figure 5B.38 Timeline and Milestone for Lake Columbia Reservoir

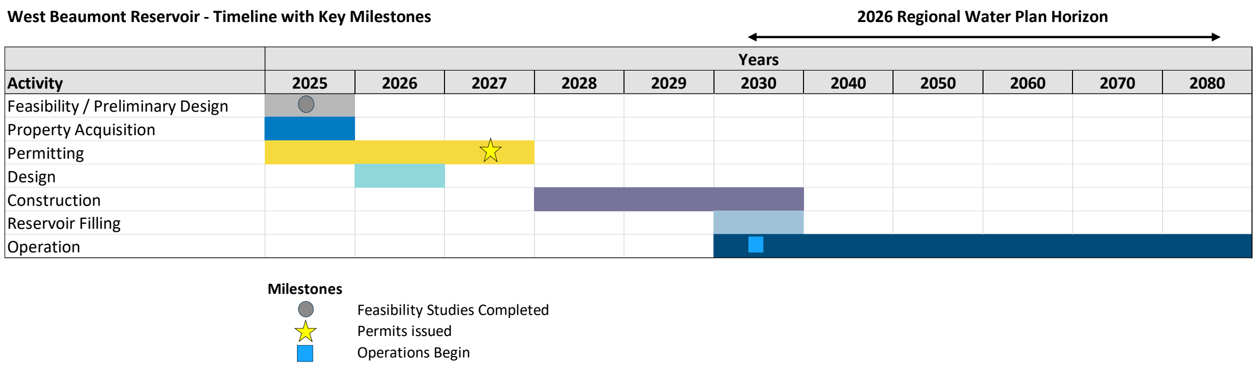


Figure 5B.39 Timeline and Milestone for West Beaumont Reservoir

5B.6 SUMMARY OF RECOMMENDED AND ALTERNATIVE WATER MANAGEMENT STRATEGIES

The tables below (Table 5B.1 and Table 5B.2) include a summary of all recommended and alternative water management strategies (WMSs) and water management strategy projects (WMSPs) considered for the WUGs and MWPs in the ETRWPA for the 2026 Plan.

Table 5B.1 2026 Needs and Water Management Strategies for Water User Groups by County (ac-ft per year)

NEEDS **RECOMMENDED STRATEGY** *ALTERNATIVE STRATEGY*

County	WUG	2026 Needs and Strategies	2030	2040	2050	2060	2070	2080	Capital Costs ($)	Annual Costs ($)	Unit Costs During Amortization ($ per acre-feet)	Unit Costs During Amortization ($ per 1000 gal)
ANDERSON	**B C Y WSC**	Unmet Need	0	0	0	0	0	0	--			
		Municipal Conservation	5	7	8	8	8	9	$310,000	$24,200	$4,500	$13.81
		New Wells (Carrizo-Wilcox)	0	170	170	170	170	170	$4,254,000	$525,000	$3,088	$9.48
	STEAM ELECTRIC POWER	Unmet Need	-2,296	-2,296	-2,296	-2,296	-2,296	-2,296	--			
		New Wells (Carrizo-Wilcox)	2,300	2,300	2,300	2,300	2,300	2,300	$21,908,000	$1,834,000	$797	$2.45
ANGELINA	**LUFKIN**	Unmet Need	0	0	0	0	0	0	--			
		Develop Sam Rayburn Water Rights	Lufkin strategies discussed in Table 5B.2						Lufkin strategies discussed in Table 5B.2			
		Municipal Conservation	208	427	526	553	582	610				
	MANUFACTURING	Unmet Need	-2,145	-2,314	-2,488	-2,671	-2,859	-3,055	--			
		Purchase from Lufkin (Sam Rayburn)	2,150	2,320	2,490	2,680	2,860	3,060	$90,393,000	$8,493,000	$1,379	$4.23
	MINING	Unmet Need	-373	-412	-448	-480	-508	-533	--			
		Purchase from ANRA (Run of River, Angelina)	380	420	450	480	510	540	$13,921,000	$1,702,000	$3,152	$9.67
CHEROKEE	**ALTO RURAL WSC**	Unmet Need	-124	-209	-306	-414	-533	-665	--			
		New Wells (Carrizo-Wilcox)	670	670	670	670	670	670	$7,612,000	$970,000	$1,448	$4.44
		Municipal Conservation	18	29	34	38	45	51	$97,000	$14,300	$800	$2.46
	JACKSONVILLE	Unmet Need	0	0	0	0	0	0	--			
		Raw Water Transmission System from Lake Columbia	Jacksonville strategies discussed in Table 5B.2						Jacksonville strategies discussed in Table 5B.2			
		Municipal Conservation	114	279	349	348	345	343				
HARDIN	***NO WUGS WITH UNMET NEEDS, NO STRATEGIES EVALUATED***											
HENDERSON	**ATHENS [2]**	Unmet Need	0	0	-364	-1,053	-2,076	-2,701	--			
		Municipal Conservation (Region C)	122	325	687	904	1,112	1,226	$157,000	$101,500	$800	$2.46
		Athens MWA Strategies	0	0	364	1,222	2,055	1,989	Athens MWA strategies discussed in Table 5B.2			
	EDOM WSC [2]	Unmet Need	-67	-75	-79	-83	-86	-87	--			
			Pending information from Region D						Pending information from Region D			
		Municipal Conservation	Pending information from Region D						Pending information from Region D			
	CHANDLER	Unmet Need	0	0	-43	-281	-573	-934	--			
		Purchase from Tyler (Lake Palestine)	0	0	50	290	580	940	$15,028,000	$2,774,000	$3,000	$9.06
		New Wells (Carrizo-Wilcox)	*0*	*0*	*940*	*940*	*940*	*940*	$10,727,000	$1,387,000	$1,476	$4.53
		Municipal Conservation	13	23	30	40	52	77	$38,000	$9,700	$700	$2.15
	LIVESTOCK [2]	Unmet Need	0	0	0	0	-321	-490	--			
		Athens MWA Indirect Reuse	0	0	507	884	1,216	1,385	$0	$0	$0	$0.00
	MINING [2]	Unmet Need	-15	-16	-17	-19	-47	-143	--			
		New Wells (Queen City)	150	150	150	150	150	150	$471,000	$40,000	$267	$0.82
	STEAM ELECTRIC POWER [2]	Unmet Need	-2,061	-2,061	-2,061	-2,061	-2,061	-2,061	--			
		This demand no longer exists, so no WMS was evaluated							-	-	-	-

Table 5B.1 2026 Needs and Water Management Strategies for Water User Groups by County (ac-ft per year)

NEEDS RECOMMENDED STRATEGY *ALTERNATIVE STRATEGY*

County	WUG	2026 Needs and Strategies	2030	2040	2050	2060	2070	2080	Capital Costs ($)	Annual Costs ($)	Unit Costs During Amortization ($ per acre-feet)	Unit Costs During Amortization ($ per 1000 gal)
HOUSTON	TDCJ EASTHAM UNIT	Unmet Need	-113	-111	-111	-111	-111	-111	--			
		New Wells (Carrizo-Wilcox)	120	120	120	120	120	120	$5,018,000	$583,000	$4,858	$14.91
		Municipal Conservation	20	30	32	34	36	37	$134,000	$15,100	$700	$2.15
	LIVESTOCK	Unmet Need	0	0	0	-59	-285	-285	--			
		New Wells (Carrizo-Wilcox)	0	0	0	290	290	290	$969,000	$87,000	$300	$0.92
JASPER	SOUTH JASPER COUNTY WSC	Unmet Need	0	0	0	0	0	0	--			
		New Wells (Gulf Coast)	0	330	330	330	330	330	$6,553,000	$812,000	$2,461	$7.55
		Municipal Conservation	1	1	1	1	1	1	$14,000	$1,300	$1,200	$3.68
	MANUFACTURING	Unmet Need	-455	-2,589	-4,802	-7,097	-9,476	-11,943	--			
		Purchase from LNVA (Sam Rayburn)	460	2,590	4,810	7,100	9,480	11,950	$159,597,000	$17,386,000	$1,074	$3.30
JEFFERSON	BEAUMONT	Unmet Need	-8,613	-9,118	-9,768	-9,793	-9,648	-9,374	--			
		Municipal Conservation	2,094	5,506	7,320	7,327	7,332	7,336	Beaumont strategies discussed in Table 5B.2			
		Well Field Infrastructure Improvements	2,823	2,823	2,823	2,823	2,823	2,823				
		Amendment to Supplemental Contract with LNVA	6,685	7,398	8,273	8,513	8,565	8,466				
		Bunn's Canal Rehabilitation	8,968	8,968	8,968	8,968	8,968	8,968				
		New Westside Surface Water Treatment Plant	0	12,331	12,331	12,331	12,331	12,331				
	CHINA	Unmet Need	0	0	0	0	0	0	--			
		New Wells (Gulf Coast)	0	250	250	250	250	250	$6,182,000.00	$525,000	$2,967	$9.09
		Municipal Conservation	3	5	6	6	6	7	$13,000	$2,200	$800	$2.46
	PORT ARTHUR	Unmet Need	0	0	0	0	0	0	--			
		Municipal Conservation	473	677	736	788	838	887	Port Arthur strategies discussed in Table 5B.2			
	TRINITY BAY CONSERVATION DISTRICT [2]	Unmet Need	0	0	0	0	-71	-207	--			
		Municipal Conservation	100	228	322	436	623	797	$18,639,709	$147,000	$1,470	$4.51
	MANUFACTURING	Unmet Need	-6,037	-36,896	-71,613	-106,146	-140,665	-175,165	--			
		Purchase from LNVA (Sam Rayburn)	6,100	36,900	71,700	106,200	140,700	175,200	$698,989,000	$117,584,000	$558	$1.71

Table 5B.1 2026 Needs and Water Management Strategies for Water User Groups by County (ac-ft per year)

NEEDS **RECOMMENDED STRATEGY** *ALTERNATIVE STRATEGY*

County	WUG	2026 Needs and Strategies	2030	2040	2050	2060	2070	2080	Capital Costs ($)	Annual Costs ($)	Unit Costs During Amortization ($ per acre-feet)	Unit Costs During Amortization ($ per 1000 gal)
NACOGDOCHES	**D & M WSC**	Unmet Need	0	-30	-62	-115	-167	-218	--			
		New Wells (Carrizo-Wilcox)	0	220	220	220	220	220	$5,542,000	$652,000	$2,964	$9.09
		Municipal Conservation	20	30	34	38	40	44	$131,000	$21,800	$1,100	$3.38
	NACOGDOCHES	Unmet Need	0	0	0	0	0	0	--			
		Lake Columbia Raw Water Transmission System	Nacogdoches strategies discussed in Table 5B.2						Nacogdoches strategies discussed in Table 5B.2			
		Municipal Conservation	364	884	1,152	1,223	1,295	1,369				
	COUNTY-OTHER	Unmet Need	0	0	0	0	0	0	--			
		Lake Naconiche Regional Water Supply System	0	1,700	1,700	1,700	1,700	1,700	$105,317,000	$8,346,000	$4,909	$15.07
NEWTON	*NO WUGS WITH UNMET NEEDS, NO STRATEGIES EVALUATED*											
ORANGE	**ORANGE COUNTY WCID 1**	Unmet Need	0	0	0	0	0	0	--			
		New Wells (Gulf Coast)	1,610	1,610	1,610	1,610	1,610	1,610	$9,364,000	$1,512,000	$939	$2.88
		Municipal Conservation	53	118	148	141	134	122	$212,000	$41,500	$800	$2.46
PANOLA	*NO WUGS WITH UNMET NEEDS, NO STRATEGIES EVALUATED*											
POLK	*NO WUGS WITH UNMET NEEDS, NO STRATEGIES EVALUATED*											
RUSK	**GASTON WSC**	Unmet Need	0	0	0	0	0	0	--			
		New Wells (Carrizo-Wilcox)	0	130	130	130	130	130	$3,700,000	$525,000	$3,492	$10.72
		Municipal Conservation	1	1	1	1	1	1	$10,000	$900	$1,200	$3.68
	JACOBS WSC	Unmet Need	0	0	0	0	-26	-58	--			
		New Wells (Carrizo-Wilcox)	0	0	0	0	60	60	$5,975,000.00	$738,000	$12,300	$37.74
		Municipal Conservation	2	2	2	2	2	2	$24,000	$2,200	$1,400	$4.30
SABINE	**LIVESTOCK**	Unmet Need	0	0	0	-97	-96	-96	--			
		New Wells (Yegua Jackson)	0	0	0	100	100	100	$601,000	$47,000	$470	$1.44
SAN AUGUSTINE	*NO WUGS WITH UNMET NEEDS, NO STRATEGIES EVALUATED*											
SHELBY	**CENTER**	Unmet Need	0	0	0	0	0	0	--			
		Municipal Conservation	80	194	241	238	236	232	Center strategies discussed in Table 5B.2			
	MANUFACTURING	Unmet Need	-841	-934	-1,053	-1,148	-1,239	-1,325	--			
		Purchase from Center	850	940	1,060	1,150	1,240	1,330	$79,104,000	$6,938,000	$2,440	$7.49

Table 5B.1 2026 Needs and Water Management Strategies for Water User Groups by County (ac-ft per year)

NEEDS RECOMMENDED STRATEGY *ALTERNATIVE STRATEGY*

County	WUG	2026 Needs and Strategies	2030	2040	2050	2060	2070	2080	Capital Costs ($)	Annual Costs ($)	Unit Costs During Amortization ($ per acre-feet)	Unit Costs During Amortization ($ per 1000 gal)
SMITH	LIBERTY UTILITIES SILVERLEAF WATER [2]	Unmet Need	-331	-360	-397	-439	-481	-524	--			
			Pending information from Region D						Pending information from Region D			
		Municipal Conservation	Pending information from Region D						Pending information from Region D			
	SOUTHERN UTILITIES [1,2]	Unmet Need	0	0	0	0	-68	-401	--			
		Amendment to Supplemental Contract with City of Tyler	0	0	0	0	70	410	$0	$670,000	$1,634	$5.02
		Municipal Conservation	680	1,815	2,438	2,552	2,668	2,786	$931,000	$313,100	$500	$1.53
	TYLER	Unmet Need	0	0	0	0	0	0	--			
		Lake Palestine Expansion	Tyler strategies discussed in Table 5B.2						Tyler strategies discussed in Table 5B.2			
		Municipal Conservation	991	2,115	2,842	3,161	3,507	3,883				
	COUNTY-OTHER	Unmet Need	-273	-143	-33	0	0	0	--			
		Purchase from Tyler	280	150	40	0	0	0	$16,362,000	$1,615,000	$5,768	$17.70
		Municipal Conservation	7	6	6	5	5	4	$216,000	$17,400	$2,400	$7.37
	MANUFACTURING	Unmet Need	0	0	-43	-413	-497	-567	--			
		Purchase from Tyler	0	0	50	420	500	570	$50,202,000	$4,295,000	$5,461	$16.76
	MINING	Unmet Need	-314	-333	-353	-374	-397	-421	--			
		Purchase from Tyler	320	340	360	380	400	430	$17,996,000	$1,890,000	$4,395	$13.49
TRINITY	IRRIGATION	Unmet Need	-215	-215	-215	-215	-215	-215	--			
		New Wells (Yegua Jackson)	220	220	220	220	220	220	$646,000	$52,000	$236	$0.73
TYLER	MANUFACTURING	Unmet Need	-78	-82	-87	-92	-97	-102	--			
		New Wells (Gulf Coast)	110	110	110	110	110	110	$607,000	$49,000	$445	$1.37

(1) Entities split into more than one county within the East Texas Regional Water Planning Area reflect the cummulative need in the region.
(2) Unmet needs shown reflect the total unmet needs for a Water User Group (WUG), including unmet needs identified in other regions (C, D, H).
(3) Conservation strategy volumes reflect the total for each WUG, including totals from other regions (C, D, H).
(4) The annual and unit costs shown are for the decade with the highest annual and unit cost.
(5) CT denotes Consultant Team
(6) For WUGs that are also Major Water Providers (MWPs), see Table 5B.2 for a full list of strategy details.
(7) *Italics indicate an alternative strategy.*
(8) Gray indicates a strategy that involves expansion of infrastructure to access existing or future supplies. These should not be included in the total to avoid double counting.
(9) Cells highlighted in yellow are still in progress. The values presented in this table are drafts and subject to change.

Table 5B.2 2026 Needs and Water Management Strategies for Major Water Providers (ac-ft per year)

NEEDS   RECOMMENDED STRATEGY   *ALTERNATIVE STRATEGY*   BALANCE (Does not include Alternative totals)

Major Water Provider	2026 Needs and Strategies	2030	2040	2050	2060	2070	2080	Capital Costs ($)	Annual Costs ($)	Unit Costs During Amortization ($ per acre-feet)	Unit Costs During Amortization ($ per 1000 gal)
ANRA	Unmet Needs	0	0	0	0	0	0	----			
	Lake Columbia	0	75,720	75,640	75,560	75,480	75,400	$486,368,000	$28,382,000	$375	$1.15
	ANRA Treatment and Distribution System	0	22,232	22,232	22,232	22,232	22,232	$455,353,000	$84,250,000	$3,790	$11.63
	RECOMMENDED WMS TOTAL	**0**	**97,952**	**97,872**	**97,792**	**97,712**	**97,632**	**$941,721,000**	**$112,632,000**	-	-
AN WCID#1	Unmet Needs	0	0	0	0	0	0	----			
	Hydraulic Dredging (Includes Volumetric Survey and Normal Pool Elevation Adjustment)	0	5,600	5,600	5,600	5,600	5,600	$27,980,652	$1,399,033	$4,997	$15.33
	RECOMMENDED WMS TOTAL	**0**	**5,600**	**5,600**	**5,600**	**5,600**	**5,600**	**$27,980,652**	**$1,399,033**	-	-
ATHENS MWA	Unmet Needs	0	0	-890	-1,972	-3,342	-4,145	----			
	Athens Municipal Conservation (Region C)	122	325	687	904	1,112	1,226	$157,000	$101,500	$800	$2.46
	Reuse of Fish Hatchery Return Flows	2,872	2,872	2,872	2,872	2,872	2,872	$0	$0	$0	$0.00
	WTP Booster Pump Station Expansion	0	0	4,592	4,592	4,592	4,592	$3,116,000	$308,000	$67	$0.21
	Additional Lake Athens Supply Used with WTP Infrastructure Upgrades	0	0	0	169	449	561				
	New Wells (Carrizo-Wilcox)	*0*	*0*	*0*	*0*	*720*	*720*	*$10,270,000*	*$1,286,000*	*$1,786*	*$5.48*
	RECOMMENDED WMS TOTAL	**2,994**	**3,197**	**3,559**	**3,945**	**4,433**	**4,659**	**$3,273,000**	**$409,500**	-	-

Table 5B.2 2026 Needs and Water Management Strategies for Major Water Providers (ac-ft per year)

NEEDS RECOMMENDED STRATEGY *ALTERNATIVE STRATEGY* BALANCE (Does not include Alternative totals)

Major Water Provider	2026 Needs and Strategies	2030	2040	2050	2060	2070	2080	Capital Costs ($)	Annual Costs ($)	Unit Costs During Amortization ($ per acre-feet)	Unit Costs During Amortization ($ per 1000 gal)
BEAUMONT	Unmet Needs	-9,508	-10,221	-11,096	-11,336	-11,388	-11,289	----			
	Municipal Conservation	2,094	5,506	7,320	7,327	7,332	7,336	$1,679,000	$858,400	$410	$1.26
	Well Field Infrastructure Improvements	2,823	2,823	2,823	2,823	2,823	2,823	$97,980,000	$8,074,000	$2,860	$8.78
	Amend Supplemental Contract with LNVA	6,685	7,398	8,273	8,513	8,565	8,466	$0	$2,803,000	$326	$1.00
	Bunn's Canal Rehabiliation	8,968	8,968	8,968	8,968	8,968	8,968	$1,139,000	$91,000	$10	$0.03
	New Westside Surface Water Treatment Plant	0	12,331	12,331	12,331	12,331	12,331	$202,160,000	$16,324,000	$1,316	$4.04
	RECOMMENDED WMS TOTAL	**11,602**	**15,727**	**18,416**	**18,663**	**18,720**	**18,625**	**$302,958,000**	**$28,150,400**	-	-
CARTHAGE	Unmet Needs	0	0	0	0	0	0	----			
	Municipal Conservation	31	46	48	50	52	54	$173,000	$23,600	$755	$2.32
CENTER	Unmet Needs	-1,139	-1,261	-1,380	-1,475	-1,566	-1,652	----			
	Municipal Conservation	176	80	194	241	238	236	$125,000	$39,300	$200	$0.61
	Reuse Pipeline to Industrial Customer	1,121	1,121	1,121	1,121	1,121	1,121	$25,824,000	$2,608,000	$2,326	$7.14
	Pipeline from Toledo Bend	*0*	*0*	*2,242*	*2,242*	*2,242*	*2,242*	*$70,786,000*	*$6,486,000*	*$2,893*	*$8.88*
	RECOMMENDED WMS TOTAL	**1,297**	**1,201**	**3,557**	**3,604**	**3,601**	**3,599**	$96,610,000	$9,094,000	-	-
HOUSTON CO WCID #1	Unmet Needs	0	0	0	0	0	0	----			
	New Wells (Carrizo-Wilcox)	3,500	3,500	3,500	3,500	3,500	3,500	$40,283,000	$3,697,000	$1,056	$3.24
	RECOMMENDED WMS TOTAL	**3,500**	**3,500**	**3,500**	**3,500**	**3,500**	**3,500**	**$40,283,000**	**$3,697,000**	-	-

Table 5B.2 2026 Needs and Water Management Strategies for Major Water Providers (ac-ft per year)

NEEDS | **RECOMMENDED STRATEGY** | *ALTERNATIVE STRATEGY* | BALANCE (Does not include Alternative totals)

Major Water Provider	2026 Needs and Strategies	2030	2040	2050	2060	2070	2080	Capital Costs ($)	Annual Costs ($)	Unit Costs During Amortization ($ per acre-feet)	Unit Costs During Amortization ($ per 1000 gal)
JACKSONVILLE	Unmet Needs	0	0	0	0	0	0	----			
	Supply from Lake Columbia	0	0	1,700	1,700	1,700	1,700	$67,185,000	$6,428,000	$3,781	$11.60
	Municipal Conservation	261	114	279	349	348	345	$257,000	$68,700	$300	$0.92
	RECOMMENDED WMS TOTAL	**261**	**114**	**1,979**	**2,049**	**2,048**	**2,045**	**$67,442,000**	**$6,496,700**	-	-
LNVA	Unmet Needs	0	0	0	0	0	0	----			
	Devers Pump Station Relocation (Region H)	88,704	88,704	88,704	88,704	88,704	88,704	$21,338,000	$1,883,000	$21	$0.07
	Neches Pump Station Upgrades and Fuel Diversification	161,420	161,420	161,420	161,420	161,420	161,420	$66,948,000	$5,681,000	$35	$0.11
	West Beaumont Reservoir	7,700	7,700	7,700	7,700	7,700	7,700	$110,438,000	$6,084,000	$790	$2.42
	Neches-Trinity Basin Interconnect (Region H)	0	67,000	67,000	67,000	67,000	67,000	$127,826,000	$11,065,000	$165	$0.51
	Purchase from SRA (Toledo Bend)	0	0	200,000	200,000	200,000	200,000	$451,797,000	$102,526,000	$513	$1.57
	RECOMMENDED WMS TOTAL	**7,700**	**7,700**	**207,700**	**207,700**	**207,700**	**207,700**	**$778,347,000**	**$127,239,000**	-	-
LUFKIN	Unmet Needs	0	0	0	0	0	0	----			
	Municipal Conservation	298	208	427	526	553	582	$740,000	$133,400	$447	$1.37
	Transfer from Rayburn to Lake Kurth – Phase I (2040)	0	11,210	11,210	11,210	11,210	11,210	$136,547,000	$15,519,000	$1,384	$4.25
	Transfer from Rayburn to Lake Kurth – Phase II (2050)	0	0	11,210	11,210	11,210	11,210	$125,310,000	$28,432,000	$1,278	$3.92
	Transfer from Rayburn to Lake Kurth – Phase III (2060)	0	0	0	5,580	5,580	5,580	$24,037,000	$20,419,000	$729	$2.24
	RECOMMENDED WMS TOTAL	298	11,418	22,847	28,526	28,553	28,582	$286,634,000	Note (9)	-	-

Table 5B.2 2026 Needs and Water Management Strategies for Major Water Providers (ac-ft per year)

NEEDS | **RECOMMENDED STRATEGY** | *ALTERNATIVE STRATEGY* | BALANCE (Does not include Alternative totals)

Major Water Provider	2026 Needs and Strategies	2030	2040	2050	2060	2070	2080	Capital Costs ($)	Annual Costs ($)	Unit Costs During Amortization ($ per acre-feet)	Unit Costs During Amortization ($ per 1000 gal)
NACOGDOCHES	Unmet Needs	0	0	0	0	0	0	----			
	Supply from Lake Columbia [Pending]	0	8,551	8,551	8,551	8,551	8,551	$82,440,000	$9,278,000	$1,085	$3.33
	Municipal Conservation	364	884	1,152	1,223	1,295	1,369	$652,000	$188,100	$517	$1.59
	RECOMMENDED WMS TOTAL	**364**	**9,435**	**9,703**	**9,774**	**9,846**	**9,920**	**$83,092,000**	**$9,466,100**	-	-
PANOLA COUNTY FWSD	No unmet needs, no strategies were identified							----			
PORT ARTHUR	Unmet Needs	0	0	0	0	0	0	----			
	Municipal Conservation	473	677	736	788	838	887	$1,518,000	$194,300	$411	$1.26
	RECOMMENDED WMS TOTAL	**473**	**677**	**736**	**788**	**838**	**887**	**$1,518,000**	**$194,300**	-	-
SRA	No unmet needs in Region I, no strategies were identified in Region I							----			
TYLER	Unmet Needs	0	0	0	0	0	0	----			
	Municipal Conservation	1,556	991	2,115	2,842	3,161	3,507	$6,731,000	$613,000	$400	$1.23
	Lake Palestine Infrastructure Expansion	0	16,815	16,815	16,815	16,815	16,815	$252,305,000	$27,852,000	$1,656	$5.08
	RECOMMENDED WMS TOTAL	**1,556**	**17,806**	**18,930**	**19,657**	**19,976**	**20,322**	**$259,036,000**	**$28,465,000**	-	-

Table 5B.2 2026 Needs and Water Management Strategies for Major Water Providers (ac-ft per year)

NEEDS RECOMMENDED STRATEGY *ALTERNATIVE STRATEGY* BALANCE (Does not include Alternative totals)

Major Water Provider	2026 Needs and Strategies	2030	2040	2050	2060	2070	2080	Capital Costs ($)	Annual Costs ($)	Unit Costs During Amortization ($ per acre-feet)	Unit Costs During Amortization ($ per 1000 gal)
UNRMWA	Unmet Needs (Contractual)	-33,137	-35,184	-37,232	-39,234	-41,239	-43,259	----			
	Run of River, Neches with Lake Palestine	0	0	0	0	82,900	82,900	$719,027,000	$69,558,000	$1,293	$3.97
	RECOMMENDED WMS TOTAL	**0**	**0**	**0**	**0**	**82,900**	**82,900**	**$719,027,000**	**$69,558,000**	-	-

(1) Entities split into more than one county within the East Texas Regional Water Planning Area reflect the cummulative need in the region.
(2) Unmet needs shown reflect the total unmet needs for a Major Water Provider (MWP), including unmet needs identified in other regions (C, D, H).
(3) Conservation strategy volumes reflect the total for each MWP, including totals from other regions (C, D, H).
(4) The annual and unit costs shown are for the decade with the highest annual and unit cost.
(5) CT denotes Consultant Team
(6) *Italics indicate an alternative strategy.*
(7) Gray indicates a strategy that involves expansion of infrastructure to access existing or future supplies. These should not be included in the total to avoid double counting.
(8) Cells highlighted in yellow are still in progress. The values presented in this table are drafts and subject to change.
(9) Annual costs from Phase 2 and 3 include the debt services from the previous phase, thus the annual costs of the three phrases cannot be added.

Appendix 5B-A

Water Management Strategies and Projects Technical Memoranda

This Appendix provides the technical memoranda for the water management strategies identified for Region I entities.

Appendix 5B-A
Water Management Strategy Analysis Technical Memorandums

The 2026 East Texas Regional Water Plan (ETRWP) includes a total of 48 unique recommended water management strategies (WMS) and water management strategy projects (WMSP) developed to ensure the East Texas Regional Water Planning Area (ETRWPA) continues to appropriately plan for water demands across the region. Appendix 5B-A provides the required evaluation of each proposed WMS contained in a technical memorandum. As required, each technical memorandum addresses the following elements:

- Strategy Description
- Supply Development
- Environmental Considerations
- Permitting and Development
- Planning-Level Opinion of Cost
- Project Evaluation

The planning-level opinion of cost (PLOC) is a critical element of the regional water planning process. The PLOC is important to project prioritization, which is one of a number of considerations in the TWDB's funding evaluation. For the 2026 Plan, PLOCs have been analyzed using the TWDB's costing tool, except where the WUG or WWP has provided more detailed cost analysis. In accordance with TWDB Guidance (Exhibit C, Second Amended General Guidelines for Regional Water Planning Development of the 2026 Regional Water Plans – September 2023), the analysis of costs for recommended and alternative WMSs includes capital costs, debt service, and annual operating and maintenance expenses over the planning horizon.

Costs include expenses associated with infrastructure needed to convey water from sources and treat water (if necessary) for end-user requirements. Capital costs consist of construction, engineering, contingencies, financial, legal, administration, environmental, permitting and mitigation, land acquisition and easements, and interest on loans. Water transmission lines were assumed to take the shortest route, following existing highways or roads where possible. Profiles were developed using geospatial information systems (GIS) mapping software and U.S. Geological Survey (USGS) topographic maps. Pipes were sized to deliver peak-day flows within reasonable pressure and velocity ranges. Water losses associated with transmission were assumed to be negligible for regional planning purposes.

The annual cost for operation and maintenance infrastructure are generally based on percentages of estimated construction cost of the infrastructure. Power costs are estimated to be $0.09 per kwh based on the TWDB Guidance. Where applicable, an allowance for cost to purchase water supply was included. Generalized regional rates to purchase water in the ETRWPA was estimated based on current wholesale water rates in the region. Estimated regional rates varied depending on the quality of the water (treated versus raw) and end user (municipal, manufacturing, mining). Ultimately, the cost to purchase water will need to be negotiated between individual users and the wholesale water provider, and will reflect their wholesale water rates at that time.

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ANGELINA COUNTY MANUFACTURING – PURCHASE FROM LUFKIN

Water User Group Name:	Manufacturing, Angelina County
Strategy Name:	Purchase from Lufkin
Strategy ID:	ANGL-MFG
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	2,150 - 3,060 ac-ft per year (1.9 - 2.7 MGD)
Implementation Decade:	2030
Development Timeline:	< 5 years
Project Capital Cost:	$90,393,000 (September 2023)
Annual Cost:	$8,493,000
Unit Water Cost (Rounded):	$1,379 per ac-ft ($2.14 per 1,000 gallons)

STRATEGY DESCRIPTION

Manufacturing water users in Angelina County were identified to have a need for approximately 2,150 ac-ft per year in 2030 and 3,060 ac-ft per year by 2080. In order to meet this need, a recommended water management project is included for individual manufacturers to enter into a contract with the City of Lufkin for raw water from their system, as their permit allows. Lufkin currently supplies water to manufacturing water users in Angelina County. Most of the need identified is associated with projected growth in manufacturing demand in Angelina County over the planning horizon. Thus, generalized estimates of infrastructure needed to access supplies from Lufkin are included as part of this strategy. Ultimately, individual manufacturing entities will need to develop infrastructure based on their individualized needs for water supply. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water. Ultimately, this cost will need to be negotiated between individual manufacturers and Lufkin and will reflect their wholesale water rates at that time.

SUPPLY DEVELOPMENT

The strategy recommended for Angelina County manufacturing is assumed to be equal to the need projected for this entity during the planning period (2030-2080). The contract with Lufkin required for this strategy increases their supply by approximately 2,150 ac-ft per year beginning in 2030 and increases over time to approximately 3,060 ac-ft per year by 2080. These supplies are considered highly reliable; however, the supply is dependent on coordination with the City of Lufkin.

ENVIRONMENTAL CONSIDERATIONS

There are not any significant environmental considerations associated with this strategy. The environmental impacts of developing infrastructure are site-specific and will be dependent upon the location and size of the project. Site-specific evaluations of potential impacts to the environment from construction activities will need to be conducted by individual entities. A contract between manufacturers in Angelina County and the City of Lufkin are anticipated to have a minimal impact on environmental water needs, low impact to the surrounding habitat, and a low impact to cultural resources in the area. The potential impact to surrounding habitat and cultural resources will need to be evaluated by entities on a project-specific basis. There is no impact expected on bays or estuaries associated with this strategy since it is in Angelina County.

PERMITTING AND DEVELOPMENT

There are no anticipated permitting or development issues associated with this strategy. There may be some minor permitting related to construction of the infrastructure required associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. Generalized estimates of conveyance infrastructure to access and deliver supply from Lufkin, including pipeline, intake pump stations, and storage, are included as part of this strategy. A regional rate for raw surface water was used for the purchase costs ($1.00 per 1,000 gallons).

WUG	**Angelina County - Manufacturing**				
STRATEGY:	**Purchase from Lufkin**				
QUANTITY (AC-FT/YR)	**2,150 – 3,060**				
CAPITAL COST					
Pipelines	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	6 – 16 in.	158,400	LF		$27,893,000
Rural Right of Way (ROW) Easements and Surveying (73)			Acres	$9,038	$726,000
Engineering and Contingencies (30%)					$8,368,000
Subtotal of Pipeline(s)	**5**	**miles per pipeline**			**$36,987,000**
Pump Station(s)					
Pump with intake	21 – 257 HP	6	LS		$29,924,000
Power connection(s)		6	LS		$450,000
Engineering and Contingencies (35%)					$10,632,000
Subtotal of Pump Station(s)					**$41,006,000**
Storage Tanks	0.1 – 0.4 MG	6	LS		$3,795,000
Engineering and Contingencies (35%)					$1,603,000
Subtotal of Storage Tanks					**$5,121,000**
Integration, Relocations, Backup Generator & Other			$ per kw	$534	$47,000
Engineering and Contingencies (35%)					$16,000
Subtotal of Integration, Relocations, Backup Generator & Other					**$63,000**
Land Acquisition and Surveying (All Facilities Excluding Pipelines)					$420,000
Environmental - Studies and Mitigation					$1,279,596
CONSTRUCTION TOTAL					**$84,875,000**
Interest During Construction (3.5% for 2 years with a 0.5% ROI)				24Months	$5,518,000
TOTAL COST OF PROJECT					**$90,393,000**
ANNUAL COST					
Debt Service (3.5% for 20 years)					$6,361,000
Pumping Energy Costs					$68,000
Operation and Maintenance (O&M)					$1,067,000
Raw Water Purchase		997,000	1000 gal	$1.00	$997,000
TOTAL ANNUAL COST					**$8,493,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot (2030-2080 Average)					$1,379
Per 1,000 Gallons (2030-2080 Average)					$4.23
UNIT COSTS (After Amortization)					
Per Acre-Foot					$697
Per 1,000 Gallons					$2.14

PROJECT EVALUATION

This strategy benefits manufacturers in Angelina County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the City of Lufkin system will reduce future demands on other water supplies in Angelina County and is anticipated to have no other apparent impact on other State water resources. This strategy involves a voluntary redistribution of water that could be used to serve rural and/or agricultural areas. However, this supply benefits various industries in those rural areas, which could contribute to their economic growth.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage
Reliability	5	High reliable supply
Cost	3	Medium cost ($1,000 - $3,000/ac-ft)
Environmental Factors	3	Low to medium impacts
Impact on Other State Water Resources	4	Low to no negative impacts and/or some positive impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no negative impacts and/or some positive impacts
Other Natural Resources	4	Low to no negative impacts and/or some positive impacts
Interbasin Transfers		No
Third Party Social & Economic Impacts	3	Low negative impacts
Major Impacts on Key Water Quality Parameters	4	Low to no negative impacts and/or some positive impacts
Political Feasibility	3	Sponsor(s) identified, commitment level uncertain.
Implementation Issues	4	Low implementation issues

REFERENCES

Discussions with the City of Lufkin.

ANGELINA COUNTY MINING – PURCHASE FROM ANRA

Water User Group Name:	Angelina - Mining
Strategy Name:	Purchase from Angelina Neches River Authority
Strategy ID:	ANGL-MIN
Strategy Type:	Existing Groundwater Source
Potential Supply Quantity:	540 ac-ft per year (0.72 MGD)
Implementation Decade:	2030
Development Timeline:	< 5 years
Project Capital Cost:	$13,921,000 (September 2023)
Annual Cost:	$1,702,000
Unit Water Cost (Rounded):	$3,152 per ac-ft ($9.67 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for Mining in Angelina County and involves a contract between individual mining water users and the Angelina Neches River Authority for raw water from Mud Creek as their permit allows. The cost for supply from the Neches River includes the cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the Angelina Neches River Authority and will reflect the wholesale water rates of this entity at the time a contract is made. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the mining need projected in Angelina County by the East Texas Regional Water Planning Group. The reliability of this water supply is considered medium due to the availability of water projected in the Neches River using the Texas Commission on Environmental Quality (TCEQ) Water Availability Models. However, this strategy is dependent on sales with the Angelina Neches River Authority and their application for 10,000 ac-ft/yr from the Neches River (Strategy ID: ANRA-ROR). The quantity of supply from this strategy represents a contract of 473 ac-ft/yr, beginning in 2020, and increase to 572 ac-ft/yr in 2030, and decreases to 167 ac-ft/yr, beginning in 2070. In 2030 through 2070, the supply is limited to the mining need projected by the East Texas Regional Water Planning Group.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between mining water users in Angelina County and the Angelina Neches River Authority should have a minimum impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. There are no bays or estuaries in close proximity to Angelina County.

PERMITTING AND DEVELOPMENT

There are no anticipated permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 6 miles of pipeline (the approximate distance from the Neches River to the center of Angelina County), a pump station with an intake, a booster pump station, and one terminal storage tank with one day of storage. The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a medium cost compared to other strategies in the 2026 East Texas Regional Water Plan due to the length of pipeline required.

WUG	**Angelina County - Manufacturing**				
STRATEGY:	**Purchase from Lufkin**				
QUANTITY (AC-FT/YR)	**2,150 – 3,060**				
CAPITAL COST					
Pipelines	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	8 in.	26,400	LF	$165	$4,353,000
Rural Right of Way (ROW)		12	Acres	$9,038	$121,000
Engineering and Contingencies (30%)					$1,306,000
Subtotal of Pipeline(s)	**5**	**miles**			**$5,780,000**
Pump Station(s)					
Pump with intake	55 HP	4	LS	$4,784,000	$4,784,000
Power connection(s)		55	HP	$200	$75,000
Engineering and Contingencies (35%)					$1,701,000
Subtotal of Pump Station(s)					**$6,560,000**
Storage Tanks	0.1 MG	1	LS	$626,772	$627,000
Engineering and Contingencies (35%)					$219,000
Subtotal of Storage Tanks					**$846,000**
Integration, Relocations, Backup Generator & Other			$ per kw	$534	$10,000
Engineering and Contingencies (35%)					$4,000
Subtotal of Integration, Relocations, Backup Generator & Other					**$14,000**
Land Acquisition and Surveying (All Facilities Excluding Pipelines)					$70,000
Environmental - Studies and Mitigation					$213,596
CONSTRUCTION TOTAL					**$13,483,000**
Interest During Construction (3.5% for 1 years with a 0.5% ROI)				12 Months	$438,000
TOTAL COST OF PROJECT					**$13,921,000**
ANNUAL COST					
Debt Service (3.5% for 20 years)					$979,000
Pumping Energy Costs					$15,000
Operation and Maintenance (O&M)					$180,000
Raw Water Purchase			1000 gal	$3.00	$528,000
TOTAL ANNUAL COST					**$1,702,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot (2030-2080 Average)					$3,152
Per 1,000 Gallons (2030-2080 Average)					$9.67
UNIT COSTS (After Amortization)					
Per Acre-Foot					$1,339
Per 1,000 Gallons					$4.11

PROJECT EVALUATION

This strategy benefits mining users in Angelina County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the Neches River will reduce demands on other water supplies in Angelina County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this voluntary redistribution of water will be beneficial because it provides water for economic growth.

Based on the analyses provided above, the Angelina Mining recommended strategy to purchase water from the Angelina Neches River Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2026 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage
Reliability	3	Medium reliable supply
Cost	2	$3,000 to $5,000/ac-ft (Medium-High)
Environmental Factors	3	Low to medium impacts
Impact on Other State Water Resources	4	Low to no negative impacts and/or some positive impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no negative impacts and/or some positive impacts
Other Natural Resources	4	Low to no negative impacts and/or some positive impacts
Interbasin Transfers		No
Third Party Social & Economic Impacts	3	Low negative impacts
Major Impacts on Key Water Quality Parameters	4	Low to no negative impacts and/or some positive impacts
Political Feasibility	4	Low to no negative impacts and/or some positive impacts
Implementation Issues	4	Low implementation issues

REFERENCES

2026 East Texas Regional Water Plan.

ALTO RURAL WSC – NEW GROUNDWATER WELL IN CARRIZO-WILCOX AQUIFER

Water User Group Name:	Alto Rural WSC (Cherokee County)
Strategy Name:	New groundwater well in Carrizo-Wilcox Aquifer
Strategy ID:	ALRU-GW
Strategy Type:	Existing Groundwater Source
Potential Supply Quantity:	670 ac-ft per year (0.05 MGD)
Implementation Decade:	2030
Development Timeline:	< 5 years
Project Capital Cost:	$7,612,000 (September 2023)
Annual Cost:	$970,000
Unit Water Cost (rounded):	$4.44 per 1,000 gallons

PROJECT DESCRIPTION

Alto Rural WSC is a municipal water user group in Cherokee County. This water user group currently relies on groundwater from the Carrizo- Wilcox Aquifer in Cherokee County. Alto Rural has an identified need of 665 ac-ft/yr. To meet this need, it is recommended that Alto Rural WSC continue to use supplies from the Carrizo Wilcox by developing additional groundwater wells.

A strategy is recommended for Alto Rural WSC in Cherokee County, which involves the development of approximately 670 acre-feet per year from the Carrizo Wilcox Aquifer in Cherokee County. The conceptual design for this strategy involves two public supply wells (capacity of 250 gpm, depth of 800 ft) located within the Carrizo Wilcox Aquifer, conveyance infrastructure (e.g., well collection piping, transmission pipeline, pump station, and storage tank), and chlorine disinfection. A peaking factor of two was assumed to size infrastructure at this well field.

SUPPLY DEVELOPMENT

The estimated supply quantity from this strategy is approximately 670 ac-ft per year based on a peaking factor of 2. There is sufficient modeled available groundwater available in the Carrizo Wilcox Aquifer in Cherokee County to develop the supply assumed for this water management strategy. This strategy is projected to be online and able to provide supply by 2030. Overall, the reliability of this supply is considered medium to high, based on the proven use of this groundwater source and groundwater availability models.

ENVIRONMENTAL CONSIDERATIONS

The environmental impacts from this strategy are expected to be low. However, groundwater development from this source should be evaluated for potential impacts on spring flows and base flows if surface water is in close proximity. The impact to the environment due to pipeline construction is expected to be temporary and minimal. Impacts to environmental water needs, habitat, and cultural resources are expected to be low due to the relatively low footprint of this strategy.

PERMITTING AND DEVELOPMENT

There are no anticipated permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital cost accounts for two 250 gpm well at a depth of 800 feet, 1 mile of pipeline, a pump station, storage tank, and chlorine disinfection.

WUG	**Alto Rural WSC**	
STRATEGY	**New Well in Carrizo-Wilcox Aquifer**	
QUANTITY (AC-FT/YR)	**670**	
CAPITAL COST		
Intake Pump Stations (0 MGD)		$736,000
Transmission Pipeline (8 in. dia., 1 miles)		$871,000
Well Fields (Wells, Pumps, and Piping)		$1,551,000
Storage Tanks (Other Than at Booster Pump Stations)		$1,092,000
Water Treatment Plant (0.7 MGD)		$1,073,000
Integration, Relocations, Backup Generator & Other		$2,000
TOTAL COST OF FACILITIES		**$5,325,000**
- Planning (3%)		$160,000
- Design (7%)		$373,000
- Construction Engineering (1%)		$53,000
Legal Assistance (2%)		$106,000
Fiscal Services (2%)		$106,000
Pipeline Contingency (15%)		$131,000
All Other Facilities Contingency (20%)		$891,000
Environmental & Archaeology Studies and Mitigation		$114,000
Land Acquisition and Surveying (11 acres)		$113,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)		$240,000
TOTAL COST OF PROJECT		**$7,612,000**
ANNUAL COST		
Debt Service (3.5 percent, 20 years)		$535,000
Operation and Maintenance		
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)		$35,000
Intakes and Pump Stations (2.5% of Cost of Facilities)		$18,000
Water Treatment Plant		$354,000
Pumping Energy Costs (196,295 kW-hr @ 0.09 $/kW-hr)		$28,000
TOTAL ANNUAL COST		**$970,000**
UNIT COSTS (Until Amortized)		
Per Acre-Foot		$1,448
Per 1,000 Gallons		$4.44
UNIT COSTS (After Amortization)		
Per Acre-Foot		$649
Per 1,000 Gallons		$1.99

PROJECT EVALUATION

This strategy will benefit the Alto Rural WSC, a municipal user in Cherokee County, and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. Developing groundwater supplies in Cherokee County will have no other apparent impact on other State water resources. This strategy does not involve a voluntary redistribution of water from a rural and/or agricultural area, so it will have low to no third-party social and economic impact to those areas. Alto Rural WSC is a rural WUG, and this strategy will benefit them from a social and economic perspective.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Houston County, Texas

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage
Reliability	4	Medium to High Reliable Supply
Cost	3	Medium Cost
Environmental Factors	3	Low to Medium Impacts
Impact on Other State Water Resources	4	No known impacts to other projects.
Threat to Agricultural Resources/Rural Areas	4	Low to no negative impacts and/or some positive impacts
Other Natural Resources	4	Low to no negative impacts and/or some positive impacts
Interbasin Transfers		No
Third Party Social & Economic Factors	4	Low to no negative impacts and/or some positive impacts
Major Impacts on Key Water Quality Parameters	4	Low to no negative impacts and/or some positive impacts
Political Feasibility	3	Sponsor identified
Implementation Issues	4	Low implementation issues

REFERENCES

Correspondence with Alto Rural for the 2026 East Texas Regional Water Plan.

B C Y WSC – NEW GROUNDWATER WELL IN CARRIZO-WILCOX AQUIFER

Water User Group Name:	B C Y Water Supply Corporation (WSC)
Strategy Name:	New Groundwater Well in Carrizo-Wilcox Aquifer
Strategy ID:	BCYW-GW
Strategy Type:	Existing Groundwater Source
Potential Supply Quantity:	170 ac-ft per year (0.15 MGD)
Implementation Decade:	2040
Development Timeline:	< 5 years
Project Capital Cost:	$4,254,000 (September 2023)
Annual Cost	$525,000
Unit Water Cost (Rounded):	$3,088 per ac-ft ($9.48 per 1,000 gallons)

STRATEGY DESCRIPTION

B C Y WSC is a municipal water user group in Anderson County. This water user currently relies on groundwater from the Carrizo-Wilcox Aquifer in Anderson County. B C Y WSC has no identified need during the current planning cycle based on their projected demand and currently available supply., but requested a strategy be added for a new well. However, they are considering developing an additional groundwater well and associated infrastructure to provide supply to potential future water demands.

A strategy is recommended for B C Y WSC that involves the development of approximately 170 acre-feet per year from the Carrizo-Wilcox Aquifer in Anderson County. The conceptual design for this strategy involves one public supply well (capacity of 200 gpm, depth of 750 ft) that produces groundwater from the Carrizo-Wilcox Aquifer, conveyance infrastructure (e.g., well collection piping, transmission pipeline, pump station, and storage tank), and a groundwater treatment system. A peaking factor of two was assumed to size infrastructure at this well field.

SUPPLY DEVELOPMENT

The estimated supply quantity from this strategy is approximately 170 ac-ft per year based on a peaking factor of 2. There is sufficient modeled available groundwater in the Carrizo-Wilcox Aquifer in Anderson County to develop the supply assumed for this water management strategy. This strategy is projected to be able to provide supply by 2040. Overall, the reliability of this supply is considered medium, based on the proven use of this groundwater source and groundwater availability models. There are other strategies involving use of this groundwater source, so there may be competition for supply.

ENVIRONMENTAL CONSIDERATIONS

The environmental impacts from this strategy are expected to be low. However, groundwater development from this source should be evaluated for potential impacts on spring flows and base flows of surface water is in close proximity. The impact to the environment due to pipeline construction is expected to be temporary and minimal. Impacts to environmental water needs, habitat, and cultural resources are expected to be low due to the relatively low footprint of this strategy.

PERMITTING AND DEVELOPMENT

This strategy is located within the Neches & Trinity Valleys Groundwater Conservation District (NTVGCD). Any additional groundwater withdrawal by B C Y WSC will require that an operating permit from the NTVGCD be obtained.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assume account for one well, 500 feet of well field piping, 600 feet of transmission pipeline, a pump station, storage tank, and a groundwater treatment system.

WUG	**B C Y WSC**	
STRATEGY	**New Well in Carrizo-Wilcox Aquifer**	
QUANTITY (AC-FT/YR)	**170**	
CAPITAL COST		
Booster Pump Stations		$511,000
Transmission Pipeline (6 in. dia., 0.1 miles)		$71,000
Well Fields (Wells, Pumps, and Piping)		$732,000
Storage Tanks (Other Than at Booster Pump Stations)		$1,051,000
Water Treatment Plant (0.3 MGD)		$568,000
Integration, Relocations, Backup Generator & Other		$1,000
TOTAL COST OF FACILITIES		**$2,934,000**
- Planning (3%)		$88,000
- Design (7%)		$205,000
- Construction Engineering (1%)		$29,000
Legal Assistance (2%)		$59,000
Fiscal Services (2%)		$59,000
Pipeline Contingency (15%)		$11,000
All Other Facilities Contingency (20%)		$572,000
Environmental & Archaeology Studies and Mitigation		$80,000
Land Acquisition and Surveying (8 acres)		$83,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)		$134,000
TOTAL COST OF PROJECT		**$4,254,000**
ANNUAL COST		
Debt Service (3.5 percent, 20 years)		$299,000
Operation and Maintenance		
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)		$19,000
Intakes and Pump Stations (2.5% of Cost of Facilities)		$13,000
Water Treatment Plant		$187,000
Pumping Energy Costs (74,108 kW-hr @ 0.09 $/kW-hr)		$7,000
TOTAL ANNUAL COST		**$525,000**
UNIT COSTS (Until Amortized)		
Per Acre-Foot		$3,088
Per 1,000 Gallons		$9.48
UNIT COSTS (After Amortization)		
Per Acre-Foot		$1,329
Per 1,000 Gallons		$4.08

PROJECT EVALUATION

This strategy benefits B C Y WSC and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. Developing groundwater supplies in Anderson County will have no other apparent impact on other state water resources. This strategy does not involve a voluntary redistribution of water from a rural and/or agricultural area, so it will have low to no third-party social and economic impact to those areas. B C Y WSC is a rural WUG, and this strategy will benefit them from a social and economic perspective.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	5	No shortage identified for WUG. Supply would be surplus
Reliability	3	Medium reliable supply. May encounter competition for supply from other users
Cost	2	Medium to high cost ($3,000 to $5,000/ac-ft)
Environmental Factors	3	Low to medium impacts
Impact on Other State Water Resources	4	Low to no impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no impacts
Other Natural Resources	4	Low to no impacts
Interbasin Transfers		No
Third Party Social & Economic Factors	4	Low to no impacts
Major Impacts on Key Water Quality Parameters	4	No known impacts
Political Feasibility	4	Sponsor identified, committed to strategy
Implementation Issues	4	No known risks

REFERENCES

Correspondence with B C Y WSC for the 2026 East Texas Regional Water Plan.

CHANDLER – PURCHASE FROM TYLER

Water User Group Name:	Chandler
Strategy Name:	Purchase from Tyler (Lake Palestine)
Strategy ID:	CHAN-TYL
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	940 ac-ft per year (0.84 MGD)
Implementation Decade:	2050
Development Timeline:	< 5 years
Project Capital Cost:	$15,028,000 (September 2023)
Annual Cost:	$2,774,000
Unit Water Cost (Rounded):	$2,951 per ac-ft ($9.06 per 1,000 gallons)

STRATEGY DESCRIPTION

The City of Chandler is a municipal water user in Henderson County. The City currently relies on groundwater pumped from the Carrizo-Wilcox Aquifer in Henderson County. Considering their projected demands and existing infrastructure constraints, the City has an identified need starting in 2050 of approximately 43 ac-ft per year and that need increases to 934 ac-ft per by 2080. Historically, the City has been solely reliant on groundwater; however, due to limited modeled available groundwater (MAG) in Henderson County from the Carrizo-Wilcox aquifer, the recommended strategy for the City is to purchase treated water from the City of Tyler to meet their needs. Chandler is adjacent to Lake Palestine (a current water supply source for the City of Tyler) and is located approximately 6 miles from the outer extent of Tyler's existing distribution system.

The recommended strategy for Chandler is to construct a water transmission line and other associated conveyance infrastructure connected to Tyler's existing distribution system to deliver water to their service area. The cost of this strategy includes the cost of treated water and infrastructure related to water conveyance. Ultimately, the cost of treated water will need to be negotiated between the cities of Chander and Tyler. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area for treated surface water.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the water needs projected for the City of Chandler during the planning period (2030-2080): 43 ac-ft/yr starting in 2050 and increasing to 934 ac-ft/yr in 2080. The reliability of this water supply is considered high due to the availability of water in the City of Tyler's sources of supply. The City of Tyler obtains its water supply from Lake Tyler and has a contract for water from Lake Palestine. In addition to this, Tyler also has groundwater supplies in Smith County. For this evaluation, it is assumed that treated water from Lake Palestine will be used to supply the needs of the City of Chandler; however, any of Tyler's available treated water supplies could be used to meet Chandler's needs. The development of this strategy will ultimately be dependent on coordination and agreement(s) between the cities of Chander and Tyler.

ENVIRONMENTAL CONSIDERATIONS

The impact on the environment due to the construction of infrastructure associated with this strategy is expected to be low to moderate. There may be some surface disturbance associated with the construction of infrastructure, but it is expected to occur primarily on land that is previously disturbed. In addition, it is anticipated that this strategy will have a minimal impact on environmental water needs, a low impact on the surrounding habitat, and a low impact on cultural resources in the area. There are no bays or estuaries in close proximity to Henderson County, so this project is anticipated to have no impact.

PERMITTING AND DEVELOPMENT

There are no anticipated permitting or development issues associated with this strategy. There may be some minor permitting related to the construction of the infrastructure required associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs for this strategy assume 6 miles of pipeline, one pump station, and one ground storage tank. The annual was estimated assuming a debt service of 3.5% and using the assumed East Texas Regional Water Planning Area rate for treated surface water ($3.00 per 1,000 gallons).

WUG	**Chandler**				
STRATEGY	**Purchase from City of Tyler**				
QUANTITY (AC-FT/YR)	**940**				
CAPITAL COST					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	10 in.	36,960	LF	$189	$6,998,000
Right of Way Easements Rural (ROW)		17	Acres	$9,250	$173,000
Engineering and Contingencies (30%)					$2,099,000
Subtotal of Pipeline	**7**	**miles**			**$9,270,000**
Pump Station(s)					
Booster Pump Station	211 HP	1	LS	$2,302,000	$2,302,000
Power connection(s)		205	HP	$200	$75,000
Engineering and Contingencies (35%)					$3,020,000
Subtotal of Storage Tanks					**$11,723,000**
Storage Tanks	0.2 MG	1	LS	$1,143,000	**$1,143,000**
Engineering and Contingencies (35%)					$400,000
Subtotal of Pump Station(s)					**$1,543,000**
Integration, Relocations, Backup Generator & Other			$ per kw	$534	$19,400
Engineering and Contingencies (35%)					$6,800
Subtotal of Integration, Relocations, Backup Generator & Other					**$26,200**
Land Acquisition and Surveying (All Facilities Excluding Pipelines)					$122,100
Environmental - Studies and Mitigation					$411,000
CONSTRUCTION TOTAL					**$14,555,300**
Interest During Construction (3.5% for 1 years with a 0.5% ROI)					$473,000
TOTAL COST OF PROJECT					**$15,028,000**
ANNUAL COST					
Debt Service (3.5% for 20 years)					$1,057,000
Pumping Energy Costs					$29,000
Operation and Maintenance (O&M)					$157,000
Treated Water Purchase			1000 gal	$5.00	$1,531,000
TOTAL ANNUAL COST					**$2,774,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot					$2,951
Per 1,000 Gallons					$9.06
UNIT COSTS (After Amortization)					
Per Acre-Foot					$1,827
Per 1,000 Gallons					$5.61

PROJECT EVALUATION

This strategy benefits the City of Chandler and is expected to have a positive impact on their water supply security. A contract to obtain water from the City of Tyler will reduce future demands on other water supplies in Henderson County and provide relief to the Carrizo-Wilcox aquifer as more entities switch from groundwater to alternative sources. This strategy analysis did not find any potential impacts to agricultural or natural resources or key parameters of water quality, and no other apparent impact on other State water resources. This strategy involves a voluntary redistribution of water that could be used to serve rural and/or agricultural areas. Chandler is a rural WUG, and this strategy will benefit them from a social and economic perspective. Additionally, the supply associated with this strategy is relatively small compared to the surplus supply Tyler has available.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 100% of supply need
Reliability	4	Medium to high reliable supply
Cost	3	Medium cost ($1,000 - $3,000/ac-ft)
Environmental Factors	3	Low to medium impacts
Impact on Other State Water Resources	4	Low impact to surface water resources, some positive impact to groundwater resources due to reduction of future demand
Threat to Agricultural Resources/Rural Areas	4	Low to no known impacts
Other Natural Resources	4	Low to no known impacts
Interbasin Transfers		No
Third Party Social & Economic Impacts	3	Low impacts. Involves voluntary redistribution of water that could be used to sere rural and/or agricultural areas. Chandler is a rural WUG, and this strategy will benefit them.
Major Impacts on Key Water Quality Parameters	3	Low impacts. There may be some consideration with mixing new source supply (surface water) with currently supply (groundwater)
Political Feasibility	3	Local sponsorship by Chandler, commitment level uncertain
Implementation Issues	3	Requires contract between the cities of Chandler and Tyler

REFERENCES

East Texas Regional Water Planning Group.

CHANDLER – NEW GROUNDWATER WELLS IN CARRIZO-WILCOX AQUIFER (ALTERNATIVE)

Water User Group Name:	Chandler
Strategy Name:	New Groundwater Wells in Carrizo-Wilcox Aquifer *(Alternative WMS)*
Strategy ID:	CHAN-GW
Strategy Type:	Existing Groundwater Source
Potential Supply Quantity:	940 ac-ft per year (0.64 MGD)
Implementation Decade:	2050
Development Timeline:	< 5 years
Project Capital Cost:	$10,727,000 (September 2023)
Annual Cost:	$1,387,000
Unit Water Cost (Rounded):	$1,476 per ac-ft ($4.53 per 1,000 gallons)

STRATEGY DESCRIPTION

The strategy involves the development of new groundwater wells in the Carrizo-Wilcox Aquifer in Henderson County. The Carrizo-Wilcox Aquifer in Henderson County (both in Region C and I) has very limited modeled available groundwater (MAG) beyond what is currently used. Consequently, this is included as an alternative strategy for Chandler. The strategy could be changed to a recommended strategy if the MAG volumes increase in the future.

The City currently relies on groundwater pumped from the Carrizo-Wilcox Aquifer in Henderson County. Considering their projected demands and existing infrastructure constraints, the City has an identified need starting in 2050 of approximately 43 ac-ft per year and that need increases to 934 ac-ft per by 2080.. Historically, the City has been solely reliant on groundwater; however, due to the MAG limitations in Henderson County from the Carrizo-Wilcox Aquifer, the recommended strategy for the City is to purchase treated water from the City of Tyler to meet their needs (discussed in a separate technical memorandum).

This strategy assumes the development of approximately 940 acre-feet per year from the Carrizo-Wilcox Aquifer in Henderson County to meet the City's maximum projected need. The conceptual design for this strategy involves four public supply wells (capacities of 250 gpm, depth of 700 ft depth each) that produces groundwater from the Carrizo-Wilcox Aquifer, conveyance infrastructure (e.g., well collection piping, transmission pipeline, pump station, and storage tank), and a groundwater treatment system. A peaking factor of two was assumed to size infrastructure at this well field.

SUPPLY DEVELOPMENT

The estimated supply quantity from this strategy is approximately 940 ac-ft per year. There is not sufficient modeled available groundwater from the Carrizo-Wilcox Aquifer in Henderson County (both in Region C and I) to develop the supply assumed for this water management strategy, so this is considered as an alternative strategy. This strategy is projected to be online by 2050. Based on historical use, this supply is considered to have medium to high reliability.

ENVIRONMENTAL CONSIDERATIONS

The environmental impacts from this strategy are expected to be low. However, groundwater development from this source should be evaluated for potential impacts on spring flows and base flows if surface water is in close proximity. The impact to the environment due to pipeline construction is expected to be temporary and minimal. Impacts to environmental water needs, habitat, and cultural resources are expected to be low due to the relatively low footprint of this strategy.

PERMITTING AND DEVELOPMENT

This strategy is located within the Neches & Trinity Valleys Groundwater Conservation District (NTVGCD). Any new groundwater withdrawal by Chandler would require that an operating permit from the NTVGCD be obtained. The assumed supply from this strategy exceeds the Carrizo-Wilcox Aquifer MAG limits in Henderson County in Regions C and I. If and when the MAG numbers are updated, the yield from the wells will be compared with the MAG. If there is sufficient MAG for this strategy in the future, this could be converted to a recommended strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assume account for three wells, 1,400 feet of well field piping, one mile of transmission pipeline, a pump station, storage tank, and a groundwater treatment system.

WUG	**Chandler**	
STRATEGY	**New Wells in Carrizo-Wilcox Aquifer (Alternative)**	
QUANTITY (AC-FT/YR)	**940**	
CAPITAL COST		
Booster Pump Stations		$875,000
Transmission Pipeline (10 in. dia., 1 mile)		$1,000,000
Well Fields (Wells, Pumps, and Piping)		$2,882,000
Storage Tanks (Other Than at Booster Pump Stations)		$1,160,000
Water Treatment Plant (1.1 MGD)		$1,617,000
Integration, Relocations, Backup Generator & Other		$3,000
TOTAL COST OF FACILITIES		**$7,537,000**
- Planning (3%)		$226,000
- Design (7%)		$528,000
- Construction Engineering (1%)		$75,000
Legal Assistance (2%)		$151,000
Fiscal Services (2%)		$151,000
Pipeline Contingency (15%)		$150,000
All Other Facilities Contingency (20%)		$1,307,000
Environmental & Archaeology Studies and Mitigation		$134,000
Land Acquisition and Surveying (13 acres)		$130,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)		$338,000
TOTAL COST OF PROJECT		**$10,727,000**
ANNUAL COST		
Debt Service (3.5 percent, 20 years)		$755,000
Operation and Maintenance		
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)		$50,000
Intakes and Pump Stations (2.5% of Cost of Facilities)		$22,000
Water Treatment Plant		$534,000
Pumping Energy Costs (287,550 kW-hr @ 0.09 $/kW-hr)		$26,000
TOTAL ANNUAL COST		**$1,387,000**
UNIT COSTS (Until Amortized)		
Per Acre-Foot		$1,476
Per 1,000 Gallons		$4.53
UNIT COSTS (After Amortization)		
Per Acre-Foot		$672
Per 1,000 Gallons		$2.06

PROJECT EVALUATION

This strategy benefits the City of Chandler in Henderson County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. Developing groundwater supplies in Henderson County will have no other apparent impact on other state water resources. However, the supply quantity from this strategy would exceed the Carrizo-Wilcox MAG in Henderson County, so this strategy is designated as an alternative strategy rather than recommended. This strategy does not involve a voluntary redistribution of water from a rural and/or agricultural area, so it will have low to no third-party social and economic impact to those areas. Chandler is a rural WUG, and this strategy will benefit them from a social and economic perspective.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 100% of supply need
Reliability	2	Medium to high reliable supply historically. However, there is limited to no MAG from the Carrizo-Wilcox Aquifer in Henderson County, so long-term reliability is uncertain
Cost	3	Medium cost ($1,000 - $3,000/ac-ft)
Environmental Factors	3	Low to medium impacts
Impact on Other State Water Resources	4	Low to no impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no impacts
Other Natural Resources	4	Low to no impacts
Interbasin Transfers		No
Third Party Social & Economic Factors	4	Low to no impacts
Major Impacts on Key Water Quality Parameters	4	No known impacts
Political Feasibility	3	Chandler is the local sponsor.
Implementation Issues	2	Supply quantity exceeds the Carrizo-Wilcox MAG in Henderson County.

REFERENCES

East Texas Regional Water Planning Group.

CHINA – NEW GROUNDWATER WELL IN GULF COAST AQUIFER

Water User Group Name:	China
Strategy Name:	New Groundwater Well in Carrizo-Wilcox Aquifer
Strategy ID:	CHNA-GW
Strategy Type:	Existing Groundwater Source
Potential Supply Quantity:	250 ac-ft per year (0.22 MGD)
Implementation Decade:	2040
Development Timeline:	< 5 years
Project Capital Cost:	$6,182,000 (September 2023)
ANNUAL COST:	$741,000
Unit Water Cost (Rounded):	$2,964 per ac-ft ($9.09 per 1,000 gallons)

STRATEGY DESCRIPTION

China is a municipal water user group in Jefferson County. This water user currently relies on groundwater from the Gulf Coast Aquifer in Jefferson County. China has no identified need during the current planning cycle based on their projected demand and currently available supply. However, the City is considering developing an additional groundwater well and associated infrastructure to provide supply to potential future water demands.

A strategy is recommended for China that involves the development of approximately 250 acre-feet per year from the Gulf Coast Aquifer in Jefferson County. The conceptual design for this strategy involves one public supply well (capacity of 300 gpm, depth of 250 ft) that produces groundwater from the Gulf Coast Aquifer, conveyance infrastructure (e.g., well collection piping, transmission pipeline, pump station, and storage tank), and a groundwater treatment system. A peaking factor of two was assumed to size infrastructure at this well field.

SUPPLY DEVELOPMENT

The estimated supply quantity from this strategy is approximately 250 ac-ft per year based on a peaking factor of 2. There is sufficient modeled available groundwater in the Gulf Coast Aquifer in Jefferson County to develop the supply assumed for this water management strategy. This strategy is projected to be able to provide supply by 2040. Overall, the reliability of this supply is considered medium to high, based on the proven use of this groundwater source and groundwater availability models.

ENVIRONMENTAL CONSIDERATIONS

The environmental impacts from this strategy are expected to be low. However, groundwater development from this source should be evaluated for potential impacts on spring flows and base flows if surface water is in close proximity. The impact to the environment due to pipeline construction is expected to be temporary and minimal. Impacts to environmental water needs, habitat, and cultural resources are expected to be low due to the relatively low footprint of this strategy.

PERMITTING AND DEVELOPMENT

There are no anticipated permitting or development issues associated with this strategy. Currently, there is no groundwater conservation district in Jefferson County.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assume account for one well, 2,100 feet of well field piping, one mile of transmission pipeline, a pump station, storage tank, and a groundwater treatment system.

WUG	**China**	
STRATEGY	**New Well in Gulf Coast Aquifer**	
QUANTITY (AC-FT/YR)	**250**	
CAPITAL COST		
Booster Pump Stations		$672,000
Transmission Pipeline (6 in. dia., 0.1 miles)		$871,000
Well Fields (Wells, Pumps, and Piping)		$820,000
Storage Tanks (Other Than at Booster Pump Stations)		$1,065,000
Water Treatment Plant (0.3 MGD)		$736,000
Integration, Relocations, Backup Generator & Other		$1,000
TOTAL COST OF FACILITIES		**$4,165,000**
- Planning (3%)		$125,000
- Design (7%)		$291,000
- Construction Engineering (1%)		$42,000
Legal Assistance (2%)		$83,000
Fiscal Services (2%)		$83,000
Pipeline Contingency (15%)		$131,000
All Other Facilities Contingency (20%)		$659,000
Environmental & Archaeology Studies and Mitigation		$194,000
Land Acquisition and Surveying (11 acres)		$214,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)		$195,000
TOTAL COST OF PROJECT		**$6,182,000**
ANNUAL COST		
Debt Service (3.5 percent, 20 years)		$435,000
Operation and Maintenance		
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)		$28,000
Intakes and Pump Stations (2.5% of Cost of Facilities)		$17,000
Water Treatment Plant		$243,000
Pumping Energy Costs (196,295 kW-hr @ 0.09 $/kW-hr)		$18,000
TOTAL ANNUAL COST		**$525,000**
UNIT COSTS (Until Amortized)		
Per Acre-Foot		$2,967
Per 1,000 Gallons		$9.09
UNIT COSTS (After Amortization)		
Per Acre-Foot		$1,224
Per 1,000 Gallons		$3.76

PROJECT EVALUATION

This strategy benefits China and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. Developing groundwater supplies in Jefferson County will have no other apparent impact on other state water resources. This strategy does not involve a voluntary redistribution of water from a rural and/or agricultural area, so it will have low to no third-party social and economic impact to those areas. China is a rural WUG, and this strategy will benefit them from a social and economic perspective.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	5	No shortage identified for WUG. Supply would be surplus.
Reliability	4	Medium to high reliable supply
Cost	3	Medium cost ($1,000 - $3,000/ac-ft)
Environmental Factors	3	Low to medium impacts
Impact on Other State Water Resources	4	Low to no impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no impacts
Other Natural Resources	4	Low to no impacts
Interbasin Transfers		No
Third Party Social & Economic Factors	4	Low to no impacts
Major Impacts on Key Water Quality Parameters	4	No known impacts
Political Feasibility	4	Sponsor identified, committed to strategy
Implementation Issues	4	No known risks

REFERENCES

Correspondence with China for the 2026 East Texas Regional Water Plan.

D&M WSC - NEW GROUNDWATER WELL IN CARRIZO-WILCOX AQUIFER

Water User Group Name:	D&M WSC
Strategy Name:	New groundwater well in Carrizo-Wilcox Aquifer
Strategy ID:	NACW-DMW
Strategy Type:	Existing Groundwater Source
Potential Supply Quantity:	220 ac-ft per year (0.20 MGD)
Implementation Decade:	2040
Development Timeline:	< 5 years
Project Capital Cost:	$5,542,000 (September 2023)
ANNUAL COST:	$652,000
Unit Water Cost:	$2,964 per ac-ft
Rounded:	($9.09 per 1,000 gallons)

STRATEGY DESCRIPTION

D&M WSC is a municipal water user group in Nacogdoches County. This water user group currently relies on groundwater from the Carrizo- Wilcox Aquifer in Nacogdoches County. D&M WSC has an identified need of 218 ac-ft/yr based on their projected demand and currently available supply. To meet this need, it is recommended that the D&M WSC continue to use supplies from the Carrizo- Wilcox by drilling additional wells.

A strategy is recommended for D&M WSC that involves the development of approximately 220 acre-feet per year from the Carrizo- Wilcox Aquifer in Nacogdoches County. The conceptual design for this strategy involves one public supply well (capacity of 250 gpm, depth of 600 ft) that produces groundwater from the Carrizo Wilcox Aquifer, conveyance infrastructure (e.g., well collection piping, transmission pipeline, pump station, and storage tank), and chlorine disinfection. A peaking factor of two was assumed to size infrastructure at this well field.

SUPPLY DEVELOPMENT

The estimated supply quantity from this strategy is approximately 220 ac-ft per year. There is sufficient groundwater available in the Carrizo Wilcox Aquifer in Nacogdoches County to develop the supply assumed for this water management strategy. This strategy is projected to be online and able to provide supply by 2040. Overall, the reliability of this supply is considered medium to high, based on the proven use of this groundwater source and groundwater availability models.

ENVIRONMENTAL CONSIDERATIONS

The environmental impacts from this strategy are expected to be low. However, groundwater development from this source should be evaluated for potential impacts on spring flows and base flows if surface water is in close proximity. The impact to the environment due to pipeline construction is expected to be temporary and minimal. Impacts to environmental water needs, habitat, and cultural resources are expected to be low due to the relatively low footprint of this strategy.

PERMITTING AND DEVELOPMENT

There are no anticipated permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital cost accounts for one well, 1 mile of pipeline, a pump station, storage tank, and chlorine disinfection.

WUG	**D&M WSC**	
STRATEGY	**New Well in Carrizo-Wilcox Aquifer**	
QUANTITY (AC-FT/YR)	**220**	
CAPITAL COST		
Intake Pump Stations (0 MGD)		$680,000
Transmission Pipeline (6 in. dia., 0.1 miles)		$747,000
Well Fields (Wells, Pumps, and Piping)		$708,000
Storage Tanks (Other Than at Booster Pump Stations)		$1,058,000
Water Treatment Plant (0.4 MGD)		$652,000
Integration, Relocations, Backup Generator & Other		$1,000
TOTAL COST OF FACILITIES		**$3,846,000**
- Planning (3%)		$115,000
- Design (7%)		$269,000
- Construction Engineering (1%)		$38,000
Legal Assistance (2%)		$77,000
Fiscal Services (2%)		$77,000
Pipeline Contingency (15%)		$112,000
All Other Facilities Contingency (20%)		$620,000
Environmental & Archaeology Studies and Mitigation		$107,000
Land Acquisition and Surveying (10 acres)		$106,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)		$175,000
TOTAL COST OF PROJECT		$5,542,000
ANNUAL COST		
Debt Service (3.5 percent, 20 years)		$390,000
Operation and Maintenance		
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)		$25,000
Intakes and Pump Stations (2.5% of Cost of Facilities)		$17,000
Water Treatment Plant		$215,000
Pumping Energy Costs (196,295 kW-hr @ 0.09 $/kW-hr)		$5,000
TOTAL ANNUAL COST		**$652,000**
UNIT COSTS (Until Amortized)		
Per Acre-Foot		$2,964
Per 1,000 Gallons		$9.09
UNIT COSTS (After Amortization)		
Per Acre-Foot		$1,191
Per 1,000 Gallons		$3.65

PROJECT EVALUATION

This strategy benefits D&M WSC and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. Developing groundwater supplies in Nacogdoches County will have no other apparent impact on other state water resources. This strategy does not involve a voluntary redistribution of water from a rural and/or agricultural area, so it will have low to no third-party social and economic impact to those areas.

Based on the conceptual strategy described above, this strategy was evaluated across eleven different criteria for the purpose of quick comparison against other strategies that may be incorporated into the 2026 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage
Reliability	4	Medium to High Reliable Supply
Cost	3	Medium Cost
Environmental Factors	3	Low to Medium Impacts
Impact on Other State Water Resources	4	Low to no negative impacts and/or some positive impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no negative impacts and/or some positive impacts
Other Natural Resources	4	Low to no negative impacts and/or some positive impacts
Interbasin Transfers		No
Third Party Social & Economic Factors	4	Low to no negative impacts and/or some positive impacts
Major Impacts on Key Water Quality Parameters	4	Low to no negative impacts and/or some positive impacts
Political Feasibility	2	Sponsor identifiable.
Implementation Issues	4	Low implementation issues

REFERENCES

Correspondence with D&M WSC for the 2026 East Texas Regional Water Plan.

GASTON WSC – NEW GROUNDWATER WELL IN CARRIZO-WILCOX AQUIFER

Water User Group Name:	Gaston WSC
Strategy Name:	New Groundwater Well in Carrizo-Wilcox Aquifer
Strategy ID:	GSTW-GW
Strategy Type:	Existing Groundwater Source
Potential Supply Quantity:	130 ac-ft per year (0.11 MGD)
Implementation Decade:	2040
Development Timeline:	< 5 years
Project Capital Cost:	$3,700,000 (September 2023)
Annual Cost:	$454,000
Unit Water Cost (Rounded):	$3,492 per ac-ft ($10.72 per 1,000 gallons)

STRATEGY DESCRIPTION

Gaston WSC is a municipal water user group in Rusk County. This water user currently relies on groundwater from the Carrizo-Wilcox Aquifer in Rusk County. Gaston WSC has no identified need during the current planning cycle based on their projected demand and currently available supply. However, they are considering developing an additional groundwater well and associated infrastructure to provide supply to potential future water demands.

A strategy is recommended for Gaston WSC that involves the development of approximately 130 acre-feet per year from the Carrizo-Wilcox Aquifer in Rusk County. The conceptual design for this strategy involves one public supply well (capacity of 150 gpm, depth of 500 ft) that produces groundwater from the Carrizo-Wilcox Aquifer, conveyance infrastructure (e.g., well collection piping, transmission pipeline, pump station, and storage tank), and a groundwater treatment system. A peaking factor of two was assumed to size infrastructure at this well field.

SUPPLY DEVELOPMENT

The estimated supply quantity from this strategy is approximately 130 ac-ft per year based on a peaking factor of 2. There is sufficient modeled available groundwater in the Carrizo-Wilcox Aquifer in Rusk County to develop the supply assumed for this water management strategy. This strategy is projected to be able to provide supply by 2040. Overall, the reliability of this supply is considered medium to high, based on the proven use of this groundwater source and groundwater availability models.

ENVIRONMENTAL CONSIDERATIONS

The environmental impacts from this strategy are expected to be low. However, groundwater development from this source should be evaluated for potential impacts on spring flows and base flows if surface water is in close proximity. The impact to the environment due to pipeline construction is expected to be temporary and minimal. Impacts to environmental water needs, habitat, and cultural resources are expected to be low due to the relatively low footprint of this strategy.

PERMITTING AND DEVELOPMENT

This strategy is located within the Rusk County Groundwater Conservation District (RCGCD). Any additional groundwater withdrawal by Gaston WSC will require that an operating permit from the RCGCD be obtained.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assume account for one well, 600 feet of well field piping, 500 feet of transmission pipeline, a pump station, storage tank, and a groundwater treatment system.

WUG	**Gaston WSC**	
STRATEGY	**New Well in Carrizo-Wilcox Aquifer**	
QUANTITY (AC-FT/YR)	**130**	
CAPITAL COST		
Booster Pump Stations		$396,000
Transmission Pipeline (6 in. dia., 0.1 miles)		$71,000
Well Fields (Wells, Pumps, and Piping)		$542,000
Storage Tanks (Other Than at Booster Pump Stations)		$1,044,000
Water Treatment Plant (0.3 MGD)		$483,000
Integration, Relocations, Backup Generator & Other		$1,000
TOTAL COST OF FACILITIES		**$2,536,000**
- Planning (3%)		$76,000
- Design (7%)		$178,000
- Construction Engineering (1%)		$25,000
Legal Assistance (2%)		$51,000
Fiscal Services (2%)		$51,000
Pipeline Contingency (15%)		$11,000
All Other Facilities Contingency (20%)		$493,000
Environmental & Archaeology Studies and Mitigation		$79,000
Land Acquisition and Surveying (11 acres)		$83,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)		$117,000
TOTAL COST OF PROJECT		**$3,700,000**
ANNUAL COST		
Debt Service (3.5 percent, 20 years)		$260,000
Operation and Maintenance		
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)		$17,000
Intakes and Pump Stations (2.5% of Cost of Facilities)		$10,000
Water Treatment Plant		$160,000
Pumping Energy Costs (73,899 kW-hr @ 0.09 $/kW-hr)		$7,000
TOTAL ANNUAL COST		**$525,000**
UNIT COSTS (Until Amortized)		
Per Acre-Foot		$3,492
Per 1,000 Gallons		$10.72
UNIT COSTS (After Amortization)		
Per Acre-Foot		$1,492
Per 1,000 Gallons		$4.58

PROJECT EVALUATION

This strategy benefits Gaston WSC and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. Developing groundwater supplies in Rusk County will have no other apparent impact on other state water resources. This strategy does not involve a voluntary redistribution of water from a rural and/or agricultural area, so it will have low to no third-party social and economic impact to those areas. Gaston WSC is a rural WUG, and this strategy will benefit them from a social and economic perspective.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	5	No shortage identified for WUG. Supply would be surplus.
Reliability	4	Medium to high reliable supply
Cost	2	Medium to high cost (3,000 - $5,000/ac-ft)
Environmental Factors	3	Low to medium impacts
Impact on Other State Water Resources	4	Low to no impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no impacts
Other Natural Resources	4	Low to no impacts
Interbasin Transfers		No
Third Party Social & Economic Factors	4	Low to no impacts
Major Impacts on Key Water Quality Parameters	4	No known impacts
Political Feasibility	4	Sponsor identified, committed to strategy
Implementation Issues	4	No known risks

REFERENCES

Correspondence with Gaston WSC for the 2026 East Texas Regional Water Plan.

JACOBS WSC – NEW GROUNDWATER WELL IN CARRIZO-WILCOX AQUIFER

Water User Group Name:	Jacobs WSC
Strategy Name:	New Groundwater Well in Carrizo-Wilcox Aquifer
Strategy ID:	JACB-GW
Strategy Type:	Existing Groundwater Source
Potential Supply Quantity:	60 ac-ft per year (0.05 MGD)
Implementation Decade:	2070
Development Timeline:	< 5 years
Project Capital Cost:	$5,975,000 (September 2023)
Annual Cost:	$738,000
Unit Water Cost (Rounded):	$12,300 per ac-ft (37.74 per 1,000 gallons)

STRATEGY DESCRIPTION

Jacobs WSC is a municipal water user group in Rusk County. This water user currently relies on groundwater from the Carrizo-Wilcox Aquifer in Rusk County. Jacobs WSC has an identified need of approximately 30 acre-feet per year by 2070 that increases to nearly 60 acre-feet per year by 2080 based on their projected demand and currently available supply.

To meet this need, a strategy is recommended for Jacobs WSC that involves the development of approximately 60 acre-feet per year from the Carrizo-Wilcox Aquifer in Rusk County by 2070. The conceptual design for this strategy involves one public supply well (capacity of 350 gpm, depth of 400 ft) that produces groundwater from the Carrizo-Wilcox Aquifer, conveyance infrastructure (e.g., well collection piping, transmission pipeline, pump station, and storage tank), and a groundwater treatment system. A peaking factor of two was assumed to size infrastructure at this well field.

SUPPLY DEVELOPMENT

The estimated supply quantity from this strategy is approximately 60 ac-ft per year based on the maximum identified need for Jacobs WSC across the planning horizon (2030-2080). There is sufficient modeled available groundwater in the Carrizo-Wilcox Aquifer in Rusk County to develop the supply assumed for this water management strategy. This strategy is projected to be able to provide supply by 2070. Overall, the reliability of this supply is considered medium to high, based on the proven use of this groundwater source and groundwater availability models.

ENVIRONMENTAL CONSIDERATIONS

The environmental impacts from this strategy are expected to be low. However, groundwater development from this source should be evaluated for potential impacts on spring flows and base flows if surface water is in close proximity. The impact to the environment due to pipeline construction is expected to be temporary and minimal. Impacts to environmental water needs, habitat, and cultural resources are expected to be low due to the relatively low footprint of this strategy.

PERMITTING AND DEVELOPMENT

This strategy is located within the Rusk County Groundwater Conservation District (RCGCD). Any additional groundwater withdrawal by Jacobs WSC will require that an operating permit from the RCGCD be obtained.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assume account for one well, 600 feet of well field piping, one mile of transmission pipeline, a pump station, storage tank, and a groundwater treatment system.

WUG	**Jacobs WSC**
STRATEGY	**New Well in Carrizo-Wilcox Aquifer**
QUANTITY (AC-FT/YR)	**60**
CAPITAL COST	
Booster Pump Stations	$685,000
Transmission Pipeline (6 in. dia., 0.1 miles)	$871,000
Well Fields (Wells, Pumps, and Piping)	$711,000
Storage Tanks (Other Than at Booster Pump Stations)	$1,071,000
Water Treatment Plant (0.3 MGD)	$820,000
Integration, Relocations, Backup Generator & Other	$1,000
TOTAL COST OF FACILITIES	**$4,159,000**
- Planning (3%)	$125,000
- Design (7%)	$291,000
- Construction Engineering (1%)	$42,000
Legal Assistance (2%)	$83,000
Fiscal Services (2%)	$83,000
Pipeline Contingency (15%)	$131,000
All Other Facilities Contingency (20%)	$658,000
Environmental & Archaeology Studies and Mitigation	$108,000
Land Acquisition and Surveying (11 acres)	$106,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$189,000
TOTAL COST OF PROJECT	**$5,975,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$420,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$27,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$17,000
Water Treatment Plant	$271,000
Pumping Energy Costs (29,714 kW-hr @ 0.09 $/kW-hr)	$3,000
TOTAL ANNUAL COST	**$525,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot	$12,300
Per 1,000 Gallons	$37.74
UNIT COSTS (After Amortization)	
Per Acre-Foot	$5,300
Per 1,000 Gallons	$16.26

PROJECT EVALUATION

This strategy benefits Jacobs WSC and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. Developing groundwater supplies in Rusk County will have no other apparent impact on other state water resources. This strategy does not involve a voluntary redistribution of water from a rural and/or agricultural area, so it will have low to no third-party social and economic impact to those areas. Jacobs WSC is a rural WUG, and this strategy will benefit them from a social and economic perspective.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 100% of supply need
Reliability	4	Medium to high reliable supply
Cost	1	High cost (> $5,000/ac-ft)
Environmental Factors	3	Low to medium impacts
Impact on Other State Water Resources	4	Low to no impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no impacts
Other Natural Resources	4	Low to no impacts
Interbasin Transfers		No
Third Party Social & Economic Impacts	4	Low to no impacts
Major Impacts on Key Water Quality Parameters	4	No known impacts
Political Feasibility	4	Sponsor identified, committed to strategy
Implementation Issues	4	No known risks

REFERENCES

East Texas Regional Water Planning Group.

NACOGDOCHES COUNTY-OTHER – LAKE NACONICHE REGIONAL WATER SYSTEM

Water User Group Name:	Multiple Water Users in Nacogdoches County
Strategy Name:	Lake Naconiche Regional Water System
Strategy ID:	NACW-NAC
Strategy Type:	New Surface Water Source
Potential Supply Quantity:	1,700 ac-ft per year (1.5 MGD)
Implementation Decade:	2040
Development Timeline:	5-10 years
Project Capital Cost:	$105,317,000 (September 2023)
Annual Cost:	$11,116,000
Unit Water Cost (Rounded):	$6,539 per ac-ft ($20.07 per 1,000 gallons)

STRATEGY DESCRIPTION

Lake Naconiche is located in northeast Nacogdoches County on Naconiche Creek. Construction of the Lake Naconiche dam was completed in 2006. This lake was built by the Natural Resources Conservation Service (NRCS) for flood storage and recreation, but there are plans to develop water supply from the lake for rural communities. A study was completed in 1992 that evaluated a potential regional water system using water from Lake Naconiche. A strategy is recommended for the development of a regional water system from Lake Naconiche to provide water to several rural WUGs and users in Nacogdoches County-Other.

This strategy includes a new lake intake, a new surface water treatment plant located near Lake Naconiche, and regional distribution system that includes pipelines, pump stations, and storage tanks to deliver supply to water users. The project is initially sized for 3 MGD peak capacity and is estimated to provide a supply of approximately 1,700 ac-ft per year.

SUPPLY DEVELOPMENT

Under Water Right Permit Number 5585, Lake Naconiche is authorized to store 9,072 ac-ft of water for flood control and recreational purposes. To use water from Lake Naconiche for water supply, the County must seek a permit amendment to divert for other purposes. According to the Neches WAM, the firm yield of the lake is approximately 4,500 ac-ft per year.

It is assumed that the regional water system would serve County-Other entities in Nacogdoches County (including Caro WSC, Lilbert-Looneyville, Libby and others), Appleby WSC, Lily Grove WSC and Swift WSC. At this time, the primary sponsor of the system has not been confirmed. The sponsor could possibly be one of the entities served or a new water provider dedicated to the operation of this system.

ENVIRONMENTAL CONSIDERATIONS

The impact on the environment due to the construction of infrastructure associated with this strategy is expected to be low to medium. There may be some surface disturbance associated with the construction of infrastructure, but it is expected to occur primarily on land that is previously disturbed. In addition, it is anticipated that this strategy will have a minimal impact on environmental water needs, a low impact on the surrounding habitat, and a low impact on cultural resources in the area. There are no bays or estuaries in close proximity to Nacogdoches County, so this project is anticipated to have no impact.

PERMITTING AND DEVELOPMENT

The water right permit for Lake Naconiche has to be changed from recreational use to multi-purpose use. In 2017, Nacogdoches County submitted an application to TCEQ to amend the Lake Naconiche water right to authorize the diversion and use of up to 4,750 ac-ft per year from the lake for municipal, industrial, and agricultural purposes in Nacogdoches County. This application is pending TCEQ review.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 28 miles of pipeline (serving all the potential customers for this source of supply), a pump station with an intake, a booster pump station, a 3 MGD treatment plant, and one terminal storage tank with 0.38 MG of storage. A regional rate to purchase treated surface was included in the annual cost ($5.00 per 1,000 gallons). Ultimately, this cost will need to be negotiated between individual users and the ultimate sponsor of the project and will reflect the wholesale water rates at that time.

The costs for each participant are based on the unit cost of water for the strategy and capital costs are proportioned by strategy amounts. Actual individual costs would be negotiated by each user.

WUG	**Nacogdoches County-Other**				
STRATEGY	**Lake Naconiche Regional Water System - Phase 1**				
QUANTITY (AC-FT/YR)	**1,700**				
CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Total		147,840	LF	Varies	$29,851,000
Right of Way (ROW) Easements and Surveying		68	Acres	$9,250	$691,000
Engineering and Contingencies (30%)					$8,955,000
Subtotal of Pipeline					**$39,497,000**
Pump Station(s)					
Booster Pump Station	240 HP	1	LS	$2,547,000	$2,547,000
Lake Intake Pump Station	240 HP	1	LS	$6,972,000	$6,972,000
Power connection(s)		480	HP	$200	$96,000
Engineering and Contingencies (35%)					$3,365,000
Subtotal of Pump Station(s)					**$12,980,000**
Storage Tanks	0.38 MG	1	LS	$786,000	$786,000
Engineering and Contingencies (35%)					$275,000
Subtotal of Storage Tanks					**$1,061,000**
Water Treatment Plant					
Water Treatment Plant	3.0 MGD	1	LS	$32,742,000	**$32,742,000**
Engineering and Contingencies (35%)					$11,460,000
Subtotal of Water Treatment Plant					**$44,202,000**
Integration, Relocations, Backup Generator & Other			$ per kw	$534	$49,000

Engineering and Contingencies (35%)				$17,000
Subtotal of Integration, Relocations, Backup Generator & Other				**$66,000**
Land Acquisition and Surveying (All Facilities Excluding Pipelines)				$127,000
Environmental - Studies and Mitigation				$955,000
Construction Total				**$98,889,000**
Interest During Construction (3.5% for 2 years with a 0.5% ROI)				$6,428,000
TOTAL COST OF PROJECT				**$105,317,000**
ANNUAL COSTS				
Debt Service (3.5% for 20 years)				$7,410,000
Pumping Energy Costs				$72,000
Operation and Maintenance (O&M)				$864,000
Treated Water Purchase	554,000	1000 gal	$5.00	$2,770,000
TOTAL ANNUAL COST				**11,116,000**
UNIT COSTS (Until Amortized)				
Per Acre-Foot				$6,539
Per 1,000 Gallons				$20.07
UNIT COSTS (After Amortization)				
Per Acre-Foot				$2,180
Per 1,000 Gallons				$6.69

PROJECT EVALUATION

This strategy benefits multiple municipal users in Nacogdoches County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. Using supplies from this source will reduce the demands on other water supplies in Nacogdoches County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this voluntary redistribution of water will be beneficial because it provides water for residents in Nacogdoches County, which could contribute to economic growth.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	5	No shortage identified for WUG. Supply would be surplus.
Reliability	4	Medium to high reliable supply

Cost	1	High cost (>$5,000/ac-ft)
Environmental Factors	3	Low to medium impacts
Impact on Other State Water Resources	4	Low to no impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no impacts
Other Natural Resources	4	Low to no impacts
Interbasin Transfers		No
Third Party Social & Economic Impacts	5	Involves a voluntary redistribution of water to rural areas across Nacogdoches County
Major Impacts on Key Water Quality Parameters	4	Low to no impacts
Political Feasibility	1	No sponsor readily identifiable
Implementation Issues	3	Water right permit application to TCEQ pending

REFERENCES

2021 East Texas Regional Water Plan.

Texas Commission on Environmental Quality, *Water Right Permit Application No. 5585 to Amend Water Use Permit No. 5585*. 2017.

Texas Natural Resource Conservation Commission, *Water Right Permit Number 5585*. 1998.

ORANGE COUNTY WCID 1 – NEW GROUNDWATER WELL IN GULF COAST AQUIFER

Water User Group Name:	Orange County WCID 1
Strategy Name:	New Groundwater Well in Gulf Coast Aquifer
Strategy ID:	OCWC-GW
Strategy Type:	Existing Groundwater Source
Potential Supply Quantity:	1,610 ac-ft per year (1.44 MGD)
Implementation Decade:	2030
Development Timeline:	< 5 years
Project Capital Cost:	$9,364,000 (September 2023)
Annual Cost:	$1,512,000
Unit Water Cost (Rounded):	$939 per ac-ft ($2.88 per 1,000 gallons)

STRATEGY DESCRIPTION

Orange County WCID 1 is a municipal water user group in Orange County. This water user currently relies on groundwater from the Gulf Coast Aquifer System in Orange County. Orange County WCID 1 has no identified need during the current planning cycle based on their projected demand and currently available supply. However, they are considering developing an additional groundwater well and associated infrastructure to provide supply to potential future water demands.

A strategy is recommended for Orange County WCID 1 that involves the development of approximately 1,610 acre-feet per year from the Carrizo-Wilcox Aquifer in Rusk County. The conceptual design for this strategy involves one public supply well (capacity of 2,000 gpm, depth of 500 ft) that produces groundwater from the Gulf Coast Aquifer, conveyance infrastructure (e.g., well collection piping, transmission pipeline, pump station, and storage tank), and a groundwater treatment system. A peaking factor of two was assumed to size infrastructure at this well field.

SUPPLY DEVELOPMENT

The estimated supply quantity from this strategy is approximately 1,610 ac-ft per year based on a peaking factor of 2. There is sufficient modeled available groundwater in the Gulf Coast Aquifer in Orange County to develop the supply assumed for this water management strategy. This strategy is projected to be able to provide supply by 2040. Overall, the reliability of this supply is considered medium, based on the proven use of this groundwater source and groundwater availability models.

ENVIRONMENTAL CONSIDERATIONS

The environmental impacts from this strategy are expected to be low. However, groundwater development from this source should be evaluated for potential impacts on spring flows and base flows if surface water is in close proximity. The impact to the environment due to pipeline construction is expected to be temporary and minimal. Impacts to environmental water needs, habitat, and cultural resources are expected to be low due to the relatively low footprint of this strategy.

PERMITTING AND DEVELOPMENT

There are no anticipated permitting or development issues associated with this strategy. Currently, there is no groundwater conservation district in Orange County.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assume account for one well, 600 feet of well field piping, 0.25 miles of transmission pipeline, a pump station, storage tank, and a groundwater treatment system.

WUG	**Orange County WCID 1**	
STRATEGY	**New Well in Gulf Coast Aquifer**	
QUANTITY (AC-FT/YR)	**1,610**	
CAPITAL COST		
Booster Pump Stations		$949,000
Transmission Pipeline (14 in. dia., 0.3 miles)		$314,000
Well Fields (Wells, Pumps, and Piping)		$1,574,000
Storage Tanks (Other Than at Booster Pump Stations)		$1,297,000
Water Treatment Plant (2.9 MGD)		$2,323,000
Integration, Relocations, Backup Generator & Other		$5,000
TOTAL COST OF FACILITIES		**$6,462,000**
- Planning (3%)		$194,000
- Design (7%)		$452,000
- Construction Engineering (1%)		$65,000
Legal Assistance (2%)		$129,000
Fiscal Services (2%)		$129,000
Pipeline Contingency (15%)		$47,000
All Other Facilities Contingency (20%)		$1,230,000
Environmental & Archaeology Studies and Mitigation		$172,000
Land Acquisition and Surveying (10 acres)		$189,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)		$295,000
TOTAL COST OF PROJECT		**$9,364,000**
ANNUAL COST		
Debt Service (3.5 percent, 20 years)		$659,000
Operation and Maintenance		
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)		$32,000
Intakes and Pump Stations (2.5% of Cost of Facilities)		$24,000
Water Treatment Plant		$767,000
Pumping Energy Costs (332,294 kW-hr @ 0.09 $/kW-hr)		$30,000
TOTAL ANNUAL COST		**$1,512,000**
UNIT COSTS (Until Amortized)		
Per Acre-Foot		$939
Per 1,000 Gallons		$2.88
UNIT COSTS (After Amortization)		
Per Acre-Foot		$530
Per 1,000 Gallons		$1.63

PROJECT EVALUATION

This strategy benefits Orange County WCID 1 and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. Developing groundwater supplies in Orange County will have no other apparent impact on other state water resources. This strategy does not involve a voluntary redistribution of water from a rural and/or agricultural area, so it will have low to no third-party social and economic impact to those areas. Orange County WCID 1 is a rural WUG, and this strategy will benefit them from a social and economic perspective.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	5	No shortage identified for WUG. Supply would be surplus.
Reliability	3	Medium reliable supply
Cost	4	Low cost ($1,000/ac-ft)
Environmental Factors	3	Low to no impacts
Impact on Other State Water Resources	4	Low to no impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no impacts
Other Natural Resources	4	Low to no impacts
Interbasin Transfers		No
Third Party Social & Economic Impacts	4	Low to no impacts
Major Impacts on Key Water Quality Parameters	4	No known impacts
Political Feasibility	4	Sponsor identified, committed to strategy
Implementation Issues	4	No known risks

REFERENCES

Correspondence with Orange County WCID 1 for the 2026 East Texas Regional Water Plan.

SOUTH JASPER COUNTY WSC – NEW GROUNDWATER WELL IN GULF COAST AQUIFER

Water User Group Name:	South Jasper County WSC
Strategy Name:	New Groundwater Well in Gulf Coast Aquifer
Strategy ID:	SJWS-GW
Strategy Type:	Existing Groundwater Source
Potential Supply Quantity:	330 ac-ft per year (0.29 MGD)
Implementation Decade:	2040
Development Timeline:	< 5 years
Project Capital Cost:	$6,553,000 (September 2023)
Annual Cost:	$812,000
Unit Water Cost (Rounded):	$2,461 per ac-ft ($7.55 per 1,000 gallons)

STRATEGY DESCRIPTION

South Jasper WSC is a municipal water user group in Jasper County. This water user currently relies on groundwater from the Gulf Coast Aquifer System in Jasper County. South Jasper WSC has no identified need during the current planning cycle based on their projected demand and currently available supply. However, they are considering developing an additional groundwater well and associated infrastructure to provide supply to potential future water demands.

A strategy is recommended for South Jasper WSC that involves the development of approximately 330 acre-feet per year from the Gulf Coast Aquifer in Jasper County. The conceptual design for this strategy involves one public supply well (capacity of 400 gpm, depth of 800 ft) that produces groundwater from the Gulf Coast Aquifer, conveyance infrastructure (e.g., well collection piping, transmission pipeline, pump station, and storage tank), and a groundwater treatment system. A peaking factor of two was assumed to size infrastructure at this well field.

SUPPLY DEVELOPMENT

The estimated supply quantity from this strategy is approximately 330 ac-ft per year based on a peaking factor of 2. There is sufficient modeled available groundwater in the Gulf Coast Aquifer in Jasper County to develop the supply assumed for this water management strategy. This strategy is projected to be able to provide supply by 2040. Overall, the reliability of this supply is considered medium to high, based on the proven use of this groundwater source and groundwater availability models.

ENVIRONMENTAL CONSIDERATIONS

The environmental impacts from this strategy are expected to be low. However, groundwater development from this source should be evaluated for potential impacts on spring flows and base flows if surface water is in close proximity. The impact to the environment due to pipeline construction is expected to be temporary and minimal. Impacts to environmental water needs, habitat, and cultural resources are expected to be low due to the relatively low footprint of this strategy.

PERMITTING AND DEVELOPMENT

This strategy is located within the Southeast Texas Groundwater Conservation District (SETGCD). Any additional groundwater withdrawal by South Jasper WSC will require that an operating permit from the

SETGCD be obtained.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assume account for one well, 600 feet of well field piping, one mile of transmission pipeline, a pump station, storage tank, and a groundwater treatment system.

WUG	**South Jasper WSC**	
STRATEGY	**New Well in Gulf Coast Aquifer**	
QUANTITY (AC-FT/YR)	**330**	
CAPITAL COST		
Booster Pump Stations		$700,000
Transmission Pipeline (8 in. dia., 1 mile)		$871,000
Well Fields (Wells, Pumps, and Piping)		$1,023,000
Storage Tanks (Other Than at Booster Pump Stations)		$1,078,000
Water Treatment Plant (0.6 MGD)		$904,000
Integration, Relocations, Backup Generator & Other		$1,000
TOTAL COST OF FACILITIES		**$4,577,000**
- Planning (3%)		$137,000
- Design (7%)		$320,000
- Construction Engineering (1%)		$46,000
Legal Assistance (2%)		$92,000
Fiscal Services (2%)		$92,000
Pipeline Contingency (15%)		$131,000
All Other Facilities Contingency (20%)		$741,000
Environmental & Archaeology Studies and Mitigation		$106,000
Land Acquisition and Surveying (10 acres)		$104,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)		$207,000
TOTAL COST OF PROJECT		**$6,553,000**
ANNUAL COST		
Debt Service (3.5 percent, 20 years)		$461,000
Operation and Maintenance		
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)		$30,000
Intakes and Pump Stations (2.5% of Cost of Facilities)		$18,000
Water Treatment Plant		$298,000
Pumping Energy Costs (58,985 kW-hr @ 0.09 $/kW-hr)		$5,000
TOTAL ANNUAL COST		**$812,000**
UNIT COSTS (Until Amortized)		
Per Acre-Foot		$2,461
Per 1,000 Gallons		$7.55
UNIT COSTS (After Amortization)		
Per Acre-Foot		$1,064
Per 1,000 Gallons		$3.26

PROJECT EVALUATION

This strategy benefits South Jasper WSC and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. Developing groundwater supplies in Jasper County will have no other apparent impact on other state water resources. This strategy does not involve a voluntary redistribution of water from a rural and/or agricultural area, so it will have low to no third-party social and economic impact to those areas. South Jasper WSC is a rural WUG, and this strategy will benefit them from a social and economic perspective.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	5	No shortage identified for WUG. Supply would be surplus.
Reliability	4	Medium to high reliable supply
Cost	3	Medium cost ($1,000 - $3,000/ac-ft)
Environmental Factors	3	Low to medium impacts
Impact on Other State Water Resources	4	Low to no impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no impacts
Other Natural Resources	4	Low to no impacts
Interbasin Transfers		No
Third Party Social & Economic Impacts	4	Low to no impacts
Major Impacts on Key Water Quality Parameters	4	No known impacts
Political Feasibility	4	Sponsor identified, committed to strategy
Implementation Issues	4	No known risks

REFERENCES

Correspondence with South Jasper WSC for the 2026 East Texas Regional Water Plan.

JASPER COUNTY MANUFACTURING – PURCHASE FROM LNVA

Water User Group Name:	Manufacturing, Jasper County
Strategy Name:	Purchase from LNVA (Sam Rayburn)
Strategy ID:	JASP-MFG
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	500 - 12,000 ac-ft per year (0.45 - 10.7 MGD)
Implementation Decade:	2030
Development Timeline:	< 5 years
Project Capital Cost:	$159,597,000 (September 2023)
Annual Cost:	$17,386,000
Unit Water Cost (Rounded):	$1,076 per ac-ft ($3.30 per 1,000 gallons)

STRATEGY DESCRIPTION

Manufacturing water users in Jasper County were identified to have a need for approximately 500 ac-ft per year in 2030 and 12,000 ac-ft per year by 2080. In order to meet this need, a recommended water management project is included for individual manufacturers to enter into a contract with the Lower Neches Valley Authority (LNVA) for raw water from their Sam Rayburn system, as their permit allows. LNVA currently supplies water to manufacturing water users in Jasper County. Most of the need identified is associated with projected growth in manufacturing demand in Jasper County over the planning horizon. Thus, generalized estimates of infrastructure needed to access supplies from LNVA are included as part of this strategy. Ultimately, individual manufacturing entities will need to develop infrastructure based on their individualized needs for water supply. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water. Ultimately, this cost will need to be negotiated between individual manufacturers and LNVA and will reflect their wholesale water rates at that time.

SUPPLY DEVELOPMENT

The strategy recommended for Jasper County manufacturing is assumed to be equal to the need projected for this entity during the planning period (2030-2080). The contract with LNVA required for this strategy increases their supply by approximately 500 ac-ft per year beginning in 2030 and increases over time to approximately 12,000 ac-ft per year by 2080. These supplies are considered highly reliable; however, the supply is dependent on coordination with the Lower Neches Valley Authority.

ENVIRONMENTAL CONSIDERATIONS

There are not any significant environmental considerations associated with this strategy. The environmental impacts of developing infrastructure are site-specific and will be dependent upon the location and size of the project. Site-specific evaluations of potential impacts to the environment from construction activities will need to be conducted by individual entities. A contract between manufacturers in Jasper County and the Lower Neches Valley Authority are anticipated to have a minimal impact on environmental water needs, low impact to the surrounding habitat, and a low impact to cultural resources in the area. The potential impact to surrounding habitat and cultural resources will need to be evaluated by entities on a project-specific basis. There is no impact expected on bays or estuaries associated with this strategy since it is in Jasper County.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy. There may be some minor permitting related to construction of the infrastructure required associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. Generalized estimates of conveyance infrastructure to access and deliver supply from LNVA, including pipeline, intake pump stations, and storage, are included as part of this strategy. A regional rate for raw surface water was used for the purchase costs ($1.00 per 1,000 gallons).

WUG	**Jasper County - Manufacturing**				
STRATEGY:	**Purchase from Lower Neches Valley Authority (Sam Rayburn)**				
QUANTITY (AC-FT/YR)	**500 – 12,000**				
CAPITAL COST					
Pipelines	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	8 – 16 in.	158,400	LF		$47,187,000
Rural Right of Way (ROW) Easements and Surveying (73)			Acres	$9,038	$726,000
Engineering and Contingencies (30%)					$14,154,000
Subtotal of Pipeline(s)	**5**	**miles per pipeline**			**$62,067,000**
Pump Station(s)					
Pump with intake	87 – 341 HP	6	LS		$58,583,000
Power connection(s)		6	LS		$450,000
Engineering and Contingencies (35%)					$20,637,000
Subtotal of Pump Station(s)					**$79,670,000**
Storage Tanks	0.1 – 0.4 MG	6	LS		$4,579,000
Engineering and Contingencies (35%)					$1,603,000
Subtotal of Storage Tanks					**$6,182,000**
Integration, Relocations, Backup Generator & Other			$ per kw	$534	$176,000
Engineering and Contingencies (35%)					$62,000
Subtotal of Integration, Relocations, Backup Generator & Other					**$238,000**
Land Acquisition and Surveying (All Facilities Excluding Pipelines)					$ 420,000
Environmental - Studies and Mitigation					$ 1,279,330
CONSTRUCTION TOTAL					**$149,855,000**
Interest During Construction (3.5% for 2 years with a 0.5% ROI)					$9,742,000
TOTAL COST OF PROJECT					**$159,597,000**
ANNUAL COST					
Debt Service (3.5% for 20 years)					$11,230,000
Pumping Energy Costs					$259,000
Operation and Maintenance (O&M)					$1,986,000
Raw Water Purchase		3,911,000	1000 gal	$1.00	$3,911,000
TOTAL ANNUAL COST					**$17,386,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot (2030-2080 Average)					$1,076
Per 1,000 Gallons (2030-2080 Average)					$3.30
UNIT COSTS (After Amortization)					
Per Acre-Foot					$513
Per 1,000 Gallons					$1.57

PROJECT EVALUATION

This strategy benefits manufacturers in Jasper County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the Lower Neches Valley Authority's Sam Rayburn system will reduce future demands on other water supplies in Jasper County and is anticipated to have no other apparent impact on other State water resources. This strategy involves a voluntary redistribution of water that could be used to serve rural and/or agricultural areas. However, this supply benefits various industries in those rural areas, which could contribute to their economic growth.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 100% of supply need
Reliability	4	Medium to highly reliable supply
Cost	3	Medium cost ($1,000 - $3,000/ac-ft)
Environmental Factors	3	Low to medium impacts
Impact on Other State Water Resources	4	No known impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no impacts
Other Natural Resources	4	Low to no impacts
Interbasin Transfers		No
Third Party Social & Economic Impacts	3	Low impacts
Major Impacts on Key Water Quality Parameters	4	No known impacts
Political Feasibility	1	Local sponsorship unknown
Implementation Issues	4	No known risks

REFERENCES

Discussions with the Lower Neches Valley Authority.

JEFFERSON COUNTY MANUFACTURING – PURCHASE FROM LNVA

Water User Group Name:	Manufacturing, Jefferson County
Strategy Name:	Purchase from Lower Neches Valley Authority (Sam Rayburn)
Strategy ID:	JEFF-MFG
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	6,100 – 175,100 ac-ft per year (5.4 – 156.3 MGD)
Implementation Decade:	2030
Development Timeline:	< 5 years
Project Capital Cost:	$692,273,000 (September 2023)
ANNUAL COST:	$116,348,000
Unit Water Cost (Rounded):	$558 per ac-ft ($1.71 per 1,000 gallons)

STRATEGY DESCRIPTION

Manufacturing water users in Jefferson County were identified to have a need for approximately 6,000 ac-ft per year in 2030 and 175,000 ac-ft per year by 2080. In order to meet this need, a recommended strategy is included for individual manufacturers to enter into a contract with the Lower Neches Valley Authority (LNVA) for raw water from their Sam Rayburn system, as their permit allows. LNVA currently supplies water to manufacturing water users in Jefferson County. Most of the need identified is associated with projected growth in manufacturing demand in Jefferson County over the planning horizon. Thus, generalized estimates of infrastructure needed to access supplies from LNVA are included as part of this strategy. Ultimately, individual manufacturing entities will need to develop infrastructure based on their individualized needs for water supply. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water. Ultimately, this cost will need to be negotiated between individual manufacturers and LNVA and will reflect their wholesale water rates at that time.

SUPPLY DEVELOPMENT

The strategy recommended for Jefferson County manufacturing is assumed to be equal to the need projected for this entity during the planning period (2030-2080). The contract with LNVA required for this strategy increases their supply by approximately 6,100 ac-ft per year beginning in 2030 and increases over time to approximately 175,100 ac-ft per year by 2080. These supplies are considered highly reliable; however, the supply is dependent on coordination with the Lower Neches Valley Authority.

ENVIRONMENTAL CONSIDERATIONS

There are not any significant environmental considerations associated with this strategy. The environmental impacts of developing infrastructure are site-specific and will be dependent upon the location and size of the project. Site-specific evaluations of potential impacts to the environment from construction activities will need to be conducted by individual entities. A contract between manufacturers in Jefferson County and the Lower Neches Valley Authority should have a minimal impact on environmental water needs, low impact to the surrounding habitat, and a low impact to cultural resources in the area. Jefferson County is located along the Gulf Coast adjacent to bays and estuaries. The potential impact to surrounding habitat, cultural resources, and/or bays and estuaries will need to be evaluated by entities on a project-specific basis.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy. There may be some minor permitting related to construction of the infrastructure required associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. Generalized estimates of conveyance infrastructure to access and deliver supply from LNVA, including pipeline, intake pump stations, and storage, are included as part of this strategy. A regional rate for raw surface water was used for the purchase costs ($1.00 per 1,000 gallons).

WUG	Jefferson County - Manufacturing				
STRATEGY	**Purchase from Lower Neches Valley Authority (Sam Rayburn)**				
QUANTITY (AC-FT/YR)	**6,100 – 175,100**				
CAPITAL COST					
Pipelines	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	24 – 60 in.	158,400	LF		$181,512,000
Rural Right of Way (ROW) Easements and Surveying		133	Acres	$17,500	$2,568,000
Engineering and Contingencies (30%)					$54,454,000
Subtotal of Pipeline(s)	**5**	**miles per pipeline**			**$238,534,000**
Pump Station(s)					
Pump with intake	426 – 2,032 HP	6	LS		$280,041,000
Power connection(s)		6	LS		$2,045,000
Engineering and Contingencies (35%)					$98,731,000
Subtotal of Pump Station(s)					**$380,817,000**
Storage Tanks	0.9 – 5.8 MG	6	LS		$19,462,000
Engineering and Contingencies (35%)					$6,812,000
Subtotal of Storage Tanks					**$26,274,000**
Integration, Relocations, Backup Generator & Other			$ per kw	$534	$1,443,000
Engineering and Contingencies (35%)					$506,000
Subtotal of Integration, Relocations, Backup Generator & Other					**$1,949,000**
Land Acquisition and Surveying (All Facilities Excluding Pipelines)					$810,000
Environmental - Studies and Mitigation					$1,635,000
CONSTRUCTION TOTAL					**$650,022,000**
Interest During Construction (3.5% for 2 years with a 0.5% ROI)					$42,251,000
TOTAL COST OF PROJECT					**$692,273,000**
ANNUAL COST					
Debt Service (3.5% for 20 years)					$48,710,000
Pumping Energy Costs					$2,132,000
Operation and Maintenance (O&M)					$9,029,000
Raw Water Purchase		56,477,000	1000 gal	$1.00	$56,477,000
TOTAL ANNUAL COST					**$116,348,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot (2030-2080 Average)					$558
Per 1,000 Gallons (2030-2080 Average)					$1.71
UNIT COSTS (After Amortization)					
Per Acre-Foot					$390
Per 1,000 Gallons					$1.20

PROJECT EVALUATION

This strategy benefits manufacturers in Jefferson County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the Lower Neches Valley Authority's Sam Rayburn system will reduce future demands on other water supplies in Jefferson County and is anticipated to have no other apparent impact on other State water resources. This strategy involves a voluntary redistribution of water that could be used to serve rural and/or agricultural areas. However, this supply benefits various industries in those rural areas, which could contribute to their economic growth.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 100% of supply need
Reliability	4	Medium to highly reliable supply
Cost	4	Low cost (< $1,000/ac-ft)
Environmental Factors	3	Low to medium impacts
Impact on Other State Water Resources	4	No known impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no impacts
Other Natural Resources	4	Low to no impacts
Interbasin Transfers		No
Third Party Social & Economic Impacts	3	Low impacts
Major Impacts on Key Water Quality Parameters	4	No known impacts
Political Feasibility	1	Local sponsorship unknown
Implementation Issues	4	No known risks

REFERENCES

Discussions with the Lower Neches Valley Authority.

HENDERSON COUNTY MINING – NEW GROUNDWATER WELLS IN QUEEN CITY AQUIFER

Water User Group Name:	Mining, Henderson County
Strategy Name:	New Groundwater Wells in Queen City Aquifer
Strategy ID:	HDSN-MIN
Strategy Type:	Existing Groundwater Source
Potential Supply Quantity:	170 ac-ft per year (0.15 MGD)
Implementation Decade:	2030
Development Timeline:	< 5 years
Project Capital Cost:	$471,000 (September 2023)
Annual Cost:	$40,000
Unit Water Cost (Rounded):	$235 per ac-ft ($0.72 per 1,000 gallons)

STRATEGY DESCRIPTION

Mining water users in Henderson County were identified to have a need of approximately 15 acre-feet per year beginning in 2030 and 150 acre-feet per year by 2080. To meet these projected needs, a strategy is recommended for mining water users in Henderson County that involves the development of a new well field. The well field is assumed to produce groundwater from the Queen City Aquifer.

Generalized estimates of infrastructure are included as part of this strategy. Ultimately, individual entities will need to develop infrastructure based on their individualized needs for water supply. The conceptual design for this strategy involves construction of a new well field comprised of two wells (100 gpm capacity, 200 feet depth each). A peaking factor of two was assumed to size infrastructure at this well field.

SUPPLY DEVELOPMENT

The estimated supply quantity from this strategy is approximately 170 acre-feet per year based on the maximum identified need for mining water users in Henderson County across the planning horizon (2030-2080). There is sufficient modeled available groundwater in the Queen City Aquifer in Henderson County to develop the supply assumed for this water management strategy. This strategy is projected to be able to provide supply by 2030. Overall, the reliability of this supply is considered medium to high, based on the historical use of this groundwater source and groundwater availability models.

ENVIRONMENTAL CONSIDERATIONS

There are not any significant environmental considerations associated with this strategy and environmental impacts are expected to be low. However, the environmental impacts of developing infrastructure are site-specific and will be dependent upon the location and size of the project. Site-specific evaluations of potential impacts to the environment from construction activities will need to be conducted by individual entities. This strategy is anticipated to have a minimal impact on environmental water needs, low impact to the surrounding habitat, and a low impact to cultural resources in the area due to the relatively small footprint of this strategy. The potential impact to surrounding habitat and cultural resources will need to be evaluated by entities on a project-specific basis.

PERMITTING AND DEVELOPMENT

This strategy is located within the Neches & Trinity Valleys Groundwater Conservation District (NTVGCD).

Any new groundwater withdrawal by either of these proposed facilities will require that an operating permit from the NTVGCD be obtained.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assume a new well field comprised of two wells and 700 feet of piping to produce groundwater for local mining water users in Henderson County.

WUG	Mining, Henderson County
STRATEGY	New Wells in Queen City Aquifer
QUANTITY (AC-FT/YR)	150

CAPITAL COST	
Well Fields (Wells, Pumps, and Piping)	$317,000
TOTAL COST OF FACILITIES	**$317,000**
- Planning (3%)	$10,000
- Design (7%)	$22,000
- Construction Engineering (1%)	$3,000
Legal Assistance (2%)	$6,000
Fiscal Services (2%)	$6,000
Pipeline Contingency (15%)	$0
All Other Facilities Contingency (20%)	$63,000
Environmental & Archaeology Studies and Mitigation	$16,000
Land Acquisition and Surveying (11 acres)	$13,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$15,000
TOTAL COST OF PROJECT	**$471,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$33,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$3,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Pumping Energy Costs (45,440 kW-hr @ 0.09 $/kW-hr)	$4,000
TOTAL ANNUAL COST	**$40,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot	$267
Per 1,000 Gallons	$0.82
UNIT COSTS (After Amortization)	
Per Acre-Foot	$47
Per 1,000 Gallons	$0.14

PROJECT EVALUATION

This strategy benefits mining water users in Henderson County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. Developing groundwater supplies in Henderson County will have no other apparent impact on other state water resources. This strategy does not involve a voluntary redistribution of water from a rural and/or agricultural area, so it will have low to no third-party social and economic impact to those areas.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 100% of supply need
Reliability	4	Medium to high reliable supply
Cost	4	Low cost (< $1,000/ac-ft)
Environmental Factors	3	Low to medium impacts
Impact on Other State Water Resources	4	Low to no impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no impacts
Other Natural Resources	4	Low to no impacts
Interbasin Transfers		No
Third Party Social & Economic Factors	4	Low to no impacts
Major Impacts on Key Water Quality Parameters	4	No known impacts
Political Feasibility	1	Local sponsorship unknown
Implementation Issues	4	No known risks

REFERENCES

2026 East Texas Regional Water Plan

HOUSTON COUNTY LIVESTOCK – NEW GROUNDWATER WELL IN CARRIZO-WILCOX AQUIFER

Water User Group Name:	Houston County Livestock
Strategy Name:	New wells in Carrizo-Wilcox Aquifer
Strategy ID:	HOUS-LTK
Strategy Type:	Existing Groundwater Source
Potential Supply Quantity:	290 ac-ft per year (0.26 MGD)
Implementation Decade:	2060
Development Timeline:	<5 years
Project Capital Cost:	$969,000 (September 2023)
Annual Cost:	$87,000
Unit Water Cost:	$300 per ac-ft
(Rounded):	($0.92 per 1,000 gallons)

STATEGY DESCRIPTION

The Livestock Water User Group is located in Houston County. This water user currently relies on groundwater from the Carrizo-Wilcox Aquifer in Houston County. Livestock has no identified need during the current planning cycle based on their projected demand and currently available supply. However, Livestock is considering developing an additional 5 groundwater wells and associated infrastructure to provide supply to potential future water demands.

A strategy is recommended for Houston County Livestock that involves the development of approximately 290 ac-ft per year from the Carrizo-Wilcox Aquifer in Houston County. The conceptual design for this strategy involves five public supply wells (capacity of 50 gpm, depth of 300 ft per well) that produce groundwater from the Carrizo-Wilcox Aquifer and conveyance infrastructure. A peaking factor of two was assumed to size infrastructure at this well field.

SUPPLY DEVELOPMENT

The estimated supply quantity from this strategy is approximately 290 ac-ft per year based on a peaking factor of 2. There is sufficient modeled available groundwater in the Carrizo-Wilcox Aquifer in Houston County to develop the supply assumed for this water management strategy. This strategy is projected to be able to provide supply by 2060. Overall, the reliability of this supply is considered medium to high, based on the proven use of this groundwater source and groundwater availability models.

ENVIRONMENTAL CONSIDERATIONS

The environmental impacts from this strategy are expected to be low. However, groundwater development from this source should be evaluated for potential impacts on spring flows and base flows if surface water is in close proximity. The impact to the environment due to pipeline construction is expected to be temporary and minimal. Impacts to environmental water needs, habitat, and cultural resources are expected to be low.

PERMITTING AND DEVELOPMENT

There are no anticipated permitting or development issues associated with this strategy. Currently, there is no groundwater conservation district in Houston County.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs account for five wells, pumps, and piping.

WUG	**Houston County Livestock**	
STRATEGY	**New Wells in Carrizo-Wilcox Aquifer (Alternative)**	
QUANTITY (AC-FT/YR)	**290**	
CAPITAL COST		
Well Fields (Wells, Pumps, and Piping)		$637,000
TOTAL COST OF FACILITIES		**$637,000**
- Planning (3%)		$19,000
- Design (7%)		$45,000
- Construction Engineering (1%)		$6,000
Legal Assistance (2%)		$13,000
Fiscal Services (2%)		$13,000
All Other Facilities Contingency (20%)		$127,000
Environmental & Archaeology Studies and Mitigation		$43,000
Land Acquisition and Surveying (3 acres)		$35,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)		$31,000
TOTAL COST OF PROJECT		**$969,000**
ANNUAL COST		
Debt Service (3.5 percent, 20 years)		$68,000
Operation and Maintenance		
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)		$6,000
Pumping Energy Costs (287,550 kW-hr @ 0.09 $/kW-hr)		$13,000
TOTAL ANNUAL COST		**$87,000**
UNIT COSTS (Until Amortized)		
Per Acre-Foot		$300
Per 1,000 Gallons		$0.92
UNIT COSTS (After Amortization)		
Per Acre-Foot		$66
Per 1,000 Gallons		$0.20

PROJECT EVALUATION

This strategy benefits livestock users in Houston County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. New wells in the county will reduce demands on other water supplies in Houston County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this voluntary redistribution of water will be beneficial from a social and economic perspective.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	4	290 ac-ft per year Highly Reliable Supply
Reliability	4	Medium to High Reliable Supply
Cost	4	Low Cost
Environmental Factors	3	Low to Medium Impacts
Impact on Other State Water Resources	4	Low to no negative impacts and/or some positive impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no negative impacts and/or some positive impacts
Other Natural Resources	4	Low to no negative impacts and/or some positive impacts
Interbasin Transfers		No
Third Party Social & Economic Factors	4	Low to no negative impacts and/or some positive impacts
Major Impacts on Key Water Quality Parameters	4	Low to no negative impacts and/or some positive impacts
Political Feasibility	1	No sponsor readily identifiable.
Implementation Issues	4	Low implementation issues

REFERENCES

2026 East Texas Regional Water Plan.

HOUSTON TDCJ EASTHAM – NEW GROUNDWATER WELL IN CARRIZO-WILCOX AQUIFER

Water User Group Name:	Houston County TDCJ Eastham
Strategy Name:	New Groundwater Well in Carrizo-Wilcox Aquifer
Strategy ID:	HOUS-TDCJ
Strategy Type:	Existing Groundwater Source
Potential Supply Quantity:	120 ac-ft per year (0.11 MGD)
Implementation Decade:	2030
Development Timeline:	< 5 years
Project Capital Cost:	$5,018,000 (September 2023)
ANNUAL COST:	$538,000
Unit Water Cost (Rounded):	$4,858 per ac-ft ($14.91 per 1,000 gallons)

Strategy Description

TDCJ Eastham is a municipal water user in Houston County. This water user currently relies on groundwater in the Carrizo-Wilcox Aquifer in Houston County. TDCJ Eastham has a small need of approximately 113 ac-ft per year. To meet this need, it is recommended that TDCJ Eastham continue to use supplies from Carrizo Wilcox by drilling additional wells. However, TDCJ Eastham is considering developing an additional groundwater well and associated infrastructure to provide supply to potential future water demands.

A strategy is recommended for TDCJ Eastham that involves the development of approximately 200 acre-feet per year from the Carrizo-Wilcox Aquifer in Houston County. The conceptual design for this strategy involves one public supply well (capacity of 200 gpm, depth of 200 ft) that produces groundwater from the Carrizo-Wilcox Aquifer, conveyance infrastructure (e.g., well collection piping, transmission pipeline, pump station, and storage tank), and a groundwater treatment system. A peaking factor of two was assumed to size infrastructure at this well field.

Supply Development

The supply is required only in the later part of the planning cycle, for decades 2050 to 2070. The estimated supply quantity from this strategy is approximately 200 ac-ft per year based on a peaking factor of 2. There is sufficient modeled available groundwater in the Carrizo-Wilcox Aquifer in Houston County to develop the supply assumed for this water management strategy. This strategy is projected to be able to provide supply by 2030. Overall, the reliability of this supply is considered high, based on the proven use of this groundwater source and groundwater availability models.

Environmental Considerations

The environmental impacts from this strategy are expected to be low. However, groundwater development from this source should be evaluated for potential impacts on spring flows and base flows if surface water is in close proximity. The impact to the environment due to pipeline construction is expected to be temporary and minimal. Impacts to environmental water needs, habitat, and cultural resources are expected to be low due to the relatively low footprint of this strategy.

Permitting and Development

There are no anticipated permitting or development issues associated with this strategy.

Planning Level Opinion of Cost

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs account for one well, 600 feet of well field piping, one mile of transmission pipeline, a pump station, storage tank, and a groundwater treatment system.

WUG	**TDCJ Eastham Unit, Houston County**
STRATEGY	**New Wells in Carrizo-Wilcox Aquifer**
QUANTITY (AC-FT/YR)	**120**

CAPITAL COST	
Intake Pump Stations	$660,000
Transmission Pipeline (6 in. dia., 0.1 miles)	$747,000
Well Fields (Wells, Pumps, and Piping)	$444,000
Storage Tanks (Other Than at Booster Pump Stations)	$1,051,000
Water Treatment Plant (0.3 MGD)	$568,000
TOTAL COST OF FACILITIES	**$3,471,000**
- Planning (3%)	$104,000
- Design (7%)	$243,000
- Construction Engineering (1%)	$35,000
Legal Assistance (2%)	$69,000
Fiscal Services (2%)	$69,000
Pipeline Contingency (15%)	$112,000
All Other Facilities Contingency (20%)	$545,000
Environmental & Archaeology Studies and Mitigation	$107,000
Land Acquisition and Surveying (10 acres)	$105,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$158,000
TOTAL COST OF PROJECT	**$5,018,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$353,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$22,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$17,000
Water Treatment Plant	$187,000
Pumping Energy Costs (49453 kW-hr @ 0.09 $/kW-hr)	$4,000
TOTAL ANNUAL COST	**$583,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot	$4,858
Per 1,000 Gallons	$14.91
UNIT COSTS (After Amortization)	
Per Acre-Foot	$1,917
Per 1,000 Gallons	$5.88

PROJECT EVALUATION

This strategy benefits municipal user TDCJ Eastham in Houston County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. Developing groundwater supplies in Houston County will have no other apparent impact on other state water resources. This strategy does not involve a voluntary redistribution of water from a rural and/or agricultural area, so it will have low to no third-party social and economic impact to those areas. China is a rural WUG, and this strategy will benefit them from a social and economic perspective.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	4	120 ac-ft/yr Highly Reliable Supply
Reliability	4	Medium to High Reliable Supply
Cost	2	Medium to High Cost
Environmental Factors	3	Low to Medium Impacts
Impact on Other State Water Resources	4	Low to no negative impacts and/or some positive impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no negative impacts and/or some positive impacts
Other Natural Resources	4	Low to no negative impacts and/or some positive impacts
Interbasin Transfers		No
Third Party Social & Economic Factors	4	Low to no negative impacts and/or some positive impacts
Major Impacts on Key Water Quality Parameters	4	Low to no negative impacts and/or some positive impacts
Political Feasibility	3	Sponsor Identified
Implementation Issues	4	Low implementation issues

REFERENCES

2026 East Texas Regional Water Plan.

SHELBY COUNTY MANUFACTURING – PURCHASE FROM CENTER

Water User Group Name:	Manufacturing, Angelina County
Strategy Name:	Purchase from Center
Strategy ID:	SHEL-MFG
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	850 - 1,330 ac-ft per year (0.8 - 1.2 MGD)
Implementation Decade:	2030
Development Timeline:	< 5 years
Project Capital Cost:	$90,393,000 (September 2023)
Annual Cost:	$79,104,000
Unit Water Cost (Rounded):	$2,440 per ac-ft ($7.49 per 1,000 gallons)

STRATEGY DESCRIPTION

Manufacturing water users in Shelby County were identified to have a need for approximately 850 ac-ft per year in 2030 and 1,330 ac-ft per year by 2080. In order to meet this need, a recommended water management project is included for individual manufacturers to enter into a contract with the City of Center for raw water from their system, as their permit allows. Most of the need identified is associated with projected growth in manufacturing demand in Shelby County over the planning horizon. Thus, generalized estimates of infrastructure needed to access supplies from Center are included as part of this strategy. Ultimately, individual manufacturing entities will need to develop infrastructure based on their individualized needs for water supply. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water. Ultimately, this cost will need to be negotiated between individual manufacturers and Lufkin and will reflect their wholesale water rates at that time.

SUPPLY DEVELOPMENT

The strategy recommended for Shelby County manufacturing is assumed to be equal to the need projected for this entity during the planning period (2030-2080). The contract with Center required for this strategy increases their supply by approximately 850 ac-ft per year beginning in 2030 and increases over time to approximately 1,330 ac-ft per year by 2080. These supplies are considered highly reliable; however, the supply is dependent on coordination with the City of Center.

ENVIRONMENTAL CONSIDERATIONS

There are not any significant environmental considerations associated with this strategy. The environmental impacts of developing infrastructure are site-specific and will be dependent upon the location and size of the project. Site-specific evaluations of potential impacts to the environment from construction activities will need to be conducted by individual entities. A contract between manufacturers in Shelby County and the City of Center are anticipated to have a minimal impact on environmental water needs, low impact to the surrounding habitat, and a low impact to cultural resources in the area. The potential impact to surrounding habitat and cultural resources will need to be evaluated by entities on a project-specific basis. There is no impact expected on bays or estuaries associated with this strategy since it is in Shelby County.

PERMITTING AND DEVELOPMENT

There are no anticipated permitting or development issues associated with this strategy. There may be some minor permitting related to construction of the infrastructure required associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. Generalized estimates of conveyance infrastructure to access and deliver supply from Center, including pipeline, intake pump stations, and storage, are included as part of this strategy. A regional rate for raw surface water was used for the purchase costs ($1.00 per 1,000 gallons).

WUG	**Shelby County - Manufacturing**				
STRATEGY:	**Purchase from Center**				
QUANTITY (AC-FT/YR)	**850 – 1,330**				
CAPITAL COST					
Pipelines	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	6 – 10 in.	158,400	LF		$25,139,000
Rural Right of Way (ROW) Easements and Surveying (73)			Acres	$9,038	$738,000
Engineering and Contingencies (30%)					$7,542,000
Subtotal of Pipeline(s)	**5**	**miles per pipeline**			**$33,419,000**
Pump Station(s)					
Pump with intake	8 – 136 HP	6	LS		$24,852,000
Power connection(s)		6	LS		$450,000
Engineering and Contingencies (35%)					$8,855,000
Subtotal of Pump Station(s)					**$34,157,000**
Storage Tanks	0.05 – 0.14 MG	6	LS		$3,675,000
Engineering and Contingencies (35%)					$1,284,000
Subtotal of Storage Tanks					**$4,959,000**
Integration, Relocations, Backup Generator & Other			$ per kw	$534	$21,000
Engineering and Contingencies (35%)					$6,000
Subtotal of Integration, Relocations, Backup Generator & Other					**$27,000**
Land Acquisition and Surveying (All Facilities Excluding Pipelines)					$426,000
Environmental - Studies and Mitigation					$1,288,500
CONSTRUCTION TOTAL					**$74,276,000**
Interest During Construction (3.5% for 2 years with a 0.5% ROI)				24Months	$4,828,000
TOTAL COST OF PROJECT					**$79,104,000**
ANNUAL COST					
Debt Service (3.5% for 20 years)					$5,565,000
Pumping Energy Costs					$31,000
Operation and Maintenance (O&M)					$910,000
Raw Water Purchase		432,000	1000 gal	$1.00	$432,000
TOTAL ANNUAL COST					**$6,938,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot (2030-2080 Average)					$2,440
Per 1,000 Gallons (2030-2080 Average)					$7.49
UNIT COSTS (After Amortization)					
Per Acre-Foot					$1,032
Per 1,000 Gallons					$3.17

PROJECT EVALUATION

This strategy benefits manufacturers in Shelby County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the City of Center system will reduce future demands on other water supplies in Shelby County and is anticipated to have no other apparent impact on other State water resources. This strategy involves a voluntary redistribution of water that could be used to serve rural and/or agricultural areas. However, this supply benefits various industries in those rural areas, which could contribute to their economic growth.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage
Reliability	4	Medium to High reliable supply
Cost	3	Medium cost ($1,000 - $3,000/ac-ft)
Environmental Factors	3	Low to medium impacts
Impact on Other State Water Resources	4	Low to no negative impacts and/or some positive impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no negative impacts and/or some positive impacts
Other Natural Resources	4	Low to no negative impacts and/or some positive impacts
Interbasin Transfers		No
Third Party Social & Economic Impacts	3	Low negative impacts
Major Impacts on Key Water Quality Parameters	4	Low to no negative impacts and/or some positive impacts
Political Feasibility	3	Sponsor(s) identified, commitment level uncertain.
Implementation Issues	4	Low implementation issues

REFERENCES

Discussions with the City of Center.

SMITH COUNTY MANUFACTURING – PURCHASE FROM TYLER

Water User Group Name:	Manufacturing, Smith County
Strategy Name:	Purchase from Tyler
Strategy ID:	SMIT-MFG
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	40 – 560 ac-ft per year (0.04 – 0.5 MGD)
Implementation Decade:	2050
Development Timeline:	< 5 years
Project Capital Cost:	$50,202,000 (September 2023)
Annual Cost:	$79,104,000
Unit Water Cost (Rounded):	$5,461 per ac-ft ($16.76 per 1,000 gallons)

STRATEGY DESCRIPTION

Manufacturing water users in Smith County were identified to have a need for approximately 40 ac-ft per year in 2050 and 560 ac-ft per year by 2080. In order to meet this need, a recommended water management project is included for individual manufacturers to enter into a contract with the City of Tyler for raw water from their system, as their permit allows. Most of the need identified is associated with projected growth in manufacturing demand in Smith County over the planning horizon. Thus, generalized estimates of infrastructure needed to access supplies from Tyler are included as part of this strategy. Ultimately, individual manufacturing entities will need to develop infrastructure based on their individualized needs for water supply. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water. Ultimately, this cost will need to be negotiated between individual manufacturers and Lufkin and will reflect their wholesale water rates at that time.

SUPPLY DEVELOPMENT

The strategy recommended for Smith County manufacturing is assumed to be equal to the need projected for this entity during the planning period (2030-2080). The contract with Tyler required for this strategy increases their supply by approximately 40 ac-ft per year beginning in 2050 and increases over time to approximately 560 ac-ft per year by 2080. These supplies are considered highly reliable; however, the supply is dependent on coordination with the City of Tyler.

ENVIRONMENTAL CONSIDERATIONS

There are not any significant environmental considerations associated with this strategy. The environmental impacts of developing infrastructure are site-specific and will be dependent upon the location and size of the project. Site-specific evaluations of potential impacts to the environment from construction activities will need to be conducted by individual entities. A contract between manufacturers in Smith County and the City of Tyler are anticipated to have a minimal impact on environmental water needs, low impact to the surrounding habitat, and a low impact to cultural resources in the area. The potential impact to surrounding habitat and cultural resources will need to be evaluated by entities on a project-specific basis. There is no impact expected on bays or estuaries associated with this strategy since it is in Smith County.

PERMITTING AND DEVELOPMENT

There are no anticipated permitting or development issues associated with this strategy. There may be some minor permitting related to construction of the infrastructure required associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. Generalized estimates of conveyance infrastructure to access and deliver supply from Tyler, including pipeline, intake pump stations, and storage, are included as part of this strategy. A regional rate for raw surface water was used for the purchase costs ($1.00 per 1,000 gallons).

WUG	**Smith County - Manufacturing**				
STRATEGY:	**Purchase from Tyler**				
QUANTITY (AC-FT/YR)	**40 – 560**				
CAPITAL COST					
Pipelines	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	6 – 8 in.	105,600	LF		$16,446,000
Rural Right of Way (ROW) Easements and Surveying		48	Acres	$9,250	$492,000
Engineering and Contingencies (30%)					$4,934,000
Subtotal of Pipeline(s)	**5**	**miles per pipeline**			**$21,872,000**
Pump Station(s)					
Pump with intake	5 – 47 HP	4	LS		$15,139,000
Power connection(s)		4	LS		$300,000
Engineering and Contingencies (35%)					$5,404,000
Subtotal of Pump Station(s)					**$20,843,000**
Storage Tanks	0.05 – 0.06 MG	4	LS		$2,423,000
Engineering and Contingencies (35%)					$847,000
Subtotal of Storage Tanks					**$3,270,000**
Integration, Relocations, Backup Generator & Other			$ per kw	$534	$8,000
Engineering and Contingencies (35%)					$2,000
Subtotal of Integration, Relocations, Backup Generator & Other					**$10,000**
Land Acquisition and Surveying (All Facilities Excluding Pipelines)					$284,000
Environmental - Studies and Mitigation					$859,000
CONSTRUCTION TOTAL					**$47,138,000**
Interest During Construction (3.5% for 2 years with a 0.5% ROI)				24Months	$3,064,000
TOTAL COST OF PROJECT					**$50,202,000**
ANNUAL COST					
Debt Service (3.5% for 20 years)					$3,532,000
Pumping Energy Costs					$12,000
Operation and Maintenance (O&M)					$568,000
Raw Water Purchase		432,000	1000 gal	$1.00	$183,000
TOTAL ANNUAL COST					**$4,295,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot (2030-2080 Average)					$5,461
Per 1,000 Gallons (2030-2080 Average)					$16.76
UNIT COSTS (After Amortization)					
Per Acre-Foot					$1,363
Per 1,000 Gallons					$4.18

PROJECT EVALUATION

This strategy benefits manufacturers in Smith County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the City of Tyler system will reduce future demands on other water supplies in Smith County and is anticipated to have no other apparent impact on other State water resources. This strategy involves a voluntary redistribution of water that could be used to serve rural and/or agricultural areas. However, this supply benefits various industries in those rural areas, which could contribute to their economic growth.

The strategy described was evaluated across twelve different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage
Reliability	4	Medium to High reliable supply
Cost	1	>$5,000/ac-ft (High)
Environmental Factors	3	Low to medium impacts
Impact on Other State Water Resources	4	Low to no negative impacts and/or some positive impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no negative impacts and/or some positive impacts
Other Natural Resources	4	Low to no negative impacts and/or some positive impacts
Interbasin Transfers		No
Third Party Social & Economic Impacts	3	Low negative impacts
Major Impacts on Key Water Quality Parameters	4	Low to no negative impacts and/or some positive impacts
Political Feasibility	3	Sponsor(s) identified, commitment level uncertain.
Implementation Issues	4	Low implementation issues

REFERENCES

Discussions with the City of Tyler.

SMITH COUNTY MINING – PURCHASE FROM TYLER

Water User Group Name:	Mining, Smith County
Strategy Name:	Purchase from Tyler
Strategy ID:	SMIT-MIN
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	430 ac-ft per year (0.58 MGD)
Implementation Decade:	2030
Development Timeline:	< 5 years
Project Capital Cost:	$17,996,000 (September 2023)
Annual Cost:	$1,890,000
Unit Water Cost (Rounded):	$4,395 per ac-ft ($13.49 per 1,000 gallons)

STRATEGY DESCRIPTION

Mining water users in Smith County were identified to have a need of approximately 320 acre-feet per year beginning in 2030 and 430 acre-feet per year by 2080. To meet these projected needs, a strategy is recommended for mining water users in Henderson County that involves the mining water users to enter into a contract with the City of Tyler for raw water from their system, as their permit allows. Most of the need identified is associated with projected growth in mining demand in Smith County over the planning horizon. Thus, generalized estimates of infrastructure needed to access supplies from Tyler are included as part of this strategy. Ultimately, individual mining entities will need to develop infrastructure based on their individualized needs for water supply. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water. Ultimately, this cost will need to be negotiated between individual manufacturers and Lufkin and will reflect their wholesale water rates at that time.

SUPPLY DEVELOPMENT

The strategy recommended for Smith County manufacturing is assumed to be equal to the need projected for this entity during the planning period (2030-2080). The contract with Tyler required for this strategy increases their supply by approximately 320 ac-ft per year beginning in 2030 and increases over time to approximately 430 ac-ft per year by 2080. These supplies are considered highly reliable; however, the supply is dependent on coordination with the City of Tyler.

ENVIRONMENTAL CONSIDERATIONS

There are not any significant environmental considerations associated with this strategy. The environmental impacts of developing infrastructure are site-specific and will be dependent upon the location and size of the project. Site-specific evaluations of potential impacts to the environment from construction activities will need to be conducted by individual entities. A contract between miners in Smith County and the City of Tyler are anticipated to have a minimal impact on environmental water needs, low impact to the surrounding habitat, and a low impact to cultural resources in the area. The potential impact to surrounding habitat and cultural resources will need to be evaluated by entities on a project-specific basis.

PERMITTING AND DEVELOPMENT

There are no anticipated permitting or development issues associated with this strategy. There may be some minor permitting related to construction of the infrastructure required associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. Generalized estimates of conveyance infrastructure to access and deliver supply from Tyler, including pipeline, intake pump stations, and storage, are included as part of this strategy. A regional rate for raw surface water was used for the purchase costs ($3.00 per 1,000 gallons).

WUG	**Smith County - Mining**				
STRATEGY:	**Purchase from Tyler**				
QUANTITY (AC-FT/YR)	**430**				
CAPITAL COST					
Pipelines	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	8 in.	52,800	LF	$165	$8,707,000
Rural Right of Way (ROW) Easements		24	Acres	$9,250	$247,000
Engineering and Contingencies (30%)					$2,612,000
Subtotal of Pipeline(s)	**10**	**miles per pipeline**			**$11,566,000**
Pump Station(s)					
Pump with intake	5 HP	1	LS	$3,511,000	$3,511,000
Power connection(s)		5	LS	$200	$75,000
Engineering and Contingencies (35%)					$1,255,000
Subtotal of Pump Station(s)					**$4,841,000**
Storage Tanks	0.1 MG	1	LS	$632,000	$632,000
Engineering and Contingencies (35%)					$221,000
Subtotal of Storage Tanks					**$853,000**
Integration, Relocations, Backup Generator & Other			$ per kw	$534	$9,000
Engineering and Contingencies (35%)					$3,000
Subtotal of Integration, Relocations, Backup Generator & Other					**$12,000**
Land Acquisition and Surveying (All Facilities Excluding Pipelines)					$71,225
Environmental - Studies and Mitigation					$364,750
CONSTRUCTION TOTAL					**$17,707,975**
Interest During Construction (3.5% for 2 years with a 0.5% ROI)				6 Months	$288,000
TOTAL COST OF PROJECT					**$17,996,000**
ANNUAL COST					
Debt Service (3.5% for 20 years)					$1,266,000
Pumping Energy Costs					$13,000
Operation and Maintenance (O&M)					$191,090
Raw Water Purchase			1000 gal	$3.00	$420,000
TOTAL ANNUAL COST					**$1,890,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot (2030-2080 Average)					$4,395
Per 1,000 Gallons (2030-2080 Average)					$13.49
UNIT COSTS (After Amortization)					
Per Acre-Foot					$1,451
Per 1,000 Gallons					$4.45

PROJECT EVALUATION

This strategy benefits mining water users in Smith County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the City of Tyler system will reduce future demands on other water supplies in Smith County and is anticipated to have no other apparent impact on other State water resources. This strategy involves a voluntary redistribution of water that could be used to serve rural and/or agricultural areas. However, this supply benefits various industries in those rural areas, which could contribute to their economic growth.

The strategy described was evaluated across twelve different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage
Reliability	4	Medium to High reliable supply
Cost	2	$3,000 to $5,000/ac-ft (Medium-High)
Environmental Factors	3	Low to medium impacts
Impact on Other State Water Resources	4	Low to no negative impacts and/or some positive impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no negative impacts and/or some positive impacts
Other Natural Resources	4	Low to no negative impacts and/or some positive impacts
Interbasin Transfers		No
Third Party Social & Economic Impacts	3	Low negative impacts
Major Impacts on Key Water Quality Parameters	4	Low to no negative impacts and/or some positive impacts
Political Feasibility	3	Sponsor(s) identified, commitment level uncertain.
Implementation Issues	4	Low implementation issues

REFERENCES

Discussions with the City of Tyler.

SMITH COUNTY-OTHER – PURCHASE FROM TYLER

Water User Group Name:	Smith County-Other
Strategy Name:	Purchase from Center
Strategy ID:	SMIT-SMC
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	280 ac-ft per year (0.37 MGD)
Implementation Decade:	2030
Development Timeline:	< 5 years
Project Capital Cost:	$90,393,000 (September 2023)
Annual Cost:	$79,104,000
Unit Water Cost (Rounded):	$2,440 per ac-ft ($7.49 per 1,000 gallons)

STRATEGY DESCRIPTION

This strategy is a recommended strategy for Smith County-Other and involves a contract to take raw surface water from the City of Tyler as their permit allows. The cost for supply from Tyler includes the cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the City of Tyler and will reflect the wholesale water rates of this entity at the time a contract is made. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the water requested by Smith County-Other as part of their long-term planning. This is equal to 280 ac-ft/yr beginning in 2030 and continuing through 2050 with 40 ac-ft/yr. The reliability of this water supply is considered medium to high due to the availability of water from the system. However, this project is dependent on coordination with the City of Tyler.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be moderate. In addition, a contract between Smith County-Other and the City of Tyler should have a minimum impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. There are no bays or estuaries in close proximity to the project area located in Jefferson and Orange Counties. Before this project could be pursued, the Lower Neches Valley Authority would need to perform a site selection study to identify environmental impacts associated with the project.

PERMITTING AND DEVELOPMENT

There are no anticipated permitting or development issues associated with this strategy. There may be some minor permitting related to construction of the infrastructure required associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. Generalized estimates of conveyance infrastructure to access and deliver supply from Tyler, including pipeline, intake pump stations, and storage, are included as part of this strategy. A regional rate for raw surface water was used for the purchase costs ($3.00 per 1,000 gallons).

WUG	**Smith County-Other**				
STRATEGY:	**Purchase from City of Tyler**				
QUANTITY (AC-FT/YR)	**280**				
CAPITAL COST					
Pipelines	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	6 in.	52,800	LF	$141	$7,471,000
Rural Right of Way (ROW)		24	Acres	$9,038	$247,000
Engineering and Contingencies (30%)					$2,241,000
Subtotal of Pipeline(s)	**10**	**miles**			**$9,959,000**
Pump Station(s)					
Pump with intake	8 – 136 HP	6	LS	$3,511,000	$3,511,000
Power connection(s)		6	LS	$200	$75,000
Engineering and Contingencies (35%)					$8,855,000
Subtotal of Pump Station(s)					**$4,841,000**
Storage Tanks	0.1 MG	1	LS	$632,000	$632,000
Engineering and Contingencies (35%)					$221,000
Subtotal of Storage Tanks					**$853,000**
Integration, Relocations, Backup Generator & Other			$ per kw	$534	$8,000
Engineering and Contingencies (35%)					$3,000
Subtotal of Integration, Relocations, Backup Generator & Other					**$11,000**
Land Acquisition and Surveying (All Facilities Excluding Pipelines)					$71,225
Environmental - Studies and Mitigation					$364,750
CONSTRUCTION TOTAL					**$16,099,975**
Interest During Construction (3.5% for 2 years with a 0.5% ROI)				6 Months	$262,000
TOTAL COST OF PROJECT					**$16,362,000**
ANNUAL COST					
Debt Service (3.5% for 20 years)					$1,151,000
Pumping Energy Costs					$11,000
Operation and Maintenance (O&M)					$179,080
Raw Water Purchase		432,000	1000 gal	$3.00	$274,000
TOTAL ANNUAL COST					**$1,615,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot (2030-2080 Average)					$2,440
Per 1,000 Gallons (2030-2080 Average)					$17.70
UNIT COSTS (After Amortization)					
Per Acre-Foot					$1,657
Per 1,000 Gallons					$5.09

PROJECT EVALUATION

This strategy benefits Smith County-Other and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the City of Tyler system will reduce future demands on other water supplies in Smith County-Other and is anticipated to have no other apparent impact on other State water resources. From a third party social and economic perspective, this voluntary redistribution of water will be beneficial because it provides water for economic growth.

The strategy described was evaluated across twelve different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage
Reliability	4	Medium to High reliable supply
Cost	1	>$5,000/ac-ft (High)
Environmental Factors	3	Low to medium impacts
Impact on Other State Water Resources	4	Low to no negative impacts and/or some positive impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no negative impacts and/or some positive impacts
Other Natural Resources	4	Low to no negative impacts and/or some positive impacts
Interbasin Transfers		No
Third Party Social & Economic Impacts	4	Low to no negative impacts and/or some positive impacts
Major Impacts on Key Water Quality Parameters	4	Low to no negative impacts and/or some positive impacts
Political Feasibility	3	Sponsor(s) identified, commitment level uncertain.
Implementation Issues	4	Low implementation issues

REFERENCES

Discussions with the City of Tyler.

SOUTHERN UTILITLES – PURCHASE FROM TYLER

Water User Group Name:	Southern Utilities, Cherokee & Smith County
Strategy Name:	Purchase from Tyler
Strategy ID:	CHRK_SO_UT
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	410 ac-ft per year (0.5 MGD)
Implementation Decade:	2070
Development Timeline:	< 5 years
Project Capital Cost:	$0 (September 2023)
Annual Cost:	$670,000
Unit Water Cost (Rounded):	$1,634 per ac-ft ($5.02per 1,000 gallons)

STRATEGY DESCRIPTION

Southern Utilities in Cherokee and Smith Counties is projected to need 410 acre-feet per year starting in 2070. In order to meet this need, a recommended water management project is included for Southern Utilities to amend their supplemental contract with the City of Tyler for raw water from their system, as their permit allows.

SUPPLY DEVELOPMENT

The strategy recommended for Southern Utilities is assumed to be equal to the need projected for this entity during the planning period (2030-2080). The contract with Tyler required for this strategy increases their supply by approximately 410 ac-ft per year beginning in 2070. These supplies are considered highly reliable; however, the supply is dependent on coordination with the City of Tyler.

ENVIRONMENTAL CONSIDERATIONS

The impact on the environment due to the construction of infrastructure associated with this strategy is expected to be low to moderate. In addition, it is anticipated that this strategy will have a minimal impact on environmental water needs, a low impact on the surrounding habitat, and a low impact on cultural resources in the area. There are no bays or estuaries in close proximity to Cherokee and Smith Counties, so this project is anticipated to have no impact.

PERMITTING AND DEVELOPMENT

There are no anticipated permitting or development issues associated with this strategy. There may be some minor permitting related to construction of the infrastructure required associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. Generalized estimates of conveyance infrastructure to access and deliver supply from Tyler. A regional rate for raw surface water was used for the purchase costs ($5.00 per 1,000 gallons).

WUG	**Cherokee & Smith County - Southern Utilities**				
STRATEGY:	**Amendment to Supplemental Contract with City of Tyler**				
QUANTITY (AC-FT/YR)	**410**				
ANNUAL COST					
O&M and Other Costs		134,000	1000 gal	$5.00	$670,000
TOTAL ANNUAL COST					**$670,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot (2030-2080 Average)					$1,634
Per 1,000 Gallons (2030-2080 Average)					$5.02
UNIT COSTS (After Amortization)					
Per Acre-Foot					NA
Per 1,000 Gallons					NA

PROJECT EVALUATION

This strategy benefits Southern Utilities in Cherokee and Smith Counties and is expected to have a positive impact on their water supply security. This strategy involves a voluntary redistribution of water that could be used to serve rural and/or agricultural areas. Additionally, the supply associated with this strategy is relatively small compared to the surplus supply Tyler has available.

The strategy described was evaluated across twelve different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage
Reliability	4	Medium to High reliable supply
Cost	3	Medium cost ($1,000 - $3,000/ac-ft)
Environmental Factors	4	Low environmental impacts
Impact on Other State Water Resources	4	Low to no negative impacts and/or some positive impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no negative impacts and/or some positive impacts
Other Natural Resources	4	Low to no negative impacts and/or some positive impacts
Interbasin Transfers		No
Third Party Social & Economic Impacts	4	Low to no negative impacts and/or some positive impacts
Major Impacts on Key Water Quality Parameters	4	Low to no negative impacts and/or some positive impacts
Political Feasibility	3	Sponsor(s) identified, commitment level uncertain.
Implementation Issues	4	Low implementation issues

REFERENCES

Discussions with the City of Tyler.

ANDERSON COUNTY STEAM ELECTRIC POWER – NEW GROUNDWATER WELLS IN CARRIZO-WILCOX AQUIFER

Water User Group Name:	Steam Electric Power, Anderson County
Strategy Name:	New Groundwater Wells in Carrizo-Wilcox Aquifer
Strategy ID:	ADSN-GW
Strategy Type:	Existing Groundwater Source
Potential Supply Quantity:	2,300 ac-ft per year (2.05 MGD)
Implementation Decade:	2030
Development Timeline:	< 5 years
Project Capital Cost:	$21,908,000 (September 2023)
Annual Cost:	$1,834,000
Unit Water Cost (Rounded):	$797 per ac-ft ($2.45 per 1,000 gallons)

STRATEGY DESCRIPTION

Two new power generation facilities with water demands have been identified in Anderson County: the Palestine Power Peaking Facility (PPPF), which is located approximately eight miles northeast of the City of Palestine, and the Apex Bethel Energy Center (ABEC), located approximately 17 miles northwest of Palestine. These plants are not constructed at this time and therefore, do not use any existing water supply (groundwater, surface water, etc.). Most groundwater use in the areas around these facilities rely on groundwater from the Carrizo-Wilcox Aquifer in Anderson County. The PPPF has an identified need of 890 acre-feet per year beginning in 2030, and the ABEC has an identified need of 1,410 acre-feet per year beginning in 2030 (approximately 2,300 ac-ft per year total in 2030). To meet these projected needs, a strategy is recommended for steam-electric power users in Anderson County that involves the development of two well fields, one at each facility. The well fields at both locations will produce groundwater from the Carrizo-Wilcox Aquifer, as this aquifer has been identified as a potential source of water near these facilities.

Generalized estimates of infrastructure are included as part of this strategy. Ultimately, individual entities will need to develop infrastructure based on their individualized needs for water supply. The conceptual design for this strategy involves construction of a new well field at each power generation facility (two well fields total). Well fields were assumed to include public supply wells located within the Carrizo-Wilcox Aquifer with sufficient capacities to generate the identified supply needed, as well as conveyance infrastructure (e.g., well collection piping, transmission pipeline, pump station, and storage tank). A peaking factor of two was assumed to size infrastructure at these well fields.

SUPPLY DEVELOPMENT

The estimated supply quantity from this strategy is approximately 2,300 ac-ft per year based on the identified need for steam electric power water users in Anderson County across the planning horizon (2030-2080). There is sufficient groundwater available in the Carrizo-Wilcox Aquifer in Anderson County to develop the supply assumed for this water management strategy. This strategy is projected to be able to provide supply by 2030. Overall, the reliability of this supply is considered medium, based on the historical use of this groundwater source and groundwater availability models. There are other strategies involving use of this groundwater source, so there may be competition for supply.

ENVIRONMENTAL CONSIDERATIONS

There are not any significant environmental considerations associated with this strategy and environmental impacts are expected to be low. However, the environmental impacts of developing infrastructure are site-specific and will be dependent upon the location and size of the project. Site-specific evaluations of potential impacts to the environment from construction activities will need to be conducted by individual entities. This strategy is anticipated to have a minimal impact on environmental water needs, low impact to the surrounding habitat, and a low impact to cultural resources in the area due to the relatively small footprint of this strategy. The potential impact to surrounding habitat and cultural resources will need to be evaluated by entities on a project-specific basis.

PERMITTING AND DEVELOPMENT

This strategy is located within the Neches & Trinity Valleys Groundwater Conservation District (NTVGCD). Any new groundwater withdrawal by either of these proposed facilities will require that an operating permit from the NTVGCD be obtained.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assume well fields located around each proposed power facility, with minimal distance required to transport water from the well field to the power facility. Additionally, capital costs assume pipelines to connect the wells within each well field, transmission pipelines from the well field to the power facility, pump stations, and ground storage tanks.

WUG	**Steam Electric Power, Jasper County**	
STRATEGY	**New Wells in Carrizo-Wilcox Aquifer**	
QUANTITY (AC-FT/YR)	**2,300**	
CAPITAL COST		
Booster Pump Stations		$1,671,000
Transmission Pipeline (6 in. dia., 0.1 miles)		$642,000
Well Fields (Wells, Pumps, and Piping)		$10,520,000
Storage Tanks (Other Than at Booster Pump Stations)		$2,403,000
Integration, Relocations, Backup Generator & Other		$7,000
TOTAL COST OF FACILITIES		**$15,243,000**
- Planning (3%)		$458,000
- Design (7%)		$1,067,000
- Construction Engineering (1%)		$153,000
Legal Assistance (2%)		$305,000
Fiscal Services (2%)		$305,000
Pipeline Contingency (15%)		$96,000
All Other Facilities Contingency (20%)		$2,920,000
Environmental & Archaeology Studies and Mitigation		$372,000
Land Acquisition and Surveying (11 acres)		$299,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)		$690,000
TOTAL COST OF PROJECT		**$21,908,000**
ANNUAL COST		
Debt Service (3.5 percent, 20 years)		$1,541,000
Operation and Maintenance		
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)		$135,000
Intakes and Pump Stations (2.5% of Cost of Facilities)		$41,000
Water Treatment Plant		$117,000
Pumping Energy Costs (29,714 kW-hr @ 0.09 $/kW-hr)		$0
TOTAL ANNUAL COST		**$1,834,000**
UNIT COSTS (Until Amortized)		
Per Acre-Foot		$797
Per 1,000 Gallons		$2.45
UNIT COSTS (After Amortization)		
Per Acre-Foot		$127
Per 1,000 Gallons		$0.39

PROJECT EVALUATION

This strategy benefits new power generation users in Anderson County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. Developing groundwater supplies in Anderson County will have no other apparent impact on other state water resources. This strategy does not involve a voluntary redistribution of water from a rural and/or agricultural area, so it will have low to no third-party social and economic impact to those areas.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 100% of supply need
Reliability	3	Medium reliable supply. May encounter competition for supply from other users
Cost	4	Low cost (< $1,000/ac-ft)
Environmental Factors	3	Low to medium impacts
Impact on Other State Water Resources	4	Low to no impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no impacts
Other Natural Resources	4	Low to no impacts
Interbasin Transfers		No
Other Natural Resources	4	Low to no impacts
Major Impacts on Key Water Quality Parameters	4	No known impacts
Political Feasibility	2	Potential sponsors identified, but willingness to develop strategy is unknown
Implementation Issues	4	No known risks

REFERENCES

East Texas Regional Water Planning Group.

ANGELINA NACOGDOCHES WCID #1 – HYDRAULIC DREDGING AND VOLUMETRIC SURVEY OF LAKE STRYKER

Water User Group Name:	Angelina Nacogdoches WCID #1
Strategy Name:	Hydraulic Dredging and Volumetric Survey of Lake Stryker
Strategy ID:	AN WCID-DRED-VOL
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	5,600 ac-ft per year (5.0 MGD)
Implementation Decade:	2030
Development Timeline:	< 5 years
Project Capital Cost:	$27,980,652 (September 2023)
Unit Water Cost (Rounded):	$4,997 per ac-ft ($15.33 per 1,000 gallons)

PROJECT DESCRIPTION

Internal studies conducted by Angelina Nacogdoches WCID #1 resulted in higher yield estimates for Lake Striker than those obtained from the Water Availability Model. Angelina Nacogdoches WCID #1 believes that the additional yield in Lake Striker is sufficient to meet the shortages manifested for this entity in this planning cycle. To address this inconsistency, Angelina Nacogdoches WCID #1 is considering a recommended strategy to conduct volumetric survey of Lake Striker to determine the Lake yield. Angelina Nacogdoches WCID #1 will coordinate with TWDB to get on a schedule for the lake volumetric survey. Angelina Nacogdoches WCID #1 believes that the volumetric survey will result in an additional yield that will address shortages in the first two decades. To address the shortages in the later decades, a recommended strategy was proposed. The strategy is to work with the Texas Water Development Board on the Normal Pool Elevation Adjustment of Lake Striker. The timing for the volumetric surveys and potential normal pool elevation adjustment is 2040.

SUPPLY DEVELOPMENT

At this time, it is not known how much (if any) additional yield will be realized from the normal pool elevation adjustment but for planning purposes it is assumed to be 5,600 ac-ft/yr.

ENVIRONMENTAL CONSIDERATIONS

No known environmental considerations at this time but these would be studied in further details during the volumetric survey process.

PERMITTING AND DEVELOPMENT

The process for volumetric survey and adjusting of the normal pool elevation may require some significant coordination with the Texas Water Development Board and Texas Council on Environmental Quality on permitting and development issues.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) was not developed for this strategy. TWDB will charge a fixed fee for conducting volumetric surveys. A cost estimate is not included for this strategy, as this cost will be determined by Angelina Nacogdoches WCID #1 during their negotiations with TWDB.

PROJECT EVALUATION

The addition of the additional yield from Lake Striker will help address the shortages in Angelina Nacogdoches WCID #1's customer demands.

The recommended strategy for infrastructure improvements was evaluated across twelve different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2026 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	5	Exceeds Shortage
Reliability	3	Medium reliable supply
Cost	2	$3,000 to $5,000/ac-ft (Medium-High)
Environmental Factors	4	Low environmental impacts
Impact on Other State Water Resources	4	Low to no negative impacts and/or some positive impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no negative impacts and/or some positive impacts
Other Natural Resources	4	Low to no negative impacts and/or some positive impacts
Interbasin Transfers		No
Third Party Social & Economic Impacts	3	Low to no negative impacts and/or some positive impacts
Major Impacts on Key Water Quality Parameters	4	Low to no negative impacts and/or some positive impacts
Political Feasibility	4	Low to no negative impacts and/or some positive impacts
Implementation Issues	4	Low implementation issues

REFERENCES

Discussions with Angelina Nacogdoches WCID #1.

ANGELINA AND NECHES RIVER AUTHORITY – WATER TREATMENT PLANT

Water User Group Name:	ANRA
Strategy Name:	Regional Water Treatment Facilities
Strategy ID:	ANRA-WTP
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	22,232 ac-ft per year (30 MGD)
Implementation Decade:	2040
Development Timeline:	<5 years
Project Capital Cost:	$455,353,000 (September 2023)
Annual Cost:	$84,250,000
Unit Water Cost (Rounded):	$3,790 per ac-ft ($11.63 per 1,000 gallons)

STRATEGY DESCRIPTION

Angelina Nacogdoches River Authority is the sponsor for the Lake Columbia project on Mud Creek in Cherokee and Rusk Counties. Lake Columbia is a recommended strategy in this round of regional water planning. Angelina Neches River Authority has been granted a water right permit (Permit No. 4228) by the TCEQ to impound 195,500 ac-ft/yr and to divert 85,507 ac-ft/yr (76.3 MGD) for municipal and industrial purposes. Angelina Neches River Authority currently has contracted customers for 53 percent of the 85,507 ac-ft/yr permit of the proposed Lake Columbia reservoir. This water management strategy for Angelina Neches River Authority was developed to address the current contracted demand for the customers receiving treated water from this wholesale provider.

Angelina Neches River Authority has contracts with several customers in East Texas Regional Water Planning Area. The water suppliers currently under contract with Angelina Neches River Authority are listed in Table below along with the current participation percentage. It is assumed that Afton Grove WSC, Stryker Lake WSC, New Summerfield, and all municipal customers in Smith County will purchase treated water from Angelina Neches River Authority.

The purpose of this water management strategy is to develop a treatment facility to treat the supplies delivered to potential municipal customers purchasing treated water from Angelina Neches River Authority. The municipal customers are Stryker WSC, Afton Grove WSC, Jackson WSC, Blackjack WSC, City of New Summerfield, City of New London, City of Troup, City of Arp, and City of Whitehouse.

SUPPLY DEVELOPMENT

The cities of Nacogdoches, Jacksonville, and Rusk are assumed to purchase raw water from Lake Columbia and develop their own raw water transmission and treatment facilities. Most of the municipal water users (and current customers of Angelina Neches River Authority) in Cherokee, Rusk, and Smith Counties will be purchasing treated water from Angelina Neches River Authority. Costs for water treatment and transmission system are shared among currently contracted entities that are assumed to buy treated water from Angelina Neches River Authority.

ENVIRONMENTAL CONSIDERATIONS

There are no significant environmental considerations associated with the treatment plant construction and the transmission system strategy.

PERMITTING AND DEVELOPMENT

There are no anticipated permitting issues associated with the construction of the water treatment facilities and the transmission facilities.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for the water treatment plant and distribution system is included below. Construction costs include the construction of water treatment plant, pipeline segments, pump station and storage tank to deliver the supplies. The annual costs were estimated assuming 3.5% interest rate over a period of 20 years. The planning level opinion of probable construction cost estimates also include cost of purchase of raw water and treated water from Angelina Neches River Authority. Overall, this strategy has a high cost compared to other strategies in the 2026 East Texas Regional Water Plan.

WWP	**Angelina and Neches River Authority**				
STRATEGY:	**Regional Water Treatment Facilities**				
QUANTITY (AC-FT/YR)	**22,232**				
CONSTRUCTION COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Segment A: WTP to Troup	30 in.	57,771	LF	$432	$25,139,000
Segment B: Troup to Arp	12 in.	36,610	LF	$214	$7,826,000
Segment C: Troup to Whitehouse & Jackson WSC	24 in.	40,879	LF	$358	$14,647,000
Segment D: Arp to New London & Blackjack WSC	8 in.	42,398	LF	$165	$6,991,000
Segment E: WTP to New Summerfield	18 in.	1,916	LF	$286	$548,000
Pipeline Segments Subtotal					**$54,946,000**
Right of Way Easements Rural (ROW)		82	Acres	$9,038	$820,000
Engineering and Contingencies (30%)					$16,484,000
Subtotal of Pipeline					**$72,250,000**
Pump Station(s)					
Pump with intake & building	3859 HP	2	LS	$58,335,000	$116,670,000
Power connection(s)		7718	HP	$200	$1,544,000
Engineering and Contingencies (35%)					$41,374,900
Subtotal of Pump Station(s)					**$159,588,900**
Water Treatment Plant	30 MGD	1	LS	$150,534,000	$150,534,000
Storage Tanks	3.7 MG	1	LS	$2,508,963	$2,509,000
Engineering and Contingencies (35%)					$53,565,000
Subtotal of Storage Tanks					**$206,608,000**
Integration, Relocations, Backup Generator & Other			$ per kw	$534	$975,000
Engineering and Contingencies (35%)					$341,000
Subtotal of Integration, Relocations, Backup Generator & Other					**$1,316,000**
Land Acquisition and Surveying (All Facilities Excluding Pipelines)					$124,273
Environmental - Studies and Mitigation					$1,132,975
CONSTRUCTION TOTAL					**$441,020,148**
Interest During Construction (3.5% for 2 years with a 0.5% ROI)				12 Months	$14,333,000
TOTAL COST OF PROJECT					**$455,353,000**

ANNUAL COST				
Debt Service (3.5% for 20 years)				$32,039,000
Pumping Energy Costs				$1,439,000
Operation and Maintenance (O&M)				$7,302,000
Raw Water Purchase	7,245,000	1000 gal	$1.00	$7,245,000
	7,245,000	1000 gal	$5.00	$36,225,000
TOTAL ANNUAL COST				**$84,250,000**
UNIT COSTS (Until Amortized)				
Per Acre-Foot				$3,790
Per 1,000 Gallons				$11.63
UNIT COSTS (After Amortization)				
Per Acre-Foot				$2,348
Per 1,000 Gallons				$7.21

PROJECT EVALUATION

The strategy described was evaluated across twelve different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	5	Exceeds Shortage
Reliability	4	Medium to High reliable supply
Cost	2	$3,000 to $5,000/ac-ft (Medium-High)
Environmental Factors	3	Low to medium impacts
Impact on Other State Water Resources	4	Low to no negative impacts and/or some positive impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no negative impacts and/or some positive impacts
Other Natural Resources	4	Low to no negative impacts and/or some positive impacts
Interbasin Transfers		No
Third Party Social & Economic Impacts	4	Low to no negative impacts and/or some positive impacts
Major Impacts on Key Water Quality Parameters	4	Low to no negative impacts and/or some positive impacts
Political Feasibility	4	Low to no negative impacts and/or some positive impacts
Implementation Issues	3	Low to medium implementation issues

REFERENCES

East Texas Regional Water Planning Group.

ATHENS MWA – INDIRECT REUSE OF FLOWS FROM FISH HATCHERY

Water User Group Name:	Athens Municipal Water Authority
Strategy Name:	Indirect Reuse of Flows from Fish Hatchery
Strategy ID:	AMWA-REU
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	2,872 ac-ft per year (2.6 MGD)
Implementation Decade:	2030
Development Timeline:	< 5 years
Project Capital Cost:	$0 (September 2023)
ANNUAL COST:	$0 per ac-ft
Unit Water Cost (Rounded):	$0 per ac-ft ($0 per 1,000 gallons)

STRATEGY DESCRIPTION

This is a recommended strategy for Athens Municipal Water Authority (MWA) that involves an indirect reuse project from the flows returned by a fish hatchery to Lake Athens. Athens MWA has a contract to supply 3,023 acre-feet per year to the fish hatchery along Lake Athens. The fish hatchery has a separate intake on Lake Athens to access the lake supplies. Currently, approximately 95 to 100 percent of the diverted water for the fish hatchery is returned to Lake Athens; however, the fish hatchery is under no contractual obligation to continue this practice. To ensure adequate supplies for the fish hatchery and other uses, Athens MWA should work with the fish hatchery to assure that the hatchery continues to return diverted water to Lake Athens for subsequent reuse. For purposes of this plan, it is assumed that 95 percent of the contracted water will be returned. This equates to 2,872 ac-ft per year of additional supply. Athens MWA would have to apply for an amendment to their existing permits to supply water to the fish hatchery and be authorized to the flows that the fish hatchery returns to Lake Athens.

SUPPLY DEVELOPMENT

According to Athens MWA, the fish hatchery returns approximately 95 to 100 percent of the water that they are diverted from Lake Athens. Assuming that 95 percent of water that is contacted to the fish hatchery is returned, approximately 2,872 acre-feet per year of supplies can be developed from this strategy.

ENVIRONMENTAL CONSIDERATIONS

The yield of this strategy will be dependent upon negotiations with TCEQ regarding environmental flow requirements. Environmental flow requirements will be set so the new permit has a minimum impact to environmental water needs and the surrounding habitat. No impacts to cultural resources in the area are expected.

PERMITTING AND DEVELOPMENT

Athens MWA has to apply for an amendment to their permit to supply water to the fish hatcheries. This amendment will allow them to utilize the water returned by the fish hatcheries to Lake Athens. Previous attempts of working with TCEQ on the permit amendment have not been successful. Athens MWA is hopeful that the amendment will be approved during the planning period. This permit amendment is dependent upon coordination with the TCEQ.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) was not prepared for this strategy because costs associated with the permit amendment are considered minimal. Any costs incurred by Athens MWA will be related to administrative and legal fees.

PROJECT EVALUATION

This strategy benefits customers of the Athens Municipal Water Authority, including the City of Athens. This strategy may reduce demands on other water supplies in Henderson County and provide relief to the Carrizo-Wilcox aquifer as more entities switch from groundwater to alternative sources. This analysis did not identify any impacts to agricultural or natural resources. The reuse associated with this strategy is already occurring, so it will have not impact on any key water quality parameters. Use of this reuse water may reduce the have no apparent impact on other state water resources. This strategy does not involve a voluntary redistribution of water that could be used to serve rural and/or agricultural areas. Ultimately, this strategy will enable Athens MWA to provide a more reliable water supply to their various rural customers, which could benefit them from a social and economic perspective.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	3	Meets 75-100% of supply need
Reliability	4	Medium to high reliable supply
Cost	5	No cost (excluding administrative and legal fees)
Environmental Factors	4	Low to no impacts
Impact on Other State Water Resources	5	Low impact to other water resources, positive impact by adding supply available for use from Lake Athens and reducing future demand on groundwater supply
Threat to Agricultural Resources/Rural Areas	4	Low to no impacts
Other Natural Resources	4	No impacts on other natural resources
Interbasin Transfers		No
Third Party Social & Economic Impacts	4	No impacts on other natural resources
Major Impacts on Key Water Quality Parameters	4	No known impact. Reuse supply from Lake Athens is already being used.
Political Feasibility	4	Athens MWA is the local sponsor. Sponsor is committed.
Implementation Issues	3	Requires agreement with fish hatchery. If a permit for the supply is pursued, the process would be administered through TCEQ.

REFERENCES

2026 East Texas Regional Water Plan. September 2020.

ATHENS MWA – WATER TREATMENT PLANT BOOSTER PUMP STATION EXPANSION

Water User Group Name:	Athens Municipal Water Authority
Strategy Name:	WTP Pump Station Expansion
Strategy ID:	AMWA-PSE
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	4,600 ac-ft per year (4.1 MGD)
Implementation Decade:	2050
Development Timeline:	1-2 years
Project Capital Cost:	$3,121,000 (September 2023)
ANNUAL COST:	$309,000 per ac-ft
Unit Water Cost (Rounded):	$67 per ac-ft ($0.21 per 1,000 gallons)

STRATEGY DESCRIPTION

A recommended strategy for Athens Municipal Water Authority (AMWA) involves an expansion of their existing high service pump station (HSPS) to be able to deliver sufficient supply from their water sources to meet the projected demands of their treated water customer: the City of Athens. AMWA treats surface water diverted from Lake Athens at their Water Treatment Plant (WTP). Additionally, AMWA supplements Lake Athens water with groundwater from a well on the property of their WTP. Water from this well is chloraminated and then blended with treated surface water prior to being pumped to the City of Athens' distribution system.

AMWA's existing WTP has a capacity of 8.0 MGD. However, the AMWA WTP high service pump station (HSPS) that delivers treated water to the City of Athens only has a firm capacity of 4.9 MGD. The projected peak (maximum) treated water demand from AMWA's WTP sources (i.e., after accounting for alternative groundwater sources available to AMWA and Athens that are not linked to the WTP) is estimated to be approximately 5.5 MGD by 2050 and 9.0 MGD by 2070, assuming a peaking factor of 2.1 based on historical flow data from the City of Athens. Consequently, the projected peak day treated water demands exceed the WTP HSPS capacity by 2050 and this infrastructure deficit continues to grow in later decades (2070-2080).

This strategy includes an expansion of AMWA's WTP HSPS. The capacity was assumed to be expanded to the largest projected peak treated water demand from AMWA's WTP sources (9.0 MGD) across the planning horizon (2030-2080). Correspondingly, this involves an expansion of approximately 4.1 MGD. Expansion of the WTP HSPS was assumed to occur in one single phase; however, expansions could be phased incrementally to meet projected treated water demands.

SUPPLY DEVELOPMENT

This infrastructure expansion will ensure that AMWA is able to distribute treated water supply from their existing treated sources (Lake Athens, AMWA WTP groundwater well) and potential future sources (indirect reuse of fish hatchery flows from Lake Athens) to meet projected demands from the City of Athens. This strategy does not generate new or additional supply.

ENVIRONMENTAL CONSIDERATIONS

This project will facilitate an increase in treated water delivery capacity from AMWA's water treatment plant. This project does not develop new surface water supply sources. Diversions will be made using existing water rights at existing diversion locations, so this strategy should have a minimal impact on environmental water needs. Construction of infrastructure may result in some surface disturbance; however, this is expected to be minimal as the proposed infrastructure has a limited footprint and could be developed at AMWA's WTP adjacent to existing facilities. Therefore, it is anticipated to have low to no impact on any surrounding habitat and/or cultural resources in the area. There are no bays or estuaries in close proximity to Henderson County, so this project is anticipated to have no impact.

PERMITTING AND DEVELOPMENT

The development of this strategy may require some permitting due to surface disturbance from the construction of the infrastructure included in this project. This impact is expected to be minimal as the proposed infrastructure has a limited footprint and could be developed at AMWA's WTP adjacent to existing facilities. The supply source is provided through AMWA's existing water rights and diversion points on Lake Athens, as well as permitted groundwater production from their WTP well in the Carrizo-Wilcox Aquifer. Permitting for either new or amended water rights will not be required for this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for AMWA's WTP pump station expansion is provided in the table below. The cost was estimated for a booster pump station expansion of 4.1 MGD. It was assumed that construction of this upgrade would occur on property owned by AMWA.

WUG	**Athens Municipal Water Authority**				
STRATEGY	**WTP Pump Station Expansion**				
QUANTITY (AC-FT/YR)	**4,600**				
CAPITAL COSTS	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pump Station(s)					
Booster Pump Station	190 HP	1	LS	$2,127,000	$2,127,000
Power connection(s)		190	HP	$200	$75,000
Engineering and Contingencies (35%)					$771,000
Subtotal of Pump Station(s)					**$2,973,000**
CONSTRUCTION TOTAL					**$2,973,000**
Interest During Construction (3.5% for 1 years with a 0.5% ROI)					$97,000
Land Acquisition and Surveying					$5,000
Environmental - Studies and Mitigation					$46,000
TOTAL CAPITAL COST					**$3,121,000**
ANNUAL COSTS					
Debt Service (3.5% for 20 years)					$220,000
Pumping Energy Costs					$36,000
Operation and Maintenance (O&M)					$53,000
Total Annual Costs					**$309,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot					$67
Per 1,000 Gallons					$0.21
UNIT COSTS (After Amortization)					
Per Acre-Foot					$19
Per 1,000 Gallons					$0.06

PROJECT EVALUATION

This strategy benefits treated water customers of the Athens Municipal Water Authority, including the City of Athens. This analysis did not identify any impacts to agricultural or natural resources or key parameters of water quality. The strategy will have no apparent impact on other state water resources. This strategy does not involve a voluntary redistribution of water that could be used to serve rural and/or agricultural areas. Ultimately, this strategy will enable Athens MWA to provide a more reliable water supply to their various rural customers, which could benefit them from a social and economic perspective.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 100% of supply need

Criteria	Rating	Explanation
Reliability	4	Medium to high reliable supply
Cost	4	Low cost (< $1,000/ac-ft)
Environmental Factors	4	Low to no impacts
Impact on Other State Water Resources	4	Low to no impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no impacts
Other Natural Resources	4	Low to no impacts
Interbasin Transfers		No
Third Party & Social Economic Factors	4	Low to no impacts
Major Impacts on Key Water Quality Parameters	4	Low to no impacts
Political Feasibility	4	Athens MWA is the local sponsor. Sponsor is committed.
Implementation Issues	4	No known risk

REFERENCES

Discussions with Athens Municipal Water Authority and City of Athens.

Garver. December 2017. *City of Athens, TX Water Distribution Model Report*.

ATHENS MWA – NEW GROUNDWATER WELLS IN CARRIZO-WILCOX AQUIFER (ALTERNATIVE)

Water User Group Name:	Athens Municipal Water Authority
Strategy Name:	New Groundwater Wells in Carrizo-Wilcox Aquifer *(Alternative WMS)*
Strategy ID:	AMWA-GW
Strategy Type:	Existing Groundwater Source
Potential Supply Quantity:	720 ac-ft per year (0.64 MGD)
Implementation Decade:	2070
Development Timeline:	< 5 years
Project Capital Cost:	$10,270,000 (September 2023)
Annual Cost:	$1,286,000
Unit Water Cost (Rounded):	$1,768 per ac-ft ($5.48 per 1,000 gallons)

STRATEGY DESCRIPTION

The strategy involves the development of new groundwater wells in the Carrizo-Wilcox Aquifer in Henderson County. The Carrizo-Wilcox Aquifer in Henderson County (both in Region C and I) has very limited modeled available groundwater (MAG) beyond what is currently used. Consequently, this is included as an alternative strategy for Athens MWA. The strategy could be changed to a recommended strategy if the MAG volumes increase in the future.

Athens MWA currently has two wells that produce groundwater from the Carrizo-Wilcox Aquifer in Henderson County. When comparing Athens MWA's projected demands to their existing water supplies (Lake Athens and groundwater) and future water supplies (indirect reuse), but not factoring in potential water conservation strategy savings, Athens MWA is projected to have a need of approximately 30 acre-feet per year from the Carrizo-Wilcox Aquifer by 2070 and 720 acre-feet per year by 2080.

This strategy assumes the development of approximately 720 acre-feet per year from the Carrizo-Wilcox Aquifer in Henderson County by 2070. The conceptual design for this strategy involves three public supply wells (capacities of 250 gpm, depth of 700 ft depth each) located within the Carrizo-Wilcox Aquifer, conveyance infrastructure (e.g., well collection piping, transmission pipeline, pump station, and storage tank), and a groundwater treatment system. A peaking factor of two was assumed to size infrastructure at this well field.

SUPPLY DEVELOPMENT

The estimated supply quantity from this strategy is approximately 720 ac-ft per year by 2070. There is not sufficient modeled available groundwater from the Carrizo-Wilcox Aquifer in Henderson County (both in Region C and I) to develop the supply assumed for this water management strategy, so this is considered as an alternative strategy. This strategy is projected to be online by 2070. Based on historical use, this supply is considered to have medium to high reliability.

ENVIRONMENTAL CONSIDERATIONS

The environmental impacts from this strategy are expected to be low. However, groundwater development from this source should be evaluated for potential impacts on spring flows and base flows if surface water is in close proximity. The impact to the environment due to pipeline construction is expected to be temporary and minimal. Impacts to environmental water needs, habitat, and cultural resources are expected to be low due to the relatively low footprint of this strategy.

PERMITTING AND DEVELOPMENT

This strategy is located within the Neches & Trinity Valleys Groundwater Conservation District (NTVGCD). Any new groundwater withdrawal by Athens MWA would require that an operating permit from the NTVGCD be obtained. The assumed supply from this strategy exceeds the Carrizo-Wilcox Aquifer MAG limits in Henderson County in Regions C and I. If and when the MAG numbers are updated, the yield from the wells will be compared with the MAG. If there is sufficient MAG for this strategy in the future, this could be converted to a recommended strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assume account for three wells, 1,300 feet of well field piping, one mile of transmission pipeline, a pump station, storage tank, and a groundwater treatment system.

WUG	**Athens MWA**
STRATEGY	**New Wells in Carrizo-Wilcox Aquifer (Alternative)**
QUANTITY (AC-FT/YR)	**720**
CAPITAL COST	
Booster Pump Stations	$776,000
Transmission Pipeline (10 in. dia., 1 mile)	$1,000,000
Well Fields (Wells, Pumps, and Piping)	$2,868,000
Storage Tanks (Other Than at Booster Pump Stations)	$1,126,000
Water Treatment Plant (1.1 MGD)	$1,441,000
Integration, Relocations, Backup Generator & Other	$2,000
TOTAL COST OF FACILITIES	**$7,213,000**
- Planning (3%)	$216,000
- Design (7%)	$505,000
- Construction Engineering (1%)	$72,000
Legal Assistance (2%)	$144,000
Fiscal Services (2%)	$144,000
Pipeline Contingency (15%)	$150,000
All Other Facilities Contingency (20%)	$1,243,000
Environmental & Archaeology Studies and Mitigation	$131,000
Land Acquisition and Surveying (13 acres)	$128,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$324,000
TOTAL COST OF PROJECT	**$10,270,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$722,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$50,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$19,000
Water Treatment Plant	$475,000
Pumping Energy Costs (220,017 kW-hr @ 0.09 $/kW-hr)	$20,000
TOTAL ANNUAL COST	**$1,286,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot	$1,786
Per 1,000 Gallons	$5.48
UNIT COSTS (After Amortization)	
Per Acre-Foot	$783
Per 1,000 Gallons	$2.40

PROJECT EVALUATION

This strategy benefits Athens MWA and their customers in Henderson County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. Developing groundwater supplies in Henderson County will have no other apparent impact on other state water resources. However, the supply quantity from this strategy would exceed the Carrizo-Wilcox MAG in Henderson County, so this strategy is designated as an alternative strategy rather than recommended. This strategy does not involve a voluntary redistribution of water that could be used to serve rural and/or agricultural areas. Ultimately, this strategy will enable Athens MWA to provide a more reliable water supply to their various rural customers, which could benefit them from a social and economic perspective.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	1	Meets < 25% of supply need
Reliability	2	Medium to high reliable supply historically. However, there is limited to no MAG from the Carrizo-Wilcox Aquifer in Henderson County, so long-term reliability is uncertain
Cost	3	Medium cost ($1,000 - $3,000/ac-ft)
Environmental Factors	3	Low to medium impacts
Impact on Other State Water Resources	4	Low to no impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no impacts
Other Natural Resources	4	Low to no impacts
Interbasin Transfers		No
Third Party Social & Economic Impacts	4	Low to no impacts
Major Impacts on Key Water Quality Parameters	4	No known impacts
Political Feasibility	3	Athens MWA is the local sponsor.
Implementation Issues	2	Supply quantity exceeds the Carrizo-Wilcox MAG in Henderson County.

REFERENCES

East Texas Regional Water Planning Group.

Discussions with Athens Municipal Water Authority.

BEAUMONT – AMENDMENT TO SUPPLEMENTAL CONTRACT WITH LNVA

Water User Group Name:	Beaumont
Strategy Name:	Amendment to Supplemental Contract with LNVA
Strategy ID:	BMNT-LNV
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	6,700 – 8,600 ac-ft per year (6.0 – 7.7 MGD)
Implementation Decade:	2030
Development Timeline:	1 year
Project Capital Cost:	$0 (September 2023)
ANNUAL COST:	$2,803,000
Unit Water Cost (Rounded):	$326 per ac-ft ($1.00 per 1,000 gallons)

STRATEGY DESCRIPTION

The City of Beaumont has an existing contractual agreement with the Lower Neches Valley Authority (LNVA) for up to 6,000 ac-ft per year. A recommended strategy is included for Beaumont to amend their existing supplement contract with LNVA for additional water supply. Based on their existing supplies and potential supplies from their well field infrastructure improvement strategy, the City of Beaumont will need approximately 6,700 ac-ft per year of additional supply from LNVA in 2030. The City’s need for additional water supply from LNVA increases across the planning horizon, with a maximum need of approximately 8,600 ac-ft per year in 2070. The City of Beaumont already has existing infrastructure and transmission lines to access supply from the LNVA; however, there are some infrastructure constraints that may limit their ability to access the full supply from this strategy. Other recommended projects are included for the City to expand the capacity of their infrastructure to fully access this supply, including a new surface water treatment plant and rehabilitating (dredging) one of their canals. These projects were analyzed in separate technical memoranda. For this strategy, the only cost for additional supply from the Lower Neches Valley Authority is the cost of raw water. Ultimately, this cost will need to be negotiated between Beaumont and LNVA and will reflect their wholesale water rates at that time. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water.

SUPPLY DEVELOPMENT

Beaumont has an existing contractual agreement with LNVA to supply up to 6,000 ac-ft per year. The quantity of supply from this strategy represents a contract increase of approximately 6,700 ac-ft per year beginning in 2030 and increases to approximately 8,600 ac-ft per year by 2060 to meet Beaumont’s needs projected by the East Texas Regional Water Planning Group. These supplies are considered reliable. Development of this strategy will ultimately be dependent on coordination and agreement(s) between Beaumont and LNVA.

ENVIRONMENTAL CONSIDERATIONS

There are not any significant environmental considerations associated with this strategy. A contract between the City of Beaumont and the Lower Neches Valley Authority should have a minimal impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. As there is no new infrastructure required for this strategy, there will be no impacts to bays or estuaries in close proximity to the City of Beaumont.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. No capital costs were assumed for this strategy, but an annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water.

WUG	**City of Beaumont**			
STRATEGY	**Amendment to Supplemental Contract with LNVA**			
QUANTITY (AC-FT/YR)	**8,600**			
ANNUAL COST	**Quantity**	**Unit**	**Unit Price**	**Cost**
Raw Water Purchase	2,803,000	1,000 gal	$1.00	$2,803,000
TOTAL ANNUAL COST				**$2,803,000**
UNIT COSTS (Until Amortized)				
Per Acre-Foot				$326
Per 1,000 Gallons				$1.00
UNIT COSTS (After Amortization)				
Per Acre-Foot				$326
Per 1,000 Gallons				$1.00

PROJECT EVALUATION

This strategy benefits municipal users in Jefferson County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to obtain water from the Sam Rayburn system will reduce future demands on other water supplies in Jefferson County and will have no other apparent impact on other State water resources. This strategy involves a voluntary redistribution of water that could be used to serve rural and/or agricultural areas. However, the supply associated with this strategy is relatively small compared to the surplus supply available from LNVA and it will enable Beaumont to provide a more reliable water supply to their various rural customers, which could benefit them from a social and economic perspective.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of supply need
Reliability	4	Medium to highly reliable supply
Cost	4	Low cost (< $1,000/ac-ft)

Criteria	Rating	Explanation
Environmental Factors	4	Low impacts
Impact on Other State Water Resources	4	Low to no impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no impacts
Other Natural Resources	4	Low to no impacts
Interbasin Transfers		No
Third Party Social & Economic Factors	4	Low to no impacts
Major Impacts on Key Water Quality Parameters	4	No known impacts
Political Feasibility	4	Local sponsorship by Beaumont
Implementation Issues	4	Requires amendment to supplemental contract with LNVA

REFERENCES

Discussions with the City of Beaumont.

Freese and Nichols, Inc. March 2024. *Water Supply Planning Study, Prepared for the City of Beaumont, Texas.*

BEAUMONT – BUNN'S CANAL REHABILITATION

Water User Group Name:	Beaumont
Strategy Name:	Bunn's Canal Rehabilitation
Strategy ID:	BEAU-BCR
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	8,970 ac-ft per year (8 MGD)
Implementation Decade:	2030
Development Timeline:	< 5 years
Project Capital Cost:	$1,139,000 (September 2023)
ANNUAL COST:	$91,000
Unit Water Cost (Rounded):	$10 per ac-ft ($0.03 per 1,000 gallons)

STRATEGY DESCRIPTION

Bunn's Canal is situated near the Neches River northeast of the City of Beaumont. The canal starts at Bunn's Bluff and runs parallel to the Neches River for about 3 miles to Lawson's Crossing. The City of Beaumont primarily uses Bunn's Canal to convey raw water diverted from the Neches River to the Beaumont Water Canal, which is then conveyed to the City of Beaumont Pine Street Surface Water Treatment Plant (WTP). Bunn's Canal is a critical component of Beaumont's water supply system and provides a steady flow of fresh water to the city's treatment facilities. In 2017, Hurricane Harvey damaged the water canal system due to overtopping, scour, erosion, and slope instability. Additionally, sediment has accumulated in the canal over time. These events have reduced the potential conveyance capacity of the canal.

A project is recommended for Beamont to rehabilitate Bunn's Canal to its pre-storm condition so that it can convey water supply diverted from the Neches River at its full capacity.

SUPPLY DEVELOPMENT

Bunn's Canal consists of excavation between and construction of two parallel earthen levees which convey canal flow through the low-lying wetlands occurring on either side. The flooding due to Hurricane Harvey in 2017 submerged canal banks causing levee overtopping and erosion in Bunn's canal. The canal has also accumulated sediment to some degree based on a recent analysis (Freese and Nichols, Inc., 2019). The purpose of this project is to improve canal access, stabilize the bank canal including levee restoration, and remove sediment materials from the canal. These improvements will increase the carrying capacity of the canal.

The City of Beaumont estimates that the canal is only able to convey 37 MGD, which is less than the treatment capacity of Beaumont's Pine Street Surface Water WTP (45 MGD). The repair and restoration of the canal will require excavation and removal of debris and sediment and importing compacted select fill and riprap material for bank stabilization to restore the canal to its pre-storm capacity. It is estimated that this will increase Beaumont's ability to convey raw water from the Neches River to their Pine Street WTP by approximately 8 MGD (8,970 ac-ft per year).

ENVIRONMENTAL CONSIDERATIONS

There are some environmental considerations associated with this project. According to an evaluation conducted by Freese and Nichols, Inc. (2019), the project area includes expanses of forested wetlands that are dominated by bald cypress (*Taxodium distichum*) and/or water tupelo (*Nyssa aquatic*). Due to their proximity of these wetlands to the Neches River, they would be considered jurisdictional and therefore, subject to regulation under Section 404 of the Clean Water Act (CWA). Construction activities along the canal may temporarily impact flow, but ultimately this strategy will not impact environmental water needs long-term. Additional study will be needed to determine potential impacts of construction activities to local habitat, including threatened and endangered species, and cultural resources, but there are anticipated to be low or no impacts. The project is not located along the Gulf of Mexico and would not impinge on the Neches River and it would not impact any bays or estuaries.

PERMITTING AND DEVELOPMENT

Proposed repair and restoration construction activities could affect jurisdictional waters of the U.S. and therefore, could be subject to permitting under Section 404 of the Clean Water Act (CWA). Additionally, the activities may be subject to several other permits and coordination with state and federal agencies, including the Texas Commission on Environmental Quality (TCEQ) and U.S. Fish and Wildlife Service (USFWS).

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this project is included in the table below. The PLOC for this project is based on data provided by the sponsor (Beaumont) developed by a consultant (Freese and Nichols, 2019) and scaled to a September 2023 cost index.

WUG	**Beaumont**
STRATEGY	**Bunn's Canal Rehabilitation**
QUANTITY (AC-FT/YR)	**8,970**
CAPITAL COSTS	
Levee Clearing and Grubbing	$12,668
Levee Repair Access	$11,954
Topographic/Hydrographic Survey	$70,483
Levee Repair - Compacted Select Fill	$102,188
Slope Protection	$245,973
Sediment Removal	$31,656
Levee Crest Road	$76,926
Seeding and Mulching	$10,557
OH&P	$84,360
Mobilization	$32,339
Engineering and Contingencies	$336,157
Construction Phase Services	$87,961
Construction Cost	**$1,103,000**
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$36,000
TOTAL CAPITAL COST	**$1,139,000**
ANNUAL COSTS	
Debt Service (3.5% for 20 years)	$80,000
Operation and Maintenance (O&M)	$11,390
TOTAL ANNUAL COST	**$91,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot	$10
Per 1,000 Gallons	$0.03
UNIT COSTS (After Amortization)	
Per Acre-Foot	$2
Per 1,000 Gallons	$0.01

PROJECT EVALUATION

This project benefits Beaumont and its customers and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. Restoring the Bunn’s canal to its pre-storm conveyance capacity will allow the City to divert larger volumes of water to their treatment facilities. This strategy will have no other apparent impact on other State water resources. This project does not involve a voluntary redistribution of water that could be used to serve rural and/or agricultural areas. Ultimately, this project will enable Beaumont to provide a more reliable water supply to their various rural customers, which could benefit them from a social and economic perspective.

The project described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	5	Meets 75-100% of supply need
Reliability	4	Moderate to highly reliable supply
Cost	4	Low cost (< $1,000/ac-ft)
Environmental Factors	3	Low to medium impacts
Impact on Other State Water Resources	4	Low to no impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no impacts
Other Natural Resources	4	Low to no impacts
Interbasin Transfers		No
Third Party Social & Economic Factors	4	Low to no impacts
Major Impacts on Key Water Quality Parameters	4	No known impacts
Political Feasibility	4	Local sponsorship by Beaumont. Sponsor is committed.
Implementation Issues	3	Major storm events have impacted the canal in the past, so there is some risk associated with water delivered through this canal

REFERENCES

Discussions with the City of Beaumont

FEMA Funding Assistance by Freese and Nichols, Inc. for the City of Beaumont. June 2019.

BEAUMONT – WELL FIELD INFRASTRUCTURE UPGRADES

Water User Group Name:	Beaumont
Strategy Name:	Well Field Infrastructure Upgrades
Strategy ID:	BMNT-WFI
Strategy Type:	Existing Groundwater Source
Potential Supply Quantity:	2,823 ac-ft per year (2.5 MGD)
Implementation Decade:	2030
Development Timeline:	< 5 years
Project Capital Cost:	$97,980,000 (September 2023)
ANNUAL COST:	$8,074,000
Unit Water Cost (Rounded):	$2,860 per ac-ft ($8.78 per 1,000 gallons)

STRATEGY DESCRIPTION

The City of Beaumont has three groundwater wells (public supply wells) at its Loeb Groundwater Facility in south Hardin County that are each permitted for a maximum production rate of 3,500 gallons per minute (approximately 5 MGD each) and permitted total annual production of 5,645.525 acre-feet per year. One of these wells is currently not in service due to its condition. A condition assessment of the Loeb Groundwater Facility (Freese and Nichols, 2019) and the City of Beaumont's Water Supply Planning Report (Freese and Nichols, 2024) highlighted that substantial infrastructure improvements are necessary to upgrade and restore the Loeb Groundwater Facility to be able to produce at its full capacity.

A recommended strategy for the City of Beaumont is to upgrade facilities at their Loeb Groundwater Facility to allow the City to fully utilize their permitted groundwater supply at a sustainable level. Major project components include construction of a new well, well collection piping, transmission pipelines, pumping facilities, storage tanks, chemical treatment systems, and other supporting infrastructure.

SUPPLY DEVELOPMENT

The estimated annual supply from this strategy is assumed to be equal to half of the permitted volume of one of the wells at the City's Loeb Groundwater Facility (2.5 MGD or 2,803 ac-ft per year). Based on groundwater simulations conducted by Advanced Groundwater Solutions (AGS) for the City of Beaumont in 2020 using the current North Gulf Coast Groundwater Availability Model (GAM), it is recommended to maintain groundwater production levels at or below 7.5 MGD, which is slightly less than 50% of the permitted annual production on average to ensure that the Desired Future Condition (DFC) is no more than 1 foot of subsidence on average by 2080. The Maximum Available Groundwater (MAG) based on the adopted DFC for the Gulf Coast Aquifer System in Hardin County is shown to remain constant at 37,571 ac-ft/year from 2030 through 2080. The combined annual permitted production of the City's Loeb wells is 16,936.58 ac-ft/year and accounts for about 45% of the total MAG value in Hardin County. These supplies are considered reliable.

ENVIRONMENTAL CONSIDERATIONS

The environmental impacts from this strategy are expected to be low. However, groundwater development from this source should be evaluated for potential impacts on spring flows and base flows if surface water is in close proximity. The impact to the environment due to pipeline construction is expected to be temporary and minimal. Impacts to environmental water needs, habitat, and cultural resources are expected to be low due to the relatively low footprint of this strategy and since construction will be conducted on property already owned by the City.

PERMITTING AND DEVELOPMENT

The City of Beaumont already has a total permitted annual production capacity of 16,936.58 acre-feet per year from three wells in Hardin County through the Southeast Texas Groundwater Conservation District (SETGCD). The upgrades to infrastructure at their Loeb Groundwater Facility are anticipated to enable the City to fully utilize their permitted groundwater supply at a sustainable level. The City will need to apply for new permits from the SETGCD to replace the existing well that is out of service with a new well. The new well is anticipated to produce from the same production zone(s) and the amounts will be the same maximum production amounts in its operating permit as the existing well that is out of service. Additional local permits may be needed for construction of the other project infrastructure, but they are anticipated to be marginal since development of this strategy will be conducted on property already owned by the City.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The PLOC for this strategy is based on data provided by the sponsor (Beaumont) developed by a consultant (Freese and Nichols, 2023).

WUG	**Beaumont**
STRATEGY	**Well Field Infrastructure Improvements**
QUANTITY (AC-FT/YR)	**2,823**
CAPITAL COST	
Loeb Well Construction Cost	$2,700,000
Water Treatment and Disinfection	$1,300,000
Conveyance Infrastructure	$7,100,000
Ground Storage Tanks	$22,500,000
Booster Pumps	$3,200,000
Transmission Lines	$19,500,000
Other Facility Improvements	$2,700,000
Engineering and Contingencies	$33,000,000
CONSTRUCTION COST	**$92,000,000**
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$5,980,000
TOTAL COST OF PROJECT	**$97,980,000**
ANNUAL COST	
Debt Service (3.5% for 20 years)	$6,894,000
Pumping Energy Costs	$500,000
Operation and Maintenance (O&M)	$630,000
Groundwater Production Fee	$50,000
TOTAL ANNUAL COST	**$8,074,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot	$2,860
Per 1,000 Gallons	$8.78
UNIT COSTS (After Amortization)	
Per Acre-Foot	$418
Per 1,000 Gallons	$1.28

PROJECT EVALUATION

This strategy benefits the City of Beaumont and its customers and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts from this strategy to agricultural or natural resources or to key parameters of water quality. Restoring the Loeb Groundwater Facility to its permitted production capacity will reduce future demands on other water supplies used the City of Beaumont (run-of-river diversions, supplies from LNVA). It will have no other apparent impact on other State water resources. This strategy does not involve a voluntary redistribution of water that could be used to serve rural and/or agricultural areas. Ultimately, this strategy will enable Beaumont to provide a more reliable water supply to their various rural customers, which could benefit them from a social and economic perspective.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	2	Meets 25-50% of supply need
Reliability	4	Reliable supply
Cost	3	Medium cost ($1,000 - $3,000/ac-ft)
Environmental Factors	3	Low to medium impacts
Impact on Other State Water Resources	4	Low to no impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no impacts
Other Natural Resources	4	Low to no impacts
Interbasin Transfers		No
Third Party Social & Economic Factors	4	Low to no impacts
Major Impacts on Key Water Quality Parameters	4	No known impacts
Political Feasibility	4	Local sponsorship by Beaumont. Sponsor is committed.
Implementation Issues	4	No known risks

REFERENCES

Discussions with the City of Beaumont.

Advanced Groundwater Consultants. 2020. *Groundwater Regulations and Well Pumping Simulations Report, Prepared for the City of Beaumont, Texas.*

Freese and Nichols, Inc. 2019. *Loeb Groundwater Facility Condition Assessment Report, Prepared for the City of Beaumont, Texas.*

Freese and Nichols, Inc. March 2024. *Water Supply Planning Study, Prepared for the City of Beaumont, Texas.*

BEAUMONT – NEW WESTSIDE SURFACE WATER TREATMENT PLANT

Water User Group Name:	Beaumont
Strategy Name:	New Westside Surface Water Treatment Plant
Strategy ID:	BMNT-WTP
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	12,400 ac-ft per year (11.1 MGD)
Implementation Decade:	2040
Development Timeline:	5-10 years
Project Capital Cost:	$202,160,000 (September 2023)
ANNUAL COST:	$16,324,000
Unit Water Cost (Rounded):	$1,316 per ac-ft ($4.04 per 1,000 gallons)

STRATEGY DESCRIPTION

In response to the negative impacts on Beaumont's potable water supply system caused by Hurricane Harvey in 2017, the City of Beaumont, in partnership with Freese and Nichols, Inc. (FNI), conducted a condition assessment of their drinking water system. This study highlighted the costs and challenges associated with maintaining the current system, prompting the City to explore alternatives to mitigate future storm impacts. One of the proposed solutions involves the design and construction of a new surface water treatment plant (SWTP) on the west side of the City with a capacity of 11 MGD. This new Westside SWTP would supplement the City's existing Pine Street Surface Water Treatment Plant in order to provide reliable, potable water supply to their customers.

A project is recommended for the City of Beaumont to construct a new SWTP on the west side of their city and an associated distribution system to deliver treated water to its customers. This project includes the construction of an 11 MGD capacity SWTP, as well as transmission and distribution infrastructure.

SUPPLY DEVELOPMENT

This project involves construction of a new surface water treatment plant. The existing treatment capacity at Beaumont's Pine Street SWTP is 45 MGD. Based on Beaumont's projected water demands coupled with impacts coupled with impacts on the City's potable water system during storm events, the City's existing system may not be sufficient long-term. The new SWTP will be able to treat 11 MGD of surface water, thereby providing flexibility to the City to meet the needs of its customers. The new SWTP could treat surface water diverted using Beaumont's existing run-of-river rights and/or backup water supplied through the City's contractual agreement with LNVA.

ENVIRONMENTAL CONSIDERATIONS

The impact on the environment due to the construction of infrastructure associated with this project is expected to be low to moderate. There may be some surface disturbance associated with the construction of infrastructure, but it is expected to occur primarily on land that is previously disturbed. In addition, it is anticipated that this project will have a minimal impact on environmental water needs, a low impact on the surrounding habitat, a low impact on cultural resources in the area, and no impact to bays or estuaries.

PERMITTING AND DEVELOPMENT

There are no anticipated permitting or development issues associated with this project. There may be some minor permitting related to the construction of the infrastructure required associated with this project.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this project is included in the table below. The PLOC for this project is based on data provided by the sponsor (Beaumont) developed by a consultant (Freese and Nichols, 2023).

WUG	**Beaumont**
STRATEGY	**New Westside Surface Water Treatment Plant**
QUANTITY (AC-FT/YR)	**12,400**
CAPITAL COSTS	
Treatment Plant Construction Cost	$103,000,000
Transmission and Distribution Infrastructure	$12,600,000
Land Acquisition Costs (Includes Environmental and Mitigation)	$2,400,000
Engineering and Contingencies	$66,200,000
CONSTRUCTION COST	**$184,200,000**
Interest During Construction (3.5% for 3 years with a 0.5% ROI)	$17,960,000
TOTAL COST OF PROJECT	**$202,160,000**
ANNUAL COST	
Debt Service (3.5% for 20 years)	$14,224,000
Pumping Energy Costs	$400,000
Operation and Maintenance (O&M)	$1,100,000
LNVA Water Surface Fee	$600,000
TOTAL ANNUAL COST	**$16,324,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot	$1,316
Per 1,000 Gallons	$4.04
UNIT COSTS (After Amortization)	
Per Acre-Foot	$169
Per 1,000 Gallons	$0.52

PROJECT EVALUATION

This project benefits the City of Beaumont customers and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. The project will have no apparent impact on other state water resources. This strategy does not involve a voluntary redistribution of water that could be used to serve rural and/or agricultural areas. Ultimately, this project will enable Beaumont to provide a more reliable water supply to their various rural customers, which could benefit them from a social and economic perspective.

The project described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of supply need
Reliability	4	Moderate to highly reliable supply
Cost	3	Medium cost ($1,000 - $3,000/ac-ft)
Environmental Factors	3	Low to medium impacts
Impact on Other State Water Resources	4	Low to no impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no impacts
Other Natural Resources	4	Low to no impacts
Interbasin Transfers		No
Third Party Social & Economic Factors	4	Low to no impacts
Major Impacts on Key Water Quality Parameters	4	No known impacts
Political Feasibility	4	Local sponsorship by Beaumont. Sponsor is committed.
Implementation Issues	4	No known risks

REFERENCES

Discussions with the City of Beaumont.

Freese and Nichols, Inc. March 2024. *Water Supply Planning Study, Prepared for the City of Beaumont, Texas*

CENTER – REUSE PIPELINE

Water User Group Name:	City of Center
Strategy Name:	Reuse Pipeline to Industrial Customer
Strategy ID:	CENT-REU
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	1,121 ac-ft per year (1.5 MGD)
Implementation Decade:	2030
Development Timeline:	<5 years
Project Capital Cost:	$25,824,000 (September 2023)
Annual Cost:	$2,608,000
Unit Water Cost (Rounded):	$2,326 per ac-ft ($7.14per 1,000 gallons)

STRATEGY DESCRIPTION

The City is permitted to use the return flows from the East Bank WWTP. The City is planning a direct reuse project by means of a reuse pipeline from East Bank WWTP to serve the City's industrial customers. The total capacity for the indirect reuse project will be approximately 1 MGD (1,121 ac-ft/yr) and the project will be online in 2030. The project is currently in TCEQ study phase, and the City anticipates the plant will be in operation in the next 2 to 5 years.

SUPPLY DEVELOPMENT

Supply is readily available at the East Bank WWTP owned and operated by the City. The City has a permit to use the return flows origination from the WWTP.

ENVIRONMENTAL CONSIDERATIONS

There is positive impact on the environment as it offsets the potable demand from the industrial demand.

PERMITTING AND DEVELOPMENT

The City needs to apply for a TCEQ permit for the reuse project.

PLANNING LEVEL OPINION OF COST

Included below is a planning level opinion of cost (PLOC) for the Phase I of the pipeline from City of Center's East Bank WWTP to the industrial customer. The transmission system cost estimate also includes a 90 HP pump station, expansion of the treatment plant to treat the additional supplies. Overall, this strategy has a medium cost compared to other strategies in the 2026 East Texas Regional Water Plan.

WWP	**City of Center**				
STRATEGY:	**Reuse Pipeline to Industrial Customer**				
QUANTITY (AC-FT/YR)	**1,121**				
CAPITAL COSTS					
Pipeline to Lake Nacogdoches	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	10 in.	5,280	LF	$189	$25,139,000
Pipeline Urban	10 in.	5,280	LF	$284	$7,826,000
Right of Way Easements Rural (ROW)		2	Acres	$9,250	$24,700
Right of Way Easements Urban (ROW)		2	Acres	$435,600	$1,166,000
Engineering and Contingencies (30%)					$752,000
Subtotal of Pipeline					**$4,448,700**
Pump Station(s)					
Pump with intake & building	87 HP	1	LS	$5,601,000	$5,601,000
Power connection(s)		87	HP	$200	$75,000
Ground Storage Tank	0.19	1	EA	$680,000	$680,000
Engineering and Contingencies (35%)					$2,225,000
Subtotal of Pump Station(s)					**$8,581,000**
Water Treatment Facility					
Expand Existing Water Treatment Plant	2 MGD	1	LS	$8,706,000	$8,706,000
Engineering and Contingencies (35%)					$3,047,000
Subtotal of Storage Tanks					**$11,753,000**
Integration, Relocations, Backup Generator & Other			$ per kw	$534	$17,000
Engineering and Contingencies (35%)					$5,950
Subtotal of Integration, Relocations, Backup Generator & Other					**$22,950**
Land Acquisition and Surveying (All Facilities Excluding Pipelines)					$76,313
Environmental - Studies and Mitigation					$129,375
CONSTRUCTION TOTAL					**$25,011,000**
Interest During Construction (3.5% for 2 years with a 0.5% ROI)				12 Months	$813,000
TOTAL COST OF PROJECT					**$25,824,000**

ANNUAL COST				
Debt Service (3.5% for 20 years)				$1,817,000
Pumping Energy Costs				$26,000
Operation and Maintenance (O&M)				$400,170
Additional Treatment	365,279	1000 gal	$1.00	$365,300
TOTAL ANNUAL COST				**$2,608,000**
UNIT COSTS (Until Amortized)				
Per Acre-Foot				$2,326
Per 1,000 Gallons				$7.14
UNIT COSTS (After Amortization)				
Per Acre-Foot				$706
Per 1,000 Gallons				$2.17

PROJECT EVALUATION

City of Center already has a permit to use the return flows, so this project has the benefit of providing a renewable source of supply that is readily available in the close proximity of Lake Center. The addition of the additional 1,121 ac-ft/yr will help City of Center supply to the increasing manufacturing demand in Shelby County. City of Center believes that the manufacturing demand reflected in the regional plan is not reflective of the more aggressive growth in the manufacturing use in the region. This strategy will help meet some of the needs in the region.

The recommended strategy for infrastructure improvements was evaluated across twelve different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2026 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	3	Meets 50-75% of Shortage
Reliability	5	High reliable supply
Cost	3	$1,000 to $3,000/ac-ft (Medium)
Environmental Factors	4	Low environmental impacts
Impact on Other State Water Resources	5	High positive impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no negative impacts and/or some positive impacts
Other Natural Resources	4	Low to no negative impacts and/or some positive impacts
Interbasin Transfers		No
Third Party Social & Economic Impacts	5	High positive impacts
Major Impacts on Key Water Quality Parameters	5	High positive impacts
Political Feasibility	4	Low to no negative impacts and/or some positive impacts
Implementation Issues	4	Low to no negative impacts and/or some positive impacts

REFERENCES

Correspondence with the City of Center

HOUSTON COUNTY WCID #1– NEW GROUNDWATER WELL IN CARRIZO-WILCOX AQUIFER

Water User Group Name:	Houston County WCID #1
Strategy Name:	New Groundwater Well in Carrizo-Wilcox Aquifer
Strategy ID:	HCWC-GW
Strategy Type:	Existing Groundwater Source
Potential Supply Quantity:	3,500 ac-ft per year
Implementation Decade:	2030
Development Timeline:	< 5 years
Project Capital Cost:	$40,283,000 (September 2023)
ANNUAL COST:	$3,697,000
Unit Water Cost (Rounded):	$1,056 per ac-ft ($3.24 per 1,000 gallons)

Strategy Description

This strategy is an recommended strategy for Houston County WCID #1 to develop 22 wells in Houston County within the Carrizo-Wilcox Aquifer. This aquifer has been identified as a potential source of water in Houston County. These wells will have a maximum total yield of 4,500 gpm, and a water depth of 300 feet was assumed. A peaking factor of two was assumed for the wells, and the cost estimate includes conveyance infrastructure in order to capture the peak annual supply.

Supply Development

It is assumed that each well will have a maximum yield of 500 ac-ft/yr to meet both municipal and non-municipal demands in Houston County providing a total strategy yield of 3,500 ac-ft/yr for every decade in the planning period (2030-2080). A target yield for this strategy was set by Houston County WCID #1 in the 2021 East Texas Regional Water Plan.

Environmental Considerations

The environmental impacts from this strategy are expected to be low. However, groundwater development from this source should be evaluated for potential impacts on spring flows and base flows if surface water is in close proximity. The impact to the environment due to pipeline construction is expected to be temporary and minimal. Impacts to environmental water needs, habitat, and cultural resources are expected to be low due to the relatively low footprint of this strategy.

Permitting and Development

There are no anticipated permitting or development issues associated with this strategy.

Planning Level Opinion of Cost

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs account for 22 well, 8,20feet of well field piping, one mile of transmission pipeline, a pump station, storage tank, and a groundwater treatment system.

WWP: Houston County WCID #1 - New Wells in Carrizo-Wilcox Aquifer

WMS: Houston County, Carrizo-Wilcox Aquifer

Supply		3,500	Ac-ft/yr	2,170	gpm
Depth to Water		300	ft		
Well Depth		820	ft		
Well Yield		200	gpm		
Well Size		10	in		
Wells Needed		22			
Construction Costs		Number		Unit Cost	Total Cost
Water Wells		22		$664,430	$14,617,000
Connection to Transmission System		22		$50,000	$1,100,000
Engineering and Contingencies (30% for pipelines, 35% for other items)					$5,446,000
Subtotal of Well(s)					**$21,163,000**
Transmission System	Size	Quantity	Unit	Unit Cost	Total Cost
Pipeline - Rural	20 in.	15,840	LF	$310	$4,918,000
Pump Station	547 HP	1	EA	$5,117,000	$5,117,000
Power Connection(s)		1	EA	$200	$109,000
Ground Storage Tank	0.78 MG	1	EA	$1,008,169	$1,008,000
Easement - Rural		145	Acres	$9,250	$1,479,500
Engineering and Contingencies (30% for pipelines, 35% for other items)					$3,657,000
Subtotal for Transmission		**3**	**miles**		**16,288,500**
Integration, Relocations, Backup Generator & Other			$ per kw	$534	$109,000
Engineering and Contingencies (35%)					$38,000
Subtotal of Integration, Relocations, Backup Generator & Other					**$147,000**
Land Acquisition and Surveying (All Facilities Excluding Pipelines)					$71,225
Environmental - Studies and Mitigation					$ 154,750
Construction Total					**$37,824,475**
Interest During Construction (3.5% for 2 years with a 0.5% ROI)			24	Months	$2,459,000
TOTAL CAPITAL COST					**$40,283,000**
Debt Service (3.5% for 20 years)					$2,834,000
Operation and Maintenance (O&M)					$360,000
Transmission & Wells		1%			$206,000
Pump Station & Storage Tank		2.50%			$153,000
Misc		1%			$1,000
Disinfection		1,140,479	$0.30	per 1000 gal	$342,000
Pumping Energy Costs					$161,000
Total Annual Cost					**$3,697,000**
UNIT COSTS (First 30 Years)					

Cost per ac-ft	$1,056
Cost per 1000 gallons	$3.24
UNIT COSTS (After 30 Years)	
Cost per ac-ft	$3,696,190
Cost per 1000 gallons	$11,343.19

PROJECT EVALUATION

This strategy benefits both municipal and non-municipal users in Houston County and would have a positive impact on their water supply security. Since 2007, Houston County WCID #1 has received multiple requests for additional water supplies from entities and business including the City of Crockett, the Crockett Economic & Industrial Development Corporation, The Consolidated WSC, Nacogdoches Power, LLC, and the Houston County Judge, Erin Ford.

This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. New wells in the county will reduce demands on other water supplies in Houston County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this strategy will provide water for economic growth.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	5	3,500 ac-ft/yr Highly Reliable Supply
Reliability	3	Medium Reliable Supply
Cost	3	Medium Cost
Environmental Factors	3	Low to Medium Impacts
Impact on Other State Water Resources	4	Low to no negative impacts and/or some positive impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no negative impacts and/or some positive impacts
Other Natural Resources	4	Low to no negative impacts and/or some positive impacts
Interbasin Transfers		No
Third Party Social & Economic Factors	4	Low to no negative impacts and/or some positive impacts
Major Impacts on Key Water Quality Parameters	4	Low to no negative impacts and/or some positive impacts
Political Feasibility	4	Sponsor Identified
Implementation Issues	3	Low implementation issues

REFERENCES

2026 East Texas Regional Water Plan.

SHELBY COUNTY MANUFACTURING – PURCHASE FROM CENTER

Water User Group Name:	Manufacturing, Angelina County
Strategy Name:	Purchase from Center
Strategy ID:	SHEL-MFG
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	850 - 1,330 ac-ft per year (0.8 - 1.2 MGD)
Implementation Decade:	2030
Development Timeline:	< 5 years
Project Capital Cost:	$90,393,000 (September 2023)
Annual Cost:	$79,104,000
Unit Water Cost (Rounded):	$2,440 per ac-ft ($7.49 per 1,000 gallons)

STRATEGY DESCRIPTION

Manufacturing water users in Shelby County were identified to have a need for approximately 850 ac-ft per year in 2030 and 1,330 ac-ft per year by 2080. In order to meet this need, a recommended water management project is included for individual manufacturers to enter into a contract with the City of Center for raw water from their system, as their permit allows. Most of the need identified is associated with projected growth in manufacturing demand in Shelby County over the planning horizon. Thus, generalized estimates of infrastructure needed to access supplies from Center are included as part of this strategy. Ultimately, individual manufacturing entities will need to develop infrastructure based on their individualized needs for water supply. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water. Ultimately, this cost will need to be negotiated between individual manufacturers and Lufkin and will reflect their wholesale water rates at that time.

SUPPLY DEVELOPMENT

The strategy recommended for Shelby County manufacturing is assumed to be equal to the need projected for this entity during the planning period (2030-2080). The contract with Center required for this strategy increases their supply by approximately 850 ac-ft per year beginning in 2030 and increases over time to approximately 1,330 ac-ft per year by 2080. These supplies are considered highly reliable; however, the supply is dependent on coordination with the City of Center.

ENVIRONMENTAL CONSIDERATIONS

There are not any significant environmental considerations associated with this strategy. The environmental impacts of developing infrastructure are site-specific and will be dependent upon the location and size of the project. Site-specific evaluations of potential impacts to the environment from construction activities will need to be conducted by individual entities. A contract between manufacturers in Shelby County and the City of Center are anticipated to have a minimal impact on environmental water needs, low impact to the surrounding habitat, and a low impact to cultural resources in the area. The potential impact to surrounding habitat and cultural resources will need to be evaluated by entities on a project-specific basis. There is no impact expected on bays or estuaries associated with this strategy since it is in Shelby County.

PERMITTING AND DEVELOPMENT

There are no anticipated permitting or development issues associated with this strategy. There may be some minor permitting related to construction of the infrastructure required associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. Generalized estimates of conveyance infrastructure to access and deliver supply from Center, including pipeline, intake pump stations, and storage, are included as part of this strategy. A regional rate for raw surface water was used for the purchase costs ($1.00 per 1,000 gallons).

JACKSONVILLE – LAKE COLOMBIA PIPELINE

Water User Group Name:	City of Jacksonville
Strategy Name:	Lake Columbia Pipeline
Strategy ID:	JACK-COL
Strategy Type:	New Surface Water Source
Potential Supply Quantity:	1,700 ac-ft per year (2.27 MGD)
Implementation Decade:	2050
Development Timeline:	<5 years
Project Capital Cost:	$67,185,000 (September 2023)
Annual Cost:	$6,428,000
Unit Water Cost (Rounded):	$3,781 per ac-ft ($11.60 per 1,000 gallons)

STRATEGY DESCRIPTION

Lake Columbia is a water management strategy for Angelina Nacogdoches River Authority. Angelina Neches River Authority has contracts with several customers that are participants in the project development. The City of Jacksonville is included in the list, participating at five percent contribution. It is assumed that Jacksonville will be purchasing raw water from Angelina Neches River Authority. City of Jacksonville will need a transmission project to transfer supplies from Lake Columbia to the City. The water management strategy associated with the transmission project is discussed in this tech memo. The current contract amount for the City of Jacksonville is 4,275 acre-feet. However, City of Jacksonville currently does not have any supply shortages and is also not expecting tremendous growth in the recent future. For these reasons, it is assumed that the transmission strategy will be developed in phases with the first phase for a potential supply of 1,700 ac-ft/yr (2.27 MGD). The tech memo discussion is associated with the Phase I of the transmission project. Additional phases will be developed at a later stage. The transmission project will include a 5-mile pipeline from Lake Columbia to the City, an intake pump station, and a 3-MGD water treatment plant to treat the supplies before delivery. Figure included at the end of the tech memo show the location map of the project and a preliminary pipeline corridor for the transmission system.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the water requested by the City of Jacksonville as part of their long-term planning. This is equal to 1,700 ac-ft/yr beginning in 2050 and continuing through the end of the planning period, 2080. The reliability of this water supply is considered high due to the potential availability of water from the new Lake Columbia system.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be moderate.

PERMITTING AND DEVELOPMENT

No additional permitting issues associated with the project. The project will commence after the commencement of the Lake Columbia project by Angelina Neches River Authority.

PLANNING LEVEL OPINION OF COST

Included below is a planning level opinion of cost (PLOC) for Phase I of the pipeline from Lake Columbia to City of Jacksonville. Costs are estimated for half-mile of pipeline in urban areas and 4.5 miles of pipeline in rural areas. The transmission system cost estimate also includes the cost of 190 HP intake pump station and a 3 MGD water treatment plant for treating the raw water. The annual costs are calculated assuming 3.5% interest rate and 20 years of return period. The estimate includes the cost for the purchase of raw water from Angelina Neches River Authority. Overall, this strategy has a medium cost compared to other strategies in the 2026 East Texas Regional Water Plan.

WWP NAME: **Jacksonville**
STRATEGY: **Lake Columbia Pipeline**
Quantity for Phase I **1,700** AF/Y

CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	12 in.	23,544	LF	$214	$5,033,000
Pipeline Urban	12 in.	3,000	LF	$321	$962,000
Right of Way Easements Rural (ROW)		11	Acres	$9,250	$110,000
Right of Way Easements Urban (ROW)		1	Acres	$435,600	$660,000
Engineering and Contingencies (30%)					$1,799,000
Subtotal of Pipeline					**$8,564,000**
Pump Station(s)					
Pump with intake & building	190 HP	1	LS	$8,238,000	$8,238,000
Power connection(s)		190	HP	$200	$75,000
Storage Tanks	0.28 MG	1	EA	$734,000	$734,000
Engineering and Contingencies (35%)					$3,166,000
Subtotal of Pump Station(s)					**$12,213,000**
Water Treatment Facility					
New Water Treatment Plant	3 MGD	1	LS	$32,557,000	$32,557,000
Engineering and Contingencies (35%)					$11,394,950
Subtotal of WTP					**$43,951,950**
Integration, Relocations, Backup Generator & Other			$ per kw	$534	$33,000
Engineering and Contingencies (35%)					$12,000
Subtotal of Integration, Relocations, Backup Generator & Other					**$45,000**
Land Acquisition and Surveying (All Facilities Excluding Pipelines)					$76,313
Environmental - Studies and Mitigation					$219,879
CONSTRUCTION TOTAL					**$65,070,000**
Interest During Construction (3.5% for 1 years with a 0.5% ROI)			12	Months	$2,115,000
TOTAL COST					**$67,185,000**
ANNUAL COSTS					
Debt Service (3.5% for 20 years)					$4,727,000
Pumping Energy Costs					$49,000
Operation and Maintenance (O&M)					$1,098,330
Raw Water Purchase			1000 gal	$1.00	$554,000
Total Annual Costs					**$6,428,000**

UNIT COSTS (Until Amortized)	
Per Acre-Foot of treated water	$3,781
Per 1,000 Gallons	$11.60
UNIT COSTS (After Amortization)	
Per Acre-Foot	$1,001
Per 1,000 Gallons	$3.07

PROJECT EVALUATION

Based on the analysis provided above, the Lake Columbia to Jacksonville Raw Water Transmission System project was evaluated across twelve different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	5	Exceeds Shortage
Reliability	4	Medium to High reliable supply
Cost	2	$3,000 to $5,000/ac-ft (Medium-High)
Environmental Factors	3	Low to medium impacts
Impact on Other State Water Resources	4	Low to no negative impacts and/or some positive impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no negative impacts and/or some positive impacts
Other Natural Resources	4	Low to no negative impacts and/or some positive impacts
Interbasin Transfers		No
Third Party Social & Economic Impacts	4	Low to no negative impacts and/or some positive impacts
Major Impacts on Key Water Quality Parameters	4	Low to no negative impacts and/or some positive impacts
Political Feasibility	4	Low to no negative impacts and/or some positive impacts
Implementation Issues	3	Low to medium implementation issues

REFERENCES

2026 East Texas Regional Water Plan.

LNVA – NECHES PUMP STATION UPGRADES AND FUEL DIVERSIFICATION

Water User Group Name:	Lower Neches Valley Authority
Strategy Name:	Neches Pump Station Improvements
Strategy ID:	LNVA-NPS
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	161,500 ac-ft per year (144 MGD)
Implementation Decade:	2030
Development Timeline:	2-4 years
Project Capital Cost:	$66,948,000 (September 2023)
Project ANNUAL COST:	$5,681,000
Unit Water Cost (Rounded):	$35 per ac-ft ($0.11 per 1,000 gallons)

STRATEGY DESCRIPTION

This is a recommended strategy for the Lower Neches Valley Authority (LNVA) that includes improvements to pump stations on their Neches River canal system in Jefferson County. LNVA serves municipal, agricultural, and industrial customers in Jefferson County through their canal systems. These canal systems are fed by intake pump stations. During Hurricane Harvey, the Neches First Lift Pump Stations and canal lift pump stations were flooded, requiring alternate measures to deliver water to LNVA customers. The Lower Neches Valley Authority is planning to construct a new pump station above the flood of record to improve resiliency and mitigate the risk to public health and safety. This will result in a dependable water supply during disaster events for the Cities of Port Arthur, Groves, Nederland, Port Neches, West Jefferson County MUD and Beaumont and other agricultural and industrial customers throughout Jefferson County.

This project includes constructing a new 200,000 gpm pump station at the Neches First Lift Pump Station with new pumps driven by electric motors with back-up diesel generators at a location that is less susceptible to flooding events. LNVA’s existing 1930’s pump station at Neches First Lift is driven only by natural gas engines and is within a building that is not able to be flood-proofed against the flood of record. In addition, this project involves a new 100,000 gpm pump and electric motor installed at the Neches Second Lift Pump Station, as well as a diesel generator for backup power. In addition to floodproofing their 1930’s pump station, this project will diversify LNVA’s fuel needs and provide back-up pumping capacity in case there is loss of natural gas to the facility.

SUPPLY DEVELOPMENT

The LNVA Neches Pump Station Rehabilitation project will increase deliverable supplies from existing sources and will not require a new water right appropriation. The new facility will add a total capacity of 300,000 gpm at Neches First and Second Lift Pump Stations, resulting in an additional 100,000 gpm (approximately 161,500 ac ft/yr) of firm pumping capacity.

ENVIRONMENTAL CONSIDERATIONS

The enhanced infrastructure from this project will facilitate an increase in diversion capacity for the LNVA Neches River canal system. Impacts on instream flows and bay and estuary flows are anticipated to be minimal, as the proposed project increases supply from LNVA’s existing water rights to levels observed in prior historic conditions. This project does not develop new surface water supply sources. Diversions will be made using existing water rights at existing diversion locations, so this strategy should have a minimal impact on environmental water needs.

Construction of infrastructure may result in some surface disturbance that could require mitigation; however, this is expected to be minimal as the proposed infrastructure has limited footprint and will be developed on LNVA's existing pump station sites and/or adjacent to existing facilities. Therefore, it is anticipated to have low to no impact to any surrounding habitat and/or cultural resources in the area.

PERMITTING AND DEVELOPMENT

The development of this strategy may require some permitting due to surface disturbance from construction of the infrastructure included in this project. This impact is expected to be minimal as the proposed infrastructure has limited footprint and will be developed on LNVA's existing pump station site and/or adjacent to existing facilities. The supply source is provided through LNVA's existing water rights and diversion points on the Neches River. Permitting for either new or amended water rights will not be required for this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this project includes costs from all aspects, including planning, design, real estate, environmental and permitting, and construction of infrastructure. Projected capital cost estimates were provided by LNVA. The annual cost was estimated assuming a debt service at a rate of 3.5 percent for 20 years, in accordance with TWDB regional water planning cost assumptions. Costs are presented in September 2023 costs.

WWP:	**Lower Neches Valley Authority**		
STRATEGY:	**Neches Pump Station Upgrade and Fuel Supply Diversification**		
QUANTITY (AC-FT/YR):	**161,500**		
CAPITAL COST			**Cost**
Planning			$412,000
Design			$7,645,000
Real Estate			$0
Environmental			$235,000
Permitting			$147,000
Construction			$38,813,000
Engineering and Contingencies (35%)			$13,585,000
CONSTRUCTION TOTAL			**$61,000,000**
Interest During Construction (3.5% for 3 years with a 0.5% ROI)	36	Months	$5,948,000
TOTAL COST OF PROJECT			**$66,948,000**
ANNUAL COST			
Debt Service (3.5% for 20 years)			$4,711,000
Operation and Maintenance (O&M)			$970,000
TOTAL ANNUAL COST			**$5,681,000**
UNIT COSTS (Until Amortized)			
Per Acre-Foot			$35
Per 1,000 Gallons			$0.11
UNIT COSTS (After Amortization)			
Per Acre-Foot			$6
Per 1,000 Gallons			$0.02

PROJECT EVALUATION

This strategy benefits both municipal and non-municipal customers of the Lower Neches Valley Authority and would have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. The strategy will have no other apparent impact on other State water resources. This strategy does not involve a voluntary redistribution of water that could be used to serve rural and/or agricultural areas. Ultimately, this strategy will enable LNVA to provide a more reliable water supply to their various rural and agricultural customers, which could benefit them from a social and economic perspective.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	5	No shortage identified for LNVA. Infrastructure would allow them to access surplus supply and add resiliency to their system

Criteria	Rating	Explanation
Reliability	4	Medium to highly reliable supply
Cost	4	Low cost (< $1,000/ac-ft)
Environmental Factors	3	Low to medium impacts
Impact on Other State Water Resources	5	Increases ability for LNVA to deliver reliable supplies to their customers, including those with projected needs
Threat to Agricultural Resources/Rural Areas	4	Low to no known impacts
Other Natural Resources	4	No known impacts
Interbasin Transfers		No
Third Party Social & Economic Factors	4	No known impacts
Major Impacts on Key Water Quality Parameters	4	No known impacts
Political Feasibility	5	Sponsorship by Lower Neches Valley Authority. Sponsor is committed.
Implementation Issues	4	No known risks

REFERENCES

Discussions with Lower Neches Valley Authority.

Lower Neches Valley Authority. 2020. *Community Development Block Grant – Mitigation (CDBG-MIT) Funding Application for Neches Lift Pump Stations Project.*

LNVA – DEVERS PUMP STATION RELOCATION

Water User Group Name:	Lower Neches Valley Authority
Strategy Name:	Devers Pump Station Relocation (Region H)
Strategy ID:	LNVA-DPS
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	88,704 ac-ft/yr (79 MGD)
Implementation Decade:	2030
Development Timeline:	1-2 years
Project Capital Cost:	$21,338,000 (September 2023)
Project ANNUAL COST:	$1,883,000
Unit Water Cost (Rounded):	$21 per ac-ft ($0.07 per 1,000 gallons)

STRATEGY DESCRIPTION

The Lower Neches Valley Authority (LNVA) is a major water supplier to irrigators in the eastern portion of Region H, including rice production in Chambers and Liberty County. A substantial portion of this supply is provided through LNVA's Devers Canal System, which diverts water from the Trinity River at the Devers 1st Pump Station near Moss Bluff, TX for conveyance through a canal network to points of use. To meet the needs of current and future customers and increase deliverable supply in this area, LNVA has identified the need to develop a new Devers 1st Pump Station. The new pump station will be located adjacent to the current pump station, limiting the required permitting and the need to develop an additional conveyance to connect to existing canal infrastructure.

The proposed infrastructure associated with this strategy will increase pumping capacity to allow existing LNVA-owned or contracted surface water supply to be diverted from the Trinity River and delivered to LNVA's customers. Major project components include development of a new intake structure, high-capacity pump station, and discharge structures to connect the pump station to the Devers Canal System.

SUPPLY DEVELOPMENT

The LNVA Devers Pump Station Relocation project will increase deliverable supplies from existing sources and will not require a new water right appropriation. The new facility has a planned capacity of 200,000 gpm, resulting in an additional 55,000 gpm (88,704 ac ft/yr) of reliable pumping capacity.

ENVIRONMENTAL CONSIDERATIONS

The enhanced infrastructure will facilitate an increase in diversion capacity for the LNVA Devers Canal system. Impacts on instream flows and bay and estuary flows are anticipated to be minimal, as the proposed project increases supply from existing water rights to levels observed in prior historical conditions; the project does not develop new surface water sources. Diversions will be made using existing water rights at existing diversion locations, so this strategy should have a minimal impact on environmental water needs.

Infrastructure development may result in some surface disturbance from construction that could require mitigation; however, this is expected to be minimal as the proposed infrastructure has a limited footprint and will be developed on LNVA's existing property adjacent to existing facilities. Therefore, this strategy is anticipated to have low to no impact on any surrounding habitat and/or cultural resources in the area.

PERMITTING AND DEVELOPMENT

The supply source is provided through LNVA's existing water rights and authorized diversion points on the Trinity River. Permitting for either new or amended water rights will not be required for this strategy. The development of this strategy may require some permitting due to surface disturbance from the construction of the infrastructure included in this project. This impact is expected to be minimal as the proposed infrastructure has a limited footprint and will be developed on LNVA's existing property in close proximity to existing facilities.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this project includes costs from all aspects, including planning, design, real estate, environmental and permitting, and infrastructure construction. Projected capital cost estimates were provided by LNVA. The annual cost was estimated assuming a debt service at a rate of 3.5 percent for 20 years, in accordance with TWDB regional water planning cost assumptions. Costs are presented in September 2023 costs.

WWP	**Lower Neches Valley Authority**	
STRATEGY	**Devers Pump Station Improvement (Region H)**	
QUANTITY (AC-FT/YR)	**88,704**	
CAPITAL COST		
Construction Cost		$15,262,337
Engineering and Contingencies (35%)		$5,342,000
Land Acquisition and Surveying		$6,000
Environmental - Studies and Mitigation		$59,195
CONSTRUCTION TOTAL		**$20,670,000**
Interest During Construction (3.5% for 3 years with a 0.5% ROI)		$668,717
TOTAL COST OF PROJECT		**$21,338,000**
ANNUAL COST		
Debt Service (3.5% for 20 years)		$1,501,000
Pumping Energy Costs		$0
Operation and Maintenance (O&M)		$381,558
TOTAL ANNUAL COST		**$1,883,000**
UNIT COSTS (Until Amortized)		
Per Acre-Foot		$21
Per 1,000 Gallons		$0.07
UNIT COSTS (After Amortization)		
Per Acre-Foot		$4
Per 1,000 Gallons		$0.01

PROJECT EVALUATION

This strategy benefits both municipal and non-municipal customers of the Lower Neches Valley Authority in Region H and would have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. The strategy will have no other apparent impact on other State water resources. This strategy does not involve a voluntary redistribution of water that could be used to serve rural and/or agricultural areas. Ultimately, this strategy will enable LNVA to provide a more reliable water supply to their various rural and agricultural customers, which could benefit them from a social and economic perspective.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	5	No shortage identified for LNVA. Infrastructure would allow them to access surplus supply and add resiliency to their system
Reliability	4	Medium to highly reliable supply
Cost	4	Low cost (< $1,000/ac-ft)
Environmental Factors	3	Low to medium impacts
Impact on Other State Water Resources	5	Increases ability for LNVA to deliver reliable supplies to their customers, including those with projected needs
Threat to Agricultural Resources/Rural Areas	4	Low to no known impacts
Other Natural Resources	4	No known impacts
Interbasin Transfers		No
Third Party Social & Economic Factors	4	No known impacts
Major Impacts on Key Water Quality Parameters	4	No known impacts
Political Feasibility	5	Sponsorship by Lower Neches Valley Authority. Sponsor is committed.
Implementation Issues	4	No known risks

REFERENCES

Discussions with Lower Neches Valley Authority.

2021 Region H Water Plan, Amendment No. 1. August 2023.

2026 Region H Initially Prepared Plan. March 2025.

LNVA – BEAUMONT WEST REGIONAL RESERVOIR

Water User Group Name:	Lower Neches Valley Authority
Strategy Name:	Beaumont West Regional Reservoir
Strategy ID:	LNVA-WRR
Strategy Type:	New Surface Water Source
Potential Supply Quantity:	7,700 ac-ft per year (6.9 MGD)
Implementation Decade:	2030
Development Timeline:	5 years
Project Capital Cost:	$110,438,000 (September 2023)
Project ANNUAL COST:	$6,084,000
Unit Water Cost (Rounded):	$790 per ac-ft ($2.42 per 1,000 gallons)

STRATEGY DESCRIPTION

This recommended strategy involves the Lower Neches Valley Authority (LNVA) constructing an approximate 1,100-acre, off-channel reservoir on the northwest end of Beaumont in the Neches River Basin. The location of the reservoir provides LNVA with a significant advantage in providing water in case of an emergency fire water demand, source pollution in the Neches River or Pine Island Bayou, or losses of either of the Lower Neches Valley Authority pumping stations in severe events, such as what occurred during Hurricane Harvey.

SUPPLY DEVELOPMENT

The reservoir is anticipated to have an approximate capacity of 7,700 acre-feet, which could supply a minimum of 10 days of storage that could be utilized to serve LNVA's customers in case of flood inundation or loss of power at their pump stations. This reservoir is located so that stored water can be provided to customers across the LNVA system during disaster events, including the cities of Port Arthur, Groves, Nederland, Port Neches, West Jefferson County MUD, Beaumont, and other agricultural and industrial customers throughout Jefferson County.

ENVIRONMENTAL CONSIDERATIONS

With the construction of any new reservoir, several environmental impacts will be considered. A summary of environmental considerations would need to be developed based on the known environmental factors, such as habitat and aquatic resources for threatened or endangered species within surrounding the reservoir footprint. Environmental flow considerations and how the construction of a reservoir affects the surrounding hydrologic environment are other considerations. There are no bays or estuaries in close proximity to the project area located in Jefferson County. Before this project is developed, the Lower Neches Valley Authority will need to perform additional studies to identify environmental impacts associated with the project.

PERMITTING AND DEVELOPMENT

Several environmental permits and permitting activities may be needed prior to construction of this project, including a U.S. Army Corps of Engineers (USACE) Section 404 Permit and ancillary studies by the U.S. Fish and Wildlife Service (USFWS) and Texas Parks and Wildlife (TPWD). Diversions to fill the reservoir will utilize the diversions authorized under LNVA's existing water right permits, so a water right amendment is not required. However, LNVA may choose to pursue amendments to their water rights to authorize additional off-channel storage or bed-and-banks authority to increase flexibility within their system.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this project includes costs from all aspects, including planning, design, real estate, environmental and permitting, and construction of the reservoir. Projected capital cost estimates were provided by LNVA. The annual cost was estimated assuming a debt service at a rate of 3.5 percent for 40 years for a reservoir, in accordance with TWDB regional water planning cost assumptions. Costs are presented in September 2023 costs.

WWP	**Lower Neches Valley Authority**
STRATEGY	**Beaumont West Regional Reservoir**
QUANTITY (AC-FT/YR)	**7,700**
RESERVOIR STORAGE CAPACITY (1 day of storage = 1,100 AC-FT)	
CAPITAL COST	**Cost**
Planning	$418,000
Design	$2,032,000
Real Estate	$10,759,000
Environmental	$179,000
Permitting	$179,000
Construction	$60,409,000
Engineering and Contingencies (30%)	$7,545,000
CONSTRUCTION TOTAL	**$95,000,000**
Interest During Construction (3.5% for 5 years with a 0.5% ROI)	$15,538,000
TOTAL COST OF PROJECT	**$110,438,000**
ANNUAL COST	
Debt Service (3.5% for 40 years)	$5,172,000
Operational Costs	$912,000
TOTAL ANNUAL COST	**$6,084,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot of treated water	$790
Per 1,000 Gallons	$2.42
UNIT COSTS (After Amortization)	
Per Acre-Foot	$118
Per 1,000 Gallons	$0.36

PROJECT EVALUATION

This strategy benefits both municipal and non-municipal customers of the Lower Neches Valley Authority and would have a positive impact on their water supply security. This analysis did not identify any impacts natural resources or to key parameters of water quality. The reservoir site may impact agricultural and/or rural land, but it will provide a water supply benefit to agricultural and/or rural water users served by LNVA. The strategy will have no other apparent impact on other State water resources. This strategy does not involve a voluntary redistribution of water that could be used to serve rural and/or agricultural areas. Ultimately, this strategy will enable LNVA to provide a more reliable water supply to their various rural and agricultural customers, which could benefit them from a social and economic perspective.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	5	No shortage identified for LNVA. Reservoir would provide surplus supply and add resiliency to their system
Reliability	4	Medium to high reliable supply
Cost	4	Low cost (< $1,000/ac-ft)
Environmental Factors	2	Medium impacts
Impact on Other State Water Resources	4	Low to no known impact. Provides a water supply benefit to water users served through LNVA system in case of emergencies
Threat to Agricultural Resources/Rural Areas	3	Low to medium impact. May impact agricultural and/or rural land, but could provide additional water supply security for those water users
Other Natural Resources	4	Low to no known impacts
Interbasin Transfers		No
Third Party Social & Economic Factors	4	Low to no known impacts. Could provide additional water supply security for agricultural and rural water users served by LNVA
Major Impacts on Key Water Quality Parameters	4	Low to no known impacts
Political Feasibility	5	Sponsorship by Lower Neches Valley Authority. Strategy is in development.
Implementation Issues	3	Limited risk; requires permits and coordination with state/federal agencies

REFERENCES

Discussions with Lower Neches Valley Authority.

Project Budget Justification Developed for The Lower Neches Valley Authority, Freese and Nichols, Inc. 2020.

LNVA – NECHES-TRINITY BASIN INTERCONNECT

Water User Group Name:	Lower Neches Valley Authority
Strategy Name:	Neches-Trinity Basin Interconnect
Strategy ID:	LNVA-NTI
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	67,000 ac-ft per year (60 MGD)
Implementation Decade:	2040
Development Timeline:	15 years
Project Capital Cost:	$127,826,000 (September 2023)
Project ANNUAL COST:	$11,065,000
Unit Water Cost (Rounded):	$165 per ac-ft ($0.51 per 1,000 gallons)

STRATEGY DESCRIPTION

The Lower Neches Valley Authority (LNVA) is planning to construct an approximate 13-mile, single 84-inch pipeline that runs in an east-west direction, as well as a 62,000-gpm pump station. The proposed pipeline enables the movement of Neches River water westward toward the upper reaches of the Devers Canal system and potentially back into the Trinity River. The intake for the canal is on the Pine Island Bayou in the Neches River (Region I), but the connection point of the pipeline to LNVA's canal system is located within the Neches-Trinity Coastal Basin. The water from this strategy will enable LNVA to provide water for irrigation customers in Region H, as well as to serve new industries as they emerge along the IH-10 corridor. The cost estimated for the project includes infrastructure and operational costs related to water conveyance. Ultimately, individual water users will need to enter into contracts with LNVA to purchase water supply generated from this strategy. The cost for raw water will need to be negotiated with LNVA and will reflect the wholesale water rates at the time a contract is made.

SUPPLY DEVELOPMENT

The purpose of this water management strategy is to allow the Lower Neches Valley Authority to divert existing supply to areas with greater water needs and plan for water needs in areas of future development. The estimated quantity of supply from this strategy is 67,000 ac-ft per year by 2040, which represents LNVA's estimate of the average volume of water that could be conveyed through the pipeline. The reliability of this supply is considered high due to the availability of water in the Neches River.

ENVIRONMENTAL CONSIDERATIONS

The construction of the pipeline and pump station is expected to have a moderate impact on the environment. The route would be selected to minimize impacts to the environment. In addition, the transport of water from the Neches River westward should have a minimal impact on environmental water needs, no impact on the surrounding habitat, and a low impact to cultural resources in the area. Water transfers may also act as a potential route for exotic or invasive species to be introduced to another river basin. Potential impacts and evaluation of opportunities to avoid or mitigate impacts would be expected during the projected planning and design process. There are no bays or estuaries in close proximity to the project area located in Jefferson and Orange Counties. Before this project is pursued, the Lower Neches Valley Authority may need to perform additional studies to identify environmental impacts associated with the project.

PERMITTING AND DEVELOPMENT

The Lower Neches Valley Authority may need to apply for a bed and banks permit to discharge and transport supplies in the Devers Canal system and possibly the Trinity River. Additionally, there may be some permitting for the construction of the infrastructure associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this project includes costs from all aspects, including planning, design, real estate, environmental and permitting, and construction of infrastructure. Projected capital cost estimates were provided by LNVA. The annual cost was estimated assuming a debt service at a rate of 3.5 percent for 20 years, in accordance with TWDB regional water planning cost assumptions. Costs are presented in September 2023 costs.

WWP	**Lower Neches Valley Authority**	
STRATEGY	**Neches-Trinity Basin Interconnect**	
QUANTITY	**67,000 AFY**	
CAPITAL COST		**Cost**
Planning		$1,811,000
Design		$8,210,000
Real Estate		$4,226,000
Environmental		$2,415,000
Permitting		$2,415,000
Construction	13 mile 84" pipeline, 62,000 gpm pump station	$64,591,000
Engineering and Contingencies (30% for the pipeline and 35% for all other facilities)		$25,100,000
CONSTRUCTION TOTAL		**$108,768,000**
Interest During Construction (3.5% for 5 years with a 0.5% ROI)		$19,057,922
TOTAL COST OF PROJECT		**$127,826,000**
ANNUAL COST		
Debt Service (3.5% for 20 years)		$8,994,000
Operation and Maintenance (O&M)		$895,000
Pumping Energy Costs		$1,175,820
TOTAL ANNUAL COST		**$11,065,000**
UNIT COSTS (Until Amortized)		
Per Acre-Foot		$165
Per 1,000 Gallons		$0.51
UNIT COSTS (After Amortization)		
Per Acre-Foot		$31
Per 1,000 Gallons		$0.09

PROJECT EVALUATION

This strategy benefits irrigation customers of the Lower Neches Valley Authority and would have a positive impact on their water supply security. Additionally, this strategy could potentially be used to benefit industrial and/or municipal customers. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. The strategy will have no other apparent impact on other State water resources. This strategy involves a voluntary redistribution of water that could be used to serve rural and/or agricultural areas in the Neches River Basin. However, the supply associated with this strategy is relatively small compared to LNVA's surplus supply available in the Neches River Basin and it enables LNVA to serve rural and/or agricultural customers in the Trinity River Basin.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	5	No shortage identified for LNVA. Strategy would provide surplus supply to irrigation and potential municipal/industrial customers in Region H
Reliability	4	Medium to highly reliable supply
Cost	4	Low cost (< $1,000/ac-ft)
Environmental Factors	2	Medium impact. Impacts along the pipeline route can be mitigated during development.
Impact on Other State Water Resources	3	Low to medium impact. Strategy involves transfer of water from Neches to Trinity River basins, which will reduce some water available in basin of origin.
Threat to Agricultural Resources/Rural Areas	5	Provides additional water supply to agricultural and rural water users
Other Natural Resources	3	Low to medium impacts
Interbasin Transfers		Yes. Transfer from the Neches River Basin to the Trinity River Basin.
Third Party Social & Economic Impacts	4	Some positive impacts. Involves voluntary redistribution of surplus supply in Neches River Basin to Trinity River Basin to provide supply to agricultural and rural water users
Major Impacts on Key Water Quality Parameters	4	Low to no known impacts
Political Feasibility	5	Sponsorship by Lower Neches Valley Authority. Sponsor is committed.
Implementation Issues	3	Limited risk; implementation may be dependent on permitting through TCEQ

REFERENCES

2026 Region H Initially Prepared Plan. March 2025.

Discussions with Lower Neches Valley Authority.

LNVA – PURCHASE FROM SRA

Water User Group Name:	Lower Neches Valley Authority
Strategy Name:	Purchase from Sabine River Authority (Toledo Bend)
Strategy ID:	LNVA-SRA
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	200,000 ac-ft per year (178.4 MGD)
Implementation Decade:	2050
Development Timeline:	15-20 years
Project Capital Cost:	$451,797,000 (September 2023)
ANNUAL COST:	$102,526,000
Unit Water Cost (Rounded):	$513 per ac-ft ($1.57 per 1,000 gallons)

STRATEGY DESCRIPTION

A recommended strategy for the Lower Neches Valley Authority (LNVA) involves entering into a contract with the Sabine River Authority (SRA) to obtain raw surface water from the Toledo Bend system in the Sabine River Basin, as their permit allows. This strategy includes a high-level concept for transmission of water from the Toledo Bend system through canal conveyance to diversion points in the Neches River Basin. Costs are estimated for the cost of raw water and infrastructure related to water conveyance. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water. Ultimately, this cost will need to be negotiated between LNVA and SRA and will reflect their wholesale water rates at that time. Additionally, individual water users will need to enter into contracts with LNVA to purchase water supply generated from this strategy. The cost for raw water will need to be negotiated with LNVA and will reflect the wholesale water rates at the time a contract is made.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the water requested by the Lower Neches Valley Authority as part of their long-term planning. This is equal to 200,000 ac-ft per year beginning in 2050 and continuing through the end of the planning period (2080). The reliability of this water supply is considered medium to high due to the availability of water from the Toledo Bend system. However, this project is dependent on coordination with the Sabine River Authority.

ENVIRONMENTAL CONSIDERATIONS

The impact on the environment due to construction of infrastructure required for this strategy is expected to be medium. A project of this magnitude may encounter environmental challenges that would need to be resolved during planning, design, and construction. To the extent possible, existing canal conveyances could be utilized in order to mitigate the disturbance to the environment, including surrounding habitat, threatened and endangered species, and/or cultural resources. Before this project could be pursued, the

Lower Neches Valley Authority would need to perform site selection and routing studies to identify potential environmental impacts and obstacles associated with this project.

Development of this project would also need to consider opportunities to address the potential for introduction of exotic or invasive species into other river basins. For example, invasive aquatic species, including the giant salvinia (*Salvinia molestal*), have been discovered in the Toledo Bend Reservoir. Additionally, environmental flows will be impacted by the transfer of water from the Sabine River Basin to the Neches River Basin. These impacts will be determined during the interbasin transfer permitting process outside of the terms granted under existing permits.

There are no bays or estuaries in close proximity to the potential project area located in Jefferson and Orange Counties. Transfer of water from the Sabine to the Neches River Basin would have an impact on freshwater inflows that could serve environmental needs and bays and estuaries downstream; however, these impacts will be determined and would be mitigated through the TCEQ permitting process.

PERMITTING AND DEVELOPMENT

The Sabine River Authority holds existing water right permits for storage and appropriation of water in the Sabine River Basin. SRA is currently authorized to transfer a combined total of up to 110,000 acre-feet per year of this supply to the Neches River Basin for multiple purposes (Certification of Adjudication (COA) 05-4658 and 05-4662). Amendments to permits would be required to transfer the volume of supply assumed for this strategy (200,000 ac-ft per year). Additionally, unappropriated flows may also be permitted in excess of these supplies and conveyed out of the basin for the purpose of this project.

These permits would require a process with the Texas Commission on Environmental Quality (TCEQ) to make additional water supply available for this project. Use of this water through interbasin transfer is administered under Section 11.085 of the Texas Water Code, which includes several requirements to obtain necessary permits such as:

- Providing the cost of water, category of use and proposed users, and cost of diverting, conveying, distributing, supplying, and treating the water for proposed users.
- Conducting required public meetings in the basin of origin and the receiving basin.
- Providing notice of an application to permit holders, county judges, city mayors, and groundwater conservation districts in the basin of origin, and state legislators in both basins.
- Publishing notice of application in newspapers of general circulation in each county in both basins.
- Consideration of comments received through the permit application's public process.

In granting the permit, consideration will be given to:

- The need for water in the basin of origin and receiving basin.
- The availability of alternative water supplies to the receiving basin.
- The purpose of use for the water in the receiving basin.
- Proposed methods for avoiding waste and implementing water conservation and drought contingency measures.
- Proposed methods to put transferred water to beneficial use.
- The projected economic impacts.
- Impacts to existing water rights, instream uses, water quality, aquatic and riparian habitat, and

bays and estuaries.
- The proposed mitigation to the basin of origin.
- The continued need to use the water for purposes under the existing water right, if an amendment to an existing water right is sought.

Finally, the commission may grant the application only to the extent that:

- The detriments to the basin of origin are less than the benefits to the receiving basin.
- The applicant has prepared a drought contingency plan and has developed and implemented a water conservation plan that will result in the highest practicable level of conservation and efficiency.

Additional environmental permitting may also be required for the development of infrastructure, including but not limited to:

- U.S. Army Corps of Engineers Section 404 Permit and mitigation plan.
- National Environmental Policy Act (NEPA) Environmental Impact Statement (EIS).
- Cultural Resources Survey and National Register of Historic Places (NRHP) testing.
- Ancillary studies as directed by the Texas Parks and Wildlife (TPWD) and U.S. Fish and Wildlife Service (USFWS).

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assume approximately 20 miles of open-channel canals and siphon structures to cross major highways, roads, and existing canals, one pump station with an intake, and balancing storage. The annual cost was estimated assuming a debt service of 3.5% for 20 years and using the East Texas Regional Water Planning Area regional rate for raw surface water.

WWP	**Lower Neches Valley Authority**				
STRATEGY	**Purchase from Sabine River Authority (Toledo Bend)**				
QUANTITY (AC-FT/YR)	**200,000**				
CAPITAL COST					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Canals and Siphon Crossings		1	LS	$250,062,000	$250,062,000
Right of Way (ROW) Easements and Surveying		279	Acres	$17,500	$5,367,000
Engineering and Contingencies (30%)					$75,019,000
Subtotal of Canal	**20**				**$330,448,000**
Pump Station(s)					
Intake Pump Station	4515 HP	1	LS	$59,658,000	$59,658,000
Booster Pump Station					
Subtotal of Pump Station(s)					**$81,757,000**
Balancing Storage	82 ac-ft	1	LS	$7,103,000	$7,103,000
Engineering and Contingencies (35%)					$2,486,000
Subtotal of Storage Tanks					**$9,589,000**
Integration, Relocations, Backup Generator & Other			$ per kw	$534	$1,006,000
Engineering and Contingencies (35%)					$352,000
Subtotal of Integration, Relocations, Backup Generator & Other					**$1,358,000**
Land Acquisition and Surveying (All Facilities Excluding Pipelines)					$240,000
Environmental - Studies and Mitigation					$831,000
Construction Total					**$424,223,000**
Interest During Construction (3.5% for 2 years with a 0.5% ROI)			24	Months	$27,574,000
TOTAL COST OF PROJECT					**$451,797,000**
ANNUAL COST					
Debt Service (3.5% for 20 years)					$31,789,000
Pumping Energy Costs					$1,485,000
Operation and Maintenance (O&M)					$4,073,000
Raw Water Purchase		65,179,000	1000 gal	$1.00	$65,179,000
TOTAL ANNUAL COST					**$102,526,000**

UNIT COSTS (Until Amortized)	
Per Acre-Foot	$513
Per 1,000 Gallons	$1.57
UNIT COSTS (After Amortization)	
Per Acre-Foot	$354
Per 1,000 Gallons	$1.09

PROJECT EVALUATION

This strategy benefits customers of the Lower Neches Valley Authority and is expected to have a positive impact on their water supply security. There may be some level of impacts to agricultural or natural resources and/or to key parameters of water quality; however, additional study will be required to assess these impacts. A contract to pull water from the Toledo Bend system will reduce future demands on the LNVA system and Neches River Basin. This strategy will impact other State water resources, as it involves transferring water between river basins, which will alter environmental flow patterns. However, these impacts will be limited through prescribed environmental flow standards. This strategy involves a voluntary redistribution of water that could be used to serve rural and/or agricultural areas in the Sabine River Basin. However, there is surplus supply available from SRA's Toledo Bend Reservoir and it potentially enables LNVA to serve rural and/or agricultural customers in the Neches River Basin.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	5	No shortage identified for LNVA. Strategy would provide surplus supply for LNVA and their customers
Reliability	4	Medium to highly reliable supply
Cost	4	Low cost (< $1,000/ac-ft)
Environmental Factors	2	Medium impacts to the environment that may be mitigated through planning and design.
Impact on Other State Water Resources	2	Medium impact to environmental flows in each basin. Impacts will be limited through prescribed environmental flow standards.
Threat to Agricultural Resources/Rural Areas	3	Low to medium impacts. Additional study will be required to assess impacts
Other Natural Resources	3	Low to medium impacts. Additional study will be required to assess impacts
Interbasin Transfers		Yes. Transfer from the Sabine River Basin to the Neches River Basin

Third Party Social & Economic Factors	4	Some positive impacts. Involves voluntary redistribution of surplus supply in Sabine River Basin to Neches River Basin to provide supply to agricultural and rural water users
Major Impacts on Key Water Quality Parameters	3	Low to medium impacts. Additional study will be required to assess potential water quality impacts from transferring water between basins.
Political Feasibility	4	Local sponsorship by Lower Neches Valley Authority
Implementation Issues	2	Medium level of risk and potential challenges. Requires a contract with SRA. Requires a water right permit through TCEQ, including authorization for an interbasin transfer.

REFERENCES

2021 East Texas Regional Water Plan. September 2020.

2021 Region H Water Plan. September 2020.

Texas Water Code, Section 11.085 – Interbasin Transfers.

Lufkin – Develop Water From Sam Rayburn

Water User Group Name:	City of Lufkin
Strategy Name:	Conveyance from Sam Rayburn to Kurth Lake
Strategy ID:	LUFK-RAY
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	11,210 - 28,000 ac-ft/yr per year (10 - 25 MGD)
Implementation Decade:	2030
Development Timeline:	2030 - 2050
Project Capital Cost:	Phase 1: $136,547,000
	Phase 2: $125,310,000
	Phase 3: $24,037,000 (September 2023)
Annual Cost	Phase 1: $15,519,000
	Phase 2: $28,432,000
	Phase 3: $20,419,000 (September 2023)
Unit Water Cost (Rounded):	$1,384 per ac-ft ($4.25 per 1,000 gallons)
	$1,278 per ac-ft ($3.92 per 1,000 gallons)
	$729 per ac-ft ($2.24 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for the City of Lufkin to provide conveyance from Sam Rayburn to Kurth Lake as their permit allows. The cost of the project will occur in three phases and includes the cost of a water treatment plant and infrastructure related to water conveyance. This is a supply that will provide water to both municipal and non-municipal customers in Angelina County; manufacturing in Angelina County is projected to have a need and has a strategy to contract water from this supply. Ultimately, manufacturing water users in Angelina County will make contracts with the City of Lufkin to purchase the water supply created by this project. The cost for raw water will need to be negotiated with the City of Lufkin and will reflect the wholesale water rates of this entity at the time a contract is made.

SUPPLY DEVELOPMENT

As requested by the City of Lufkin, the supply from this strategy represents their water right from Sam Rayburn for 28,000 ac-ft/yr. However, since the strategy will be implemented in phases, the full supply will not be available until 2050, pending the demands of potential future customers. The supply in 2030 will be 11,210 ac-ft/yr (10 MGD), 22,420 ac-ft/yr (20 MGD) in 2040, and 28,000 ac-ft/yr (25 MGD) in 2050. The reliability of this water supply is considered high due to the availability of water from the Sam Rayburn system and because the City of Lufkin already has the water right in place to access this water. In addition, the City of Lufkin would not be dependent on sponsorship from another entity.

ENVIRONMENTAL CONSIDERATIONS

A specific location for the new water treatment plant has not been determined. Before this strategy could be pursued, a site selection study would need to be performed, in addition to other studies to identify and quantity potential environmental impacts associated with the projected. For the purposes of this analysis, it is assumed that a site could be selected that would have acceptable impacts. Once the water treatment plant is constructed, expanding the water treatment plant will have minimum environmental impacts.

During the construction of the pipeline, impacts to the environment and other natural resources are expected to be minimal and temporary.

PERMITTING AND DEVELOPMENT

Additional study and mitigation may be required before construction of the transmission pipeline.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below; an estimate was prepared for each phase of this strategy. The total capital cost assumes a pipeline length of 12.4 miles, and the water treatment plant would include a 5-million-gallon storage tank. The annual cost was estimated assuming a debt service of 3.5% for 20 years as well as electrical and operation and maintenance costs. Overall, this strategy has a high cost compared to other strategies in the 2026 East Texas Regional Water Plan.

WWP NAME:	**Lufkin**				
STRATEGY:	**Develop Water from Sam Rayburn**				
Water Quantity	**28,000**	AF/Y		37.5	MGD
PHASE 1 - 2030 DECADE		**Total Capacity (acre-feet per year)**			**11,210**
Treated Water Quantity	**11,210**	AF/Y	**15**	MGD	
Pipeline & Treatment Facility	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline from Sam Rayburn	30 in.	65,500	LF	$432	$28,270,000
Right of Way Easements Rural (ROW)		90	Acres	$9,038	$897,000
Engineering and Contingencies (30%)					$8,481,000
Subtotal of Pipeline	**12.4**	**Miles**			**$37,648,000**
Pump Station(s)					
Lake Intake and Pump Station	1200 HP	1	LS	$34,098,000	$34,098,000
Power connection(s)		1200	HP	$200	$240,000
Engineering and Contingencies (35%)					$12,018,000
Subtotal of Pump Station(s)					**$46,356,000**
Water Treatment Facility					
Storage	5.00 MG	1	EA	$3,337,000	$3,337,000
Water Treatment Facility	10 MGD	1	LS	$28,814,000	$28,814,000
Engineering and Contingencies (35%)					$11,252,850
Subtotal of WTP					**$43,404,000**
Integration, Relocations, Backup Generator & Other			$ per kw	$534	$215,000
Engineering and Contingencies (35%)					$75,250
Subtotal of Integration, Relocations, Backup Generator & Other					**$290,250**
Land Acquisition and Surveying (All Facilities Excluding Pipelines)					$74,564
Environmental - Studies and Mitigation					$ 439,944
CONSTRUCTION TOTAL					**$128,213,000**
Interest During Construction (3.5% for 2 years with a 0.5% ROI)			24	Months	$8,334,000
PHASE I TOTAL CAPITAL COST					**$136,547,000**
Debt Service (3.5% for 20 years)					$9,608,000
Debt Service from Previous Phase					$0
Pumping Energy Costs					$317,000
Operation and Maintenance (O&M)					$1,941,000
Raw Water Treatment		3,653,000	1000 gal	$1.00	$3,653,000
Total Annual Costs					**$15,519,000**

PHASE 1 - 2030 DECADE (Cont.)	
UNIT COSTS (Until Amortized)	
Per Acre-Foot	$1,384
Per 1,000 Gallons	$4.25
UNIT COSTS (After Amortization)	
Per Acre-Foot	$527
Per 1,000 Gallons	$1.62

PHASE 2 - 2040 DECADE		Total Capacity (acre-feet per year)		22,240	
Treated Water Quantity	**11,210**	AF/Y	**15**	MGD	
Expand Treated Water Supply	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline from Sam Rayburn	30 in.	65,500	LF	$432	$28,270,000
Right of Way Easements Rural (ROW)		90	Acres	$9,038	$815,000
Engineering and Contingencies (30%)					$8,481,000
Subtotal of Pipeline	**12.4**	**Miles**			**$0**
Upgrades to Pump Stations					
Lake Intake and Pump Station	1200 HP	1	LS	$34,098,000	$34,098,000
Power connection(s)		1200	HP	$200	$240,000
Engineering and Contingencies (35%)					$12,018,000
Subtotal of Pump Station(s)					**$46,356,000**
Water Treatment Facility					
Storage	0.00 MG	0	EA	$0	$0
Upgrade Treatment Facility	22 MGD	1	LS	$52,258,000	$52,258,000
Engineering and Contingencies (35%)					$18,290,300
Subtotal of WTP					**$70,548,300**
Integration, Relocations, Backup Generator & Other			$ per kw	$534	$215,000
Engineering and Contingencies (35%)					$75,250
Subtotal of Integration, Relocations, Backup Generator & Other					**$290,250**
Land Acquisition and Surveying (All Facilities Excluding Pipelines)					$49,709
Environmental - Studies and Mitigation				$ 417,349	
CONSTRUCTION TOTAL					**$117,662,000**
Interest During Construction					
(3.5% for 2 years with a 0.5% ROI)			24	Months	$7,648,000
PHASE 2 TOTAL CAPITAL COST					**$125,310,000**
Debt Service (3.5% for 20 years)					$8,817,000
Debt Service from Previous Phase					$9,608,000
Pumping Energy Costs					$317,000
Operation and Maintenance (O&M)					$2,443,000
Raw Water Treatment		7,248,000	1000 gal	$1.00	$7,247,000
Total Annual Costs					**$28,432,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot					$1,278
Per 1,000 Gallons					$3.92
UNIT COSTS (After Amortization)					
Per Acre-Foot					$882
Per 1,000 Gallons					$2.71

PHASE 3 - 2050 DECADE		Total Capacity (acre-feet per year)			28,000
Treated Water Quantity	**5,580**	AF/Y		**7**	MGD
Expand Pump Stations	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline from Sam Rayburn	24 in.	65,500	LF	$358	$23,469,000
Right of Way Easements Rural (ROW)		90	Acres	$9,038	$815,000
Engineering and Contingencies (30%)					$7,041,000
Subtotal of Pipeline	**12.4**	**Miles**			**$0**
Pump Station(s)					
Lake Intake and Pump Station	500 HP	1	LS	$16,173,000	$16,173,000
Power connection(s)		500	HP	$200	$100,000
Engineering and Contingencies (35%)					$5,696,000
Subtotal of Pump Station(s)					**$21,969,000**
Water Treatment Facility					
Storage	0.00 MG	0	EA	$0	$0
Water Treatment Facility	0 MGD	0	LS	$0	$0
Engineering and Contingencies (35%)					$0
Subtotal of WTP					**$0**
Integration, Relocations, Backup Generator & Other			$ per kw	$534	$99,000
Engineering and Contingencies (35%)					$34,650
Subtotal of Integration, Relocations, Backup Generator & Other					**$133,650**
Land Acquisition and Surveying (All Facilities Excluding Pipelines)					$49,709
Environmental - Studies and Mitigation					$417,349
CONSTRUCTION TOTAL					**$22,570,000**
Interest During Construction (3.5% for 2 years with a 0.5% ROI)			24	Months	$1,467,000
PHASE 3 TOTAL CAPITAL COST					**$24,037,000**
Debt Service (3.5% for 20 years)					$1,691,000
Debt Service from Previous Phase					$8,817,000
Pumping Energy Costs					$147,000
Operation and Maintenance (O&M)					$640,000
Raw Water Treatment		9,125,000	1000 gal	$1.00	$9,124,000
Total Annual Costs					**$20,419,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot					$729
Per 1,000 Gallons					$2.24
UNIT COSTS (After Amortization)					
Per Acre-Foot					$669
Per 1,000 Gallons					$2.05

PROJECT EVALUATION

This strategy benefits both municipal and non-municipal customers in Angelina County, specifically manufacturing water users. Angelina Manufacturing has a recommended strategy to purchase water from Lufkin created by this new supply. Overall, providing conveyance from Sam Rayburn to Kurth Lake will have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. This project may reduce demands on other water resources in Angelina County; however, the project is not expected to impact any other State water resources.

Based on the analyses provided above, the City of Lufkin recommended strategy to develop supplies from Sam Rayburn in Angelina County was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2026 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	5	Exceeds Shortage
Reliability	4	Medium to High reliable supply
Cost	3	$1,000 to $3,000/ac-ft (Medium)
Environmental Factors	3	Low to medium impacts
Impact on Other State Water Resources	4	Low to no negative impacts and/or some positive impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no negative impacts and/or some positive impacts
Other Natural Resources	4	Low to no negative impacts and/or some positive impacts
Interbasin Transfers		No
Third Party Social & Economic Impacts	4	Low to no negative impacts and/or some positive impacts
Major Impacts on Key Water Quality Parameters	4	Low to no negative impacts and/or some positive impacts
Political Feasibility	4	Low to no negative impacts and/or some positive impacts
Implementation Issues	4	Low implementation issues

REFERENCES

2026 East Texas Regional Water Plan.

NACOGDOCHES – LAKE COLUMBIA TRANSMISSION SYSTEM

Water User Group Name:	City of Nacogdoches
Strategy Name:	Lake Columbia Transmission System
Strategy ID:	NACP-COL
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	8,551 ac-ft per year (11.44 MGD)
Implementation Decade:	2040
Development Timeline:	< 5 years
Project Capital Cost:	$82,440,000 (September 2023)
Annual Cost:	$9,278,000
Unit Water Cost (Rounded):	$1,085 per ac-ft ($3.33 per 1,000 gallons)

PROJECT DESCRIPTION

Lake Columbia is a water management strategy for Angelina Nacogdoches River Authority. Angelina Neches River Authority has contracts with several customers that are participants in the project development. City of Nacogdoches is included in the list, participating at 10 percent contribution, respectively. It is assumed that Nacogdoches will be purchasing raw water from Angelina Neches River Authority. City of Nacogdoches will need a transmission project to transfer supplies from Lake Columbia to the City.

The water management strategy associated with the transmission project is discussed in this technical memorandum. The total current contract amount for City of Nacogdoches is 8,551 ac-ft/yr (11.44 MGD). It is assumed that the transmission strategy will be developed for a potential supply of 8,551 ac-ft/yr. The transmission project will include a 3.5-mile pipeline from Lake Columbia to the City, an intake pump station, and a 12-MGD water treatment plant to treat the supplies before delivery.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal.

PERMITTING AND DEVELOPMENT

No additional permitting issues associated with the project. The project will commence after the commencement of the Lake Columbia project by Angelina Neches River Authority.

PLANNING LEVEL OPINION OF COST

Included below is a planning level opinion of cost (PLOC) for the pipeline from Lake Columbia to City of Nacogdoches. Costs are estimated for 3.5 miles of pipeline in urban areas. The transmission system cost estimate also includes the cost of 511 HP intake pump station and a 12 MGD water treatment plant for treating the raw water. The annual costs are calculated assuming 3.5% interest rate and 20 years of return period. The estimate includes the cost for the purchase of raw water from Angelina Neches River Authority. Overall, this strategy has a high cost compared to other strategies in the 2026 East Texas Regional Water Plan.

WWP NAME:	**Nacogdoches**				
STRATEGY:	**Lake Columbia Transmission System**				
Quantity:	**8,551** AF/Y		11.44 MGD		
CAPITAL COSTS					
Pipeline to Lake Nacogdoches	**Size**	**Qty**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	30 in.	18,117	LF	$432	$7,819,000
Right of Way Easements Rural (ROW)		8	Acres	$9,250	$85,000
Engineering and Contingencies (30%)					$2,346,000
Subtotal of Pipeline					**$10,250,000**
Pump Station(s)					
Pump with intake & building	511 HP	1	LS	$16,455,000	$16,455,000
Power connection(s)		511	HP	$200	$102,000
Engineering and Contingencies (35%)					$5,795,000
Subtotal of Pump Station(s)					**$22,352,000**
Water Treatment Facility					
Expand Existing Water Treatment Plant	11 MGD	1	LS	$31,526,000	$31,526,000
Storage Tanks	1.43 MG	1	LS	$1,366,000	$1,366,000
Engineering and Contingencies (35%)					$11,512,000
Subtotal of WTP					**$44,404,000**
Integration, Relocations, Backup Generator & Other			$ per kw	$534	$113,000
Engineering and Contingencies (35%)					$40,000
Subtotal of Integration, Relocations, Backup Generator & Other					**$153,000**
Land Acquisition and Surveying (All Facilities Excluding Pipelines)					$76,313
Environmental - Studies and Mitigation					$ 172,375
Construction Total					**$77,408,000**
Interest During Construction (3.5% for 0 years with a 0.5% ROI)				24 Months	$5,032,000
TOTAL COST					**$82,440,000**
ANNUAL COSTS					
Debt Service (3.5% for 20 years)					$5,801,000
Pumping Energy Costs					$166,000
Operational Costs*					$524,000
Raw Water Purchase	2,787,000		1000 gal	$1.00	$2,787,000
Total Annual Costs					**$9,278,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot					$1,085
Per 1,000 Gallons					$3.33
UNIT COSTS (After Amortization)					
Per Acre-Foot					$407
Per 1,000 Gallons					$1.25

PROJECT EVALUATION

Based on the analysis provided above, the Lake Columbia to Nacogdoches Raw Water Transmission System project was evaluated across twelve different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	5	Exceeds Shortage
Reliability	4	Medium to High
Cost	3	$1,000 to $3,000/ac-ft (Medium)
Environmental Factors	3	Low to medium environmental impacts. Impacts can be mitigated.
Impact on Other State Water Resources	4	Low to no negative impacts and/or some positive impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no negative impacts and/or some positive impacts
Other Natural Resources	4	Low to no negative impacts and/or some positive impacts
Interbasin Transfers		No
Third Party Social & Economic Impacts	4	Low negative impacts
Major Impacts on Key Water Quality Parameters	4	Low to no negative impacts and/or some positive impacts
Political Feasibility	4	Low to no negative impacts and/or some positive impacts
Implementation Issues	3	Low to medium implementation issues

REFERENCES

2026 East Texas Regional Water Plan.

SABINE COUNTY LIVESTOCK – NEW GROUNDWATER WELL IN YEGUA JACKSON AQUIFER

Water User Group Name:	Sabine County Livestock
Strategy Name:	New wells in Yegua Jackson Aquifer
Strategy ID:	Sab-LSK
Strategy Type:	Existing Groundwater Source
Potential Supply Quantity:	100 ac-ft per year (0.09 MGD)
Implementation Decade:	2060
Development Timeline:	2060
Project Capital Cost:	$601,000 (September 2023)
Annual Cost:	$47,000
Unit Water Cost: **(Rounded):**	$470 per ac-ft ($1.44 per 1,000 gallons)

STRATEGY DESCRIPTION

A strategy is a recommended strategy for livestock users in Sabine County that involves the development of 100 acre-feet per year from the Yegua Jackson Aquifer in Sabine County. The conceptual design for this strategy involves three irrigation wells (capacity 50 gpm, depth of 200 ft) that produces groundwater from the Yegua Jackson Aquifer and Conveyance infrastructure. A peaking factor of two was assumed for the wells.

SUPPLY DEVELOPMENT

The estimated supply quantity from this strategy is approximately 100 ac-ft per year based on a peaking factor of 2. There is sufficient modeled available in Sabine County in the Yegua Jackson Aquifer to develop the supply needed for this water management strategy. This strategy is projected to be able to provide supply by 2060. Overall, the reliability of this supply is considered high, based on the proven use of this source and groundwater availability models.

ENVIRONMENTAL CONSIDERATIONS

The environmental impacts from this strategy are expected to be low. However, groundwater development from this source should be evaluated for potential impacts on spring flows and base flows if surface water is in close proximity. The impact to the environment due to pipeline construction is expected to be temporary and minimal. Impacts to environmental water needs, habitat, and cultural resources are expected to be low.

PERMITTING AND DEVELOPMENT

There are no anticipated permitting or development issues associated with this strategy. Currently, there is no groundwater conservation district in Jefferson County.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 3 wells, a peaking factor of two, and a maximum well yield of 50 gpm for each well.

WUG	**Sabine County Livestock**
STRATEGY	**New Wells in Yegua-Jackson Aquifer**
QUANTITY (AC-FT/YR)	**100**
CAPITAL COST	
Well Fields (Wells, Pumps, and Piping)	$396,000
TOTAL COST OF FACILITIES	**$396,000**
- Planning (3%)	$12,000
- Design (7%)	$28,000
- Construction Engineering (1%)	$4,000
Legal Assistance (2%)	$8,000
Fiscal Services (2%)	$8,000
All Other Facilities Contingency (20%)	$79,000
Environmental & Archaeology Studies and Mitigation	$26,000
Land Acquisition and Surveying (2 acres)	$21,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$19,000
TOTAL COST OF PROJECT	**$601,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$42,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$4,000
Pumping Energy Costs (196,295 kW-hr @ 0.09 $/kW-hr)	$1,000
TOTAL ANNUAL COST	**$47,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot	$470
Per 1,000 Gallons	$1.44
UNIT COSTS (After Amortization)	
Per Acre-Foot	$50
Per 1,000 Gallons	$0.15

PROJECT EVALUATION

This strategy benefits livestock users in Sabine County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. New wells in Sabine County will reduce demands on other water supplies in Sabine County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this voluntary redistribution of water will be beneficial because it provides water for economic growth.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage
Reliability	4	Medium to High Reliable Supply
Cost	4	Low Cost
Environmental Factors	3	Low to Medium Impacts
Impact on Other State Water Resources	4	Low to no negative impacts and/or some positive impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no negative impacts and/or some positive impacts
Other Natural Resources	4	Low to no negative impacts and/or some positive impacts
Interbasin Transfers		No
Third Party Social & Economic Factors	4	Low to no negative impacts and/or some positive impacts
Major Impacts on Key Water Quality Parameters	4	Low to no negative impacts and/or some positive impacts
Political Feasibility	3	Sponsor identified
Implementation Issues	4	Low implementation issues

1.1.1 REFERENCES

Correspondence with Sabine County Livestock for the 2026 East Texas Regional Water Plan.

TRINITY COUNTY IRRIGATION – NEW GROUNDWATER WELL IN YEGUA JACKSON AQUIFER

Water User Group Name:	Trinity County Irrigation
Strategy Name:	New wells in Yegua Jackson Aquifer
Strategy ID:	TRI-IRR
Strategy Type:	New Groundwater Source
Potential Supply Quantity:	220 ac-ft per year (0.20 MGD)
Implementation Decade:	2030
Development Timeline:	<5 years
Project Capital Cost:	$646,000 (September 2023)
Annual Cost:	$52,000
Unit Water Cost:	$236 per ac-ft
(Rounded):	($0.73 per 1,000 gallons)

PROJECT DESCRIPTION

A strategy is recommended for The Trinity Irrigation Water User Group that involves the development of approximately 220 acre-feet per year from the Yegua Jackson Aquifer in Trinity County. The conceptual design for this strategy involves three irrigation wells (capacity of 100 gpm, depth of 250 ft) that produces groundwater from the Yegua Jackson Aquifer and conveyance infrastructure. A peaking factor of two was assumed to size infrastructure at this well field.

SUPPLY DEVELOPMENT

The estimated supply quantity from this strategy is approximately 220 ac-ft per year based on a peaking factor of 2. There are sufficient supplies available in the Trinity County Yegua Jackson to develop the supply needed for this water management strategy. This strategy is projected to be able to provide supply by 2030. Overall, the reliability of this supply is considered high, based on the proven use of this source and groundwater availability models.

ENVIRONMENTAL CONSIDERATIONS

The environmental impacts from this strategy are expected to be low. However, groundwater development from this source should be evaluated for potential impacts on spring flows and base flows if surface water is in close proximity. The impact to the environment due to pipeline construction is expected to be temporary and minimal. Impacts to environmental water needs, habitat, and cultural resources are expected to be low due to the relatively low footprint of this strategy.

PERMITTING AND DEVELOPMENT

There are no anticipated permitting or development issues associated with this strategy. Currently, there is no groundwater conservation district in Trinity County.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 3 wells, a peaking factor of two, and a maximum well yield of 100 gpm for each well.

WUG	**Trinity County Irrigation**
STRATEGY	**New Well in Yegua Jackson Aquifer**
QUANTITY (AC-FT/YR)	**220**

CAPITAL COST	
Well Fields (Wells, Pumps, and Piping)	$435,000
TOTAL COST OF FACILITIES	**$435,000**
- Planning (3%)	$13,000
- Design (7%)	$30,000
- Construction Engineering (1%)	$4,000
Legal Assistance (2%)	$9,000
Fiscal Services (2%)	$9,000
All Other Facilities Contingency (20%)	$87,000
Environmental & Archaeology Studies and Mitigation	$22,000
Land Acquisition and Surveying (11 acres)	$16,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$21,000
TOTAL COST OF PROJECT	**$646,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$45,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$4,000
Pumping Energy Costs (196,295 kW-hr @ 0.09 $/kW-hr)	$3,000
TOTAL ANNUAL COST	**$52,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot	$236
Per 1,000 Gallons	$0.73
UNIT COSTS (After Amortization)	
Per Acre-Foot	$32
Per 1,000 Gallons	$0.10

PROJECT EVALUATION

This strategy benefits The Trinity Irrigation Water User Group in Trinity County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. New wells in the county will reduce demands on other water supplies in Trinity County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this voluntary redistribution of water will be beneficial because it provides water for economic growth.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage
Reliability	4	Medium to High Reliable Supply
Cost	4	Low Cost
Environmental Factors	3	Low to Medium Impacts
Impact on Other State Water Resources	4	Low to no negative impacts and/or some positive impacts
Threat to Agricultural Resources/Rural Areas	5	High Positive Impacts
Other Natural Resources	4	Low to no negative impacts and/or some positive impacts
Interbasin Transfers		No
Third Party Social & Economic Factors	4	Low to no negative impacts and/or some positive impacts
Major Impacts on Key Water Quality Parameters	4	Low to no negative impacts and/or some positive impacts
Political Feasibility	3	Sponsor identifiable.
Implementation Issues	4	Low implementation issues

REFERENCES

Correspondence with Trinity County Irrigation for the 2026 East Texas Regional Water Plan.

TYLER COUNTY MANUFACTURING - NEW GROUNDWATER WELL IN GULF COAST AQUIFER

Water User Group Name:	Tyler County Manufacturing
Strategy Name:	New wells in Gulf Coast Aquifer
Strategy ID:	TYL-MFG
Strategy Type:	Existing Groundwater Source
Potential Supply Quantity:	110 ac-ft per year (0.10 MGD)
Implementation Decade:	2030
Development Timeline:	<5 years
Project Capital Cost:	$646,000 (September 2023)
Annual Cost:	$52,000
Unit Water Cost:	$236 per ac-ft
(Rounded):	($0.73 per 1,000 gallons)

STRATEGY DESCRIPTION

A strategy is recommended for the Tyler Manufacturing Water User Group that involves the development of approximately 110 acre-feet per year from the Gulf Coast Aquifer in Tyler County. The conceptual design for this strategy involves two manufacturing wells (capacity of 120 gpm, depth of 350 ft) that produces groundwater from the Gulf Coast Aquifer, conveyance infrastructure (e.g., well collection piping, transmission pipeline, pump station). A peaking factor of two was assumed to size infrastructure at this well field.

SUPPLY DEVELOPMENT

The estimated supply quantity from this strategy is approximately 120 ac-ft per year based on a peaking factor of 2. There are sufficient supplies available in the Tyler County Gulf Coast Aquifer System to develop the supply needed for this water management strategy. This strategy is projected to be able to provide supply by 2030. Overall, the reliability of this supply is considered high, based on the proven use of this source and groundwater availability models.

ENVIRONMENTAL CONSIDERATIONS

There are not any significant environmental considerations associated with this strategy. The environmental impacts of developing infrastructure are site-specific and will be dependent upon the location and size of the project. Site-specific evaluations of potential impacts to the environment from construction activities will need to be conducted by individual entities. A contract between manufacturers in Jasper County and the Lower Neches Valley Authority are anticipated to have a minimal impact on environmental water needs, low impact to the surrounding habitat, and a low impact to cultural resources in the area. The potential impact to surrounding habitat and cultural resources will need to be evaluated by entities on a project-specific basis. There are no bays or estuaries in close proximity of Tyler County.

PERMITTING AND DEVELOPMENT

There are no anticipated permitting or development issues associated with this strategy. There may be some minor permitting related to construction of the infrastructure required associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assume account for one well, 700 feet of well field piping, and a pump station.

WUG	**Tyler County Manufacturing**
STRATEGY	**New Well in Gulf Coast Aquifer**
QUANTITY (AC-FT/YR)	**110**
CAPITAL COST	
Well Fields (Wells, Pumps, and Piping)	$414,000
TOTAL COST OF FACILITIES	**$414,000**
- Planning (3%)	$12,000
- Design (7%)	$29,000
- Construction Engineering (1%)	$4,000
Legal Assistance (2%)	$8,000
Fiscal Services (2%)	$8,000
All Other Facilities Contingency (20%)	$83,000
Environmental & Archaeology Studies and Mitigation	$16,000
Land Acquisition and Surveying (1 acres)	$13,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$20,000
TOTAL COST OF PROJECT	**$607,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$43,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$4,000
Pumping Energy Costs (196,295 kW-hr @ 0.09 $/kW-hr)	$2,000
TOTAL ANNUAL COST	**$49,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot	$445
Per 1,000 Gallons	$1.37
UNIT COSTS (After Amortization)	
Per Acre-Foot	$55
Per 1,000 Gallons	$0.17

PROJECT EVALUATION

This strategy benefits The Tyler Manufacturing Water User Group in Tyler County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. New wells in the county will reduce demands on other water supplies in Tyler County and will have no other apparent impact on other State water resources. This strategy involves a voluntary redistribution of water that could be used to serve rural and/or agricultural areas. However, this supply benefits various industries in those rural areas, which could contribute to their economic growth.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage
Reliability	4	Medium to High Reliable Supply
Cost	4	Low Cost
Environmental Factors	3	Low to Medium Impacts
Impact on Other State Water Resources	4	Low to no negative impacts and/or some positive impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no negative impacts and/or some positive impacts
Other Natural Resources	4	Low to no negative impacts and/or some positive impacts
Interbasin Transfers		No
Third Party Social & Economic Factors	4	Low to no negative impacts and/or some positive impacts
Major Impacts on Key Water Quality Parameters	4	Low to no negative impacts and/or some positive impacts
Political Feasibility	3	Sponsor identified.
Implementation Issues	4	Low implementation issues

REFERENCES

Correspondence with Tyler County Manufacturing for the 2026 East Texas Regional Water Plan.

City of Tyler – Lake Palestine Expansion

Water User Group Name:	City of Tyler
Strategy Name:	Lake Palestine Expansion
Strategy ID:	TYLR-PAL
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	16,815 ac-ft per year (30 MGD)
Implementation Decade:	2040
Development Timeline:	< 5 years
Project Capital Cost:	$252,305,000 (September 2023)
Annual Cost:	$27,852,000
Unit Water Cost (Rounded):	$1,656 per ac-ft ($5.08 per 1,000 gallons)

PROJECT DESCRIPTION

The current supplies for the City include 34 MGD from Lake Tyler, 30 MGD from Lake Palestine, 0.4 MGD from Bellwood Lake, and 12 groundwater wells in Carrizo Wilcox aquifer producing approximately 8 MGD. The City of Tyler is shown to have sufficient supplies through the planning period using the TWDB approved demand projections.

In addition, there is considerable interest in other users in Smith County contracting with the City of Tyler for water supplies. There are recommended strategies for Tyler to provide additional water to Bullard, Crystal Systems Texas, Lindale, Walnut Grove WSC, Mining, and Manufacturing in Smith County. Until 2060, City of Tyler has sufficient supplies to meet the proposed demands for the potential future customers. City of Tyler has a small shortage in 2070 when current and future customer demands are taken into consideration.

City of Tyler proposed the following recommended strategies for the 2026 regional plan. City of Tyler will develop the additional 30 MGD of Lake Palestine water. The City has developed about half of its contracted supply in Lake Palestine and plans to develop the remaining supply by 2040, as part of its long-term water supply plan.

SUPPLY DEVELOPMENT

The supply for this strategy represents City of Tyler's contract with Upper Neches River Municipal Water Authority for 67,200 ac-ft/yr supplies from Lake Palestine. City of Tyler has transmission capacity to access half of the supplies and plans to develop this recommended strategy to access the other half.

ENVIRONMENTAL CONSIDERATIONS

A specific location for the new water treatment plant has been determined. The new water treatment plant will be at the same location as the current plant and the process train will be a mirror image of the current process train. For the purposes of this analysis, it is assumed that the current site would have acceptable impacts. Once the water treatment plant is constructed, expanding the water treatment plant will have minimum environmental impacts. During the construction of the pipeline, impacts to the environment and other natural resources are expected to be minimal and temporary.

PERMITTING AND DEVELOPMENT

Additional study and mitigation may be required before construction of the transmission pipeline.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The total capital cost assumes a pipeline length of 5 miles, and 30 MGD water treatment plant would include a 2-million-gallon storage tank. The annual cost was estimated assuming a debt service of 3.5% for 20 years as well as electrical and operation and maintenance costs. Overall, this strategy has a high cost compared to other strategies in the 2026 East Texas Regional Water Plan.

WWPNAME:	**City of Tyler**				
STRATEGY:	**Lake Palestine Expansion**				
Quantity:	**16,815** AF/Y				
CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	36 in.	23,400	LF	$590	$13,815,000
Pipeline Urban	36 in.	3,000	LF	$1,014	$3,042,000
Right of Way Easements Rural (ROW)		11	Acres	$9,250	$109,000
Right of Way Easements Urban (ROW)		1	Acres	$435,600	$660,000
Engineering and Contingencies (30%)					$5,057,000
Subtotal of Pipeline					**$22,683,000**
Pump Station(s)					
Ground Storage Tanks	1.88 MG	1	LS	$1,612,000	$1,612,000
Booster Pump Station	1181 HP	1	LS	$10,421,000	$10,421,000
Power connection(s)		1181	HP	$200	$236,000
Engineering and Contingencies (35%)					$4,212,000
Subtotal of Pump Station(s)					**$16,481,000**
Water Treatment Facility					
Expand Water Treatment Plant	30 MGD	1	LS	$151,536,000	$151,536,000
Engineering and Contingencies (35%)					$53,038,000
Subtotal of WTP					**$204,574,000**
Integration, Relocations, Backup Generator & Other			$ per kw	$534	$244,000
Engineering and Contingencies (35%)					$85,000
Subtotal of Integration, Relocations, Backup Generator & Other					**$329,000**
Land Acquisition and Surveying (All Facilities Excluding Pipelines)					$76,313
Environmental - Studies and Mitigation					$219,375
CONSTRUCTION TOTAL					**$244,362,688**
Interest During Construction			12	Months	$7,942,000
TOTAL COST					**$252,305,000**
ANNUAL COSTS					
Debt Service (3.5% for 20 years)					$17,752,000
Pumping Energy Costs					$360,000
Operation and Maintenance (O&M)					$4,261,000
Raw Water Purchase			1000 gal	$1.00	$5,479,000
Total Annual Costs					**$27,852,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot					$1,656
Per 1,000 Gallons					$5.08
UNIT COSTS (After Amortization)					
Per Acre-Foot					$601
Per 1,000 Gallons					$1.84

PROJECT EVALUATION

Based on the analysis provided above, the City of Tyler Lake Palestine Expansion project was evaluated across tw different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	5	Exceeds Shortage
Reliability	4	Medium to High
Cost	3	$1,000 to $3,000/ac-ft (Medium)
Environmental Factors	3	Low to medium environmental impacts. Impacts can be mitigated.
Impact on Other State Water Resources	4	Low to no negative impacts and/or some positive impacts
Threat to Agricultural Resources/Rural Areas	4	Low to no negative impacts and/or some positive impacts
Other Natural Resources	4	Low to no negative impacts and/or some positive impacts
Interbasin Transfers		No
Third Party Social & Economic Impacts	4	Low to no negative impacts and/or some positive impacts
Major Impacts on Key Water Quality Parameters	4	Low to no negative impacts and/or some positive impacts
Political Feasibility	3	Sponsor(s) identified, commitment level uncertain.
Implementation Issues	4	Low to no negative impacts and/or some positive impacts

REFERENCES

2026 East Texas Regional Water Plan.

UNRMWA – NECHES RUN OF RIVER WITH LAKE PALESTINE

Water User Group Name:	Upper Neches River Municipal Water Authority
WMS Name:	Neches Run of River with Lake Palestine
WMS Project ID:	UNM-ROR
WMS Type:	New Surface Water Source
Potential Supply Quantity (Rounded):	82,900 ac-ft/yr (74.0 MGD)
Implementation Decade:	2070
Development Timeline:	10-15 years
Strategy Capital Cost:	$719,027,000 (September 2023)
Strategy ANNUAL COST:	$69,558,000
Unit Water Cost (Rounded):	$1,293 per ac-ft (during loan period) $3.97 per 1,000 gallons

STRATEGY DESCRIPTION

In 2013, the Upper Neches River Municipal Water Authority (UNRMWA) and Dallas initiated the Upper Neches River Water Supply Project Feasibility Study (HDR, 2014) to evaluate potential water supply strategies to replace the Lake Fastrill project. These strategies included Neches run-of-river diversions of unappropriated water from the Upper Neches River operated in system with Lake Palestine, tributary storage, and/or operated conjunctively with groundwater. Using the run-of-river diversions operated as a system with Lake Palestine was determined to be the recommended strategy for the 2014 Dallas Long Range Water Supply Plan (LRWSP; Dallas Water Utilities, 2014) and was a recommended strategy in the 2016 and 2021 regional water plans. The Draft 2024 Dallas Long Range Water Supply Plan (Dallas Water Utilities, 2024) re-evaluated this strategy and again designated the Neches run-of-river diversion operated as a system with Lake Palestine as a recommended strategy. The re-evaluated configuration of this strategy from the Draft 2024 Dallas LRWSP is included as a recommended strategy for UNRMWA and Dallas in the 2026 regional water plans.

This recommended strategy includes run-of-river diversions near SH 21 on Neches River operated as a system with storage in Lake Palestine. UNRMWA is the project sponsor for this strategy. The run-of-river diversions will be taken from the river segment between the existing Rocky Point diversion and the Weches Dam site below the SH21 crossing, between the Neches River National Wildlife Refuge and upstream of the Weches Dam site. The run-of-the-river diversions will be authorized under a new appropriation of surface water, subject to senior water rights and environmental flows. Diversions would be conveyed through a 42-mile pipeline (23 miles of 72-inch diameter pipeline and 19 miles of 66-inch pipeline) to Dallas' pump station located at Lake Palestine. This water supply would then be delivered to Dallas through their integrated pipeline project (IPL). New facilities required for this strategy include a small diversion dam on the Neches River, a river intake and pump station, and a transmission pipeline and booster pump station supporting transmission to Lake Palestine. The run-of-river diversions are an interruptible supply and the firm yield associated with the WMS is the incremental increase in the firm yield of Lake Palestine resulting from the system operation of the new diversions and the transmission facilities with the Lake Palestine.

For regional planning purposes, this strategy is expected to be online in 2070 when the City of Dallas is expected to use its share of supplies from this strategy. The timing can be changed to an earlier or later date if the timing of needs for customers change.

SUPPLY DEVELOPMENT

The supply available from this strategy was provided by the sponsor and is reported in the Draft 2024 Dallas Long Range Water Supply Plan (LRWSP; Dallas Water Utilities, 2024). According to this report, supply was computed using a 2021 version of TCEQ's Neches River WAM, which includes hydrology from 1940 to 2018.

Water availability at the designated diversion point was calculated based on a maximum diversion rate of 141 cfs (91 MGD). The estimated firm yield from this strategy is approximately 82,900 ac-ft per year (74 MGD). The run-of-river diversions are an interruptible supply, and the firm yield associated with the WMS is the incremental increase in the firm yield of Lake Palestine resulting from the system operation of the new diversions and the transmission facilities with Lake Palestine. Although the additional system firm yield from this strategy is approximately 82,900 ac-ft per year, the water available from this strategy is limited to the available capacity in Dallas' IPL, which is approximately 53,800 ac-ft per year (48 MGD).

ENVIRONMENTAL CONSIDERATIONS

The Draft 2024 Dallas LRWSP includes a preliminary desktop evaluation of potential environmental impacts of this strategy. According to this evaluation, the pipeline corridor for this project intersects environmental habitat and wetlands; however, flexibility in the pipeline siting would be used, as possible, to avoid or minimize potential impacts to environmental habitat and wetlands. Thus, any impacts to existing environmental habitat or wetlands are expected to be low.

The proposed project area includes 25 species that are federally or state listed as threatened or endangered, a federal candidate, or proposed species. These species would need to be considered and potentially mitigated for during project permitting and implementation. Additionally, there are proposed critical habitat for two species along the proposed pipeline corridor: the proposed threatened Louisiana pigtoe (*Pleurobema riddellii*) and proposed endangered Texas heelsplitter (*Potamilus amphichaenus*). These species are currently proposed and awaiting listing through the U.S. Fish and Wildlife Service (USFWS), so no mitigation or coordination is currently required; however, the status of these species will need to be monitored before and during construction. Overall, there is a moderate potential for impact to threatened and endangered species.

The implementation and operation of this strategy will comply with TCEQ environmental flow standards and will be set so the new permit has a minimal impact to environmental water needs and the surrounding habitat. Diversions from the Neches River are expected to have very limited effects on freshwater inflows to the bays and estuaries downstream.

PERMITTING AND DEVELOPMENT

This strategy requires a surface water permit from TCEQ for the channel dam and river diversion from the Neches River that would need to include authorization for an inter-basin transfer from the Neches River Basin to the Trinity River Basin. In addition, this strategy will require a Section 404 permit through the U.S. Army Corps of Engineers (USACE) for potential impacts to Waters of the U.S. (WOTUS) from construction activities associated with the diversion facilities and pipeline.

COST ANALYSIS

The cost estimate for this strategy was obtained from the Draft 2024 Dallas Long Range Water Supply Plan. Costs from this report are generally consistent with the TWDB regional water planning cost assumptions. Costs are presented in September 2023 costs. The unit cost shown is representative of the supply quantity that can be delivered to Dallas through their IPL (53,800 ac-ft per year). The additional firm yield benefit from this strategy is 82,900 ac-ft per year. Additional infrastructure costs may be required to obtain the additional supply available from this strategy. Additional details and assumptions related to this cost estimate can be obtained from the report.

WWP	**Upper Neches River MWA**
STRATEGY	**Neches Run of River with Lake Palestine**
QUANTITY (AC-FT/YR)	**53,800**
CAPITAL COST	**Cost**
Channel Dam	$13,201,000
Intake Pump Stations (91.4 MGD)	$69,929,000
Transmission Pipeline (66-72 in. dia., 42.3 miles)	$370,378,000
Transmission Pump Station(s) and Storage Tank(s)	$55,850,000
Integration, Relocations, Backup Generator & Other	$2,283,000
TOTAL COST OF FACILITIES	**$511,641,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel and Contingencies (30% for pipes, 35% for all other facilities)	$160,556,000
Environmental and Archaeology Studies and Mitigation	$1,329,000
Land Acquisition and Surveying (266 acres)	$1,756,000
Interest During Construction (3.5% for 2 years with 0.5% ROI)	$43,745,000
TOTAL COST OF PROJECT	**$719,027,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$50,592,000
Operation and Maintenance (O&M)	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$3,806,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$2,945,000
Dam and Reservoir (1.5% of Cost of Facilities)	$198,000
Pumping Energy Costs	$3,371,000
Delivery Through Dallas IPL ($180,000 per MGD)	$8,646,000
TOTAL ANNUAL COST	**$69,558,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot	$1,293
Per 1,000 Gallons	$3.97
UNIT COSTS (After Amortization)	
Per Acre-Foot	$353
Per 1,000 Gallons	$1.08

PROJECT EVALUATION

This strategy benefits both municipal and non-municipal customers of Dallas (Region C) and would have a positive impact on their water supply security. In addition, this strategy could also be utilized as a supply for customers of UNRMWA in the East Texas Regional Water Planning Area (Region I) or Region C. According to the 2024 Draft Dallas LRWSP, the proposed pipeline corridor would impact 36 acres of prime farmland soils identified by the U.S. Department of Agriculture (USDA) and some agricultural activities may be disturbed during pipeline construction. However, these soils will be returned to original land uses and agricultural activities can continue undisturbed after construction, so impacts are anticipated to be low. This analysis did not identify any impacts to key parameters of water quality. This strategy will impact other State water resources, as it involves transferring water between river basins, which will alter-environmental flow patterns. However, these impacts will be limited through prescribed environmental flow standards. This strategy involves a voluntary redistribution of water that could be used to serve rural and/or agricultural areas in the Neches River Basin. Additional yield generated from this strategy that is not used by Dallas could potentially be used to serve those areas.

The strategy described was evaluated across eleven different criteria to compare against other strategies evaluated in the 2026 East Texas Regional Water Plan. The results of this evaluation are shown in the table below.

Criteria	Rating	Explanation
Quantity	5	Provides supply surplus of UNRMWA's contracted demands
Reliability	4	Medium to high reliable supply
Cost	3	Medium cost ($1,000 - $3,000/ac-ft)
Environmental Factors	2	Medium impact to the environment which may be mitigated through siting, planning, and design.
Impact on Other State Water Resources	3	Medium impact to environmental flows in the Neches River Basin. Impacts will be limited through prescribed environmental flow standards.
Threat to Agricultural Resources/Rural Areas	3	Low to medium impact. Additional study will be required to assess impacts
Other Natural Resources	3	Low to medium impact. Additional study will be required to assess impacts
Interbasin Transfers		Yes. Transfer from the Neches River Basin to the Trinity River Basin
Third Party Social & Economic Factors	2	Medium impacts. Involves voluntary redistribution of supply from Neches to Trinity basin. Some yield from this strategy could be used to serve rural and/or agricultural customers in basin of origin.
Major Impacts on Key Water Quality Parameters	3	Low to medium impacts. Additional study will be required to assess potential water quality impacts from transferring water between basins.
Political Feasibility	4	Local sponsorship by the Upper Neches River MWA
Implementation Issues	3	Medium level of risk and potential challenges. Requires a water right permit through TCEQ, including authorization for an interbasin transfer.

REFERENCES

Discussions with Upper Neches River Municipal Water Authority.

Dallas Water Utilities. October 2024. *Draft 2024 Dallas Long Range Water Supply Plan*.

HDR, Inc. 2014. *Upper Neches River Water Supply Project Feasibility Study*.

2021 East Texas Regional Water Plan. September 2020.

2026 Region C Initially Prepared Plan. March 2025.

Appendix 5B-B

Strategy Evaluation Matrix and Quantified Environmental Impacts Matrix

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This Appendix documents the strategy evaluation matrices.

Appendix 5B-B
Strategy Evaluation Matrix and Quantified Environmental Impacts Matrix

IDENTIFYING AND SELECTING STRATEGIES

In accordance with TWDB rules and guidelines pursuant to TAC 357.5 (e)(4), the East Texas Regional Planning Group (ETRWPG) is required to summarize the approach used for identifying and selecting Water Management Strategies (WMSs) for development of the 2026 Regional Water Plan (RWP). This approach classifies the strategies using the TWDB's standard categories developed for regional water planning.

Potential WMSs were developed based on the needs identified for Water User Groups (WUGs) from a comparison of projected demands and existing supplies. Similarly, Major Water Providers (MWP) supplies and projected demands/contracts were reviewed to determine needs, and appropriate WMSs were developed for the MWPs to address the needs. In some cases, WMSs were developed for WUGs and MWPs that wanted to develop additional supplies to increase their supply reliability even if there was no identified need.

The viability of the WMS for a given WUG or MWP was determined by using the following considerations:

- Is it preferable to identify a groundwater, surface water, reuse, and/or demand reduction strategy for the WUG/MWP?
- Does this strategy alone meet the entire need for the WUG/MWP, or does it need to be paired with another strategy?
- Is the strategy within a reasonable proximity to the location of the water need?
- Is this the most preferred strategy for the WUG/MWP?
- Is the unit cost supportable by the WUG/MWP?
- Are there any flaws identified with the implementation or formulation of the strategy for the WUG/MWP?

STRATEGY EVALUATION AND ENVIRONMENTAL IMPACTS

After WMSs are identified and developed based on the initial screening process, they are evaluated and assigned scores across several categories. In accordance with TWDB rules and guidelines, the ETRWPG adopted a standard methodology to evaluate WMSs based upon the following categories:

- Quantity
- Reliability
- Cost
- Environmental Factors
- Impact on Other State Water Resources
- Threat to Agricultural Resources/Rural Areas
- Interbasin Transfers
- Other Natural Resources
- Major Impacts on Key Water Quality Parameters
- Political Feasibility
- Implementation Issues

Each WMS analyzed in the ETRWP was quantitatively evaluated and assigned a score (from 1 to 5) for each category. A summary of the scoring gradations for each strategy evaluation category is summarized in **Table 5B-B.1**. A matrix summarizing the strategy evaluation scores for each strategy is included in **Table 5B-B.3.** Included below is a discussion of each evaluation category.

Quantity

This category is evaluated and scored based on the percentage of the WUG/MWP need the given strategy is expected to meet. If the strategy provides a supply surplus of the identified need for a WUG/MWP, it was assigned a score of 5.

Reliability

This category is evaluated based on the potential for the water to be available during drought. Strategies in which there is considerable competition for water, supplies are temporary, or the supply volume exceeds modeled available supply (e.g., Modeled Available Groundwater) are rated as low reliability. Strategies that use water from a source that would not exceed 90% of available supply are rated as low to medium reliability. Strategies that use water from a source that would not exceed 75% of available supply are rated as medium reliability. Strategies that use water from a source that would not exceed 50% of available supply are rated as medium to high reliability. Strategies that use water from a source that is resilient to drought are rated as high reliability. The reliability ranges are presented in **Table 5B-B.1**.

Cost

This category is evaluated based on the gradation of the unit cost for the given strategy compared to the range defining the scores 1 to 5. The ranges are presented in **Table 5B-B.1**.

Environmental Factors

The potential environmental impacts from each WMS to existing conditions is quantified across several environmental factors, which were used to determine the score for this category. These factors include:

- Total Acres Impacted
- Total Wetland Acres Impacted
- Environmental Water Needs
- Habitat
- Threatened and Endangered Species
- Cultural Resources
- Bays, Estuaries, and Arms of the Gulf of Mexico

Each factor is quantitatively assessed and assigned a score from 1 to 5. **Table 5B-B.2** summarizes the scoring gradations for each environmental factor. The overall score for this category takes into account an average score of the environmental factors evaluated for each WMS. This value is illustrated in the strategy evaluation matrix as the “Environmental Factors” score. A matrix summarizing the environmental factors scores for each WMS is included in **Table 5B-B.4.** A description of each environmental factor evaluated is summarized below.

Acreage Impacted refers to the total amount of area that will be impacted due to the implementation of a strategy. The following conservative assumptions were made (unless more detailed information was available) based on suggested land area values for various facility types from the TWDB Uniform Costing Model (UCM):

- Each well will impact approximately 1 acre of land
- The acres impacted for pipelines is equivalent to the right of way easements required
- Reservoirs will impact an area equal to their surface area
- A conventional water treatment plant will impact 5 acres
- Pump stations will impact approximately 5 acres
- Water storage tanks will impact approximately 2 acres
- Conservation strategies will have no impact on acreage

Wetland Acreage Impacted refers to the number of acres that are classified as wetlands that are impacted by implementation of the strategy. The only strategy identified that had an impact on surrounding wetlands was the Lake Columbia strategy.

Environmental Water Needs refers to how the strategy will impact the area's overall environmental water needs. Water is vital to the environmental health of a region, and so it is important to take into account how strategies will impact the amount of water that will be available to the environment. The following conservative assumptions were made (unless more detailed information was available):

- Strategies that involve surface water diversions that would decrease instream flows (i.e., water available for the environment) were assumed to have a medium impact on environmental water needs.
- All other strategies that involve infrastructure were conservatively assumed to have a low impact on environmental water needs (unless more detailed information was available).
- Strategies that either reduce demand (conservation) or return water supply (reuse) were assumed to have a positive impact.

Habitat refers to how the strategy will impact the habitat of the local area. The more area that is impacted due to the implementation of the strategy, the more the area's habitat will be disrupted. The following conservative assumptions were made (unless more detailed information was available):

- Strategies with no infrastructure, such as conservation, will have no impact.
- Strategies with less than 100 acres impacted will have a low impact
- Strategies with more than 100 acres impacted will have a medium impact.

Threatened and Endangered Species refers to how the strategy could potentially impact those species in the area once implemented. The following conservative assumptions were made (unless more detailed information was available):

- Only applicable to strategies implementing infrastructure and impact acreage.
- Rankings were based on the amount of threatened and endangered species located within the county. This amount was found using the Texas Parks and Wildlife Database located at http://tpwd.texas.gov/gis/rtest/ and the U.S. Fish and Wildlife Service Database located at http://www.fws.gov/endangered/.
- This ranking only includes threatened and endangered species as defined in the TWDB guidelines and does not include species without official protection such as those proposed for listing or species that are considered rare or otherwise of special concern.

Cultural Resources refers to how the strategy will impact cultural resources located within the area. Cultural resources are defined as the collective evidence of the past activities and accomplishments of people. Locations, buildings and features with scientific, cultural or historic value are considered to be cultural resources. The following conservative assumptions were made (unless more detailed information was available):

- Only applicable to strategies implementing infrastructure and impact acreage.
- All transmission and groundwater strategies implementing infrastructure will have a low impact on cultural resources.
- Other infrastructure strategies were evaluated on an individual basis considering location.

Bays, Estuaries, and Arms of the Gulf of Mexico refers to the impact to bays, estuaries, and arms of the Gulf of Mexico (if any) due to a strategy.

- Strategies that involve surface water diversions that would decrease instream flows and are located in counties along the Gulf Coast were assumed to have a medium impact.
- All other strategies involving surface water (e.g., voluntary transfers, infrastructure expansions) were conservatively assumed to have a low impact.
- Groundwater strategies were conservatively assumed to have a low impact.
- Strategies that either reduce demand (conservation) or return water supply (reuse) were assumed to have a positive impact.

Environmental Water Quality refers to the impact that a strategy will have on water quality in the local environment.

- Conservation strategies were assumed to have no impact on environmental water quality.
- Most strategies were assumed to have a low impact on environmental water quality.
- If a strategy could have more than a low impact, then it was evaluated on an individual basis considering location.

Impact on Other State Water Resources

This category is quantified based on the impact of the strategy on other water resources of the state, including other WMSs and groundwater and surface water interrelationships.

Threat to Agricultural Resources/Rural Areas

This category is quantified based on the impacts to water supplies for agriculture (irrigation) and/or impacts to irrigated agricultural and/or rural land. Assumptions regarding this category include:

- If the location of the strategy is known and data is available, actual impacts to agricultural lands are used.
- Since most strategies could avoid direct, permanent impacts to agricultural lands, the quantity of agricultural acreage that could be impacted is estimated to be no more than 10% of the total acreage estimated for a strategy. Pipelines are anticipated to have a temporary, low impact and could be routed to avoid agricultural areas.
- Where applicable, the estimated impact on agricultural acreage from a strategy was used to assign scores for this category. If a strategy could impact more than 2,000 acres of agricultural land, impacts are rated as “high”. If a strategy could impact between 100 to 2,000 acres of agricultural land, impacts are rated as “medium”. If a strategy could impact between 10 to 100 acres of agricultural land, impacts as rated as “low”. If a strategy could impact less than 10 acres of agricultural land, impacts as rated as “low to none”.

- If a strategy will reduce the available water to an irrigation user (by county) by the greater of 10% or 5,000 ac-ft per year, then the strategy is determined to have a "high" impact. If a strategy will reduce the water available to an irrigation user (by county) by 1% of irrigation use or 500 ac-ft per year, the strategy is determined to have a "low" impact.
- If an entity already holds water rights for the strategy, it assumed to have no impact.
- If a strategy provides water to agricultural (irrigation) users, the strategy has a positive impact.

Other Natural Resources

This category is quantified based on the impact of the strategy to other natural resources in the region. The potential impact of a strategy on other natural resources was evaluated on a case-by-case basis. If the strategy does not alter the natural condition of other resources, the strategy is determined to have no impacts.

Interbasin Transfer

This category is quantified by means of a yes or no qualifier. If there is an interbasin transfer triggered because of the strategy, then the impact is quantified as a "yes". If there is no interbasin transfer triggered, then the impact is quantified as a "no".

Third Party Social & Economic Factors

This category is quantified based on the potential third-party social and economic factors impacts resulting from voluntary redistributions of water, including analysis of third-party impacts of moving water from rural and agricultural areas. If a strategy does not involve voluntary redistribution of water, then it has no impact. If a strategy voluntary redistribution of water, the impact was assessed on a case-by-case basis.

Major Impacts on Key Water Quality Parameters

This category is quantified based on the impact that the implementation of the strategy will have on the area's applicable water quality.

Political Feasibility

This category evaluates the local preference and likelihood for public support or opposition created by the strategy. This evaluation also takes into consideration if a local sponsor is identifiable and committed to implementing the strategy.

Implementation Issues

This category evaluates the potential for factors such as permitting and land acquisition to affect the strategy. It also evaluates the risk to the strategy's ability to deliver water from natural or man-made disasters such as hurricanes, climate change, or terrorism.

Navigation

RWPGs are required to assess the impact of strategies on navigation. No strategies identified in the ETRWP were identified to have an impact on navigation, so this was not included as a category in the strategy evaluation.

Table 5B-B.1 Strategy Evaluation Categories and Scoring Gradations

Category	Strategy Evaluation Category Ratings (1-5)				
	1	2	3	4	5
Quantity	Meets 0-25% Shortage	Meets 25-50% of Shortage	Meets 50-75% of Shortage	Meets 75-100% of Shortage	Exceeds Shortage
Reliability	Low	Low to Medium	Medium	Medium to High	High
Cost	>$5,000/ac-ft (High)	$3,000 to $5,000/ac-ft (Medium-High)	$1,000 to $3,000/ac-ft (Medium)	$0 to $1,000/ac-ft (Low)	No Cost
Environmental Factors	Significant environmental impacts	Medium environmental impacts	Low to medium environmental impacts. Impacts can be mitigated.	Low environmental impacts	No environmental impacts
Impact on Other State Water Resources	Significant negative impacts	Medium negative Impacts	Low negative impacts	Low to no negative impacts and/or some positive impacts	High positive impacts
Threat to Agricultural Resources/Rural Areas	Significant negative impacts	Medium negative Impacts	Low negative impacts	Low to no negative impacts and/or some positive impacts	High positive impacts
Other Natural Resources	Significant negative impacts	Medium negative Impacts	Low negative impacts	Low to no negative impacts and/or some positive impacts	High positive impacts
Interbasin Transfers	Yes/No				
Third Party Social & Economic Factors	Significant negative impacts	Medium negative Impacts	Low negative impacts	Low to no negative impacts and/or some positive impacts	High positive impacts
Major Impacts on Key Water Quality Parameters	Significant negative impacts	Medium negative Impacts	Low negative impacts	Low to no negative impacts and/or some positive impacts	High positive impacts
Political Feasibility	No sponsor readily identifiable.	Sponsor identifiable, but uncommitted.	Sponsor(s) identified, commitment level uncertain.	Sponsor(s) are identified and committed to strategy.	Sponsors identified and strategy is in development.
Implementation Issues	High implementation issues	Medium implementation issues	Low to medium implementation issues	Low implementation issues	Low to no implementation issues

Table 5B-B.2 Environmental Factors Evaluation and Scoring Gradations

Category	Environmental Factor Ratings (1-5)				
	1	2	3	4	5
Acres Impacted	Greater than 1,000 acres and/or impacts to wetlands	501-1,000 acres	101-500 acres	0-100 acres	None
Environmental Water Needs	High impact to instream flows	Moderate impact to instream flows	Low impact to instream flows	No impact to instream flows	Increases instream flows
Habitat	High impact	Medium impact	Low impact	No impact	Positive impact
Threatened and Endangered Species	> 30 designated T&E species occur in county	20-30 designated T&E species occur in county	10-20 designated T&E species occur in county	5-10 designated T&E species occur in county	< 5 designated T&E species occur in county
Cultural Resources	High impact	Medium impact	Low impact	No impact	Positive impact
Bays and Estuaries	High impact to B&E flows	Moderate impact to B&E flows	Low impact to B&E flows	No impact to B&E flows	Increases B&E flows
Environmental Water Quality	High impact	Medium impact	Low impact	No impact	Positive impact

Table 5B-B.3 – ETRWPA WMS Evaluation Matrix Rankings for Recommended and Alternative Water Management Strategies/Projects ***(Alternative Strategies/Projects are identified in italics)***

										Strategy Evaluation Scores (1-5)													
#	County	Entity	Basin Used	Strategy/Project Name	Strategy Key	Maximum Need from 2030-2080 (ac-ft/year)	Maximum Strategy Quantity (ac-ft/year)	Percentage of Maximum Need Met (%)	Unit Cost ($/ac-ft)	Quantity	Source Supply Available Before WMS	Percent Strategy Supply / Available Source Supply	Reliability	Cost	Environmental Factors	Impact on Other State Water Resources	Agricultural Resources	Other Natural Resources	Interbasin Transfers	Third Party Social & Economic Factors	Key Water Quality Parameters	Political Feasibility	Implementation Issues
1	Multiple	Multiple	Multiple	Conservation - Water Use Reduction	CONS-WUR	Varies by WUG	Varies by WUG	>100%	Varies by WUG	5	-	0%	2	4	5	5	4	5	No	4	4	3	3
2	Multiple	Multiple	Multiple	Conservation - Water Loss Mitigation	CONS-WLM	Varies by WUG	Varies by WUG	>100%	Varies by WUG	5	-	0%	2	4	5	5	4	5	No	4	4	3	3
3	Anderson	B C Y WSC	Neches	New Well(s) in Carrizo-Wilcox Aquifer	BCYW-GW	0	170	>100%	$3,088	5	14,245	1%	3	2	3	4	4	4	No	4	4	4	4
4	Anderson	Steam Electric Power	Neches/Trinity	New Well(s) in Carrizo-Wilcox Aquifer	ADSN-SEP	2,296	2,300	100%	$797	4	14,245	16%	3	4	3	4	4	4	No	4	4	2	4
5	Angelina	Manufacturing	Neches	Purchase from Lufkin	ANGL-MFG	3,055	3,060	100%	$1,379	4	6,590	46%	5	3	3	4	4	4	No	3	4	3	4
6	Angelina	Mining	Neches	Purchase from ANRA	ANGL-MIN	533	540	100%	$3,152	4	68,499	1%	3	2	3	4	4	4	No	3	4	4	4
7	Cherokee	Alto Rural WSC	Neches	New Well(s) in Carrizo-Wilcox Aquifer	CHER-ALT	665	670	100%	$1,448	4	8,976	7%	4	3	3	4	4	4	No	4	4	3	4
8	Henderson	Chandler	Neches	Purchase from Tyler	CHAN-TYL	934	940	100%	$3,000	4	6,693	14%	4	3	3	4	4	4	No	4	4	3	3
9	*Henderson*	*Chandler*	*Neches*	*New Well(s) in Carrizo-Wilcox Aquifer*	*CHAN-GW*	*934*	*940*	*100%*	*$1,476*	*4*	*0*	100%	*2*	*3*	*3*	*4*	*4*	*4*	*No*	*4*	*4*	*3*	*2*
10	Henderson	Mining	Neches	New Well(s) in Queen City Aquifer	HDSN-MIN	143	150	100%	$235	4	8,739	2%	4	4	3	4	4	4	No	4	4	1	4
11	Houston	TDCJ Eastham Unit	Trinity	New Well(s) in Carrizo-Wilcox Aquifer	HOUS-TDCJ	111	120	100%	$4,858	4	1,223	10%	4	2	3	4	4	4	No	4	4	3	4
12	Houston	Livestock	Neches/Trinity	New Well(s) in Carrizo-Wilcox Aquifer	HOUS-LTK	285	290	100%	$300	4	1,223	24%	4	4	3	4	4	4	No	4	4	1	4
13	Jasper	South Jasper County WSC	Sabine	New Well(s) in Gulf Coast Aquifer	SJWS-GW	0	330	>100%	$2,461	5	7,518	4%	4	3	3	4	4	4	No	4	4	3	4
14	Jasper	Manufacturing	Neches	Purchase from LNVA	JASP-MFG	11,943	11,950	100%	$1,074	4	561,278	2%	4	3	3	4	4	4	No	3	4	1	4
15	Jefferson	China	Neches-Trinity	New Well(s) in Gulf Coast Aquifer	CHNA-GW	0	250	>100%	$2,967	5	9,516	3%	4	3	3	4	4	4	No	4	4	4	4
16	Jefferson	Manufacturing	Neches-Trinity	Purchase from LNVA	JEFF-MFG	175,165	175,200	>100%	$558	5	561,278	31%	4	4	3	4	4	4	No	3	4	1	4
17	Nacogdoches	D & M WSC	Neches	New Well(s) in Carrizo-Wilcox Aquifer	NACW-DMW	218	220	100%	$2,964	4	7,276	3%	4	3	3	4	4	4	No	4	4	2	4
18	Nacogdoches	County-Other	Neches	Lake Naconiche Regional Water Supply System	NACO-NAC	0	1,700	>100%	$6,539	5	4,500	38%	4	1	3	4	4	4	No	5	4	1	3
19	Orange	Orange County WCID 1	Sabine	New Well(s) in Gulf Coast Aquifer	OCWC-GW	0	1,610	>100%	$939	5	2,572	63%	3	4	3	4	4	4	No	4	4	4	4
20	Rusk	Gaston WSC	Neches	New Well(s) in Carrizo-Wilcox Aquifer	GSTW-GW	0	130	>100%	$3,492	5	2,188	6%	4	2	3	4	4	4	No	4	4	4	4
21	Rusk	Jacobs WSC	Sabine	New Well(s) in Carrizo-Wilcox Aquifer	JACW-GW	60	60	100%	$12,300	4	0	100%	4	1	3	4	4	4	No	4	4	3	4
22	Sabine	Livestock	Neches/Sabine	New Well(s) in Yegua-Jackson Aquifer	SAB-LSK	97	100	100%	$470	4	1,005	10%	4	4	3	4	4	4	No	4	4	3	4
23	Shelby	Manufacturing	Neches	Purchase from Center	SHEL-MFG	1,325	1,330	100%	$2,440	4	0	100%	4	3	3	4	4	4	No	3	4	3	4
24	Smith	Southern Utilities	Neches	Amendment to Supplemental Contract with Tyler	SMIT-STU	410	410	100%	$1,634	4	6,693	6%	4	3	4	4	4	4	No	4	4	3	4
25	Smith	County-Other	Neches	Purchase from Tyler	SMIT-SMC	273	280	100%	$5,768	4	6,693	4%	4	1	3	4	4	4	No	4	4	3	4
26	Smith	Manufacturing	Neches	Purchase from Tyler	SMIT-MFG	567	570	100%	$5,461	4	6,693	9%	4	1	3	4	4	4	No	3	4	3	4
27	Smith	Mining	Neches	Purchase from Tyler	SMIT-MIN	421	430	100%	$4,395	4	6,693	6%	4	2	3	4	4	4	No	3	4	3	4
28	Trinity	Irrigation	Trinity	New Well(s) in Yegua-Jackson Aquifer	TRI-IRR	215	220	100%	$236	4	266	83%	4	4	3	4	5	4	No	4	4	3	4
29	Tyler	Manufacturing	Neches	New Well(s) in Gulf Coast Aquifer	TYL-MFG	102	110	100%	$445	4	30,493	0%	4	4	3	4	4	4	No	4	4	3	4
30	Angelina	Angelina Neches River Authority	Neches	Lake Columbia	ANRA-COL	0	75,720	>100%	$375	5	-	0%	4	4	2	3	2	4	Yes	2	4	4	3
31	Angelina	Angelina Neches River Authority	Neches	ANRA Treatment and Distribution System	ANRA-WTP	0	22,232	>100%	$3,790	5	-	0%	4	2	3	4	4	4	No	4	4	4	3
32	Cherokee/Rusk	Angelina-Nacogdoches WCID #1	Neches	Hydraulic Dredging of Lake Striker	ANCD-VOL	0	5,600	>100%	$4,997	5	-	0%	3	2	4	4	4	4	No	4	4	4	4
33	Henderson	Athens MWA	Neches	Indirect Reuse of Flows from Fish Hatcheries	AMWA-REU	4,145	2,872	69%	$0	3	-	0%	4	5	4	5	4	4	No	4	4	4	3

Table 5B-B.3 – ETRWPA WMS Evaluation Matrix Rankings for Recommended and Alternative Water Management Strategies/Projects ***(Alternative Strategies/Projects are identified in italics)***

										Strategy Evaluation Scores (1-5)													
#	County	Entity	Basin Used	Strategy/Project Name	Strategy Key	Maximum Need from 2030-2080 (ac-ft/year)	Maximum Strategy Quantity (ac-ft/year)	Percentage of Maximum Need Met (%)	Unit Cost ($/ac-ft)	Quantity	Source Supply Available Before WMS	Percent Strategy Supply / Available Source Supply	Reliability	Cost	Environmental Factors	Impact on Other State Water Resources	Agricultural Resources	Other Natural Resources	Interbasin Transfers	Third Party Social & Economic Factors	Key Water Quality Parameters	Political Feasibility	Implementation Issues
34	Henderson	Athens MWA	Neches	WTP Booster Pump Station Expansion	AMWA-BPS	4,145	4,592	>100%	$67	5	-	0%	4	4	4	4	4	4	No	4	4	4	4
35	*Henderson*	*Athens MWA*	*Neches*	*New Well(s) in Carrizo-Wilcox Aquifer*	*AMWA-GW*	*4,145*	*720*	*17%*	*$1,786*	*1*	*0*	100%	*2*	*3*	*3*	*4*	*4*	*4*	*No*	*4*	*4*	*3*	*2*
36	Hardin	Beaumont	Neches-Trinity	Well Field Infrastructure Improvements	BEAU-WFI	11,388	2,823	25%	$2,784	2	9,516	30%	4	3	3	4	4	4	No	4	4	4	4
37	Jefferson	Beaumont	Neches-Trinity	Amendment to Supplemental Contract with LNVA	BEAU-LNV	11,388	8,565	75%	$326	4	561,278	2%	4	4	4	4	4	4	No	4	4	4	4
38	Jefferson	Beaumont	Neches-Trinity	Bunn's Canal Rehabilitation	BEAU-BCR	11,388	8,968	79%	$10	4	-	0%	4	4	3	4	4	4	No	4	4	4	3
39	Jefferson	Beaumont	Neches-Trinity	New Westside Surface WTP	BEAU-WTP	11,388	12,331	>100%	$1,316	5	-	0%	4	3	3	4	4	4	No	4	4	4	4
40	Shelby	Center	Sabine	Reuse Pipeline to Industrial Customer	CENT-REU	1,652	1,121	68%	$2,326	3	-	0%	5	3	4	5	4	4	No	5	5	4	4
41	*Shelby*	*Center*	*Sabine*	*Pipeline from Toledo Bend Reservoir*	*CENT-TOL*	1,652	*2,242*	>100%	$2,893	5	936,835	0%	*4*	3	3	4	4	4	No	*4*	*4*	*4*	*4*
42	Houston	Houston Co. WCID #1	Trinity	New Well(s) in Carrizo-Wilcox Aquifer	HCWC-GW	0	3,500	>100%	$1,056	5	1,223	n/a	3	3	3	4	4	4	No	4	*4*	4	3
43	Cherokee	Jacksonville	Neches	Raw Water Transmission System from Lake Columbia	JACK-COL	0	1,700	>100%	$3,781	5	68,499	2%	4	2	3	4	4	4	No	4	*4*	4	3
44	Jefferson	Lower Neches Valley Authority	Trinity	Devers Pump Station Relocation (Region H)	LNVA-DPS	0	88,704	>100%	$21	5	-	0%	4	4	3	5	4	4	No	4	4	5	4
45	Jefferson	Lower Neches Valley Authority	Neches	Neches Pump Station Upgrade and Fuel Diversification	LNVA-NPS	0	161,420	>100%	$35	5	-	0%	4	4	3	5	4	4	No	4	4	5	4
46	Jefferson	Lower Neches Valley Authority	Neches/Neches-Trinity	West Beaumont Reservoir	LNVA-WRR	0	7,700	>100%	$790	5	-	0%	4	4	2	4	3	4	No	4	4	5	3
47	Jefferson	Lower Neches Valley Authority	Neches-Trinity/Trinity	Neches-Trinity Basin Interconnect (Region H)	LNVA-NTI	0	67,000	>100%	$165	5	561,278	12%	4	4	2	3	5	3	Yes	4	3	5	3
48	Jefferson	Lower Neches Valley Authority	Neches-Trinity/Sabine	Purchase from SRA (Toledo Bend)	LNVA-SRA	0	200,000	>100%	$513	5	936,835	21%	4	4	2	2	3	3	Yes	4	3	4	2
49	Angelina	Lufkin	Neches	Transfer from Sam Rayburn to Lake Kurth	LUFK-RAY	0	28,000	>100%	$2,299	5	561,278	5%	4	3	3	4	4	4	No	4	*4*	4	4
50	Nacogdoches	Nacogdoches	Neches	Raw Water Transmission System from Lake Columbia	NACP-COL	0	8,551	>100%	$1,085	5	68,499	12%	4	3	3	4	4	4	No	4	*4*	4	3
51	Smith	Tyler	Neches	Lake Palestine Infrastructure Expansion	TYLR-PAL	0	16,815	>100%	$1,656	5	-	0%	4	3	3	4	4	4	No	4	*4*	3	4
52	Anderson	Upper Neches River MWA	Neches	Neches Run-of-River with Lake Palestine	UMWA-ROR	43,259	82,900	>100%	$1,293	5	-	0%	4	3	2	3	3	3	Yes	2	3	4	3

Table 5B-B.4 – ETRWPA Water Management Strategy/Project Environmental Impact Analysis (*Alternative Strategies/Projects are identified in italics*)

					Environmental Factors and Scores (1-5)															
#	County	Entity	Basin	Strategy	Acres Impacted	Wetland Acres Impacted (Yes/No)	Acres Impacted Score	Environmental Water Needs Impact	Environmental Water Needs Score	Habitat Impact	Habitat Score	Potential Number of Threatened and Endangered Species in County	Threatened and Endangered Species Score	Cultural Resources Impact	Cultural Resources Score	Bays & Estuaries Impact	Bays & Estuaries Score	Environmental Water Quality Impact	Environmental Water Quality Score	Overall Environmental Impacts Score
1	Multiple	Multiple	Multiple	Conservation - Water Use Reduction	0	No	5	Positive	5	None	4	N/A	5	None	4	Positive	5	None	4	5
2	Multiple	Multiple	Multiple	Conservation - Water Loss Mitigation	0	No	5	Positive	5	None	4	N/A	5	None	4	Positive	5	None	4	5
3	Anderson	B C Y WSC	Neches	New Well(s) in Carrizo-Wilcox Aquifer	8	No	4	Low	3	Low	3	24	2	Low	3	None	4	Low	3	3
4	Anderson	Steam Electric Power	Neches, Trinity	New Well(s) in Carrizo-Wilcox Aquifer	30	No	4	Low	3	Low	3	24	2	Low	3	None	4	Low	3	3
5	Angelina	Manufacturing	Neches	Purchase from Lufkin	115	No	3	Low	3	Medium	2	19	3	Low	3	None	4	Low	3	3
6	Angelina	Mining	Neches	Purchase from ANRA	19	No	4	Low	3	Low	3	19	3	Low	3	None	4	Low	3	3
7	Cherokee	Alto Rural WSC	Neches	New Well(s) in Carrizo-Wilcox Aquifer	11	No	4	Low	3	Low	3	21	2	Low	3	None	4	Low	3	3
8	Henderson	Chandler	Neches	Purchase from Tyler	29	No	4	Low	3	Low	3	21	2	Low	3	Low	3	Low	3	3
9	*Henderson*	*Chandler*	*Neches*	*New Well(s) in Carrizo-Wilcox Aquifer*	13	No	4	Low	3	Low	3	21	2	Low	3	None	4	Low	3	3
10	Henderson	Mining	Neches	New Well(s) in Queen City Aquifer	1	No	4	Low	3	Low	3	21	2	Low	3	None	4	Low	3	3
11	Houston	TDCJ Eastham Unit	Trinity	New Well(s) in Carrizo-Wilcox Aquifer	13	No	4	Low	3	Low	3	21	2	Low	3	None	4	Low	3	3
12	Houston	Livestock	Neches/Trinity	New Well(s) in Carrizo-Wilcox Aquifer	3	No	4	Low	3	Low	3	21	2	Low	3	None	4	Low	3	3
13	Jasper	South Jasper County WSC	Sabine	New Well(s) in Gulf Coast Aquifer	13	No	4	Low	3	Low	3	21	2	Low	3	None	4	Low	3	3
14	Jasper	Manufacturing	Neches	Purchase from LNVA	95	No	4	Low	3	Low	3	21	2	Low	3	Low	3	Low	3	3
15	Jefferson	China	Neches-Trinity	New Well(s) in Gulf Coast Aquifer	14	No	4	Low	3	Low	3	43	1	Low	3	None	4	Low	3	3
16	Jefferson	Manufacturing	Neches-Trinity	Purchase from LNVA	95	No	4	Low	3	Low	3	43	1	Low	3	Low	3	Low	3	3
17	Nacogdoches	D & M WSC	Neches	New Well(s) in Carrizo-Wilcox Aquifer	13	No	4	Low	3	Low	3	19	3	Low	3	None	4	Low	3	3
18	Nacogdoches	County-Other	Neches	Lake Naconiche Regional Water Supply System	82	No	4	Low	3	Low	3	19	3	Low	3	Low	3	Low	3	3
19	Orange	Orange County WCID 1	Sabine	New Well(s) in Gulf Coast Aquifer	10	No	4	Low	3	Low	3	16	3	Low	3	None	4	Low	3	3
20	Rusk	Gaston WSC	Neches	New Well(s) in Carrizo-Wilcox Aquifer	8	No	4	Low	3	Low	3	18	3	Low	3	None	4	Low	3	3
21	Rusk	Jacobs WSC	Sabine	New Well(s) in Carrizo-Wilcox Aquifer	13	No	4	Low	3	Low	3	18	3	Low	3	None	4	Low	3	3
22	Sabine	Livestock	Neches, Sabine	New Well(s) in Yegua-Jackson Aquifer	2	No	4	Low	3	Low	3	20	3	Low	3	None	4	Low	3	3
23	Shelby	Manufacturing	Neches	Purchase from Center	115	No	3	Low	3	Medium	2	17	3	Low	3	None	4	Low	3	3
24	Smith	Southern Utilities	Neches	Amendment to Supplemental Contract with Tyler	0	No	5	Low	3	None	4	N/A	5	Low	3	None	4	Low	3	4
25	Smith	County-Other	Neches	Purchase from Tyler	31	No	4	Low	3	Low	3	17	3	Low	3	None	4	Low	3	3
26	Smith	Manufacturing	Neches	Purchase from Tyler	76	No	4	Low	3	Low	3	17	3	Low	3	None	4	Low	3	3
27	Smith	Mining	Neches	Purchase from Tyler	31	No	4	Low	3	Low	3	17	3	Low	3	None	4	Low	3	3
28	Trinity	Irrigation	Trinity	New Well(s) in Yegua-Jackson Aquifer	2	No	4	Low	3	Low	3	21	2	Low	3	None	4	Low	3	3
29	Tyler	Manufacturing	Neches	New Well(s) in Gulf Coast Aquifer	1	No	4	Low	3	Low	3	20	3	Low	3	None	4	Low	3	3
30	Angelina	Angelina Neches River Authority	Neches	Lake Columbia	10,133	Yes	1	Medium	2	Medium	2	19	3	Low	3	Medium	2	Medium	2	2
31	Angelina	Angelina Neches River Authority	Neches	ANRA Treatment and Distribution System	94	No	4	Low	3	Low	3	19	3	Low	3	None	4	Low	3	3
32	Cherokee/Rusk	Angelina-Nacogdoches WCID #1	Neches	Hydraulic Dredging of Lake Striker	0	No	5	Low	3	None	4	N/A	5	Low	3	None	4	Low	3	4
33	Henderson	Athens MWA	Neches	Indirect Reuse of Flows from Fish Hatcheries	0	No	5	Positive	5	None	4	N/A	5	Low	3	Positive	5	Low	3	4
34	Henderson	Athens MWA	Neches	WTP Booster Pump Station Expansion	0	No	5	Low	3	None	4	N/A	5	Low	3	Low	3	Low	3	4
35	*Henderson*	*Athens MWA*	*Neches*	*New Well(s) in Carrizo-Wilcox Aquifer*	13	No	4	Low	3	Low	3	21	2	Low	3	None	4	Low	3	3
36	Hardin	Beaumont	Neches-Trinity	Well Field Infrastructure Improvements	28	No	4	Low	3	Low	3	20	3	Low	3	None	4	Low	3	3
37	Jefferson	Beaumont	Neches-Trinity	Amendment to Supplemental Contract with LNVA	0	No	5	Low	3	None	4	N/A	5	Low	3	Low	3	Low	3	4
38	Jefferson	Beaumont	Neches-Trinity	Bunn's Canal Rehabilitation	37	No	4	Low	3	Low	3	43	1	Low	3	Low	3	Low	3	3
39	Jefferson	Beaumont	Neches-Trinity	New Westside Surface WTP	85	No	4	Low	3	Low	3	43	1	Low	3	Low	3	Low	3	3
40	Shelby	Center	Sabine	Reuse Pipeline to Industrial Customer	11	No	4	Positive	5	Low	3	17	3	Low	3	Positive	5	Low	3	4
41	Shelby	Center	Sabine	Pipeline from Toledo Bend Reservoir	53	No	4	Low	3	Low	3	17	3	Low	3	None	4	Low	3	3
42	Houston	Houston Co. WCID #1	Trinity	New Well(s) in Carrizo-Wilcox Aquifer	174	No	3	Low	3	Medium	2	21	2	Low	3	None	4	Low	3	3
43	Cherokee	Jacksonville	Neches	Raw Water Transmission System from Lake Columbia	24	No	4	Low	3	Low	3	21	2	Low	3	None	4	Low	3	3
44	Jefferson	Lower Neches Valley Authority	Trinity	Devers Pump Station Relocation (Region H)	5	No	4	Low	3	Low	3	43	1	Low	3	Low	3	Low	3	3

Table 5B-B.4 – ETRWPA Water Management Strategy/Project Environmental Impact Analysis (*Alternative Strategies/Projects are identified in italics*)

					Environmental Factors and Scores (1-5)															
#	County	Entity	Basin	Strategy	Acres Impacted	Wetland Acres Impacted (Yes/No)	Acres Impacted Score	Environmental Water Needs Impact	Environmental Water Needs Score	Habitat Impact	Habitat Score	Potential Number of Threatened and Endangered Species in County	Threatened and Endangered Species Score	Cultural Resources Impact	Cultural Resources Score	Bays & Estuaries Impact	Bays & Estuaries Score	Environmental Water Quality Impact	Environmental Water Quality Score	Overall Environmental Impacts Score
45	Jefferson	Lower Neches Valley Authority	Neches	Neches Pump Station Upgrade and Fuel Diversification	5	No	4	Low	3	Low	3	43	1	Low	3	Low	3	Low	3	3
46	Jefferson	Lower Neches Valley Authority	Neches, Neches-Trinity	West Beaumont Reservoir	1,100	No	1	Medium	2	Medium	2	43	1	Low	3	Medium	2	Low	3	2
47	Jefferson	Lower Neches Valley Authority	Neches-Trinity, Trinity	Neches-Trinity Basin Interconnect (Region H)	163	No	3	Medium	2	Medium	2	43	1	Low	3	Medium	2	Low	3	2
48	Jefferson	Lower Neches Valley Authority	Neches-Trinity, Sabine	Purchase from SRA (Toledo Bend)	401	No	3	Medium	2	Medium	2	43	1	Low	3	Medium	2	Medium	2	2
49	Angelina	Lufkin	Neches	Transfer from Sam Rayburn to Lake Kurth	141	No	3	Low	3	Medium	2	19	3	Low	3	Low	3	Low	3	3
50	Nacogdoches	Nacogdoches	Neches	Raw Water Transmission System from Lake Columbia	20	No	4	Low	3	Low	3	19	3	Low	3	None	4	Low	3	3
51	Smith	Tyler	Neches	Lake Palestine Infrastructure Expansion	24	No	4	Low	3	Low	3	17	3	Low	3	None	4	Low	3	3
52	Anderson	Upper Neches River MWA	Neches	Neches Run-of-River with Lake Palestine	276	No	3	Medium	2	Medium	2	24	2	Low	3	Low	3	Medium	2	2