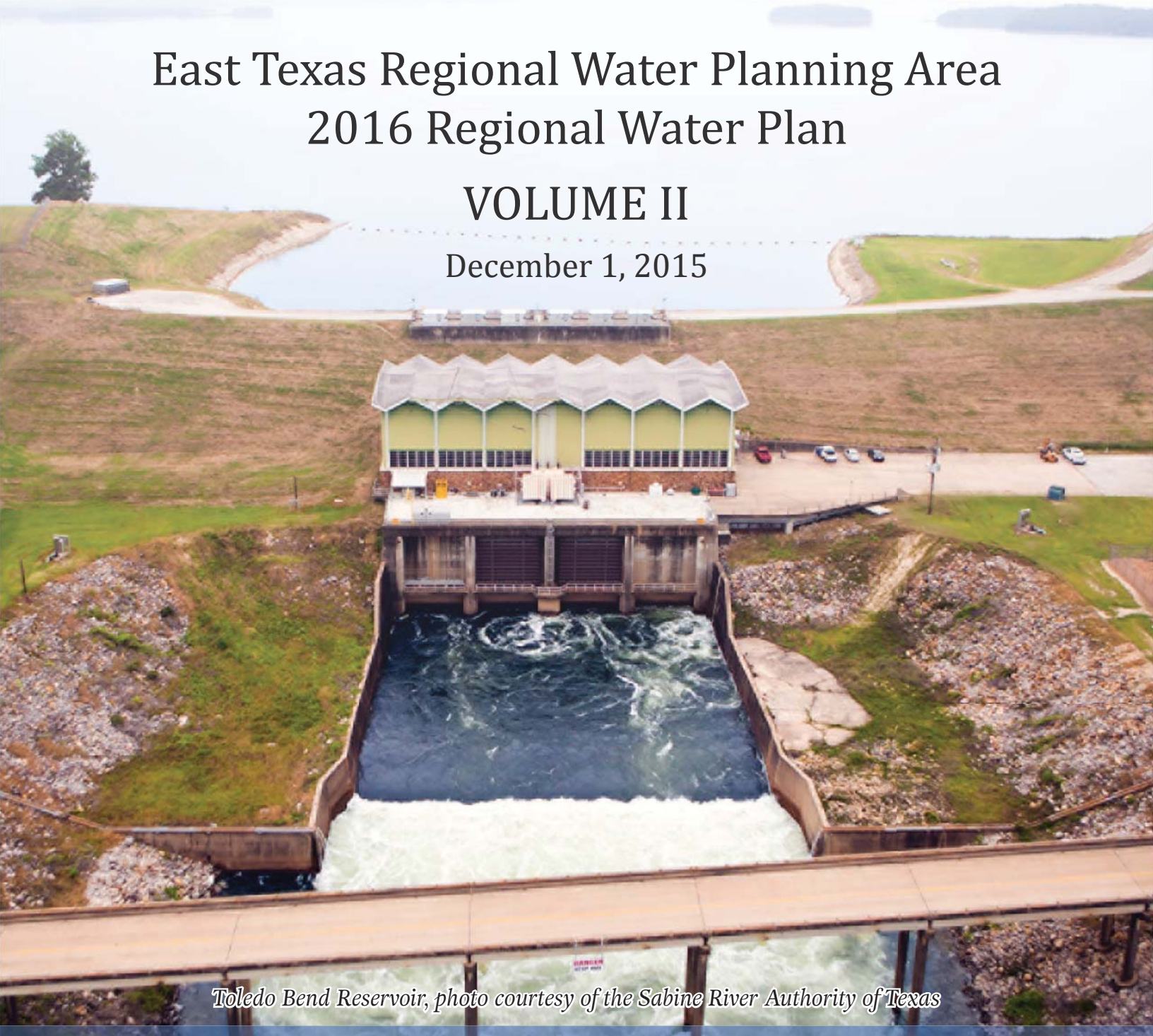
Region I
East Texas Regional
Water Planning Group

# East Texas Regional Water Planning Area
# 2016 Regional Water Plan

## VOLUME II

December 1, 2015



*Toledo Bend Reservoir, photo courtesy of the Sabine River Authority of Texas*


ALAN PLUMMER ASSOCIATES, INC.
ENVIRONMENTAL ENGINEERS AND SCIENTISTS

LBG GUYTON

FREESE AND NICHOLS

# List of Appendices

# Appendix 1-A

# Species of Special Concern in the ETRWPA

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The TPWD has compiled a list of species of special concern in the State of Texas. Rare species are listed by county in the Rare, Threatened, and Endangered Species Database, which includes regulatory listing and habitats of each species.

Table 1-A.1 identifies rare, threatened or endangered species in the region by county and lists federal and state status for each species. Species are grouped by taxonomic assemblage (i.e., bird, insect, fish, mammal, vascular plant, etc.). Information on habitats for these species may be found on the TPWD website, http://tpwd.texas.gov/gis/rtest/.

The key to the federal and state status for threatened and endangered species follows:

| | |
|---|---|
| LE, LT | Federally Listed Endangered/Threatened |
| PE, PT | Federally Proposed Endangered/Threatened |
| SAE, SAT | Federally Listed Endangered/Threatened by Similarity of Appearance |
| C | Federal Candidate for Listing; formerly Category 1 Candidate |
| DL, PDL | Federally Delisted/Proposed for Delisting |
| NL | Not Federally Listed |
| E, T | State Listed Endangered/Threatened |
| NT | Not tracked or no longer tracked by the State |
| “blank” | Rare, but with no regulatory listing status |

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| Taxon | Common Name | Federal Status | State Status | County | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Anderson | Angelina | Cherokee | Hardin | Henderson | Houston | Jasper | Jefferson | Nacogdoches | Newton | Orange | Panola | Polk | Rusk | Sabine | San Augustine | Shelby | Smith | Trinity | Tyler |
| Amphibians | Southern Crawfish Frog | | | | | | | ● | ● | ● | ● | | ● | | | ● | | | | | | ● | |
| Birds | American Peregrine Falcon | DL | T | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | Arctic Peregrine Falcon | DL | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | Bachman's Sparrow | | T | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | Bald Eagle | DL | T | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | Black Rail | | | | | | | | | | ● | | | | | | | | | | | | | |
| | Brown Pelican | DL | E | | | | | | | | ● | | | ● | | | | | | | | | | |
| | Henslow's Sparrow | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | Interior Least Tern | LE | E | ● | | ● | | ● | ● | | | | | | ● | | ● | | | ● | ● | | | |
| | Peregrine Falcon | DL | T | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | Piping Plover | LT | T | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | Red Knot | T | | ● | | | | ● | ● | | ● | | | | | | | | | | | | ● | |
| | Red-cockaded Woodpecker | LE | E | ● | ● | ● | ● | | ● | ● | | ● | ● | | ● | ● | | ● | ● | | ● | ● | ● | ● |
| | Reddish egret | | T | | | | | | | | ● | | | | | | | | | | | | | |
| | Snowy Plover | | | | | | | | | | ● | | | | | | | | | | | | | |
| | Sooty tern | | T | | | | | | | | | | | ● | | | | | | | | | | |
| | Sprague's Pipit | C | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | Swallow-tailed kite | | T | | ● | | ● | | | ● | ● | ● | ● | ● | | ● | | ● | ● | ● | | | | ● |
| | Western snowey plover | | | | | | | | | | ● | | | | | | | | | | | | | |
| | Western Snowy Plover | | | | | | | | | | ● | | | | | | | | | | | | | |
| | White-faced Ibis | | T | ● | | | ● | | | ● | ● | | ● | ● | | | | | | | | | ● | |
| | Whooping Crane | LE | E | ● | | | | ● | | | | | | | | | | | | | | | | |
| | Wood Stork | | T | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Crustaceans | A crayfish (1 of 5 species, Procambarus nechesae) | | | | ● | | | | | | | | | | | | | | | | | | ● | |
| | Texas prairie crayfish | | | | ● | | | | | | | | | | | | | | | | | | | |

| Taxon | Common Name | Federal Status | State Status | County | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Anderson | Angelina | Cherokee | Hardin | Henderson | Houston | Jasper | Jefferson | Nacogdoches | Newton | Orange | Panola | Polk | Rusk | Sabine | San Augustine | Shelby | Smith | Trinity | Tyler |
| Fishes | American Eel | | | ● | ● | ● | ● | | ● | ● | ● | | ● | ● | | ● | | | | | | ● | ● |
| | Blackside darter | | T | | | | | | | | | ● | | | ● | | | | | ● | ● | | |
| | Blue sucker | | T | | | | ● | | | ● | | | ● | | | | | ● | | | | | ● |
| | Creek chubsucker | | T | | ● | ● | ● | | ● | ● | | ● | ● | | ● | ● | ● | ● | ● | ● | ● | ● | |
| | Ironcolor shiner | | | | | | | | | ● | | | ● | ● | ● | | ● | ● | | ● | ● | | |
| | Orangebelly darter | | | | ● | ● | | | | ● | | ● | ● | | ● | ● | ● | ● | ● | ● | ● | | |
| | Paddlefish | | T | ● | ● | ● | ● | | ● | ● | | ● | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | Smalltooth sawfish | LE | E | | | | | | | | ● | | | | | | | | | | | | |
| | Western sand darter | | | | | | ● | | | ● | | | ● | | ● | | ● | ● | | ● | ● | | ● |
| Insects | A caddisfly | | | ● | | | | | | | | | | | | | | | | | | | |
| | A mayfly | | | | | | | | | ● | | | | | | | | | | | | | |
| | A Purse casemaker caddisfly | | | ● | | | | | | | | | | | | | | | | | | | |
| | Bay skipper | | | | | | | | | | ● | | | | | | | | | | | | |
| | Gulf Coast clubtail | | | | | | | | | | | | ● | | | | | | | | | | |
| | Holzenthal's philopotamid caddisfly | | | ● | | | | | | | | | | | | | | | | | | | |
| | Morse's net-spinning caddisfly | | | ● | | | | | | | | | | | | | | | | | | | |
| | Texas emerald dragonfly | | | ● | | | | ● | ● | | | | | | | | | ● | ● | ● | | ● | |
| Mammals | Black bear | T/SA;NL | T | ● | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | Louisiana black bear | LT | T | ● | ● | ● | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● |
| | Plains spotted skunk | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | Rafinesque's big-eared bat | | T | | ● | ● | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● |
| | Red wolf | LE | E | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | Southeastern myotis bat | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Mollusks | Louisiana pigtoe | | T | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | Sandbank pocketbook | | T | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | Southern hickorynut | | T | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | Texas heelsplitter | | T | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | Texas pigtoe | | T | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | Triangle pigtoe | | T | ● | ● | ● | ● | | | | | ● | | | | | | | | ● | | | |
| Plants | Boynton's oak | | | | ● | | | | | | | | | | | | | | | | | | |
| | Bristle nailwort | | | | | | | | | | | ● | | | | | | | | | | | |

| Taxon | Common Name | Federal Status | State Status | County | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Anderson | Angelina | Cherokee | Hardin | Henderson | Houston | Jasper | Jefferson | Nacogdoches | Newton | Orange | Panola | Polk | Rusk | Sabine | San Augustine | Shelby | Smith | Trinity | Tyler |
| Plants | Carrizo leather flower | | | | | ● | | ● | | | | | | | | | | | | | ● | | |
| | Chapman's orchid | | | | | | ● | | | | ● | | | ● | | | | | | | | | ● |
| | Chapman's yellow-eyed grass | | | | | | | ● | | | | | | | | | | | | | | | |
| | Earth fruit (Tinytim) | LT | T | ● | | | | | | | | | | | ● | | | | | | | | |
| | Florida ladies-tresses | | | | | | ● | | | | ● | | ● | | | | | | | | | | ● |
| | Long-sepaled false dragonhead | | | | | | ● | | | ● | | | ● | ● | | | | | | | | | ● |
| | Navasota false foxglove | | | | | | | | | | | | | | | | | | | | | | ● |
| | Navasota ladies'-tresses | LE | E | | | | | | | ● | | | | | | | | | | | | | |
| | Neches River rosemallow | T | | | | ● | | | ● | ● | | | | | | | | | | | | ● | |
| | Nixon's dwarf hawthorn | | | | | | | | | | | ● | | | | | | | | | | | |
| | Nodding yucca | | | | | | | | | ● | | | ● | | | | | | | | | | |
| | Panicled indigobush | | | ● | ● | ● | | ● | ● | ● | | ● | ● | | | ● | ● | | | | ● | ● | ● |
| | Rough-stem aster | | | ● | | | | ● | | | | | | | | | | | | | ● | | |
| | Sandhill woolywhite | | | | | | | | | | | | | | | | | | | | | | |
| | Shinner's sunflower | | | | | | | | | | | | ● | | | | | | | | ● | | |
| | Small-headed pipewort | | | ● | | | | ● | | | | | | | | | | | | | | | |
| | Texas golden gladecress | E | | | | | | | | | | | | | | | | ● | ● | | | | |
| | Texas ladies'-tresses | | | | | | | | | | | | | | | | | | | | | | ● |
| | Texas prairie dawn | LE | E | | | | | | | | | | | | | | | | | | | ● | |
| | Texas screwstem | | | | ● | | ● | | | ● | | ● | ● | | | ● | | | ● | | | | ● |
| | Texas three-birds orchid | | | | | | | | ● | | | | | | | | | | | | | | |
| | Texas trailing phlox | LE | E | | | | ● | | | | | | | | | ● | | | | | | | ● |
| | Texas trillium | | | | ● | ● | | | ● | ● | | ● | | | ● | | ● | | | | ● | | |
| | White bladderpod | LE | E | | | | | | | | | | | | | | | | ● | | | | |
| | White firewheel | | | | | | ● | | | | | | ● | | | | | | | | | | ● |
| Reptiles | Alligator snapping turtle | | T | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | Atlantic hawksbill sea turtle | LE | E | | | | | | | | ● | | | | | | | | | | | | |
| | Green sea turtle | LT | T | | | | | | | | ● | | | | | | | | | | | | |
| | Kemp's Ridley sea turtle | LE | E | | | | | | | | ● | | | | | | | | | | | | |
| | Leatherback sea turtle | LE | E | | | | | | | | ● | | | | | | | | | | | | |
| | Loggerhead sea turtle | LT | T | | | | | | | | ● | | | | | | | | | | | | |

| Taxon | Common Name | Federal Status | State Status | County | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Anderson | Angelina | Cherokee | Hardin | Henderson | Houston | Jasper | Jefferson | Nacogdoches | Newton | Orange | Panola | Polk | Rusk | Sabine | San Augustine | Shelby | Smith | Trinity | Tyler |
| Reptiles | Louisiana pine snake | C | T | | ● | ● | ● | | ● | ● | | ● | ● | | | ● | | ● | ● | | | ● | ● |
| | Northern scarlet snake | | T | | | ● | ● | ● | | ● | ● | | ● | ● | ● | | ● | ● | ● | ● | ● | | | ● |
| | Texas diamondback terrapin | | | | | | | | | | ● | | | ● | | | | | | | | | | |
| | Texas horned lizard | | T | ● | | ● | | ● | ● | | ● | ● | | ● | | | ● | | | | ● | | | |
| | Timber rattlesnake | | T | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

# Appendix 1-B

# Water Loss Audits

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The TWDB established new requirements requiring water audit reporting for public utilities that provide potable water. Every five years public utilities must perform a water audit computing the utility's most recent annual water loss. Entities with active financial obligations with the TWDB are required to submit water loss data annually. This appendix provides Entity-Level Water Loss Audit Data for 2013 as well as a Statewide Region-Level 2010 Water Loss Audit Data Summary.

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# East Texas Regional Water Planning Area
## 2013 Production Water Loss Audit Data

| PWS Name | PWS Code | Is Loan Wsc Required | Is Connections Required | Is Five Year Required | Person Filing Name | Report Period Start | Report Period End | Surface Water Percentage | Ground Water Percentage | Retail Population Served | Wholesale Population Served |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Angelina WSC | TX0030016 | TRUE | FALSE | FALSE | Keith Weathers | 01/01/13 | 12/31/13 | 0.00 | 100.00 | 3,750 | 0 |
| Beechwood WSC | TX2020014 | TRUE | FALSE | FALSE | Laura Zito | 01/01/13 | 12/31/13 | 0.00 | 100.00 | 1,143 | 0 |
| Brookeland FWSD | TX2020004 | TRUE | FALSE | FALSE | Becky Hall | 01/01/13 | 12/31/13 | 0.00 | 100.00 | 1,419 | 0 |
| City of Beaumont Water Utility Dept | TX1230001 | FALSE | TRUE | FALSE | Amalia Villarreal | 01/01/13 | 12/31/13 | 64.30 | 35.70 | 175,341 | 7,778 |
| City of Bridge City | TX1810001 | FALSE | TRUE | FALSE | Mike Lund | 01/01/13 | 12/31/13 | 0.00 | 100.00 | 8,700 | 72 |
| City of Bridge City Waterwood Estates | TX1810175 | FALSE | FALSE | FALSE | Mike Lund | 01/01/13 | 12/31/13 | 0.00 | 100.00 | 225 | 0 |
| City of Brownsboro | TX1070003 | FALSE | FALSE | FALSE | Gary Arnold | 01/01/13 | 12/31/13 | 0.00 | 100.00 | 1,440 | 486 |
| City of Carthage | TX1830001 | FALSE | TRUE | FALSE | Debbie Pierce | 01/01/13 | 12/31/13 | 1.00 | 99.00 | 6,668 | 5,627 |
| City of Center | TX2100001 | FALSE | FALSE | FALSE | John Holt | 01/01/13 | 12/31/13 | 100.00 | 0.00 | 5,193 | 0 |
| City of Crockett | TX1130001 | FALSE | TRUE | FALSE | Kelly McChesney | 01/01/13 | 12/31/13 | 99.00 | 1.00 | 6,679 | 164 |
| City of Groves | TX1230012 | FALSE | TRUE | FALSE | Marcus Johnson | 01/01/13 | 12/31/13 | 100.00 | 0.00 | 15,733 | 0 |
| City of Hemphill | TX2020001 | TRUE | FALSE | FALSE | Donald Iles | 01/01/13 | 12/31/13 | 100.00 | 0.00 | 1,198 | 3,000 |
| City of Henderson | TX2010001 | FALSE | TRUE | FALSE | James Hughes | 01/01/13 | 12/31/13 | 31.07 | 68.93 | 16,212 | 150 |
| City of Huntington | TX0030002 | FALSE | FALSE | FALSE | Damon Walters | 01/01/13 | 12/31/13 | 100.00 | 0.00 | 0 | 0 |
| City of Huxley | TX2100019 | TRUE | FALSE | FALSE | Gerald Huddleston | 01/01/13 | 12/31/13 | 100.00 | 0.00 | 2,307 | 0 |
| City of Jasper | TX1210001 | TRUE | TRUE | FALSE | Erik Rogers | 01/01/13 | 12/31/13 | 0.00 | 100.00 | 4,776 | 0 |
| City of Kountze | TX1000001 | TRUE | FALSE | FALSE | George Timothy Drake II | 01/01/13 | 12/31/13 | 0.00 | 100.00 | 3,405 | 0 |
| City of Lovelady | TX1130003 | TRUE | FALSE | FALSE | Thomas Vaughn | 01/01/13 | 12/31/13 | 26.00 | 74.00 | 649 | 0 |
| City of Nederland | TX1230006 | FALSE | TRUE | FALSE | Robert Sangster | 01/01/13 | 12/31/13 | 100.00 | 0.00 | 17,545 | 0 |
| City of Orange | TX1810004 | FALSE | TRUE | FALSE | David Martindale | 01/01/13 | 12/31/13 | 0.00 | 100.00 | 18,643 | 0 |
| City of Palestine | TX0010001 | FALSE | TRUE | FALSE | Robert Sedgwick | 01/01/13 | 12/31/13 | 100.00 | 0.00 | 18,712 | 250 |
| City of Port Arthur | TX1230009 | FALSE | TRUE | FALSE | JohnTomplait | 01/01/13 | 12/31/13 | 100.00 | 0.00 | 53,818 | 0 |
| City of Port Neches | TX1230010 | FALSE | TRUE | FALSE | Ken DuBois | 01/01/13 | 12/31/13 | 100.00 | 0.00 | 13,040 | 0 |
| City of San Augustine | TX2030001 | FALSE | FALSE | FALSE | chris anding | 01/01/13 | 12/31/13 | 100.00 | 0.00 | 2,108 | 0 |
| City of Silsbee | TX1000002 | FALSE | TRUE | FALSE | Joe Moreno | 01/01/13 | 12/31/13 | 0.00 | 100.00 | 9,888 | 0 |
| City of Tyler | TX2120004 | FALSE | TRUE | FALSE | P. Clayton Nicolardi | 01/01/13 | 12/31/13 | 96.70 | 3.30 | 109,242 | 11,527 |
| Cypress Creek WSC | TX2290007 | TRUE | FALSE | FALSE | ELMER MAY | 01/01/13 | 12/31/13 | 0.00 | 100.00 | 810 | 0 |
| El Pinon Estates Water System | TX2030013 | FALSE | FALSE | FALSE | Lonzo Gale | 10/01/13 | 12/31/13 | 0.00 | 100.00 | 135 | 0 |
| Forest Hills Water Supply | TX1210012 | TRUE | FALSE | FALSE | Becky Hall | 01/01/13 | 12/31/13 | 0.00 | 100.00 | 453 | 0 |
| G M WSC | TX2020067 | TRUE | TRUE | FALSE | Debra Daniel | 01/01/13 | 12/31/13 | 80.00 | 20.00 | 8,922 | 0 |
| Jefferson County WCID 10 | TX1230003 | FALSE | FALSE | FALSE | Thomas E. McDonald | 01/01/13 | 12/31/13 | 100.00 | 0.00 | 5,500 | 0 |
| Lake Livingston Big Thicket Retreat | TX1000053 | FALSE | FALSE | FALSE | Big Thicket Retreat | 01/01/13 | 12/31/13 | 0.00 | 100.00 | 108 | 0 |
| Lake Livingston Wayward Winds Oasis | TX2290014 | FALSE | FALSE | FALSE | Boyd McDaniel | 01/01/13 | 12/31/13 | 0.00 | 100.00 | 39 | 0 |
| Lilly Grove SUD | TX1740014 | TRUE | FALSE | FALSE | Donna Harris | 01/01/13 | 12/31/13 | 0.00 | 100.00 | 2,130 | 0 |
| Loma Linda Subdivision | TX2100038 | FALSE | FALSE | FALSE | Lonzo Gale | 01/01/13 | 12/31/13 | 0.00 | 100.00 | 66 | 0 |
| Lumberton MUD | TX1000035 | TRUE | TRUE | FALSE | Robb Starr | 01/01/13 | 12/31/13 | 0.00 | 100.00 | 21,450 | 0 |
| Meeker MWD | TX1230004 | TRUE | FALSE | FALSE | Stephanie Hoppe | 01/01/13 | 12/31/13 | 0.00 | 100.00 | 3,300 | 0 |
| Mulberry Water Supply Brookeland FWSD | TX1210049 | TRUE | FALSE | FALSE | Becky Hall | 01/01/13 | 12/31/13 | 0.00 | 100.00 | 111 | 0 |
| Orange County WCID 1 | TX1810005 | TRUE | TRUE | FALSE | | 01/01/13 | 12/31/13 | 0.00 | 100.00 | 17,031 | 0 |
| Rayburn Country MUD | TX1210014 | TRUE | FALSE | FALSE | Linda Powell | 01/15/13 | 12/15/13 | 0.00 | 100.00 | 1,893 | 0 |
| Shawnee Shores | TX2020050 | TRUE | FALSE | FALSE | Becky Hall | 01/01/13 | 12/31/13 | 0.00 | 100.00 | 348 | 0 |
| South Newton WSC | TX1760022 | TRUE | FALSE | FALSE | Brandy Lane | 01/01/13 | 12/31/13 | 0.00 | 100.00 | 5,000 | 0 |
| Toledo Village WSC | TX1760002 | TRUE | FALSE | FALSE | Becky Hall | 01/01/13 | 12/31/13 | 0.00 | 100.00 | 1,701 | 0 |
| Tyler County WSC | TX2290037 | TRUE | FALSE | FALSE | Jerry Lovelady | 01/01/13 | 12/31/13 | 0.00 | 100.00 | 5,100 | 0 |
| Woodland Shores Subdivision | TX2100037 | FALSE | FALSE | FALSE | Lonzo Gale | 01/01/13 | 12/31/13 | 0.00 | 100.00 | 57 | 0 |

# East Texas Regional Water Planning Area
## 2013 Production Water Loss Audit Data

| PWS Name | Main Lines Miles | Main Lines Miles AS | Wholesale Connections Served | Retail Connections Served | Service Connection Density (c) | Yearly Operating Pressure | Yearly Operating Pressure AS | Volume Units Of Measure | Old Volume Units Of Measure | Water Delivery | Water Delivery AS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Angelina WSC | 51 | 3 | 0 | 1,250 | 25 | 80 | 3 | G | G | 83,587,000 | 4 |
| Beechwood WSC | 11 | 0 | 0 | 504 | 46 | 50 | 0 | G | G | 0 | 0 |
| Brookeland FWSD | 28 | 3 | 0 | 469 | 17 | 75 | 3 | G | G | 26,030,000 | 3 |
| City of Beaumont Water Utility Dept | 707 | 4 | 4 | 58,447 | 83 | 55 | 5 | G | G | 9,451,212,000 | 4 |
| City of Bridge City | 67 | 4 | 3 | 267 | 4 | 46 | 5 | G | G | 251,281,000 | 5 |
| City of Bridge City Waterwood Estates | 2 | 4 | 0 | 75 | 38 | 49 | 4 | G | G | 6,732,000 | 4 |
| City of Brownsboro | 16 | 2 | 1 | 380 | 23 | 80 | 2 | G | G | 47,888,400 | 4 |
| City of Carthage | 330 | 3 | 8 | 4,024 | 12 | 42 | 3 | G | G | 909,154,000 | 3 |
| City of Center | 82 | 4 | 0 | 2,467 | 30 | 50 | 1 | G | G | 1,052,708,000 | 3 |
| City of Crockett | 40 | 0 | 59 | 3,186 | 80 | 80 | 0 | G | G | 373,258,000 | 0 |
| City of Groves | 90 | 3 | 0 | 6,350 | 71 | 55 | 3 | G | G | 732,678,000 | 5 |
| City of Hemphill | 17 | 1 | 3000 | 692 | 41 | 40 | 1 | G | G | 193,968,000 | 3 |
| City of Henderson | 125 | 3 | 1 | 5,914 | 47 | 50 | 3 | G | G | 930,641,000 | 4 |
| City of Huntington | 0 | 0 | 0 | 0 | 0 | 0 | 0 | G | G | 0 | 0 |
| City of Huxley | 70 | 1 | 0 | 769 | 11 | 60 | 2 | G | G | 62,580,000 | 5 |
| City of Jasper | 156 | 0 | 0 | 4,786 | 31 | 76 | 2 | G | G | 608,998,000 | 4 |
| City of Kountze | 40 | 2 | 0 | 1,135 | 28 | 54 | 3 | G | G | 84,811,000 | 4 |
| City of Lovelady | 12 | 2 | 0 | 388 | 32 | 48 | 3 | G | G | 31,507,800 | 4 |
| City of Nederland | 106 | 4 | 1 | 8,380 | 79 | 58 | 0 | G | G | 759,671,000 | 0 |
| City of Orange | 156 | 2 | 0 | 6,921 | 44 | 53 | 2 | G | G | 1,040,512,000 | 5 |
| City of Palestine | 275 | 1 | 0 | 7,500 | 27 | 85 | 1 | G | G | 1,570,313,000 | 4 |
| City of Port Arthur | 350 | 2 | 0 | 22,848 | 65 | 50 | 3 | G | G | 5,622,523,000 | 5 |
| City of Port Neches | 250 | 4 | 0 | 5,334 | 21 | 47 | 4 | G | G | 565,595,000 | 4 |
| City of San Augustine | 29 | 3 | 0 | 998 | 34 | 65 | 2 | G | G | 257,201,000 | 3 |
| City of Silsbee | 25 | 0 | 0 | 3,296 | 132 | 59 | 0 | G | G | 279,818,540 | 0 |
| City of Tyler | 693 | 5 | 10 | 36,414 | 53 | 70 | 2 | G | G | 8,907,739,200 | 4 |
| Cypress Creek WSC | 30 | 0 | 0 | 270 | 9 | 70 | 0 | G | G | 23,118,000 | 0 |
| El Pinon Estates Water System | 4 | 1 | 0 | 45 | 11 | 42 | 2 | G | G | 150,000 | 3 |
| Forest Hills Water Supply | 8 | 3 | 0 | 151 | 19 | 55 | 3 | G | G | 10,565,000 | 0 |
| G M WSC | 25 | 1 | 0 | 2,974 | 119 | 70 | 2 | G | G | 27,142,500 | 4 |
| Jefferson County WCID 10 | 28 | 3 | 0 | 2,185 | 78 | 47 | 2 | G | G | 183,410,000 | 5 |
| Lake Livingston Big Thicket Retreat | 5 | 4 | 0 | 36 | 7 | 52 | 3 | G | G | 2,368,000 | 4 |
| Lake Livingston Wayward Winds Oasis | 2 | 4 | 0 | 13 | 7 | 50 | 3 | G | G | 675,000 | 4 |
| Lilly Grove SUD | 130 | 3 | 0 | 980 | 8 | 85 | 5 | G | G | 105,450,000 | 5 |
| Loma Linda Subdivision | 1 | 1 | 0 | 33 | 66 | 50 | 2 | G | G | 2,121,000 | 4 |
| Lumberton MUD | 305 | 1 | 0 | 7,541 | 25 | 54 | 4 | G | G | 685,469,000 | 5 |
| Meeker MWD | 48 | 3 | 0 | 1,100 | 23 | 50 | 5 | G | G | 100,761,560 | 3 |
| Mulberry Water Supply Brookeland FWSD | 1 | 0 | 0 | 37 | 37 | 46 | 3 | G | G | 1,664,740 | 4 |
| Orange County WCID 1 | 110 | 3 | 0 | 4,866 | 44 | 55 | 5 | G | G | 423,523,000 | 4 |
| Rayburn Country MUD | 44 | 0 | 0 | 778 | 18 | 65 | 0 | G | G | 109,202,000 | 0 |
| Shawnee Shores | 9 | 0 | 0 | 116 | 14 | 55 | 4 | G | G | 2,074,470 | 3 |
| South Newton WSC | 87 | 1 | 0 | 1,408 | 16 | 53 | 2 | G | G | 114,036,000 | 4 |
| Toledo Village WSC | 25 | 3 | 0 | 567 | 23 | 55 | 3 | G | G | 16,546,900 | 4 |
| Tyler County WSC | 235 | 0 | 0 | 1,787 | 8 | 60 | 0 | G | G | 168,890,900 | 0 |
| Woodland Shores Subdivision | 12 | 1 | 0 | 19 | 2 | 45 | 2 | G | G | 608,000 | 4 |

| PWS Name | Production Meter Accuracy Percentage | Production Meter Accuracy Percentage AS | Corrected Input Volume (c) | Wholesale Water Imported | Wholesale Water Imported AS | Wholesale Water Exported | Wholesale Water Exported AS | System Input Volume (c) | Billed Metered (c) | Billed Metered AS |
|---|---|---|---|---|---|---|---|---|---|---|
| Angelina WSC | 100.00 | 4.00 | 83,587,000 | 0 | 5 | 0 | 5 | 83,587,000 | 74,934,000 | 4 |
| Beechwood WSC | 97.00 | 0.00 | 0 | 16816000 | 0 | 0 | 0 | 16,816,000 | 12,355,000 | 0 |
| Brookeland FWSD | 99.30 | 4.00 | 26,213,494 | 0 | 0 | 0 | 0 | 26,213,494 | 20,209,340 | 3 |
| City of Beaumont Water Utility Dept | 99.90 | 5.00 | 9,460,672,673 | 0 | 5 | 561,659,500 | 4 | 8,899,013,173 | 5,179,053,900 | 3 |
| City of Bridge City | 96.00 | 5.00 | 261,751,042 | 0 | 5 | 0 | 5 | 261,751,042 | 244,807,000 | 5 |
| City of Bridge City Waterwood Estates | 96.00 | 4.00 | 7,012,500 | 0 | 5 | 10 | 5 | 7,012,490 | 6,347,000 | 4 |
| City of Brownsboro | 99.80 | 5.00 | 47,984,369 | 0 | 0 | 769,500 | 3 | 47,214,869 | 34,288,392 | 2 |
| City of Carthage | 95.00 | 2.00 | 957,004,211 | 0 | 0 | 0 | 0 | 957,004,211 | 843,784,250 | 4 |
| City of Center | 95.00 | 2.00 | 1,108,113,684 | 0 | 0 | 0 | 0 | 1,108,113,684 | 892,076,300 | 4 |
| City of Crockett | 98.90 | 0.00 | 377,409,505 | 369193000 | 0 | 373,217,700 | 0 | 373,384,805 | 243,236,800 | 0 |
| City of Groves | 99.00 | 5.00 | 740,078,788 | 0 | 0 | 0 | 0 | 740,078,788 | 410,254,128 | 3 |
| City of Hemphill | 100.00 | 3.00 | 193,968,000 | 0 | 0 | 123,283,000 | 3 | 70,685,000 | 44,818,000 | 2 |
| City of Henderson | 99.90 | 4.00 | 931,572,573 | 0 | 0 | 5,415,786 | 3 | 926,156,787 | 748,631,931 | 3 |
| City of Huntington | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| City of Huxley | 100.30 | 0.00 | 62,392,822 | 0 | 0 | 0 | 0 | 62,392,822 | 48,041,000 | 2 |
| City of Jasper | 96.00 | 4.00 | 634,372,917 | 0 | 0 | 0 | 0 | 634,372,917 | 480,854,914 | 2 |
| City of Kountze | 102.00 | 5.00 | 83,148,039 | 0 | 0 | 0 | 0 | 83,148,039 | 71,755,083 | 3 |
| City of Lovelady | 97.00 | 4.00 | 32,482,268 | 8190800 | 4 | 0 | 1 | 40,673,068 | 21,016,300 | 4 |
| City of Nederland | 98.00 | 0.00 | 775,174,490 | 0 | 0 | 0 | 0 | 775,174,490 | 570,458,000 | 4 |
| City of Orange | 98.00 | 5.00 | 1,061,746,939 | 0 | 0 | 0 | 0 | 1,061,746,939 | 566,263,000 | 2 |
| City of Palestine | 100.00 | 5.00 | 1,570,313,000 | 0 | 0 | 0 | 0 | 1,570,313,000 | 1,151,563,000 | 5 |
| City of Port Arthur | 98.00 | 5.00 | 5,737,268,367 | 0 | 0 | 0 | 0 | 5,737,268,367 | 1,861,216,310 | 3 |
| City of Port Neches | 98.00 | 4.00 | 577,137,755 | 0 | 0 | 0 | 0 | 577,137,755 | 473,331,100 | 4 |
| City of San Augustine | 100.00 | 5.00 | 257,201,000 | 0 | 3 | 47,553,000 | 3 | 209,648,000 | 170,786,000 | 2 |
| City of Silsbee | 101.00 | 0.00 | 277,048,059 | 0 | 0 | 260,550 | 0 | 276,787,509 | 258,448,600 | 0 |
| City of Tyler | 100.20 | 2.00 | 8,889,959,281 | 0 | 5 | 388,015,000 | 4 | 8,501,944,281 | 7,586,613,000 | 4 |
| Cypress Creek WSC | 100.00 | 0.00 | 23,118,000 | 0 | 0 | 0 | 0 | 23,118,000 | 17,031,500 | 0 |
| El Pinon Estates Water System | 96.00 | 2.00 | 156,250 | 0 | 0 | 0 | 0 | 156,250 | 143,000 | 2 |
| Forest Hills Water Supply | 101.00 | 4.00 | 10,460,396 | 0 | 0 | 0 | 0 | 10,460,396 | 9,474,480 | 3 |
| G M WSC | 99.00 | 4.00 | 27,416,667 | 132662130 | 4 | 0 | 0 | 160,078,797 | 125,279,980 | 2 |
| Jefferson County WCID 10 | 101.70 | 5.00 | 180,344,149 | 0 | 0 | 0 | 0 | 180,344,149 | 128,393,000 | 2 |
| Lake Livingston Big Thicket Retreat | 99.00 | 4.00 | 2,391,919 | 0 | 0 | 0 | 0 | 2,391,919 | 1,867,000 | 2 |
| Lake Livingston Wayward Winds Oasis | 99.00 | 4.00 | 681,818 | 0 | 0 | 0 | 0 | 681,818 | 540,000 | 2 |
| Lilly Grove SUD | 98.00 | 5.00 | 107,602,041 | 0 | 0 | 0 | 0 | 107,602,041 | 83,508,000 | 2 |
| Loma Linda Subdivision | 96.00 | 4.00 | 2,209,375 | 0 | 0 | 0 | 0 | 2,209,375 | 2,001,000 | 2 |
| Lumberton MUD | 99.90 | 5.00 | 686,155,155 | 0 | 5 | 0 | 5 | 686,155,155 | 607,681,140 | 5 |
| Meeker MWD | 104.00 | 5.00 | 96,886,115 | 7100 | 5 | 0 | 0 | 96,893,215 | 86,767,039 | 3 |
| Mulberry Water Supply Brookeland FWSD | 100.30 | 4.00 | 1,659,761 | 0 | 0 | 0 | 0 | 1,659,761 | 1,573,820 | 0 |
| Orange County WCID 1 | 98.00 | 4.00 | 432,166,327 | 0 | 0 | 0 | 0 | 432,166,327 | 310,284,880 | 5 |
| Rayburn Country MUD | 99.00 | 0.00 | 110,305,051 | 0 | 0 | 0 | 0 | 110,305,051 | 56,838,900 | 0 |
| Shawnee Shores | 98.20 | 3.00 | 2,112,495 | 0 | 0 | 0 | 0 | 2,112,495 | 1,860,350 | 0 |
| South Newton WSC | 99.00 | 0.00 | 115,187,879 | 0 | 0 | 0 | 0 | 115,187,879 | 76,971,940 | 2 |
| Toledo Village WSC | 99.60 | 4.00 | 16,613,353 | 0 | 0 | 0 | 0 | 16,613,353 | 13,348,520 | 3 |
| Tyler County WSC | 100.00 | 0.00 | 168,890,900 | 0 | 0 | 0 | 0 | 168,890,900 | 92,429,000 | 0 |
| Woodland Shores Subdivision | 97.00 | 3.00 | 626,804 | 0 | 0 | 0 | 0 | 626,804 | 599,000 | 2 |

| PWS Name | Billed Unmetered | Billed Unmetered AS | Unbilled Metered | Unbilled Metered AS | Unbilled Unmetered (c) | Unbilled Unmetered Uses System Input Vol | Unbilled Unmetered AS | Total Authorized Consumption (c) | Water Losses (c) | Customer Meter Accuracy Percentage |
|---|---|---|---|---|---|---|---|---|---|---|
| Angelina WSC | 0 | 5 | 800,000 | 2 | 1,044,838 | TRUE | 5 | 76,778,838 | 6,808,163 | 95 |
| Beechwood WSC | 0 | 0 | 0 | 0 | 210,200 | TRUE | 0 | 12,565,200 | 4,250,800 | 97 |
| Brookeland FWSD | 0 | 0 | 0 | 0 | 327,669 | TRUE | 0 | 20,537,009 | 5,676,486 | 95 |
| City of Beaumont Water Utility Dept | 0 | 5 | 188,896,000 | 4 | 111,237,665 | TRUE | 1 | 5,479,187,565 | 3,419,825,608 | 98 |
| City of Bridge City | 0 | 3 | 1,890,000 | 3 | 3,271,888 | TRUE | 3 | 249,968,888 | 11,782,154 | 96 |
| City of Bridge City Waterwood Estates | 0 | 5 | 0 | 5 | 87,656 | TRUE | 4 | 6,434,656 | 577,834 | 96 |
| City of Brownsboro | 0 | 0 | 403,280 | 2 | 590,186 | TRUE | 0 | 35,281,858 | 11,933,011 | 96 |
| City of Carthage | 0 | 0 | 0 | 0 | 24,840,505 | FALSE | 4 | 868,624,755 | 88,379,456 | 95 |
| City of Center | 45,586,000 | 3 | 36,937,000 | 2 | 13,851,421 | TRUE | 2 | 988,450,721 | 119,662,963 | 98 |
| City of Crockett | 0 | 0 | 5,000,000 | 0 | 4,667,310 | FALSE | 0 | 252,904,110 | 120,480,695 | 95 |
| City of Groves | 0 | 0 | 77,123,085 | 3 | 51,415,390 | FALSE | 0 | 538,792,603 | 201,286,185 | 96 |
| City of Hemphill | 11,332,000 | 2 | 5,332,000 | 1 | 883,563 | TRUE | 3 | 62,365,563 | 8,319,438 | 98 |
| City of Henderson | 0 | 0 | 61,313,600 | 2 | 21,721,900 | FALSE | 2 | 831,667,431 | 94,489,356 | 96 |
| City of Huntington | 0 | 0 | 0 | 0 | 0 | TRUE | 0 | 0 | 0 | 0 |
| City of Huxley | 0 | 0 | 0 | 0 | 7,089,500 | FALSE | 3 | 55,130,500 | 7,262,322 | 97 |
| City of Jasper | 0 | 0 | 0 | 0 | 7,929,661 | TRUE | 0 | 488,784,575 | 145,588,341 | 95 |
| City of Kountze | 0 | 0 | 1,798,160 | 2 | 1,039,350 | TRUE | 2 | 74,592,593 | 8,555,446 | 99 |
| City of Lovelady | 100,000 | 1 | 200,000 | 2 | 508,413 | TRUE | 1 | 21,824,713 | 18,848,355 | 98 |
| City of Nederland | 0 | 0 | 0 | 0 | 9,689,681 | TRUE | 1 | 580,147,681 | 195,026,809 | 98 |
| City of Orange | 0 | 0 | 0 | 0 | 13,271,837 | TRUE | 2 | 579,534,837 | 482,212,102 | 96 |
| City of Palestine | 0 | 0 | 0 | 0 | 0 | FALSE | 1 | 1,151,563,000 | 418,750,000 | 100 |
| City of Port Arthur | 0 | 0 | 208,100 | 3 | 71,715,855 | TRUE | 1 | 1,933,140,265 | 3,804,128,103 | 95 |
| City of Port Neches | 924,600 | 1 | 17,644,100 | 3 | 60,330,200 | FALSE | 3 | 552,230,000 | 24,907,755 | 98 |
| City of San Augustine | 0 | 0 | 30,897,000 | 0 | 2,620,600 | TRUE | 0 | 204,303,600 | 5,344,400 | 95 |
| City of Silsbee | 0 | 0 | 260,550 | 0 | 3,459,844 | TRUE | 0 | 262,168,994 | 14,618,516 | 98 |
| City of Tyler | 4,738,322 | 2 | 0 | 2 | 106,274,304 | TRUE | 1 | 7,697,625,626 | 804,318,656 | 100 |
| Cypress Creek WSC | 0 | 0 | 0 | 0 | 288,975 | TRUE | 0 | 17,320,475 | 5,797,525 | 90 |
| El Pinon Estates Water System | 0 | 0 | 0 | 0 | 1,953 | TRUE | 1 | 144,953 | 11,297 | 96 |
| Forest Hills Water Supply | 0 | 0 | 34,290 | 3 | 130,755 | TRUE | 0 | 9,639,525 | 820,871 | 95 |
| G M WSC | 0 | 0 | 0 | 0 | 2,000,985 | TRUE | 0 | 127,280,965 | 32,797,832 | 95 |
| Jefferson County WCID 10 | 0 | 0 | 0 | 0 | 2,254,302 | FALSE | 2 | 130,647,302 | 49,696,847 | 97 |
| Lake Livingston Big Thicket Retreat | 0 | 0 | 0 | 0 | 29,899 | TRUE | 0 | 1,896,899 | 495,020 | 100 |
| Lake Livingston Wayward Winds Oasis | 0 | 0 | 0 | 0 | 8,523 | TRUE | 0 | 548,523 | 133,295 | 100 |
| Lilly Grove SUD | 0 | 0 | 0 | 0 | 1,345,026 | TRUE | 2 | 84,853,026 | 22,749,015 | 96 |
| Loma Linda Subdivision | 0 | 0 | 0 | 0 | 27,617 | TRUE | 1 | 2,028,617 | 180,758 | 96 |
| Lumberton MUD | 0 | 5 | 34,724,556 | 3 | 6,654,675 | FALSE | 0 | 649,060,371 | 37,094,784 | 99 |
| Meeker MWD | 0 | 0 | 0 | 0 | 1,211,165 | TRUE | 0 | 87,978,204 | 8,915,011 | 99 |
| Mulberry Water Supply Brookeland FWSD | 0 | 0 | 0 | 0 | 20,747 | TRUE | 0 | 1,594,567 | 65,194 | 95 |
| Orange County WCID 1 | 3,235,000 | 0 | 218,459 | 0 | 5,402,079 | TRUE | 0 | 319,140,418 | 113,025,908 | 98 |
| Rayburn Country MUD | 0 | 0 | 0 | 0 | 1,378,813 | TRUE | 0 | 58,217,713 | 52,087,337 | 80 |
| Shawnee Shores | 0 | 0 | 0 | 0 | 26,406 | TRUE | 0 | 1,886,756 | 225,739 | 95 |
| South Newton WSC | 0 | 0 | 26,845,623 | 1 | 1,439,848 | TRUE | 0 | 105,257,411 | 9,930,467 | 98 |
| Toledo Village WSC | 0 | 0 | 0 | 0 | 207,667 | TRUE | 0 | 13,556,187 | 3,057,166 | 95 |
| Tyler County WSC | 0 | 0 | 0 | 0 | 20,600,000 | FALSE | 0 | 113,029,000 | 55,861,900 | 96 |
| Woodland Shores Subdivision | 0 | 0 | 0 | 0 | 7,835 | TRUE | 3 | 606,835 | 19,969 | 99 |

# East Texas Regional Water Planning Area
## 2013 Production Water Loss Audit Data

| PWS Name | Customer Meter Accuracy Percentage AS | Customer Meter Accuracy Loss (c) | Data Handling Discrepancy | Data Handling Discrepancy AS | Unauthorized Consumption (c) | Unauthorized Consumption Uses System Input Vol | Unauthorized Consumption AS | Total Apparent Losses (c) | Reported Breaks Leaks | Reported Breaks Leaks AS |
|---|---|---|---|---|---|---|---|---|---|---|
| Angelina WSC | 2 | 3,943,895 | 0 | 0 | 208,968 | TRUE | 0 | 4,152,862 | 0 | 0 |
| Beechwood WSC | 0 | 382,113 | 0 | 0 | 42,040 | TRUE | 0 | 424,153 | 1,189,200 | 0 |
| Brookeland FWSD | 3 | 1,063,649 | 0 | 0 | 65,534 | TRUE | 4 | 1,129,183 | 611,030 | 4 |
| City of Beaumont Water Utility Dept | 3 | 105,694,978 | 0 | 2 | 22,247,533 | TRUE | 2 | 127,942,510 | 358,762,335 | 1 |
| City of Bridge City | 5 | 10,200,292 | 50000 | 2 | 654,378 | TRUE | 0 | 10,904,669 | 475,000 | 2 |
| City of Bridge City Waterwood Estates | 4 | 264,458 | 50000 | 2 | 17,531 | TRUE | 3 | 331,990 | 100,000 | 3 |
| City of Brownsboro | 3 | 1,428,683 | 0 | 0 | 118,037 | TRUE | 0 | 1,546,720 | 1,005,656 | 4 |
| City of Carthage | 3 | 44,409,697 | 0 | 0 | 275,160 | FALSE | 1 | 44,684,857 | 3,953,328 | 3 |
| City of Center | 2 | 18,205,639 | 1944401 | 1 | 2,770,284 | TRUE | 2 | 22,920,324 | 10,500,000 | 2 |
| City of Crockett | 0 | 12,801,937 | 0 | 0 | 933,462 | TRUE | 0 | 13,735,399 | 6,300,000 | 0 |
| City of Groves | 3 | 17,093,922 | 0 | 0 | 1,850,197 | TRUE | 0 | 18,944,119 | 15,000,000 | 0 |
| City of Hemphill | 2 | 914,653 | 0 | 0 | 176,713 | TRUE | 0 | 1,091,366 | 1,000,000 | 2 |
| City of Henderson | 0 | 31,192,997 | 0 | 0 | 2,315,392 | TRUE | 0 | 33,508,389 | 5,017,500 | 3 |
| City of Huntington | 0 | 0 | 0 | 0 | 0 | TRUE | 0 | 0 | 0 | 0 |
| City of Huxley | 2 | 1,485,804 | 0 | 0 | 155,982 | TRUE | 0 | 1,641,786 | 24,000 | 1 |
| City of Jasper | 1 | 25,308,153 | 0 | 0 | 1,585,932 | TRUE | 0 | 26,894,086 | 204 | 3 |
| City of Kountze | 2 | 433,129 | 0 | 0 | 207,870 | TRUE | 2 | 640,999 | 2,127,669 | 4 |
| City of Lovelady | 3 | 428,904 | 0 | 0 | 101,683 | TRUE | 2 | 530,587 | 1,000,000 | 3 |
| City of Nederland | 4 | 11,642,000 | 0 | 0 | 1,937,936 | TRUE | 1 | 13,579,936 | 50,000,000 | 1 |
| City of Orange | 2 | 23,594,292 | 0 | 0 | 2,654,367 | TRUE | 2 | 26,248,659 | 18,000,000 | 2 |
| City of Palestine | 2 | 0 | 0 | 0 | 3,925,783 | TRUE | 0 | 3,925,783 | 250,000,000 | 4 |
| City of Port Arthur | 1 | 97,958,753 | 0 | 0 | 14,343,171 | TRUE | 0 | 112,301,924 | 2,500,000,000 | 3 |
| City of Port Neches | 3 | 9,659,818 | 0 | 5 | 1,442,844 | TRUE | 2 | 11,102,663 | 4,750,000 | 3 |
| City of San Augustine | 2 | 8,988,737 | 0 | 0 | 524,120 | TRUE | 0 | 9,512,857 | 1,500,000 | 1 |
| City of Silsbee | 0 | 5,274,461 | 0 | 0 | 691,969 | TRUE | 0 | 5,966,430 | 50,000 | 0 |
| City of Tyler | 2 | 0 | 0 | 4 | 21,254,861 | TRUE | 2 | 21,254,861 | 5,000,000 | 2 |
| Cypress Creek WSC | 0 | 1,892,389 | 0 | 0 | 57,795 | TRUE | 0 | 1,950,184 | 1,330,200 | 0 |
| El Pinon Estates Water System | 1 | 5,958 | 0 | 1 | 391 | TRUE | 1 | 6,349 | 0 | 0 |
| Forest Hills Water Supply | 3 | 498,657 | 0 | 0 | 26,151 | TRUE | 4 | 524,808 | 81,450 | 4 |
| G M WSC | 2 | 6,593,683 | 0 | 0 | 400,197 | TRUE | 0 | 6,993,880 | 4,891,282 | 3 |
| Jefferson County WCID 10 | 2 | 3,970,918 | 0 | 2 | 450,860 | FALSE | 1 | 4,421,778 | 15,123,183 | 4 |
| Lake Livingston Big Thicket Retreat | 4 | 9,382 | 0 | 5 | 5,980 | TRUE | 0 | 15,362 | 76,673 | 5 |
| Lake Livingston Wayward Winds Oasis | 4 | 2,714 | 0 | 5 | 1,705 | TRUE | 0 | 4,418 | 2,514 | 5 |
| Lilly Grove SUD | 2 | 3,479,500 | 0 | 0 | 269,005 | TRUE | 2 | 3,748,505 | 21,942,000 | 3 |
| Loma Linda Subdivision | 4 | 83,375 | 20000 | 3 | 5,523 | TRUE | 0 | 108,898 | 60,000 | 4 |
| Lumberton MUD | 3 | 9,254,028 | 315048 | 3 | 1,715,388 | TRUE | 2 | 11,284,463 | 5,512,792 | 3 |
| Meeker MWD | 0 | 876,435 | 800000 | 3 | 242,233 | TRUE | 0 | 1,918,668 | 3,659,000 | 1 |
| Mulberry Water Supply Brookeland FWSD | 0 | 82,833 | 0 | 0 | 4,149 | TRUE | 0 | 86,982 | 36,889 | 4 |
| Orange County WCID 1 | 1 | 6,332,344 | 61590571 | 1 | 1,080,416 | TRUE | 1 | 69,003,331 | 22,795,000 | 0 |
| Rayburn Country MUD | 0 | 14,209,725 | 0 | 0 | 275,763 | TRUE | 0 | 14,485,488 | 46,050,000 | 0 |
| Shawnee Shores | 3 | 97,913 | 0 | 0 | 5,281 | TRUE | 0 | 103,194 | 242,410 | 0 |
| South Newton WSC | 0 | 1,570,856 | 0 | 0 | 287,970 | TRUE | 0 | 1,858,826 | 500,000 | 0 |
| Toledo Village WSC | 3 | 702,554 | 0 | 0 | 41,533 | TRUE | 5 | 744,087 | 283,796 | 4 |
| Tyler County WSC | 0 | 3,851,208 | 0 | 0 | 500,000 | FALSE | 0 | 4,351,208 | 34,891,000 | 0 |
| Woodland Shores Subdivision | 3 | 6,051 | 0 | 0 | 1,567 | TRUE | 0 | 7,618 | 7,000 | 2 |

# East Texas Regional Water Planning Area
## 2013 Production Water Loss Audit Data

| PWS Name | Unreported Loss (c) | Unreported Leaks Repaired AS | Total Real Losses (c) | Apparent Plus Real Losses(c) | Nonrevenue Water (c) | Apparent Loss Connections (c) | Real Loss Volume (c) | Unavoidable Annual Real Losses (c) | Infrastructure Leakage Index (c) |
|---|---|---|---|---|---|---|---|---|---|
| Angelina WSC | 2,655,300 | 0 | 2,655,300 | 6,808,163 | 8,653,000 | 9 | 2,655,300 | 13,531,572 | 0 |
| Beechwood WSC | 2,637,447 | 0 | 3,826,647 | 4,250,800 | 4,461,000 | 2 | 3,826,647 | 2,467,732 | 2 |
| Brookeland FWSD | 3,936,273 | 0 | 4,547,303 | 5,676,486 | 6,004,154 | 7 | 4,547,303 | 6,072,596 | 1 |
| City of Beaumont Water Utility Dept | 2,933,120,763 | 2 | 3,291,883,098 | 3,419,825,608 | 3,719,959,273 | 6 | 3,291,883,098 | 252,782,794 | 13 |
| City of Bridge City | 402,484 | 2 | 877,484 | 11,782,154 | 16,944,042 | 112 | 877,484 | 6,758,311 | 0 |
| City of Bridge City Waterwood Estates | 145,844 | 2 | 245,844 | 577,834 | 665,490 | 12 | 245,844 | 394,722 | 1 |
| City of Brownsboro | 9,380,635 | 0 | 10,386,291 | 11,933,011 | 12,926,477 | 11 | 10,386,291 | 4,266,199 | 2 |
| City of Carthage | 39,741,270 | 1 | 43,694,598 | 88,379,456 | 113,219,961 | 30 | 43,694,598 | 36,621,837 | 1 |
| City of Center | 86,242,639 | 1 | 96,742,639 | 119,662,963 | 170,451,384 | 25 | 96,742,639 | 14,849,478 | 7 |
| City of Crockett | 100,445,296 | 0 | 106,745,296 | 120,480,695 | 130,148,005 | 12 | 106,745,296 | 20,273,560 | 5 |
| City of Groves | 167,342,066 | 0 | 182,342,066 | 201,286,185 | 329,824,660 | 8 | 182,342,066 | 28,895,955 | 6 |
| City of Hemphill | 6,228,072 | 0 | 7,228,072 | 8,319,438 | 14,535,000 | 4 | 7,228,072 | 2,858,242 | 3 |
| City of Henderson | 55,963,466 | 3 | 60,980,966 | 94,489,356 | 177,524,856 | 16 | 60,980,966 | 28,531,138 | 2 |
| City of Huntington | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| City of Huxley | 5,596,535 | 0 | 5,620,535 | 7,262,322 | 14,351,822 | 6 | 5,620,535 | 10,819,695 | 1 |
| City of Jasper | 118,694,052 | 2 | 118,694,256 | 145,588,341 | 153,518,003 | 15 | 118,694,256 | 43,325,996 | 3 |
| City of Kountze | 5,786,777 | 1 | 7,914,446 | 8,555,446 | 11,392,956 | 2 | 7,914,446 | 7,620,872 | 1 |
| City of Lovelady | 17,317,768 | 1 | 18,317,768 | 18,848,355 | 19,556,768 | 4 | 18,317,768 | 2,157,062 | 8 |
| City of Nederland | 131,446,872 | 0 | 181,446,872 | 195,026,809 | 204,716,490 | 4 | 181,446,872 | 38,750,838 | 5 |
| City of Orange | 437,963,443 | 2 | 455,963,443 | 482,212,102 | 495,483,939 | 10 | 455,963,443 | 36,409,418 | 13 |
| City of Palestine | 164,824,218 | 1 | 414,824,218 | 418,750,000 | 418,750,000 | 1 | 414,824,218 | 81,060,569 | 5 |
| City of Port Arthur | 1,191,826,179 | 0 | 3,691,826,179 | 3,804,128,103 | 3,876,052,057 | 13 | 3,691,826,179 | 97,102,775 | 38 |
| City of Port Neches | 9,055,092 | 2 | 13,805,092 | 24,907,755 | 102,882,055 | 6 | 13,805,092 | 36,927,853 | 0 |
| City of San Augustine | -5,668,457 | 1 | -4,168,457 | 5,344,400 | 38,862,000 | 26 | -4,168,457 | 7,273,848 | -1 |
| City of Silsbee | 8,602,086 | 0 | 8,652,086 | 14,618,516 | 18,338,909 | 5 | 8,652,086 | 13,543,425 | 1 |
| City of Tyler | 778,063,795 | 0 | 783,063,795 | 804,318,656 | 910,592,959 | 2 | 783,063,795 | 235,346,927 | 3 |
| Cypress Creek WSC | 2,517,141 | 0 | 3,847,341 | 5,797,525 | 6,086,500 | 20 | 3,847,341 | 5,181,540 | 1 |
| El Pinon Estates Water System | 4,948 | 0 | 4,948 | 11,297 | 13,250 | 0 | 4,948 | 435,219 | 0 |
| Forest Hills Water Supply | 214,613 | 2 | 296,063 | 820,871 | 985,916 | 10 | 296,063 | 1,323,545 | 0 |
| G M WSC | 20,912,670 | 0 | 25,803,952 | 32,797,832 | 34,798,817 | 6 | 25,803,952 | 14,853,493 | 2 |
| Jefferson County WCID 10 | 30,151,887 | 1 | 45,275,070 | 49,696,847 | 51,951,149 | 6 | 45,275,070 | 8,221,191 | 6 |
| Lake Livingston Big Thicket Retreat | 402,985 | 0 | 479,658 | 495,020 | 524,919 | 1 | 479,658 | 605,633 | 1 |
| Lake Livingston Wayward Winds Oasis | 126,363 | 0 | 128,877 | 133,295 | 141,818 | 1 | 128,877 | 223,179 | 1 |
| Lilly Grove SUD | -2,941,490 | 2 | 19,000,510 | 22,749,015 | 24,094,041 | 10 | 19,000,510 | 26,380,558 | 1 |
| Loma Linda Subdivision | 11,859 | 1 | 71,859 | 180,758 | 208,375 | 9 | 71,859 | 139,704 | 1 |
| Lumberton MUD | 20,297,529 | 2 | 25,810,321 | 37,094,784 | 78,474,015 | 4 | 25,810,321 | 54,817,452 | 0 |
| Meeker MWD | 3,337,343 | 0 | 6,996,343 | 8,915,011 | 10,126,176 | 5 | 6,996,343 | 7,750,410 | 1 |
| Mulberry Water Supply Brookeland FWSD | -58,677 | 2 | -21,788 | 65,194 | 85,941 | 6 | -21,788 | 184,018 | 0 |
| Orange County WCID 1 | 21,227,577 | 0 | 44,022,577 | 113,025,908 | 118,646,447 | 39 | 44,022,577 | 26,599,375 | 2 |
| Rayburn Country MUD | -8,448,150 | 0 | 37,601,850 | 52,087,337 | 53,466,151 | 51 | 37,601,850 | 8,416,207 | 4 |
| Shawnee Shores | -119,866 | 0 | 122,544 | 225,739 | 252,145 | 2 | 122,544 | 1,272,454 | 0 |
| South Newton WSC | 7,571,642 | 0 | 8,071,642 | 9,930,467 | 38,215,939 | 4 | 8,071,642 | 13,190,775 | 1 |
| Toledo Village WSC | 2,029,283 | 2 | 2,313,079 | 3,057,166 | 3,264,833 | 4 | 2,313,079 | 4,422,523 | 1 |
| Tyler County WSC | 16,619,692 | 0 | 51,510,692 | 55,861,900 | 76,461,900 | 7 | 51,510,692 | 33,712,860 | 2 |
| Woodland Shores Subdivision | 5,352 | 1 | 12,352 | 19,969 | 27,804 | 1 | 12,352 | 1,113,122 | 0 |

| PWS Name | Real Loss Connections (c) | Real Loss Miles (c) | Total Apparent Losses 2 (c) | Retail Price Of Water | Retail Price Of Water AS | Cost Of Apparent Losses (c) | Real Losses Duplicate 2 (c) | Variable Production Cost Of Water | Variable Production Cost Of Water AS | Cost Of Real Losses (c) |
|---|---|---|---|---|---|---|---|---|---|---|
| Angelina WSC | 6 | 143 | 4,152,862 | 0.00 | 5.00 | 8,596 | 2,655,300 | 0 | 0 | 5,496 |
| Beechwood WSC | 21 | 951 | 424,153 | 2.87 | 0.00 | 1,217,320 | 3,826,647 | 3 | 0 | 10,140,613 |
| Brookeland FWSD | 27 | 445 | 1,129,183 | 0.00 | 4.00 | 2,823 | 4,547,303 | 0 | 4 | 2,274 |
| City of Beaumont Water Utility Dept | 154 | 12757 | 127,942,510 | 0.00 | 4.00 | 522,005 | 3,291,883,098 | 0 | 4 | 1,310,169 |
| City of Bridge City | 9 | 36 | 10,904,669 | 0.00 | 3.00 | 26,171 | 877,484 | 0 | 0 | 114 |
| City of Bridge City Waterwood Estates | 9 | 337 | 331,990 | 0.00 | 4.00 | 863 | 245,844 | 0 | 4 | 81 |
| City of Brownsboro | 75 | 1728 | 1,546,720 | 0.01 | 2.00 | 16,241 | 10,386,291 | 0 | 2 | 5,681 |
| City of Carthage | 30 | 363 | 44,684,857 | 0.00 | 2.00 | 172,037 | 43,694,598 | 0 | 2 | 50,249 |
| City of Center | 107 | 3232 | 22,920,324 | 0.00 | 3.00 | 55,467 | 96,742,639 | 0 | 2 | 84,843 |
| City of Crockett | 92 | 7311 | 13,735,399 | 0.01 | 0.00 | 189,549 | 106,745,296 | 0 | 0 | 1,473,085 |
| City of Groves | 79 | 5551 | 18,944,119 | 0.65 | 2.00 | 12,313,677 | 182,342,066 | 0 | 1 | 32,821,572 |
| City of Hemphill | 29 | 1165 | 1,091,366 | 0.00 | 1.00 | 3,274 | 7,228,072 | 0 | 1 | 19,444 |
| City of Henderson | 28 | 1337 | 33,508,389 | 0.00 | 4.00 | 110,578 | 60,980,966 | 0 | 3 | 48,785 |
| City of Huntington | 0 | 0 | 0 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 |
| City of Huxley | 20 | 220 | 1,641,786 | 5.00 | 0.00 | 8,208,931 | 5,620,535 | 0 | 1 | 12,101 |
| City of Jasper | 68 | 2085 | 26,894,086 | 0.00 | 2.00 | 29,315 | 118,694,256 | 0 | 2 | 2,967,356 |
| City of Kountze | 19 | 542 | 640,999 | 0.00 | 2.00 | 1,846 | 7,914,446 | 0 | 4 | 2,691 |
| City of Lovelady | 129 | 4182 | 530,587 | 0.01 | 2.00 | 4,643 | 18,317,768 | 0 | 1 | 109,907 |
| City of Nederland | 59 | 4690 | 13,579,936 | 0.00 | 4.00 | 34,629 | 181,446,872 | 0 | 0 | 217,736 |
| City of Orange | 181 | 8008 | 26,248,659 | 2.51 | 2.00 | 65,884,134 | 455,963,443 | 0 | 2 | 50,155,979 |
| City of Palestine | 152 | 4133 | 3,925,783 | 3.52 | 2.00 | 13,818,754 | 414,824,218 | 0 | 3 | 3,526,006 |
| City of Port Arthur | 443 | 28899 | 112,301,924 | 0.00 | 2.00 | 494,128 | 3,691,826,179 | 0 | 3 | 2,152,335 |
| City of Port Neches | 7 | 151 | 11,102,663 | 0.00 | 3.00 | 35,529 | 13,805,092 | 0 | 3 | 79,379 |
| City of San Augustine | 0 | 0 | 9,512,857 | 21.78 | 2.00 | 207,190,022 | -4,168,457 | 0 | 1 | -1,292,222 |
| City of Silsbee | 7 | 948 | 5,966,430 | 0.03 | 0.00 | 178,993 | 8,652,086 | 0 | 0 | 173,042 |
| City of Tyler | 59 | 3096 | 21,254,861 | 0.00 | 4.00 | 47,823 | 783,063,795 | 0 | 3 | 440,082 |
| Cypress Creek WSC | 39 | 351 | 1,950,184 | 0.37 | 0.00 | 711,817 | 3,847,341 | 1 | 0 | 3,847,341 |
| El Pinon Estates Water System | 0 | 3 | 6,349 | 0.00 | 1.00 | 24 | 4,948 | 0 | 1 | 19 |
| Forest Hills Water Supply | 5 | 101 | 524,808 | 0.00 | 4.00 | 1,312 | 296,063 | 0 | 4 | 178 |
| G M WSC | 24 | 2828 | 6,993,880 | 0.00 | 2.00 | 25,528 | 25,803,952 | 8 | 2 | 211,076,324 |
| Jefferson County WCID 10 | 57 | 4430 | 4,421,778 | 0.02 | 4.00 | 103,912 | 45,275,070 | 0 | 2 | 43,011 |
| Lake Livingston Big Thicket Retreat | 37 | 268 | 15,362 | 0.04 | 3.00 | 595 | 479,658 | 0 | 3 | 192 |
| Lake Livingston Wayward Winds Oasis | 27 | 186 | 4,418 | 0.04 | 3.00 | 171 | 128,877 | 0 | 3 | 77 |
| Lilly Grove SUD | 53 | 400 | 3,748,505 | 4.25 | 2.00 | 15,931,147 | 19,000,510 | 1 | 1 | 23,750,638 |
| Loma Linda Subdivision | 6 | 394 | 108,898 | 0.00 | 3.00 | 490 | 71,859 | 0 | 1 | 323 |
| Lumberton MUD | 9 | 232 | 11,284,463 | 0.00 | 3.00 | 25,954 | 25,810,321 | 0 | 3 | 6,762 |
| Meeker MWD | 17 | 399 | 1,918,668 | 0.01 | 5.00 | 18,995 | 6,996,343 | 0 | 2 | 2,099 |
| Mulberry Water Supply Brookeland FWSD | 0 | 0 | 86,982 | 0.00 | 4.00 | 217 | -21,788 | 0 | 4 | -13 |
| Orange County WCID 1 | 25 | 1096 | 69,003,331 | 0.00 | 5.00 | 179,409 | 44,022,577 | 0 | 1 | 7,924 |
| Rayburn Country MUD | 132 | 2341 | 14,485,488 | 0.01 | 0.00 | 166,583 | 37,601,850 | 0 | 0 | 31,962 |
| Shawnee Shores | 3 | 40 | 103,194 | 0.00 | 4.00 | 258 | 122,544 | 0 | 4 | 61 |
| South Newton WSC | 16 | 254 | 1,858,826 | 0.00 | 0.00 | 7,435 | 8,071,642 | 0 | 0 | 4,359 |
| Toledo Village WSC | 11 | 253 | 744,087 | 0.00 | 4.00 | 1,860 | 2,313,079 | 0 | 4 | 1,619 |
| Tyler County WSC | 79 | 601 | 4,351,208 | 0.00 | 0.00 | 15,229 | 51,510,692 | 0 | 0 | 19,059 |
| Woodland Shores Subdivision | 2 | 3 | 7,618 | 0.00 | 3.00 | 10 | 12,352 | 0 | 1 | 16 |

# East Texas Regional Water Planning Area
## 2013 Production Water Loss Audit Data

| PWS Name | Total Assessment Score (c) | Total Cost Of Losses (c) | Saved Date | Survey Submitted | Date Submitted | Create Date | Total Loss Percent (c) |
|---|---|---|---|---|---|---|---|
| Angelina WSC | 47 | 14,093 | 06/11/14 | TRUE | 06/11/14 | 06/11/14 | 8.15 |
| Beechwood WSC | 0 | 11,357,934 | | TRUE | 04/08/14 | 04/08/14 | 25.28 |
| Brookeland FWSD | 35 | 5,097 | 03/31/14 | TRUE | 03/31/14 | 02/05/14 | 21.65 |
| City of Beaumont Water Utility Dept | 58 | 1,832,175 | 05/01/14 | TRUE | 05/01/14 | 04/28/14 | 38.43 |
| City of Bridge City | 57 | 26,285 | 04/28/14 | TRUE | 04/28/14 | 04/16/14 | 4.50 |
| City of Bridge City Waterwood Estates | 66 | 944 | 04/28/14 | TRUE | 04/28/14 | 04/16/14 | 8.24 |
| City of Brownsboro | 31 | 21,922 | 04/17/14 | TRUE | 04/17/14 | 04/15/14 | 25.27 |
| City of Carthage | 31 | 222,285 | 04/04/14 | TRUE | 05/21/14 | 04/02/14 | 9.24 |
| City of Center | 34 | 140,310 | 04/30/14 | TRUE | 04/30/14 | 04/29/14 | 10.80 |
| City of Crockett | 0 | 1,662,634 | 04/22/14 | TRUE | 04/23/14 | 04/22/14 | 32.27 |
| City of Groves | 28 | 45,135,249 | 04/15/14 | TRUE | 04/23/14 | 03/06/14 | 27.20 |
| City of Hemphill | 25 | 22,718 | 01/24/14 | TRUE | 01/24/14 | 01/24/14 | 11.77 |
| City of Henderson | 37 | 159,362 | 05/12/14 | TRUE | 05/21/14 | 05/09/14 | 10.20 |
| City of Huntington | 0 | 0 | 04/24/14 | FALSE | | 04/24/14 | 0.00 |
| City of Huxley | 17 | 8,221,032 | 03/28/14 | TRUE | 03/28/14 | 03/27/14 | 11.64 |
| City of Jasper | 22 | 2,996,671 | 05/27/14 | TRUE | 05/27/14 | 05/27/14 | 22.95 |
| City of Kountze | 36 | 4,537 | 03/10/14 | TRUE | 03/10/14 | 03/06/14 | 10.29 |
| City of Lovelady | 38 | 114,549 | 01/08/14 | TRUE | 01/08/14 | 01/08/14 | 46.34 |
| City of Nederland | 19 | 252,365 | 04/28/14 | TRUE | 04/28/14 | 04/28/14 | 25.16 |
| City of Orange | 30 | 116,040,113 | | TRUE | 05/09/14 | 05/09/14 | 45.42 |
| City of Palestine | 29 | 17,344,760 | 05/06/14 | TRUE | 05/07/14 | 05/06/14 | 26.67 |
| City of Port Arthur | 31 | 2,646,463 | 04/23/14 | TRUE | 04/23/14 | 03/11/14 | 66.31 |
| City of Port Neches | 48 | 114,908 | 04/02/14 | TRUE | 04/02/14 | 03/19/14 | 4.32 |
| City of San Augustine | 28 | 205,897,800 | 04/14/14 | TRUE | 04/15/14 | 04/14/14 | 2.55 |
| City of Silsbee | 0 | 352,035 | 03/31/14 | TRUE | 03/31/14 | 02/26/14 | 5.28 |
| City of Tyler | 48 | 487,905 | 04/23/14 | TRUE | 05/21/14 | 04/07/14 | 9.46 |
| Cypress Creek WSC | 0 | 4,559,158 | | TRUE | 05/14/14 | 05/14/14 | 25.08 |
| El Pinon Estates Water System | 16 | 42 | | TRUE | 03/27/14 | 03/27/14 | 7.23 |
| Forest Hills Water Supply | 37 | 1,490 | 02/05/14 | TRUE | 03/31/14 | 01/29/14 | 7.85 |
| G M WSC | 26 | 211,101,851 | 02/24/14 | TRUE | 02/26/14 | 02/24/14 | 20.49 |
| Jefferson County WCID 10 | 35 | 146,923 | 04/04/14 | TRUE | 04/04/14 | 03/21/14 | 27.56 |
| Lake Livingston Big Thicket Retreat | 37 | 787 | 02/28/14 | TRUE | 02/28/14 | 02/28/14 | 20.70 |
| Lake Livingston Wayward Winds Oasis | 37 | 248 | 03/04/14 | TRUE | 03/04/14 | 03/04/14 | 19.55 |
| Lilly Grove SUD | 34 | 39,681,784 | 02/06/14 | TRUE | 02/06/14 | 02/04/14 | 21.14 |
| Loma Linda Subdivision | 30 | 813 | 03/27/14 | TRUE | 04/04/14 | 03/27/14 | 8.18 |
| Lumberton MUD | 57 | 32,717 | 05/29/14 | TRUE | 05/29/14 | 05/27/14 | 5.41 |
| Meeker MWD | 35 | 21,094 | 05/22/14 | TRUE | 05/22/14 | 05/22/14 | 9.20 |
| Mulberry Water Supply Brookeland FWSD | 25 | 204 | 02/05/14 | TRUE | 03/31/14 | 02/05/14 | 3.93 |
| Orange County WCID 1 | 30 | 187,333 | 05/09/14 | TRUE | 05/09/14 | 04/07/14 | 26.15 |
| Rayburn Country MUD | 0 | 198,545 | 02/24/14 | TRUE | 02/24/14 | 02/20/14 | 47.22 |
| Shawnee Shores | 21 | 319 | 02/05/14 | TRUE | 03/31/14 | 02/05/14 | 10.69 |
| South Newton WSC | 10 | 11,794 | 03/04/14 | TRUE | 03/04/14 | 03/04/14 | 8.62 |
| Toledo Village WSC | 39 | 3,479 | 02/05/14 | TRUE | 03/31/14 | 02/05/14 | 18.40 |
| Tyler County WSC | 0 | 34,288 | 04/14/14 | TRUE | 04/14/14 | 04/14/14 | 33.08 |
| Woodland Shores Subdivision | 25 | 25 | 03/28/14 | TRUE | 04/04/14 | 03/28/14 | 3.19 |

# Appendix 2-A

# Correspondence of the ETRWPG Chair to the TWDB

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Following is a letter from Kelley Holcomb, Chair of the ETRWPG, to the TWDB, regarding the 2016 Plan Projected Demands. The letter is dated September 27, 2012, and contains a letter prepared by Alan Plummer Associates, Inc. presenting revised non-municipal demand projections with the following attachments:

- Attachment 1 – Summary of Proposed non-Municipal Water Demands
- Attachment 2 – Non-Municipal Water Demands Revisions on Tables Provided by the Texas Water Development Board
- Attachment 3 – Irrigation Water Demands Evaluation
- Attachment 4 – Rice Irrigation Demand Projections Technical Memorandum
- Attachment 5 – Meeting Summary of Non-Municipal Water Demands in Jefferson County
- Attachment 6 – John Martin Correspondence Regarding Manufacturing and Steam-Electric Demands in Tyler County
- Attachment 7 – Kelley Holcomb Correspondence Regarding Mining Demands

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EAST TEXAS
Regional Water Planning Group
Region I WPG

September 27, 2012

Ms. Melanie Callahan
Executive Administrator
Texas Water Development Board
1700 North Congress Avenue
Austin, Texas 78701

Re: Transmittal of Recommended Changes to Proposed Non-Municipal Water Demand Projections for the East Texas Regional Water Planning Area (Region I)

Dear Ms. Callahan:

The Texas Water Development Board (TWDB) has provided proposed non-municipal water demand projections for the 20 counties included in the East Texas Regional Water Planning Area (ETRWPA). In addition, the TWDB has invited the East Texas Regional Water Planning Group (ETRWPG) to submit recommendations for changes to the proposed projections before the proposed projections are taken to the agency's board (Board) for adoption. On September 12, 2012, the ETRWPG considered the projections and agreed that changes to some categories of projections are justified.

Attached is a letter from Mr. Rex H. Hunt, P.E., of Alan Plummer Associates, Inc., Project Manager for the ETRWPA consultant team. The letter transmits the recommended changes to the proposed non-municipal water demand projections. In addition, the letter includes back-up information related to the proposed changes. These recommended changes have been adopted by the ETRWPG.

Pursuant to the TWDB request, the consultant team will transmit separately, via electronic mail, an electronic file (Excel spreadsheet) of the changes recommended herein to Mr. Lann Bookout, TWDB Project Manager for the ETRWPA. The electronic file will include the tables contained in Attachment 2 of the enclosed recommendations.

**Lila Fuller, Administrative Contact**
**P. O. Box 635030, Nacogdoches, TX 75963-5030**
**Phone: 936-559-2504 Fax: 936-559-2912**

It is understood that additional changes to the mining water demand are being contemplated by TWDB staff as a result of revisions that are underway to a report on mining demand in the State. Mining water demand associated particularly with the oil and gas industry is an especially important issue to the ETRWPG due to significant gas-shale plays located within the region. If projections are modified for the ETRWPA, as a result of the revised report, the ETRWPG requests the opportunity to review those changes before projections are formalized by Board action.

In addition, it is understood that the TWDB staff will evaluate this request and incorporate changes, as appropriate, prior to submitting the final proposed projections to the Board for approval. The Board's approval of the projections will then start a process of formal adoption, which will include a public comment period wherein the ETRWPG may formally request further changes to the projections, if desired.

The ETRWPG appreciates the opportunity to submit these recommendations for changes to the non-municipal water demand projections. Please do not hesitate to contact me if you have any questions.

Respectfully,

Kelley Holcomb, Chair
East Texas Regional Water Planning Group

Enclosures

cc: Mr. Lann Bookout, Texas Water Development Board
Ms. Lila Fuller, City of Nacogdoches

ALAN PLUMMER ASSOCIATES, INC.
ENVIRONMENTAL ENGINEERS AND SCIENTISTS

ROBERT F. ADAMS, DE, PE
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TIMOTHY J. NOACK, PE
ALAN H. PLUMMER, JR., PE, BCEE
WILLIAM C. RACKLEY, PE
ALAN R. TUCKER, PE

1600-002-01

September 26, 2012

Mr. Kelley Holcomb, Chair
East Texas Regional Water Planning Group
c/o City of Nacogdoches
202 E. Pilar Street
Nacogdoches, Texas 75961

Re: Recommended Revisions to Non-Municipal Water Demands
East Texas Regional Water Planning Area

Dear Chairman Holcomb:

This letter transmits recommendations for modifications of the non-municipal water demands for the 2016 Regional Water Plan (2016 Plan) for the East Texas Regional Water Planning Area (ETRWPA). These recommendations were requested by the East Texas Regional Water Planning Group (ETRWPG) at its meeting on February 1, 2012. Following is a brief explanation of the non-municipal demands and the recommended changes. A summary of the recommended changes is provided as Attachment 1 to this letter. Attachment 2 provides the information in a format requested by the Texas Water Development Board (TWDB).

## NON-MUNICIPAL WATER DEMAND CHANGES

The non-municipal water demands are divided into five categories of use, as follows:

- Irrigation
- Manufacturing
- Steam-Electric
- Mining
- Livestock

The TWDB provided initial estimates of water demand for each county in the ETRWPA for each of these categories of use and requested the ETRWPG to consider whether any changes should be made to the demands. At the February 1 meeting of the ETRWPG, the consultant team was charged with the task of evaluating the demand projections and suggesting potential changes to the projections, as appropriate. Several specific areas in need of evaluation were identified at the meeting, including rice irrigation in coastal counties in the region, a possible new irrigation need for bio-fuel crops, and poultry water demands in the region. At the ETRWPG meeting of September 12, 2012, additional possible changes were discussed, including modifications for mining, manufacturing, and steam-electric categories in selected counties. Following (Table 1) is a summary of the proposed changes to non-municipal water demands for the ETRWPA on a category by category basis. The recommended projections are shown in red.

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**Table 1**
**Summary of Proposed Revisions by Demand Category**

| Demand Category | State Water Plan Year | Volume (af/yr) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| Irrigation | 2012 Plan Projections[1] | 151,417 | 151,771 | 152,153 | 152,575 | 153,040 | NA |
| | 2017 Plan Projections[2] | 89,375 | 89,653 | 89,953 | 90,284 | 90,648 | 91,137 |
| | 2017 ETRWPG Projections[3] | 177,919 | 187,894 | 194,851 | 197,546 | 195,445 | 192,186 |
| Manufacturing | 2012 Plan Projections | 591,904 | 784,140 | 821,841 | 857,902 | 893,476 | NA |
| | 2017 Plan Projections | 608,237 | 800,559 | 838,209 | 874,116 | 908,943 | 945,456 |
| | 2017 ETRWPG Projections | 608,667 | 800,989 | 838,639 | 874,546 | 909,373 | 945,886 |
| Mining | 2012 Plan Projections | 37,297 | 17,331 | 18,385 | 19,432 | 20,314 | NA |
| | 2017 Plan Projections | 25,474 | 21,792 | 16,664 | 11,636 | 6,857 | 7,066 |
| | 2017 ETRWPG Projections | 22,817 | 17,923 | 6,716 | 5,590 | 4,600 | 4,890 |
| Steam Electric | 2012 Plan Projections | 80,989 | 94,515 | 111,006 | 131,108 | 155,611 | NA |
| | 2017 Plan Projections | 81,016 | 94,547 | 111,043 | 131,152 | 155,663 | 183,747 |
| | 2017 ETRWPG Projections | 82,018 | 95,544 | 112,035 | 132,137 | 156,640 | 184,714 |
| Livestock | 2012 Plan Projections | 25,114 | 26,899 | 29,020 | 31,546 | 34,533 | NA |
| | 2017 Plan Projections | 21,389 | 22,911 | 24,723 | 26,883 | 29,443 | 30,126 |
| | 2017 ETRWPG Projections | 24,027 | 25,549 | 27,361 | 29,521 | 32,081 | 32,764 |
| Total Non-Municipal Water Demands | 2012 Plan Projections | 886,721 | 1,074,656 | 1,132,405 | 1,192,563 | 1,256,974 | NA |
| | 2017 Plan Projections | 825,491 | 1,029,462 | 1,080,592 | 1,134,071 | 1,191,554 | 1,257,532 |
| | 2017 ETRWPG Projections | 915,448 | 1,127,899 | 1,179,602 | 1,239,340 | 1,298,139 | 1,360,440 |

[1] 2012 Plan Projections are from the *2012 State Water Plan* and *2011 Update of the Regional Water Plan* in the East Texas Regional Water Planning Area (ETRWPA) or Region I

[2] 2017 Plan Projections are from the 2017 database (DB17) provided by the Texas Water Development Board

[3] 2017 ETRWPG Projections are those proposed by the East Texas Regional Water Planning Group (ETRWPG)

A discussion of all recommendations for non-municipal demands by category is described below.

**Irrigation**

The consultant team recommends revisions to irrigation demands for all counties but one in the ETRWPA. Changes to 16 of the 20 counties in the region are related to recent historical irrigation demands, while changes to non-municipal demands in three counties are related to an alternative approach to projections of rice irrigation demands.

The TWDB projections of irrigation demand for the 2017 State Water Plan were based generally on an assumption of average demand for each county in the region using the most recent five years of available irrigation data. This average demand was used as the starting point for the projections. Demand changes over time rose, fell, or remained constant in accordance with what the previous water plan assumed. The consultant team has revised this approach by assuming that the starting point would be the maximum demand of the last five years of data. This approach was used for the following counties in the ETRWPA:

| | | |
|---|---|---|
| Anderson | Nacogdoches | Shelby |
| Angelina | Newton | Smith |
| Cherokee | Panola | Trinity |
| Henderson | Polk | Tyler |
| Houston | Rusk | |
| Jasper | San Augustine | |

The revised approach has had the effect of increasing irrigation demand for the 16 counties. Attachment 3 contains a summary of the irrigation water demand evaluation for each of the above counties.

For Hardin, Jefferson, and Orange Counties, a different approach was taken. These counties have significant rice irrigation demands (or have had historically). The approach taken to project irrigation demands in these counties was detailed in a draft technical memorandum prepared by the consultant team entitled, *Rice Water Demand Projections Revisions*, dated August 21, 2012. This memorandum was presented to the ETRWPG Technical Committee in August and to the ETRWPG at the September 12 meeting and is included as Attachment 4 to this letter. The revised approach for rice irrigation demands had the effect of significantly increasing irrigation demand in these three counties over what the TWDB has proposed.

The TWDB has not yet indicated whether they agree with the approach proposed in the draft *Rice Water Demand Projections Revisions* Technical Memorandum. TWDB staff indicated that they believe there should be an assumption of no rice irrigation in Orange County on the belief that there has been no credible report of irrigation within the past five years.

An additional modification to irrigation demands for Jefferson County has been developed to account for a new bio-fuels industry that appears to be ready to take off in the county. Under contract to oil and gas industry companies, farmers in Jefferson County are beginning to raise "energy cane," which is a crop with a high capacity for producing bio-fuels. It has been estimated that approximately 26,000 acre-feet per year (af/yr) of irrigation will be needed for this crop in Jefferson County by 2020. This assumption has been carried forward for each decade in the planning period. Attachment 5 contains a copy of a summary of a meeting with representatives of the farming industry, oil and gas industry, the TWDB, and the ETRWPG, in which bio-fuels crop irrigation demands were addressed.

Sabine County irrigation projections have been assumed in previous water plans to be zero throughout the planning horizon. Likewise, the TWDB projected irrigation demand for Sabine County to remain at zero throughout the planning horizon. There is no historical information that irrigated agriculture is occurring in the county. Therefore, it is recommended that Sabine County continue to reflect no irrigation demand.

Table 1 and Figure 1 in Attachment 1 provide the recommended irrigation demands for each county in the ETRWPA.

**Manufacturing**

Changes to the TWDB's proposed manufacturing water demand numbers are recommended only for Tyler County. John Martin of the Southeast Texas Groundwater Conservation District and representing Groundwater Management Area 14 on the ETRWPG, has reported that a new wood pellet manufacturing facility is under construction in the City of Woodville and has received authorization from the Southeast Texas Groundwater Conservation District to withdraw 430 af/yr of groundwater for use in the process. Attachment 6 contains an email from Mr. Martin regarding manufacturing and steam-electric demands in Tyler County. In addition, Mr. Martin has requested additional documentation regarding this demand from the manufacturer. He expects this demand to be in place prior to 2020. Therefore, this demand has been added to the Tyler County manufacturing demand projections for 2020 and is assumed to remain constant through 2070.

Table 2 and Figure 2 in Attachment 1 provide the recommended manufacturing demands for each county in the ETRWPA.

**Steam Electric**

Changes to the TWDB's proposed steam electric water demand numbers are only recommended for Tyler County. John Martin has reported that a biomass electric generating facility is under construction in the City of Woodville and is expected to have a demand of 1,029 af/yr. He expects this demand to be in place prior to 2020 (see

Attachment 6). Mr. Martin has requested additional documentation regarding steam electric demand from the power generating company. Therefore, this demand has been added to the Tyler County steam electric demand projections.

Table 3 and Figure 3 in Attachment 1 provide the recommended steam electric demands for each county in the ETRWPA.

**Mining**

Changes to the TWDB's proposed mining water demands are not recommended for any county in the ETRWPA except Nacogdoches, Panola, Rusk, Sabine, San Augustine, and Shelby Counties. At the September 12 ETRWPA meeting, Leah Adams, General Manager for the Panola County Groundwater Conservation District and the representative from GMA 11, reported that the shale gas water demands for Panola County are approximately 50% above the initial demands provided by the TWDB. In addition, documentation of mining water projections has been provided for Nacogdoches, Rusk, Sabine, San Augustine, and Shelby Counties (see Attachment 7). On the basis of these reports, mining water demand projections have been modified for six counties in the ETRWPA.

The TWDB is expecting a revision of the Bureau of Economic Geology report on mining water demands soon. The revised report may make significant changes to the TWDB's proposed mining water demand projections. It will be necessary to revisit these demands at that time.

Table 4 and Figure 4 in Attachment 1 provide the recommended mining demands for each county in the ETRWPA.

**Livestock**

Changes to livestock water demands are recommended for the ETRWPA on the basis of a significant change in the way poultry water demands are determined. The consultant team, with the support of David Alders from the ETRWPG, have researched water demands for poultry production and concluded that the water demand projections provided by the TWDB are inadequate, as they do not account for cooling water demands for the poultry houses in the region. Cooling water demands appear to increase the water requirements for poultry by approximately 15 gallons per 1,000 chickens. The result has been a projected increase in livestock water demand for all counties in the region. A technical memorandum will be prepared to describe the methodology for the revisions to the poultry water demands.

Table 5 and Figure 5 in Attachment 1 provide the recommended livestock demands for each county in the ETRWPA.

**NEXT STEPS**

Once the ETRWPG has approved the final numbers for its recommended demands, it will be necessary to transmit the recommended changes to TWDB. At the request of the ETRWPG, the ETRWPA consultant team will prepare a final transmittal to the TWDB, which will include the final demand projections in the format provided in Attachment 2. This will include an electronic submittal of the projections as an excel file.

We appreciate the opportunity to support the ETRWPG in preparation of the 2016 Regional Water Plan. Please let me know if you need additional information or have any questions.

Sincerely,

ALAN PLUMMER ASSOCIATES, INC.
TBPE Firm Registration No. F-13

Rex H. Hunt, PE
Principal

RHH/rjm

Enclosures

cc: Mr. Michael Harbordt, East Texas Regional Water Planning Group
Mr. Lann Bookout, Texas Water Development Board
Ms. Simone Kiel, P.E., Freese and Nichols, Inc.

# Attachment 1
# Summary of Proposed Non-Municipal Water Demands

**Table 1**

**Attachment 1**
**East Texas Regional Water Planning Area**
**Non-Municipal Water Demand Projections**
**Irrigation Water Demands**

| County | State Water Plan Year | Volume (af/yr) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| Anderson | 2012 Plan Projections[1] | 212 | 212 | 212 | 212 | 212 | NA |
| | 2017 Plan Projections[2] | 403 | 403 | 403 | 403 | 403 | 403 |
| | 2017 ETRWPG Projections[3] | 462 | 462 | 462 | 462 | 462 | 462 |
| Angelina | 2012 Plan Projections | 30 | 30 | 30 | 30 | 30 | NA |
| | 2017 Plan Projections | 294 | 294 | 294 | 294 | 294 | 294 |
| | 2017 ETRWPG Projections | 481 | 481 | 481 | 481 | 481 | 481 |
| Cherokee | 2012 Plan Projections | 321 | 321 | 321 | 321 | 321 | NA |
| | 2017 Plan Projections | 294 | 294 | 294 | 294 | 294 | 294 |
| | 2017 ETRWPG Projections | 355 | 355 | 355 | 355 | 355 | 355 |
| Hardin | 2012 Plan Projections | 3,502 | 3,502 | 3,502 | 3,502 | 3,502 | NA |
| | 2017 Plan Projections | 1,349 | 1,349 | 1,349 | 1,349 | 1,349 | 1,349 |
| | 2017 ETRWPG Projections | 3,414 | 3,645 | 3,804 | 3,861 | 3,802 | 3,712 |
| Henderson | 2012 Plan Projections | 10 | 10 | 10 | 10 | 10 | NA |
| | 2017 Plan Projections | 284 | 284 | 284 | 284 | 284 | 284 |
| | 2017 ETRWPG Projections | 384 | 384 | 384 | 384 | 384 | 384 |
| Houston | 2012 Plan Projections | 3,024 | 3,343 | 3,691 | 4,077 | 4,503 | NA |
| | 2017 Plan Projections | 2,333 | 2,579 | 2,847 | 3,145 | 3,474 | 3,922 |
| | 2017 ETRWPG Projections | 2,989 | 3,235 | 3,503 | 3,801 | 4,130 | 4,578 |
| Jasper | 2012 Plan Projections | 0 | 0 | 0 | 0 | 0 | NA |
| | 2017 Plan Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2017 ETRWPG Projections | 36 | 36 | 36 | 36 | 36 | 36 |
| Jefferson | 2012 Plan Projections | 140,000 | 140,000 | 140,000 | 140,000 | 140,000 | NA |
| | 2017 Plan Projections | 82,814 | 82,814 | 82,814 | 82,814 | 82,814 | 82,814 |
| | 2017 ETRWPG Projections | 161,952 | 171,165 | 177,490 | 179,735 | 177,394 | 173,833 |
| Nacogdoches | 2012 Plan Projections | 302 | 302 | 302 | 302 | 302 | NA |
| | 2017 Plan Projections | 330 | 330 | 330 | 330 | 330 | 330 |
| | 2017 ETRWPG Projections | 400 | 400 | 400 | 400 | 400 | 400 |
| Newton | 2012 Plan Projections | 367 | 367 | 367 | 367 | 367 | NA |
| | 2017 Plan Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2017 ETRWPG Projections | 375 | 375 | 375 | 375 | 375 | 375 |
| Orange | 2012 Plan Projections | 2,509 | 2,509 | 2,509 | 2,509 | 2,509 | NA |
| | 2017 Plan Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2017 ETRWPG Projections | 3,730 | 3,983 | 4,156 | 4,218 | 4,153 | 4,056 |
| Panola | 2012 Plan Projections | 0 | 0 | 0 | 0 | 0 | NA |
| | 2017 Plan Projections | 31 | 31 | 31 | 31 | 31 | 31 |
| | 2017 ETRWPG Projections | 64 | 64 | 64 | 64 | 64 | 64 |
| Polk | 2012 Plan Projections | 135 | 135 | 135 | 135 | 135 | NA |
| | 2017 Plan Projections | 259 | 259 | 259 | 259 | 259 | 259 |
| | 2017 ETRWPG Projections | 428 | 428 | 428 | 428 | 428 | 428 |

**Table 1**

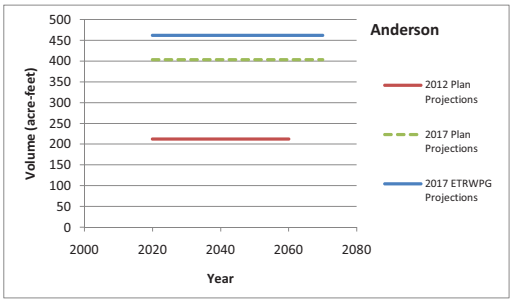
**Attachment 1**
**East Texas Regional Water Planning Area**
**Non-Municipal Water Demand Projections**
**Irrigation Water Demands**

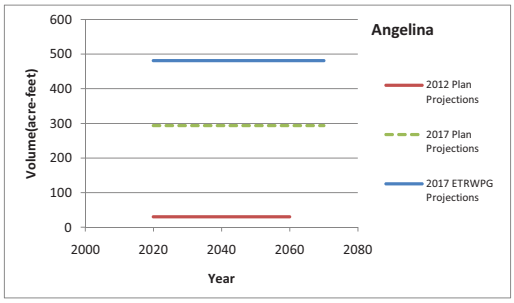
| County | State Water Plan Year | Volume (af/yr) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| Rusk | 2012 Plan Projections | 126 | 126 | 126 | 126 | 126 | NA |
| | 2017 Plan Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2017 ETRWPG Projections | 100 | 100 | 100 | 100 | 100 | 100 |
| Sabine | 2012 Plan Projections | 0 | 0 | 0 | 0 | 0 | NA |
| | 2017 Plan Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2017 ETRWPG Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| San Augustine | 2012 Plan Projections | 225 | 225 | 225 | 225 | 225 | NA |
| | 2017 Plan Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2017 ETRWPG Projections | 62 | 62 | 62 | 62 | 62 | 62 |
| Shelby | 2012 Plan Projections | 30 | 34 | 37 | 41 | 46 | NA |
| | 2017 Plan Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2017 ETRWPG Projections | 26 | 26 | 26 | 26 | 26 | 26 |
| Smith | 2012 Plan Projections | 595 | 626 | 657 | 689 | 723 | NA |
| | 2017 Plan Projections | 610 | 642 | 674 | 707 | 742 | 783 |
| | 2017 ETRWPG Projections | 1,486 | 1,518 | 1,550 | 1,583 | 1,618 | 1,659 |
| Trinity | 2012 Plan Projections | 0 | 0 | 0 | 0 | 0 | NA |
| | 2017 Plan Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2017 ETRWPG Projections | 500 | 500 | 500 | 500 | 500 | 500 |
| Tyler | 2012 Plan Projections | 29 | 29 | 29 | 29 | 29 | NA |
| | 2017 Plan Projections | 374 | 374 | 374 | 374 | 374 | 374 |
| | 2017 ETRWPG Projections | 675 | 675 | 675 | 675 | 675 | 675 |
| TOTAL | 2012 Plan Projections | 151,417 | 151,771 | 152,153 | 152,575 | 153,040 | NA |
| | 2017 Plan Projections | 89,375 | 89,653 | 89,953 | 90,284 | 90,648 | 91,137 |
| | 2017 ETRWPG Projections | 177,919 | 187,894 | 194,851 | 197,546 | 195,445 | 192,186 |

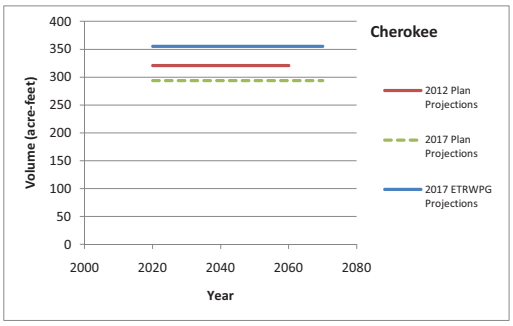
(1) 2012 Plan Projections are from the *2012 State Water Plan* and *2011 Update of the Regional Water Plan* in the East Texas Regional Water Planning Area (ETRWPA) or Region I

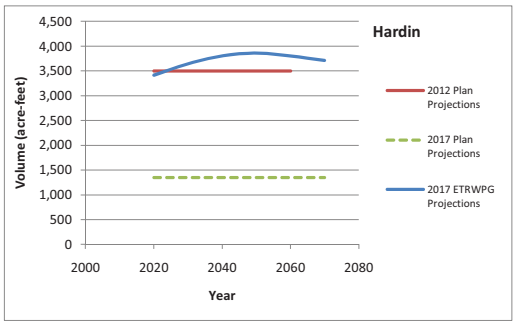
(2) 2017 Plan Projections are from the 2017 database (DB17) provided by the Texas Water Development Board

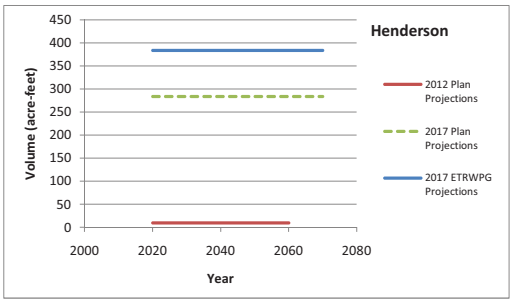
(3) 2017 ETRWPG Projections are those proposed by the East Texas Regional Water Planning Group (ETRWPG)

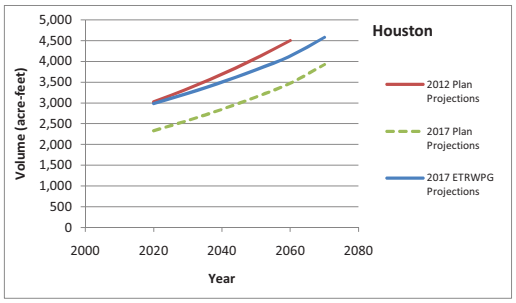


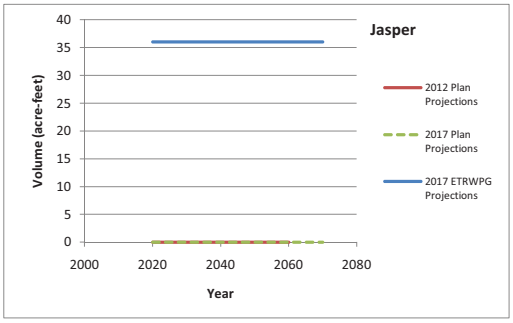



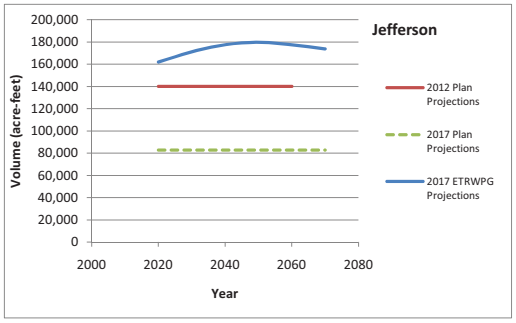



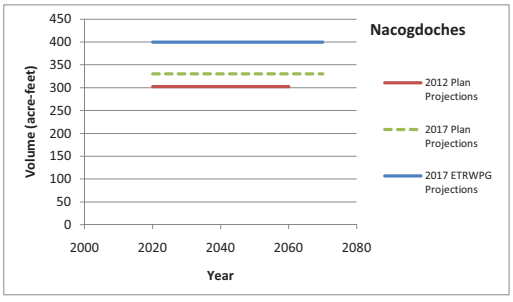



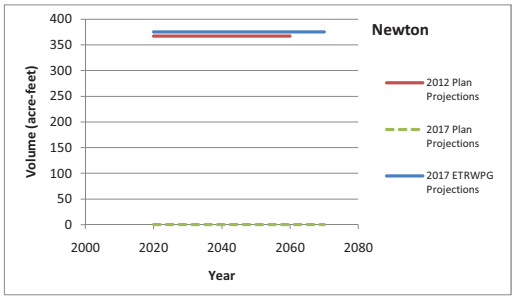
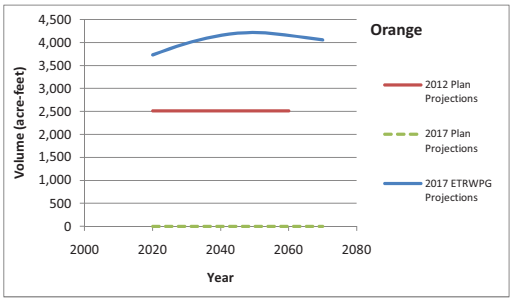
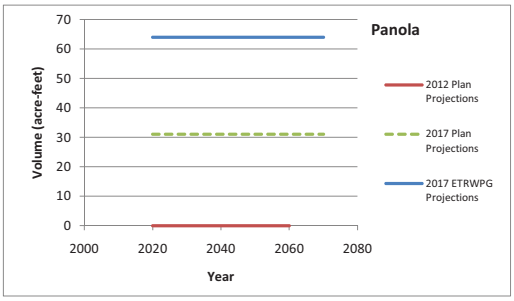
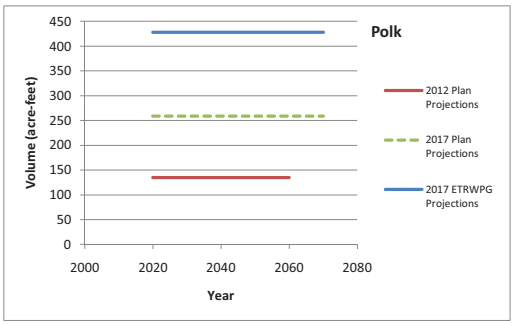



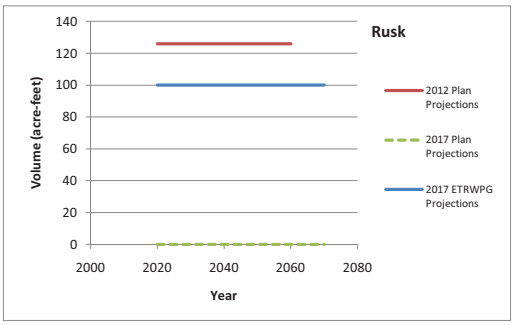

**Figure 1**

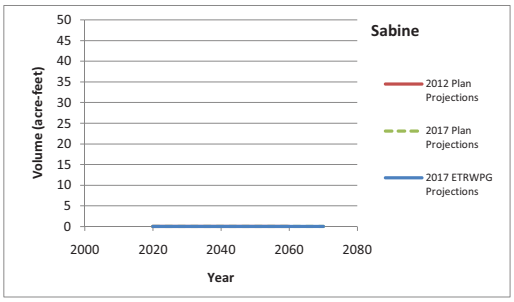
**Attachment 1**
**East Texas Regional Water Planning Area**
**Comparison of Historical Water Demand Estimates and 2012 and 2017 Projections**
**Irrigation Water Demands**

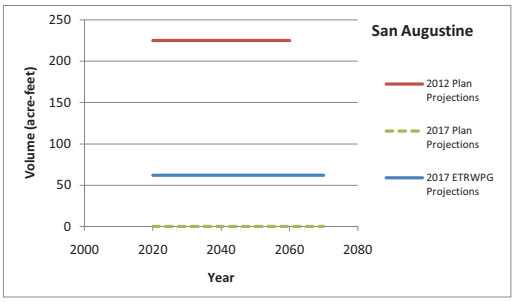


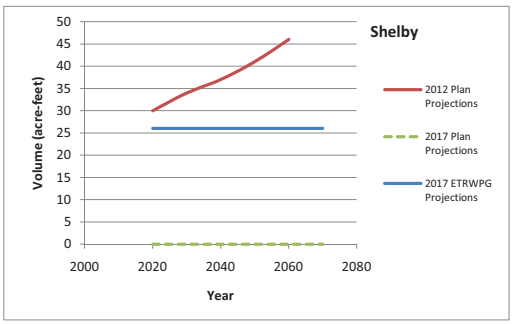



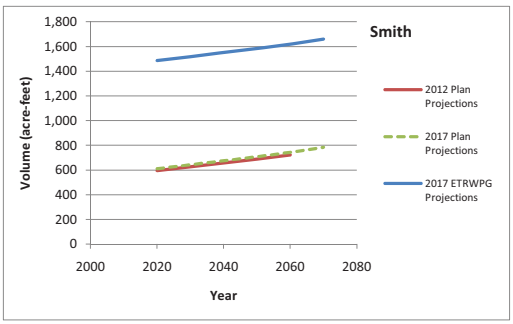



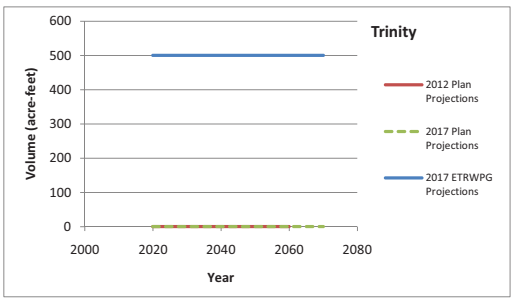



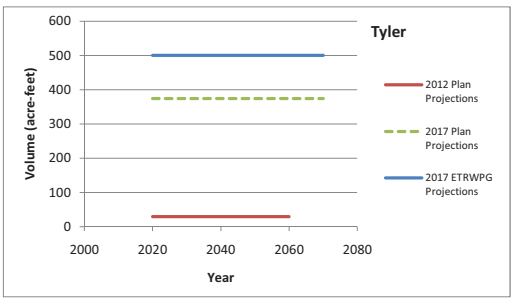




**Figure 1 (continued)**

**Attachment 1**
**East Texas Regional Water Planning Area**
**Comparison of Historical Water Demand Estimates and 2012 and 2017 Projections**
**Irrigation Water Demands**

**Table 2**

**Attachment 1**
**East Texas Regional Water Planning Area**
**Non-Municipal Water Demand Projections**
**Manufacturing Water Demands**

| County | State Water Plan Year | Volume (af/yr) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| Anderson | 2012 Plan Projections[1] | 0 | 0 | 0 | 0 | 0 | NA |
| | 2017 Plan Projections[2] | 30 | 40 | 42 | 44 | 46 | 48 |
| | 2017 ETRWPG Projections[3] | 30 | 40 | 42 | 44 | 46 | 48 |
| Angelina | 2012 Plan Projections | 23,500 | 25,980 | 28,490 | 30,720 | 33,100 | NA |
| | 2017 Plan Projections | 15,249 | 16,858 | 18,487 | 19,934 | 21,478 | 23,142 |
| | 2017 ETRWPG Projections | 15,249 | 16,858 | 18,487 | 19,934 | 21,478 | 23,142 |
| Cherokee | 2012 Plan Projections | 784 | 839 | 891 | 934 | 1,007 | NA |
| | 2017 Plan Projections | 413 | 442 | 469 | 492 | 530 | 571 |
| | 2017 ETRWPG Projections | 413 | 442 | 469 | 492 | 530 | 571 |
| Hardin | 2012 Plan Projections | 165 | 182 | 200 | 216 | 233 | NA |
| | 2017 Plan Projections | 288 | 318 | 349 | 377 | 407 | 439 |
| | 2017 ETRWPG Projections | 288 | 318 | 349 | 377 | 407 | 439 |
| Henderson | 2012 Plan Projections | 14 | 16 | 18 | 20 | 22 | NA |
| | 2017 Plan Projections | 54 | 62 | 70 | 78 | 86 | 95 |
| | 2017 ETRWPG Projections | 54 | 62 | 70 | 78 | 86 | 95 |
| Houston | 2012 Plan Projections | 190 | 209 | 227 | 243 | 263 | NA |
| | 2017 Plan Projections | 307 | 338 | 367 | 393 | 425 | 460 |
| | 2017 ETRWPG Projections | 307 | 338 | 367 | 393 | 425 | 460 |
| Jasper | 2012 Plan Projections | 67,649 | 70,162 | 72,359 | 74,006 | 74,069 | NA |
| | 2017 Plan Projections | 91,580 | 94,982 | 97,956 | 100,186 | 100,271 | 100,356 |
| | 2017 ETRWPG Projections | 91,580 | 94,982 | 97,956 | 100,186 | 100,271 | 100,356 |
| Jefferson | 2012 Plan Projections | 423,258 | 603,321 | 629,171 | 655,034 | 680,914 | NA |
| | 2017 Plan Projections | 423,258 | 603,321 | 629,171 | 655,034 | 680,914 | 707,817 |
| | 2017 ETRWPG Projections | 423,258 | 603,321 | 629,171 | 655,034 | 680,914 | 707,817 |
| Nacogdoches | 2012 Plan Projections | 2,553 | 2,786 | 3,016 | 3,214 | 3,468 | NA |
| | 2017 Plan Projections | 2,564 | 2,798 | 3,029 | 3,228 | 3,483 | 3,758 |
| | 2017 ETRWPG Projections | 2,564 | 2,798 | 3,029 | 3,228 | 3,483 | 3,758 |
| Newton | 2012 Plan Projections | 793 | 899 | 1,006 | 1,103 | 1,196 | NA |
| | 2017 Plan Projections | 568 | 644 | 721 | 791 | 858 | 931 |
| | 2017 ETRWPG Projections | 568 | 644 | 721 | 791 | 858 | 931 |
| Orange | 2012 Plan Projections | 64,461 | 70,439 | 76,399 | 81,690 | 87,641 | NA |
| | 2017 Plan Projections | 64,461 | 70,439 | 76,399 | 81,690 | 87,641 | 94,026 |
| | 2017 ETRWPG Projections | 64,461 | 70,439 | 76,399 | 81,690 | 87,641 | 94,026 |
| Panola | 2012 Plan Projections | 1,437 | 1,500 | 1,561 | 1,614 | 1,720 | NA |
| | 2017 Plan Projections | 1,393 | 1,454 | 1,513 | 1,564 | 1,667 | 1,777 |
| | 2017 ETRWPG Projections | 1,393 | 1,454 | 1,513 | 1,564 | 1,667 | 1,777 |
| Polk | 2012 Plan Projections | 725 | 825 | 930 | 1,026 | 1,110 | NA |
| | 2017 Plan Projections | 604 | 687 | 774 | 854 | 924 | 1,000 |
| | 2017 ETRWPG Projections | 604 | 687 | 774 | 854 | 924 | 1,000 |

**Table 2**

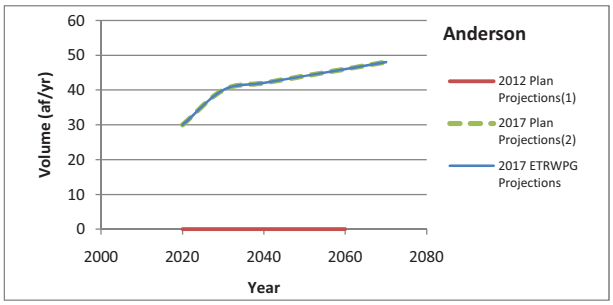
**Attachment 1**
**East Texas Regional Water Planning Area**
**Non-Municipal Water Demand Projections**
**Manufacturing Water Demands**

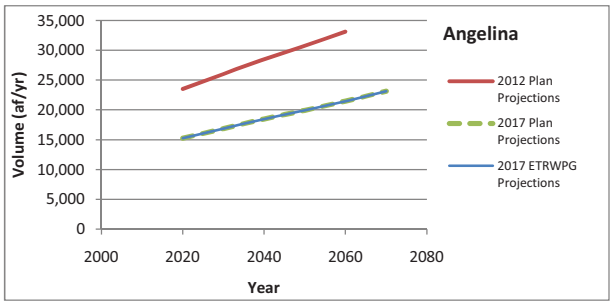
| County | State Water Plan Year | Volume (af/yr) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| Rusk | 2012 Plan Projections | 90 | 97 | 103 | 108 | 116 | NA |
| | 2017 Plan Projections | 317 | 342 | 363 | 381 | 409 | 439 |
| | 2017 ETRWPG Projections | 317 | 342 | 363 | 381 | 409 | 439 |
| Sabine | 2012 Plan Projections | 427 | 490 | 554 | 611 | 662 | NA |
| | 2017 Plan Projections | 467 | 536 | 606 | 668 | 724 | 785 |
| | 2017 ETRWPG Projections | 467 | 536 | 606 | 668 | 724 | 785 |
| San Augustine | 2012 Plan Projections | 7 | 8 | 9 | 10 | 11 | NA |
| | 2017 Plan Projections | 8 | 9 | 10 | 11 | 12 | 13 |
| | 2017 ETRWPG Projections | 8 | 9 | 10 | 11 | 12 | 13 |
| Shelby | 2012 Plan Projections | 1,508 | 1,637 | 1,766 | 1,880 | 2,019 | NA |
| | 2017 Plan Projections | 1,510 | 1,639 | 1,768 | 1,882 | 2,021 | 2,170 |
| | 2017 ETRWPG Projections | 1,510 | 1,639 | 1,768 | 1,882 | 2,021 | 2,170 |
| Smith | 2012 Plan Projections | 4,297 | 4,697 | 5,081 | 5,407 | 5,854 | NA |
| | 2017 Plan Projections | 5,120 | 5,597 | 6,055 | 6,443 | 6,976 | 7,553 |
| | 2017 ETRWPG Projections | 5,120 | 5,597 | 6,055 | 6,443 | 6,976 | 7,553 |
| Trinity | 2012 Plan Projections | 0 | 0 | 0 | 0 | 0 | NA |
| | 2017 Plan Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2017 ETRWPG Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| Tyler | 2012 Plan Projections | 46 | 53 | 60 | 66 | 71 | NA |
| | 2017 Plan Projections | 46 | 53 | 60 | 66 | 71 | 76 |
| | 2017 ETRWPG Projections | 476 | 483 | 490 | 496 | 501 | 506 |
| TOTAL | 2012 Plan Projections | 591,904 | 784,140 | 821,841 | 857,902 | 893,476 | NA |
| | 2017 Plan Projections | 608,237 | 800,559 | 838,209 | 874,116 | 908,943 | 945,456 |
| | 2017 ETRWPG Projections | 608,667 | 800,989 | 838,639 | 874,546 | 909,373 | 945,886 |

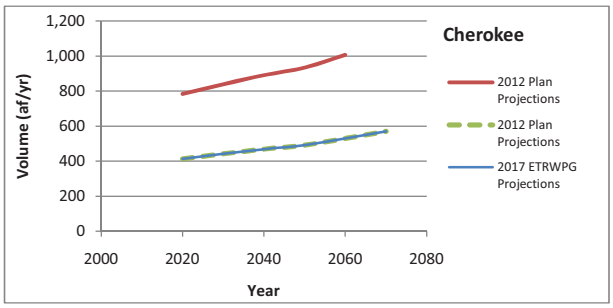
(1) 2012 Plan Projections are from the *2012 State Water Plan* and *2011 Update of the Regional Water Plan* in the East Texas Regional Water Planning Area (ETRWPA) or Region I

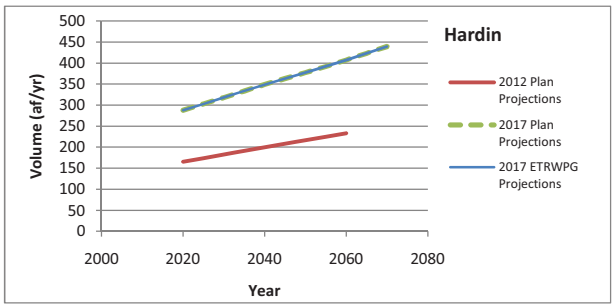
(2) 2017 Plan Projections are from the 2017 database (DB17) provided by the Texas Water Development Board

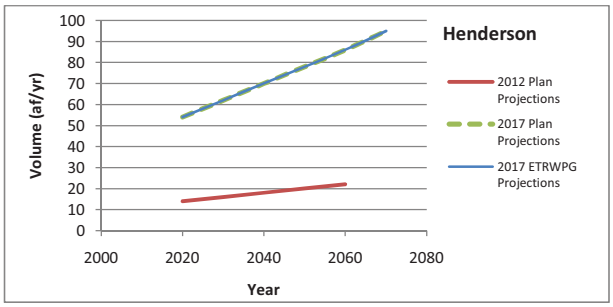
(3) 2017 ETRWPG Projections are those proposed by the East Texas Regional Water Planning Group (ETRWPG)

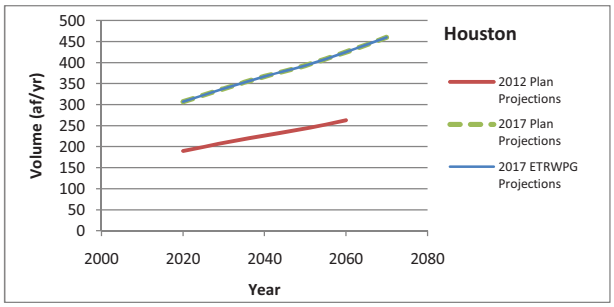


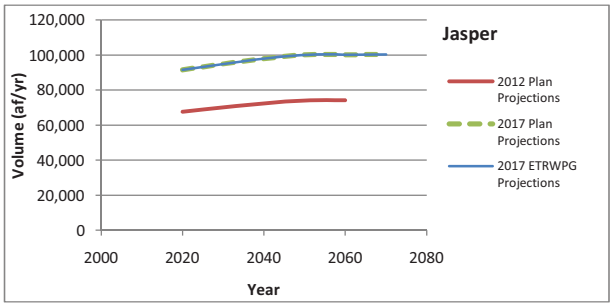



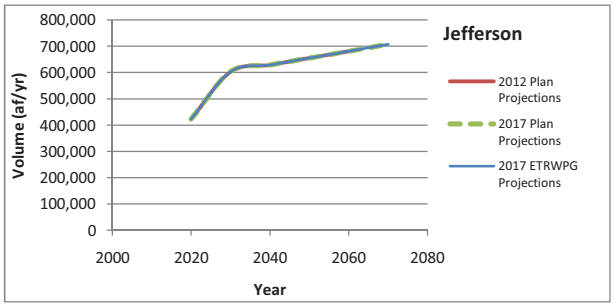



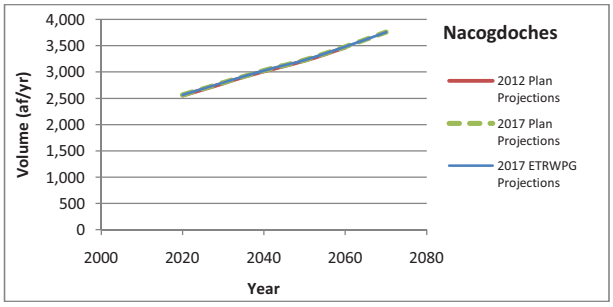



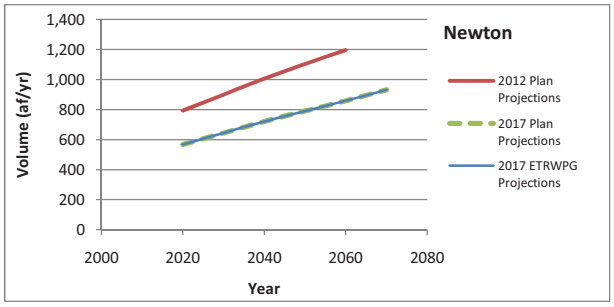
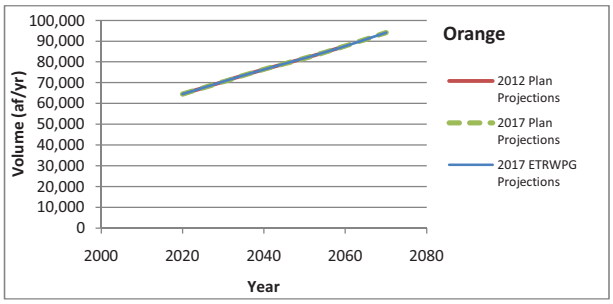
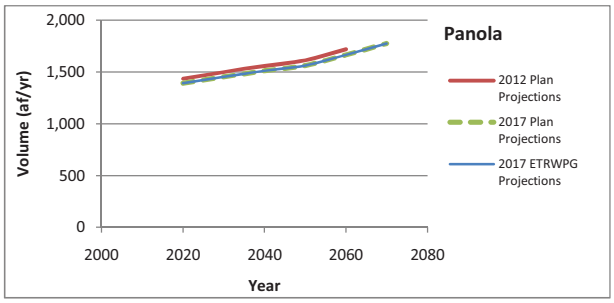
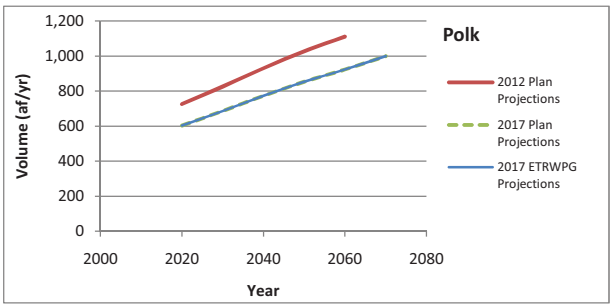



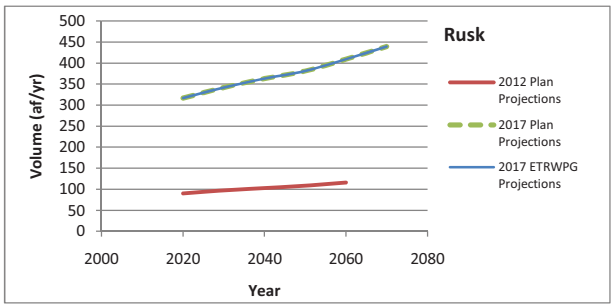

**Figure 2**

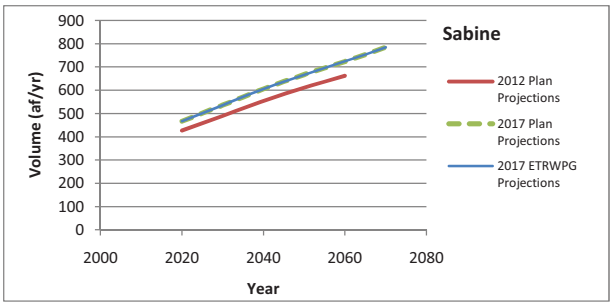
**Attachment 1**
**East Texas Regional Water Planning Area**
**Comparison of Historical Water Demand Estimates and 2012 and 2017 Projections**
**Manufacturing Water Demands**

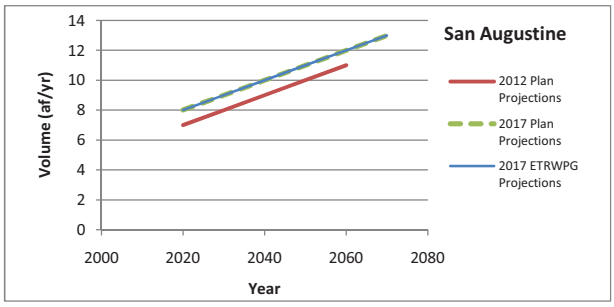


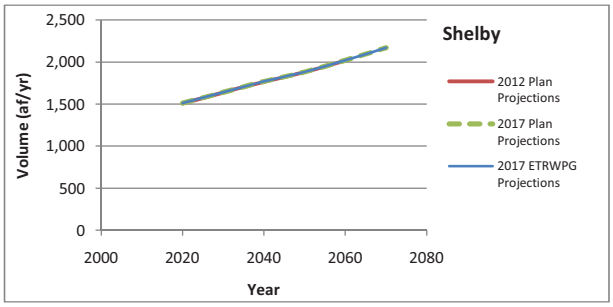



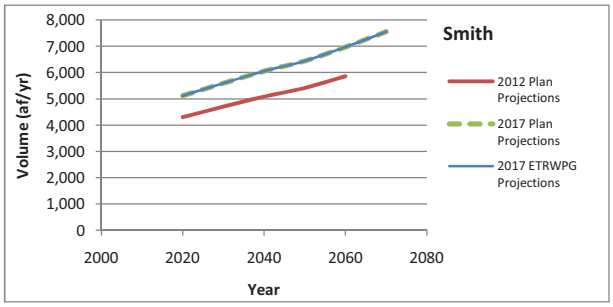



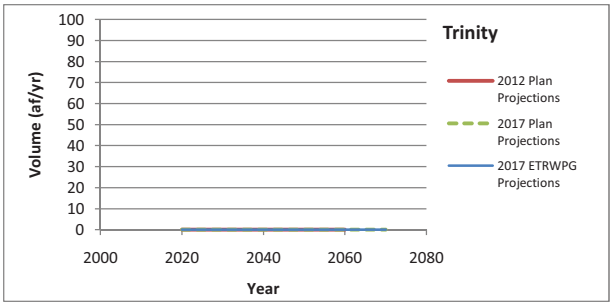



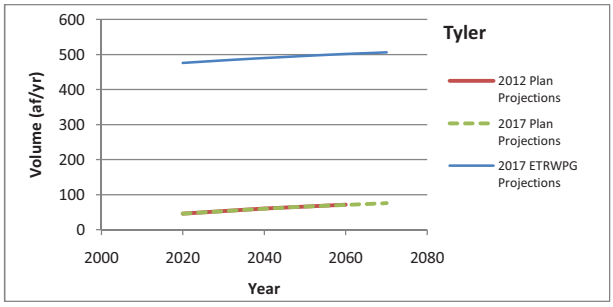




**Figure 2 (continued)**

**Attachment 1**
**East Texas Regional Water Planning Area**
**Comparison of Historical Water Demand Estimates and 2012 and 2017 Projections**
**Manufacturing Water Demands**

**Table 3**

**Attachment 1**
**East Texas Regional Water Planning Area**
**Non-Municipal Water Demand Projections**
**Mining Water Demands**

| County | State Water Plan Year | Volume (af/yr) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| Anderson | 2012 Plan Projections[1] | 557 | 583 | 608 | 633 | 657 | NA |
| | 2017 Plan Projections[2] | 70 | 105 | 83 | 58 | 32 | 23 |
| | 2017 ETRWPG Projections[3] | 70 | 105 | 83 | 58 | 32 | 23 |
| Angelina | 2012 Plan Projections | 4,017 | 17 | 17 | 17 | 17 | NA |
| | 2017 Plan Projections | 486 | 585 | 410 | 236 | 63 | 28 |
| | 2017 ETRWPG Projections | 486 | 585 | 410 | 236 | 63 | 28 |
| Cherokee | 2012 Plan Projections | 1,597 | 99 | 101 | 103 | 105 | NA |
| | 2017 Plan Projections | 295 | 304 | 203 | 104 | 15 | 15 |
| | 2017 ETRWPG Projections | 295 | 304 | 203 | 104 | 15 | 15 |
| Hardin | 2012 Plan Projections | 8,648 | 9,219 | 9,788 | 10,361 | 10,798 | NA |
| | 2017 Plan Projections | 12 | 12 | 12 | 12 | 12 | 12 |
| | 2017 ETRWPG Projections | 12 | 12 | 12 | 12 | 12 | 12 |
| Henderson | 2012 Plan Projections | 14 | 14 | 14 | 14 | 14 | NA |
| | 2017 Plan Projections | 77 | 86 | 59 | 34 | 8 | 4 |
| | 2017 ETRWPG Projections | 77 | 86 | 59 | 34 | 8 | 4 |
| Houston | 2012 Plan Projections | 160 | 158 | 156 | 154 | 153 | NA |
| | 2017 Plan Projections | 17 | 17 | 17 | 17 | 17 | 17 |
| | 2017 ETRWPG Projections | 17 | 17 | 17 | 17 | 17 | 17 |
| Jasper | 2012 Plan Projections | 4 | 4 | 4 | 4 | 4 | NA |
| | 2017 Plan Projections | 13 | 13 | 13 | 13 | 13 | 13 |
| | 2017 ETRWPG Projections | 13 | 13 | 13 | 13 | 13 | 13 |
| Jefferson | 2012 Plan Projections | 334 | 341 | 348 | 355 | 360 | NA |
| | 2017 Plan Projections | 194 | 216 | 243 | 294 | 328 | 368 |
| | 2017 ETRWPG Projections | 194 | 216 | 243 | 294 | 328 | 368 |
| Nacogdoches | 2012 Plan Projections | 7,213 | 212 | 211 | 210 | 209 | NA |
| | 2017 Plan Projections | 4,612 | 3,597 | 2,435 | 1,275 | 127 | 57 |
| | 2017 ETRWPG Projections | 7,000 | 4,500 | 0 | 0 | 0 | 0 |
| Newton | 2012 Plan Projections | 32 | 32 | 32 | 32 | 32 | NA |
| | 2017 Plan Projections | 269 | 248 | 190 | 155 | 128 | 106 |
| | 2017 ETRWPG Projections | 269 | 248 | 190 | 155 | 128 | 106 |
| Orange | 2012 Plan Projections | 9 | 9 | 9 | 9 | 9 | NA |
| | 2017 Plan Projections | 309 | 314 | 313 | 314 | 319 | 327 |
| | 2017 ETRWPG Projections | 309 | 314 | 313 | 314 | 319 | 327 |
| Panola | 2012 Plan Projections | 4,271 | 4,587 | 4,905 | 5,228 | 5,536 | NA |
| | 2017 Plan Projections | 3,944 | 3,906 | 3,366 | 2,845 | 2,413 | 2,625 |
| | 2017 ETRWPG Projections | 5,916 | 5,859 | 5,049 | 4,268 | 3,620 | 3,938 |
| Polk | 2012 Plan Projections | 0 | 0 | 0 | 0 | 0 | NA |
| | 2017 Plan Projections | 7 | 7 | 7 | 7 | 7 | 7 |
| | 2017 ETRWPG Projections | 7 | 7 | 7 | 7 | 7 | 7 |

**Table 3**

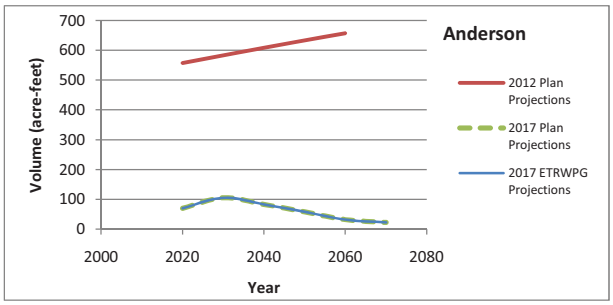
**Attachment 1**
**East Texas Regional Water Planning Area**
**Non-Municipal Water Demand Projections**
**Mining Water Demands**

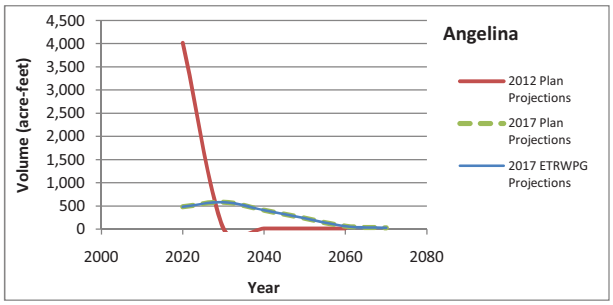
| County | State Water Plan Year | Volume (af/yr) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| Rusk | 2012 Plan Projections | 1,679 | 1,761 | 1,841 | 1,921 | 1,996 | NA |
| | 2017 Plan Projections | 4,410 | 4,314 | 3,745 | 3,196 | 2,686 | 2,921 |
| | 2017 ETRWPG Projections | 1,000 | 500 | 0 | 0 | 0 | 0 |
| Sabine | 2012 Plan Projections | 0 | 0 | 0 | 0 | 0 | NA |
| | 2017 Plan Projections | 2,695 | 2,175 | 1,597 | 1,022 | 448 | 425 |
| | 2017 ETRWPG Projections | 1,500 | 1,000 | 0 | 0 | 0 | 0 |
| San Augustine | 2012 Plan Projections | 7,000 | 0 | 0 | 0 | 0 | NA |
| | 2017 Plan Projections | 3,167 | 2,254 | 1,513 | 773 | 76 | 34 |
| | 2017 ETRWPG Projections | 4,000 | 3,000 | 0 | 0 | 0 | 0 |
| Shelby | 2012 Plan Projections | 1,500 | 0 | 0 | 0 | 0 | NA |
| | 2017 Plan Projections | 4,745 | 3,482 | 2,341 | 1,203 | 127 | 52 |
| | 2017 ETRWPG Projections | 1,500 | 1,000 | 0 | 0 | 0 | 0 |
| Smith | 2012 Plan Projections | 262 | 295 | 351 | 391 | 424 | NA |
| | 2017 Plan Projections | 134 | 139 | 99 | 60 | 20 | 14 |
| | 2017 ETRWPG Projections | 134 | 139 | 99 | 60 | 20 | 14 |
| Trinity | 2012 Plan Projections | 0 | 0 | 0 | 0 | 0 | NA |
| | 2017 Plan Projections | 5 | 5 | 5 | 5 | 5 | 5 |
| | 2017 ETRWPG Projections | 5 | 5 | 5 | 5 | 5 | 5 |
| Tyler | 2012 Plan Projections | 0 | 0 | 0 | 0 | 0 | NA |
| | 2017 Plan Projections | 13 | 13 | 13 | 13 | 13 | 13 |
| | 2017 ETRWPG Projections | 13 | 13 | 13 | 13 | 13 | 13 |
| TOTAL | 2012 Plan Projections | 37,297 | 17,331 | 18,385 | 19,432 | 20,314 | NA |
| | 2017 Plan Projections | 25,474 | 21,792 | 16,664 | 11,636 | 6,857 | 7,066 |
| | 2017 ETRWPG Projections | 22,817 | 17,923 | 6,716 | 5,590 | 4,600 | 4,890 |

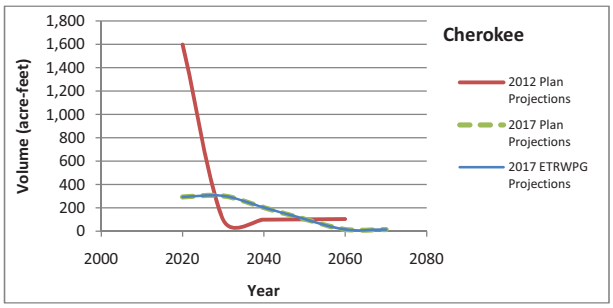
(1) 2012 Plan Projections are from the *2012 State Water Plan* and *2011 Update of the Regional Water Plan* in the East Texas Regional Water Planning Area (ETRWPA) or Region I

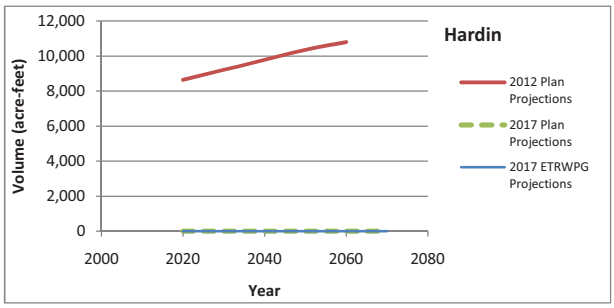
(2) 2017 Plan Projections are from the 2017 database (DB17) provided by the Texas Water Development Board

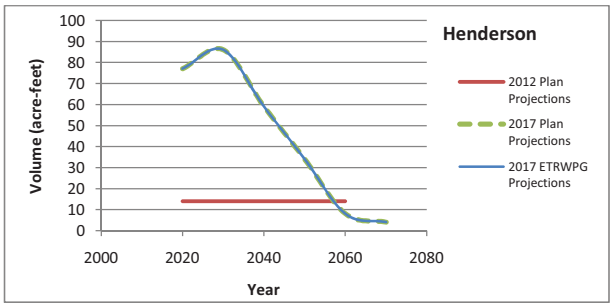
(3) 2017 ETRWPG Projections are those proposed by the East Texas Regional Water Planning Group (ETRWPG)

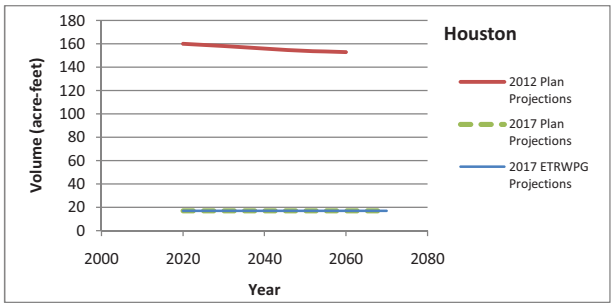


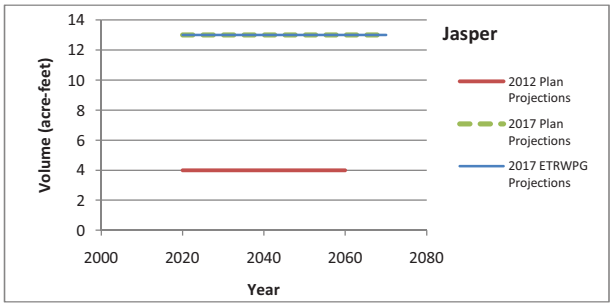



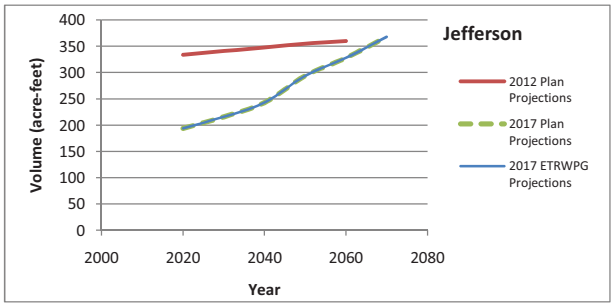



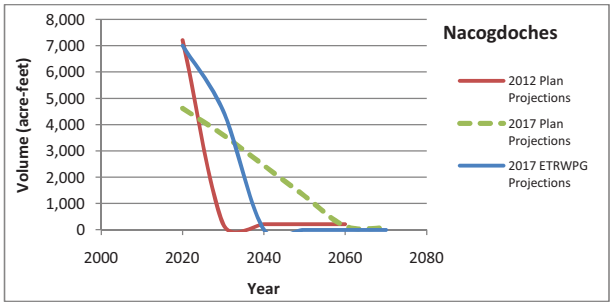



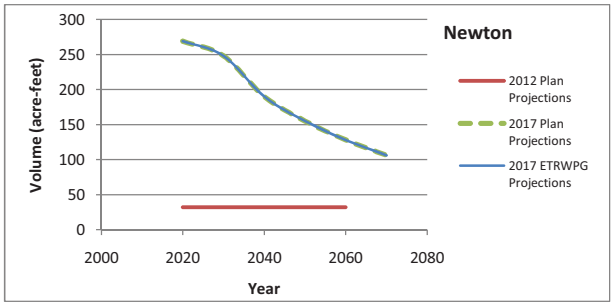
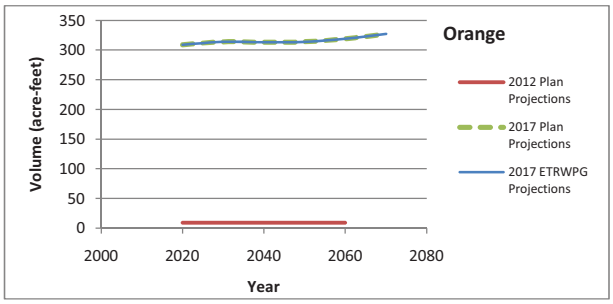
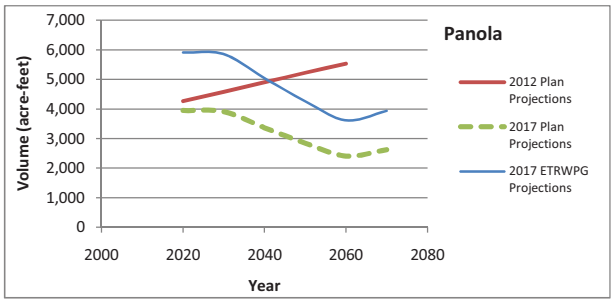
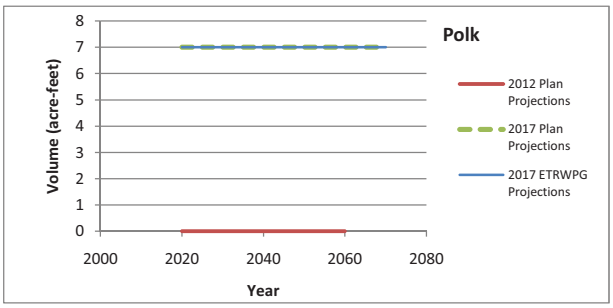



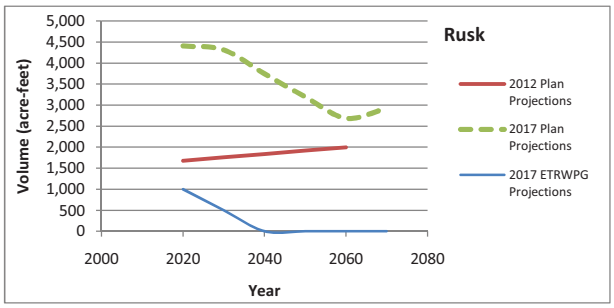

**Figure 3**

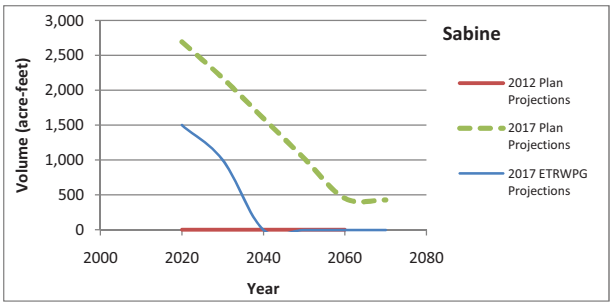
**Attachment 1**
**East Texas Regional Water Planning Area**
**Revised Non-Municipal Water Demands Projections**
**Mining Water Demands**

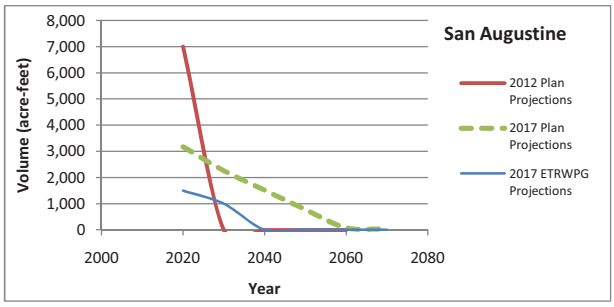


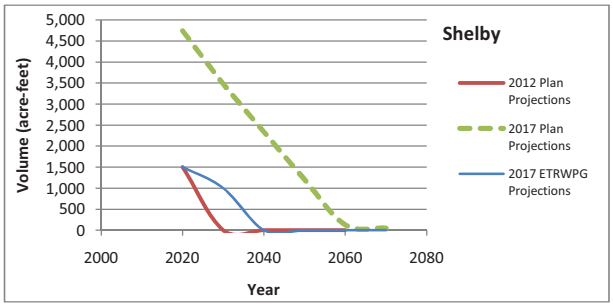



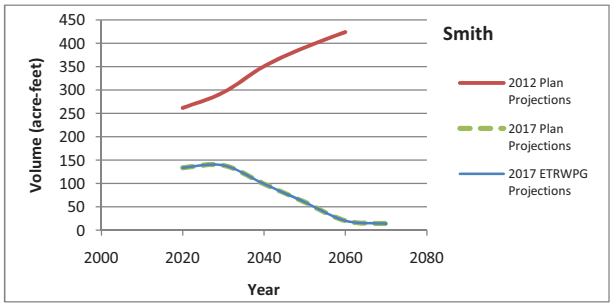



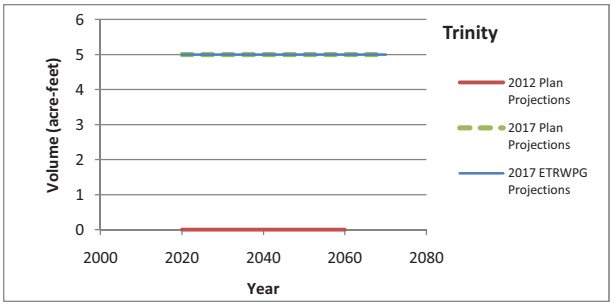



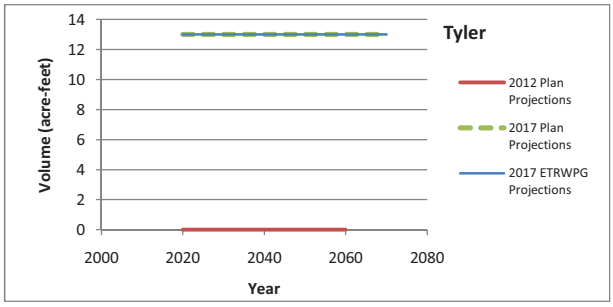




**Figure 3 (continued)**

**Attachment 1**
**East Texas Regional Water Planning Area**
**Revised Non-Municipal Water Demands Projections**
**Mining Water Demands**

**Table 4**

**Attachment 1**
**East Texas Regional Water Planning Area**
**Non-Municipal Water Demand Projections**
**Steam Electric Water Demands**

| County | State Water Plan Year | Volume (af/yr) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| Anderson | 2012 Plan Projections[1] | 11,306 | 13,218 | 15,549 | 18,390 | 21,853 | NA |
| | 2017 Plan Projections[2] | 11,306 | 13,218 | 15,549 | 18,390 | 21,853 | 25,968 |
| | 2017 ETRWPG Projections[3] | 11,306 | 13,218 | 15,549 | 18,390 | 21,853 | 25,968 |
| Angelina | 2012 Plan Projections | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | NA |
| | 2017 Plan Projections | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 |
| | 2017 ETRWPG Projections | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 |
| Cherokee | 2012 Plan Projections | 1,790 | 2,093 | 2,462 | 2,912 | 3,460 | NA |
| | 2017 Plan Projections | 1,790 | 2,093 | 2,462 | 2,912 | 3,460 | 3,835 |
| | 2017 ETRWPG Projections | 1,790 | 2,093 | 2,462 | 2,912 | 3,460 | 3,835 |
| Hardin | 2012 Plan Projections | 0 | 0 | 0 | 0 | 0 | NA |
| | 2017 Plan Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2017 ETRWPG Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| Henderson | 2012 Plan Projections | 0 | 0 | 0 | 0 | 0 | NA |
| | 2017 Plan Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2017 ETRWPG Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| Houston | 2012 Plan Projections | 0 | 0 | 0 | 0 | 0 | NA |
| | 2017 Plan Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2017 ETRWPG Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| Jasper | 2012 Plan Projections | 0 | 0 | 0 | 0 | 0 | NA |
| | 2017 Plan Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2017 ETRWPG Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| Jefferson | 2012 Plan Projections | 13,426 | 15,696 | 18,464 | 21,838 | 25,951 | NA |
| | 2017 Plan Projections | 13,426 | 15,696 | 18,464 | 21,838 | 25,951 | 30,839 |
| | 2017 ETRWPG Projections | 13,426 | 15,696 | 18,464 | 21,838 | 25,951 | 30,839 |
| Nacogdoches | 2012 Plan Projections | 6,911 | 8,079 | 9,504 | 11,241 | 13,358 | NA |
| | 2017 Plan Projections | 6,911 | 8,079 | 9,504 | 11,241 | 13,358 | 15,874 |
| | 2017 ETRWPG Projections | 6,911 | 8,079 | 9,504 | 11,241 | 13,358 | 15,874 |
| Newton | 2012 Plan Projections | 14,132 | 16,522 | 19,436 | 22,987 | 27,317 | NA |
| | 2017 Plan Projections | 14,132 | 16,522 | 19,436 | 22,987 | 27,317 | 32,463 |
| | 2017 ETRWPG Projections | 14,132 | 16,522 | 19,436 | 22,987 | 27,317 | 32,463 |
| Orange | 2012 Plan Projections | 4,966 | 5,805 | 6,829 | 8,077 | 9,598 | NA |
| | 2017 Plan Projections | 4,966 | 5,805 | 6,829 | 8,077 | 9,598 | 10,637 |
| | 2017 ETRWPG Projections | 4,966 | 5,805 | 6,829 | 8,077 | 9,598 | 10,637 |
| Panola | 2012 Plan Projections | 0 | 0 | 0 | 0 | 0 | NA |
| | 2017 Plan Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2017 ETRWPG Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| Polk | 2012 Plan Projections | 0 | 0 | 0 | 0 | 0 | NA |
| | 2017 Plan Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2017 ETRWPG Projections | 0 | 0 | 0 | 0 | 0 | 0 |

**Table 4**

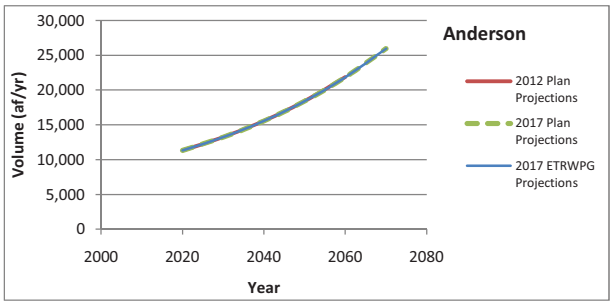
**Attachment 1**
**East Texas Regional Water Planning Area**
**Non-Municipal Water Demand Projections**
**Steam Electric Water Demands**

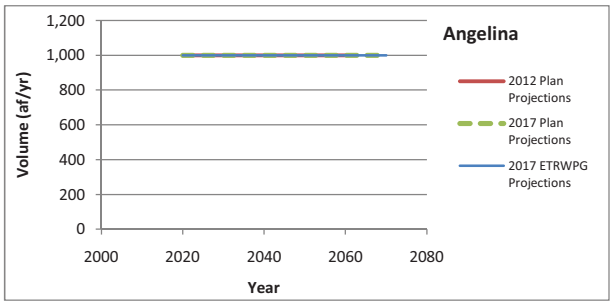
| County | State Water Plan Year | Volume (af/yr) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| Rusk | 2012 Plan Projections | 27,458 | 32,102 | 37,762 | 44,663 | 53,074 | NA |
| | 2017 Plan Projections | 27,458 | 32,102 | 37,762 | 44,663 | 53,074 | 63,069 |
| | 2017 ETRWPG Projections | 27,458 | 32,102 | 37,762 | 44,663 | 53,074 | 63,069 |
| Sabine | 2012 Plan Projections | 0 | 0 | 0 | 0 | 0 | NA |
| | 2017 Plan Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2017 ETRWPG Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| San Augustine | 2012 Plan Projections | 0 | 0 | 0 | 0 | 0 | NA |
| | 2017 Plan Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2017 ETRWPG Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| Shelby | 2012 Plan Projections | 0 | 0 | 0 | 0 | 0 | NA |
| | 2017 Plan Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2017 ETRWPG Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| Smith | 2012 Plan Projections | 0 | 0 | 0 | 0 | 0 | NA |
| | 2017 Plan Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2017 ETRWPG Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| Trinity | 2012 Plan Projections | 0 | 0 | 0 | 0 | 0 | NA |
| | 2017 Plan Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2017 ETRWPG Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| Tyler | 2012 Plan Projections | 0 | 0 | 0 | 0 | 0 | NA |
| | 2017 Plan Projections | 27 | 32 | 37 | 44 | 52 | 62 |
| | 2017 ETRWPG Projections | 1,029 | 1,029 | 1,029 | 1,029 | 1,029 | 1,029 |
| TOTAL | 2012 Plan Projections | 80,989 | 94,515 | 111,006 | 131,108 | 155,611 | NA |
| | 2017 Plan Projections | 81,016 | 94,547 | 111,043 | 131,152 | 155,663 | 183,747 |
| | 2017 ETRWPG Projections | 82,018 | 95,544 | 112,035 | 132,137 | 156,640 | 184,714 |

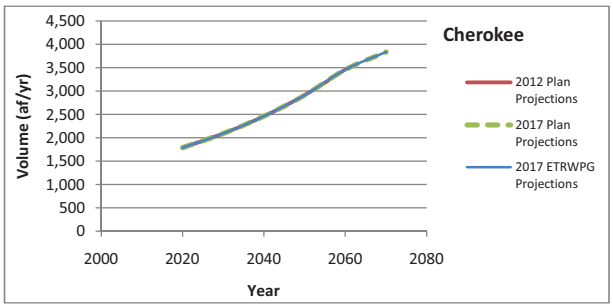
(1) 2012 Plan Projections are from the *2012 State Water Plan* and *2011 Update of the Regional Water Plan* in the East Texas Regional Water Planning Area (ETRWPA) or Region I

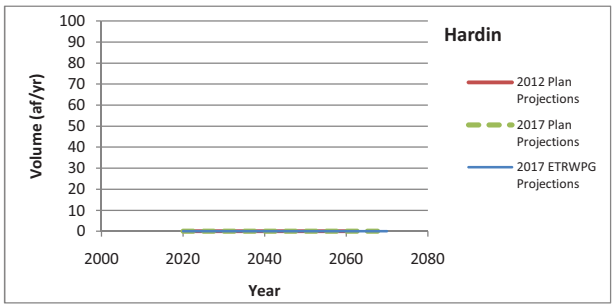
(2) 2017 Plan Projections are from the 2017 database (DB17) provided by the Texas Water Development Board

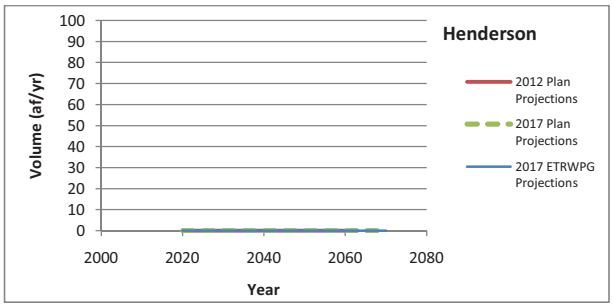
(3) 2017 ETRWPG Projections are those proposed by the East Texas Regional Water Planning Group (ETRWPG)

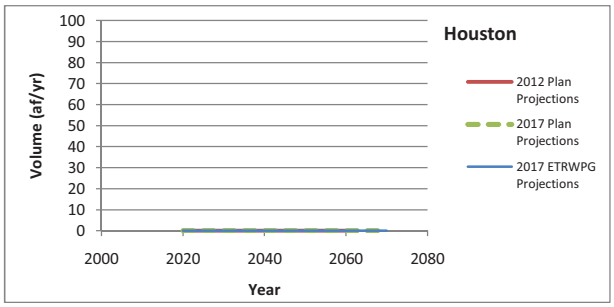


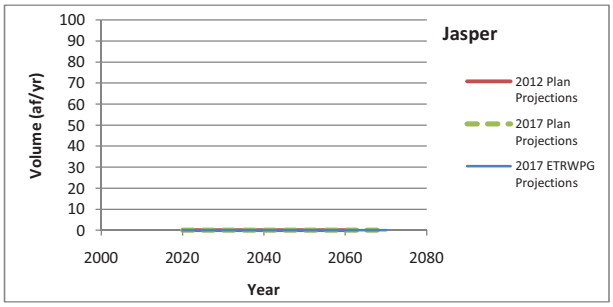



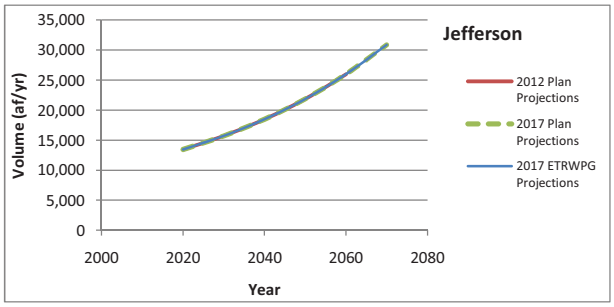



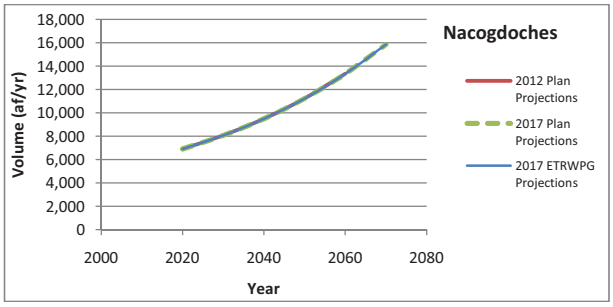



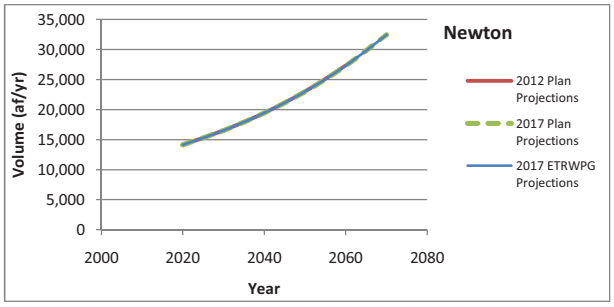
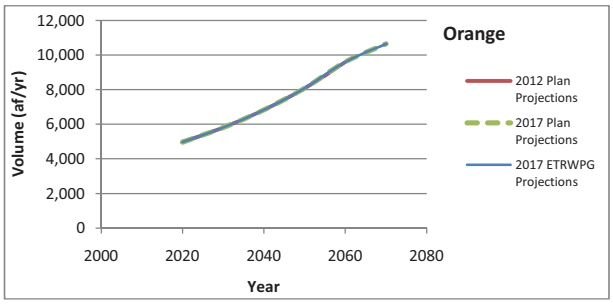
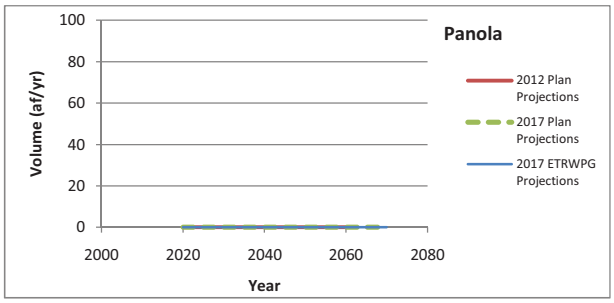
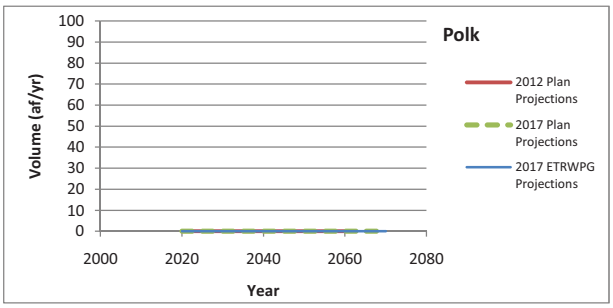



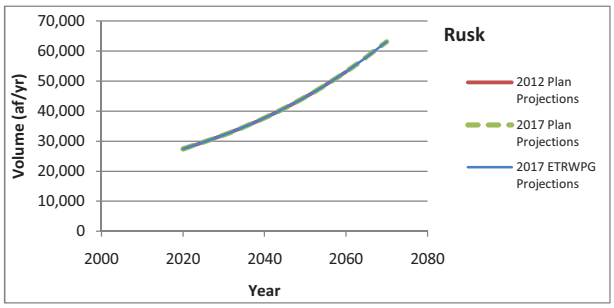

**Figure 4**

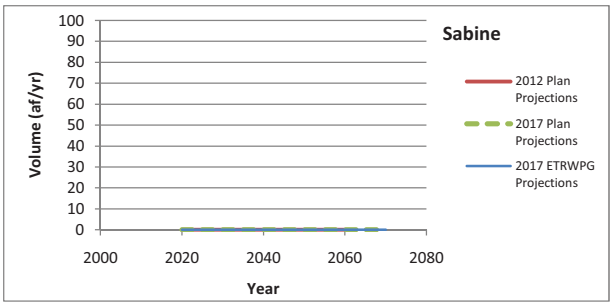
**Attachment 1**
**East Texas Regional Water Planning Area**
**Revised Non-Municipal Water Demands Projections**
**Steam Electric Water Demands**

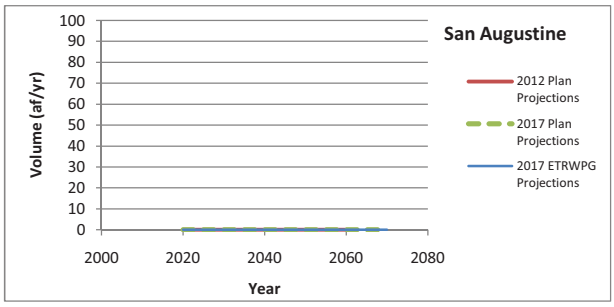


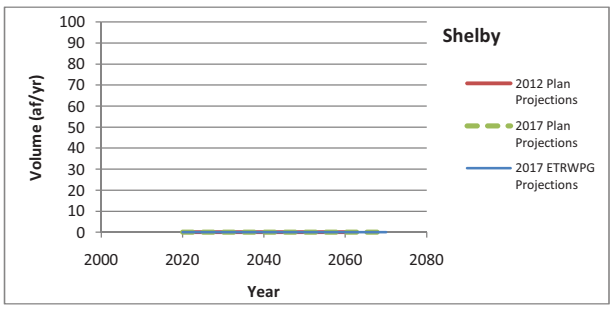



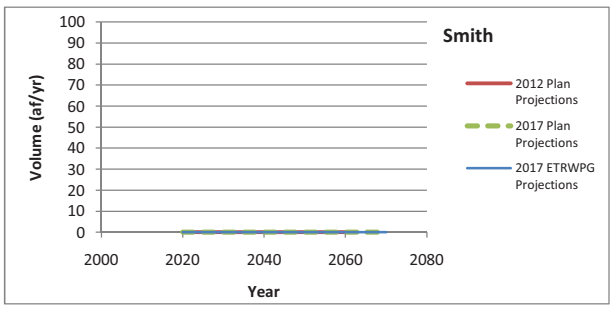



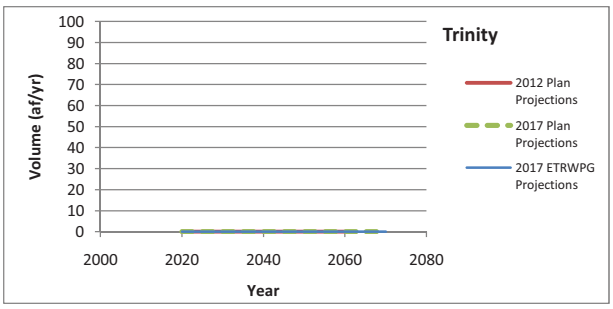



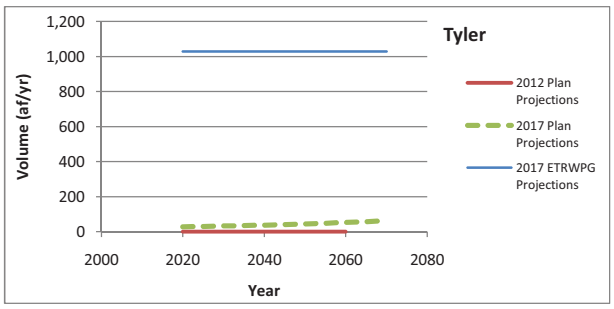




**Figure 4 (continued)**

**Attachment 1**
**East Texas Regional Water Planning Area**
**Revised Non-Municipal Water Demands Projections**
**Steam Electric Water Demands**

**Table 5**

**Attachment 1**
**East Texas Regional Water Planning Area**
**Non-Municipal Water Demand Projections**
**Livestock Water Demands**

| County | State Water Plan Year | Volume (af/yr) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| Anderson | 2012 Plan Projections[1] | 1,708 | 1,708 | 1,708 | 1,708 | 1,708 | NA |
| | 2017 Plan Projections[2] | 1,410 | 1,410 | 1,410 | 1,410 | 1,410 | 1,410 |
| | 2017 ETRWPG Projections[3] | 1,402 | 1,402 | 1,402 | 1,402 | 1,402 | 1,402 |
| Angelina | 2012 Plan Projections | 620 | 647 | 677 | 712 | 749 | NA |
| | 2017 Plan Projections | 434 | 434 | 434 | 434 | 434 | 434 |
| | 2017 ETRWPG Projections | 648 | 648 | 648 | 648 | 648 | 648 |
| Cherokee | 2012 Plan Projections | 1,765 | 1,765 | 1,765 | 1,765 | 1,765 | NA |
| | 2017 Plan Projections | 1,361 | 1,361 | 1,361 | 1,361 | 1,361 | 1,361 |
| | 2017 ETRWPG Projections | 1,681 | 1,681 | 1,681 | 1,681 | 1,681 | 1,681 |
| Hardin | 2012 Plan Projections | 156 | 156 | 156 | 156 | 156 | NA |
| | 2017 Plan Projections | 165 | 165 | 165 | 165 | 165 | 165 |
| | 2017 ETRWPG Projections | 163 | 163 | 163 | 163 | 163 | 163 |
| Henderson | 2012 Plan Projections | 2,594 | 2,594 | 2,594 | 2,594 | 2,594 | NA |
| | 2017 Plan Projections | 937 | 937 | 937 | 937 | 937 | 937 |
| | 2017 ETRWPG Projections | 1,253 | 1,253 | 1,253 | 1,253 | 1,253 | 1,253 |
| Houston | 2012 Plan Projections | 2,291 | 2,483 | 2,690 | 2,915 | 3,158 | NA |
| | 2017 Plan Projections | 1,772 | 1,921 | 2,081 | 2,255 | 2,443 | 2,684 |
| | 2017 ETRWPG Projections | 1,630 | 1,779 | 1,939 | 2,113 | 2,301 | 2,542 |
| Jasper | 2012 Plan Projections | 317 | 317 | 317 | 317 | 317 | NA |
| | 2017 Plan Projections | 392 | 392 | 392 | 392 | 392 | 392 |
| | 2017 ETRWPG Projections | 362 | 362 | 362 | 362 | 362 | 362 |
| Jefferson | 2012 Plan Projections | 807 | 807 | 807 | 807 | 807 | NA |
| | 2017 Plan Projections | 946 | 946 | 946 | 946 | 946 | 946 |
| | 2017 ETRWPG Projections | 943 | 943 | 943 | 943 | 943 | 943 |
| Nacogdoches | 2012 Plan Projections | 1,954 | 2,227 | 2,544 | 2,911 | 3,332 | NA |
| | 2017 Plan Projections | 1,380 | 1,573 | 1,797 | 2,056 | 2,353 | 2,795 |
| | 2017 ETRWPG Projections | 4,364 | 4,557 | 4,781 | 5,040 | 5,337 | 5,779 |
| Newton | 2012 Plan Projections | 110 | 110 | 110 | 110 | 110 | NA |
| | 2017 Plan Projections | 122 | 122 | 122 | 122 | 122 | 122 |
| | 2017 ETRWPG Projections | 121 | 121 | 121 | 121 | 121 | 121 |
| Orange | 2012 Plan Projections | 210 | 210 | 210 | 210 | 210 | NA |
| | 2017 Plan Projections | 209 | 209 | 209 | 209 | 209 | 209 |
| | 2017 ETRWPG Projections | 208 | 208 | 208 | 208 | 208 | 208 |
| Panola | 2012 Plan Projections | 3,096 | 3,096 | 3,096 | 3,096 | 3,096 | NA |
| | 2017 Plan Projections | 3,197 | 3,197 | 3,197 | 3,197 | 3,197 | 3,197 |
| | 2017 ETRWPG Projections | 1,480 | 1,480 | 1,480 | 1,480 | 1,480 | 1,480 |
| Polk | 2012 Plan Projections | 202 | 202 | 202 | 202 | 202 | NA |
| | 2017 Plan Projections | 215 | 215 | 215 | 215 | 215 | 215 |
| | 2017 ETRWPG Projections | 357 | 357 | 357 | 357 | 357 | 357 |

**Table 5**

**Attachment 1**
**East Texas Regional Water Planning Area**
**Non-Municipal Water Demand Projections**
**Livestock Water Demands**

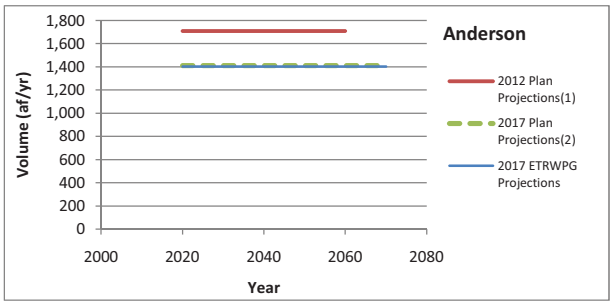
| County | State Water Plan Year | Volume (af/yr) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| Rusk | 2012 Plan Projections | 1,188 | 1,207 | 1,231 | 1,257 | 1,283 | NA |
| | 2017 Plan Projections | 1,067 | 1,084 | 1,106 | 1,129 | 1,152 | 1,152 |
| | 2017 ETRWPG Projections | 1,207 | 1,224 | 1,246 | 1,269 | 1,292 | 1,292 |
| Sabine | 2012 Plan Projections | 710 | 759 | 816 | 882 | 954 | NA |
| | 2017 Plan Projections | 843 | 901 | 969 | 1,047 | 1,132 | 1,132 |
| | 2017 ETRWPG Projections | 159 | 217 | 285 | 363 | 448 | 448 |
| San Augustine | 2012 Plan Projections | 1,082 | 1,173 | 1,278 | 1,400 | 1,534 | NA |
| | 2017 Plan Projections | 1,148 | 1,245 | 1,356 | 1,485 | 1,627 | 1,627 |
| | 2017 ETRWPG Projections | 903 | 1,000 | 1,111 | 1,240 | 1,382 | 1,382 |
| Shelby | 2012 Plan Projections | 5,176 | 6,310 | 7,691 | 9,376 | 11,430 | NA |
| | 2017 Plan Projections | 4,599 | 5,607 | 6,834 | 8,331 | 10,156 | 10,156 |
| | 2017 ETRWPG Projections | 5,265 | 6,273 | 7,500 | 8,997 | 10,822 | 10,822 |
| Smith | 2012 Plan Projections | 660 | 660 | 660 | 660 | 660 | NA |
| | 2017 Plan Projections | 673 | 673 | 673 | 673 | 673 | 673 |
| | 2017 ETRWPG Projections | 1,115 | 1,115 | 1,115 | 1,115 | 1,115 | 1,115 |
| Trinity | 2012 Plan Projections | 194 | 194 | 194 | 194 | 194 | NA |
| | 2017 Plan Projections | 230 | 230 | 230 | 230 | 230 | 230 |
| | 2017 ETRWPG Projections | 478 | 478 | 478 | 478 | 478 | 478 |
| Tyler | 2012 Plan Projections | 274 | 274 | 274 | 274 | 274 | NA |
| | 2017 Plan Projections | 289 | 289 | 289 | 289 | 289 | 289 |
| | 2017 ETRWPG Projections | 288 | 288 | 288 | 288 | 288 | 288 |
| TOTAL | 2012 Plan Projections | 25,114 | 26,899 | 29,020 | 31,546 | 34,533 | NA |
| | 2017 Plan Projections | 21,389 | 22,911 | 24,723 | 26,883 | 29,443 | 30,126 |
| | 2017 ETRWPG Projections | 24,027 | 25,549 | 27,361 | 29,521 | 32,081 | 32,764 |

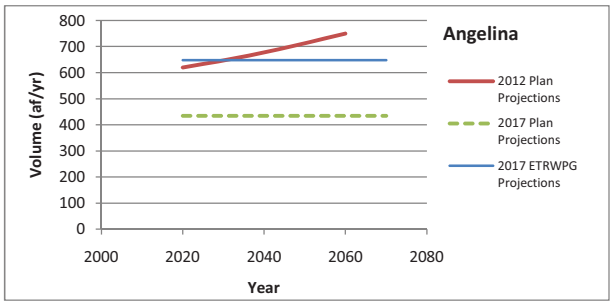
(1) 2012 Plan Projections are from the *2012 State Water Plan* and *2011 Update of the Regional Water Plan* in the East Texas Regional Water Planning Area (ETRWPA) or Region I

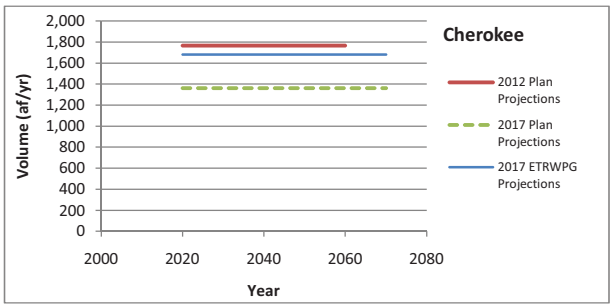
(2) 2017 Plan Projections are from the 2017 database (DB17) provided by the Texas Water Development Board

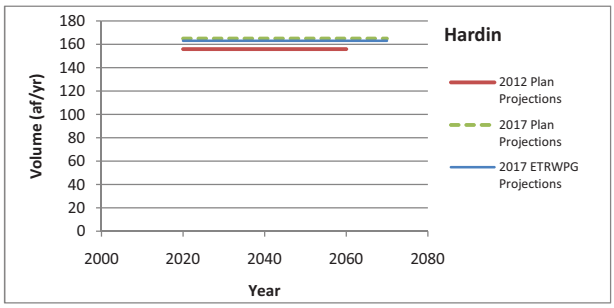
(3) 2017 ETRWPG Projections are those proposed by the East Texas Regional Water Planning Group (ETRWPG)

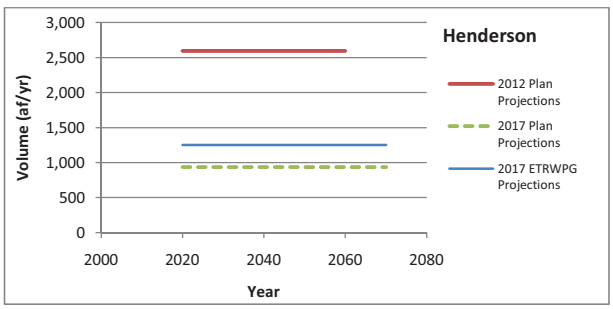
(4) NC denotes that no change is proposed from 2017 Plan Projections

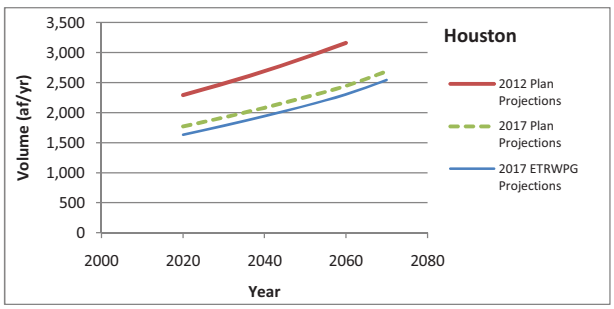


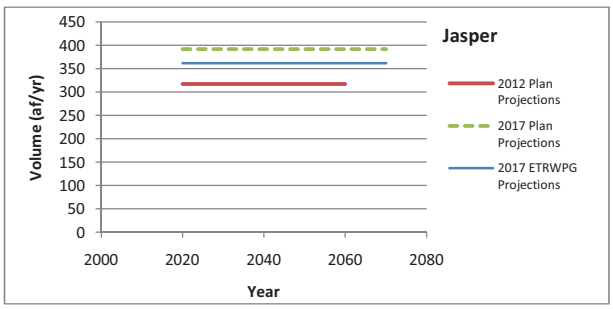



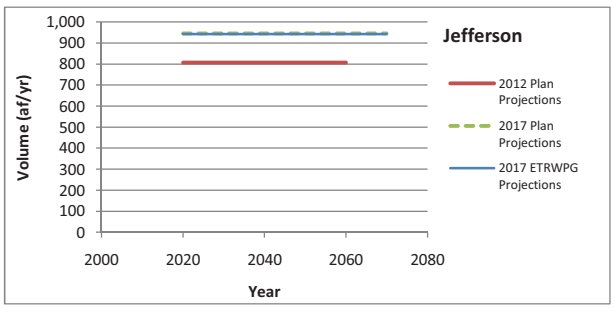



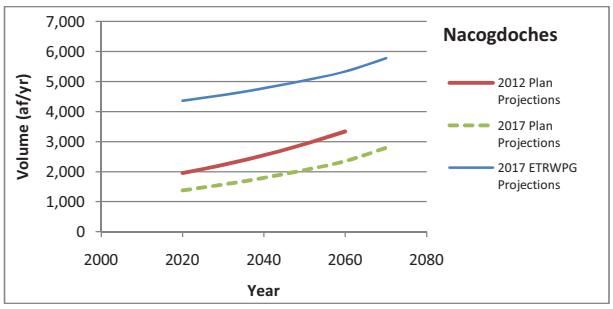



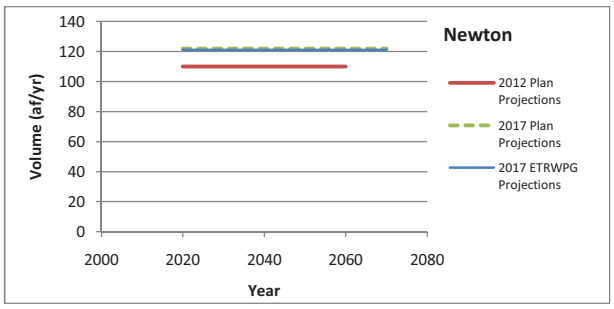
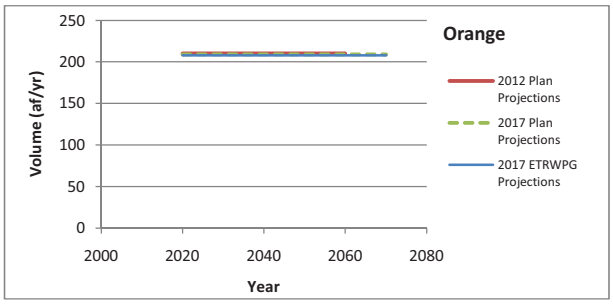
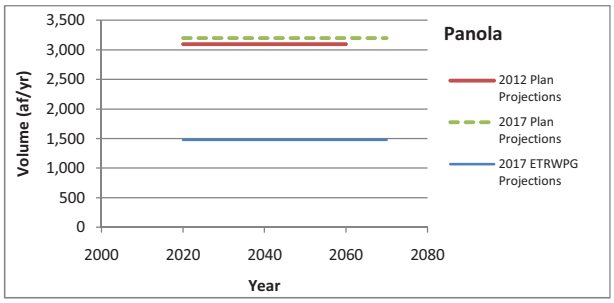
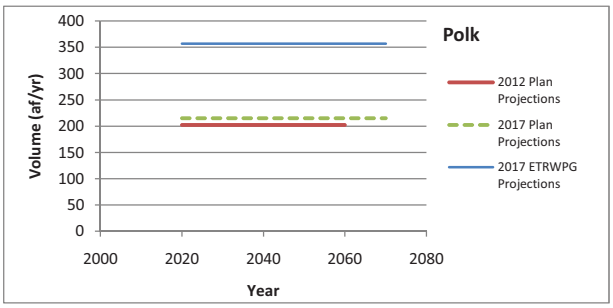



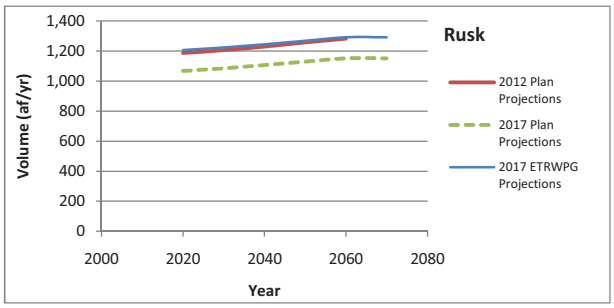

**Figure 5**

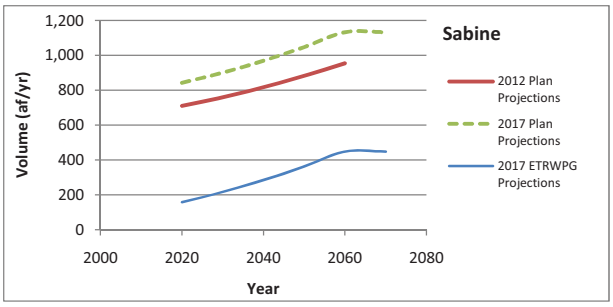
**Attachment 1**
**East Texas Regional Water Planning Area**
**Revised Non-Municipal Water Demands Projections**
**Livestock Water Demands**

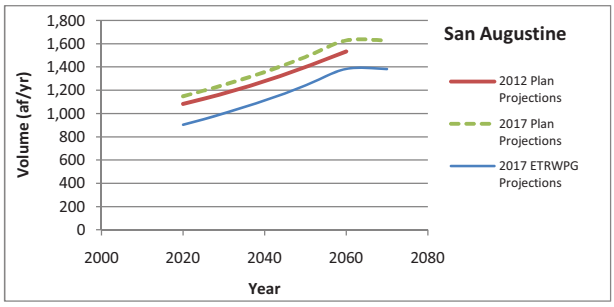


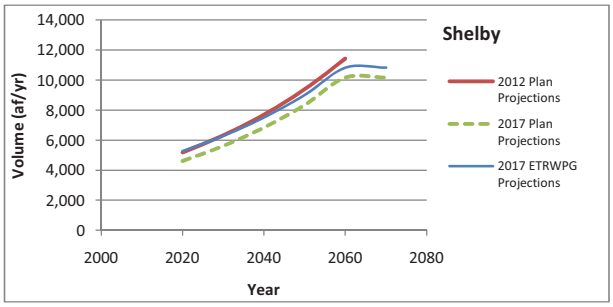



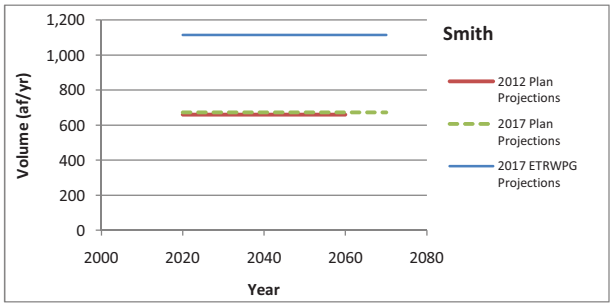



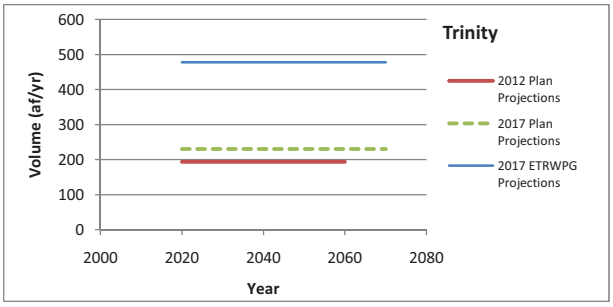



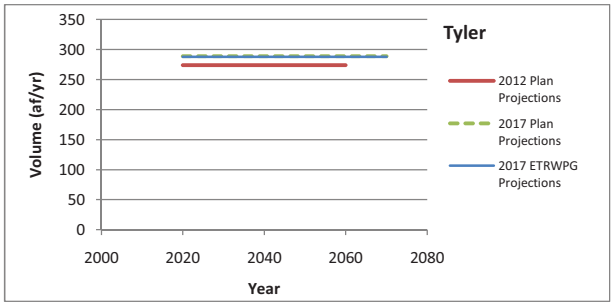




**Figure 5 (continued)**

**Attachment 1**
**East Texas Regional Water Planning Area**
**Revised Non-Municipal Water Demands Projections**
**Livestock Water Demands**

# Attachment 2
# Non-Municipal Water Demands Revisions on Tables Provided by the Texas Water Development Board

**Table 1**

**Attachment 2**
**East Texas Regional Water Planning Area**
**Revised Non-Municipal Water Demand Projections**
**Irrigation Water Demands**

| Draft Projections for 2017 Projections (af/yr) SWP | | | | | | |
|---|---|---|---|---|---|---|
| **County Name** | **2020** | **2030** | **2040** | **2050** | **2060** | **2070** |
| Anderson | 403 | 403 | 403 | 403 | 403 | 403 |
| Angelina | 294 | 294 | 294 | 294 | 294 | 294 |
| Cherokee | 294 | 294 | 294 | 294 | 294 | 294 |
| Hardin | 1,349 | 1,349 | 1,349 | 1,349 | 1,349 | 1,349 |
| Henderson | 284 | 284 | 284 | 284 | 284 | 284 |
| Houston | 2,333 | 2,579 | 2,847 | 3,145 | 3,474 | 3,922 |
| Jasper | 0 | 0 | 0 | 0 | 0 | 0 |
| Jefferson | 82,814 | 82,814 | 82,814 | 82,814 | 82,814 | 82,814 |
| Nacogdoches | 330 | 330 | 330 | 330 | 330 | 330 |
| Newton | 0 | 0 | 0 | 0 | 0 | 0 |
| Orange | 0 | 0 | 0 | 0 | 0 | 0 |
| Panola | 31 | 31 | 31 | 31 | 31 | 31 |
| Polk | 259 | 259 | 259 | 259 | 259 | 259 |
| Rusk | 0 | 0 | 0 | 0 | 0 | 0 |
| Sabine | 0 | 0 | 0 | 0 | 0 | 0 |
| San Augustine | 0 | 0 | 0 | 0 | 0 | 0 |
| Shelby | 0 | 0 | 0 | 0 | 0 | 0 |
| Smith | 610 | 642 | 674 | 707 | 742 | 783 |
| Trinity | 0 | 0 | 0 | 0 | 0 | 0 |
| Tyler | 374 | 374 | 374 | 374 | 374 | 374 |
| Total | 89,375 | 89,653 | 89,953 | 90,284 | 90,648 | 91,137 |

| 2012 Projection (af/yr) SWP Projections | | | | | | |
|---|---|---|---|---|---|---|
| **County Name** | **2020** | **2030** | **2040** | **2050** | **2060** | **2070** |
| Anderson | 212 | 212 | 212 | 212 | 212 | NA |
| Angelina | 30 | 30 | 30 | 30 | 30 | NA |
| Cherokee | 321 | 321 | 321 | 321 | 321 | NA |
| Hardin | 3,502 | 3,502 | 3,502 | 3,502 | 3,502 | NA |
| Henderson | 10 | 10 | 10 | 10 | 10 | NA |
| Houston | 3,024 | 3,343 | 3,691 | 4,077 | 4,503 | NA |
| Jasper | 0 | 0 | 0 | 0 | 0 | NA |
| Jefferson | 140,000 | 140,000 | 140,000 | 140,000 | 140,000 | NA |
| Nacogdoches | 302 | 302 | 302 | 302 | 302 | NA |
| Newton | 367 | 367 | 367 | 367 | 367 | NA |
| Orange | 2,509 | 2,509 | 2,509 | 2,509 | 2,509 | NA |
| Panola | 0 | 0 | 0 | 0 | 0 | NA |
| Polk | 135 | 135 | 135 | 135 | 135 | NA |
| Rusk | 126 | 126 | 126 | 126 | 126 | NA |
| Sabine | 0 | 0 | 0 | 0 | 0 | NA |
| San Augustine | 225 | 225 | 225 | 225 | 225 | NA |
| Shelby | 30 | 34 | 37 | 41 | 46 | NA |
| Smith | 595 | 626 | 657 | 689 | 723 | NA |
| Trinity | 0 | 0 | 0 | 0 | 0 | NA |
| Tyler | 29 | 29 | 29 | 29 | 29 | NA |
| Total | 151,417 | 151,771 | 152,153 | 152,575 | 153,040 | NA |

**Table 1 (continued)**

**Attachment 2**
**East Texas Regional Water Planning Area**
**Revised Non-Municipal Water Demand Projections**
**Irrigation Water Demands**

| | RWPG Revisions | | | | | | |
|---|---|---|---|---|---|---|---|
| County Name | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 | RWPG Comments |
| Anderson | 462 | 462 | 462 | 462 | 462 | 462 | See Attachment 3 |
| Angelina | 481 | 481 | 481 | 481 | 481 | 481 | See Attachment 3 |
| Cherokee | 355 | 355 | 355 | 355 | 355 | 355 | See Attachment 3 |
| Hardin | 3,414 | 3,645 | 3,804 | 3,861 | 3,802 | 3,712 | See Attachment 4 |
| Henderson | 384 | 384 | 384 | 384 | 384 | 384 | See Attachment 3 |
| Houston | 2,989 | 3,235 | 3,503 | 3,801 | 4,130 | 4,578 | See Attachment 3 |
| Jasper | 36 | 36 | 36 | 36 | 36 | 36 | See Attachment 3 |
| Jefferson | 161,952 | 171,165 | 177,490 | 179,735 | 177,394 | 173,833 | See Attachments 4 & 5 |
| Nacogdoches | 400 | 400 | 400 | 400 | 400 | 400 | See Attachment 3 |
| Newton | 375 | 375 | 375 | 375 | 375 | 375 | See Attachment 3 |
| Orange | 3,730 | 3,983 | 4,156 | 4,218 | 4,153 | 4,056 | See Attachment 4 |
| Panola | 64 | 64 | 64 | 64 | 64 | 64 | See Attachment 3 |
| Polk | 428 | 428 | 428 | 428 | 428 | 428 | See Attachment 3 |
| Rusk | 100 | 100 | 100 | 100 | 100 | 100 | See Attachment 3 |
| Sabine | 0 | 0 | 0 | 0 | 0 | 0 | No Changes |
| San Augustine | 62 | 62 | 62 | 62 | 62 | 62 | See Attachment 3 |
| Shelby | 26 | 26 | 26 | 26 | 26 | 26 | See Attachment 3 |
| Smith | 1,486 | 1,518 | 1,550 | 1,583 | 1,618 | 1,659 | See Attachment 3 |
| Trinity | 500 | 500 | 500 | 500 | 500 | 500 | See Attachment 3 |
| Tyler | 675 | 675 | 675 | 675 | 675 | 675 | See Attachment 3 |
| Total | 177,919 | 187,894 | 194,851 | 197,546 | 195,445 | 192,186 | |

**Table 2**

**Attachment 2**
**East Texas Regional Water Planning Area**
**Revised Non-Municipal Water Demand Projections**
**Manufacturing Water Demands**

| Draft Projections for 2017 Projections (af/yr) SWP | | | | | | |
|---|---|---|---|---|---|---|
| **County Name** | **2020** | **2030** | **2040** | **2050** | **2060** | **2070** |
| Anderson | 30 | 40 | 42 | 44 | 46 | 48 |
| Angelina | 15,249 | 16,858 | 18,487 | 19,934 | 21,478 | 23,142 |
| Cherokee | 413 | 442 | 469 | 492 | 530 | 571 |
| Hardin | 288 | 318 | 349 | 377 | 407 | 439 |
| Henderson | 54 | 62 | 70 | 78 | 86 | 95 |
| Houston | 307 | 338 | 367 | 393 | 425 | 460 |
| Jasper | 91,580 | 94,982 | 97,956 | 100,186 | 100,271 | 100,356 |
| Jefferson | 423,258 | 603,321 | 629,171 | 655,034 | 680,914 | 707,817 |
| Nacogdoches | 2,564 | 2,798 | 3,029 | 3,228 | 3,483 | 3,758 |
| Newton | 568 | 644 | 721 | 791 | 858 | 931 |
| Orange | 64,461 | 70,439 | 76,399 | 81,690 | 87,641 | 94,026 |
| Panola | 1,393 | 1,454 | 1,513 | 1,564 | 1,667 | 1,777 |
| Polk | 604 | 687 | 774 | 854 | 924 | 1,000 |
| Rusk | 317 | 342 | 363 | 381 | 409 | 439 |
| Sabine | 467 | 536 | 606 | 668 | 724 | 785 |
| San Augustine | 8 | 9 | 10 | 11 | 12 | 13 |
| Shelby | 1,510 | 1,639 | 1,768 | 1,882 | 2,021 | 2,170 |
| Smith | 5,120 | 5,597 | 6,055 | 6,443 | 6,976 | 7,553 |
| Trinity | 0 | 0 | 0 | 0 | 0 | 0 |
| Tyler | 46 | 53 | 60 | 66 | 71 | 76 |
| Total | 608,237 | 800,559 | 838,209 | 874,116 | 908,943 | 945,456 |

| 2012 SWP Projections | | | | | | |
|---|---|---|---|---|---|---|
| **County Name** | **2020** | **2030** | **2040** | **2050** | **2060** | |
| Anderson | 0 | 0 | 0 | 0 | 0 | NA |
| Angelina | 23,500 | 25,980 | 28,490 | 30,720 | 33,100 | NA |
| Cherokee | 784 | 839 | 891 | 934 | 1,007 | NA |
| Hardin | 165 | 182 | 200 | 216 | 233 | NA |
| Henderson | 14 | 16 | 18 | 20 | 22 | NA |
| Houston | 190 | 209 | 227 | 243 | 263 | NA |
| Jasper | 67,649 | 70,162 | 72,359 | 74,006 | 74,069 | NA |
| Jefferson | 423,258 | 603,321 | 629,171 | 655,034 | 680,914 | NA |
| Nacogdoches | 2,553 | 2,786 | 3,016 | 3,214 | 3,468 | NA |
| Newton | 793 | 899 | 1,006 | 1,103 | 1,196 | NA |
| Orange | 64,461 | 70,439 | 76,399 | 81,690 | 87,641 | NA |
| Panola | 1,437 | 1,500 | 1,561 | 1,614 | 1,720 | NA |
| Polk | 725 | 825 | 930 | 1,026 | 1,110 | NA |
| Rusk | 90 | 97 | 103 | 108 | 116 | NA |
| Sabine | 427 | 490 | 554 | 611 | 662 | NA |
| San Augustine | 7 | 8 | 9 | 10 | 11 | NA |
| Shelby | 1,508 | 1,637 | 1,766 | 1,880 | 2,019 | NA |
| Smith | 4,297 | 4,697 | 5,081 | 5,407 | 5,854 | NA |
| Trinity | 0 | 0 | 0 | 0 | 0 | NA |
| Tyler | 46 | 53 | 60 | 66 | 71 | NA |
| Total | 591,904 | 784,140 | 821,841 | 857,902 | 893,476 | NA |

**Table 2 (continued)**

**Attachment 2**
**East Texas Regional Water Planning Area**
**Revised Non-Municipal Water Demand Projections**
**Manufacturing Water Demands**

| RWPG Revisions | | | | | | | |
|---|---|---|---|---|---|---|---|
| **County Name** | **2020** | **2030** | **2040** | **2050** | **2060** | **2070** | **RWPG Comments** |
| Anderson | 30 | 40 | 42 | 44 | 46 | 48 | No Changes |
| Angelina | 15,249 | 16,858 | 18,487 | 19,934 | 21,478 | 23,142 | No Changes |
| Cherokee | 413 | 442 | 469 | 492 | 530 | 571 | No Changes |
| Hardin | 288 | 318 | 349 | 377 | 407 | 439 | No Changes |
| Henderson | 54 | 62 | 70 | 78 | 86 | 95 | No Changes |
| Houston | 307 | 338 | 367 | 393 | 425 | 460 | No Changes |
| Jasper | 91,580 | 94,982 | 97,956 | 100,186 | 100,271 | 100,356 | No Changes |
| Jefferson | 423,258 | 603,321 | 629,171 | 655,034 | 680,914 | 707,817 | No Changes |
| Nacogdoches | 2,564 | 2,798 | 3,029 | 3,228 | 3,483 | 3,758 | No Changes |
| Newton | 568 | 644 | 721 | 791 | 858 | 931 | No Changes |
| Orange | 64,461 | 70,439 | 76,399 | 81,690 | 87,641 | 94,026 | No Changes |
| Panola | 1,393 | 1,454 | 1,513 | 1,564 | 1,667 | 1,777 | No Changes |
| Polk | 604 | 687 | 774 | 854 | 924 | 1,000 | No Changes |
| Rusk | 317 | 342 | 363 | 381 | 409 | 439 | No Changes |
| Sabine | 467 | 536 | 606 | 668 | 724 | 785 | No Changes |
| San Augustine | 8 | 9 | 10 | 11 | 12 | 13 | No Changes |
| Shelby | 1,510 | 1,639 | 1,768 | 1,882 | 2,021 | 2,170 | No Changes |
| Smith | 5,120 | 5,597 | 6,055 | 6,443 | 6,976 | 7,553 | No Changes |
| Trinity | 0 | 0 | 0 | 0 | 0 | 0 | No Changes |
| Tyler | 476 | 483 | 490 | 496 | 501 | 506 | See Attachment 6 |
| Total | 608,667 | 800,989 | 838,639 | 874,546 | 909,373 | 945,886 | |

**Table 3**

**Attachment 2**
**East Texas Regional Water Planning Area**
**Revised Non-Municipal Water Demand Projections**
**Mining Water Demands**

| Draft Projections for 2017 Projections (af/yr) SWP | | | | | | |
|---|---|---|---|---|---|---|
| **County Name** | **2020** | **2030** | **2040** | **2050** | **2060** | **2070** |
| Anderson | 70 | 105 | 83 | 58 | 32 | 23 |
| Angelina | 486 | 585 | 410 | 236 | 63 | 28 |
| Cherokee | 295 | 304 | 203 | 104 | 15 | 15 |
| Hardin | 12 | 12 | 12 | 12 | 12 | 12 |
| Henderson | 77 | 86 | 59 | 34 | 8 | 4 |
| Houston | 17 | 17 | 17 | 17 | 17 | 17 |
| Jasper | 13 | 13 | 13 | 13 | 13 | 13 |
| Jefferson | 194 | 216 | 243 | 294 | 328 | 368 |
| Nacogdoches | 4,612 | 3,597 | 2,435 | 1,275 | 127 | 57 |
| Newton | 269 | 248 | 190 | 155 | 128 | 106 |
| Orange | 309 | 314 | 313 | 314 | 319 | 327 |
| Panola | 3,944 | 3,906 | 3,366 | 2,845 | 2,413 | 2,625 |
| Polk | 7 | 7 | 7 | 7 | 7 | 7 |
| Rusk | 4,410 | 4,314 | 3,745 | 3,196 | 2,686 | 2,921 |
| Sabine | 2,695 | 2,175 | 1,597 | 1,022 | 448 | 425 |
| San Augustine | 3,167 | 2,254 | 1,513 | 773 | 76 | 34 |
| Shelby | 4,745 | 3,482 | 2,341 | 1,203 | 127 | 52 |
| Smith | 134 | 139 | 99 | 60 | 20 | 14 |
| Trinity | 5 | 5 | 5 | 5 | 5 | 5 |
| Tyler | 13 | 13 | 13 | 13 | 13 | 13 |
| Total | 25,474 | 21,792 | 16,664 | 11,636 | 6,857 | 7,066 |

| 2012 SWP Projections | | | | | | |
|---|---|---|---|---|---|---|
| **County Name** | **2020** | **2030** | **2040** | **2050** | **2060** | **2070** |
| Anderson | 557 | 583 | 608 | 633 | 657 | NA |
| Angelina | 4,017 | 17 | 17 | 17 | 17 | NA |
| Cherokee | 1,597 | 99 | 101 | 103 | 105 | NA |
| Hardin | 8,648 | 9,219 | 9,788 | 10,361 | 10,798 | NA |
| Henderson | 14 | 14 | 14 | 14 | 14 | NA |
| Houston | 160 | 158 | 156 | 154 | 153 | NA |
| Jasper | 4 | 4 | 4 | 4 | 4 | NA |
| Jefferson | 334 | 341 | 348 | 355 | 360 | NA |
| Nacogdoches | 7,213 | 212 | 211 | 210 | 209 | NA |
| Newton | 32 | 32 | 32 | 32 | 32 | NA |
| Orange | 9 | 9 | 9 | 9 | 9 | NA |
| Panola | 4,271 | 4,587 | 4,905 | 5,228 | 5,536 | NA |
| Polk | 0 | 0 | 0 | 0 | 0 | NA |
| Rusk | 1,679 | 1,761 | 1,841 | 1,921 | 1,996 | NA |
| Sabine | 0 | 0 | 0 | 0 | 0 | NA |
| San Augustine | 7,000 | 0 | 0 | 0 | 0 | NA |
| Shelby | 1,500 | 0 | 0 | 0 | 0 | NA |
| Smith | 262 | 295 | 351 | 391 | 424 | NA |
| Trinity | 0 | 0 | 0 | 0 | 0 | NA |
| Tyler | 0 | 0 | 0 | 0 | 0 | NA |
| Total | 37,297 | 17,331 | 18,385 | 19,432 | 20,314 | NA |

**Table 3 (continued)**

**Attachment 2**
**East Texas Regional Water Planning Area**
**Revised Non-Municipal Water Demand Projections**
**Mining Water Demands**

| RWPG Revisions | | | | | | | |
|---|---|---|---|---|---|---|---|
| **County Name** | **2020** | **2030** | **2040** | **2050** | **2060** | **2070** | **RWPG Comments** |
| Anderson | 70 | 105 | 83 | 58 | 32 | 23 | No Changes |
| Angelina | 486 | 585 | 410 | 236 | 63 | 28 | No Changes |
| Cherokee | 295 | 304 | 203 | 104 | 15 | 15 | No Changes |
| Hardin | 12 | 12 | 12 | 12 | 12 | 12 | No Changes |
| Henderson | 77 | 86 | 59 | 34 | 8 | 4 | No Changes |
| Houston | 17 | 17 | 17 | 17 | 17 | 17 | No Changes |
| Jasper | 13 | 13 | 13 | 13 | 13 | 13 | No Changes |
| Jefferson | 194 | 216 | 243 | 294 | 328 | 368 | No Changes |
| Nacogdoches | 7,000 | 4,500 | 0 | 0 | 0 | 0 | See Attachment 7 |
| Newton | 269 | 248 | 190 | 155 | 128 | 106 | No Changes |
| Orange | 309 | 314 | 313 | 314 | 319 | 327 | No Changes |
| Panola | 5,916 | 5,859 | 5,049 | 4,268 | 3,620 | 3,938 | Per Request from Leah Adams, GM of Panola County GCD |
| Polk | 7 | 7 | 7 | 7 | 7 | 7 | No Changes |
| Rusk | 1,000 | 500 | 0 | 0 | 0 | 0 | See Attachment 7 |
| Sabine | 1,500 | 1,000 | 0 | 0 | 0 | 0 | See Attachment 7 |
| San Augustine | 4,000 | 3,000 | 0 | 0 | 0 | 0 | See Attachment 7 |
| Shelby | 1,500 | 1,000 | 0 | 0 | 0 | 0 | See Attachment 7 |
| Smith | 134 | 139 | 99 | 60 | 20 | 14 | No Changes |
| Trinity | 5 | 5 | 5 | 5 | 5 | 5 | No Changes |
| Tyler | 13 | 13 | 13 | 13 | 13 | 13 | No Changes |
| Total | 22,817 | 17,923 | 6,716 | 5,590 | 4,600 | 4,890 | |

**Table 4**

**Attachment 2**
**East Texas Regional Water Planning Area**
**Revised Non-Municipal Water Demand Projections**
**Steam Electric Water Demands**

| Draft Projections for 2017 Projections (af/yr) SWP | | | | | | |
|---|---|---|---|---|---|---|
| **County Name** | **2020** | **2030** | **2040** | **2050** | **2060** | **2070** |
| Anderson | 11,306 | 13,218 | 15,549 | 18,390 | 21,853 | 25,968 |
| Angelina | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 |
| Cherokee | 1,790 | 2,093 | 2,462 | 2,912 | 3,460 | 3,835 |
| Hardin | 0 | 0 | 0 | 0 | 0 | 0 |
| Henderson | 0 | 0 | 0 | 0 | 0 | 0 |
| Houston | 0 | 0 | 0 | 0 | 0 | 0 |
| Jasper | 0 | 0 | 0 | 0 | 0 | 0 |
| Jefferson | 13,426 | 15,696 | 18,464 | 21,838 | 25,951 | 30,839 |
| Nacogdoches | 6,911 | 8,079 | 9,504 | 11,241 | 13,358 | 15,874 |
| Newton | 14,132 | 16,522 | 19,436 | 22,987 | 27,317 | 32,463 |
| Orange | 4,966 | 5,805 | 6,829 | 8,077 | 9,598 | 10,637 |
| Panola | 0 | 0 | 0 | 0 | 0 | 0 |
| Polk | 0 | 0 | 0 | 0 | 0 | 0 |
| Rusk | 27,458 | 32,102 | 37,762 | 44,663 | 53,074 | 63,069 |
| Sabine | 0 | 0 | 0 | 0 | 0 | 0 |
| San Augustine | 0 | 0 | 0 | 0 | 0 | 0 |
| Shelby | 0 | 0 | 0 | 0 | 0 | 0 |
| Smith | 0 | 0 | 0 | 0 | 0 | 0 |
| Trinity | 0 | 0 | 0 | 0 | 0 | 0 |
| Tyler | 27 | 32 | 37 | 44 | 52 | 62 |
| Total | 81,016 | 94,547 | 111,043 | 131,152 | 155,663 | 183,747 |

| 2012 SWP Projections | | | | | | |
|---|---|---|---|---|---|---|
| **County Name** | **2020** | **2030** | **2040** | **2050** | **2060** | **2070** |
| Anderson | 11,306 | 13,218 | 15,549 | 18,390 | 21,853 | NA |
| Angelina | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | NA |
| Cherokee | 1,790 | 2,093 | 2,462 | 2,912 | 3,460 | NA |
| Hardin | 0 | 0 | 0 | 0 | 0 | NA |
| Henderson | 0 | 0 | 0 | 0 | 0 | NA |
| Houston | 0 | 0 | 0 | 0 | 0 | NA |
| Jasper | 0 | 0 | 0 | 0 | 0 | NA |
| Jefferson | 13,426 | 15,696 | 18,464 | 21,838 | 25,951 | NA |
| Nacogdoches | 6,911 | 8,079 | 9,504 | 11,241 | 13,358 | NA |
| Newton | 14,132 | 16,522 | 19,436 | 22,987 | 27,317 | NA |
| Orange | 4,966 | 5,805 | 6,829 | 8,077 | 9,598 | NA |
| Panola | 0 | 0 | 0 | 0 | 0 | NA |
| Polk | 0 | 0 | 0 | 0 | 0 | NA |
| Rusk | 27,458 | 32,102 | 37,762 | 44,663 | 53,074 | NA |
| Sabine | 0 | 0 | 0 | 0 | 0 | NA |
| San Augustine | 0 | 0 | 0 | 0 | 0 | NA |
| Shelby | 0 | 0 | 0 | 0 | 0 | NA |
| Smith | 0 | 0 | 0 | 0 | 0 | NA |
| Trinity | 0 | 0 | 0 | 0 | 0 | NA |
| Tyler | 0 | 0 | 0 | 0 | 0 | NA |
| Total | 80,989 | 94,515 | 111,006 | 131,108 | 155,611 | NA |

**Table 4 (continued)**

**Attachment 2**
**East Texas Regional Water Planning Area**
**Revised Non-Municipal Water Demand Projections**
**Steam Electric Water Demands**

| RWPG Revisions | | | | | | | RWPG Comments |
|---|---|---|---|---|---|---|---|
| County Name | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 | |
| Anderson | 11,306 | 13,218 | 15,549 | 18,390 | 21,853 | 25,968 | No Changes |
| Angelina | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | No Changes |
| Cherokee | 1,790 | 2,093 | 2,462 | 2,912 | 3,460 | 3,835 | No Changes |
| Hardin | 0 | 0 | 0 | 0 | 0 | 0 | No Changes |
| Henderson | 0 | 0 | 0 | 0 | 0 | 0 | No Changes |
| Houston | 0 | 0 | 0 | 0 | 0 | 0 | No Changes |
| Jasper | 0 | 0 | 0 | 0 | 0 | 0 | No Changes |
| Jefferson | 13,426 | 15,696 | 18,464 | 21,838 | 25,951 | 30,839 | No Changes |
| Nacogdoches | 6,911 | 8,079 | 9,504 | 11,241 | 13,358 | 15,874 | No Changes |
| Newton | 14,132 | 16,522 | 19,436 | 22,987 | 27,317 | 32,463 | No Changes |
| Orange | 4,966 | 5,805 | 6,829 | 8,077 | 9,598 | 10,637 | No Changes |
| Panola | 0 | 0 | 0 | 0 | 0 | 0 | No Changes |
| Polk | 0 | 0 | 0 | 0 | 0 | 0 | No Changes |
| Rusk | 27,458 | 32,102 | 37,762 | 44,663 | 53,074 | 63,069 | No Changes |
| Sabine | 0 | 0 | 0 | 0 | 0 | 0 | No Changes |
| San Augustine | 0 | 0 | 0 | 0 | 0 | 0 | No Changes |
| Shelby | 0 | 0 | 0 | 0 | 0 | 0 | No Changes |
| Smith | 0 | 0 | 0 | 0 | 0 | 0 | No Changes |
| Trinity | 0 | 0 | 0 | 0 | 0 | 0 | No Changes |
| Tyler | 1,029 | 1,029 | 1,029 | 1,029 | 1,029 | 1,029 | See Attachment 6 |
| Total | 82,018 | 95,544 | 112,035 | 132,137 | 156,640 | 184,714 | |

**Table 5**

**Attachment 2**
**East Texas Regional Water Planning Area**
**Revised Non-Municipal Water Demand Projections**
**Livestock Water Demands**

| Draft Projections for 2017 Projections (af/yr) SWP | | | | | | |
|---|---|---|---|---|---|---|
| **County Name** | **2020** | **2030** | **2040** | **2050** | **2060** | **2070** |
| Anderson | 1,410 | 1,410 | 1,410 | 1,410 | 1,410 | 1,410 |
| Angelina | 434 | 434 | 434 | 434 | 434 | 434 |
| Cherokee | 1,361 | 1,361 | 1,361 | 1,361 | 1,361 | 1,361 |
| Hardin | 165 | 165 | 165 | 165 | 165 | 165 |
| Henderson | 937 | 937 | 937 | 937 | 937 | 937 |
| Houston | 1,772 | 1,921 | 2,081 | 2,255 | 2,443 | 2,684 |
| Jasper | 392 | 392 | 392 | 392 | 392 | 392 |
| Jefferson | 946 | 946 | 946 | 946 | 946 | 946 |
| Nacogdoches | 1,380 | 1,573 | 1,797 | 2,056 | 2,353 | 2,795 |
| Newton | 122 | 122 | 122 | 122 | 122 | 122 |
| Orange | 209 | 209 | 209 | 209 | 209 | 209 |
| Panola | 3,197 | 3,197 | 3,197 | 3,197 | 3,197 | 3,197 |
| Polk | 215 | 215 | 215 | 215 | 215 | 215 |
| Rusk | 1,067 | 1,084 | 1,106 | 1,129 | 1,152 | 1,152 |
| Sabine | 843 | 901 | 969 | 1,047 | 1,132 | 1,132 |
| San Augustine | 1,148 | 1,245 | 1,356 | 1,485 | 1,627 | 1,627 |
| Shelby | 4,599 | 5,607 | 6,834 | 8,331 | 10,156 | 10,156 |
| Smith | 673 | 673 | 673 | 673 | 673 | 673 |
| Trinity | 230 | 230 | 230 | 230 | 230 | 230 |
| Tyler | 289 | 289 | 289 | 289 | 289 | 289 |
| Total | 21,389 | 22,911 | 24,723 | 26,883 | 29,443 | 30,126 |

| 2012 SWP Projections | | | | | | |
|---|---|---|---|---|---|---|
| **County Name** | **2020** | **2030** | **2040** | **2050** | **2060** | **2070** |
| Anderson | 1,708 | 1,708 | 1,708 | 1,708 | 1,708 | NA |
| Angelina | 620 | 647 | 677 | 712 | 749 | NA |
| Cherokee | 1,765 | 1,765 | 1,765 | 1,765 | 1,765 | NA |
| Hardin | 156 | 156 | 156 | 156 | 156 | NA |
| Henderson | 2,594 | 2,594 | 2,594 | 2,594 | 2,594 | NA |
| Houston | 2,291 | 2,483 | 2,690 | 2,915 | 3,158 | NA |
| Jasper | 317 | 317 | 317 | 317 | 317 | NA |
| Jefferson | 807 | 807 | 807 | 807 | 807 | NA |
| Nacogdoches | 1,954 | 2,227 | 2,544 | 2,911 | 3,332 | NA |
| Newton | 110 | 110 | 110 | 110 | 110 | NA |
| Orange | 210 | 210 | 210 | 210 | 210 | NA |
| Panola | 3,096 | 3,096 | 3,096 | 3,096 | 3,096 | NA |
| Polk | 202 | 202 | 202 | 202 | 202 | NA |
| Rusk | 1,188 | 1,207 | 1,231 | 1,257 | 1,283 | NA |
| Sabine | 710 | 759 | 816 | 882 | 954 | NA |
| San Augustine | 1,082 | 1,173 | 1,278 | 1,400 | 1,534 | NA |
| Shelby | 5,176 | 6,310 | 7,691 | 9,376 | 11,430 | NA |
| Smith | 660 | 660 | 660 | 660 | 660 | NA |
| Trinity | 194 | 194 | 194 | 194 | 194 | NA |
| Tyler | 274 | 274 | 274 | 274 | 274 | NA |
| Total | 25,114 | 26,899 | 29,020 | 31,546 | 34,533 | NA |

**Table 5 (continued)**

**Attachment 2**
**East Texas Regional Water Planning Area**
**Revised Non-Municipal Water Demand Projections**
**Livestock Water Demands**

| RWPG Revisions | | | | | | | |
|---|---|---|---|---|---|---|---|
| **County Name** | **2020** | **2030** | **2040** | **2050** | **2060** | **2070** | **RWPG Comments** |
| Anderson | 1,402 | 1,402 | 1,402 | 1,402 | 1,402 | 1,402 | See Attachment 6 |
| Angelina | 648 | 648 | 648 | 648 | 648 | 648 | See Attachment 6 |
| Cherokee | 1,681 | 1,681 | 1,681 | 1,681 | 1,681 | 1,681 | See Attachment 6 |
| Hardin | 163 | 163 | 163 | 163 | 163 | 163 | See Attachment 6 |
| Henderson | 1253 | 1,253 | 1,253 | 1,253 | 1,253 | 1,253 | See Attachment 6 |
| Houston | 1,630 | 1,779 | 1,939 | 2,113 | 2,301 | 2,542 | See Attachment 6 |
| Jasper | 362 | 362 | 362 | 362 | 362 | 362 | See Attachment 6 |
| Jefferson | 943 | 943 | 943 | 943 | 943 | 943 | See Attachment 6 |
| Nacogdoches | 4,364 | 4,557 | 4,781 | 5,040 | 5,337 | 5,779 | See Attachment 6 |
| Newton | 121 | 121 | 121 | 121 | 121 | 121 | See Attachment 6 |
| Orange | 208 | 208 | 208 | 208 | 208 | 208 | See Attachment 6 |
| Panola | 1,480 | 1,480 | 1,480 | 1,480 | 1,480 | 1,480 | See Attachment 6 |
| Polk | 357 | 357 | 357 | 357 | 357 | 357 | See Attachment 6 |
| Rusk | 1,207 | 1,224 | 1,246 | 1,269 | 1,292 | 1,292 | See Attachment 6 |
| Sabine | 159 | 217 | 285 | 363 | 448 | 448 | See Attachment 6 |
| San Augustine | 903 | 1,000 | 1,111 | 1,240 | 1,382 | 1,382 | See Attachment 6 |
| Shelby | 5,265 | 6,273 | 7,500 | 8,997 | 10,822 | 10,822 | See Attachment 6 |
| Smith | 1,115 | 1,115 | 1,115 | 1,115 | 1,115 | 1,115 | See Attachment 6 |
| Trinity | 478 | 478 | 478 | 478 | 478 | 478 | See Attachment 6 |
| Tyler | 288 | 288 | 288 | 288 | 288 | 288 | See Attachment 6 |
| Total | 24,027 | 25,549 | 27,361 | 29,521 | 32,081 | 32,764 | |

# Attachment 3
# Irrigation Water Demands Evaluation

**Table 1**

**Attachment 3**
**East Texas Regional Water Planning Area**
**Revised Non-Municipal Water Demand Projections**
**Irrigation Water Demands**

| Counties | Volume (af/yr) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Historical Water Use Estimates | | | | | | | 2017 Plan Projections 2020 Base Year[1] | 2017 ETRWPG Projections 2020 Base Year[2] |
| | 2005 | 2006 | 2007 | 2008 | 2009 | Average | Maximum | | |
| Anderson | 367 | 305 | 444 | 462 | 435 | 403 | 462 | 403 | 462 |
| Angelina | 309 | 233 | 481 | 94 | 350 | 293 | 481 | 294 | 481 |
| Cherokee | 251 | 253 | 355 | 309 | 300 | 294 | 355 | 294 | 355 |
| Hardin | 339 | 976 | 1,937 | 2,428 | 1,058 | 1,348 | 2,428 | 1,349 | 3,414[3] |
| Henderson | 342 | 384 | 243 | 281 | 170 | 284 | 384 | 284 | 384 |
| Houston | 2,627 | 2,989 | 1,358 | 1,895 | 1,685 | 2,111 | 2,989 | 2,333 | 2,989 |
| Jasper | 0 | 36 | 30 | 30 | 0 | 32 | 36 | 0 | 36 |
| Jefferson | 84,883 | 90,243 | 91,889 | 87,971 | 59,084 | 82,814 | 91,889 | 82,814 | 161,952[3] |
| Nacogdoches | 390 | 400 | 146 | 338 | 375 | 330 | 400 | 330 | 400 |
| Newton | 375 | 375 | 366 | 0 | 0 | 372 | 375 | 0 | 375 |
| Orange | 4,333 | 6,250 | 3,125 | 0 | 0 | 4,569 | 6,250 | 0 | 3,730[3] |
| Panola | 0 | 18 | 30 | 64 | 29 | 35 | 64 | 31 | 64 |
| Polk | 100 | 100 | 341 | 325 | 428 | 259 | 428 | 259 | 428 |
| Rusk | 92 | 100 | 25 | 29 | 0 | 62 | 100 | 0 | 100 |
| Sabine | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| San Augustine | 50 | 62 | 0 | 0 | 0 | 56 | 62 | 0 | 62 |
| Shelby | 23 | 26 | 20 | 25 | | 24 | 26 | 0 | 26 |
| Smith | 1,300 | 1,486 | 525 | 708 | 810 | 966 | 1,486 | 610 | 1,486 |
| Trinity | 488 | 500 | 335 | 0 | 0 | 441 | 500 | 0 | 500 |
| Tyler | 500 | 500 | 175 | 18 | 675 | 374 | 675 | 374 | 675 |
| **Total** | **96,769** | **105,236** | **101,825** | **94,977** | **65,399** | **95,065** | **109,390** | **89,375** | **177,116** |

[1] 2017 Plan Projections are from the 2017 database (DB17) provided by the Texas Water Development Board. In most cases, the base year was based upon the average of the historical water use estimates (2005-2009).

[2] 2017 ETRWPG Projections are those proposed by the East Texas Regional Water Planning Group (ETRWPG)

[3] Irrigation values for Hardin, Jefferson, and Orange Counties were calculated based on a technical memorandum prepared by the consulting team in August 2012 entitled, "Draft Rice Water Demand Projections Revisions."

# Attachment 4
# Rice Irrigation Demands Projections Technical Memorandum

ALAN PLUMMER ASSOCIATES, INC.
ENVIRONMENTAL ENGINEERS • DESIGNERS • SCIENTISTS

# TECHNICAL MEMORANDUM

**East Texas Regional Water Planning Group**
**Rice Water Demand Projections Revisions**

**Date:** August 21, 2012

**Prepared For:** East Texas Regional Water Planning Group

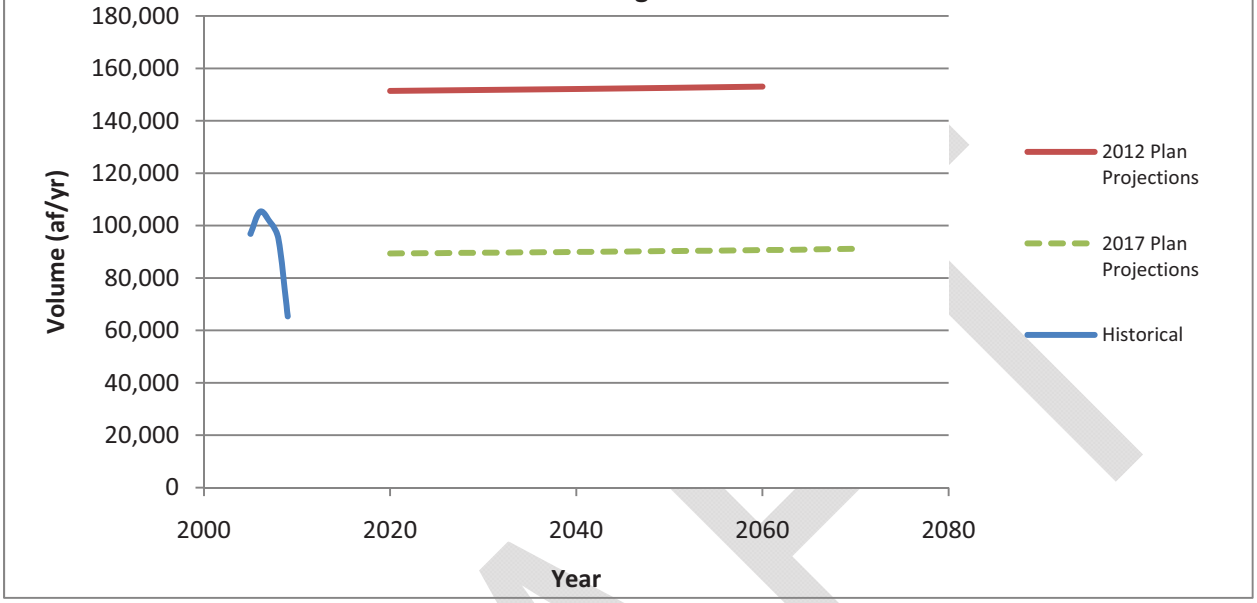
**Prepared By:** Rex H. Hunt, P.E. and Lauren E. Gonzalez, Alan Plummer Associates, Inc.

The Texas Water Development Board (TWDB) requires regional water planning groups to project water demands for non-municipal purposes on a 50-year planning cycle. Non-municipal water demands include the following categories: irrigation, manufacturing, mining, steam-electric and livestock. The TWDB has provided proposed non-municipal water demand projections for the *2017 State Water Plan* for each decade from 2020 to 2070 for the East Texas Regional Water Planning Area (ETRWPA) or Region I, hereafter referred to as the 2017 Plan Projections. The TWDB advised the East Texas Regional Water Planning Group (ETRWPG) that modifications to the 2017 Plan Projections would be considered if appropriate justification were provided. This technical memorandum presents a model, developed to project irrigation demands for rice in Hardin, Jefferson, and Orange Counties from 2020 to 2070 and provides documentation to justify the revised projections. Revisions to rice irrigation demands are based on factors that include historical and current rice production in Texas, global rice supply and demand, and estimates of global population growth.

## BACKGROUND

The 2017 Plan Projections indicate that the ETRWPA will experience a 41 percent (%) decrease in irrigation demand over the *2012 State Water Plan* projections (2012 Plan Projections) for each decade beginning in 2020 through 2070 (See Figure 1). This decrease represents a reduction of over 60,000 acre-feet per year (af/yr) in irrigation demand. A major component of the projected decrease in irrigation water demands is related to projections of rice production in Hardin, Jefferson, and Orange Counties. Although the estimation of irrigation water demand 50 years into the future is a coarse and inexact science, this significant decrease in irrigation water demand may not be indicative of future conditions in the ETRWPA. Future water demands related to rice production were significantly underestimated for Hardin, Jefferson, and Orange Counties. After review of available data, rice production in the ETRWPA may actually increase in the future.

**Figure 1**
**Total Irrigation Estimates and Projections for the East Texas Regional Water Planning Area**




## DATA SOURCES UTILIZED

For purposes of this evaluation, the following data sources were utilized to evaluate rice production trends in the ETRWPA:

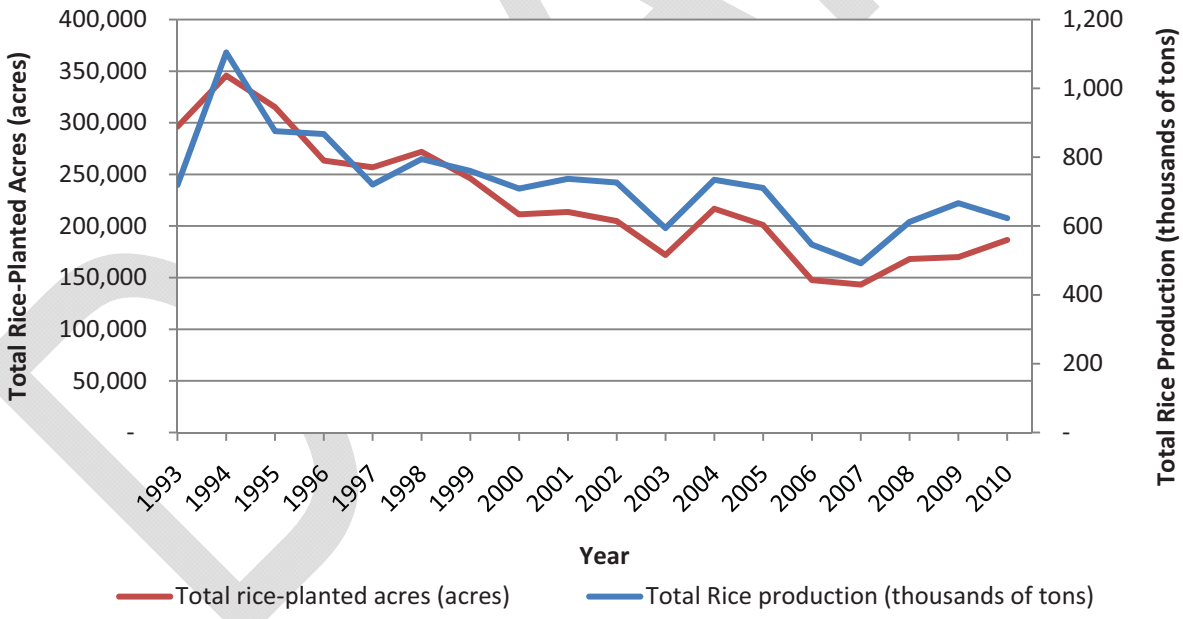
- Texas Water Development Board Non-Municipal Water Demands Spreadsheet for Irrigation (2017 Plan Projections). A copy of this spreadsheet is provided in Attachment A.
- *2012 State Water Plan* Projections and *2011 Update of the Regional Water Plan* for Irrigation demands (2012 Plan Projections).
- Texas Water Development Board Irrigation Basis Spreadsheet with crop acreage and corresponding water demands for each acre in af/yr. Reported crop acreage was based on data from the United States Department of Agriculture (USDA) Farm Service Agency (FSA). A copy of this spreadsheet is provided in Attachment B.
- Texas AgriLife Research and Extension Center at Beaumont document entitled, *2012 Texas Rice Production Guidelines* (AgriLife Research Document). Reported crop acreage was based on data from the USDA FSA. A copy of page 74 of the AgriLife Research Document is provided in Attachment C.
- Personal communication with Dr. Lloyd T. (Ted) Wilson from the Texas A&M University System AgriLife Research & Extension Center in Beaumont, Texas.

- Personal communication with Scott Hall, P.E., of the Lower Neches Valley Authority regarding irrigated acres and irrigation rates for rice in Jefferson County.
- United Nations Population Projections through 2070.
- *USDA Agricultural Projections to 2021* current rice production and use estimates for the United States.
- USDA Economic Research Service Market Outlook per acre yields projections.

## HISTORICAL AND CURRENT RICE PRODUCTION IN TEXAS AND IN THE EAST TEXAS REGIONAL WATER PLANNING AREA

According to the AgriLife Research Document, historical rice production data and rice-planted acreage data exhibit dynamic patterns of increasing and decreasing totals over time (Figure 2). Both rice production and acreage are dependent on various factors such as water availability, weather, production costs, variety availability, and crop disease, among others.

**Figure 2**
**Rice Production and Rice-Planted Acreage in Texas**



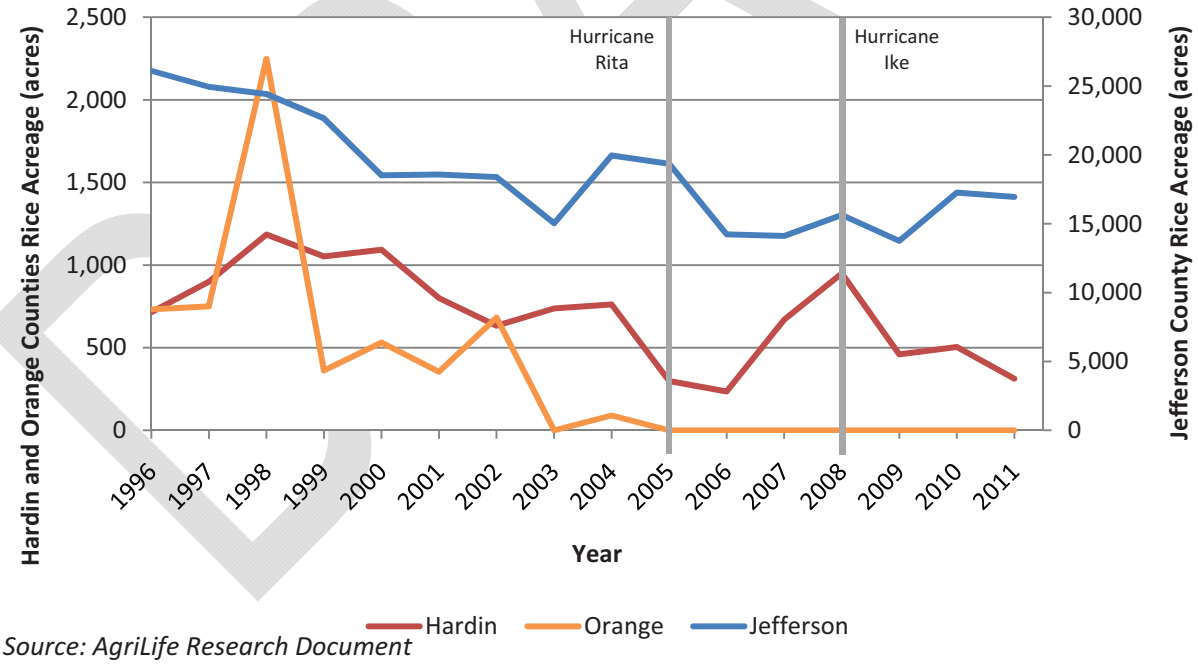

*Source: AgriLife Research Document*

The rice-producing counties in Region I, which are Hardin, Jefferson, and Orange Counties, exhibit similar patterns of varying increased and decreased rice-planted acreage (Figure 3). Both the TWDB and the AgriLife Research Document provide historical rice acreage estimates for these counties, which

are based on USDA FSA reported acreage data. In addition, information provided by the Lower Neches Valley Authority (LNVA) indicated rice acreage in Jefferson County is somewhat higher than the USDA FSA estimates. Similar to the Texas-wide reported crop acreage estimates in Figure 2, Hardin and Jefferson Counties exhibit temporary decreased rice-planted acreage that may be due to extreme weather events (Figure 3). Sharp declines in acreage occurred in 2005 which may be due to Hurricane Rita and another decline in 2007 may be attributed to Hurricane Ike.

While rice-related water demands account for the majority of the total irrigation demands in Hardin, Jefferson, and Orange Counties, other agricultural demands are also included in the development of total irrigation water demands. Irrigation water demands include water demand estimates for the growth of crops such as vegetables, grapes, hay, orchards, corn, cotton, sorghum, peanuts, rice, and wheat. Irrigation water demands also include water demands for golf courses. A summary of the historical total irrigation demands and the percentage of rice-related water demands for Hardin, Jefferson, and Orange Counties are provided in Table 1.

**Figure 3**
**Historical Rice Acreage Trends by County**




*Source: AgriLife Research Document*

**Table 1**
**Historical Total Irrigation Water Use (af/yr) for Rice-Producing Counties in the East Texas Regional Water Planning Area**

| Counties | Volume (af/yr) | | | | | Average | Average Percent of Rice-Related Demands |
|---|---|---|---|---|---|---|---|
| | 2005 | 2006 | 2007 | 2008 | 2009 | | |
| **Hardin** | 339 | 976 | 1,937 | 2,428 | 1,058 | 1,348 | 70% |
| **Jefferson** | 84,883 | 90,243 | 91,889 | 87,971 | 59,084 | 82,814 | 99% |
| **Orange** | 4,333 | 6,250 | 3,125 | 0 | 0 | 2,742 | 100% |

*Source: TWDB Irrigation Basis and 2017 Plan Projections*

## PROJECTED RICE PRODUCTION AND IRRIGATION IN THE EAST TEXAS REGIONAL WATER PLANNING AREA

As described previously, development of irrigation projections over a 50-year planning horizon is inexact due to a multitude of variables that affect trends. The TWDB developed the 2017 Plan Projections by assessing historical crop acreage from 2005 to 2009, which was impacted by two unique weather events. In order to calculate water demands associated with each crop's acreage, the TWDB assigned gross irrigation rates of any given crop in inches per year (in/yr). Multiplying this value by the number of crop-planted acres and dividing by 12 yields an estimate of water use for crop production for that year in af/yr.

The TWDB averaged these historical irrigation water demands by county from 2005 to 2009 to develop the projected irrigation water demand in 2020 and adjusted according to stakeholder input to the TWDB. The 2017 Plan Projections do not indicate that irrigation water demands for Hardin, Jefferson, and Orange Counties will increase or decrease over the planning horizon. The irrigation demand projections for rice-producing counties in 2020 were carried forward for each decade through 2070.

The resulting TWDB projections for Hardin, Jefferson, and Orange Counties show a decrease in irrigation water demand from the 2012 Plan Projections by 61%, 41%, and 100%, respectively (Table 2). The projections show that irrigation water demand in Hardin and Jefferson Counties is significantly decreased and is zero for Orange County (Figures 4, 5, and 6). Since the majority of irrigation demands for Hardin, Jefferson, and Orange Counties are due to rice production, a model-based evaluation of future rice production was conducted.

**Table 2**
**Projected Irrigation Water Demands Developed for the *2012 State Water Plan* and *2017 State Water Plan***

| County | State Water Plan Year | Volume (af/yr) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| Hardin | 2012 Plan Projections | 3,502 | 3,502 | 3,502 | 3,502 | 3,502 | NA |
| | 2017 Plan Projections | 1,349 | 1,349 | 1,349 | 1,349 | 1,349 | 1,349 |
| | Difference | -2,153 | -2,153 | -2,153 | -2,153 | -2,153 | NA |
| | % Difference | -61% | -61% | -61% | -61% | -61% | NA |
| Jefferson | 2012 Plan Projections | 140,000 | 140,000 | 140,000 | 140,000 | 140,000 | NA |
| | 2017 Plan Projections | 82,814 | 82,814 | 82,814 | 82,814 | 82,814 | 82,814 |
| | Difference | -57,186 | -57,186 | -57,186 | -57,186 | -57,186 | NA |
| | % Difference | -41% | -41% | -41% | -41% | -41% | NA |
| Orange | 2012 Plan Projections | 2,509 | 2,509 | 2,509 | 2,509 | 2,509 | NA |
| | 2017 Plan Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| | Difference | -2,509 | -2,509 | -2,509 | -2,509 | -2,509 | NA |
| | % Difference | -100% | -100% | -100% | -100% | -100% | NA |

**Figure 4**
**Hardin County Historical and Projected Irrigation Water Demands**

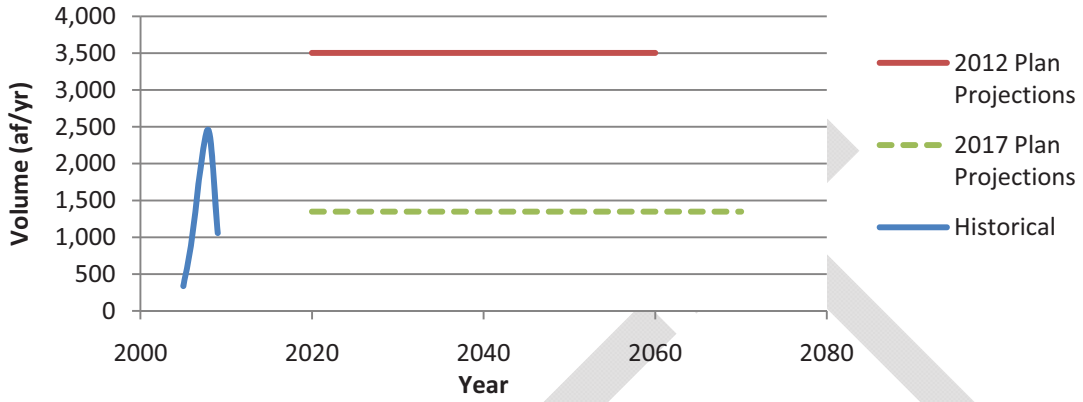



**Figure 5**
**Jefferson County Historical and Projected Irrigation Water Demands**

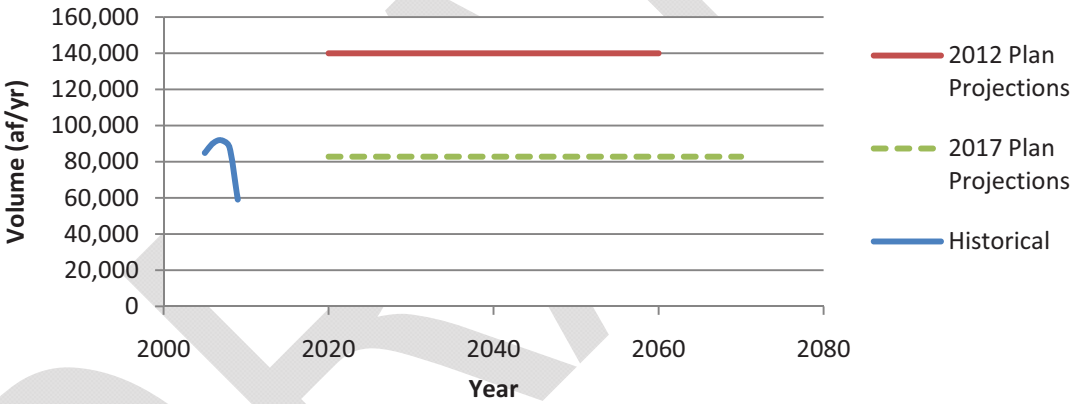
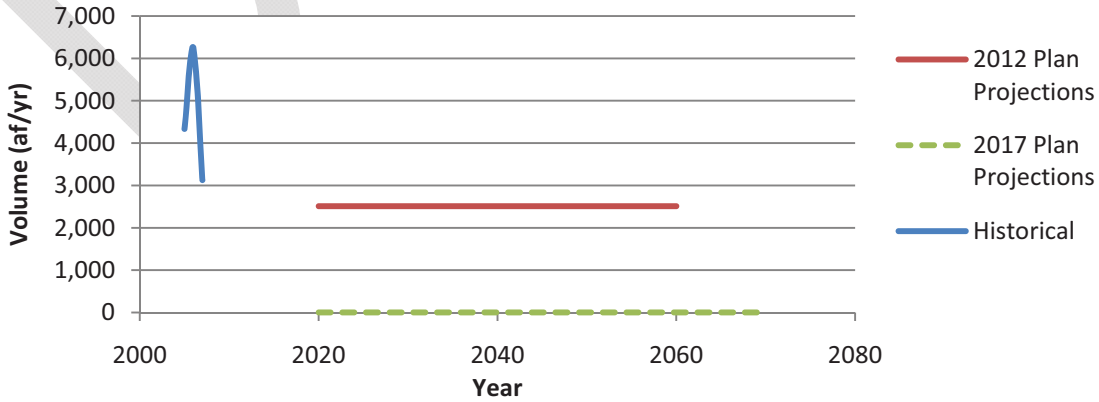



**Figure 6**
**Orange County Historical and Projected Irrigation Water Demands**



**AN APPROACH TO PROJECTING RICE-RELATED WATER DEMANDS IN THE EAST TEXAS REGIONAL WATER PLANNING AREA**

In order to evaluate rice irrigation in the ETRWPA, it is necessary to examine rice irrigation projections throughout Texas. Rice production in Texas is primarily from Orange County on the upper coast to Wharton, Matagorda and Victoria Counties in the middle portion of the coast. A small amount of rice is also grown in Bowie, Lamar, and Red River Counties in northeast Texas, as well as Robertson County in central Texas. Table 3 presents a list of Texas counties in which rice is produced or has historically been produced.

**Table 3**
**Rice-Producing Counties in Texas**

| County | Region | County | Region |
|---|---|---|---|
| Bowie | D | **Hardin*** | **I** |
| Lamar | D | **Jefferson*** | **I** |
| Red River | D | **Orange*** | **I** |
| Robertson | G | Colorado | K |
| Austin | H | Matagorda | K |
| Brazoria | H | Wharton | K |
| **Chambers*** | **H** | Calhoun | L |
| Fort Bend | H | Victoria | L |
| Galveston | H | Jackson | P |
| Harris | H | Lavaca | P |
| **Liberty*** | **H** | Wharton | P |
| Waller | H | | |

** Southeastern Texas Counties*

The five counties shown in bold letters with an asterisk are those located east of Harris County in southeast Texas and along the Texas coast, hereafter referred to as Southeastern Rice-Producing Counties. All other counties that are not in bold letters will hereafter be referred to as Western and Other Rice-Producing Counties. The Southeastern Rice-Producing Counties are likely to experience an increase in rice production in the coming years, based on the model-based approach proposed in this memorandum.

In the model, global population projections and rice production trends were evaluated in order to assess likely global population-based rice production by the United States and Texas for the global market over

the next 50 years. Using this projected rice production by decade, combined with the 2017 Plan Projections for irrigation and rice trends for Western and Other Rice-Producing Counties, projections of the estimated water use for Southeastern Rice-Producing Counties were revised.

Attachment D provides a spreadsheet model of the proposed irrigation demands for the ETRWPA. Assumptions and data sources used to develop the irrigation demand projections for Hardin, Jefferson, and Orange Counties are also provided in Attachment D.

The model considers a variety of global and regional variables to develop proposed projections of rice irrigation demand. These variables are conservative and reasonable, but some can have a significant impact on the outcome, if changed. Figures 7, 8, and 9 depict the historical, current TWDB, and proposed ETRWPA rice water demand projections for Hardin, Jefferson, and Orange Counties. As may be seen in the figures, rice irrigation is projected to increase in Hardin, Jefferson, and Orange Counties over the planning period to meet growing global rice demand. In each case, irrigation increases by decade until around 2050, at which point it levels off. For each county, the 2060 and 2070 rice irrigation projections decrease slightly from the previous decade.

The gradual slowing of the growth in irrigation demand in each decade is primarily a function of two variables in the model. Global population is expected to increase with each decade over the planning horizon (see Line 4 of the Attachment D table). However, the rate of increase slows significantly from one decade to the next. For example, global population is expected to increase by some 715 million persons from 2010 to 2020, but by only 320 million from 2060 to 2070. This factor will have a significant impact on the increase in rice demand over time.

The yield on a per-acre basis for rice is expected to increase by approximately 60% by year 2070 as a result of rice farmers adopting higher yielding long-grain varieties. While resulting in increased rice production per acre (see Line 5 of the Attachment D table), this increase will also theoretically result in a commensurate decrease in irrigation demand on a per-acre basis needed to grow the same amount of rice. This, coupled with slowing population growth, results in an eventual peaking of rice irrigation water demands in 2050 and a slight decrease in the following decades.

Another significant factor in the model is the assumption that Texas' role in global rice production will grow with global rice demand. Hence, Texas currently produces approximately 0.1% of rice produced globally; and it is assumed that this production percentage will remain constant throughout the planning

**Figure 7**
**Hardin County Historical, Projected, and Proposed Rice Water Demands**

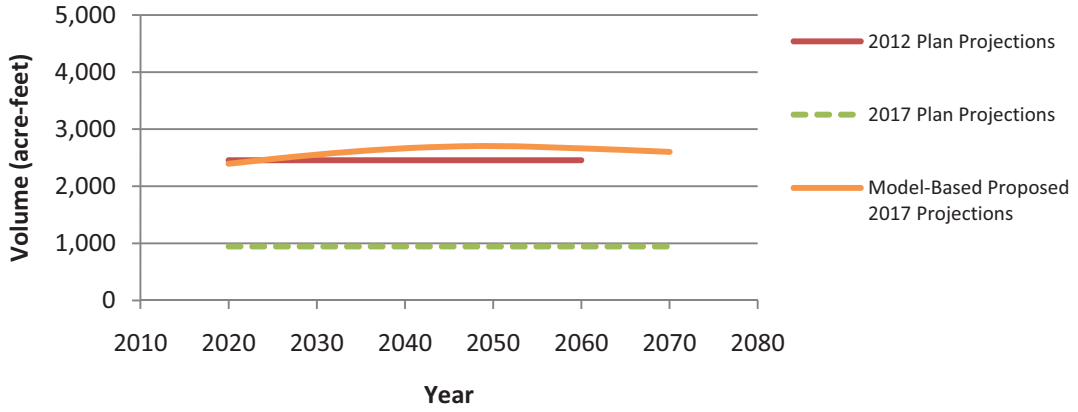



**Figure 8**
**Jefferson County Historical, Projected, and Proposed Rice Water Demands**

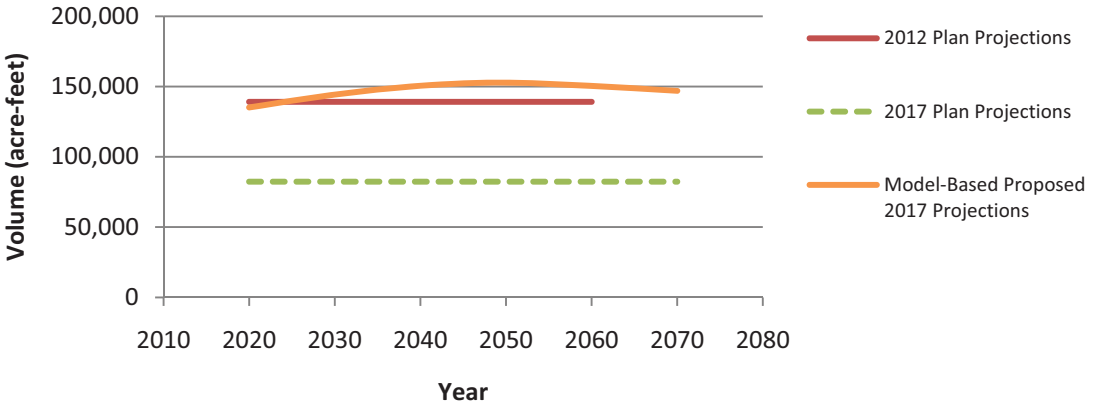
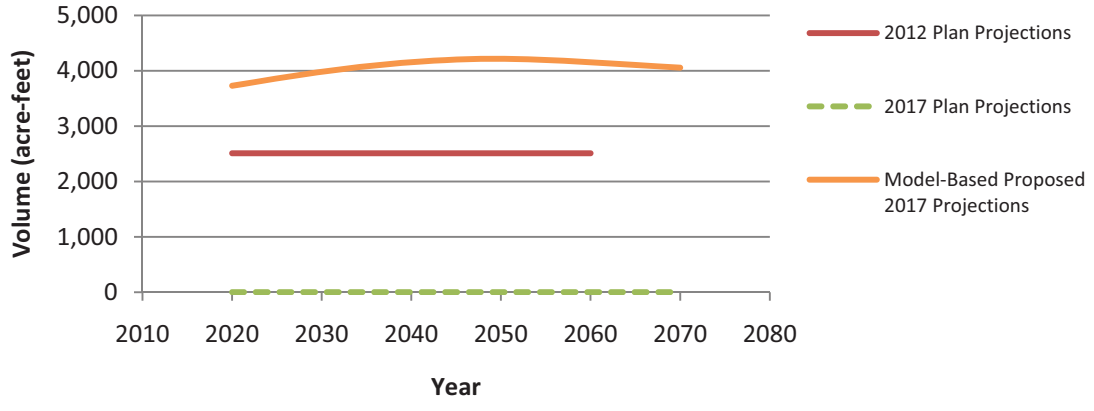



**Figure 9**
**Orange County Historical, Projected, and Proposed Rice Water Demands**



period. However, a key factor in this model is the assumption that over time, water restrictions and population encroachment on many areas west (or down coast) of Houston will restrict acreage dedicated to growing rice and, therefore, production. It is assumed that the Southeastern Rice-Producing Counties will increase production to meet demand.

The historical crop-specific irrigation rates provided by the TWDB for 2005-2009 indicate that average rice irrigation rates were 54 in/yr for the Southeastern Rice-Producing Counties and 51 in/yr for Western and Other Rice-Producing Counties. However, these averages include both wet and dry years and may be considered too low for long-range water supply planning. The model assumed a 10% increase for these averages to account for drought-impacted years. For purposes of this model, the estimated gross irrigation rates for Southeastern Rice-Producing Counties was assumed to be 60 in/yr (see Line 17 of the Attachment D table) and the Western and Other Rice-Producing Counties was 56 in/yr (see Line 11 of the Attachment D table).

It is also important to note that 2017 Plan Projections for irrigation demands in Western and Other Rice-Producing Counties have not been altered in this model. In general, the TWDB projections show declines in irrigation in the affected counties over the planning period. The model retains the 2012 Plan Projections and 2017 Plan Projections and assumes that projected rice demand increases will be met by rice production in the five Southeastern Rice-Producing Counties.

## REQUEST FOR MODIFICATION OF RICE IRRIGATION DEMANDS FOR HARDIN, JEFFERSON, AND ORANGE COUNTIES

Based on the model developed for projecting rice irrigation demands in Southeastern Rice-Producing Counties, it is recommended that the ETRWPG request that rice irrigation demands be modified as indicated in Table 4 for Hardin, Jefferson, and Orange Counties. These proposed modifications only relate to rice-related water demands and must be incorporated with other irrigation demands identified in these counties for total irrigation demand projections.

**Table 4**
**Historical, Projected, and Proposed Rice-Related Water Demands for the East Texas Regional Water Planning Area**

| County | State Water Plan Year | Volume (af/yr) Year 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
|---|---|---|---|---|---|---|---|
| Hardin | 2012 Plan Projections | 2,455 | 2,455 | 2,455 | 2,455 | 2,455 | NA |
| | 2017 Plan Projections | 946 | 946 | 946 | 946 | 946 | 946 |
| | Model-Based Proposed 2017 Plan Projections | 2,393 | 2,555 | 2,666 | 2,706 | 2,665 | 2,602 |
| | Difference of Proposed from 2012 | -62 | 100 | 212 | 251 | 210 | NA |
| | % Difference | -3% | 4% | 9% | 10% | 9% | NA |
| Jefferson | 2012 Plan Projections | 139,173 | 139,173 | 139,173 | 139,173 | 139,173 | NA |
| | 2017 Plan Projections | 82,325 | 82,325 | 82,325 | 82,325 | 82,325 | 82,325 |
| | Model-Based Proposed 2017 Plan Projections | 135,149 | 144,307 | 150,596 | 152,827 | 150,500 | 146,960 |
| | Difference of Proposed from 2012 | -4,025 | 5,134 | 11,423 | 13,653 | 11,327 | NA |
| | % Difference | -3% | 4% | 8% | 10% | 8% | NA |
| Orange | 2012 Plan Projections | 2,509 | 2,509 | 2,509 | 2,509 | 2,509 | NA |
| | 2017 Plan Projections | 0 | 0 | 0 | 0 | 0 | 0 |
| | Model-Based Proposed 2017 Plan Projections | 3,730 | 3,983 | 4,156 | 4,218 | 4,153 | 4,056 |
| | Difference of Proposed from 2012 | 1,221 | 1,474 | 1,647 | 1,709 | 1,644 | NA |
| | % Difference | 49% | 59% | 66% | 68% | 66% | NA |

**ATTACHMENT A**

**2017 PLAN PROJECTIONS SPREADSHEET PROVIDED BY THE TEXAS WATER DEVELOPMENT BOARD**

**Attachment A**
**2017 Plan Projections Spreadsheet Provided by the**
**Texas Water Development Board**

| Draft Irrigation Projections for 2017 SWP | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Volume (af/yr) | | | | | |
| Region | County Name | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| D | Bowie | 6,221 | 6,221 | 6,060 | 5,657 | 5,281 | 5,121 |
| D | Lamar | 5,945 | 5,879 | 5,813 | 5,748 | 5,684 | 5,622 |
| D | Red River | 5,156 | 5,103 | 5,050 | 4,998 | 4,945 | 4,895 |
| G | Robertson | 63,420 | 61,607 | 59,841 | 58,127 | 56,460 | 55,124 |
| H | Austin | 3,932 | 3,932 | 3,932 | 3,932 | 3,932 | 3,932 |
| H | Brazoria | 77,121 | 74,258 | 72,532 | 72,532 | 72,532 | 70,465 |
| H | Chambers | 55,059 | 55,059 | 55,059 | 55,059 | 55,059 | 55,059 |
| H | Fort Bend | 32,091 | 32,091 | 32,091 | 32,091 | 32,091 | 32,091 |
| H | Galveston | 3,565 | 3,565 | 3,565 | 3,565 | 3,565 | 3,565 |
| H | Harris | 3,397 | 3,397 | 3,397 | 3,397 | 3,397 | 3,397 |
| H | Liberty | 43,632 | 43,632 | 43,632 | 43,632 | 43,632 | 43,632 |
| H | Waller | 19,197 | 19,197 | 19,197 | 19,197 | 19,197 | 19,197 |
| I | Hardin | 1,349 | 1,349 | 1,349 | 1,349 | 1,349 | 1,349 |
| I | Jefferson | 82,814 | 82,814 | 82,814 | 82,814 | 82,814 | 82,814 |
| K | Colorado | 120,618 | 115,551 | 110,647 | 105,878 | 101,314 | 97,363 |
| K | Matagorda | 117,462 | 113,220 | 109,157 | 105,247 | 101,477 | 98,081 |
| K | Wharton | 126,140 | 121,626 | 117,277 | 113,083 | 97,165 | 92,166 |
| L | Calhoun | 13,472 | 11,935 | 10,894 | 10,148 | 9,453 | 8,726 |
| L | Victoria | 3,255 | 2,809 | 2,424 | 2,092 | 1,806 | 1,618 |
| P | Jackson | 38,967 | 38,967 | 38,967 | 38,967 | 38,967 | 38,967 |
| P | Lavaca | 4,387 | 4,387 | 4,387 | 4,387 | 4,387 | 4,387 |
| P | Wharton | 102,785 | 102,785 | 102,785 | 102,785 | 102,785 | 102,785 |

**ATTACHMENT B**

**IRRIGATION BASIS SPREADSHEET PROVIDED BY THE TEXAS WATER DEVELOPMENT BOARD**

**Attachment B**
**Irrigation Basis Spreadsheet Provided by the**
**Texas Water Development Board**

| Year | Region | County Name | Crop Name | Reported Acreage (acres) | Rate (in/yr) | Water Use (af/yr) |
|---|---|---|---|---|---|---|
| 2005 | D | BOWIE | rice | 2,100 | 30 | 5,250 |
| 2006 | D | BOWIE | rice | 608 | 33 | 1,672 |
| 2007 | D | BOWIE | rice | 283 | 33 | 778 |
| 2008 | D | BOWIE | RICE | 569 | 35 | 1,659 |
| 2009 | D | BOWIE | RICE | 517 | 28 | 1,206 |
| 2010 | D | BOWIE | RICE | 881 | 33 | 2,422 |
| 2007 | D | LAMAR | RICE | 105 | 28 | 245 |
| 2008 | D | LAMAR | RICE | 203 | 35 | 592 |
| 2009 | D | LAMAR | RICE | 215 | 26 | 465 |
| 2005 | D | RED RIVER | RICE | 750 | 36 | 2,250 |
| 2006 | D | RED RIVER | RICE | 440 | 36 | 1,320 |
| 2007 | D | RED RIVER | RICE | 620 | 36 | 1,860 |
| 2008 | D | RED RIVER | RICE | 800 | 51 | 3,400 |
| 2005 | G | ROBERTSON | RICE | 200 | 46 | 766 |
| 2006 | G | ROBERTSON | RICE | 162 | 46 | 621 |
| 2007 | G | ROBERTSON | RICE | 322 | 46 | 1,234 |
| 2008 | G | ROBERTSON | RICE | 240 | 46 | 920 |
| 2009 | G | ROBERTSON | RICE | 1,000 | 46 | 3,833 |
| 2010 | G | ROBERTSON | RICE | 1,000 | 46 | 3,833 |
| 2005 | H | AUSTIN | RICE | 2,400 | 32 | 6,400 |
| 2006 | H | AUSTIN | RICE | 904 | 40 | 3,013 |
| 2007 | H | AUSTIN | RICE | 1,003 | 40 | 3,343 |
| 2008 | H | AUSTIN | RICE | 959 | 45 | 3,595 |
| 2009 | H | AUSTIN | RICE | 1,036 | 33 | 2,848 |
| 2010 | H | AUSTIN | RICE | 1,111 | 42 | 3,888 |
| 2005 | H | BRAZORIA | RICE | 16,000 | 80 | 106,666 |
| 2006 | H | BRAZORIA | RICE | 13,138 | 75 | 82,112 |
| 2007 | H | BRAZORIA | RICE | 11,460 | 75 | 71,625 |
| 2008 | H | BRAZORIA | RICE | 15,174 | 60 | 75,869 |
| 2009 | H | BRAZORIA | RICE | 17,000 | 48 | 68,000 |
| 2010 | H | BRAZORIA | RICE | 17,366 | 52 | 75,252 |
| 2005 | H | CHAMBERS | RICE | 12,800 | 79 | 84,266 |
| 2006 | H | CHAMBERS | RICE | 8,088 | 81 | 54,594 |
| 2007 | H | CHAMBERS | RICE | 9,896 | 81 | 66,798 |
| 2008 | H | CHAMBERS | RICE | 13,072 | 48 | 52,288 |
| 2009 | H | CHAMBERS | RICE | 2,750 | 60 | 13,750 |
| 2010 | H | CHAMBERS | RICE | 11,250 | 64 | 60,000 |
| 2005 | H | FORT BEND | RICE | 6,900 | 80 | 46,000 |
| 2006 | H | FORT BEND | RICE | 4,482 | 75 | 28,012 |
| 2007 | H | FORT BEND | RICE | 4,925 | 70 | 28,729 |
| 2008 | H | FORT BEND | RICE | 4,794 | 60 | 23,967 |
| 2009 | H | FORT BEND | RICE | 6,400 | 57 | 30,400 |
| 2010 | H | FORT BEND | RICE | 5,500 | 57 | 26,125 |
| 2005 | H | GALVESTON | RICE | 900 | 84 | 6,300 |
| 2006 | H | GALVESTON | RICE | 310 | 80 | 2,071 |
| 2007 | H | GALVESTON | RICE | 300 | 80 | 2,000 |
| 2008 | H | GALVESTON | RICE | 654 | 45 | 2,452 |
| 2009 | H | GALVESTON | RICE | 1,500 | 40 | 5,000 |
| 2010 | H | GALVESTON | RICE | 500 | 55 | 2,291 |
| 2005 | H | HARRIS | RICE | 1,200 | 60 | 6,000 |
| 2006 | H | HARRIS | RICE | 195 | 80 | 1,300 |
| 2007 | H | HARRIS | RICE | 192 | 80 | 1,280 |
| 2008 | H | HARRIS | RICE | 395 | 45 | 1,480 |
| 2005 | H | LIBERTY | RICE | 9,400 | 77 | 59,925 |
| 2006 | H | LIBERTY | RICE | 5,436 | 81 | 36,693 |

**Attachment B**
**Irrigation Basis Spreadsheet Provided by the**
**Texas Water Development Board**

| Year | Region | County Name | Crop Name | Reported Acreage (acres) | Rate (in/yr) | Water Use (af/yr) |
|---|---|---|---|---|---|---|
| 2007 | H | LIBERTY | RICE | 6,445 | 81 | 43,503 |
| 2008 | H | LIBERTY | RICE | 7,579 | 60 | 37,893 |
| 2009 | H | LIBERTY | RICE | 7,500 | 54 | 33,750 |
| 2010 | H | LIBERTY | RICE | 7,850 | 65 | 42,520 |
| 2005 | H | WALLER | RICE | 7,700 | 32 | 20,533 |
| 2006 | H | WALLER | RICE | 6,264 | 33 | 17,226 |
| 2007 | H | WALLER | RICE | 6,038 | 33 | 16,604 |
| 2008 | H | WALLER | RICE | 6,208 | 35 | 18,105 |
| 2009 | H | WALLER | RICE | 6,379 | 33 | 17,543 |
| 2010 | H | WALLER | RICE | 6,300 | 38 | 19,950 |
| 2006 | I | HARDIN | RICE | 238 | 33 | 654 |
| 2007 | I | HARDIN | RICE | 670 | 33 | 1,842 |
| 2008 | I | HARDIN | RICE | 950 | 30 | 2,375 |
| 2009 | I | HARDIN | RICE | 460 | 25 | 958 |
| 2010 | I | HARDIN | RICE | 500 | 36 | 1,500 |
| 2005 | I | JEFFERSON | RICE | 19,300 | 52 | 83,633 |
| 2006 | I | JEFFERSON | RICE | 14,239 | 75 | 88,993 |
| 2007 | I | JEFFERSON | RICE | 14,596 | 75 | 91,225 |
| 2008 | I | JEFFERSON | RICE | 17,578 | 60 | 87,888 |
| 2009 | I | JEFFERSON | RICE | 13,875 | 51 | 58,968 |
| 2010 | I | JEFFERSON | RICE | 17,200 | 60 | 86,000 |
| 2005 | I | ORANGE | RICE | 1,000 | 52 | 4,333 |
| 2006 | I | ORANGE | RICE | 1,000 | 75 | 6,250 |
| 2007 | I | ORANGE | RICE | 500 | 75 | 3,125 |
| 2005 | K | COLORADO | RICE | 31,000 | 45 | 116,250 |
| 2006 | K | COLORADO | RICE | 25,395 | 53 | 112,161 |
| 2007 | K | COLORADO | RICE | 26,516 | 53 | 117,112 |
| 2008 | K | COLORADO | RICE | 31,687 | 51 | 134,667 |
| 2009 | K | COLORADO | RICE | 32,000 | 54 | 144,000 |
| 2010 | K | COLORADO | RICE | 32,115 | 56 | 149,870 |
| 2005 | K | MATAGORDA | RICE | 21,900 | 55 | 100,375 |
| 2006 | K | MATAGORDA | RICE | 18,075 | 55 | 82,843 |
| 2007 | K | MATAGORDA | RICE | 15,100 | 39 | 49,452 |
| 2008 | K | MATAGORDA | RICE | 19,671 | 45 | 73,766 |
| 2009 | K | MATAGORDA | RICE | 25,000 | 48 | 100,000 |
| 2010 | K | MATAGORDA | RICE | 25,103 | 58 | 121,331 |
| 2005 | K | WHARTON | RICE | 50,700 | 55 | 232,375 |
| 2006 | K | WHARTON | RICE | 35,417 | 55 | 162,327 |
| 2007 | K | WHARTON | RICE | 17,101 | 63 | 89,780 |
| 2010 | K, P | WHARTON | RICE | 45,000 | 48 | 180,000 |
| 2008 | K,P | WHARTON | RICE | 38,179 | 58 | 184,531 |
| 2009 | K,P | WHARTON | RICE | 46,400 | 48 | 185,600 |
| 2005 | L | CALHOUN | RICE | 2,440 | 89 | 18,096 |
| 2006 | L | CALHOUN | RICE | 2,636 | 69 | 15,157 |
| 2007 | L | CALHOUN | RICE | 2,086 | 69 | 11,994 |
| 2008 | L | CALHOUN | RICE | 2,803 | 60 | 14,015 |
| 2009 | L | CALHOUN | RICE | 2,400 | 72 | 14,400 |
| 2010 | L | CALHOUN | RICE | 2,177 | 56 | 10,159 |
| 2005 | L | VICTORIA | RICE | 1,700 | 32 | 4,533 |
| 2006 | L | VICTORIA | RICE | 564 | 36 | 1,692 |
| 2007 | L | VICTORIA | RICE | 300 | 36 | 900 |
| 2008 | L | VICTORIA | RICE | 1,081 | 35 | 3,152 |
| 2009 | L | VICTORIA | RICE | 1,771 | 32 | 4,723 |
| 2010 | L | VICTORIA | RICE | 1,922 | 42 | 6,727 |
| 2008 | M | CAMERON | RICE | 187 | 50 | 779 |

**Attachment B**
**Irrigation Basis Spreadsheet Provided by the**
**Texas Water Development Board**

| Year | Region | County Name | Crop Name | Reported Acreage (acres) | Rate (in/yr) | Water Use (af/yr) |
|---|---|---|---|---|---|---|
| 2005 | P | JACKSON | RICE | 12,700 | 40 | 42,333 |
| 2006 | P | JACKSON | RICE | 9,929 | 40 | 33,096 |
| 2007 | P | JACKSON | RICE | 10,114 | 40 | 33,713 |
| 2008 | P | JACKSON | RICE | 9,926 | 45 | 37,222 |
| 2009 | P | JACKSON | RICE | 11,400 | 46 | 43,700 |
| 2010 | P | JACKSON | RICE | 11,200 | 43 | 40,133 |
| 2005 | P | LAVACA | RICE | 1,800 | 42 | 6,300 |
| 2006 | P | LAVACA | RICE | 1,039 | 42 | 3,636 |
| 2007 | P | LAVACA | RICE | 1,029 | 42 | 3,601 |
| 2008 | P | LAVACA | RICE | 1,377 | 45 | 5,164 |
| 2009 | P | LAVACA | RICE | 1,057 | 32 | 2,819 |
| 2010 | P | LAVACA | RICE | 1,401 | 46 | 5,370 |

**ATTACHMENT C**

**AGRILIFE RESEARCH DOCUMENT EXCERPT**

# Historical Texas Rice Production Statistics

***Table 40.*** 18-year Texas rice acreage, yields and production comparison.

| Crop year | Planted acres* | Main crop** Yield (lb/A) | Ratoon crop** Yield (lb/A) | % MC ratooned** | Total** Yield (lb/A) | Production*** cwt | |
|---|---|---|---|---|---|---|---|
| **1993** | 296,193 | 5,054 | 1,168 | 34 | 5,451 | 14,383,037 | |
| **1994** | 345,680 | 5,944 | 984 | 43 | 6,195 | 22,089,662 | |
| **1995** | 315,108 | 5,505 | 165 | 32 | 5,558 | 17,513,703 | |
| **1996** | 263,407 | 6,022 | 1,228 | 46 | 6,587 | 17,350,830 | |
| **1997** | 256,944 | 5,232 | 895 | 42 | 5,608 | 14,408,971 | |
| **1998** | 271,989 | 5,413 | 796 | 54 | 5,843 | 15,891,008 | |
| **1999** | 246,228 | 5,818 | 1,361 | 26 | 6,172 | 15,196,150 | |
| **2000** | 211,241 | 6,360 | 948 | 37 | 6,711 | 14,176,944 | |
| **2001** | 213,704 | 6,291 | 1,264 | 48 | 6,898 | 14,741,250 | |
| **2002** | 204,880 | 6,744 | 1,017 | 34 | 7,090 | 14,526,940 | |
| **2003** | 171,953 | 6,055 | 2,247 | 38 | 6,909 | 11,880,000 | # |
| **2004** | 216,810 | 6,231 | 1,557 | 35 | 6,776 | 14,690,000 | # |
| **2005** | 201,024 | 6,542 | 1,955 | 27 | 7,070 | 14,212,274 | |
| **2006** | 147,549 | 6,913 | 1,248 | 39 | 7,400 | 10,918,626 | ## |
| **2007** | 143,299 | 6,179 | 1,948 | 35 | 6,860 | 9,830,311 | * |
| **2008** | 168,039 | 6,314 | 1,830 | 53 | 7,283 | 12,238,280 | * |
| **2009** | 169,990 | 6,531 | 2,264 | 58 | 7,844 | 13,334,015 | * |
| **2010** | 186,522 | 5,430 | 2,315 | 54 | 6,680 | 12,459,669 | * |
| **Avg. 1993–2010** | 223,920 | 5,951 | 1,297 | 40 | 6,473 | 15,041,149 | |
| **2011** | 181,761 | 6,440 | 1,607 | 77 | 6,969 | 12,667,079 | |

* 10,271,940 (2007 sales) * 8,722,088 (2008 sales) *10,488,859 (2009 sales) *12,429,033 (2010 sales)
* USDA-FSA certified planted acres ** TAMUS AgriLife Research Beaumont Crop survey data *** Texas Rice Research Foundation check-off collections
# Modified to account for carryover stocks ## Estimated

***Table 41.*** 16-year Texas rice-planted acres* comparison.

| County | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Chambers** | 20,906 | 20,411 | 21,672 | 17,197 | 11,432 | 13,438 | 13,202 | 10,937 | 16,024 | 12,792 | 8,088 | 8,180 | 13,048 | 1,262 | 11,191 | 11,555 |
| **Brazoria** | 16,818 | 21,888 | 18,718 | 19,241 | 17,163 | 15,279 | 14,077 | 10,395 | 15,748 | 15,976 | 12,997 | 11,461 | 14,833 | 16,452 | 17,366 | 17,604 |
| **Jackson** | 25,235 | 20,521 | 20,128 | 18,355 | 16,208 | 14,953 | 14,005 | 13,057 | 14,734 | 12,713 | 9,929 | 10,115 | 9,519 | 11,350 | 11,042 | 11,739 |
| **Jefferson** | 26,102 | 24,947 | 24,422 | 22,655 | 18,519 | 18,575 | 18,389 | 15,037 | 19,954 | 19,355 | 14,234 | 14,112 | 15,641 | 13,749 | 17,264 | 16,949 |
| **Wharton** | 58,930 | 50,737 | 57,530 | 55,253 | 52,205 | 50,520 | 49,958 | 41,664 | 53,413 | 50,678 | 35,417 | 34,928 | 38,699 | 43,064 | 45,024 | 41,656 |
| **Liberty** | 11,071 | 14,074 | 18,706 | 14,328 | 8,740 | 12,705 | 9,714 | 7,949 | 10,475 | 9,381 | 5,440 | 4,387 | 7,579 | 7,227 | 7,812 | 7,030 |
| **Colorado** | 36,200 | 36,091 | 35,698 | 33,522 | 31,136 | 32,110 | 30,734 | 28,572 | 33,273 | 30,903 | 25,465 | 26,517 | 30,776 | 31,587 | 32,116 | 34,281 |
| **Harris** | 6,654 | 6,484 | 6,187 | 4,875 | 2,957 | 1,975 | 2,083 | 1,664 | 1,522 | 1,067 | 195 | 192 | 395 | | | |
| **Calhoun** | 4,760 | 2,511 | 3,851 | 3,164 | 1,568 | 1,468 | 1,498 | 1,897 | 2,488 | 2,439 | 2,767 | 2,086 | 2,803 | 2,154 | 2,177 | 2,249 |
| **Fort Bend** | 9,418 | 10,680 | 10,179 | 9,006 | 8,894 | 8,652 | 8,615 | 6,071 | 7,933 | 6,409 | 4,496 | 4,925 | 4,358 | 5,589 | 4,857 | 4,869 |
| **Matagorda** | 26,692 | 26,814 | 30,518 | 28,598 | 23,036 | 24,958 | 24,516 | 18,878 | 23,672 | 21,863 | 18,075 | 16,913 | 17,979 | 24,594 | 25,103 | 21,479 |
| **Victoria** | 2,775 | 2,941 | 3,302 | 2,401 | 1,937 | 1,977 | 1,748 | 1,247 | 1,356 | 1,705 | 564 | | 1,081 | 1,771 | 1,922 | 1,851 |
| **Lavaca** | 3,703 | 2,682 | 2,452 | 2,006 | 2,523 | 1,746 | 1,790 | 1,582 | 2,189 | 1,804 | 1,039 | 1,029 | 1,255 | 1,057 | 1,401 | 1,280 |
| **Galveston** | 2,144 | 2,110 | 1,993 | 1,590 | 1,360 | 768 | 1,166 | 781 | 847 | 833 | 314 | 300 | 654 | 1,527 | 463 | 951 |
| **Orange** | 732 | 750 | 2,248 | 362 | 531 | 354 | 682 | 0 | 90 | | | | | | | |
| **Austin** | 2,479 | 2,878 | 2,673 | 2,702 | 2,435 | 2,601 | 1,694 | 1,684 | 2,313 | 2,359 | 904 | 1,003 | 959 | 1,036 | 1,111 | 1,166 |
| **Bowie** | 1,600 | 1,136 | 1,329 | 1,538 | 1,030 | 1,435 | 1,287 | 1,332 | 1,510 | 2,054 | 608 | 284 | 569 | 517 | 881 | 429 |
| **Red River** | 47 | 951 | 941 | 1,100 | 709 | 965 | 1,017 | 587 | 639 | 639 | 440 | | | | | |
| **Waller** | 5,677 | 6,741 | 6,694 | 6,142 | 6,206 | 6,951 | 7,038 | 7,168 | 7,868 | 7,672 | 6,260 | 6,038 | 6,508 | 6,379 | 6,288 | 6,051 |
| **Hardin** | 714 | 899 | 1,185 | 1,052 | 1,093 | 801 | 633 | 738 | 762 | 298 | 235 | 670 | 950 | 460 | 504 | 313 |
| **Hopkins** | 750 | 700 | 1,563 | 1,141 | 1,562 | 1,473 | 1,034 | 713 | 0 | | | | | 0 | | 105 |
| **Robertson** | | | | | | | | | | 87 | 81 | 159 | 200 | | | |
| **Lamar** | | | | | | | | | | | | | 203 | 215 | | 204 |
| **Cameron** | | | | | | | | | | | | | 30 | | | |
| **Total** | **263,407** | **256,944** | **271,989** | **246,227** | **211,241** | **213,703** | **204,880** | **171,953** | **216,810** | **201,024** | **147,549** | **143,298** | **168,038** | **169,989** | **186,523** | **181,763** |

*USDA–FSA certified planted acres

# ATTACHMENT D
# MODEL TO CALCULATE RICE WATER USE AND TOTAL IRRIGATION FOR SOUTHEASTERN RICE-PRODUCING COUNTIES

**DRAFT**

**Attachment D**

**Model to Calculate Rice Water Use and Total Irrigation for Southeastern Rice-Producing Counties**

| Line | Parameter | Units | 2010/2011 | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | U.S. Rice Production[1] | lbs | 25,000,000,000 | 27,524,411,927 | 30,055,052,023 | 32,352,245,997 | 34,260,849,768 | 35,655,796,001 | 36,786,440,837 |
| 2 | % Global Rice Produced by U.S.[2] | % | 2% | 2% | 2% | 2% | 2% | 2% | 2% |
| 3 | Global Rice Demand[3] | lbs | 1,250,000,000,000 | 1,376,220,596,352 | 1,502,752,601,133 | 1,617,612,299,871 | 1,713,042,488,396 | 1,782,789,800,049 | 1,839,322,041,874 |
| 4 | Global Population Projections[4] | People | 7,084,321,722 | 7,799,671,572 | 8,516,786,316 | 9,167,748,763 | 9,708,595,289 | 10,103,885,205 | 10,424,279,276 |
| 5 | Per-Capita Rice Demands[5] | lbs/person | 176 | 176 | 176 | 176 | 176 | 176 | 176 |
| 6 | Per Acre Yields[6] | lbs/acre | 6,969 | 7,606 | 8,315 | 9,024 | 9,733 | 10,441 | 11,150 |
| 7 | Texas Rice Production[7] | lbs | 1,266,707,900 | 1,394,615,601 | 1,522,838,873 | 1,639,233,824 | 1,735,939,562 | 1,806,619,139 | 1,863,907,009 |
| 8 | % Global Rice Produced by Texas[8] | % | 0.1013% | 0.1013% | 0.1013% | 0.1013% | 0.1013% | 0.1013% | 0.1013% |
| 9 | **Western and Other Rice-Producing Counties[9]** | | | | | | | | |
| 10 | Rice Irrigation Demands[10] | af/yr | 595,021 | 575,004 | 554,987 | 534,970 | 514,953 | 494,936 | 474,919 |
| 11 | Estimated Gross Irrigation Rate[11] | in/yr | 56.0 | 56.0 | 56.0 | 56.0 | 56.0 | 56.0 | 56.0 |
| 12 | Rice-Planted Acreage[12] | acres | 127,505 | 123,215 | 118,926 | 114,636 | 110,347 | 106,058 | 101,768 |
| 13 | Rice Production[13] | lbs | 888,579,109 | 937,174,377 | 988,867,908 | 1,034,479,131 | 1,074,008,046 | 1,107,348,595 | 1,134,717,182 |
| 14 | **Southeastern Rice-Producing Counties[14]** | | | | | | | | |
| 15 | Rice Production[15] | lbs | 378,128,791 | 457,441,225 | 533,970,965 | 604,754,692 | 661,931,516 | 699,270,544 | 729,189,827 |
| 16 | Rice-Planted Acreage[16] | acres | 54,259 | 60,142 | 64,218 | 67,016 | 68,009 | 66,974 | 65,398 |
| 17 | Estimated Gross Irrigation Rate[17] | in/yr | 60.0 | 60.0 | 60.0 | 60.0 | 60.0 | 60.0 | 60.0 |
| 18 | Rice Irrigation Demands[18] | af/yr | 271,293 | 300,711 | 321,089 | 335,081 | 340,045 | 334,868 | 326,991 |
| 19 | **Rice Irrigation Demand for Region I Rice-Producing Counties[19]** | | | | | | | | |
| 20 | Hardin County | af/yr | 2,159 | 2,393 | 2,555 | 2,666 | 2,706 | 2,665 | 2,602 |
| 21 | Jefferson County | af/yr | 121,928 | 135,149 | 144,307 | 150,596 | 152,827 | 150,500 | 146,960 |
| 22 | Orange County | af/yr | 3,365 | 3,730 | 3,983 | 4,156 | 4,218 | 4,153 | 4,056 |
| 23 | **Proposed Irrigation Revisions for Region I Rice-Producing Counties[20]** | | | | | | | | |
| 24 | Hardin County | af/yr | 3,080 | 3,414 | 3,645 | 3,804 | 3,861 | 3,802 | 3,712 |
| 25 | Jefferson County | af/yr | 122,652 | 135,952 | 145,165 | 151,490 | 153,735 | 151,394 | 147,833 |
| 26 | Orange County | af/yr | 3,365 | 3,730 | 3,983 | 4,156 | 4,218 | 4,153 | 4,056 |

**Footnotes:**

[1] **U.S. Rice Production**. The 2010 total production was sourced from the *USDA Agricultural Projections to 2021.* Decadal Projections for 2020-2070 were calculated by multiplying global rice demand (Line 3) by the percent of global rice produced by the U.S. (Line 2).

[2] **Percent Global Rice Produced by U.S**. The current percentage of global rice demand met by U.S. production is 2%, as sourced from the USDA Rice Projections 2008-17 Market Outlook. This percentage has been held constant throughout the planning period, based on information provided by Dr. Lloyd T. (Ted) Wilson of the AgriLife Research & Extension Center in Beaumont, Texas.

[3] **Global Rice Demand**. The 2010 global rice demand value was determined by dividing the 2010 U.S. rice production (Line 1) by the 2010 percent U.S. rice production (Line 2). Decadal values for 2020-2070 were then determined by multiplying the per-capita rice production value for each decade (Line 5) by the global population projection (Line 4) for the same decade.

[4] **Global Population Projections**. Population projections for each decade were sourced from the United Nations Department of Economic and Social Affairs.

[5] **Per-Capita Rice Demand**. The 2010 estimated per-capita demand for rice was determined by dividing the global rice demand in 2010 (Line 3) by the 2010 global population. The per-capita value for all decades was assumed to be constant and was established at the 2010 value.

[6] **Per Acre Yields**. The 2011 per-acre yield (Yield) was sourced from the AgriLife Research Document. Based on personal correspondence with Dr. Wilson, yields are expected to increase by 60% over the planning period, enabling an estimate of the yield for 2070 at 1.6 X Yield for 2011. Decadal values for 2020-2060 were determined by linear interpolation between the 2011 and 2070 values.

[7] **Texas Rice Production**. The 2011 Texas rice production was sourced from the AgriLife Research Document. Decadal projections for 2020-2070 were calculated by multiplying the global rice demand (Line 3) by the Texas contribution to the global rice market (Line 8).

[8] **Percent Global Rice Produced by Texas**. The current percentage of rice produced by Texas for the global market was calculated by dividing the 2010 Texas Rice Production (Line 7) by the 2010 Global Rice Demand (Line 3). This value was held constant throughout the planning period.

[9] **Western and Other Rice-Producing Counties.** These counties include all rice-producing counties in Regions D, G, K, L, and P, Harris County, and all rice-producing Region H counties west of Harris County. Table 3 in the Technical Memorandum identifies these 18 counties. Lines 10-13 provide relevant model inputs for Western and Other Rice-Producing Counties.

[10] **Rice Irrigation Demands for Western and Other Rice-Producing Counties**. The 2010 rice irrigation demand value was determined by summing the average historical rice water use estimates (2005-2010) for Western and Other Rice-Producing Counties. Decadal water use projections from 2020 to 2070 were provided by the TWDB for these counties. The Western and Other Rice-Producing Counties projections for each decade were summed to determine Western and Other Rice-Producing Counties irrigation demands for each decade.

[11] **Estimated Gross Irrigation Rate for Western and Other Rice-Producing Counties**. The irrigation rates for the Western and Other Rice-Producing Counties were estimated based on historical rice irrigation rates for each county provided by the TWDB (51 in/yr), coupled with an approximate 10% increase to allow for drought-year planning.

[12] **Rice-Planted Acreage for Western and Other Rice-Producing Counties**. Decadal values were determined by multiplying the rice irrigation demands (Line 10) by 12 and dividing by the average gross irrigation rate (Line 11).

[13] **Rice Production for Western and Other Rice-Producing Counties**. Decadal values were determined by multiplying the rice planted acres (Line 11) by the yield for each decade (Line 6).

[14] **Southeastern Rice-Producing Counties.** The Southeastern Rice-Producing Counties are located east of Harris County in Regions H and I. Included are Hardin, Jefferson, and Orange Counties (Region I), and Chambers and Liberty Counties (Region H). Lines 15-18 provide relevant model inputs for Southeastern Rice-Producing Counties.

[15] **Rice Production for Southeastern Rice-Producing Counties**. Decadal values were calculated by subtracting Rice Production for Western and Other Rice-Producing Counties (Line 13) from Texas Rice Production (Line 7).

[16] **Rice-Planted Acreage for Southeastern Rice-Producing Counties**. Decadal values were calculated by dividing the rice production for Southeastern Rice-Producing Counties (Line 15) by the yield for each decade (Line 6).

[17] **Estimated Gross Irrigation Rate for Southeastern Rice-Producing Counties**. The irrigation rates for the Southeastern Rice-Producing Counties were estimated based on historical rice irrigation rates for each county provided by the TWDB (55 in/yr), coupled with an approximate 10% increase to allow for drought-year planning.

[18] **Rice Irrigation Demands for Southeastern Rice-Producing Counties**. Calculated by multiplying the rice-planted acreage (Line 16) by the average gross irrigation rate for Southeastern Rice-Producing Counties (Line 17)

[19] **Rice Irrigation Demand for Region I Rice-Producing Counties.** Historical (2005-2010) irrigation use estimates were provided by the TWDB and averaged for each rice-producing county. The proportion of rice irrigation water use that each Region I county represents was determined by dividing the average irrigation water use for each county by the total for the Southeastern Rice-Producing Counties. This proportion was multiplied by the decadal Southeastern rice-producing counties rice water demands (Line 18) to calculate the county-specific rice water use for Hardin, Jefferson, and Orange Counties. These values represent the county-specific water demands for only the production of rice.

[20] **Proposed Irrigation Revisions for Region I Rice-Producing Counties**. Calculated by dividing the county-specific rice irrigation demands (Lines 20, 21, and 22) by the percentage of rice-related water demands (in Table 1 of the Technical Memorandum) for each county. This value represents the proposed total irrigation demands for irrigating golf courses and growing crops such as vegetables, hay, grapes, orchards, and rice.

# Attachment 5
# Meeting Summary of Non-Municipal Water Demands in Jefferson County

ALAN PLUMMER ASSOCIATES, INC.
ENVIRONMENTAL ENGINEERS • DESIGNERS • SCIENTISTS

**MEETING SUMMARY**

# East Texas Regional Water Planning Area (Region I)
# Discussion of Non-Municipal Water Demands in Jefferson County
# Meeting Summary

**Prepared For:** East Texas Regional Water Planning Group

**Prepared By:** Rex Hunt, P.E., Alan Plummer Associates

**Date:** September 16, 2012

This is a follow-up to both the RWPG meeting and the subsequent meeting in Beaumont on Thursday, where various non-municipal irrigation projections were discussed. First is a summary of the Thursday meeting, followed by additional suggestions on where we might need to head with respect to the non-municipal projections.

## SUMMARY OF MEETING AT LNVA OFFICES ON SEPTEMBER 13

The meeting was coordinated by Scott Hall, although it was essentially carried out not by him but by several of the local farmers. The purpose of the meeting was to discuss several aspects of ongoing irrigation in Jefferson County and adjoining counties. The following were in attendance:

- Representing the farmers:
  - Bill Dishman, Jr.
  - Herb Dishman
  - Mike Douget
  - Tina Blake
  - Ted Wilson, Texas Agrilife Research Center
  - Pete Kafalas, BP Biofuels North America, LLC
- Representing the Texas Water Development Board
  - Dan Hardin
  - Doug Shaw
- Others present:
  - Scott Hall, LNVA
  - Mike Daws, LNVA
  - Dawn Pilcher, LNVA
  - Jerry Clark, Sabine River Authority

The farmers opened the meeting with a discussion of the status and future of irrigation and livestock water demands in the area in and around Jefferson County. They reported a steady growth and stabilization of rice farming in the area, with prospects that it will continue to grow (for similar reasons to those addressed in the APAI rice memorandum). Row crops are on the increase, especially energy cane

and specialty crops. Attached is a pdf of three handouts provided by the delegation of farmers for the meeting.

**Rice**

Organic rice is a niche market, but steadily increasing. Genetically engineered see rice is also on the increase. It is beginning to move out of areas to the west of Houston and into the Jefferson County area, and is doing better in this area than anyone expected. It should be expected that irrigation demand for rice will increase in the region. The economic impact of rice in this area goes beyond the production and sale of rice. Rice irrigation provides habitat for ducks, and other waterfowl, which supports additional recreational revenue for the region. The habitat also provides replacement for losses of natural wetlands due to population growth and encroachment.

**Energy Cane**

Energy cane is being grown under contracts with BP, who is planning to develop ethanol refineries. The energy cane is a high cellulose crop that grows quickly. The refinery will be developed to deal with the high-cellulose material to develop the ethanol. Approximately 1,000 acres of energy cane are being cultivated at this time; approximately 4,000 acres next year; and 6,000 to 8,000 acres in 2014. Pete Kafalas estimated that by 2020, there could be approximately 52,000 acres of energy cane crops in eastern Jefferson and western Chambers Counties being grown. The farmers indicated that this would not be land that is being used, or would be expected to be used, for rice farming. All water for these crops would be supplied by LNVA. The amount of water needed to grow the energy cane would typically be around 1 foot per year. In dry years, it could be 1.5 feet. The energy cane crops will support a 75 to 92 million gallon per year ethanol refinery to be constructed by BP nearby. In all, BP is planning 6 to 10 such plants along the Gulf Coast from Texas to Florida.

It does not appear that BP is looking at areas in Texas other than this portion of Jefferson and Chambers, although Kafalas did not rule it out. Other energy companies (e.g., Valero or Chevron) may be looking at other counties, such as Orange.

**Specialty Crops**

A number of specialty crops are being grown, or experimented with at this time in the area. These include blueberries, olives, soy beans, eucalyptus, crawfish, etc. Specific irrigation numbers were not provided, but it should be anticipated that there will continue to be an irrigation water demand for such crops.

**Cattle**

Tina Blake is the cattle rancher in the group. Her handout provides specifics of her discussion. Her primary point was that the cattle industry in this area is important to the area and to Texas from an economic perspective.

# Attachment 6
# John Martin Correspondence Regarding Manufacturing and Steam-Electric Demands in Tyler County

## Gonzalez,Lauren

**From:** Hunt, Rex
**Sent:** Sunday, September 16, 2012 3:25 PM
**To:** Gonzalez,Lauren
**Subject:** FW: Non-municipal demand

**Follow Up Flag:** Follow up
**Flag Status:** Completed

**Rex Hunt**
Alan Plummer Associates, Inc.
512.826,1568 (cell)
512.452.5905 (office)
512.687.2155 (office-direct)

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**From:** jmartin@setgcd.org [mailto:jmartin@setgcd.org]
**Sent:** Friday, September 14, 2012 10:54 AM
**To:** 'Lila Fuller'; Hunt, Rex; MichaelHarbordt@suddenlink.net
**Subject:** Non-municipal demand

Hello All,

After having made several phones, the only modifications that I will suggest are for Tyler County, as follows:

East Texas Electric Cooperative is currently building a facility will use an estimated 1,029 acre feet for steam electric production. The facility is expected to come online in late 2014. Please note that it is expect that approximately 1,000 acre feet of that water demand will come from recycling the effluent from the City of Woodville; and

German Pellets of Texas is a manufacturing facility that has a groundwater permit for 430 acre feet per year. This facility is expected to come online in 2013 or early 2014.

Should you have any questions, please do not hesitate to call.

John M. Martin
Southeast Texas Groundwater Conservation District
P.O. Box 1407
Jasper, TX 75951
(409) 383-1577

# Attachment 7
# Kelley Holcomb Correspondence Regarding Mining Demands

ANRA

ANGELINA & NECHES RIVER AUTHORITY

September 19, 2012

Mr. Rex Hunt, APAI
Region I, East Texas Regional Water Planning Group
Alan Plummer Associates, Inc.
6300 La Calma, Suite 400
Austin, Texas 78752

Re: Revised Mining Water Demand Projections for the 2016 Region I Water Plan

Dear Mr. Hunt:

The Angelina & Neches River Authority (ANRA) has contractual water demands for mining purposes in Nacogdoches, Rusk, Sabine, Shelby and San Augustine counties for the portions that lie within the Neches River Basin. Therefore, ANRA would like to revise its water demand projections for inclusion in the 2016 Region I Water Plan. These projections would be above and beyond ANRA's previously stated projections for our Lake Columbia Participants.

These demands are the result of oil & gas operations activities associated with the Haynesville Shale and its outcrop areas within the counties stated above. ANRA has working relationship with two energy companies who have interests in these counties. Their intent is to continue drilling activities based on market demands over the next 20 to 30 year period.

I have attached a table that delineates estimated water demand by county within ANRA's jurisdictional service area. ANRA intends to meet these demands via surface water rights permits and contracts with current water rights holders within those counties. As part of the process of meeting these demands, ANRA will also evaluate the potential for amending its water rights permit for Lake Columbia to reflect these consumptive uses at some point in the future after the reservoir is completed.

If you have any questions, please contact me at 936-633-7543.

Respectfully,

Kelley Holcomb
General Manager

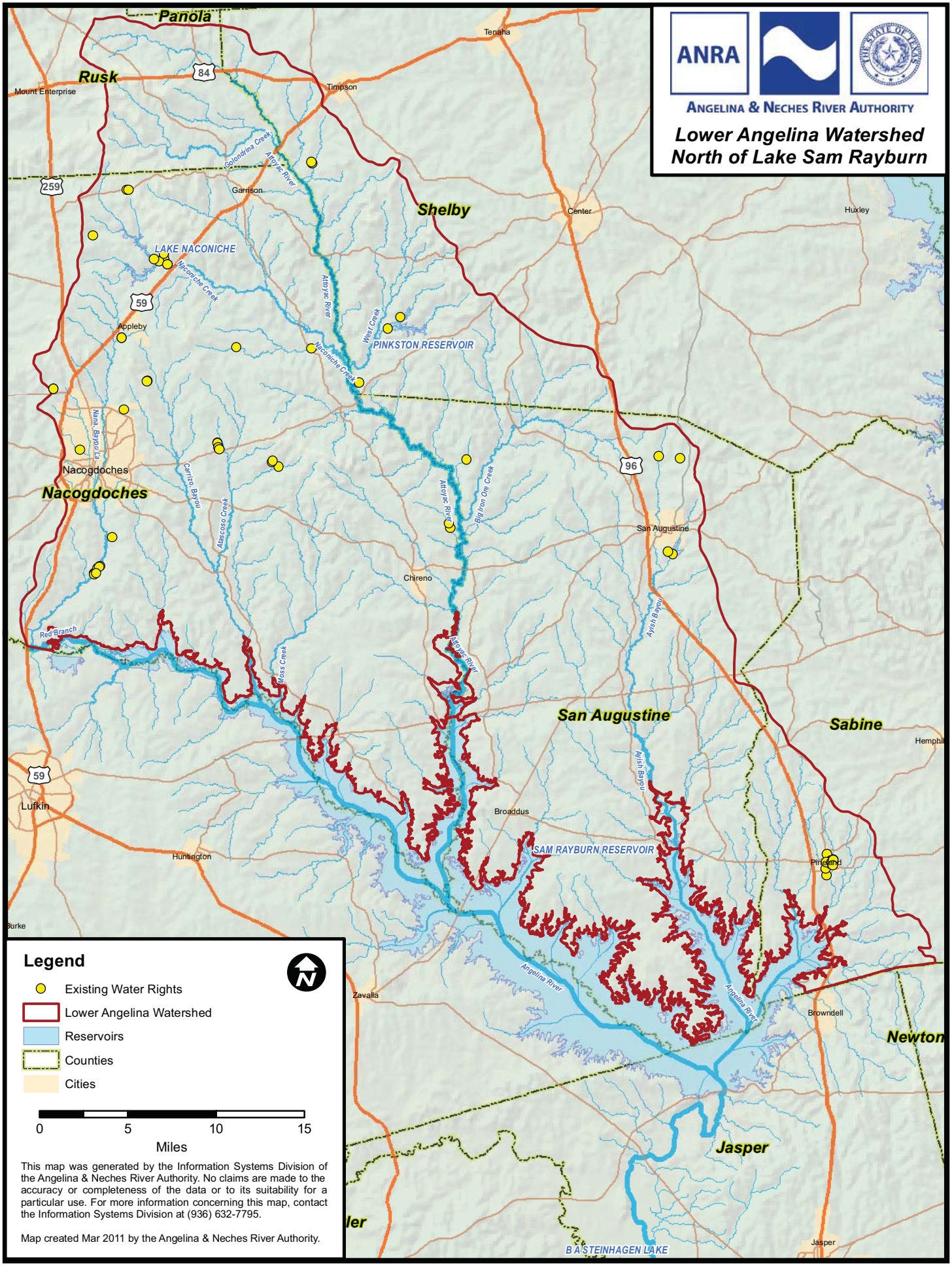
attachment

Post Office Box 387 / 210 Lufkin Avenue / Lufkin, Texas 75902 / 936-632-7795 / Fax 936-632-2564

*Serving the 17 county area of the Angelina & Neches River basins in East Texas*

**Angelina & Neches River Authority**
**Proposed Mining Demands**
**2016 Region I Water Plan**

| | Proposed Mining Water Demands (acre-feet per year) | | | | | |
|---|---|---|---|---|---|---|
| County/WUG | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Nacogdoches | 7,000 | 4,500 | 0 | 0 | 0 | 0 |
| Rusk | 1,000 | 500 | 0 | 0 | 0 | 0 |
| Sabine | 1,500 | 1,000 | | | | |
| Shelby | 1,500 | 1,000 | 0 | 0 | 0 | 0 |
| San Augustine | 4,000 | 3,000 | | | | |
| Total | 15,000 | 10,000 | 0 | 0 | 0 | 0 |


ANRA
ANGELINA & NECHES RIVER AUTHORITY
Lower Angelina Watershed
North of Lake Sam Rayburn
Panola
Rusk
Mount Enterprise
Tenaha
Timpson
84
259
Garrison
Shelby
Center
Huxley
LAKE NACONICHE
Naconiche Creek
59
Appleby
Attoyac River
West Creek
PINKSTON RESERVOIR
Nana Bayou La
Nacogdoches
Nacogdoches
Carrizo Bayou
Alazcoso Creek
Big Iron Ore Creek
96
San Augustine
Chireno
Red Branch
Moss Creek
Ayish Bayou
San Augustine
Sabine
Lufkin
Broaddus
Huntington
SAM RAYBURN RESERVOIR
Pineland
Angelina River
Zavalla
Browndell
Newton
Jasper
B A STEINHAGEN LAKE
Jasper
Legend
Existing Water Rights
Lower Angelina Watershed
Reservoirs
Counties
Cities
0
5
10
15
Miles
This map was generated by the Information Systems Division of the Angelina & Neches River Authority. No claims are made to the accuracy or completeness of the data or to its suitability for a particular use. For more information concerning this map, contact the Information Systems Division at (936) 632-7795.
Map created Mar 2011 by the Angelina & Neches River Authority.

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# Appendix 2-B

# Population Projections DB17 Report

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The following appendix includes a copy of the Population Projections data from the TWDB Data Web Interface known as the DB17. The summary is divided by Water User Group, county, and river basin.

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# Water User Group (WUG) Population

| REGION I | WUG POPULATION | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **ANDERSON COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| BRUSHY CREEK WSC | 1,751 | 1,808 | 1,829 | 1,829 | 1,829 | 1,829 |
| FRANKSTON | 1,263 | 1,305 | 1,320 | 1,320 | 1,320 | 1,320 |
| PALESTINE | 10,022 | 10,351 | 10,471 | 10,471 | 10,471 | 10,471 |
| WALSTON SPRINGS WSC | 2,860 | 2,954 | 2,988 | 2,988 | 2,988 | 2,988 |
| COUNTY-OTHER | 6,218 | 6,421 | 6,495 | 6,495 | 6,495 | 6,495 |
| **NECHES BASIN TOTAL POPULATION** | **22,114** | **22,839** | **23,103** | **23,103** | **23,103** | **23,103** |
| **TRINITY BASIN** | | | | | | |
| BRUSHY CREEK WSC | 1,028 | 1,062 | 1,074 | 1,074 | 1,074 | 1,074 |
| ELKHART | 1,431 | 1,478 | 1,496 | 1,496 | 1,496 | 1,496 |
| FOUR PINES WSC | 3,595 | 3,713 | 3,756 | 3,756 | 3,756 | 3,756 |
| PALESTINE | 9,509 | 9,821 | 9,934 | 9,934 | 9,934 | 9,934 |
| THE CONSOLIDATED WSC | 1,669 | 1,724 | 1,744 | 1,744 | 1,744 | 1,744 |
| WALSTON SPRINGS WSC | 1,142 | 1,180 | 1,193 | 1,193 | 1,193 | 1,193 |
| COUNTY-OTHER | 20,528 | 21,200 | 21,446 | 21,446 | 21,446 | 21,446 |
| **TRINITY BASIN TOTAL POPULATION** | **38,902** | **40,178** | **40,643** | **40,643** | **40,643** | **40,643** |
| **ANDERSON COUNTY TOTAL POPULATION** | **61,016** | **63,017** | **63,746** | **63,746** | **63,746** | **63,746** |
| **ANGELINA COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| ANGELINA WSC | 2,999 | 3,209 | 3,385 | 3,546 | 3,689 | 3,817 |
| BURKE | 793 | 849 | 895 | 938 | 976 | 1,009 |
| CENTRAL WCID OF ANGELINA COUNTY | 6,876 | 7,357 | 7,761 | 8,129 | 8,459 | 8,751 |
| DIBOLL | 5,137 | 5,496 | 5,798 | 6,073 | 6,320 | 6,538 |
| FOUR WAY SUD | 5,666 | 6,062 | 6,395 | 6,699 | 6,971 | 7,211 |
| HUDSON | 5,088 | 5,444 | 5,743 | 6,016 | 6,260 | 6,476 |
| HUDSON WSC | 6,045 | 6,469 | 6,824 | 7,148 | 7,438 | 7,695 |
| HUNTINGTON | 2,278 | 2,438 | 2,571 | 2,694 | 2,803 | 2,900 |
| LUFKIN | 37,713 | 40,352 | 42,567 | 44,589 | 46,398 | 48,000 |
| REDLAND WSC | 2,594 | 2,776 | 2,928 | 3,067 | 3,192 | 3,302 |
| ZAVALLA | 767 | 821 | 866 | 907 | 944 | 976 |
| COUNTY-OTHER | 17,360 | 18,575 | 19,596 | 20,526 | 21,358 | 22,097 |
| **NECHES BASIN TOTAL POPULATION** | **93,316** | **99,848** | **105,329** | **110,332** | **114,808** | **118,772** |
| **ANGELINA COUNTY TOTAL POPULATION** | **93,316** | **99,848** | **105,329** | **110,332** | **114,808** | **118,772** |
| **CHEROKEE COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| ALTO | 1,341 | 1,470 | 1,597 | 1,749 | 1,907 | 2,079 |
| ALTO RURAL WSC | 3,272 | 3,588 | 3,898 | 4,267 | 4,655 | 5,074 |
| BULLARD | 52 | 57 | 62 | 68 | 74 | 80 |
| CRAFT-TURNEY WSC | 5,195 | 5,696 | 6,188 | 6,775 | 7,390 | 8,055 |
| JACKSONVILLE | 15,914 | 17,451 | 18,959 | 20,756 | 22,640 | 24,677 |
| NEW SUMMERFIELD | 1,216 | 1,334 | 1,449 | 1,586 | 1,730 | 1,886 |
| NORTH CHEROKEE WSC | 4,901 | 5,375 | 5,839 | 6,392 | 6,973 | 7,600 |

# Water User Group (WUG) Population

| REGION I | WUG POPULATION | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **CHEROKEE COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| RUSK | 6,074 | 6,661 | 7,236 | 7,922 | 8,641 | 9,419 |
| RUSK RURAL WSC | 3,592 | 3,938 | 4,279 | 4,684 | 5,109 | 5,569 |
| SOUTHERN UTILITIES COMPANY | 2,805 | 3,076 | 3,341 | 3,658 | 3,990 | 4,349 |
| TROUP | 67 | 74 | 80 | 88 | 95 | 104 |
| WELLS | 865 | 948 | 1,030 | 1,128 | 1,230 | 1,341 |
| WRIGHT CITY WSC | 601 | 659 | 716 | 784 | 855 | 932 |
| COUNTY-OTHER | 9,739 | 10,678 | 11,603 | 12,703 | 13,859 | 15,104 |
| **NECHES BASIN TOTAL POPULATION** | **55,634** | **61,005** | **66,277** | **72,560** | **79,148** | **86,269** |
| **CHEROKEE COUNTY TOTAL POPULATION** | **55,634** | **61,005** | **66,277** | **72,560** | **79,148** | **86,269** |
| **HARDIN COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| KOUNTZE | 2,129 | 2,135 | 2,139 | 2,142 | 2,145 | 2,147 |
| LUMBERTON | 14,314 | 16,522 | 18,093 | 19,252 | 20,158 | 20,838 |
| LUMBERTON MUD | 8,547 | 9,053 | 9,413 | 9,679 | 9,887 | 10,043 |
| NORTH HARDIN WSC | 7,821 | 8,344 | 8,716 | 8,991 | 9,206 | 9,367 |
| SILSBEE | 6,772 | 6,922 | 7,029 | 7,108 | 7,170 | 7,217 |
| SOUR LAKE | 1,921 | 2,022 | 2,094 | 2,147 | 2,189 | 2,220 |
| WEST HARDIN WSC | 3,999 | 4,020 | 4,035 | 4,046 | 4,055 | 4,062 |
| COUNTY-OTHER | 13,642 | 14,611 | 15,300 | 15,807 | 16,201 | 16,498 |
| **NECHES BASIN TOTAL POPULATION** | **59,145** | **63,629** | **66,819** | **69,172** | **71,011** | **72,392** |
| **TRINITY BASIN** | | | | | | |
| LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY | 134 | 152 | 165 | 175 | 183 | 189 |
| WEST HARDIN WSC | 53 | 53 | 53 | 53 | 53 | 53 |
| COUNTY-OTHER | 145 | 152 | 157 | 160 | 163 | 164 |
| **TRINITY BASIN TOTAL POPULATION** | **332** | **357** | **375** | **388** | **399** | **406** |
| **HARDIN COUNTY TOTAL POPULATION** | **59,477** | **63,986** | **67,194** | **69,560** | **71,410** | **72,798** |
| **HENDERSON COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| ATHENS | 275 | 295 | 312 | 334 | 353 | 372 |
| BERRYVILLE | 1,088 | 1,191 | 1,277 | 1,390 | 1,488 | 1,583 |
| BETHEL-ASH WSC | 3,186 | 3,602 | 3,949 | 4,407 | 4,803 | 5,187 |
| BROWNSBORO | 1,366 | 1,664 | 1,913 | 2,241 | 2,525 | 2,800 |
| BRUSHY CREEK WSC | 758 | 814 | 861 | 923 | 977 | 1,028 |
| CHANDLER | 3,589 | 4,370 | 5,020 | 5,878 | 6,620 | 7,339 |
| FRANKSTON | 44 | 67 | 86 | 111 | 133 | 154 |
| MURCHISON | 596 | 598 | 600 | 602 | 604 | 606 |
| R-P-M WSC | 703 | 839 | 952 | 1,102 | 1,231 | 1,356 |
| VIRGINIA HILL WSC | 1,825 | 2,095 | 2,320 | 2,617 | 2,874 | 3,123 |

# Water User Group (WUG) Population

| REGION I | WUG POPULATION | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **HENDERSON COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| COUNTY-OTHER | 11,374 | 11,109 | 10,887 | 10,594 | 10,340 | 10,096 |
| **NECHES BASIN TOTAL POPULATION** | **24,804** | **26,644** | **28,177** | **30,199** | **31,948** | **33,644** |
| **HENDERSON COUNTY TOTAL POPULATION** | **24,804** | **26,644** | **28,177** | **30,199** | **31,948** | **33,644** |
| **HOUSTON COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| GRAPELAND | 597 | 600 | 601 | 601 | 601 | 601 |
| THE CONSOLIDATED WSC | 3,710 | 3,742 | 3,742 | 3,742 | 3,742 | 3,742 |
| COUNTY-OTHER | 188 | 173 | 172 | 172 | 172 | 172 |
| **NECHES BASIN TOTAL POPULATION** | **4,495** | **4,515** | **4,515** | **4,515** | **4,515** | **4,515** |
| **TRINITY BASIN** | | | | | | |
| CROCKETT | 7,073 | 7,105 | 7,105 | 7,105 | 7,105 | 7,105 |
| GRAPELAND | 922 | 927 | 927 | 927 | 927 | 927 |
| LOVELADY | 681 | 690 | 690 | 690 | 690 | 690 |
| THE CONSOLIDATED WSC | 10,121 | 10,187 | 10,188 | 10,188 | 10,188 | 10,188 |
| COUNTY-OTHER | 859 | 836 | 835 | 835 | 835 | 835 |
| **TRINITY BASIN TOTAL POPULATION** | **19,656** | **19,745** | **19,745** | **19,745** | **19,745** | **19,745** |
| **HOUSTON COUNTY TOTAL POPULATION** | **24,151** | **24,260** | **24,260** | **24,260** | **24,260** | **24,260** |
| **JASPER COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| JASPER | 7,839 | 8,012 | 8,045 | 8,045 | 8,045 | 8,045 |
| COUNTY-OTHER | 14,226 | 14,541 | 14,601 | 14,601 | 14,601 | 14,601 |
| **NECHES BASIN TOTAL POPULATION** | **22,065** | **22,553** | **22,646** | **22,646** | **22,646** | **22,646** |
| **SABINE BASIN** | | | | | | |
| JASPER COUNTY WCID #1 | 2,995 | 3,062 | 3,074 | 3,074 | 3,074 | 3,074 |
| KIRBYVILLE | 2,213 | 2,262 | 2,271 | 2,271 | 2,271 | 2,271 |
| MAURICEVILLE SUD | 429 | 439 | 440 | 440 | 440 | 440 |
| COUNTY-OTHER | 9,176 | 9,379 | 9,418 | 9,418 | 9,418 | 9,418 |
| **SABINE BASIN TOTAL POPULATION** | **14,813** | **15,142** | **15,203** | **15,203** | **15,203** | **15,203** |
| **JASPER COUNTY TOTAL POPULATION** | **36,878** | **37,695** | **37,849** | **37,849** | **37,849** | **37,849** |
| **JEFFERSON COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| BEAUMONT | 42,378 | 45,111 | 47,983 | 51,321 | 55,003 | 59,125 |
| BEVIL OAKS | 1,351 | 1,438 | 1,529 | 1,636 | 1,753 | 1,884 |
| CHINA | 22 | 24 | 25 | 27 | 29 | 31 |
| GROVES | 500 | 500 | 500 | 500 | 500 | 500 |
| JEFFERSON COUNTY WCID #10 | 856 | 911 | 969 | 1,036 | 1,111 | 1,194 |
| MEEKER MUD | 836 | 889 | 946 | 1,012 | 1,084 | 1,166 |
| NEDERLAND | 670 | 713 | 758 | 811 | 869 | 934 |
| NOME | 399 | 424 | 451 | 482 | 517 | 556 |

# Water User Group (WUG) Population

| REGION I | WUG POPULATION | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **JEFFERSON COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| PORT ARTHUR | 171 | 173 | 173 | 173 | 173 | 173 |
| PORT NECHES | 7,183 | 7,646 | 8,133 | 8,699 | 9,323 | 10,022 |
| COUNTY-OTHER | 784 | 877 | 978 | 1,091 | 1,217 | 1,359 |
| **NECHES BASIN TOTAL POPULATION** | **55,150** | **58,706** | **62,445** | **66,788** | **71,579** | **76,944** |
| **NECHES-TRINITY BASIN** | | | | | | |
| BEAUMONT | 83,002 | 88,354 | 93,980 | 100,517 | 107,727 | 115,802 |
| CHINA | 1,208 | 1,285 | 1,368 | 1,462 | 1,567 | 1,685 |
| GROVES | 15,644 | 15,644 | 15,644 | 15,644 | 15,644 | 15,644 |
| JEFFERSON COUNTY WCID #10 | 4,268 | 4,543 | 4,833 | 5,169 | 5,539 | 5,955 |
| MEEKER MUD | 2,497 | 2,659 | 2,828 | 3,024 | 3,241 | 3,484 |
| NEDERLAND | 17,928 | 19,084 | 20,300 | 21,712 | 23,269 | 25,014 |
| NOME | 225 | 240 | 255 | 273 | 292 | 314 |
| PORT ARTHUR | 56,866 | 57,582 | 57,582 | 57,582 | 57,582 | 57,582 |
| PORT NECHES | 6,638 | 7,067 | 7,516 | 8,039 | 8,615 | 9,261 |
| WEST JEFFERSON COUNTY MWD | 8,554 | 9,105 | 9,685 | 10,359 | 11,102 | 11,934 |
| COUNTY-OTHER | 15,399 | 20,351 | 26,308 | 33,233 | 40,873 | 49,422 |
| **NECHES-TRINITY BASIN TOTAL POPULATION** | **212,229** | **225,914** | **240,299** | **257,014** | **275,451** | **296,097** |
| **JEFFERSON COUNTY TOTAL POPULATION** | **267,379** | **284,620** | **302,744** | **323,802** | **347,030** | **373,041** |
| **NACOGDOCHES COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| APPLEBY WSC | 3,638 | 4,087 | 4,530 | 5,001 | 5,499 | 6,020 |
| CUSHING | 685 | 769 | 852 | 941 | 1,035 | 1,133 |
| D&M WSC | 6,239 | 7,009 | 7,768 | 8,575 | 9,430 | 10,323 |
| GARRISON | 1,001 | 1,125 | 1,246 | 1,376 | 1,513 | 1,656 |
| LILLY GROVE SUD | 3,075 | 3,454 | 3,828 | 4,226 | 4,648 | 5,088 |
| MELROSE WSC | 3,468 | 3,897 | 4,318 | 4,767 | 5,242 | 5,739 |
| NACOGDOCHES | 36,889 | 41,442 | 45,930 | 50,706 | 55,758 | 61,040 |
| SWIFT WSC | 2,795 | 3,140 | 3,480 | 3,842 | 4,225 | 4,625 |
| WODEN WSC | 2,694 | 3,026 | 3,354 | 3,702 | 4,071 | 4,457 |
| COUNTY-OTHER | 11,652 | 13,091 | 14,509 | 16,019 | 17,614 | 19,283 |
| **NECHES BASIN TOTAL POPULATION** | **72,136** | **81,040** | **89,815** | **99,155** | **109,035** | **119,364** |
| **NACOGDOCHES COUNTY TOTAL POPULATION** | **72,136** | **81,040** | **89,815** | **99,155** | **109,035** | **119,364** |
| **NEWTON COUNTY** | | | | | | |
| **SABINE BASIN** | | | | | | |
| MAURICEVILLE SUD | 390 | 390 | 390 | 390 | 390 | 390 |
| NEWTON | 2,478 | 2,478 | 2,478 | 2,478 | 2,478 | 2,478 |
| SOUTH NEWTON WSC | 2,622 | 2,622 | 2,622 | 2,622 | 2,622 | 2,622 |
| COUNTY-OTHER | 8,955 | 8,955 | 8,955 | 8,955 | 8,955 | 8,955 |
| **SABINE BASIN TOTAL POPULATION** | **14,445** | **14,445** | **14,445** | **14,445** | **14,445** | **14,445** |
| **NEWTON COUNTY TOTAL POPULATION** | **14,445** | **14,445** | **14,445** | **14,445** | **14,445** | **14,445** |

# Water User Group (WUG) Population

| REGION I | WUG POPULATION | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **ORANGE COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| BRIDGE CITY | 1,208 | 1,262 | 1,301 | 1,327 | 1,347 | 1,361 |
| MAURICEVILLE SUD | 701 | 733 | 756 | 771 | 782 | 791 |
| ORANGEFIELD WSC | 2,029 | 2,120 | 2,185 | 2,229 | 2,262 | 2,286 |
| PORT ARTHUR | 5 | 5 | 5 | 5 | 5 | 5 |
| ROSE CITY | 530 | 554 | 571 | 582 | 591 | 597 |
| VIDOR | 9,017 | 9,425 | 9,712 | 9,907 | 10,056 | 10,163 |
| COUNTY-OTHER | 13,937 | 14,569 | 15,012 | 15,313 | 15,543 | 15,710 |
| **NECHES BASIN TOTAL POPULATION** | **27,427** | **28,668** | **29,542** | **30,134** | **30,586** | **30,913** |
| **NECHES-TRINITY BASIN** | | | | | | |
| BRIDGE CITY | 968 | 1,011 | 1,042 | 1,063 | 1,079 | 1,091 |
| COUNTY-OTHER | 30 | 33 | 33 | 34 | 34 | 34 |
| **NECHES-TRINITY BASIN TOTAL POPULATION** | **998** | **1,044** | **1,075** | **1,097** | **1,113** | **1,125** |
| **SABINE BASIN** | | | | | | |
| BRIDGE CITY | 6,095 | 6,372 | 6,565 | 6,697 | 6,797 | 6,870 |
| MAURICEVILLE SUD | 8,407 | 8,787 | 9,055 | 9,236 | 9,375 | 9,475 |
| ORANGE | 19,616 | 20,503 | 21,128 | 21,552 | 21,875 | 22,109 |
| ORANGEFIELD WSC | 3,174 | 3,318 | 3,419 | 3,488 | 3,540 | 3,578 |
| PINEHURST | 2,213 | 2,313 | 2,383 | 2,431 | 2,467 | 2,494 |
| SOUTH NEWTON WSC | 1,475 | 1,542 | 1,589 | 1,621 | 1,645 | 1,663 |
| VIDOR | 2,143 | 2,240 | 2,308 | 2,354 | 2,389 | 2,415 |
| WEST ORANGE | 3,632 | 3,797 | 3,912 | 3,991 | 4,051 | 4,094 |
| COUNTY-OTHER | 11,147 | 11,649 | 12,008 | 12,247 | 12,431 | 12,562 |
| **SABINE BASIN TOTAL POPULATION** | **57,902** | **60,521** | **62,367** | **63,617** | **64,570** | **65,260** |
| **ORANGE COUNTY TOTAL POPULATION** | **86,327** | **90,233** | **92,984** | **94,848** | **96,269** | **97,298** |
| **PANOLA COUNTY** | | | | | | |
| **CYPRESS BASIN** | | | | | | |
| COUNTY-OTHER | 55 | 58 | 60 | 61 | 62 | 63 |
| **CYPRESS BASIN TOTAL POPULATION** | **55** | **58** | **60** | **61** | **62** | **63** |
| **SABINE BASIN** | | | | | | |
| BECKVILLE | 968 | 1,084 | 1,155 | 1,221 | 1,271 | 1,310 |
| CARTHAGE | 6,925 | 7,066 | 7,152 | 7,232 | 7,292 | 7,339 |
| GILL WSC | 734 | 756 | 770 | 783 | 793 | 801 |
| TATUM | 333 | 397 | 436 | 472 | 499 | 520 |
| COUNTY-OTHER | 16,096 | 17,017 | 17,581 | 18,104 | 18,495 | 18,799 |
| **SABINE BASIN TOTAL POPULATION** | **25,056** | **26,320** | **27,094** | **27,812** | **28,350** | **28,769** |
| **PANOLA COUNTY TOTAL POPULATION** | **25,111** | **26,378** | **27,154** | **27,873** | **28,412** | **28,832** |
| **POLK COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| CORRIGAN | 1,821 | 2,035 | 2,202 | 2,345 | 2,462 | 2,556 |

# Water User Group (WUG) Population

| REGION I | WUG POPULATION | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **POLK COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| COUNTY-OTHER | 7,138 | 7,973 | 8,632 | 9,192 | 9,650 | 10,018 |
| **NECHES BASIN TOTAL POPULATION** | **8,959** | **10,008** | **10,834** | **11,537** | **12,112** | **12,574** |
| **POLK COUNTY TOTAL POPULATION** | **8,959** | **10,008** | **10,834** | **11,537** | **12,112** | **12,574** |
| **RUSK COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| HENDERSON | 12,984 | 14,473 | 15,920 | 17,474 | 19,089 | 20,763 |
| NEW LONDON | 615 | 685 | 753 | 827 | 904 | 983 |
| OVERTON | 285 | 318 | 349 | 384 | 419 | 456 |
| WRIGHT CITY WSC | 497 | 554 | 610 | 669 | 731 | 795 |
| COUNTY-OTHER | 15,639 | 17,432 | 19,174 | 21,045 | 22,991 | 25,007 |
| **NECHES BASIN TOTAL POPULATION** | **30,020** | **33,462** | **36,806** | **40,399** | **44,134** | **48,004** |
| **SABINE BASIN** | | | | | | |
| CHALK HILL SUD | 3,695 | 4,118 | 4,530 | 4,972 | 5,432 | 5,908 |
| CROSS ROADS SUD | 2,872 | 3,202 | 3,522 | 3,865 | 4,223 | 4,593 |
| EASTON | 58 | 65 | 71 | 78 | 85 | 93 |
| ELDERVILLE WSC | 1,757 | 1,958 | 2,153 | 2,364 | 2,582 | 2,809 |
| HENDERSON | 2,256 | 2,514 | 2,765 | 3,035 | 3,316 | 3,607 |
| KILGORE | 3,349 | 3,733 | 4,106 | 4,507 | 4,924 | 5,355 |
| NEW LONDON | 495 | 552 | 607 | 666 | 727 | 791 |
| OVERTON | 2,354 | 2,623 | 2,886 | 3,167 | 3,460 | 3,764 |
| TATUM | 1,243 | 1,386 | 1,524 | 1,673 | 1,827 | 1,987 |
| WEST GREGG SUD | 188 | 210 | 231 | 253 | 277 | 301 |
| COUNTY-OTHER | 10,985 | 12,244 | 13,468 | 14,784 | 16,151 | 17,568 |
| **SABINE BASIN TOTAL POPULATION** | **29,252** | **32,605** | **35,863** | **39,364** | **43,004** | **46,776** |
| **RUSK COUNTY TOTAL POPULATION** | **59,272** | **66,067** | **72,669** | **79,763** | **87,138** | **94,780** |
| **SABINE COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| G M WSC | 1,427 | 1,433 | 1,434 | 1,434 | 1,434 | 1,434 |
| PINELAND | 881 | 883 | 883 | 883 | 883 | 883 |
| COUNTY-OTHER | 94 | 93 | 92 | 92 | 92 | 92 |
| **NECHES BASIN TOTAL POPULATION** | **2,402** | **2,409** | **2,409** | **2,409** | **2,409** | **2,409** |
| **SABINE BASIN** | | | | | | |
| G M WSC | 5,891 | 5,914 | 5,914 | 5,914 | 5,914 | 5,914 |
| HEMPHILL | 1,295 | 1,304 | 1,304 | 1,304 | 1,304 | 1,304 |
| COUNTY-OTHER | 1,629 | 1,622 | 1,622 | 1,622 | 1,622 | 1,622 |
| **SABINE BASIN TOTAL POPULATION** | **8,815** | **8,840** | **8,840** | **8,840** | **8,840** | **8,840** |
| **SABINE COUNTY TOTAL POPULATION** | **11,217** | **11,249** | **11,249** | **11,249** | **11,249** | **11,249** |

# Water User Group (WUG) Population

| REGION I | WUG POPULATION | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **SAN AUGUSTINE COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| SAN AUGUSTINE | 2,121 | 2,121 | 2,121 | 2,121 | 2,121 | 2,121 |
| COUNTY-OTHER | 6,020 | 6,020 | 6,020 | 6,020 | 6,020 | 6,020 |
| **NECHES BASIN TOTAL POPULATION** | **8,141** | **8,141** | **8,141** | **8,141** | **8,141** | **8,141** |
| **SABINE BASIN** | | | | | | |
| G M WSC | 714 | 714 | 714 | 714 | 714 | 714 |
| COUNTY-OTHER | 62 | 62 | 62 | 62 | 62 | 62 |
| **SABINE BASIN TOTAL POPULATION** | **776** | **776** | **776** | **776** | **776** | **776** |
| **SAN AUGUSTINE COUNTY TOTAL POPULATION** | **8,917** | **8,917** | **8,917** | **8,917** | **8,917** | **8,917** |
| **SHELBY COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| TIMPSON | 44 | 47 | 50 | 53 | 55 | 58 |
| COUNTY-OTHER | 2,864 | 3,081 | 3,271 | 3,452 | 3,621 | 3,777 |
| **NECHES BASIN TOTAL POPULATION** | **2,908** | **3,128** | **3,321** | **3,505** | **3,676** | **3,835** |
| **SABINE BASIN** | | | | | | |
| CENTER | 5,604 | 6,027 | 6,400 | 6,754 | 7,085 | 7,390 |
| JOAQUIN | 890 | 957 | 1,016 | 1,072 | 1,125 | 1,173 |
| TENAHA | 1,252 | 1,347 | 1,430 | 1,509 | 1,583 | 1,651 |
| TIMPSON | 1,203 | 1,294 | 1,374 | 1,450 | 1,521 | 1,586 |
| COUNTY-OTHER | 15,604 | 16,779 | 17,821 | 18,805 | 19,725 | 20,578 |
| **SABINE BASIN TOTAL POPULATION** | **24,553** | **26,404** | **28,041** | **29,590** | **31,039** | **32,378** |
| **SHELBY COUNTY TOTAL POPULATION** | **27,461** | **29,532** | **31,362** | **33,095** | **34,715** | **36,213** |
| **SMITH COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| ARP | 1,017 | 1,066 | 1,115 | 1,168 | 1,222 | 1,278 |
| BULLARD | 3,299 | 4,233 | 5,170 | 6,179 | 7,206 | 8,259 |
| CRYSTAL SYSTEMS INC | 832 | 1,068 | 1,305 | 1,560 | 1,820 | 2,086 |
| DEAN WSC | 4,736 | 4,917 | 5,099 | 5,294 | 5,493 | 5,697 |
| JACKSON WSC | 2,158 | 2,381 | 2,605 | 2,846 | 3,091 | 3,342 |
| LINDALE | 2,099 | 2,704 | 3,311 | 3,964 | 4,629 | 5,311 |
| LINDALE RURAL WSC | 2,831 | 3,079 | 3,328 | 3,596 | 3,869 | 4,149 |
| NEW CHAPEL HILL | 622 | 652 | 682 | 714 | 746 | 779 |
| NOONDAY | 953 | 1,139 | 1,326 | 1,527 | 1,731 | 1,941 |
| OVERTON | 151 | 191 | 231 | 274 | 318 | 363 |
| R-P-M WSC | 292 | 331 | 370 | 412 | 455 | 499 |
| SOUTHERN UTILITIES COMPANY | 36,455 | 38,555 | 40,661 | 42,928 | 45,235 | 47,603 |
| TROUP | 2,005 | 2,212 | 2,420 | 2,644 | 2,872 | 3,105 |
| TYLER | 104,786 | 114,056 | 123,354 | 133,362 | 143,548 | 154,002 |
| WALNUT GROVE WSC | 8,208 | 9,695 | 11,187 | 12,793 | 14,427 | 16,104 |
| WHITEHOUSE | 9,209 | 10,848 | 12,492 | 14,261 | 16,061 | 17,909 |
| WRIGHT CITY WSC | 2,381 | 2,669 | 2,958 | 3,269 | 3,585 | 3,910 |

# Water User Group (WUG) Population

| REGION I | WUG POPULATION | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **SMITH COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| COUNTY-OTHER | 6,986 | 8,783 | 10,582 | 12,521 | 14,495 | 16,522 |
| **NECHES BASIN TOTAL POPULATION** | **189,020** | **208,579** | **228,196** | **249,312** | **270,803** | **292,859** |
| **SMITH COUNTY TOTAL POPULATION** | **189,020** | **208,579** | **228,196** | **249,312** | **270,803** | **292,859** |
| **TRINITY COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| GROVETON | 540 | 584 | 589 | 572 | 599 | 627 |
| COUNTY-OTHER | 3,208 | 3,470 | 3,495 | 3,397 | 3,554 | 3,719 |
| **NECHES BASIN TOTAL POPULATION** | **3,748** | **4,054** | **4,084** | **3,969** | **4,153** | **4,346** |
| **TRINITY COUNTY TOTAL POPULATION** | **3,748** | **4,054** | **4,084** | **3,969** | **4,153** | **4,346** |
| **TYLER COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| COLMESNEIL | 611 | 614 | 614 | 614 | 614 | 614 |
| IVANHOE | 909 | 913 | 913 | 913 | 913 | 913 |
| IVANHOE NORTH | 551 | 554 | 554 | 554 | 554 | 554 |
| LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY | 65 | 65 | 65 | 65 | 65 | 65 |
| TYLER COUNTY WSC | 5,684 | 5,711 | 5,711 | 5,711 | 5,711 | 5,711 |
| WOODVILLE | 2,649 | 2,661 | 2,661 | 2,661 | 2,661 | 2,661 |
| COUNTY-OTHER | 11,819 | 11,878 | 11,878 | 11,878 | 11,878 | 11,878 |
| **NECHES BASIN TOTAL POPULATION** | **22,288** | **22,396** | **22,396** | **22,396** | **22,396** | **22,396** |
| **TYLER COUNTY TOTAL POPULATION** | **22,288** | **22,396** | **22,396** | **22,396** | **22,396** | **22,396** |
| | | | | | | |
| **REGION I TOTAL POPULATION** | **1,151,556** | **1,233,973** | **1,309,681** | **1,388,867** | **1,469,843** | **1,553,652** |

# Appendix 2-C

# Water User Group Demand Projections DB17 Report

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The following appendix includes a copy of the Water Demand Projections data from the TWDB Data Web Interface known as the DB17. The summary is divided by Water User Group, county, and river basin.

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# Water User Group (WUG) Demand

| REGION I | WUG DEMAND (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **ANDERSON COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| BRUSHY CREEK WSC | 149 | 146 | 141 | 138 | 138 | 138 |
| FRANKSTON | 239 | 240 | 238 | 236 | 236 | 236 |
| PALESTINE | 2,588 | 2,626 | 2,620 | 2,600 | 2,596 | 2,596 |
| WALSTON SPRINGS WSC | 291 | 288 | 283 | 277 | 276 | 276 |
| COUNTY-OTHER | 877 | 878 | 867 | 856 | 854 | 854 |
| MANUFACTURING | 14 | 18 | 19 | 20 | 21 | 22 |
| MINING | 64 | 81 | 85 | 68 | 48 | 35 |
| STEAM ELECTRIC POWER | 11,306 | 13,218 | 15,549 | 18,390 | 21,853 | 25,968 |
| LIVESTOCK | 648 | 648 | 648 | 648 | 648 | 648 |
| IRRIGATION | 207 | 207 | 207 | 207 | 207 | 207 |
| **NECHES BASIN TOTAL DEMAND** | **16,383** | **18,350** | **20,657** | **23,440** | **26,877** | **30,980** |
| **TRINITY BASIN** | | | | | | |
| BRUSHY CREEK WSC | 89 | 87 | 84 | 82 | 81 | 81 |
| ELKHART | 249 | 251 | 250 | 247 | 246 | 246 |
| FOUR PINES WSC | 336 | 336 | 331 | 327 | 326 | 325 |
| PALESTINE | 2,457 | 2,492 | 2,484 | 2,465 | 2,462 | 2,462 |
| THE CONSOLIDATED WSC | 189 | 189 | 185 | 182 | 181 | 181 |
| WALSTON SPRINGS WSC | 117 | 116 | 113 | 111 | 111 | 111 |
| COUNTY-OTHER | 2,895 | 2,899 | 2,863 | 2,825 | 2,817 | 2,817 |
| MANUFACTURING | 16 | 22 | 23 | 24 | 25 | 26 |
| MINING | 76 | 96 | 100 | 79 | 57 | 40 |
| LIVESTOCK | 754 | 754 | 754 | 754 | 754 | 754 |
| IRRIGATION | 255 | 255 | 255 | 255 | 255 | 255 |
| **TRINITY BASIN TOTAL DEMAND** | **7,433** | **7,497** | **7,442** | **7,351** | **7,315** | **7,298** |
| **ANDERSON COUNTY TOTAL DEMAND** | **23,816** | **25,847** | **28,099** | **30,791** | **34,192** | **38,278** |
| **ANGELINA COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| ANGELINA WSC | 251 | 251 | 255 | 265 | 275 | 284 |
| BURKE | 156 | 165 | 172 | 180 | 186 | 193 |
| CENTRAL WCID OF ANGELINA COUNTY | 480 | 495 | 522 | 547 | 569 | 589 |
| DIBOLL | 672 | 690 | 707 | 738 | 766 | 792 |
| FOUR WAY SUD | 490 | 509 | 527 | 546 | 566 | 585 |
| HUDSON | 388 | 397 | 406 | 418 | 433 | 448 |
| HUDSON WSC | 407 | 435 | 459 | 481 | 500 | 518 |
| HUNTINGTON | 231 | 236 | 241 | 247 | 257 | 265 |
| LUFKIN | 6,271 | 6,523 | 6,736 | 6,979 | 7,246 | 7,494 |
| REDLAND WSC | 201 | 199 | 208 | 217 | 225 | 232 |
| ZAVALLA | 79 | 81 | 82 | 84 | 87 | 90 |
| COUNTY-OTHER | 1,961 | 1,999 | 2,045 | 2,134 | 2,214 | 2,289 |
| MANUFACTURING | 15,249 | 16,858 | 18,487 | 19,934 | 21,478 | 23,142 |
| MINING | 486 | 585 | 410 | 312 | 237 | 180 |
| STEAM ELECTRIC POWER | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 |
| LIVESTOCK | 648 | 648 | 648 | 648 | 648 | 648 |
| IRRIGATION | 481 | 481 | 481 | 481 | 481 | 481 |
| **NECHES BASIN TOTAL DEMAND** | **29,451** | **31,552** | **33,386** | **35,211** | **37,168** | **39,230** |
| **ANGELINA COUNTY TOTAL DEMAND** | **29,451** | **31,552** | **33,386** | **35,211** | **37,168** | **39,230** |

# Water User Group (WUG) Demand

| REGION I | WUG DEMAND (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **CHEROKEE COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| ALTO | 249 | 266 | 284 | 308 | 335 | 366 |
| ALTO RURAL WSC | 638 | 678 | 734 | 802 | 873 | 951 |
| BULLARD | 11 | 12 | 13 | 14 | 15 | 16 |
| CRAFT-TURNEY WSC | 483 | 502 | 523 | 560 | 609 | 663 |
| JACKSONVILLE | 2,680 | 2,858 | 3,042 | 3,297 | 3,588 | 3,908 |
| NEW SUMMERFIELD | 156 | 166 | 177 | 192 | 209 | 228 |
| NORTH CHEROKEE WSC | 602 | 640 | 681 | 737 | 801 | 873 |
| RUSK | 1,019 | 1,089 | 1,162 | 1,260 | 1,371 | 1,494 |
| RUSK RURAL WSC | 365 | 383 | 402 | 433 | 470 | 512 |
| SOUTHERN UTILITIES COMPANY | 480 | 513 | 546 | 592 | 644 | 701 |
| TROUP | 14 | 15 | 16 | 17 | 18 | 20 |
| WELLS | 139 | 148 | 157 | 170 | 185 | 201 |
| WRIGHT CITY WSC | 69 | 73 | 78 | 84 | 91 | 99 |
| COUNTY-OTHER | 1,139 | 1,205 | 1,277 | 1,379 | 1,500 | 1,633 |
| MANUFACTURING | 413 | 442 | 469 | 492 | 530 | 571 |
| MINING | 295 | 304 | 267 | 204 | 141 | 97 |
| STEAM ELECTRIC POWER | 1,790 | 2,093 | 2,462 | 2,912 | 3,460 | 3,835 |
| LIVESTOCK | 1,681 | 1,681 | 1,681 | 1,681 | 1,681 | 1,681 |
| IRRIGATION | 355 | 355 | 355 | 355 | 355 | 355 |
| **NECHES BASIN TOTAL DEMAND** | **12,578** | **13,423** | **14,326** | **15,489** | **16,876** | **18,204** |
| **CHEROKEE COUNTY TOTAL DEMAND** | **12,578** | **13,423** | **14,326** | **15,489** | **16,876** | **18,204** |
| **HARDIN COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| KOUNTZE | 255 | 246 | 238 | 234 | 234 | 234 |
| LUMBERTON | 1,656 | 1,852 | 1,990 | 2,097 | 2,191 | 2,263 |
| LUMBERTON MUD | 781 | 794 | 802 | 811 | 826 | 838 |
| NORTH HARDIN WSC | 544 | 561 | 586 | 605 | 619 | 630 |
| SILSBEE | 893 | 881 | 869 | 864 | 869 | 875 |
| SOUR LAKE | 280 | 285 | 289 | 292 | 297 | 301 |
| WEST HARDIN WSC | 269 | 270 | 271 | 272 | 273 | 273 |
| COUNTY-OTHER | 1,618 | 1,657 | 1,677 | 1,727 | 1,765 | 1,797 |
| MANUFACTURING | 288 | 318 | 349 | 377 | 407 | 439 |
| MINING | 12 | 12 | 12 | 12 | 12 | 12 |
| LIVESTOCK | 161 | 161 | 161 | 161 | 161 | 161 |
| IRRIGATION | 3,414 | 3,645 | 3,804 | 3,861 | 3,802 | 3,712 |
| **NECHES BASIN TOTAL DEMAND** | **10,171** | **10,682** | **11,048** | **11,313** | **11,456** | **11,535** |
| **TRINITY BASIN** | | | | | | |
| LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY | 10 | 11 | 12 | 12 | 13 | 13 |
| WEST HARDIN WSC | 4 | 4 | 4 | 4 | 4 | 4 |
| COUNTY-OTHER | 18 | 18 | 18 | 18 | 18 | 18 |
| LIVESTOCK | 2 | 2 | 2 | 2 | 2 | 2 |
| **TRINITY BASIN TOTAL DEMAND** | **34** | **35** | **36** | **36** | **37** | **37** |
| **HARDIN COUNTY TOTAL DEMAND** | **10,205** | **10,717** | **11,084** | **11,349** | **11,493** | **11,572** |
| **HENDERSON COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| ATHENS | 57 | 59 | 62 | 66 | 69 | 73 |

# Water User Group (WUG) Demand

| REGION I | WUG DEMAND (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **HENDERSON COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| BERRYVILLE | 118 | 124 | 128 | 137 | 147 | 156 |
| BETHEL-ASH WSC | 325 | 354 | 380 | 419 | 455 | 491 |
| BROWNSBORO | 218 | 260 | 295 | 343 | 386 | 428 |
| BRUSHY CREEK WSC | 65 | 66 | 67 | 70 | 74 | 78 |
| CHANDLER | 608 | 723 | 820 | 954 | 1,073 | 1,189 |
| FRANKSTON | 9 | 13 | 16 | 20 | 24 | 28 |
| MURCHISON | 93 | 91 | 89 | 88 | 88 | 88 |
| R-P-M WSC | 77 | 89 | 98 | 113 | 126 | 138 |
| VIRGINIA HILL WSC | 176 | 193 | 207 | 230 | 252 | 273 |
| COUNTY-OTHER | 1,043 | 957 | 890 | 862 | 837 | 817 |
| MANUFACTURING | 54 | 62 | 70 | 78 | 86 | 95 |
| MINING | 77 | 86 | 77 | 59 | 40 | 28 |
| LIVESTOCK | 1,253 | 1,253 | 1,253 | 1,253 | 1,253 | 1,253 |
| IRRIGATION | 384 | 384 | 384 | 384 | 384 | 384 |
| **NECHES BASIN TOTAL DEMAND** | **4,557** | **4,714** | **4,836** | **5,076** | **5,294** | **5,519** |
| **HENDERSON COUNTY TOTAL DEMAND** | **4,557** | **4,714** | **4,836** | **5,076** | **5,294** | **5,519** |
| **HOUSTON COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| GRAPELAND | 83 | 81 | 79 | 78 | 78 | 78 |
| THE CONSOLIDATED WSC | 421 | 409 | 397 | 390 | 389 | 389 |
| COUNTY-OTHER | 33 | 30 | 29 | 29 | 29 | 29 |
| MANUFACTURING | 12 | 14 | 15 | 16 | 17 | 18 |
| MINING | 113 | 89 | 65 | 42 | 18 | 8 |
| LIVESTOCK | 460 | 502 | 547 | 596 | 649 | 717 |
| IRRIGATION | 331 | 359 | 388 | 421 | 458 | 507 |
| **NECHES BASIN TOTAL DEMAND** | **1,453** | **1,484** | **1,520** | **1,572** | **1,638** | **1,746** |
| **TRINITY BASIN** | | | | | | |
| CROCKETT | 1,281 | 1,253 | 1,226 | 1,211 | 1,209 | 1,209 |
| GRAPELAND | 128 | 125 | 121 | 119 | 118 | 118 |
| LOVELADY | 131 | 130 | 128 | 127 | 126 | 126 |
| THE CONSOLIDATED WSC | 1,146 | 1,111 | 1,078 | 1,060 | 1,056 | 1,056 |
| COUNTY-OTHER | 151 | 142 | 141 | 140 | 140 | 140 |
| MANUFACTURING | 295 | 324 | 352 | 377 | 408 | 442 |
| MINING | 209 | 165 | 122 | 77 | 33 | 14 |
| LIVESTOCK | 1,170 | 1,277 | 1,392 | 1,517 | 1,652 | 1,825 |
| IRRIGATION | 2,658 | 2,876 | 3,115 | 3,380 | 3,672 | 4,071 |
| **TRINITY BASIN TOTAL DEMAND** | **7,169** | **7,403** | **7,675** | **8,008** | **8,414** | **9,001** |
| **HOUSTON COUNTY TOTAL DEMAND** | **8,622** | **8,887** | **9,195** | **9,580** | **10,052** | **10,747** |
| **JASPER COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| JASPER | 1,699 | 1,699 | 1,676 | 1,660 | 1,657 | 1,657 |
| COUNTY-OTHER | 1,500 | 1,472 | 1,431 | 1,405 | 1,399 | 1,399 |
| MANUFACTURING | 91,534 | 94,935 | 97,907 | 100,136 | 100,221 | 100,306 |
| MINING | 70 | 55 | 41 | 27 | 13 | 7 |
| LIVESTOCK | 230 | 230 | 230 | 230 | 230 | 230 |
| IRRIGATION | 23 | 23 | 23 | 23 | 23 | 23 |

# Water User Group (WUG) Demand

| REGION I | WUG DEMAND (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **JASPER COUNTY** | | | | | | |
| **NECHES BASIN TOTAL DEMAND** | **95,056** | **98,414** | **101,308** | **103,481** | **103,543** | **103,622** |
| **SABINE BASIN** | | | | | | |
| JASPER COUNTY WCID #1 | 224 | 212 | 207 | 207 | 207 | 207 |
| KIRBYVILLE | 402 | 401 | 395 | 390 | 390 | 390 |
| MAURICEVILLE SUD | 30 | 30 | 30 | 30 | 30 | 30 |
| COUNTY-OTHER | 967 | 950 | 923 | 906 | 903 | 903 |
| MANUFACTURING | 46 | 47 | 49 | 50 | 50 | 50 |
| MINING | 78 | 63 | 47 | 31 | 15 | 7 |
| LIVESTOCK | 132 | 132 | 132 | 132 | 132 | 132 |
| IRRIGATION | 13 | 13 | 13 | 13 | 13 | 13 |
| **SABINE BASIN TOTAL DEMAND** | **1,892** | **1,848** | **1,796** | **1,759** | **1,740** | **1,732** |
| **JASPER COUNTY TOTAL DEMAND** | **96,948** | **100,262** | **103,104** | **105,240** | **105,283** | **105,354** |
| **JEFFERSON COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| BEAUMONT | 10,035 | 10,466 | 10,959 | 11,627 | 12,440 | 13,367 |
| BEVIL OAKS | 135 | 137 | 139 | 147 | 157 | 169 |
| CHINA | 3 | 3 | 3 | 3 | 4 | 4 |
| GROVES | 70 | 67 | 65 | 64 | 64 | 64 |
| JEFFERSON COUNTY WCID #10 | 75 | 76 | 78 | 81 | 87 | 93 |
| MEEKER MUD | 108 | 112 | 116 | 123 | 131 | 141 |
| NEDERLAND | 87 | 89 | 92 | 97 | 104 | 111 |
| NOME | 48 | 49 | 51 | 53 | 57 | 61 |
| PORT ARTHUR | 60 | 60 | 59 | 59 | 59 | 59 |
| PORT NECHES | 742 | 752 | 770 | 807 | 862 | 926 |
| COUNTY-OTHER | 125 | 135 | 147 | 163 | 181 | 202 |
| MANUFACTURING | 220,094 | 313,727 | 327,169 | 340,618 | 354,075 | 368,065 |
| MINING | 128 | 143 | 161 | 194 | 217 | 243 |
| STEAM ELECTRIC POWER | 13,426 | 15,696 | 18,464 | 21,838 | 25,951 | 30,839 |
| LIVESTOCK | 75 | 75 | 75 | 75 | 75 | 75 |
| IRRIGATION | 11,337 | 11,982 | 12,424 | 12,581 | 12,418 | 12,168 |
| **NECHES BASIN TOTAL DEMAND** | **256,548** | **353,569** | **370,772** | **388,530** | **406,882** | **426,587** |
| **NECHES-TRINITY BASIN** | | | | | | |
| BEAUMONT | 19,654 | 20,497 | 21,464 | 22,771 | 24,365 | 26,181 |
| CHINA | 140 | 143 | 147 | 155 | 164 | 177 |
| GROVES | 2,168 | 2,093 | 2,029 | 2,005 | 1,999 | 1,999 |
| JEFFERSON COUNTY WCID #10 | 373 | 377 | 385 | 404 | 430 | 462 |
| MEEKER MUD | 323 | 333 | 346 | 365 | 391 | 419 |
| NEDERLAND | 2,317 | 2,375 | 2,454 | 2,585 | 2,761 | 2,966 |
| NOME | 27 | 28 | 29 | 31 | 33 | 35 |
| PORT ARTHUR | 19,745 | 19,715 | 19,489 | 19,442 | 19,423 | 19,422 |
| PORT NECHES | 686 | 695 | 711 | 746 | 796 | 854 |
| WEST JEFFERSON COUNTY MWD | 741 | 752 | 772 | 809 | 863 | 927 |
| COUNTY-OTHER | 2,435 | 3,111 | 3,946 | 4,944 | 6,070 | 7,335 |
| MANUFACTURING | 203,164 | 289,594 | 302,002 | 314,416 | 326,839 | 339,752 |
| MINING | 66 | 73 | 83 | 100 | 112 | 125 |
| LIVESTOCK | 868 | 868 | 868 | 868 | 868 | 868 |
| IRRIGATION | 150,615 | 159,183 | 165,066 | 167,154 | 164,976 | 161,665 |

# Water User Group (WUG) Demand

| REGION I | WUG DEMAND (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **JEFFERSON COUNTY** | | | | | | |
| **NECHES-TRINITY BASIN TOTAL DEMAND** | **403,322** | **499,837** | **519,791** | **536,795** | **550,090** | **563,187** |
| **JEFFERSON COUNTY TOTAL DEMAND** | **659,870** | **853,406** | **890,563** | **925,325** | **956,972** | **989,774** |
| **NACOGDOCHES COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| APPLEBY WSC | 655 | 718 | 783 | 858 | 941 | 1,030 |
| CUSHING | 124 | 135 | 147 | 160 | 176 | 192 |
| D&M WSC | 905 | 994 | 1,086 | 1,190 | 1,306 | 1,428 |
| GARRISON | 225 | 247 | 269 | 295 | 324 | 354 |
| LILLY GROVE SUD | 429 | 469 | 511 | 559 | 613 | 671 |
| MELROSE WSC | 504 | 549 | 595 | 650 | 713 | 780 |
| NACOGDOCHES | 6,742 | 7,376 | 8,027 | 8,781 | 9,638 | 10,545 |
| SWIFT WSC | 428 | 465 | 503 | 550 | 603 | 660 |
| WODEN WSC | 330 | 356 | 384 | 418 | 458 | 501 |
| COUNTY-OTHER | 1,185 | 1,294 | 1,427 | 1,570 | 1,720 | 1,881 |
| MANUFACTURING | 2,564 | 2,798 | 3,029 | 3,228 | 3,483 | 3,758 |
| MINING | 7,000 | 4,500 | 1,643 | 1,299 | 958 | 707 |
| STEAM ELECTRIC POWER | 6,911 | 8,079 | 9,504 | 11,241 | 13,358 | 15,874 |
| LIVESTOCK | 4,364 | 4,557 | 4,781 | 5,040 | 5,337 | 5,779 |
| IRRIGATION | 400 | 400 | 400 | 400 | 400 | 400 |
| **NECHES BASIN TOTAL DEMAND** | **32,766** | **32,937** | **33,089** | **36,239** | **40,028** | **44,560** |
| **NACOGDOCHES COUNTY TOTAL DEMAND** | **32,766** | **32,937** | **33,089** | **36,239** | **40,028** | **44,560** |
| **NEWTON COUNTY** | | | | | | |
| **SABINE BASIN** | | | | | | |
| MAURICEVILLE SUD | 28 | 27 | 27 | 27 | 27 | 27 |
| NEWTON | 443 | 434 | 426 | 421 | 420 | 420 |
| SOUTH NEWTON WSC | 177 | 177 | 177 | 177 | 177 | 177 |
| COUNTY-OTHER | 969 | 925 | 887 | 878 | 875 | 875 |
| MANUFACTURING | 568 | 644 | 721 | 791 | 858 | 931 |
| MINING | 429 | 373 | 279 | 209 | 146 | 107 |
| STEAM ELECTRIC POWER | 14,132 | 16,522 | 19,436 | 22,987 | 27,317 | 32,463 |
| LIVESTOCK | 121 | 121 | 121 | 121 | 121 | 121 |
| IRRIGATION | 375 | 375 | 375 | 375 | 375 | 375 |
| **SABINE BASIN TOTAL DEMAND** | **17,242** | **19,598** | **22,449** | **25,986** | **30,316** | **35,496** |
| **NEWTON COUNTY TOTAL DEMAND** | **17,242** | **19,598** | **22,449** | **25,986** | **30,316** | **35,496** |
| **ORANGE COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| BRIDGE CITY | 107 | 106 | 104 | 105 | 106 | 107 |
| MAURICEVILLE SUD | 50 | 50 | 51 | 52 | 53 | 54 |
| ORANGEFIELD WSC | 188 | 192 | 195 | 197 | 199 | 201 |
| PORT ARTHUR | 2 | 2 | 2 | 2 | 2 | 2 |
| ROSE CITY | 86 | 87 | 87 | 89 | 90 | 91 |
| VIDOR | 1,819 | 1,854 | 1,873 | 1,900 | 1,925 | 1,945 |
| COUNTY-OTHER | 1,608 | 1,593 | 1,636 | 1,664 | 1,684 | 1,701 |
| MANUFACTURING | 1,289 | 1,409 | 1,528 | 1,634 | 1,753 | 1,881 |
| MINING | 139 | 141 | 141 | 141 | 144 | 147 |
| STEAM ELECTRIC POWER | 4,966 | 5,805 | 6,829 | 8,077 | 9,598 | 10,637 |
| LIVESTOCK | 68 | 68 | 68 | 68 | 68 | 68 |

# Water User Group (WUG) Demand

| REGION I | WUG DEMAND (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **ORANGE COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| IRRIGATION | 932 | 996 | 1,039 | 1,054 | 1,038 | 1,014 |
| **NECHES BASIN TOTAL DEMAND** | **11,254** | **12,303** | **13,553** | **14,983** | **16,660** | **17,848** |
| **NECHES-TRINITY BASIN** | | | | | | |
| BRIDGE CITY | 86 | 85 | 83 | 84 | 85 | 86 |
| COUNTY-OTHER | 4 | 4 | 4 | 4 | 4 | 4 |
| **NECHES-TRINITY BASIN TOTAL DEMAND** | **90** | **89** | **87** | **88** | **89** | **90** |
| **SABINE BASIN** | | | | | | |
| BRIDGE CITY | 540 | 531 | 522 | 527 | 533 | 538 |
| MAURICEVILLE SUD | 587 | 590 | 609 | 621 | 630 | 636 |
| ORANGE | 2,619 | 2,638 | 2,639 | 2,657 | 2,689 | 2,717 |
| ORANGEFIELD WSC | 293 | 299 | 304 | 308 | 311 | 315 |
| PINEHURST | 282 | 283 | 284 | 289 | 292 | 295 |
| SOUTH NEWTON WSC | 100 | 104 | 107 | 109 | 111 | 112 |
| VIDOR | 433 | 441 | 446 | 452 | 458 | 463 |
| WEST ORANGE | 552 | 557 | 562 | 572 | 580 | 586 |
| COUNTY-OTHER | 1,287 | 1,275 | 1,310 | 1,331 | 1,347 | 1,361 |
| MANUFACTURING | 63,172 | 69,030 | 74,871 | 80,056 | 85,888 | 92,145 |
| MINING | 170 | 173 | 172 | 173 | 175 | 180 |
| LIVESTOCK | 140 | 140 | 140 | 140 | 140 | 140 |
| IRRIGATION | 2,798 | 2,987 | 3,117 | 3,164 | 3,115 | 3,042 |
| **SABINE BASIN TOTAL DEMAND** | **72,973** | **79,048** | **85,083** | **90,399** | **96,269** | **102,530** |
| **ORANGE COUNTY TOTAL DEMAND** | **84,317** | **91,440** | **98,723** | **105,470** | **113,018** | **120,468** |
| **PANOLA COUNTY** | | | | | | |
| **CYPRESS BASIN** | | | | | | |
| COUNTY-OTHER | 5 | 6 | 6 | 6 | 6 | 6 |
| MINING | 6 | 6 | 5 | 4 | 4 | 4 |
| LIVESTOCK | 15 | 15 | 15 | 15 | 15 | 15 |
| **CYPRESS BASIN TOTAL DEMAND** | **26** | **27** | **26** | **25** | **25** | **25** |
| **SABINE BASIN** | | | | | | |
| BECKVILLE | 133 | 144 | 150 | 156 | 162 | 167 |
| CARTHAGE | 1,650 | 1,651 | 1,644 | 1,648 | 1,659 | 1,670 |
| GILL WSC | 85 | 84 | 82 | 83 | 84 | 85 |
| TATUM | 65 | 75 | 81 | 87 | 92 | 96 |
| COUNTY-OTHER | 1,615 | 1,629 | 1,623 | 1,639 | 1,669 | 1,696 |
| MANUFACTURING | 1,393 | 1,454 | 1,513 | 1,564 | 1,667 | 1,777 |
| MINING | 5,910 | 5,853 | 5,044 | 4,264 | 3,616 | 3,934 |
| LIVESTOCK | 1,465 | 1,465 | 1,465 | 1,465 | 1,465 | 1,465 |
| IRRIGATION | 64 | 64 | 64 | 64 | 64 | 64 |
| **SABINE BASIN TOTAL DEMAND** | **12,380** | **12,419** | **11,666** | **10,970** | **10,478** | **10,954** |
| **PANOLA COUNTY TOTAL DEMAND** | **12,406** | **12,446** | **11,692** | **10,995** | **10,503** | **10,979** |
| **POLK COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| CORRIGAN | 225 | 241 | 253 | 269 | 281 | 292 |
| COUNTY-OTHER | 743 | 797 | 840 | 882 | 923 | 957 |
| MANUFACTURING | 604 | 687 | 774 | 854 | 924 | 1,000 |
| MINING | 123 | 97 | 72 | 46 | 20 | 9 |
| LIVESTOCK | 357 | 357 | 357 | 357 | 357 | 357 |

# Water User Group (WUG) Demand

| REGION I | WUG DEMAND (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **POLK COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| IRRIGATION | 428 | 428 | 428 | 428 | 428 | 428 |
| **NECHES BASIN TOTAL DEMAND** | **2,480** | **2,607** | **2,724** | **2,836** | **2,933** | **3,043** |
| **POLK COUNTY TOTAL DEMAND** | **2,480** | **2,607** | **2,724** | **2,836** | **2,933** | **3,043** |
| **RUSK COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| HENDERSON | 3,254 | 3,564 | 3,874 | 4,226 | 4,611 | 5,014 |
| NEW LONDON | 215 | 235 | 257 | 281 | 306 | 333 |
| OVERTON | 61 | 66 | 72 | 78 | 85 | 93 |
| WRIGHT CITY WSC | 57 | 62 | 66 | 72 | 78 | 85 |
| COUNTY-OTHER | 1,697 | 1,803 | 1,916 | 2,071 | 2,255 | 2,450 |
| MANUFACTURING | 304 | 328 | 348 | 366 | 393 | 421 |
| MINING | 1,555 | 2,084 | 2,012 | 1,936 | 1,873 | 1,868 |
| LIVESTOCK | 675 | 684 | 697 | 709 | 722 | 722 |
| IRRIGATION | 56 | 56 | 56 | 56 | 56 | 56 |
| **NECHES BASIN TOTAL DEMAND** | **7,874** | **8,882** | **9,298** | **9,795** | **10,379** | **11,042** |
| **SABINE BASIN** | | | | | | |
| CHALK HILL SUD | 323 | 343 | 364 | 393 | 428 | 464 |
| CROSS ROADS SUD | 238 | 251 | 265 | 285 | 310 | 336 |
| EASTON | 4 | 5 | 5 | 6 | 6 | 7 |
| ELDERVILLE WSC | 119 | 132 | 145 | 159 | 174 | 189 |
| HENDERSON | 566 | 620 | 673 | 735 | 801 | 871 |
| KILGORE | 723 | 789 | 855 | 931 | 1,016 | 1,104 |
| NEW LONDON | 173 | 191 | 207 | 226 | 247 | 268 |
| OVERTON | 499 | 545 | 590 | 643 | 701 | 762 |
| TATUM | 240 | 261 | 283 | 308 | 336 | 365 |
| WEST GREGG SUD | 17 | 18 | 19 | 20 | 22 | 24 |
| COUNTY-OTHER | 1,192 | 1,267 | 1,346 | 1,455 | 1,584 | 1,722 |
| MANUFACTURING | 13 | 14 | 15 | 15 | 16 | 18 |
| MINING | 1,435 | 1,923 | 1,858 | 1,788 | 1,728 | 1,724 |
| STEAM ELECTRIC POWER | 27,458 | 32,102 | 37,762 | 44,663 | 53,074 | 63,069 |
| LIVESTOCK | 532 | 540 | 549 | 560 | 570 | 570 |
| IRRIGATION | 44 | 44 | 44 | 44 | 44 | 44 |
| **SABINE BASIN TOTAL DEMAND** | **33,576** | **39,045** | **44,980** | **52,231** | **61,057** | **71,537** |
| **RUSK COUNTY TOTAL DEMAND** | **41,450** | **47,927** | **54,278** | **62,026** | **71,436** | **82,579** |
| **SABINE COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| G M WSC | 96 | 97 | 97 | 97 | 97 | 97 |
| PINELAND | 83 | 78 | 75 | 74 | 74 | 74 |
| COUNTY-OTHER | 9 | 8 | 8 | 8 | 8 | 8 |
| MANUFACTURING | 467 | 536 | 606 | 668 | 724 | 785 |
| MINING | 240 | 218 | 192 | 167 | 142 | 124 |
| LIVESTOCK | 25 | 34 | 45 | 57 | 71 | 71 |
| **NECHES BASIN TOTAL DEMAND** | **920** | **971** | **1,023** | **1,071** | **1,116** | **1,159** |
| **SABINE BASIN** | | | | | | |
| G M WSC | 396 | 397 | 397 | 397 | 397 | 397 |

# Water User Group (WUG) Demand

| REGION I | WUG DEMAND (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **SABINE COUNTY** | | | | | | |
| **SABINE BASIN** | | | | | | |
| HEMPHILL | 306 | 302 | 298 | 295 | 295 | 295 |
| COUNTY-OTHER | 140 | 131 | 125 | 124 | 124 | 124 |
| MINING | 1,260 | 1,147 | 1,011 | 879 | 746 | 652 |
| LIVESTOCK | 134 | 183 | 240 | 306 | 377 | 377 |
| **SABINE BASIN TOTAL DEMAND** | **2,236** | **2,160** | **2,071** | **2,001** | **1,939** | **1,845** |
| **SABINE COUNTY TOTAL DEMAND** | **3,156** | **3,131** | **3,094** | **3,072** | **3,055** | **3,004** |
| **SAN AUGUSTINE COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| SAN AUGUSTINE | 519 | 508 | 500 | 499 | 498 | 498 |
| COUNTY-OTHER | 582 | 559 | 539 | 529 | 526 | 526 |
| MANUFACTURING | 8 | 9 | 10 | 11 | 12 | 13 |
| MINING | 3,800 | 2,850 | 1,405 | 1,121 | 840 | 629 |
| LIVESTOCK | 816 | 904 | 1,004 | 1,121 | 1,249 | 1,249 |
| IRRIGATION | 56 | 56 | 56 | 56 | 56 | 56 |
| **NECHES BASIN TOTAL DEMAND** | **5,781** | **4,886** | **3,514** | **3,337** | **3,181** | **2,971** |
| **SABINE BASIN** | | | | | | |
| G M WSC | 48 | 48 | 48 | 48 | 48 | 48 |
| COUNTY-OTHER | 7 | 6 | 6 | 6 | 6 | 6 |
| MINING | 200 | 150 | 74 | 59 | 44 | 33 |
| LIVESTOCK | 87 | 96 | 107 | 119 | 133 | 133 |
| IRRIGATION | 6 | 6 | 6 | 6 | 6 | 6 |
| **SABINE BASIN TOTAL DEMAND** | **348** | **306** | **241** | **238** | **237** | **226** |
| **SAN AUGUSTINE COUNTY TOTAL DEMAND** | **6,129** | **5,192** | **3,755** | **3,575** | **3,418** | **3,197** |
| **SHELBY COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| TIMPSON | 7 | 7 | 7 | 8 | 8 | 8 |
| COUNTY-OTHER | 314 | 324 | 334 | 347 | 362 | 378 |
| MINING | 919 | 823 | 699 | 554 | 411 | 304 |
| LIVESTOCK | 1,006 | 1,198 | 1,433 | 1,718 | 2,067 | 2,067 |
| IRRIGATION | 7 | 7 | 7 | 7 | 7 | 7 |
| **NECHES BASIN TOTAL DEMAND** | **2,253** | **2,359** | **2,480** | **2,634** | **2,855** | **2,764** |
| **SABINE BASIN** | | | | | | |
| CENTER | 1,847 | 1,958 | 2,056 | 2,158 | 2,262 | 2,358 |
| JOAQUIN | 137 | 142 | 147 | 155 | 162 | 169 |
| TENAHA | 227 | 238 | 248 | 259 | 271 | 283 |
| TIMPSON | 172 | 179 | 186 | 193 | 202 | 211 |
| COUNTY-OTHER | 1,707 | 1,762 | 1,815 | 1,885 | 1,971 | 2,055 |
| MANUFACTURING | 1,510 | 1,639 | 1,768 | 1,882 | 2,021 | 2,170 |
| MINING | 2,364 | 2,115 | 1,797 | 1,426 | 1,056 | 783 |
| LIVESTOCK | 4,259 | 5,075 | 6,067 | 7,279 | 8,755 | 8,755 |
| IRRIGATION | 19 | 19 | 19 | 19 | 19 | 19 |
| **SABINE BASIN TOTAL DEMAND** | **12,242** | **13,127** | **14,103** | **15,256** | **16,719** | **16,803** |
| **SHELBY COUNTY TOTAL DEMAND** | **14,495** | **15,486** | **16,583** | **17,890** | **19,574** | **19,567** |
| **SMITH COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| ARP | 164 | 168 | 171 | 178 | 185 | 194 |

# Water User Group (WUG) Demand

| REGION I | WUG DEMAND (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **SMITH COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| BULLARD | 654 | 827 | 1,002 | 1,193 | 1,390 | 1,592 |
| CRYSTAL SYSTEMS INC | 260 | 330 | 403 | 481 | 560 | 642 |
| DEAN WSC | 765 | 774 | 786 | 808 | 836 | 867 |
| JACKSON WSC | 197 | 207 | 218 | 234 | 253 | 274 |
| LINDALE | 476 | 604 | 734 | 875 | 1,020 | 1,170 |
| LINDALE RURAL WSC | 221 | 229 | 239 | 253 | 271 | 290 |
| NEW CHAPEL HILL | 237 | 246 | 255 | 266 | 277 | 289 |
| NOONDAY | 189 | 221 | 254 | 291 | 330 | 369 |
| OVERTON | 33 | 40 | 48 | 56 | 65 | 74 |
| R-P-M WSC | 32 | 35 | 39 | 42 | 47 | 51 |
| SOUTHERN UTILITIES COMPANY | 6,234 | 6,420 | 6,638 | 6,937 | 7,294 | 7,671 |
| TROUP | 398 | 428 | 459 | 497 | 539 | 582 |
| TYLER | 20,049 | 21,331 | 22,696 | 24,331 | 26,141 | 28,031 |
| WALNUT GROVE WSC | 1,018 | 1,162 | 1,313 | 1,486 | 1,671 | 1,864 |
| WHITEHOUSE | 1,165 | 1,330 | 1,503 | 1,699 | 1,909 | 2,127 |
| WRIGHT CITY WSC | 273 | 295 | 319 | 348 | 381 | 415 |
| COUNTY-OTHER | 823 | 1,000 | 1,180 | 1,382 | 1,595 | 1,816 |
| MANUFACTURING | 5,120 | 5,597 | 6,055 | 6,443 | 6,976 | 7,553 |
| MINING | 134 | 139 | 140 | 109 | 80 | 58 |
| LIVESTOCK | 1,115 | 1,115 | 1,115 | 1,115 | 1,115 | 1,115 |
| IRRIGATION | 1,486 | 1,518 | 1,550 | 1,583 | 1,618 | 1,659 |
| **NECHES BASIN TOTAL DEMAND** | **41,043** | **44,016** | **47,117** | **50,607** | **54,553** | **58,703** |
| **SMITH COUNTY TOTAL DEMAND** | **41,043** | **44,016** | **47,117** | **50,607** | **54,553** | **58,703** |
| **TRINITY COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| GROVETON | 58 | 59 | 58 | 56 | 58 | 61 |
| COUNTY-OTHER | 230 | 234 | 235 | 229 | 239 | 250 |
| MINING | 5 | 5 | 5 | 5 | 5 | 5 |
| LIVESTOCK | 478 | 478 | 478 | 478 | 478 | 478 |
| IRRIGATION | 500 | 500 | 500 | 500 | 500 | 500 |
| **NECHES BASIN TOTAL DEMAND** | **1,271** | **1,276** | **1,276** | **1,268** | **1,280** | **1,294** |
| **TRINITY COUNTY TOTAL DEMAND** | **1,271** | **1,276** | **1,276** | **1,268** | **1,280** | **1,294** |
| **TYLER COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| COLMESNEIL | 148 | 146 | 143 | 142 | 142 | 142 |
| IVANHOE | 92 | 90 | 88 | 87 | 87 | 87 |
| IVANHOE NORTH | 62 | 60 | 59 | 58 | 58 | 58 |
| LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY | 5 | 5 | 5 | 5 | 5 | 5 |
| TYLER COUNTY WSC | 661 | 639 | 618 | 606 | 604 | 604 |
| WOODVILLE | 908 | 900 | 890 | 884 | 883 | 883 |
| COUNTY-OTHER | 1,494 | 1,448 | 1,404 | 1,380 | 1,376 | 1,376 |
| MANUFACTURING | 476 | 483 | 490 | 496 | 501 | 506 |
| MINING | 160 | 198 | 150 | 103 | 55 | 29 |
| STEAM ELECTRIC POWER | 1,029 | 1,029 | 1,029 | 1,029 | 1,029 | 1,029 |
| LIVESTOCK | 288 | 288 | 288 | 288 | 288 | 288 |

# Water User Group (WUG) Demand

| REGION I | WUG DEMAND (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **TYLER COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| IRRIGATION | 675 | 675 | 675 | 675 | 675 | 675 |
| **NECHES BASIN TOTAL DEMAND** | **5,998** | **5,961** | **5,839** | **5,753** | **5,703** | **5,682** |
| **TYLER COUNTY TOTAL DEMAND** | **5,998** | **5,961** | **5,839** | **5,753** | **5,703** | **5,682** |
| | | | | | | |
| **REGION I TOTAL DEMAND** | **1,108,800** | **1,330,825** | **1,395,212** | **1,463,778** | **1,533,147** | **1,607,250** |

# Appendix 2-D

# Wholesale Water Provider Demands DB17 Report

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This appendix will include a copy of the Wholesale Water Provider Demands data from the TWDB Data Web Interface known as the DB17. The summary will be divided by Wholesale Water Provider, county, and river basin. The TWDB will make this DB17 report available to RWPGs after submittal of the 2016 Initially Prepared Plan.

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# WWP DEMAND

## ANGELINA NECHES RIVER AUTHORITY

| CUSTOMER | WUG | County | Basin | USE TYPE | WWP DEMAND (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| CHEROKEE COUNTY-OTHER | COUNTY-OTHER | CHEROKEE | NECHES | COUNTY OTHER | 3,848 | 3,848 | 3,848 | 3,848 | 3,848 | 3,848 |
| CITY OF JACKSONVILLE | JACKSONVILLE | CHEROKEE | NECHES | MUNICIPAL | 4,275 | 4,275 | 4,275 | 4,275 | 4,275 | 4,275 |
| CITY OF NEW SUMMERFILED | NEW SUMMERFIELD | CHEROKEE | NECHES | MUNICIPAL | 2,565 | 2,565 | 2,565 | 2,565 | 2,565 | 2,565 |
| NORTH CHEROKEE WSC | NORTH CHEROKEE WSC | CHEROKEE | NECHES | MUNICIPAL | 4,275 | 4,275 | 4,275 | 4,275 | 4,275 | 4,275 |
| CITY OF RUSK | RUSK | CHEROKEE | NECHES | MUNICIPAL | 4,275 | 4,275 | 4,275 | 4,275 | 4,275 | 4,275 |
| RUSK RURAL WSC | RUSK RURAL WSC | CHEROKEE | NECHES | MUNICIPAL | 855 | 855 | 855 | 855 | 855 | 855 |
| CITY OF ALTO | ALTO | CHEROKEE | NECHES | MUNICIPAL | 428 | 428 | 428 | 428 | 428 | 428 |
| NACOGDOCHES COUNTY-OTHER | CARO WSC | NACOGDOCHES | NECHES | MUNICIPAL | 428 | 428 | 428 | 428 | 428 | 428 |
| CITY OF NACOGDOCHES | NACOGDOCHES | NACOGDOCHES | NECHES | MUNICIPAL | 8,551 | 8,551 | 8,551 | 8,551 | 8,551 | 8,551 |
| CITY OF NEW LONDON | NEW LONDON | RUSK | SABINE | MUNICIPAL | 855 | 855 | 855 | 855 | 855 | 855 |
| CITY OF TROUP | TROUP | SMITH | NECHES | MUNICIPAL | 4,275 | 4,275 | 4,275 | 4,275 | 4,275 | 4,275 |
| CITY OF ARP | ARP | SMITH | NECHES | MUNICIPAL | 428 | 428 | 428 | 428 | 428 | 428 |
| SMITH COUNTY-OTHER | BLACKJACK WSC | SMITH | NECHES | COUNTY OTHER | 855 | 855 | 855 | 855 | 855 | 855 |
| JACKSON WSC | JACKSON WSC | SMITH | NECHES | MUNICIPAL | 855 | 855 | 855 | 855 | 855 | 855 |
| CITY OF WHITEHOUSE | WHITEHOUSE | SMITH | NECHES | MUNICIPAL | 8,551 | 8,551 | 8,551 | 8,551 | 8,551 | 8,551 |
| DALLAS | DALLAS | | | MUNICIPAL | 0 | 0 | 0 | 0 | 0 | 56,050 |
| COUNTY OTHER | HOLMWOOD UTILITY | JASPER | NECHES | COUNTY OTHER | 65 | 70 | 70 | 70 | 70 | 70 |
| UNIDENTIFIED CUSTOMER | STEAM ELECTRIC POWER | CHEROKEE | NECHES | STEAM ELECTRIC POWER | 8,000 | 15,000 | 20,000 | 20,000 | 20,000 | 20,000 |
| RUSK COUNTY REFINERY | MANUFACTURING | RUSK | NECHES | MANUFACTURING | 5,600 | 5,600 | 5,600 | 5,600 | 5,600 | 5,600 |
| ANGELINA MINING | MINING | ANGELINA | NECHES | MINING | 474 | 573 | 398 | 300 | 225 | 168 |
| CHEROKEE MINING | MINING | CHEROKEE | NECHES | MINING | 238 | 247 | 210 | 147 | 84 | 40 |
| NACOGDOCHES MINING | MINING | NACOGDOCHES | NECHES | MINING | 5,475 | 2,975 | 118 | 0 | 0 | 0 |
| SHELBY MINING | MINING | SHELBY | NECHES | MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| SAN AUGUSTINE MINING | MINING | SAN AUGUSTINE | NECHES | MINING | 2,102 | 1,102 | 0 | 0 | 0 | 0 |
| RUSK MINING | MINING | RUSK | NECHES | MINING | 1,285 | 1,814 | 1,742 | 1,666 | 1,603 | 1,598 |
| **ANRA TOTAL DEMAND** | | | | | **68,557** | **72,699** | **73,456** | **73,102** | **72,901** | **128,845** |

## ANGELINA NACOGDOCHES WCID#1

| CUSTOMER | WUG | County | Basin | USE TYPE | WWP DEMAND (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| LUMINANT | STEAM ELECTRIC POWER | CHEROKEE | NECHES | STEAM ELECTRIC POWER | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 |
| NACOGDOCHES | STEAM ELECTRIC POWER | NACOGDOCHES | NECHES | STEAM ELECTRIC POWER | 7,280 | 7,280 | 7,280 | 7,280 | 7,280 | 7,280 |
| HENDERSON | HENDERSON | RUSK | NECHES | MUNICIPAL | 0 | 0 | 8,289 | 8,289 | 8,289 | 8,289 |
| **AN WCID #1 TOTAL DEMAND** | | | | | **12,280** | **12,280** | **20,569** | **20,569** | **20,569** | **20,569** |

## ATHENS MUNICIPAL WATER AUTHORITY

| CUSTOMER | WUG | County | Basin | USE TYPE | WWP DEMAND (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| ATHENS | ATHENS | HENDERSON | TRINITY AND NECHES | MUNICIPAL | 2,973 | 3,244 | 3,473 | 3,809 | 6,484 | 9,782 |
| HENDERSON COUNTY | IRRIGATION | HENDERSON | NECHES | IRRIGATION | 170 | 170 | 170 | 170 | 170 | 170 |
| HENDERSON COUNTY | LIVESTOCK | HENDERSON | NECHES | LIVESTOCK | 3,023 | 3,023 | 3,023 | 3,023 | 3,023 | 3,023 |
| HENDERSON COUNTY | MANUFACTURING | HENDERSON | TRINITY | MANUFACTURING | 345 | 356 | 368 | 380 | 391 | 403 |
| **ATHENS MWA TOTAL DEMAND** | | | | | **6,511** | **6,793** | **7,034** | **7,382** | **10,068** | **13,378** |

## CITY OF BEAUMONT

| CUSTOMER | WUG | County | Basin | USE TYPE | WWP DEMAND (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| CITY OF BEAUMONT | BEAUMONT | JEFFERSON | NECHES | MUNICIPAL | 29,689 | 30,963 | 32,423 | 34,398 | 36,805 | 39,548 |
| JEFFERSON | COUNTY-OTHER | JEFFERSON | NECHES | COUNTY-OTHER | 2,509 | 3,181 | 4,000 | 4,000 | 4,000 | 4,000 |
| JEFFERSON | MANUFACTURING | JEFFERSON | NECHES | MANUFACTURING | 1,642 | 1,658 | 1,675 | 1,692 | 1,709 | 1,726 |
| MEEKER MUD | JEFFERSON | JEFFERSON | NECHES | MUNICIPAL | 4 | 4 | 5 | 5 | 5 | 6 |
| **CITY OF BEAUMONT TOTAL DEMAND** | | | | | **33,844** | **35,807** | **38,103** | **40,095** | **42,519** | **45,279** |

## CITY OF CARTHAGE

| CUSTOMER | WUG | County | Basin | USE TYPE | WWP DEMAND (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| CITY OF CARTHAGE | CARTHAGE | PANOLA | SABINE | MUNICIPAL | 1,650 | 1,651 | 1,644 | 1,648 | 1,659 | 1,670 |
| PANOLA | COUNTY-OTHER | PANOLA | SABINE | COUNTY-OTHER | 300 | 300 | 300 | 300 | 300 | 300 |
| PANOLA | MANUFACTURING | PANOLA | SABINE | MANUFACTURING | 905 | 945 | 983 | 1,017 | 1,084 | 1,155 |
| **CITY OF CARTHAGE TOTAL DEMAND** | | | | | **2,855** | **2,896** | **2,927** | **2,965** | **3,043** | **3,125** |

## CITY OF CENTER

| CUSTOMER | WUG | County | Basin | USE TYPE | WWP DEMAND (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| SAND HILLS WSC | COUNTY-OTHER | SHELBY | SABINE | COUNTY-OTHER | 162 | 167 | 172 | 179 | 187 | 195 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SHELBYVILLE WSC | COUNTY-OTHER | SHELBY | SABINE | COUNTY-OTHER | 10 | 10 | 11 | 11 | 12 | 12 |
| PANOLA | SHELBY | SHELBY | SABINE | MANUFACTURING | 1,510 | 1,639 | 1,768 | 1,882 | 2,021 | 2,170 |
| CITY OF CENTER | CENTER | SHELBY | SABINE | MUNICIPAL | 1,847 | 1,958 | 2,056 | 2,158 | 2,262 | 2,358 |
| **CITY OF CENTER TOTAL DEMAND** | | | | | **3,529** | **3,774** | **4,007** | **4,230** | **4,481** | **4,735** |

**HOUSTON COUNTY WCID #1**

| | | | | | WWP DEMAND (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **CUSTOMER** | **WUG** | **County** | **Basin** | **USE TYPE** | **2020** | **2030** | **2040** | **2050** | **2060** | **2070** |
| GRAPELAND | GRAPELAND | HOUSTON | TRINITY | MUNICIPAL | 170 | 170 | 170 | 170 | 170 | 170 |
| COUNTY-OTHER | COUNTY-OTHER | HOUSTON | TRINITY | COUNTY-OTHER | 92 | 92 | 92 | 92 | 92 | 92 |
| HOUSTON MANUFACTURING | MANUFACTURING | HOUSTON | TRINITY | MANUFACTURING | 301 | 331 | 360 | 385 | 417 | 451 |
| CROCKETT | CROCKETT | HOUSTON | TRINITY | MUNICIPAL | 2,148 | 2,148 | 2,148 | 2,148 | 2,148 | 2,148 |
| LOVELADY | LOVELADY | HOUSTON | TRINITY | MUNICIPAL | 37 | 37 | 37 | 37 | 37 | 37 |
| CONSOLIDATED WSC | CONSOLIDATED WSC | HOUSTON | TRINITY | MUNICIPAL | 1,043 | 1,043 | 1,043 | 1,043 | 1,043 | 1,043 |
| CONSOLIDATED WSC (POTENTIAL) | CONSOLIDATED WSC | HOUSTON | TRINITY | MUNICIPAL | 522 | 522 | 522 | 522 | 522 | 522 |
| NACOGDOCHES POWER | STEAM ELECTRIC POWER | HOUSTON | TRINITY | STEAM ELECTRIC POWER | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 |
| HOUSTON MINING | MINNG | HOUSTON | TRINITY | MINING | | | 250 | 250 | 500 | 500 |
| **HOUSTON COUNTY WCID #1 TOTAL DEMAND** | | | | | **5,313** | **5,343** | **5,622** | **5,647** | **5,929** | **5,963** |

**CITY OF JACKSONVILLE**

| | | | | | WWP DEMAND (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **CUSTOMER** | **WUG** | **County** | **Basin** | **USE TYPE** | **2020** | **2030** | **2040** | **2050** | **2060** | **2070** |
| CITY OF JACKSONVILLE | JACKSONVILLE | CHEROKEE | NECHES | MUNICIPAL | 2,680 | 2,858 | 3,042 | 3,297 | 3,588 | 3,908 |
| CHEROKEE MANUFACTURING | MANUFACTURING | CHEROKEE | NECHES | MANUFACTURING | 413 | 442 | 469 | 492 | 530 | 571 |
| COUNTY-OTHER | COUNTY-OTHER | CHEROKEE | NECHES | COUNTY-OTHER | 285 | 301 | 319 | 345 | 375 | 408 |
| NORTH CHEROKEE WSC | NORTH CHEROKEE WSC | CHEROKEE | NECHES | MUNICIPAL | 615 | 653 | 694 | 750 | 814 | 886 |
| CRAFT TURNEY WSC | CRAFT TURNEY WSC | CHEROKEE | NECHES | MUNICIPAL | 483 | 502 | 523 | 560 | 609 | 663 |
| **CITY OF JACKSONVILLE TOTAL DEMAND** | | | | | **4,476** | **4,756** | **5,047** | **5,444** | **5,916** | **6,436** |

**LOWER NECHES VALLEY AUTHORITY**

| | | | | | WWP DEMAND (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **CUSTOMER** | **WUG** | **County** | **Basin** | **USE TYPE** | **2020** | **2030** | **2040** | **2050** | **2060** | **2070** |
| CITY OF BEAUMONT | BEAUMONT | JEFFERSON | NECHES | MUNICIPAL | 8,411 | 9,575 | 10,933 | 11,718 | 12,712 | 13,718 |
| JASPER MANUFACTURING | MANUFACTURING | JASPER | NECHES | MANUFACTURING | 60,000 | 60,000 | 60,000 | 60,000 | 60,000 | 60,000 |
| NACOGDOCHES MANUFACTURING | MANUFACTURING | NACOGDOCHES | NECHES | MANUFACTURING | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 |
| GROVES | GROVES | JEFFERSON | NECHES | MUNICIPAL | 2,238 | 2,160 | 2,094 | 2,069 | 2,063 | 2,063 |
| NEDERLAND | NEDERLAND | JEFFERSON | NECHES | MUNICIPAL | 2,404 | 2,464 | 2,546 | 2,682 | 2,865 | 3,077 |
| PORT ARTHUR | PORT ARTHUR | JEFFERSON | NECHES | MUNICIPAL | 26,253 | 26,223 | 25,996 | 25,949 | 25,930 | 25,929 |
| PORT NECHES | PORT NECHES | JEFFERSON | NECHES | MUNICIPAL | 1,428 | 1,447 | 1,481 | 1,553 | 1,658 | 1,780 |
| JEFFERSON COUNTY-OTHER | COUNTY-OTHER | JEFFERSON | NECHES | COUNTY-OTHER | 256 | 325 | 409 | 511 | 625 | 754 |
| JEFFERSON MANUFACTURING | MANUFACTURING | JEFFERSON | NECHES | MANUFACTURING | 232,792 | 331,827 | 346,044 | 360,269 | 374,503 | 389,299 |
| JEFFERSON IRRIGATION | IRRIGATION | JEFFERSON | NECHES | IRRIGATION | 140,000 | 140,000 | 140,000 | 140,000 | 140,000 | 140,000 |
| WEST JEFFERSON COUNTY MWD | JEFFERSON | JEFFERSON | NECHES | MUNICIPAL | 741 | 752 | 772 | 809 | 863 | 927 |
| JEFFERSON COUNTY WCID #1 | JEFFERSON | JEFFERSON | NECHES | MUNICIPAL | 448 | 453 | 463 | 485 | 517 | 555 |
| NOME | NOME | JEFFERSON | NECHES | MUNICIPAL | 75 | 77 | 80 | 84 | 90 | 96 |
| WINNIE & STOWELL | TRINITY BAY CONSERVATION | CHAMBERS | TRINITY | MUNICIPAL | 2,262 | 2,637 | 3,037 | 3,488 | 3,988 | 4,518 |
| BOLIVAR PENINSULA SUD | CHAMBERS | CHAMBERS | TRINITY | MUNICIPAL | 6,000 | 6,000 | 6,000 | 6,000 | 6,000 | 6,000 |
| CHAMBERS IRRIGATION | IRRIGATION | CHAMBERS | TRINITY | IRRIGATION | 37,000 | 37,000 | 37,000 | 37,000 | 37,000 | 37,000 |
| LIBERTY IRRIGATION | IRRIGATION | LIBERTY | TRINITY | IRRIGATION | 23,000 | 23,000 | 23,000 | 23,000 | 23,000 | 23,000 |
| CITY OF WOODVILLE | WOODVILLE | TRINITY | TRINITY | MUNICIPAL | 5,600 | 5,600 | 5,600 | 5,600 | 5,600 | 5,600 |
| **LOWER NECHES VALLEY AUTHORITY TOTAL DEMAND** | | | | | **558,908** | **659,539** | **675,455** | **691,216** | **707,414** | **724,316** |

**LUFKIN**

| | | | | | WWP DEMAND (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **CUSTOMER** | **WUG** | **County** | **Basin** | **USE TYPE** | **2020** | **2030** | **2040** | **2050** | **2060** | **2070** |
| CITY OF LUFKIN | LUFKIN | ANGELINA | NECHES | MUNICIPAL | 6,271 | 6,523 | 6,736 | 6,979 | 7,246 | 7,494 |
| COUNTY-OTHER | COUNTY-OTHER | ANGELINA | NECHES | COUNTY-OTHER | 156 | 165 | 172 | 180 | 186 | 193 |
| ANGELINA MANUFACTURING | MANUFACTURING | ANGELINA | NECHES | MANUFACTURING | 3,050 | 3,372 | 3,697 | 3,987 | 4,296 | 4,628 |
| REDLAND WSC | REDLAND WSC | ANGELINA | NECHES | MUNICIPAL | 307 | 307 | 307 | 307 | 307 | 307 |
| ANGELINA FRESH WATER | COUNTY-OTHER | ANGELINA | NECHES | COUNTY-OTHER | 74 | 74 | 74 | 74 | 74 | 74 |
| HUNTINGTON | HUNTINGTON | ANGELINA | NECHES | MUNICIPAL | 448 | 448 | 448 | 448 | 448 | 448 |
| DIBOLL | DIBOLL | ANGELINA | NECHES | MUNICIPAL | 1,940 | 1,940 | 1,940 | 1,940 | 1,940 | 1,940 |
| WOODLAWN WSC | COUNTY-OTHER | ANGELINA | NECHES | COUNTY-OTHER | 221 | 221 | 221 | 221 | 221 | 221 |
| STEAM ELECTRIC POWER | STEAM ELECTRIC POWER | ANGELINA | NECHES | STEAM ELECTRIC POWER | 16,802 | 16,802 | 16,802 | 16,802 | 16,802 | 16,802 |
| ANGELINA IRRIGATION | IRRIGATION | ANGELINA | NECHES | IRRIGATION | 481 | 481 | 481 | 481 | 481 | 481 |
| LOWER NECHES VALLEY AUTHORITY | | | | | 28,000 | 0 | 0 | 0 | 0 | 0 |
| **CITY OF LUFKIN TOTAL DEMAND** | | | | | **29,749** | **30,332** | **30,878** | **31,418** | **32,000** | **32,588** |

**CITY OF NACOGDOCHES**

| | | | | | WWP DEMAND (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **CUSTOMER** | **WUG** | **County** | **Basin** | **USE TYPE** | **2020** | **2030** | **2040** | **2050** | **2060** | **2070** |
| CITY OF NACOGDOCHES | NACOGDOCHES | NACOGDOCHES | NECHES | MUNICIPAL | 6,742 | 7,376 | 8,027 | 8,781 | 9,638 | 10,545 |
| NACOGDOCHES MANUFACTURING | NACOGDOCHES | NACOGDOCHES | NECHES | MANUFACTURING | 2,564 | 2,798 | 3,029 | 3,228 | 3,483 | 3,758 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| D&M WSC | D&M WSC | NACOGDOCHES | NECHES | MUNICIPAL | 258 | 258 | 258 | 258 | 258 | 258 |
| APPLEBY WSC | APPLEBY WSC | NACOGDOCHES | NECHES | MUNICIPAL | 93 | 93 | 93 | 93 | 93 | 93 |
| NACOGDOCHES MUD#1, LILY GROV | COUNTY-OTHER | NACOGDOCHES | NECHES | COUNTY-OTHER | 67 | 67 | 67 | 67 | 67 | 67 |
| MELROSE WSC | MELROSE WSC | NACOGDOCHES | NECHES | MUNICIPAL | 37 | 37 | 37 | 37 | 37 | 37 |
| **CITY OF NACOGDOCHES TOTAL DEMAND** | | | | | **9,761** | **10,629** | **11,511** | **12,464** | **13,576** | **14,758** |

**PANOLA COUNTY FRESH WATER SUPPLY DISTRICT**

| | | | | | WWP DEMAND (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **CUSTOMER** | **WUG** | **County** | **Basin** | **USE TYPE** | **2020** | **2030** | **2040** | **2050** | **2060** | **2070** |
| CITY OF CARTHAGE | CARTHAGE | PANOLA | SABINE | MUNICIPAL | 13,452 | 13,452 | 13,452 | 13,452 | 13,452 | 13,452 |
| PANOLA MINING | PANOLA | PANOLA | SABINE | MINING | 3,550 | 3,515 | 3,029 | 2,561 | 2,172 | 2,363 |
| **PANOLA COUNTY FWSD TOTAL DEMAND** | | | | | **17,002** | **16,967** | **16,481** | **16,013** | **15,624** | **15,815** |

**CITY OF PORT ARTHUR**

| | | | | | WWP DEMAND (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **CUSTOMER** | **WUG** | **County** | **Basin** | **USE TYPE** | **2020** | **2030** | **2040** | **2050** | **2060** | **2070** |
| CITY OF PORT ARTHUR | PORT ARTHUR | JEFFERSON | NECHES/NECHES-TRINITY | MUNICIPAL | 19,805 | 19,775 | 19,548 | 19,501 | 19,482 | 19,481 |
| TEXAS PARKS AND WILDLIFE | COUNTY-OTHER | JEFFERSON | NECHES/NECHES-TRINITY | COUNTY-OTHER | 5 | 5 | 5 | 5 | 5 | 5 |
| MOTIVA | MANUFACTURING | JEFFERSON | NECHES/NECHES-TRINITY | MANUFACTURING | 280 | 280 | 280 | 280 | 280 | 280 |
| FLINT HILLS RESOURCES | MANUFACTURING | JEFFERSON | NECHES/NECHES-TRINITY | MANUFACTURING | 55 | 55 | 55 | 55 | 55 | 55 |
| TOTAL PETROCHEMICALS | MANUFACTURING | JEFFERSON | NECHES/NECHES-TRINITY | MANUFACTURING | 95 | 95 | 95 | 95 | 95 | 95 |
| GOLDEN PASS LNG | MANUFACTURING | JEFFERSON | NECHES/NECHES-TRINITY | MANUFACTURING | 28 | 28 | 28 | 28 | 28 | 28 |
| BASF TOTAL PETROCHEMICALS | MANUFACTURING | JEFFERSON | NECHES/NECHES-TRINITY | MANUFACTURING | 57 | 57 | 57 | 57 | 57 | 57 |
| CHENIERE LNG | MANUFACTURING | JEFFERSON | NECHES/NECHES-TRINITY | MANUFACTURING | 5,646 | 5,646 | 5,646 | 5,646 | 5,646 | 5,646 |
| OTHER | MANUFACTURING | JEFFERSON | NECHES/NECHES-TRINITY | MANUFACTURING | 282 | 282 | 282 | 282 | 282 | 282 |
| **CITY OF PORT ARTHUR TOTAL DEMAND** | | | | | **26,253** | **26,223** | **25,996** | **25,949** | **25,930** | **25,929** |

**SABINE RIVER AUTHORITY**

| | | | | | WWP DEMAND (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **CUSTOMER** | **WUG** | **County** | **Basin** | **USE TYPE** | **2020** | **2030** | **2040** | **2050** | **2060** | **2070** |
| **LOWER BASIN CUSTOMERS** | | | | | | | | | | |
| HEMPHILL | | SABINE | SABINE | MUNICIPAL | 743 | 743 | 743 | 743 | 743 | 743 |
| HUXLEY | COUNTY-OTHER | SHELBY | SABINE | COUNTY-OTHER | 280 | 280 | 280 | 280 | 280 | 280 |
| TENASKA | STEAM ELECTRIC POWER | RUSK | SABINE | STEAM ELECTRIC POWER | 17,922 | 17,922 | 17,922 | 17,922 | 17,922 | 17,922 |
| BEECHWOOD WSC | COUNTY-OTHER | SABINE | SABINE | COUNTY-OTHER | 190 | 190 | 190 | 190 | 190 | 190 |
| EL CAMINO WSC | COUNTY-OTHER | SABINE | SABINE | COUNTY-OTHER | 36 | 36 | 36 | 36 | 36 | 36 |
| G-M WSC | | SABINE | SABINE | MUNICIPAL | 560 | 560 | 560 | 560 | 560 | 560 |
| XTO | MINING | PANOLA, SHELBY, | SABINE | MINING | 7,500 | 7,500 | 7,500 | 7,500 | 7,500 | 7,500 |
| INVISTA | MANUFACTURING | ORANGE | SABINE | MANUFACTURING | 31 | 31 | 31 | 31 | 31 | 31 |
| **CANAL (GULF COAST DIVISION) CUSTOMERS** | | | | | | | | | | |
| HONEYWELL | MANUFACTURING | ORANGE | SABINE | MANUFACTURING | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 |
| CHEVRON PHILLIPS | MANUFACTURING | ORANGE | SABINE | MANUFACTURING | 1,841 | 1,841 | 1,841 | 1,841 | 1,841 | 1,841 |
| E.I. DUPONT | MANUFACTURING | ORANGE | SABINE | MANUFACTURING | 24,643 | 24,643 | 24,643 | 24,643 | 24,643 | 24,643 |
| ENTERGY | STEAM ELECTRIC POWER | ORANGE | SABINE | STEAM ELECTRIC POWER | 4,481 | 4,481 | 4,481 | 4,481 | 4,481 | 4,481 |
| FIRESTONE | MANUFACTURING | ORANGE | SABINE | MANUFACTURING | 1,473 | 1,473 | 1,473 | 1,473 | 1,473 | 1,473 |
| INTERNATIONAL PAPER | MANUFACTURING | ORANGE | SABINE | MANUFACTURING | 22,403 | 22,403 | 22,403 | 22,403 | 22,403 | 22,403 |
| GERDAU AMERISTEEL US INC | MANUFACTURING | JEFFERSON | NECHES | MANUFACTURING | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 |
| LANXESS | MANUFACTURING | ORANGE | SABINE | MANUFACTURING | 4,480 | 4,480 | 4,480 | 4,480 | 4,480 | 4,480 |
| COTTONWOOD ENERGY | STEAM ELECTRIC POWER | NEWTON | SABINE | STEAM ELECTRIC POWER | 13,442 | 13,442 | 13,442 | 13,442 | 13,442 | 13,442 |
| ROSE CITY | ROSE CITY | ORANGE | SABINE | MUNICIPAL | 478 | 478 | 478 | 478 | 478 | 478 |
| ORANGE IRRIGATION | IRRIGATION | ORANGE | SABINE | IRRIGATION | 1,255 | 1,255 | 1,255 | 1,255 | 1,255 | 1,255 |
| **SRA POTENTIAL CUSTOMERS** | | | | | | | | | | |
| LOWER NECHES VALLEY AUTHORIT | MUNICIPAL | JEFFERSON | NECHES | MUNICIPAL | | | | 200,000 | 200,000 | 200,000 |
| CITY OF CENTER | CENTER | SHELBY | SABINE | MUNICIPAL | | | 2,242 | 2,242 | 2,242 | 2,242 |
| ORANGE IRRIGATION | IRRIGATION | ORANGE | SABINE | IRRIGATION | 2,432 | 2,685 | 2,858 | 2,920 | 2,855 | 2,758 |
| ORANGE MANUFACTURING | MANUFACTURING | ORANGE | SABINE | MANUFACTURING | 3,943 | 9,890 | 15,850 | 21,141 | 27,092 | 33,477 |
| ORANGE STEAM ELECTRIC POWER | STEAM ELECTRIC POWER | ORANGE | SABINE | STEAM ELECTRIC POWER | 0 | 14 | 1,038 | 2,286 | 3,807 | 4,846 |
| NEWTON MINING AND STEAM ELEC | STEAM ELECTRIC POWER | ORANGE | SABINE | STEAM ELECTRIC POWER | 805 | 3,139 | 5,994 | 9,545 | 13,875 | 19,021 |
| SHELBY LIVESTOCK | LIVESTOCK | SHELBY | SABINE | LIVESTOCK | 1,367 | 2,375 | 3,602 | 5,099 | 6,924 | 6,924 |
| RUSK STEAM ELECTRIC POWER | STEAM ELECTRIC POWER | RUSK | NECHES | STEAM ELECTRIC POWER | 0 | 0 | 0 | 462 | 8,873 | 18,868 |
| **OTHER POTENTIAL CUSTOMERS IN OTHER REGIONS** | | | | | | | | | | |
| EAST TEXAS TRANSFER | | REGION H | | MUNICIPAL | | | 250,000 | 250,000 | 250,000 | 250,000 |
| NORTH TEXAS MUNICIPAL WATER DISTRICT | | REGION C | | MUNICIPAL | | | | | | 100,000 |
| HARRISON MANUFACTURING | | REGION D | | MANUFACTURING | 50,000 | 55,000 | 65,000 | 70,000 | 80,000 | 0 |
| HARRISON STEAM ELECTRIC POWER | | REGION D | | STEAM ELECTRIC POWER | 2,000 | 6,000 | 10,000 | 15,000 | 21,000 | 47,000 |
| GREENVILLE | | REGION D | | MUNICIPAL | 0 | 0 | 0 | 0 | 0 | 9,090 |
| **SABINE RIVER AUTHORITY TOTAL DEMAND** | | | | | **164,545** | **183,101** | **460,582** | **682,693** | **720,666** | **798,224** |

**CITY OF TYLER**

| | | | | | WWP DEMAND (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **CUSTOMER** | **WUG** | **County** | **Basin** | **USE TYPE** | **2020** | **2030** | **2040** | **2050** | **2060** | **2070** |
| **CURRENT CUSTOMERS** | | | | | | | | | | |
| CITY OF TYLER | TYLER | SMITH | NECHES | MUNICIPAL | 20,049 | 21,331 | 22,696 | 24,331 | 26,141 | 28,031 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CITY OF TYLER | TYLER | SMITH | NECHES | MANUFACTURING | 192 | 214 | 239 | 272 | 311 | 359 |
| SMITH MANUFACTURING | MANUFACTURING | SMITH | NECHES | STEAM ELECTRIC POWER | 3,072 | 3,358 | 3,633 | 3,866 | 4,186 | 4,532 |
| WHITEHOUSE | WHITEHOUSE | SMITH | NECHES | MUNICIPAL | 747 | 747 | 747 | 747 | 747 | 747 |
| SOUTHERN UTILITIES COMPANY | SOUTHERN UTILITIES COMPA | SMITH | NECHES | COUNTY-OTHER | 312 | 321 | 332 | 347 | 365 | 384 |
| WALNUT GROVE WATER SYSTEM | | SMITH | NECHES | MUNICIPAL | 1,495 | 1,495 | 1,495 | 1,495 | 1,495 | 1,495 |
| COMMUNITY WATER | COUNTY-OTHER | SMITH | NECHES | COUNTY-OTHER | 92 | 92 | 92 | 92 | 92 | 92 |
| SMITH IRRIGATION | IRRIGATION | SMITH | NECHES | IRRIGATION | 400 | 400 | 400 | 400 | 400 | 400 |
| POTENTIAL CUSTOMERS | | | | | | | | | | |
| BULLARD | BULLARD | SMITH | NECHES | MUNICIPAL | 67 | 239 | 413 | 603 | 799 | 1,001 |
| CRYSTAL SYSTEMS INC | CRYSTAL SYSTEMS INC | SMITH | NECHES | MUNICIPAL | 12 | 105 | 219 | 356 | 510 | 642 |
| LINDALE | LINDALE | SMITH | NECHES | MUNICIPAL | 52 | 180 | 323 | 490 | 662 | 826 |
| SMITH MANUFACTURING | MANUFACTURING | SMITH | NECHES | MANUFACTURING | 1,764 | 1,982 | 2,192 | 2,370 | 2,614 | 2,879 |
| SMITH MINING | MINING | SMITH | NECHES | MINING | 108 | 113 | 114 | 83 | 54 | 32 |
| CHANDLER | HENDERSON | HENDERSON | TRINITY | MUNICIPAL | 0 | 0 | 0 | 66 | 176 | 350 |
| **CITY OF TYLER TOTAL DEMAND** | | | | | **28,362** | **30,578** | **32,895** | **35,518** | **38,552** | **41,770** |

**UPPER NECHES RIVER MUNICIPAL WATER AUTHORITY**

| | | | | | WWP DEMAND (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **CUSTOMER** | **WUG** | **County** | **Basin** | **USE TYPE** | **2020** | **2030** | **2040** | **2050** | **2060** | **2070** |
| CITY OF DALLAS | DALLAS | DALLAS | TRINITY | MUNICIPAL | 114,337 | 114,337 | 114,337 | 114,337 | 114,337 | 114,337 |
| CITY OF TYLER | TYLER | SMITH | NECHES | MUNICIPAL | 67,200 | 67,200 | 67,200 | 67,200 | 67,200 | 67,200 |
| CITY OF PALESTINE | PALESTINE | ANDERSON | NECHES | MUNICIPAL | 28,000 | 28,000 | 28,000 | 28,000 | 28,000 | 28,000 |
| SMITH IRRIGATION | IRRIGATION | SMITH | NECHES | IRRIGATION | 82 | 73 | 64 | 57 | 51 | 51 |
| CHEROKEE IRRIGATION | IRRIGATION | SMITH | NECHES | IRRIGATION | 41 | 36 | 32 | 28 | 25 | 25 |
| HENDERSON IRRIGATION | IRRIGATION | SMITH | NECHES | IRRIGATION | 82 | 73 | 64 | 57 | 51 | 51 |
| EMERALD BAY GOLF COURSE | IRRIGATION | SMITH | NECHES | IRRIGATION | 105 | 105 | 105 | 105 | 105 | 105 |
| MONARCH UTILITIES | MANUFACTURING | SMITH | NECHES | MANUFACTURING | 100 | 100 | 100 | 100 | 100 | 100 |
| ARBORGEN SUPER TREE FARM | IRRIGATION | SMITH | NECHES | IRRIGATION | 300 | 300 | 300 | 300 | 300 | 300 |
| DALLAS (FUTURE CONTRACT) | DALLAS | DALLAS | TRINITY | MUNICIPAL | 0 | 0 | 0 | 0 | 47,250 | 47,250 |
| **UPPER NECHES RIVER MUNICIPAL WATER AUTHORITY TOTAL DEMAND** | | | | | **210,247** | **210,224** | **210,202** | **210,184** | **257,419** | **257,419** |

# Appendix 3-A

# Water Availability DB17 Report

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The following appendix includes a copy of the Water Availability data from the TWDB Data Web Interface known as the DB17. The summary is divided by source, county, basin, and salinity.

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# Source Availability

## REGION I

| GROUNDWATER | COUNTY | BASIN | SALINITY | SOURCE AVAILABILITY (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| CARRIZO-WILCOX AQUIFER | ANDERSON | NECHES | FRESH | 4,393 | 4,393 | 4,393 | 4,393 | 4,393 | 4,393 |
| CARRIZO-WILCOX AQUIFER | ANDERSON | TRINITY | FRESH | 5,684 | 5,684 | 5,684 | 5,684 | 5,684 | 5,684 |
| CARRIZO-WILCOX AQUIFER | ANGELINA | NECHES | FRESH | 26,414 | 26,414 | 26,414 | 26,414 | 26,414 | 26,414 |
| CARRIZO-WILCOX AQUIFER | CHEROKEE | NECHES | FRESH | 11,222 | 11,222 | 11,222 | 11,222 | 11,222 | 11,222 |
| CARRIZO-WILCOX AQUIFER | HENDERSON | NECHES | FRESH | 3,999 | 3,999 | 3,999 | 3,999 | 3,999 | 3,999 |
| CARRIZO-WILCOX AQUIFER | HOUSTON | NECHES | FRESH | 1,924 | 1,924 | 1,924 | 1,924 | 1,924 | 1,924 |
| CARRIZO-WILCOX AQUIFER | HOUSTON | TRINITY | FRESH | 3,432 | 3,432 | 3,432 | 3,432 | 3,432 | 3,432 |
| CARRIZO-WILCOX AQUIFER | NACOGDOCHES | NECHES | FRESH | 21,385 | 21,385 | 21,385 | 21,385 | 21,385 | 21,385 |
| CARRIZO-WILCOX AQUIFER | PANOLA | CYPRESS | FRESH | 6 | 6 | 6 | 6 | 6 | 6 |
| CARRIZO-WILCOX AQUIFER | PANOLA | SABINE | FRESH | 8,221 | 8,221 | 8,063 | 8,063 | 8,063 | 8,063 |
| CARRIZO-WILCOX AQUIFER | RUSK | NECHES | FRESH | 11,776 | 11,766 | 11,766 | 11,766 | 11,747 | 11,747 |
| CARRIZO-WILCOX AQUIFER | RUSK | SABINE | FRESH | 9,067 | 9,067 | 9,067 | 9,067 | 9,067 | 9,067 |
| CARRIZO-WILCOX AQUIFER | SABINE | NECHES | FRESH | 1,254 | 1,254 | 1,254 | 1,254 | 1,254 | 1,254 |
| CARRIZO-WILCOX AQUIFER | SABINE | SABINE | FRESH | 5,604 | 5,604 | 5,604 | 5,604 | 5,604 | 5,604 |
| CARRIZO-WILCOX AQUIFER | SAN AUGUSTINE | NECHES | FRESH | 1,490 | 1,490 | 1,490 | 1,490 | 1,490 | 1,490 |
| CARRIZO-WILCOX AQUIFER | SAN AUGUSTINE | SABINE | FRESH | 291 | 291 | 291 | 291 | 291 | 291 |
| CARRIZO-WILCOX AQUIFER | SHELBY | NECHES | FRESH | 2,736 | 2,578 | 2,288 | 2,152 | 2,019 | 2,019 |
| CARRIZO-WILCOX AQUIFER | SHELBY | SABINE | FRESH | 8,481 | 8,323 | 8,159 | 8,159 | 7,710 | 7,710 |
| CARRIZO-WILCOX AQUIFER | SMITH | NECHES | FRESH | 21,004 | 21,004 | 21,004 | 21,004 | 21,004 | 21,004 |
| CARRIZO-WILCOX AQUIFER | TRINITY | NECHES | FRESH | 1,114 | 1,114 | 1,114 | 1,114 | 1,114 | 1,114 |
| GULF COAST AQUIFER | HARDIN | NECHES | FRESH | 34,821 | 34,821 | 34,821 | 34,821 | 34,821 | 34,821 |
| GULF COAST AQUIFER | HARDIN | TRINITY | FRESH | 138 | 138 | 138 | 138 | 138 | 138 |
| GULF COAST AQUIFER | JASPER | NECHES | FRESH | 37,620 | 37,541 | 37,541 | 37,541 | 37,541 | 37,541 |
| GULF COAST AQUIFER | JASPER | SABINE | FRESH | 29,953 | 29,953 | 29,953 | 29,953 | 29,953 | 29,953 |
| GULF COAST AQUIFER | JEFFERSON | NECHES | FRESH | 804 | 804 | 804 | 804 | 804 | 804 |
| GULF COAST AQUIFER | JEFFERSON | NECHES-TRINITY | FRESH | 1,641 | 1,641 | 1,641 | 1,641 | 1,641 | 1,641 |
| GULF COAST AQUIFER | NEWTON | NECHES | FRESH | 176 | 176 | 176 | 176 | 176 | 176 |
| GULF COAST AQUIFER | NEWTON | SABINE | FRESH | 34,001 | 33,963 | 33,963 | 33,963 | 33,963 | 33,963 |
| GULF COAST AQUIFER | ORANGE | NECHES | FRESH | 3,925 | 3,925 | 3,925 | 3,925 | 3,925 | 3,925 |
| GULF COAST AQUIFER | ORANGE | NECHES-TRINITY | FRESH | 256 | 256 | 256 | 256 | 256 | 256 |
| GULF COAST AQUIFER | ORANGE | SABINE | FRESH | 15,832 | 15,832 | 15,832 | 15,832 | 15,832 | 15,832 |
| GULF COAST AQUIFER | POLK | NECHES | FRESH | 11,886 | 11,886 | 11,886 | 11,276 | 11,224 | 11,224 |

# Source Availability

## REGION I

| GROUNDWATER | COUNTY | BASIN | SALINITY | SOURCE AVAILABILITY (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| GULF COAST AQUIFER | TYLER | NECHES | FRESH | 38,199 | 38,156 | 38,156 | 38,156 | 38,156 | 38,156 |
| OTHER AQUIFER \| UNDIFFERENTIATED | ANDERSON | TRINITY | FRESH | 298 | 298 | 298 | 298 | 298 | 298 |
| OTHER AQUIFER \| UNDIFFERENTIATED | ANGELINA | NECHES | FRESH | 812 | 812 | 812 | 812 | 812 | 812 |
| OTHER AQUIFER \| UNDIFFERENTIATED | CHEROKEE | NECHES | FRESH | 268 | 268 | 268 | 268 | 268 | 268 |
| OTHER AQUIFER \| UNDIFFERENTIATED | HENDERSON | NECHES | FRESH | 5 | 5 | 5 | 5 | 5 | 5 |
| OTHER AQUIFER \| UNDIFFERENTIATED | HENDERSON | TRINITY | FRESH | 680 | 680 | 680 | 680 | 680 | 680 |
| OTHER AQUIFER \| UNDIFFERENTIATED | HOUSTON | NECHES | FRESH | 378 | 378 | 378 | 378 | 378 | 378 |
| OTHER AQUIFER \| UNDIFFERENTIATED | HOUSTON | TRINITY | FRESH | 888 | 888 | 888 | 888 | 888 | 888 |
| OTHER AQUIFER \| UNDIFFERENTIATED | NACOGDOCHES | NECHES | FRESH | 1,131 | 1,131 | 1,131 | 1,131 | 1,131 | 1,131 |
| OTHER AQUIFER \| UNDIFFERENTIATED | POLK | NECHES | FRESH | 1,270 | 1,270 | 1,270 | 1,270 | 1,270 | 1,270 |
| OTHER AQUIFER \| UNDIFFERENTIATED | RUSK | NECHES | FRESH | 270 | 270 | 270 | 270 | 270 | 270 |
| OTHER AQUIFER \| UNDIFFERENTIATED | RUSK | SABINE | FRESH | 469 | 469 | 469 | 469 | 469 | 469 |
| OTHER AQUIFER \| UNDIFFERENTIATED | SABINE | SABINE | FRESH | 336 | 336 | 336 | 336 | 336 | 336 |
| OTHER AQUIFER \| UNDIFFERENTIATED | SAN AUGUSTINE | NECHES | FRESH | 1,395 | 1,395 | 1,395 | 1,395 | 1,395 | 1,395 |
| OTHER AQUIFER \| UNDIFFERENTIATED | SMITH | NECHES | FRESH | 922 | 922 | 922 | 922 | 922 | 922 |
| OTHER AQUIFER \| UNDIFFERENTIATED | TRINITY | NECHES | FRESH | 700 | 700 | 700 | 700 | 700 | 700 |
| QUEEN CITY AQUIFER | ANDERSON | NECHES | FRESH | 9,762 | 9,762 | 9,762 | 9,762 | 9,762 | 9,762 |
| QUEEN CITY AQUIFER | ANDERSON | TRINITY | FRESH | 9,039 | 9,039 | 9,039 | 9,039 | 9,039 | 9,039 |
| QUEEN CITY AQUIFER | ANGELINA | NECHES | FRESH | 1,093 | 1,093 | 1,093 | 1,093 | 1,093 | 1,093 |
| QUEEN CITY AQUIFER | CHEROKEE | NECHES | FRESH | 22,396 | 22,396 | 22,396 | 22,396 | 22,396 | 22,396 |
| QUEEN CITY AQUIFER | HENDERSON | NECHES | FRESH | 12,316 | 12,316 | 12,316 | 12,316 | 12,316 | 12,316 |
| QUEEN CITY AQUIFER | HOUSTON | NECHES | FRESH | 131 | 131 | 131 | 131 | 131 | 131 |
| QUEEN CITY AQUIFER | HOUSTON | TRINITY | FRESH | 279 | 279 | 279 | 279 | 279 | 279 |
| QUEEN CITY AQUIFER | NACOGDOCHES | NECHES | FRESH | 5,002 | 5,002 | 5,002 | 5,002 | 5,002 | 5,002 |
| QUEEN CITY AQUIFER | RUSK | NECHES | FRESH | 40 | 40 | 40 | 40 | 40 | 40 |
| QUEEN CITY AQUIFER | RUSK | SABINE | FRESH | 18 | 18 | 18 | 18 | 18 | 18 |
| QUEEN CITY AQUIFER | SAN AUGUSTINE | NECHES | FRESH | 7 | 7 | 7 | 7 | 7 | 7 |
| QUEEN CITY AQUIFER | SAN AUGUSTINE | SABINE | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| QUEEN CITY AQUIFER | SMITH | NECHES | FRESH | 28,259 | 28,259 | 28,259 | 28,259 | 28,259 | 28,259 |
| QUEEN CITY AQUIFER | TRINITY | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| SPARTA AQUIFER | ANDERSON | NECHES | FRESH | 344 | 344 | 344 | 344 | 344 | 344 |
| SPARTA AQUIFER | ANDERSON | TRINITY | FRESH | 272 | 272 | 272 | 272 | 272 | 272 |
| SPARTA AQUIFER | ANGELINA | NECHES | FRESH | 689 | 689 | 689 | 689 | 689 | 689 |
| SPARTA AQUIFER | CHEROKEE | NECHES | FRESH | 359 | 359 | 359 | 359 | 359 | 359 |
| SPARTA AQUIFER | HOUSTON | NECHES | FRESH | 302 | 302 | 302 | 302 | 302 | 302 |

# Source Availability

## REGION I

| GROUNDWATER | COUNTY | BASIN | SALINITY | SOURCE AVAILABILITY (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| SPARTA AQUIFER | HOUSTON | TRINITY | FRESH | 594 | 594 | 594 | 594 | 594 | 594 |
| SPARTA AQUIFER | NACOGDOCHES | NECHES | FRESH | 409 | 409 | 409 | 409 | 409 | 409 |
| SPARTA AQUIFER | SABINE | NECHES | FRESH | 61 | 61 | 61 | 61 | 61 | 61 |
| SPARTA AQUIFER | SABINE | SABINE | FRESH | 235 | 235 | 235 | 235 | 235 | 235 |
| SPARTA AQUIFER | SAN AUGUSTINE | NECHES | FRESH | 202 | 202 | 202 | 202 | 202 | 202 |
| SPARTA AQUIFER | SAN AUGUSTINE | SABINE | FRESH | 3 | 3 | 3 | 3 | 3 | 3 |
| SPARTA AQUIFER | TRINITY | NECHES | FRESH | 313 | 313 | 313 | 313 | 313 | 313 |
| YEGUA-JACKSON AQUIFER | ANGELINA | NECHES | FRESH | 16,890 | 16,890 | 16,890 | 16,890 | 16,507 | 16,507 |
| YEGUA-JACKSON AQUIFER | HOUSTON | NECHES | FRESH | 1,324 | 1,324 | 1,324 | 1,324 | 1,324 | 1,324 |
| YEGUA-JACKSON AQUIFER | HOUSTON | TRINITY | FRESH | 4,061 | 4,061 | 4,061 | 4,061 | 4,061 | 4,061 |
| YEGUA-JACKSON AQUIFER | NACOGDOCHES | NECHES | FRESH | 235 | 235 | 235 | 235 | 235 | 235 |
| YEGUA-JACKSON AQUIFER | POLK | NECHES | FRESH | 360 | 360 | 360 | 360 | 360 | 360 |
| YEGUA-JACKSON AQUIFER | SABINE | NECHES | FRESH | 3,724 | 3,724 | 3,724 | 3,724 | 3,724 | 3,724 |
| YEGUA-JACKSON AQUIFER | SABINE | SABINE | FRESH | 575 | 575 | 575 | 575 | 575 | 575 |
| YEGUA-JACKSON AQUIFER | SAN AUGUSTINE | NECHES | FRESH | 2,102 | 2,102 | 2,102 | 2,102 | 2,102 | 2,102 |
| YEGUA-JACKSON AQUIFER | SAN AUGUSTINE | SABINE | FRESH | 9 | 9 | 9 | 9 | 9 | 9 |
| YEGUA-JACKSON AQUIFER | TRINITY | NECHES | FRESH | 700 | 700 | 700 | 700 | 700 | 700 |
| **GROUNDWATER TOTAL SOURCE AVAILABILITY** | | | | **490,676** | **490,190** | **489,578** | **488,832** | **487,796** | **487,796** |

## REGION I

| REUSE | COUNTY | BASIN | SALINITY | SOURCE AVAILABILITY (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| DIRECT REUSE | ORANGE | SABINE | FRESH | 15 | 15 | 15 | 15 | 15 | 15 |
| DIRECT REUSE \| IRRIGATION/MANUFACTURING | SHELBY | SABINE | FRESH | 233 | 246 | 259 | 270 | 284 | 299 |
| DIRECT REUSE \| MANUFACTURING | SABINE | SABINE | FRESH | 20 | 20 | 20 | 20 | 20 | 20 |
| INDIRECT REUSE \| IRRIGATION | JEFFERSON | NECHES-TRINITY | FRESH | 13,687 | 13,687 | 13,687 | 13,687 | 13,687 | 13,687 |
| **REUSE TOTAL SOURCE AVAILABILITY** | | | | **13,955** | **13,968** | **13,981** | **13,992** | **14,006** | **14,021** |

## REGION I

| SURFACE WATER | COUNTY | BASIN | SALINITY | SOURCE AVAILABILITY (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| ATHENS LAKE/RESERVOIR | RESERVOIR | NECHES | FRESH | 5,983 | 5,903 | 5,822 | 5,741 | 5,660 | 5,580 |
| BELLWOOD LAKE/RESERVOIR | RESERVOIR | NECHES | FRESH | 950 | 950 | 950 | 950 | 950 | 950 |
| CENTER LAKE/RESERVOIR | RESERVOIR | SABINE | FRESH | 1,874 | 1,874 | 1,874 | 1,874 | 1,874 | 1,874 |
| CHEROKEE LAKE/RESERVOIR | RESERVOIR | SABINE | FRESH | 28,650 | 28,415 | 28,180 | 27,945 | 27,710 | 27,477 |

# Source Availability

## REGION I

| SURFACE WATER | COUNTY | BASIN | SALINITY | SOURCE AVAILABILITY (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| CYPRESS LIVESTOCK LOCAL SUPPLY | PANOLA | CYPRESS | FRESH | 30 | 30 | 30 | 30 | 30 | 30 |
| HOUSTON COUNTY LAKE/RESERVOIR | RESERVOIR | TRINITY | FRESH | 7,000 | 7,000 | 7,000 | 7,000 | 7,000 | 7,000 |
| JACKSONVILLE LAKE/RESERVOIR | RESERVOIR | NECHES | FRESH | 6,200 | 6,200 | 6,200 | 6,200 | 6,200 | 6,200 |
| KURTH LAKE/RESERVOIR | RESERVOIR | NECHES | FRESH | 18,417 | 18,413 | 18,408 | 18,404 | 18,400 | 18,396 |
| LAKE NACONICHE/RESERVOIR | RESERVOIR | NECHES | FRESH | 4,500 | 4,500 | 4,500 | 4,500 | 4,500 | 4,500 |
| MARTIN LAKE/RESERVOIR | RESERVOIR | SABINE | FRESH | 25,000 | 25,000 | 25,000 | 25,000 | 25,000 | 25,000 |
| MURVAUL LAKE/RESERVOIR | RESERVOIR | SABINE | FRESH | 21,203 | 20,615 | 20,027 | 19,438 | 18,850 | 18,279 |
| NACOGDOCHES LAKE/RESERVOIR | RESERVOIR | NECHES | FRESH | 16,683 | 16,300 | 15,917 | 15,533 | 15,150 | 14,776 |
| NECHES LIVESTOCK LOCAL SUPPLY | ANDERSON | NECHES | FRESH | 333 | 333 | 333 | 333 | 333 | 333 |
| NECHES LIVESTOCK LOCAL SUPPLY | ANGELINA | NECHES | FRESH | 661 | 661 | 661 | 661 | 661 | 661 |
| NECHES LIVESTOCK LOCAL SUPPLY | CHEROKEE | NECHES | FRESH | 1,555 | 1,555 | 1,555 | 1,555 | 1,555 | 1,555 |
| NECHES LIVESTOCK LOCAL SUPPLY | HARDIN | NECHES | FRESH | 155 | 155 | 155 | 155 | 155 | 155 |
| NECHES LIVESTOCK LOCAL SUPPLY | HENDERSON | NECHES | FRESH | 770 | 770 | 770 | 770 | 770 | 770 |
| NECHES LIVESTOCK LOCAL SUPPLY | HOUSTON | NECHES | FRESH | 1,007 | 1,007 | 1,007 | 1,007 | 1,007 | 1,007 |
| NECHES LIVESTOCK LOCAL SUPPLY | JASPER | NECHES | FRESH | 332 | 332 | 332 | 332 | 332 | 332 |
| NECHES LIVESTOCK LOCAL SUPPLY | NACOGDOCHES | NECHES | FRESH | 2,386 | 2,386 | 2,386 | 2,386 | 2,386 | 2,386 |
| NECHES LIVESTOCK LOCAL SUPPLY | ORANGE | NECHES | FRESH | 56 | 56 | 56 | 56 | 56 | 56 |
| NECHES LIVESTOCK LOCAL SUPPLY | POLK | NECHES | FRESH | 396 | 396 | 396 | 396 | 396 | 396 |
| NECHES LIVESTOCK LOCAL SUPPLY | RUSK | NECHES | FRESH | 808 | 808 | 808 | 808 | 808 | 808 |
| NECHES LIVESTOCK LOCAL SUPPLY | SABINE | NECHES | FRESH | 71 | 71 | 71 | 71 | 71 | 71 |
| NECHES LIVESTOCK LOCAL SUPPLY | SAN AUGUSTINE | NECHES | FRESH | 465 | 465 | 465 | 465 | 465 | 465 |
| NECHES LIVESTOCK LOCAL SUPPLY | SHELBY | NECHES | FRESH | 334 | 334 | 334 | 334 | 334 | 334 |
| NECHES LIVESTOCK LOCAL SUPPLY | SMITH | NECHES | FRESH | 605 | 605 | 605 | 605 | 605 | 605 |
| NECHES LIVESTOCK LOCAL SUPPLY | TRINITY | NECHES | FRESH | 449 | 449 | 449 | 449 | 449 | 449 |
| NECHES LIVESTOCK LOCAL SUPPLY | TYLER | NECHES | FRESH | 239 | 239 | 239 | 239 | 239 | 239 |
| NECHES OTHER LOCAL SUPPLY | CHEROKEE | NECHES | FRESH | 19 | 19 | 19 | 19 | 19 | 19 |
| NECHES OTHER LOCAL SUPPLY | JEFFERSON | NECHES | FRESH | 110 | 110 | 110 | 110 | 110 | 110 |
| NECHES OTHER LOCAL SUPPLY | NACOGDOCHES | NECHES | FRESH | 494 | 494 | 494 | 494 | 494 | 494 |
| NECHES OTHER LOCAL SUPPLY | POLK | NECHES | FRESH | 20 | 20 | 20 | 20 | 20 | 20 |

# Source Availability

## REGION I

| SURFACE WATER | COUNTY | BASIN | SALINITY | SOURCE AVAILABILITY (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| NECHES OTHER LOCAL SUPPLY | TYLER | NECHES | FRESH | 8 | 8 | 8 | 8 | 8 | 8 |
| NECHES RUN-OF-RIVER | ANDERSON | NECHES | FRESH | 197 | 197 | 197 | 197 | 197 | 197 |
| NECHES RUN-OF-RIVER | ANGELINA | NECHES | FRESH | 74 | 74 | 74 | 74 | 74 | 74 |
| NECHES RUN-OF-RIVER | CHEROKEE | NECHES | FRESH | 182 | 182 | 182 | 182 | 182 | 182 |
| NECHES RUN-OF-RIVER | HARDIN | NECHES | FRESH | 57 | 57 | 57 | 57 | 57 | 57 |
| NECHES RUN-OF-RIVER | HOUSTON | NECHES | FRESH | 287 | 287 | 287 | 287 | 287 | 287 |
| NECHES RUN-OF-RIVER | JASPER | NECHES | FRESH | 743 | 743 | 743 | 743 | 743 | 743 |
| NECHES RUN-OF-RIVER | JEFFERSON | NECHES | BRACKISH | 752,152 | 752,152 | 752,152 | 752,152 | 752,152 | 752,152 |
| NECHES RUN-OF-RIVER | NACOGDOCHES | NECHES | FRESH | 136 | 136 | 136 | 136 | 136 | 136 |
| NECHES RUN-OF-RIVER | ORANGE | NECHES | BRACKISH | 17,310 | 17,310 | 17,310 | 17,310 | 17,310 | 17,310 |
| NECHES RUN-OF-RIVER | RUSK | NECHES | FRESH | 88 | 88 | 88 | 88 | 88 | 88 |
| NECHES RUN-OF-RIVER | SABINE | NECHES | FRESH | 182 | 182 | 182 | 182 | 182 | 182 |
| NECHES RUN-OF-RIVER | SMITH | NECHES | FRESH | 50 | 50 | 50 | 50 | 50 | 50 |
| NECHES RUN-OF-RIVER | TRINITY | NECHES | FRESH | 62 | 62 | 62 | 62 | 62 | 62 |
| NECHES RUN-OF-RIVER | TYLER | NECHES | FRESH | 123 | 123 | 123 | 123 | 123 | 123 |
| NECHES RUN-OF-RIVER \| ANGELINA & NECHES RIVER AUTHORITY | SHELBY | NECHES | FRESH | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 |
| NECHES RUN-OF-RIVER \| BEAUMONT | JEFFERSON | NECHES | FRESH | 15,933 | 16,732 | 17,670 | 18,877 | 20,307 | 21,588 |
| NECHES RUN-OF-RIVER \| PINE ISLAND BAYOU | JASPER | NECHES | FRESH | 381,876 | 381,876 | 381,876 | 381,876 | 381,876 | 381,876 |
| NECHES-TRINITY LIVESTOCK LOCAL SUPPLY | JEFFERSON | NECHES-TRINITY | FRESH | 800 | 800 | 800 | 800 | 800 | 800 |
| NECHES-TRINITY OTHER LOCAL SUPPLY | JEFFERSON | NECHES-TRINITY | FRESH | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 |
| NECHES-TRINITY RUN-OF-RIVER | JEFFERSON | NECHES-TRINITY | FRESH | 55,940 | 55,940 | 55,940 | 55,940 | 55,940 | 55,940 |
| PALESTINE LAKE/RESERVOIR | RESERVOIR | NECHES | FRESH | 205,417 | 203,375 | 201,333 | 199,292 | 197,250 | 195,229 |
| PINKSTON LAKE/RESERVOIR | RESERVOIR | NECHES | FRESH | 3,800 | 3,800 | 3,800 | 3,800 | 3,800 | 3,800 |
| RUSK CITY LAKE/RESERVOIR | RESERVOIR | NECHES | FRESH | 63 | 63 | 62 | 61 | 60 | 59 |
| SABINE LIVESTOCK LOCAL SUPPLY | JASPER | SABINE | FRESH | 215 | 215 | 215 | 215 | 215 | 215 |
| SABINE LIVESTOCK LOCAL SUPPLY | NEWTON | SABINE | FRESH | 155 | 155 | 155 | 155 | 155 | 155 |
| SABINE LIVESTOCK LOCAL SUPPLY | ORANGE | SABINE | FRESH | 42 | 42 | 42 | 42 | 42 | 42 |
| SABINE LIVESTOCK LOCAL SUPPLY | PANOLA | SABINE | FRESH | 1,224 | 1,224 | 1,224 | 1,224 | 1,224 | 1,224 |
| SABINE LIVESTOCK LOCAL SUPPLY | RUSK | SABINE | FRESH | 308 | 308 | 308 | 308 | 308 | 308 |
| SABINE LIVESTOCK LOCAL SUPPLY | SABINE | SABINE | FRESH | 634 | 634 | 634 | 634 | 634 | 634 |
| SABINE LIVESTOCK LOCAL SUPPLY | SAN AUGUSTINE | SABINE | FRESH | 71 | 71 | 71 | 71 | 71 | 71 |
| SABINE LIVESTOCK LOCAL SUPPLY | SHELBY | SABINE | FRESH | 2,998 | 2,998 | 2,998 | 2,998 | 2,998 | 2,998 |

# Source Availability

## REGION I

| SURFACE WATER | COUNTY | BASIN | SALINITY | SOURCE AVAILABILITY (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| SABINE OTHER LOCAL SUPPLY | NEWTON | SABINE | FRESH | 158 | 158 | 158 | 158 | 158 | 158 |
| SABINE OTHER LOCAL SUPPLY | ORANGE | SABINE | FRESH | 178 | 178 | 178 | 178 | 178 | 178 |
| SABINE OTHER LOCAL SUPPLY | RUSK | SABINE | FRESH | 1,230 | 1,230 | 1,230 | 1,230 | 1,230 | 1,230 |
| SABINE RUN-OF-RIVER | NEWTON | SABINE | FRESH | 185 | 185 | 185 | 185 | 185 | 185 |
| SABINE RUN-OF-RIVER | ORANGE | SABINE | FRESH | 28 | 28 | 28 | 28 | 28 | 28 |
| SABINE RUN-OF-RIVER | ORANGE | SABINE | BRACKISH | 267,000 | 267,000 | 267,000 | 267,000 | 267,000 | 267,000 |
| SABINE RUN-OF-RIVER | PANOLA | SABINE | FRESH | 601 | 601 | 601 | 601 | 601 | 601 |
| SABINE RUN-OF-RIVER | RUSK | SABINE | FRESH | 137 | 137 | 137 | 137 | 137 | 137 |
| SABINE RUN-OF-RIVER \| SRA CANAL | NEWTON | SABINE | FRESH | 147,100 | 147,100 | 147,100 | 147,100 | 147,100 | 147,100 |
| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | RESERVOIR | NECHES | FRESH | 848,000 | 848,000 | 848,000 | 848,000 | 848,000 | 848,000 |
| SAN AUGUSTINE LAKE/RESERVOIR | RESERVOIR | NECHES | FRESH | 1,285 | 1,285 | 1,285 | 1,285 | 1,285 | 1,285 |
| STRIKER LAKE/RESERVOIR | RESERVOIR | NECHES | FRESH | 19,357 | 18,530 | 17,703 | 16,877 | 16,050 | 15,264 |
| TIMPSON LAKE/RESERVOIR | RESERVOIR | NECHES | FRESH | 350 | 350 | 350 | 350 | 350 | 350 |
| TOLEDO BEND LAKE/RESERVOIR | RESERVOIR | SABINE | FRESH | 750,000 | 750,000 | 750,000 | 750,000 | 750,000 | 750,000 |
| TOLEDO BEND LAKE/RESERVOIR \| LOUISIANA PORTION | RESERVOIR | SABINE-LOUISIANA | FRESH | 336 | 336 | 336 | 336 | 336 | 336 |
| TRINITY LIVESTOCK LOCAL SUPPLY | ANDERSON | TRINITY | FRESH | 684 | 684 | 684 | 684 | 684 | 684 |
| TRINITY LIVESTOCK LOCAL SUPPLY | HOUSTON | TRINITY | FRESH | 783 | 783 | 783 | 783 | 783 | 783 |
| TRINITY RUN-OF-RIVER | ANDERSON | TRINITY | FRESH | 1,060 | 1,060 | 1,060 | 1,060 | 1,060 | 1,060 |
| TRINITY RUN-OF-RIVER | HOUSTON | TRINITY | FRESH | 1,783 | 1,783 | 1,783 | 1,783 | 1,783 | 1,783 |
| TYLER LAKE/RESERVOIR | RESERVOIR | NECHES | FRESH | 30,900 | 30,875 | 30,850 | 30,825 | 30,800 | 30,775 |
| **SURFACE WATER TOTAL SOURCE AVAILABILITY** | | | | **3,662,037** | **3,658,652** | **3,655,403** | **3,652,424** | **3,649,668** | **3,646,854** |
| | | | | | | | | | |
| **REGION I TOTAL SOURCE AVAILABILITY** | | | | **4,166,668** | **4,162,810** | **4,158,962** | **4,155,248** | **4,151,470** | **4,148,671** |

# Appendix 3-B

# Water User Group Existing Water Supplies

# DB17 Report

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The following appendix includes a copy of the Water User Group Existing Water Supplies data from the TWDB Data Web Interface known as the DB17. The summary is divided by Water User Group, source, county, and basin.

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# Water User Group (WUG) Existing Water Supply

| REGION I | SOURCE REGION \| SOURCE NAME | EXISTING SUPPLY (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **ANDERSON COUNTY** | | | | | | | |
| **NECHES BASIN** | | | | | | | |
| BRUSHY CREEK WSC | I \| CARRIZO-WILCOX AQUIFER \| ANDERSON COUNTY | 296 | 296 | 296 | 296 | 296 | 296 |
| FRANKSTON | I \| CARRIZO-WILCOX AQUIFER \| ANDERSON COUNTY | 388 | 382 | 378 | 372 | 366 | 360 |
| PALESTINE | I \| CARRIZO-WILCOX AQUIFER \| ANDERSON COUNTY | 366 | 404 | 397 | 377 | 373 | 373 |
| PALESTINE | I \| PALESTINE LAKE/RESERVOIR | 2,222 | 2,222 | 2,223 | 2,223 | 2,223 | 2,223 |
| WALSTON SPRINGS WSC | I \| CARRIZO-WILCOX AQUIFER \| ANDERSON COUNTY | 299 | 299 | 299 | 299 | 299 | 299 |
| COUNTY-OTHER | I \| CARRIZO-WILCOX AQUIFER \| ANDERSON COUNTY | 249 | 250 | 239 | 228 | 226 | 226 |
| COUNTY-OTHER | I \| PALESTINE LAKE/RESERVOIR | 47 | 47 | 47 | 47 | 47 | 47 |
| COUNTY-OTHER | I \| QUEEN CITY AQUIFER \| ANDERSON COUNTY | 466 | 466 | 466 | 466 | 466 | 466 |
| COUNTY-OTHER | I \| SPARTA AQUIFER \| ANDERSON COUNTY | 163 | 163 | 163 | 163 | 163 | 163 |
| MANUFACTURING | I \| CARRIZO-WILCOX AQUIFER \| ANDERSON COUNTY | 14 | 18 | 19 | 20 | 21 | 22 |
| MINING | I \| CARRIZO-WILCOX AQUIFER \| ANDERSON COUNTY | 64 | 81 | 85 | 68 | 48 | 35 |
| STEAM ELECTRIC POWER | | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | I \| CARRIZO-WILCOX AQUIFER \| ANDERSON COUNTY | 14 | 14 | 14 | 14 | 14 | 14 |
| LIVESTOCK | I \| NECHES LIVESTOCK LOCAL SUPPLY | 333 | 333 | 333 | 333 | 333 | 333 |
| LIVESTOCK | I \| QUEEN CITY AQUIFER \| ANDERSON COUNTY | 301 | 301 | 301 | 301 | 301 | 301 |
| IRRIGATION | I \| CARRIZO-WILCOX AQUIFER \| ANDERSON COUNTY | 124 | 124 | 124 | 124 | 124 | 124 |
| IRRIGATION | I \| NECHES RUN-OF-RIVER | 197 | 197 | 197 | 197 | 197 | 197 |
| IRRIGATION | I \| QUEEN CITY AQUIFER \| ANDERSON COUNTY | 149 | 149 | 149 | 149 | 149 | 149 |
| **NECHES BASIN TOTAL EXISTING SUPPLY** | | **5,692** | **5,746** | **5,730** | **5,677** | **5,646** | **5,628** |
| **TRINITY BASIN** | | | | | | | |
| BRUSHY CREEK WSC | I \| CARRIZO-WILCOX AQUIFER \| ANDERSON COUNTY | 382 | 382 | 382 | 382 | 382 | 382 |
| ELKHART | I \| CARRIZO-WILCOX AQUIFER \| ANDERSON COUNTY | 428 | 428 | 428 | 428 | 428 | 428 |
| PALESTINE | I \| CARRIZO-WILCOX AQUIFER \| ANDERSON COUNTY | 348 | 383 | 376 | 357 | 354 | 354 |
| PALESTINE | I \| PALESTINE LAKE/RESERVOIR | 2,109 | 2,109 | 2,108 | 2,108 | 2,108 | 2,108 |
| WALSTON SPRINGS WSC | I \| CARRIZO-WILCOX AQUIFER \| ANDERSON COUNTY | 117 | 116 | 113 | 111 | 111 | 111 |
| FOUR PINES WSC | I \| CARRIZO-WILCOX AQUIFER \| ANDERSON COUNTY | 549 | 549 | 549 | 549 | 549 | 549 |
| THE CONSOLIDATED WSC | I \| CARRIZO-WILCOX AQUIFER \| ANDERSON COUNTY | 254 | 254 | 254 | 254 | 254 | 254 |
| THE CONSOLIDATED WSC | I \| HOUSTON COUNTY LAKE/RESERVOIR | 102 | 104 | 103 | 102 | 100 | 98 |
| COUNTY-OTHER | I \| CARRIZO-WILCOX AQUIFER \| ANDERSON COUNTY | 2,335 | 2,339 | 2,303 | 2,265 | 2,257 | 2,257 |
| COUNTY-OTHER | I \| OTHER AQUIFER \| ANDERSON COUNTY | 260 | 260 | 260 | 260 | 260 | 260 |
| COUNTY-OTHER | I \| QUEEN CITY AQUIFER \| ANDERSON COUNTY | 432 | 432 | 432 | 432 | 432 | 432 |
| COUNTY-OTHER | I \| SPARTA AQUIFER \| ANDERSON COUNTY | 128 | 128 | 128 | 128 | 128 | 128 |

# Water User Group (WUG) Existing Water Supply

| REGION I | SOURCE REGION \| SOURCE NAME | EXISTING SUPPLY (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **ANDERSON COUNTY** | | | | | | | |
| **TRINITY BASIN** | | | | | | | |
| MANUFACTURING | I \| CARRIZO-WILCOX AQUIFER \| ANDERSON COUNTY | 16 | 22 | 23 | 24 | 25 | 26 |
| MINING | I \| CARRIZO-WILCOX AQUIFER \| ANDERSON COUNTY | 100 | 100 | 100 | 100 | 100 | 100 |
| MINING | I \| OTHER AQUIFER \| ANDERSON COUNTY | 29 | 29 | 29 | 29 | 29 | 29 |
| LIVESTOCK | I \| CARRIZO-WILCOX AQUIFER \| ANDERSON COUNTY | 18 | 18 | 18 | 18 | 18 | 18 |
| LIVESTOCK | I \| OTHER AQUIFER \| ANDERSON COUNTY | 9 | 9 | 9 | 9 | 9 | 9 |
| LIVESTOCK | I \| QUEEN CITY AQUIFER \| ANDERSON COUNTY | 64 | 64 | 64 | 64 | 64 | 64 |
| LIVESTOCK | I \| TRINITY LIVESTOCK LOCAL SUPPLY | 684 | 684 | 684 | 684 | 684 | 684 |
| IRRIGATION | I \| CARRIZO-WILCOX AQUIFER \| ANDERSON COUNTY | 161 | 161 | 161 | 161 | 161 | 161 |
| IRRIGATION | I \| QUEEN CITY AQUIFER \| ANDERSON COUNTY | 138 | 138 | 138 | 138 | 138 | 138 |
| IRRIGATION | I \| TRINITY RUN-OF-RIVER | 1,060 | 1,060 | 1,060 | 1,060 | 1,060 | 1,060 |
| **TRINITY BASIN TOTAL EXISTING SUPPLY** | | **9,723** | **9,769** | **9,722** | **9,663** | **9,651** | **9,650** |
| **ANDERSON COUNTY TOTAL EXISTING SUPPLY** | | **15,415** | **15,515** | **15,452** | **15,340** | **15,297** | **15,278** |
| **ANGELINA COUNTY** | | | | | | | |
| **NECHES BASIN** | | | | | | | |
| LUFKIN | I \| CARRIZO-WILCOX AQUIFER \| ANGELINA COUNTY | 3,763 | 3,914 | 4,042 | 4,187 | 4,348 | 4,186 |
| LUFKIN | I \| KURTH LAKE/RESERVOIR | 2,508 | 2,609 | 2,694 | 2,792 | 2,898 | 3,308 |
| CENTRAL WCID OF ANGELINA COUNTY | I \| CARRIZO-WILCOX AQUIFER \| ANGELINA COUNTY | 877 | 877 | 877 | 877 | 877 | 877 |
| DIBOLL | I \| CARRIZO-WILCOX AQUIFER \| ANGELINA COUNTY | 1,806 | 1,806 | 1,806 | 1,806 | 1,806 | 1,806 |
| DIBOLL | I \| YEGUA-JACKSON AQUIFER \| ANGELINA COUNTY | 908 | 908 | 908 | 908 | 908 | 908 |
| HUDSON | I \| CARRIZO-WILCOX AQUIFER \| ANGELINA COUNTY | 642 | 642 | 642 | 642 | 642 | 664 |
| HUDSON WSC | I \| CARRIZO-WILCOX AQUIFER \| ANGELINA COUNTY | 1,157 | 1,157 | 1,157 | 1,157 | 1,157 | 1,157 |
| HUNTINGTON | I \| CARRIZO-WILCOX AQUIFER \| ANGELINA COUNTY | 448 | 448 | 448 | 448 | 448 | 448 |
| HUNTINGTON | I \| YEGUA-JACKSON AQUIFER \| ANGELINA COUNTY | 609 | 609 | 609 | 609 | 609 | 609 |
| ZAVALLA | I \| YEGUA-JACKSON AQUIFER \| ANGELINA COUNTY | 79 | 81 | 82 | 84 | 87 | 90 |
| ANGELINA WSC | I \| OTHER AQUIFER \| ANGELINA COUNTY | 523 | 523 | 523 | 523 | 523 | 523 |
| REDLAND WSC | I \| CARRIZO-WILCOX AQUIFER \| ANGELINA COUNTY | 778 | 778 | 778 | 778 | 778 | 778 |
| FOUR WAY SUD | I \| YEGUA-JACKSON AQUIFER \| ANGELINA COUNTY | 1,216 | 1,216 | 1,216 | 1,216 | 1,216 | 1,216 |
| BURKE | I \| YEGUA-JACKSON AQUIFER \| ANGELINA COUNTY | 156 | 165 | 172 | 180 | 186 | 193 |
| COUNTY-OTHER | I \| CARRIZO-WILCOX AQUIFER \| ANGELINA COUNTY | 1,733 | 1,733 | 1,733 | 1,733 | 1,733 | 1,733 |
| COUNTY-OTHER | I \| OTHER AQUIFER \| ANGELINA COUNTY | 175 | 175 | 175 | 175 | 175 | 175 |
| COUNTY-OTHER | I \| SPARTA AQUIFER \| ANGELINA COUNTY | 175 | 175 | 175 | 175 | 175 | 175 |
| COUNTY-OTHER | I \| YEGUA-JACKSON AQUIFER \| ANGELINA COUNTY | 275 | 275 | 275 | 275 | 275 | 275 |
| MANUFACTURING | I \| CARRIZO-WILCOX AQUIFER \| ANGELINA COUNTY | 1,964 | 2,157 | 2,352 | 2,526 | 2,711 | 2,911 |
| MANUFACTURING | I \| KURTH LAKE/RESERVOIR | 1,220 | 1,349 | 1,479 | 1,595 | 1,719 | 1,851 |

# Water User Group (WUG) Existing Water Supply

| REGION I | SOURCE REGION \| SOURCE NAME | EXISTING SUPPLY (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **ANGELINA COUNTY** | | | | | | | |
| **NECHES BASIN** | | | | | | | |
| MANUFACTURING | I \| OTHER AQUIFER \| ANGELINA COUNTY | 101 | 101 | 101 | 101 | 101 | 101 |
| MANUFACTURING | I \| YEGUA-JACKSON AQUIFER \| ANGELINA COUNTY | 1,242 | 1,242 | 1,242 | 1,242 | 1,242 | 1,242 |
| MINING | I \| OTHER AQUIFER \| ANGELINA COUNTY | 13 | 13 | 13 | 13 | 13 | 13 |
| STEAM ELECTRIC POWER | I \| CARRIZO-WILCOX AQUIFER \| ANGELINA COUNTY | 10,081 | 10,081 | 10,081 | 10,081 | 10,081 | 10,081 |
| STEAM ELECTRIC POWER | I \| KURTH LAKE/RESERVOIR | 6,721 | 6,721 | 6,721 | 6,721 | 6,721 | 6,721 |
| LIVESTOCK | I \| CARRIZO-WILCOX AQUIFER \| ANGELINA COUNTY | 13 | 13 | 13 | 13 | 13 | 13 |
| LIVESTOCK | I \| NECHES LIVESTOCK LOCAL SUPPLY | 661 | 661 | 661 | 661 | 661 | 661 |
| LIVESTOCK | I \| SPARTA AQUIFER \| ANGELINA COUNTY | 13 | 13 | 13 | 13 | 13 | 13 |
| LIVESTOCK | I \| YEGUA-JACKSON AQUIFER \| ANGELINA COUNTY | 50 | 50 | 50 | 50 | 50 | 50 |
| IRRIGATION | I \| KURTH LAKE/RESERVOIR | 481 | 481 | 481 | 481 | 481 | 481 |
| IRRIGATION | I \| YEGUA-JACKSON AQUIFER \| ANGELINA COUNTY | 331 | 331 | 331 | 331 | 331 | 331 |
| **NECHES BASIN TOTAL EXISTING SUPPLY** | | **40,719** | **41,304** | **41,850** | **42,393** | **42,978** | **43,590** |
| **ANGELINA COUNTY TOTAL EXISTING SUPPLY** | | **40,719** | **41,304** | **41,850** | **42,393** | **42,978** | **43,590** |
| **CHEROKEE COUNTY** | | | | | | | |
| **NECHES BASIN** | | | | | | | |
| JACKSONVILLE | I \| CARRIZO-WILCOX AQUIFER \| CHEROKEE COUNTY | 804 | 858 | 913 | 989 | 1,077 | 1,173 |
| JACKSONVILLE | I \| JACKSONVILLE LAKE/RESERVOIR | 1,876 | 2,000 | 2,129 | 2,308 | 2,511 | 2,735 |
| ALTO | I \| CARRIZO-WILCOX AQUIFER \| CHEROKEE COUNTY | 508 | 508 | 508 | 508 | 508 | 508 |
| ALTO RURAL WSC | I \| CARRIZO-WILCOX AQUIFER \| CHEROKEE COUNTY | 736 | 736 | 736 | 736 | 736 | 736 |
| BULLARD | I \| CARRIZO-WILCOX AQUIFER \| CHEROKEE COUNTY | 16 | 16 | 16 | 16 | 16 | 16 |
| BULLARD | I \| CARRIZO-WILCOX AQUIFER \| SMITH COUNTY | 10 | 9 | 8 | 7 | 6 | 6 |
| CRAFT-TURNEY WSC | I \| CARRIZO-WILCOX AQUIFER \| CHEROKEE COUNTY | 145 | 151 | 157 | 168 | 183 | 199 |
| CRAFT-TURNEY WSC | I \| JACKSONVILLE LAKE/RESERVOIR | 338 | 351 | 366 | 392 | 426 | 464 |
| NEW SUMMERFIELD | I \| CARRIZO-WILCOX AQUIFER \| CHEROKEE COUNTY | 253 | 253 | 253 | 253 | 253 | 253 |
| NORTH CHEROKEE WSC | I \| CARRIZO-WILCOX AQUIFER \| CHEROKEE COUNTY | 185 | 196 | 208 | 225 | 244 | 266 |
| NORTH CHEROKEE WSC | I \| JACKSONVILLE LAKE/RESERVOIR | 417 | 444 | 473 | 512 | 557 | 607 |
| RUSK | I \| CARRIZO-WILCOX AQUIFER \| CHEROKEE COUNTY | 1,339 | 1,340 | 1,341 | 1,342 | 1,342 | 1,443 |
| RUSK | I \| RUSK CITY LAKE/RESERVOIR | 63 | 63 | 62 | 61 | 60 | 59 |
| RUSK RURAL WSC | I \| CARRIZO-WILCOX AQUIFER \| CHEROKEE COUNTY | 557 | 557 | 557 | 557 | 557 | 557 |
| SOUTHERN UTILITIES COMPANY | I \| CARRIZO-WILCOX AQUIFER \| CHEROKEE COUNTY | 480 | 513 | 546 | 592 | 644 | 701 |
| TROUP | I \| CARRIZO-WILCOX AQUIFER \| CHEROKEE COUNTY | 14 | 15 | 16 | 17 | 18 | 20 |
| WELLS | I \| CARRIZO-WILCOX AQUIFER \| CHEROKEE COUNTY | 382 | 382 | 382 | 382 | 382 | 382 |
| WRIGHT CITY WSC | I \| CARRIZO-WILCOX AQUIFER \| CHEROKEE COUNTY | 102 | 102 | 102 | 102 | 102 | 99 |

# Water User Group (WUG) Existing Water Supply

| REGION I | SOURCE REGION \| SOURCE NAME | EXISTING SUPPLY (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **CHEROKEE COUNTY** | | | | | | | |
| **NECHES BASIN** | | | | | | | |
| COUNTY-OTHER | I \| CARRIZO-WILCOX AQUIFER \| CHEROKEE COUNTY | 587 | 591 | 597 | 605 | 614 | 623 |
| COUNTY-OTHER | I \| JACKSONVILLE LAKE/RESERVOIR | 199 | 211 | 223 | 241 | 262 | 286 |
| COUNTY-OTHER | I \| OTHER AQUIFER \| CHEROKEE COUNTY | 196 | 196 | 196 | 196 | 196 | 196 |
| COUNTY-OTHER | I \| QUEEN CITY AQUIFER \| CHEROKEE COUNTY | 676 | 676 | 676 | 676 | 676 | 676 |
| COUNTY-OTHER | I \| SPARTA AQUIFER \| CHEROKEE COUNTY | 156 | 156 | 156 | 156 | 156 | 156 |
| MANUFACTURING | I \| CARRIZO-WILCOX AQUIFER \| CHEROKEE COUNTY | 134 | 143 | 151 | 158 | 169 | 181 |
| MANUFACTURING | I \| JACKSONVILLE LAKE/RESERVOIR | 289 | 309 | 328 | 344 | 371 | 400 |
| MANUFACTURING | I \| QUEEN CITY AQUIFER \| CHEROKEE COUNTY | 1 | 1 | 1 | 1 | 1 | 1 |
| MINING | I \| NECHES OTHER LOCAL SUPPLY | 19 | 19 | 19 | 19 | 19 | 19 |
| MINING | I \| OTHER AQUIFER \| CHEROKEE COUNTY | 38 | 38 | 38 | 38 | 38 | 38 |
| STEAM ELECTRIC POWER | I \| STRIKER LAKE/RESERVOIR | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 |
| LIVESTOCK | I \| CARRIZO-WILCOX AQUIFER \| CHEROKEE COUNTY | 49 | 49 | 49 | 49 | 49 | 49 |
| LIVESTOCK | I \| NECHES LIVESTOCK LOCAL SUPPLY | 1,555 | 1,555 | 1,555 | 1,555 | 1,555 | 1,555 |
| LIVESTOCK | I \| OTHER AQUIFER \| CHEROKEE COUNTY | 33 | 33 | 33 | 33 | 33 | 33 |
| LIVESTOCK | I \| QUEEN CITY AQUIFER \| CHEROKEE COUNTY | 176 | 176 | 176 | 176 | 176 | 176 |
| IRRIGATION | I \| CARRIZO-WILCOX AQUIFER \| CHEROKEE COUNTY | 5 | 5 | 5 | 5 | 5 | 5 |
| IRRIGATION | I \| NECHES RUN-OF-RIVER | 182 | 182 | 182 | 182 | 182 | 182 |
| IRRIGATION | I \| OTHER AQUIFER \| CHEROKEE COUNTY | 1 | 1 | 1 | 1 | 1 | 1 |
| IRRIGATION | I \| PALESTINE LAKE/RESERVOIR | 41 | 36 | 32 | 28 | 25 | 25 |
| IRRIGATION | I \| QUEEN CITY AQUIFER \| CHEROKEE COUNTY | 206 | 206 | 206 | 206 | 206 | 206 |
| IRRIGATION | I \| SPARTA AQUIFER \| CHEROKEE COUNTY | 1 | 1 | 1 | 1 | 1 | 1 |
| **NECHES BASIN TOTAL EXISTING SUPPLY** | | **17,769** | **18,078** | **18,398** | **18,837** | **19,357** | **20,033** |
| **CHEROKEE COUNTY TOTAL EXISTING SUPPLY** | | **17,769** | **18,078** | **18,398** | **18,837** | **19,357** | **20,033** |
| **HARDIN COUNTY** | | | | | | | |
| **NECHES BASIN** | | | | | | | |
| KOUNTZE | I \| GULF COAST AQUIFER \| HARDIN COUNTY | 1,041 | 1,041 | 1,041 | 1,041 | 1,041 | 1,041 |
| LUMBERTON | I \| GULF COAST AQUIFER \| HARDIN COUNTY | 1,656 | 1,852 | 1,990 | 2,097 | 2,191 | 2,263 |
| LUMBERTON MUD | I \| GULF COAST AQUIFER \| HARDIN COUNTY | 4,382 | 4,186 | 4,048 | 3,941 | 3,847 | 3,775 |
| NORTH HARDIN WSC | I \| GULF COAST AQUIFER \| HARDIN COUNTY | 1,906 | 1,906 | 1,906 | 1,906 | 1,906 | 1,906 |
| SILSBEE | I \| GULF COAST AQUIFER \| HARDIN COUNTY | 1,617 | 1,617 | 1,617 | 1,617 | 1,617 | 1,617 |
| SOUR LAKE | I \| GULF COAST AQUIFER \| HARDIN COUNTY | 934 | 934 | 934 | 934 | 934 | 934 |
| WEST HARDIN WSC | I \| GULF COAST AQUIFER \| HARDIN COUNTY | 771 | 768 | 766 | 763 | 761 | 758 |
| COUNTY-OTHER | I \| GULF COAST AQUIFER \| HARDIN COUNTY | 1,629 | 1,668 | 1,688 | 1,738 | 1,776 | 1,808 |
| MANUFACTURING | I \| GULF COAST AQUIFER \| HARDIN COUNTY | 294 | 324 | 355 | 383 | 413 | 445 |
| MINING | I \| GULF COAST AQUIFER \| HARDIN COUNTY | 12 | 12 | 12 | 12 | 12 | 12 |
| LIVESTOCK | I \| GULF COAST AQUIFER \| HARDIN COUNTY | 69 | 69 | 69 | 69 | 69 | 69 |
| LIVESTOCK | I \| NECHES LIVESTOCK LOCAL SUPPLY | 155 | 155 | 155 | 155 | 155 | 155 |
| IRRIGATION | I \| GULF COAST AQUIFER \| HARDIN COUNTY | 3,357 | 3,588 | 3,747 | 3,804 | 3,745 | 3,655 |
| IRRIGATION | I \| NECHES RUN-OF-RIVER | 57 | 57 | 57 | 57 | 57 | 57 |

# Water User Group (WUG) Existing Water Supply

| REGION I | SOURCE REGION \| SOURCE NAME | EXISTING SUPPLY (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **HARDIN COUNTY** | | | | | | | |
| **NECHES BASIN TOTAL EXISTING SUPPLY** | | **17,880** | **18,177** | **18,385** | **18,517** | **18,524** | **18,495** |
| **TRINITY BASIN** | | | | | | | |
| LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY | I \| GULF COAST AQUIFER \| HARDIN COUNTY | 10 | 11 | 12 | 12 | 13 | 13 |
| WEST HARDIN WSC | I \| GULF COAST AQUIFER \| HARDIN COUNTY | 4 | 4 | 4 | 4 | 4 | 4 |
| COUNTY-OTHER | I \| GULF COAST AQUIFER \| HARDIN COUNTY | 18 | 18 | 18 | 18 | 18 | 18 |
| LIVESTOCK | I \| GULF COAST AQUIFER \| HARDIN COUNTY | 2 | 2 | 2 | 2 | 2 | 2 |
| **TRINITY BASIN TOTAL EXISTING SUPPLY** | | **34** | **35** | **36** | **36** | **37** | **37** |
| **HARDIN COUNTY TOTAL EXISTING SUPPLY** | | **17,914** | **18,212** | **18,421** | **18,553** | **18,561** | **18,532** |
| **HENDERSON COUNTY** | | | | | | | |
| **NECHES BASIN** | | | | | | | |
| ATHENS | C \| CARRIZO-WILCOX AQUIFER \| HENDERSON COUNTY | 16 | 15 | 18 | 22 | 16 | 11 |
| ATHENS | I \| ATHENS LAKE/RESERVOIR | 39 | 41 | 42 | 43 | 36 | 29 |
| BERRYVILLE | I \| CARRIZO-WILCOX AQUIFER \| HENDERSON COUNTY | 118 | 124 | 128 | 137 | 147 | 156 |
| BETHEL-ASH WSC | I \| CARRIZO-WILCOX AQUIFER \| HENDERSON COUNTY | 659 | 637 | 625 | 620 | 616 | 616 |
| BROWNSBORO | I \| CARRIZO-WILCOX AQUIFER \| HENDERSON COUNTY | 218 | 260 | 295 | 343 | 386 | 428 |
| BRUSHY CREEK WSC | I \| CARRIZO-WILCOX AQUIFER \| HENDERSON COUNTY | 65 | 66 | 67 | 70 | 74 | 78 |
| CHANDLER | I \| CARRIZO-WILCOX AQUIFER \| HENDERSON COUNTY | 877 | 877 | 877 | 877 | 877 | 877 |
| FRANKSTON | I \| CARRIZO-WILCOX AQUIFER \| ANDERSON COUNTY | 15 | 21 | 25 | 31 | 37 | 43 |
| MURCHISON | I \| CARRIZO-WILCOX AQUIFER \| HENDERSON COUNTY | 93 | 91 | 89 | 88 | 88 | 88 |
| VIRGINIA HILL WSC | C \| CARRIZO-WILCOX AQUIFER \| HENDERSON COUNTY | 280 | 280 | 279 | 280 | 279 | 273 |
| R-P-M WSC | D \| CARRIZO-WILCOX AQUIFER \| VAN ZANDT COUNTY | 38 | 37 | 37 | 38 | 38 | 39 |
| R-P-M WSC | D \| QUEEN CITY AQUIFER \| VAN ZANDT COUNTY | 36 | 35 | 35 | 36 | 36 | 36 |
| COUNTY-OTHER | I \| CARRIZO-WILCOX AQUIFER \| HENDERSON COUNTY | 1,044 | 958 | 891 | 863 | 838 | 818 |
| COUNTY-OTHER | I \| OTHER AQUIFER \| HENDERSON COUNTY | 539 | 539 | 539 | 539 | 539 | 539 |
| MANUFACTURING | I \| CARRIZO-WILCOX AQUIFER \| HENDERSON COUNTY | 78 | 78 | 78 | 79 | 87 | 96 |
| MINING | I \| CARRIZO-WILCOX AQUIFER \| HENDERSON COUNTY | 54 | 54 | 54 | 54 | 54 | 54 |
| MINING | I \| OTHER AQUIFER \| HENDERSON COUNTY | 65 | 65 | 65 | 65 | 65 | 65 |
| LIVESTOCK | I \| ATHENS LAKE/RESERVOIR | 1,547 | 1,474 | 1,416 | 1,341 | 951 | 700 |
| LIVESTOCK | I \| CARRIZO-WILCOX AQUIFER \| HENDERSON COUNTY | 360 | 360 | 360 | 360 | 360 | 360 |
| LIVESTOCK | I \| NECHES LIVESTOCK LOCAL SUPPLY | 770 | 770 | 770 | 770 | 770 | 770 |
| LIVESTOCK | I \| QUEEN CITY AQUIFER \| HENDERSON COUNTY | 188 | 188 | 188 | 188 | 188 | 188 |
| IRRIGATION | C \| CARRIZO-WILCOX AQUIFER \| HENDERSON COUNTY | 50 | 51 | 60 | 71 | 68 | 63 |
| IRRIGATION | C \| DIRECT REUSE | 32 | 32 | 32 | 32 | 32 | 32 |
| IRRIGATION | C \| TRINITY RUN-OF-RIVER | 415 | 415 | 415 | 415 | 415 | 415 |

# Water User Group (WUG) Existing Water Supply

| REGION I | SOURCE REGION \| SOURCE NAME | EXISTING SUPPLY (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **HENDERSON COUNTY** | | | | | | | |
| **NECHES BASIN** | | | | | | | |
| IRRIGATION | I \| ATHENS LAKE/RESERVOIR | 168 | 160 | 154 | 146 | 103 | 76 |
| IRRIGATION | I \| PALESTINE LAKE/RESERVOIR | 82 | 73 | 64 | 57 | 51 | 51 |
| IRRIGATION | I \| QUEEN CITY AQUIFER \| HENDERSON COUNTY | 25 | 25 | 25 | 25 | 25 | 25 |
| **NECHES BASIN TOTAL EXISTING SUPPLY** | | **7,871** | **7,726** | **7,628** | **7,590** | **7,176** | **6,926** |
| **HENDERSON COUNTY TOTAL EXISTING SUPPLY** | | **7,871** | **7,726** | **7,628** | **7,590** | **7,176** | **6,926** |
| **HOUSTON COUNTY** | | | | | | | |
| **NECHES BASIN** | | | | | | | |
| GRAPELAND | I \| CARRIZO-WILCOX AQUIFER \| HOUSTON COUNTY | 240 | 239 | 241 | 241 | 242 | 242 |
| GRAPELAND | I \| HOUSTON COUNTY LAKE/RESERVOIR | 45 | 45 | 45 | 45 | 45 | 44 |
| THE CONSOLIDATED WSC | I \| CARRIZO-WILCOX AQUIFER \| HOUSTON COUNTY | 755 | 755 | 755 | 755 | 755 | 755 |
| THE CONSOLIDATED WSC | I \| HOUSTON COUNTY LAKE/RESERVOIR | 227 | 224 | 221 | 218 | 214 | 211 |
| COUNTY-OTHER | I \| CARRIZO-WILCOX AQUIFER \| HOUSTON COUNTY | 10 | 10 | 10 | 10 | 10 | 10 |
| COUNTY-OTHER | I \| OTHER AQUIFER \| HOUSTON COUNTY | 5 | 5 | 5 | 5 | 5 | 5 |
| COUNTY-OTHER | I \| SPARTA AQUIFER \| HOUSTON COUNTY | 30 | 30 | 30 | 30 | 30 | 30 |
| MANUFACTURING | I \| CARRIZO-WILCOX AQUIFER \| HOUSTON COUNTY | 24 | 24 | 24 | 24 | 24 | 24 |
| MINING | I \| OTHER AQUIFER \| HOUSTON COUNTY | 113 | 89 | 65 | 42 | 18 | 8 |
| LIVESTOCK | I \| CARRIZO-WILCOX AQUIFER \| HOUSTON COUNTY | 4 | 4 | 4 | 4 | 4 | 4 |
| LIVESTOCK | I \| NECHES LIVESTOCK LOCAL SUPPLY | 1,007 | 1,007 | 1,007 | 1,007 | 1,007 | 1,007 |
| LIVESTOCK | I \| OTHER AQUIFER \| HOUSTON COUNTY | 14 | 14 | 14 | 14 | 14 | 14 |
| LIVESTOCK | I \| QUEEN CITY AQUIFER \| HOUSTON COUNTY | 14 | 14 | 14 | 14 | 14 | 14 |
| LIVESTOCK | I \| SPARTA AQUIFER \| HOUSTON COUNTY | 29 | 29 | 29 | 29 | 29 | 29 |
| IRRIGATION | I \| NECHES RUN-OF-RIVER | 287 | 287 | 287 | 287 | 287 | 287 |
| IRRIGATION | I \| OTHER AQUIFER \| HOUSTON COUNTY | 50 | 50 | 50 | 50 | 50 | 50 |
| **NECHES BASIN TOTAL EXISTING SUPPLY** | | **2,854** | **2,826** | **2,801** | **2,775** | **2,748** | **2,734** |
| **TRINITY BASIN** | | | | | | | |
| CROCKETT | I \| HOUSTON COUNTY LAKE/RESERVOIR | 2,008 | 1,995 | 1,981 | 1,968 | 1,952 | 1,934 |
| GRAPELAND | I \| CARRIZO-WILCOX AQUIFER \| HOUSTON COUNTY | 369 | 370 | 368 | 368 | 367 | 367 |
| GRAPELAND | I \| HOUSTON COUNTY LAKE/RESERVOIR | 70 | 69 | 68 | 68 | 67 | 67 |
| LOVELADY | I \| HOUSTON COUNTY LAKE/RESERVOIR | 35 | 34 | 34 | 34 | 34 | 33 |
| LOVELADY | I \| YEGUA-JACKSON AQUIFER \| HOUSTON COUNTY | 201 | 201 | 201 | 201 | 201 | 201 |
| THE CONSOLIDATED WSC | I \| CARRIZO-WILCOX AQUIFER \| HOUSTON COUNTY | 1,329 | 1,329 | 1,329 | 1,329 | 1,329 | 1,329 |
| THE CONSOLIDATED WSC | I \| HOUSTON COUNTY LAKE/RESERVOIR | 617 | 608 | 599 | 592 | 582 | 574 |
| COUNTY-OTHER | I \| CARRIZO-WILCOX AQUIFER \| HOUSTON COUNTY | 94 | 94 | 94 | 94 | 94 | 94 |
| COUNTY-OTHER | I \| HOUSTON COUNTY LAKE/RESERVOIR | 86 | 80 | 78 | 77 | 77 | 76 |
| COUNTY-OTHER | I \| OTHER AQUIFER \| HOUSTON COUNTY | 100 | 100 | 100 | 100 | 100 | 100 |

# Water User Group (WUG) Existing Water Supply

| REGION I | SOURCE REGION \| SOURCE NAME | EXISTING SUPPLY (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **HOUSTON COUNTY** | | | | | | | |
| **TRINITY BASIN** | | | | | | | |
| COUNTY-OTHER | I \| YEGUA-JACKSON AQUIFER \| HOUSTON COUNTY | 50 | 50 | 50 | 50 | 50 | 50 |
| MANUFACTURING | I \| CARRIZO-WILCOX AQUIFER \| HOUSTON COUNTY | 18 | 18 | 18 | 18 | 18 | 18 |
| MANUFACTURING | I \| HOUSTON COUNTY LAKE/RESERVOIR | 301 | 331 | 360 | 385 | 417 | 451 |
| MINING | I \| OTHER AQUIFER \| HOUSTON COUNTY | 209 | 165 | 122 | 77 | 33 | 14 |
| LIVESTOCK | I \| CARRIZO-WILCOX AQUIFER \| HOUSTON COUNTY | 244 | 351 | 466 | 591 | 726 | 899 |
| LIVESTOCK | I \| OTHER AQUIFER \| HOUSTON COUNTY | 55 | 55 | 55 | 55 | 55 | 55 |
| LIVESTOCK | I \| QUEEN CITY AQUIFER \| HOUSTON COUNTY | 13 | 13 | 13 | 13 | 13 | 13 |
| LIVESTOCK | I \| SPARTA AQUIFER \| HOUSTON COUNTY | 75 | 75 | 75 | 75 | 75 | 75 |
| LIVESTOCK | I \| TRINITY LIVESTOCK LOCAL SUPPLY | 783 | 783 | 783 | 783 | 783 | 783 |
| IRRIGATION | I \| CARRIZO-WILCOX AQUIFER \| HOUSTON COUNTY | 38 | 38 | 38 | 38 | 38 | 38 |
| IRRIGATION | I \| OTHER AQUIFER \| HOUSTON COUNTY | 6 | 6 | 6 | 6 | 6 | 6 |
| IRRIGATION | I \| QUEEN CITY AQUIFER \| HOUSTON COUNTY | 50 | 50 | 50 | 50 | 50 | 50 |
| IRRIGATION | I \| SPARTA AQUIFER \| HOUSTON COUNTY | 25 | 25 | 25 | 25 | 25 | 25 |
| IRRIGATION | I \| TRINITY RUN-OF-RIVER | 1,783 | 1,783 | 1,783 | 1,783 | 1,783 | 1,783 |
| **TRINITY BASIN TOTAL EXISTING SUPPLY** | | **8,559** | **8,623** | **8,696** | **8,780** | **8,875** | **9,035** |
| **HOUSTON COUNTY TOTAL EXISTING SUPPLY** | | **11,413** | **11,449** | **11,497** | **11,555** | **11,623** | **11,769** |
| **JASPER COUNTY** | | | | | | | |
| **NECHES BASIN** | | | | | | | |
| JASPER | I \| GULF COAST AQUIFER \| JASPER COUNTY | 4,790 | 4,790 | 4,790 | 4,790 | 4,790 | 4,790 |
| COUNTY-OTHER | I \| GULF COAST AQUIFER \| JASPER COUNTY | 1,500 | 1,472 | 1,431 | 1,405 | 1,399 | 1,399 |
| MANUFACTURING | I \| GULF COAST AQUIFER \| JASPER COUNTY | 31,270 | 31,270 | 31,270 | 31,270 | 31,270 | 31,270 |
| MANUFACTURING | I \| NECHES RUN-OF-RIVER | 616 | 616 | 616 | 616 | 616 | 616 |
| MANUFACTURING | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 60,000 | 60,000 | 60,000 | 60,000 | 60,000 | 60,000 |
| MINING | I \| GULF COAST AQUIFER \| JASPER COUNTY | 70 | 55 | 41 | 27 | 13 | 7 |
| LIVESTOCK | I \| GULF COAST AQUIFER \| JASPER COUNTY | 115 | 115 | 115 | 115 | 115 | 115 |
| LIVESTOCK | I \| NECHES LIVESTOCK LOCAL SUPPLY | 332 | 332 | 332 | 332 | 332 | 332 |
| IRRIGATION | I \| NECHES RUN-OF-RIVER | 81 | 81 | 81 | 81 | 81 | 81 |
| **NECHES BASIN TOTAL EXISTING SUPPLY** | | **98,774** | **98,731** | **98,676** | **98,636** | **98,616** | **98,610** |
| **SABINE BASIN** | | | | | | | |
| JASPER COUNTY WCID #1 | I \| GULF COAST AQUIFER \| JASPER COUNTY | 1,073 | 1,073 | 1,073 | 1,073 | 1,073 | 1,073 |
| KIRBYVILLE | I \| GULF COAST AQUIFER \| JASPER COUNTY | 584 | 584 | 584 | 584 | 584 | 584 |
| MAURICEVILLE SUD | I \| GULF COAST AQUIFER \| ORANGE COUNTY | 73 | 73 | 71 | 69 | 68 | 68 |
| COUNTY-OTHER | I \| GULF COAST AQUIFER \| JASPER COUNTY | 1,159 | 1,183 | 1,233 | 1,259 | 1,265 | 1,265 |
| MANUFACTURING | I \| GULF COAST AQUIFER \| JASPER COUNTY | 50 | 50 | 50 | 50 | 50 | 50 |
| MINING | I \| GULF COAST AQUIFER \| JASPER COUNTY | 78 | 63 | 47 | 31 | 15 | 7 |
| LIVESTOCK | I \| GULF COAST AQUIFER \| JASPER COUNTY | 134 | 134 | 134 | 134 | 134 | 134 |
| LIVESTOCK | I \| SABINE LIVESTOCK LOCAL SUPPLY | 215 | 215 | 215 | 215 | 215 | 215 |
| IRRIGATION | I \| NECHES RUN-OF-RIVER | 46 | 46 | 46 | 46 | 46 | 46 |
| **SABINE BASIN TOTAL EXISTING SUPPLY** | | **3,412** | **3,421** | **3,453** | **3,461** | **3,450** | **3,442** |

# Water User Group (WUG) Existing Water Supply

| REGION I | SOURCE REGION \| SOURCE NAME | EXISTING SUPPLY (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **JASPER COUNTY TOTAL EXISTING SUPPLY** | | **102,186** | **102,152** | **102,129** | **102,097** | **102,066** | **102,052** |
| **JEFFERSON COUNTY** | | | | | | | |
| **NECHES BASIN** | | | | | | | |
| BEAUMONT | I \| GULF COAST AQUIFER \| HARDIN COUNTY | 3,211 | 3,211 | 3,211 | 3,211 | 3,211 | 3,211 |
| BEAUMONT | I \| NECHES RUN-OF-RIVER | 4,358 | 4,392 | 4,442 | 4,903 | 5,442 | 5,933 |
| BEAUMONT | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 2,466 | 2,863 | 3,137 | 2,754 | 2,299 | 1,892 |
| PORT ARTHUR | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 60 | 60 | 59 | 59 | 59 | 59 |
| BEVIL OAKS | I \| GULF COAST AQUIFER \| JEFFERSON COUNTY | 135 | 137 | 139 | 147 | 157 | 169 |
| CHINA | I \| GULF COAST AQUIFER \| JEFFERSON COUNTY | 3 | 3 | 3 | 3 | 4 | 4 |
| GROVES | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 70 | 67 | 65 | 64 | 64 | 64 |
| JEFFERSON COUNTY WCID #10 | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 75 | 76 | 78 | 81 | 87 | 93 |
| MEEKER MUD | I \| GULF COAST AQUIFER \| JEFFERSON COUNTY | 127 | 128 | 128 | 128 | 133 | 139 |
| MEEKER MUD | I \| NECHES RUN-OF-RIVER | 1 | 1 | 1 | 1 | 1 | 2 |
| NEDERLAND | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 87 | 89 | 92 | 97 | 104 | 111 |
| NOME | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 48 | 49 | 51 | 53 | 57 | 61 |
| PORT NECHES | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 742 | 752 | 770 | 807 | 862 | 926 |
| COUNTY-OTHER | I \| GULF COAST AQUIFER \| JEFFERSON COUNTY | 2 | 2 | 2 | 2 | 1 | 1 |
| COUNTY-OTHER | I \| NECHES RUN-OF-RIVER | 123 | 132 | 141 | 119 | 102 | 89 |
| COUNTY-OTHER | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 18 | 19 | 19 | 20 | 21 | 23 |
| MANUFACTURING | I \| GULF COAST AQUIFER \| HARDIN COUNTY | 10 | 10 | 10 | 10 | 10 | 10 |
| MANUFACTURING | I \| GULF COAST AQUIFER \| JEFFERSON COUNTY | 80 | 80 | 80 | 80 | 80 | 80 |
| MANUFACTURING | I \| NECHES RUN-OF-RIVER | 121,326 | 126,064 | 126,079 | 126,100 | 126,123 | 126,146 |
| MANUFACTURING | I \| SABINE RUN-OF-RIVER | 582 | 582 | 582 | 582 | 582 | 582 |
| MANUFACTURING | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 4,324 | 51,094 | 58,470 | 65,828 | 73,187 | 80,841 |
| MINING | I \| GULF COAST AQUIFER \| JEFFERSON COUNTY | 18 | 33 | 51 | 84 | 107 | 133 |
| MINING | I \| NECHES OTHER LOCAL SUPPLY | 110 | 110 | 110 | 110 | 110 | 110 |
| STEAM ELECTRIC POWER | | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | I \| GULF COAST AQUIFER \| JEFFERSON COUNTY | 75 | 75 | 75 | 75 | 75 | 75 |
| IRRIGATION | I \| NECHES RUN-OF-RIVER | 9,800 | 9,800 | 9,800 | 9,800 | 9,800 | 9,800 |
| IRRIGATION | I \| NECHES-TRINITY INDIRECT REUSE | 958 | 958 | 958 | 958 | 958 | 958 |
| IRRIGATION | I \| NECHES-TRINITY RUN-OF-RIVER | 3,832 | 3,832 | 3,832 | 3,832 | 3,832 | 3,832 |
| **NECHES BASIN TOTAL EXISTING SUPPLY** | | **152,641** | **204,619** | **212,385** | **219,908** | **227,468** | **235,344** |
| **NECHES-TRINITY BASIN** | | | | | | | |
| BEAUMONT | I \| GULF COAST AQUIFER \| HARDIN COUNTY | 6,289 | 6,289 | 6,289 | 6,289 | 6,289 | 6,289 |
| BEAUMONT | I \| NECHES RUN-OF-RIVER | 8,536 | 8,602 | 8,701 | 9,602 | 10,660 | 11,622 |
| BEAUMONT | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 4,829 | 5,606 | 6,143 | 5,394 | 4,502 | 3,705 |
| PORT ARTHUR | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 19,745 | 19,715 | 19,489 | 19,442 | 19,423 | 19,422 |
| CHINA | I \| GULF COAST AQUIFER \| JEFFERSON COUNTY | 140 | 143 | 147 | 155 | 164 | 177 |

# Water User Group (WUG) Existing Water Supply

| REGION I | SOURCE REGION \| SOURCE NAME | EXISTING SUPPLY (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **JEFFERSON COUNTY** | | | | | | | |
| **NECHES-TRINITY BASIN** | | | | | | | |
| GROVES | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 2,168 | 2,093 | 2,029 | 2,005 | 1,999 | 1,999 |
| JEFFERSON COUNTY WCID #10 | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 373 | 377 | 385 | 404 | 430 | 462 |
| MEEKER MUD | I \| GULF COAST AQUIFER \| JEFFERSON COUNTY | 381 | 380 | 380 | 380 | 395 | 415 |
| MEEKER MUD | I \| NECHES RUN-OF-RIVER | 3 | 3 | 4 | 4 | 4 | 4 |
| NEDERLAND | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 2,317 | 2,375 | 2,454 | 2,585 | 2,761 | 2,966 |
| NOME | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 27 | 28 | 29 | 31 | 33 | 35 |
| PORT NECHES | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 686 | 695 | 711 | 746 | 796 | 854 |
| WEST JEFFERSON COUNTY MWD | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 741 | 752 | 772 | 809 | 863 | 927 |
| COUNTY-OTHER | I \| GULF COAST AQUIFER \| JEFFERSON COUNTY | 48 | 48 | 48 | 48 | 49 | 49 |
| COUNTY-OTHER | I \| NECHES RUN-OF-RIVER | 2,386 | 3,049 | 3,798 | 3,625 | 3,428 | 3,226 |
| COUNTY-OTHER | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 360 | 428 | 512 | 613 | 726 | 853 |
| MANUFACTURING | I \| GULF COAST AQUIFER \| HARDIN COUNTY | 10 | 10 | 10 | 10 | 10 | 10 |
| MANUFACTURING | I \| GULF COAST AQUIFER \| JEFFERSON COUNTY | 1 | 1 | 1 | 1 | 1 | 1 |
| MANUFACTURING | I \| NECHES RUN-OF-RIVER | 111,992 | 116,365 | 116,380 | 116,399 | 116,423 | 116,442 |
| MANUFACTURING | I \| SABINE RUN-OF-RIVER | 538 | 538 | 538 | 538 | 538 | 538 |
| MANUFACTURING | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 3,934 | 47,104 | 53,915 | 60,707 | 67,499 | 74,564 |
| MINING | I \| GULF COAST AQUIFER \| JEFFERSON COUNTY | 32 | 39 | 49 | 66 | 78 | 91 |
| MINING | I \| NECHES-TRINITY RUN-OF-RIVER | 34 | 34 | 34 | 34 | 34 | 34 |
| LIVESTOCK | I \| GULF COAST AQUIFER \| JEFFERSON COUNTY | 131 | 131 | 131 | 131 | 131 | 131 |
| LIVESTOCK | I \| NECHES-TRINITY LIVESTOCK LOCAL SUPPLY | 800 | 800 | 800 | 800 | 800 | 800 |
| IRRIGATION | I \| NECHES RUN-OF-RIVER | 130,200 | 130,200 | 130,200 | 130,200 | 130,200 | 130,200 |
| IRRIGATION | I \| NECHES-TRINITY INDIRECT REUSE | 12,729 | 12,729 | 12,729 | 12,729 | 12,729 | 12,729 |
| IRRIGATION | I \| NECHES-TRINITY RUN-OF-RIVER | 50,914 | 50,914 | 50,914 | 50,914 | 50,914 | 50,914 |
| **NECHES-TRINITY BASIN TOTAL EXISTING SUPPLY** | | **360,344** | **409,448** | **417,592** | **424,661** | **431,879** | **439,459** |
| **JEFFERSON COUNTY TOTAL EXISTING SUPPLY** | | **512,985** | **614,067** | **629,977** | **644,569** | **659,347** | **674,803** |
| **NACOGDOCHES COUNTY** | | | | | | | |
| **NECHES BASIN** | | | | | | | |
| NACOGDOCHES | I \| CARRIZO-WILCOX AQUIFER \| NACOGDOCHES COUNTY | 1,889 | 2,101 | 2,326 | 2,588 | 2,891 | 3,219 |
| NACOGDOCHES | I \| NACOGDOCHES LAKE/RESERVOIR | 4,853 | 5,275 | 5,701 | 6,193 | 6,747 | 7,326 |
| APPLEBY WSC | I \| CARRIZO-WILCOX AQUIFER \| NACOGDOCHES COUNTY | 873 | 873 | 874 | 874 | 876 | 965 |
| APPLEBY WSC | I \| NACOGDOCHES LAKE/RESERVOIR | 67 | 67 | 66 | 66 | 65 | 65 |
| CUSHING | I \| CARRIZO-WILCOX AQUIFER \| NACOGDOCHES COUNTY | 229 | 229 | 229 | 229 | 229 | 229 |
| GARRISON | I \| CARRIZO-WILCOX AQUIFER \| NACOGDOCHES COUNTY | 565 | 565 | 565 | 565 | 565 | 565 |
| LILLY GROVE SUD | I \| CARRIZO-WILCOX AQUIFER \| NACOGDOCHES COUNTY | 761 | 761 | 761 | 761 | 761 | 761 |
| SWIFT WSC | I \| CARRIZO-WILCOX AQUIFER \| NACOGDOCHES COUNTY | 666 | 666 | 666 | 666 | 666 | 666 |
| D&M WSC | I \| CARRIZO-WILCOX AQUIFER \| NACOGDOCHES COUNTY | 1,008 | 1,009 | 1,011 | 1,012 | 1,013 | 1,015 |

# Water User Group (WUG) Existing Water Supply

| REGION I | SOURCE REGION \| SOURCE NAME | EXISTING SUPPLY (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **NACOGDOCHES COUNTY** | | | | | | | |
| **NECHES BASIN** | | | | | | | |
| D&M WSC | I \| NACOGDOCHES LAKE/RESERVOIR | 186 | 185 | 183 | 182 | 181 | 179 |
| MELROSE WSC | I \| CARRIZO-WILCOX AQUIFER \| NACOGDOCHES COUNTY | 781 | 782 | 782 | 782 | 782 | 782 |
| MELROSE WSC | I \| NACOGDOCHES LAKE/RESERVOIR | 27 | 26 | 26 | 26 | 26 | 26 |
| WODEN WSC | I \| CARRIZO-WILCOX AQUIFER \| NACOGDOCHES COUNTY | 770 | 770 | 770 | 770 | 770 | 770 |
| COUNTY-OTHER | I \| CARRIZO-WILCOX AQUIFER \| NACOGDOCHES COUNTY | 655 | 764 | 897 | 1,040 | 1,190 | 1,351 |
| COUNTY-OTHER | I \| NACOGDOCHES LAKE/RESERVOIR | 48 | 48 | 48 | 48 | 48 | 48 |
| COUNTY-OTHER | I \| OTHER AQUIFER \| NACOGDOCHES COUNTY | 79 | 79 | 79 | 79 | 79 | 79 |
| COUNTY-OTHER | I \| QUEEN CITY AQUIFER \| NACOGDOCHES COUNTY | 221 | 221 | 221 | 221 | 221 | 221 |
| COUNTY-OTHER | I \| SPARTA AQUIFER \| NACOGDOCHES COUNTY | 156 | 156 | 156 | 156 | 156 | 156 |
| COUNTY-OTHER | I \| YEGUA-JACKSON AQUIFER \| NACOGDOCHES COUNTY | 26 | 26 | 26 | 26 | 26 | 26 |
| MANUFACTURING | I \| CARRIZO-WILCOX AQUIFER \| NACOGDOCHES COUNTY | 718 | 797 | 878 | 951 | 1,045 | 1,147 |
| MANUFACTURING | I \| NACOGDOCHES LAKE/RESERVOIR | 1,846 | 2,001 | 2,151 | 2,277 | 2,438 | 2,611 |
| MANUFACTURING | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 |
| MINING | I \| HOUSTON COUNTY LAKE/RESERVOIR | 0 | 0 | 0 | 0 | 0 | 0 |
| MINING | I \| NECHES OTHER LOCAL SUPPLY | 494 | 494 | 494 | 494 | 494 | 494 |
| MINING | I \| OTHER AQUIFER \| NACOGDOCHES COUNTY | 1,031 | 1,031 | 1,031 | 1,031 | 1,031 | 1,031 |
| STEAM ELECTRIC POWER | I \| HOUSTON COUNTY LAKE/RESERVOIR | 0 | 0 | 0 | 0 | 0 | 0 |
| STEAM ELECTRIC POWER | I \| STRIKER LAKE/RESERVOIR | 7,280 | 7,280 | 7,280 | 7,280 | 7,280 | 7,280 |
| LIVESTOCK | I \| CARRIZO-WILCOX AQUIFER \| NACOGDOCHES COUNTY | 229 | 229 | 229 | 229 | 229 | 229 |
| LIVESTOCK | I \| NECHES LIVESTOCK LOCAL SUPPLY | 2,386 | 2,386 | 2,386 | 2,386 | 2,386 | 2,386 |
| LIVESTOCK | I \| OTHER AQUIFER \| NACOGDOCHES COUNTY | 21 | 21 | 21 | 21 | 21 | 21 |
| LIVESTOCK | I \| QUEEN CITY AQUIFER \| NACOGDOCHES COUNTY | 84 | 84 | 84 | 84 | 84 | 84 |
| IRRIGATION | I \| CARRIZO-WILCOX AQUIFER \| NACOGDOCHES COUNTY | 373 | 373 | 373 | 373 | 373 | 373 |
| IRRIGATION | I \| NECHES RUN-OF-RIVER | 136 | 136 | 136 | 136 | 136 | 136 |
| **NECHES BASIN TOTAL EXISTING SUPPLY** | | **38,458** | **39,435** | **40,450** | **41,546** | **42,809** | **44,241** |
| **NACOGDOCHES COUNTY TOTAL EXISTING SUPPLY** | | **38,458** | **39,435** | **40,450** | **41,546** | **42,809** | **44,241** |
| **NEWTON COUNTY** | | | | | | | |
| **SABINE BASIN** | | | | | | | |
| MAURICEVILLE SUD | I \| GULF COAST AQUIFER \| ORANGE COUNTY | 68 | 65 | 64 | 62 | 62 | 61 |
| NEWTON | I \| GULF COAST AQUIFER \| NEWTON COUNTY | 483 | 483 | 483 | 483 | 483 | 483 |
| SOUTH NEWTON WSC | I \| GULF COAST AQUIFER \| NEWTON COUNTY | 321 | 321 | 321 | 321 | 321 | 321 |
| COUNTY-OTHER | I \| GULF COAST AQUIFER \| NEWTON COUNTY | 1,425 | 1,425 | 1,425 | 1,425 | 1,425 | 1,425 |
| MANUFACTURING | I \| GULF COAST AQUIFER \| NEWTON COUNTY | 433 | 509 | 586 | 656 | 723 | 796 |
| MANUFACTURING | I \| SABINE RUN-OF-RIVER | 135 | 135 | 135 | 135 | 135 | 135 |
| MINING | I \| GULF COAST AQUIFER \| NEWTON COUNTY | 156 | 156 | 156 | 156 | 156 | 156 |
| MINING | I \| SABINE OTHER LOCAL SUPPLY | 158 | 158 | 158 | 158 | 158 | 158 |

# Water User Group (WUG) Existing Water Supply

| REGION I | SOURCE REGION \| SOURCE NAME | EXISTING SUPPLY (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **NEWTON COUNTY** | | | | | | | |
| **SABINE BASIN** | | | | | | | |
| STEAM ELECTRIC POWER | I \| SABINE RUN-OF-RIVER | 13,442 | 13,442 | 13,442 | 13,442 | 13,442 | 13,442 |
| LIVESTOCK | I \| GULF COAST AQUIFER \| NEWTON COUNTY | 104 | 104 | 104 | 104 | 104 | 104 |
| LIVESTOCK | I \| SABINE LIVESTOCK LOCAL SUPPLY | 155 | 155 | 155 | 155 | 155 | 155 |
| IRRIGATION | I \| GULF COAST AQUIFER \| NEWTON COUNTY | 330 | 330 | 330 | 330 | 330 | 330 |
| IRRIGATION | I \| SABINE RUN-OF-RIVER | 50 | 50 | 50 | 50 | 50 | 50 |
| **SABINE BASIN TOTAL EXISTING SUPPLY** | | **17,260** | **17,333** | **17,409** | **17,477** | **17,544** | **17,616** |
| **NEWTON COUNTY TOTAL EXISTING SUPPLY** | | **17,260** | **17,333** | **17,409** | **17,477** | **17,544** | **17,616** |
| **ORANGE COUNTY** | | | | | | | |
| **NECHES BASIN** | | | | | | | |
| PORT ARTHUR | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 2 | 2 | 2 | 2 | 2 | 2 |
| BRIDGE CITY | I \| GULF COAST AQUIFER \| ORANGE COUNTY | 117 | 117 | 117 | 117 | 117 | 117 |
| MAURICEVILLE SUD | I \| GULF COAST AQUIFER \| ORANGE COUNTY | 121 | 121 | 120 | 120 | 121 | 122 |
| ROSE CITY | I \| GULF COAST AQUIFER \| ORANGE COUNTY | 106 | 106 | 106 | 106 | 106 | 106 |
| ROSE CITY | I \| SABINE RUN-OF-RIVER | 478 | 478 | 478 | 478 | 478 | 478 |
| VIDOR | I \| GULF COAST AQUIFER \| ORANGE COUNTY | 1,819 | 1,854 | 1,873 | 1,900 | 1,925 | 1,945 |
| ORANGEFIELD WSC | I \| GULF COAST AQUIFER \| ORANGE COUNTY | 188 | 192 | 195 | 197 | 199 | 201 |
| COUNTY-OTHER | I \| GULF COAST AQUIFER \| ORANGE COUNTY | 1,608 | 1,593 | 1,636 | 1,664 | 1,684 | 1,701 |
| MANUFACTURING | I \| GULF COAST AQUIFER \| ORANGE COUNTY | 1,289 | 1,320 | 1,320 | 1,320 | 1,320 | 1,320 |
| MINING | I \| GULF COAST AQUIFER \| ORANGE COUNTY | 149 | 149 | 149 | 149 | 149 | 147 |
| STEAM ELECTRIC POWER | I \| GULF COAST AQUIFER \| ORANGE COUNTY | 1,310 | 1,310 | 1,310 | 1,310 | 1,310 | 1,310 |
| STEAM ELECTRIC POWER | I \| SABINE RUN-OF-RIVER | 4,481 | 4,481 | 4,481 | 4,481 | 4,481 | 4,481 |
| LIVESTOCK | I \| GULF COAST AQUIFER \| ORANGE COUNTY | 114 | 114 | 114 | 114 | 114 | 114 |
| LIVESTOCK | I \| NECHES LIVESTOCK LOCAL SUPPLY | 56 | 56 | 56 | 56 | 56 | 56 |
| IRRIGATION | | 0 | 0 | 0 | 0 | 0 | 0 |
| **NECHES BASIN TOTAL EXISTING SUPPLY** | | **11,838** | **11,893** | **11,957** | **12,014** | **12,062** | **12,100** |
| **NECHES-TRINITY BASIN** | | | | | | | |
| BRIDGE CITY | I \| GULF COAST AQUIFER \| ORANGE COUNTY | 90 | 90 | 90 | 90 | 90 | 90 |
| COUNTY-OTHER | I \| GULF COAST AQUIFER \| ORANGE COUNTY | 4 | 4 | 4 | 4 | 4 | 4 |
| **NECHES-TRINITY BASIN TOTAL EXISTING SUPPLY** | | **94** | **94** | **94** | **94** | **94** | **94** |
| **SABINE BASIN** | | | | | | | |
| BRIDGE CITY | I \| GULF COAST AQUIFER \| ORANGE COUNTY | 540 | 540 | 540 | 540 | 540 | 540 |
| MAURICEVILLE SUD | I \| GULF COAST AQUIFER \| ORANGE COUNTY | 1,425 | 1,428 | 1,432 | 1,436 | 1,436 | 1,436 |
| ORANGE | I \| GULF COAST AQUIFER \| ORANGE COUNTY | 2,619 | 2,638 | 2,639 | 2,657 | 2,689 | 2,717 |
| PINEHURST | I \| GULF COAST AQUIFER \| ORANGE COUNTY | 282 | 283 | 284 | 289 | 292 | 295 |
| SOUTH NEWTON WSC | I \| GULF COAST AQUIFER \| ORANGE COUNTY | 100 | 104 | 107 | 109 | 111 | 112 |
| VIDOR | I \| GULF COAST AQUIFER \| ORANGE COUNTY | 433 | 441 | 446 | 452 | 458 | 463 |
| WEST ORANGE | I \| GULF COAST AQUIFER \| ORANGE COUNTY | 552 | 557 | 562 | 572 | 580 | 586 |
| ORANGEFIELD WSC | I \| GULF COAST AQUIFER \| ORANGE COUNTY | 293 | 299 | 304 | 308 | 311 | 315 |

# Water User Group (WUG) Existing Water Supply

| REGION I | SOURCE REGION \| SOURCE NAME | EXISTING SUPPLY (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **ORANGE COUNTY** | | | | | | | |
| **SABINE BASIN** | | | | | | | |
| COUNTY-OTHER | I \| GULF COAST AQUIFER \| ORANGE COUNTY | 1,287 | 1,275 | 1,310 | 1,331 | 1,347 | 1,361 |
| MANUFACTURING | I \| GULF COAST AQUIFER \| ORANGE COUNTY | 4,649 | 4,649 | 4,649 | 4,649 | 4,650 | 4,604 |
| MANUFACTURING | I \| SABINE RUN-OF-RIVER | 55,960 | 55,960 | 55,960 | 55,960 | 55,960 | 55,960 |
| MANUFACTURING | I \| TOLEDO BEND LAKE/RESERVOIR | 31 | 31 | 31 | 31 | 31 | 31 |
| MINING | I \| GULF COAST AQUIFER \| ORANGE COUNTY | 0 | 0 | 0 | 0 | 0 | 2 |
| MINING | I \| SABINE OTHER LOCAL SUPPLY | 178 | 178 | 178 | 178 | 178 | 178 |
| LIVESTOCK | I \| GULF COAST AQUIFER \| ORANGE COUNTY | 114 | 114 | 114 | 114 | 114 | 114 |
| LIVESTOCK | I \| SABINE LIVESTOCK LOCAL SUPPLY | 42 | 42 | 42 | 42 | 42 | 42 |
| IRRIGATION | I \| DIRECT REUSE | 15 | 15 | 15 | 15 | 15 | 15 |
| IRRIGATION | I \| SABINE RUN-OF-RIVER | 1,283 | 1,283 | 1,283 | 1,283 | 1,283 | 1,283 |
| **SABINE BASIN TOTAL EXISTING SUPPLY** | | **69,803** | **69,837** | **69,896** | **69,966** | **70,037** | **70,054** |
| **ORANGE COUNTY TOTAL EXISTING SUPPLY** | | **81,735** | **81,824** | **81,947** | **82,074** | **82,193** | **82,248** |
| **PANOLA COUNTY** | | | | | | | |
| **CYPRESS BASIN** | | | | | | | |
| COUNTY-OTHER | I \| CARRIZO-WILCOX AQUIFER \| PANOLA COUNTY | 6 | 6 | 6 | 6 | 6 | 6 |
| MINING | I \| MURVAUL LAKE/RESERVOIR | 4 | 4 | 3 | 2 | 2 | 2 |
| MINING | I \| TOLEDO BEND LAKE/RESERVOIR | 4 | 4 | 4 | 4 | 6 | 6 |
| LIVESTOCK | I \| CYPRESS LIVESTOCK LOCAL SUPPLY | 30 | 30 | 30 | 30 | 30 | 30 |
| **CYPRESS BASIN TOTAL EXISTING SUPPLY** | | **44** | **44** | **43** | **42** | **44** | **44** |
| **SABINE BASIN** | | | | | | | |
| CARTHAGE | I \| CARRIZO-WILCOX AQUIFER \| PANOLA COUNTY | 49 | 49 | 49 | 49 | 49 | 49 |
| CARTHAGE | I \| MURVAUL LAKE/RESERVOIR | 1,601 | 1,602 | 1,595 | 1,599 | 1,610 | 1,621 |
| BECKVILLE | I \| CARRIZO-WILCOX AQUIFER \| PANOLA COUNTY | 581 | 581 | 581 | 581 | 581 | 581 |
| GILL WSC | D \| CARRIZO-WILCOX AQUIFER \| HARRISON COUNTY | 126 | 126 | 126 | 126 | 126 | 126 |
| GILL WSC | D \| O' THE PINES LAKE/RESERVOIR | 33 | 33 | 33 | 33 | 33 | 33 |
| TATUM | I \| CARRIZO-WILCOX AQUIFER \| RUSK COUNTY | 65 | 75 | 81 | 87 | 92 | 96 |
| COUNTY-OTHER | I \| CARRIZO-WILCOX AQUIFER \| PANOLA COUNTY | 1,503 | 1,503 | 1,503 | 1,503 | 1,503 | 1,503 |
| COUNTY-OTHER | I \| MURVAUL LAKE/RESERVOIR | 291 | 291 | 291 | 291 | 291 | 291 |
| MANUFACTURING | I \| CARRIZO-WILCOX AQUIFER \| PANOLA COUNTY | 266 | 267 | 268 | 269 | 271 | 273 |
| MANUFACTURING | I \| MURVAUL LAKE/RESERVOIR | 879 | 917 | 955 | 987 | 1,052 | 1,081 |
| MANUFACTURING | I \| SABINE RUN-OF-RIVER | 114 | 114 | 114 | 114 | 114 | 114 |
| MINING | I \| CARRIZO-WILCOX AQUIFER \| PANOLA COUNTY | 1,489 | 1,489 | 1,489 | 1,489 | 1,489 | 1,489 |
| MINING | I \| MURVAUL LAKE/RESERVOIR | 3,546 | 3,511 | 3,026 | 2,559 | 2,170 | 2,361 |
| MINING | I \| SABINE RUN-OF-RIVER | 296 | 296 | 296 | 296 | 296 | 296 |
| MINING | I \| TOLEDO BEND LAKE/RESERVOIR | 3,896 | 4,196 | 4,496 | 4,496 | 5,494 | 5,494 |
| LIVESTOCK | I \| CARRIZO-WILCOX AQUIFER \| PANOLA COUNTY | 416 | 416 | 416 | 416 | 416 | 416 |
| LIVESTOCK | I \| SABINE LIVESTOCK LOCAL SUPPLY | 1,224 | 1,224 | 1,224 | 1,224 | 1,224 | 1,224 |
| IRRIGATION | I \| CARRIZO-WILCOX AQUIFER \| PANOLA COUNTY | 383 | 383 | 383 | 383 | 383 | 383 |

# Water User Group (WUG) Existing Water Supply

| REGION I | SOURCE REGION \| SOURCE NAME | EXISTING SUPPLY (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **PANOLA COUNTY** | | | | | | | |
| **SABINE BASIN** | | | | | | | |
| IRRIGATION | I \| SABINE RUN-OF-RIVER | 191 | 191 | 191 | 191 | 191 | 191 |
| **SABINE BASIN TOTAL EXISTING SUPPLY** | | **16,949** | **17,264** | **17,117** | **16,693** | **17,385** | **17,622** |
| **PANOLA COUNTY TOTAL EXISTING SUPPLY** | | **16,993** | **17,308** | **17,160** | **16,735** | **17,429** | **17,666** |
| **POLK COUNTY** | | | | | | | |
| **NECHES BASIN** | | | | | | | |
| CORRIGAN | I \| OTHER AQUIFER \| POLK COUNTY | 292 | 292 | 292 | 292 | 292 | 292 |
| COUNTY-OTHER | I \| GULF COAST AQUIFER \| POLK COUNTY | 583 | 637 | 680 | 722 | 763 | 797 |
| COUNTY-OTHER | I \| OTHER AQUIFER \| POLK COUNTY | 160 | 160 | 160 | 160 | 160 | 160 |
| MANUFACTURING | I \| GULF COAST AQUIFER \| POLK COUNTY | 166 | 249 | 336 | 416 | 486 | 562 |
| MANUFACTURING | I \| OTHER AQUIFER \| POLK COUNTY | 447 | 447 | 447 | 447 | 447 | 447 |
| MINING | I \| GULF COAST AQUIFER \| POLK COUNTY | 83 | 83 | 83 | 83 | 83 | 83 |
| MINING | I \| NECHES OTHER LOCAL SUPPLY | 20 | 20 | 20 | 20 | 20 | 20 |
| MINING | I \| OTHER AQUIFER \| POLK COUNTY | 83 | 83 | 83 | 83 | 83 | 83 |
| LIVESTOCK | I \| GULF COAST AQUIFER \| POLK COUNTY | 231 | 231 | 231 | 231 | 231 | 231 |
| LIVESTOCK | I \| NECHES LIVESTOCK LOCAL SUPPLY | 396 | 396 | 396 | 396 | 396 | 396 |
| LIVESTOCK | I \| OTHER AQUIFER \| POLK COUNTY | 1 | 1 | 1 | 1 | 1 | 1 |
| LIVESTOCK | I \| YEGUA-JACKSON AQUIFER \| POLK COUNTY | 6 | 6 | 6 | 6 | 6 | 6 |
| IRRIGATION | I \| GULF COAST AQUIFER \| POLK COUNTY | 769 | 769 | 769 | 769 | 769 | 769 |
| **NECHES BASIN TOTAL EXISTING SUPPLY** | | **3,237** | **3,374** | **3,504** | **3,626** | **3,737** | **3,847** |
| **POLK COUNTY TOTAL EXISTING SUPPLY** | | **3,237** | **3,374** | **3,504** | **3,626** | **3,737** | **3,847** |
| **RUSK COUNTY** | | | | | | | |
| **NECHES BASIN** | | | | | | | |
| HENDERSON | D \| FORK LAKE/RESERVOIR | 3,470 | 3,469 | 3,470 | 3,470 | 3,470 | 3,470 |
| HENDERSON | I \| CARRIZO-WILCOX AQUIFER \| RUSK COUNTY | 2,466 | 2,466 | 2,466 | 2,466 | 2,466 | 2,466 |
| HENDERSON | I \| STRIKER LAKE/RESERVOIR | 0 | 0 | 0 | 0 | 0 | 0 |
| NEW LONDON | I \| CARRIZO-WILCOX AQUIFER \| RUSK COUNTY | 333 | 333 | 333 | 333 | 333 | 333 |
| OVERTON | I \| CARRIZO-WILCOX AQUIFER \| RUSK COUNTY | 100 | 100 | 100 | 100 | 100 | 100 |
| WRIGHT CITY WSC | I \| CARRIZO-WILCOX AQUIFER \| RUSK COUNTY | 84 | 84 | 84 | 84 | 84 | 85 |
| COUNTY-OTHER | I \| CARRIZO-WILCOX AQUIFER \| RUSK COUNTY | 2,446 | 2,446 | 2,446 | 2,446 | 2,446 | 2,446 |
| COUNTY-OTHER | I \| OTHER AQUIFER \| RUSK COUNTY | 4 | 4 | 4 | 4 | 4 | 4 |
| MANUFACTURING | I \| CARRIZO-WILCOX AQUIFER \| RUSK COUNTY | 333 | 357 | 377 | 395 | 422 | 450 |
| MANUFACTURING | I \| NECHES RUN-OF-RIVER | 2 | 2 | 2 | 2 | 2 | 2 |
| MINING | I \| OTHER AQUIFER \| RUSK COUNTY | 270 | 270 | 270 | 270 | 270 | 270 |
| MINING | I \| SABINE OTHER LOCAL SUPPLY | 210 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | I \| CARRIZO-WILCOX AQUIFER \| RUSK COUNTY | 156 | 156 | 156 | 156 | 156 | 156 |
| LIVESTOCK | I \| NECHES LIVESTOCK LOCAL SUPPLY | 808 | 808 | 808 | 808 | 808 | 808 |
| IRRIGATION | I \| CARRIZO-WILCOX AQUIFER \| RUSK COUNTY | 215 | 215 | 215 | 215 | 215 | 215 |
| IRRIGATION | I \| NECHES RUN-OF-RIVER | 86 | 86 | 86 | 86 | 86 | 86 |
| **NECHES BASIN TOTAL EXISTING SUPPLY** | | **10,983** | **10,796** | **10,817** | **10,835** | **10,862** | **10,891** |
| **SABINE BASIN** | | | | | | | |
| EASTON | I \| CHEROKEE LAKE/RESERVOIR | 4 | 5 | 5 | 6 | 6 | 7 |

# Water User Group (WUG) Existing Water Supply

| REGION I | SOURCE REGION \| SOURCE NAME | EXISTING SUPPLY (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **RUSK COUNTY** | | | | | | | |
| **SABINE BASIN** | | | | | | | |
| ELDERVILLE WSC | D \| FORK LAKE/RESERVOIR | 97 | 97 | 97 | 97 | 97 | 96 |
| ELDERVILLE WSC | I \| CHEROKEE LAKE/RESERVOIR | 95 | 96 | 96 | 96 | 95 | 94 |
| HENDERSON | D \| FORK LAKE/RESERVOIR | 603 | 604 | 603 | 603 | 603 | 603 |
| HENDERSON | I \| CARRIZO-WILCOX AQUIFER \| RUSK COUNTY | 400 | 400 | 400 | 400 | 400 | 400 |
| HENDERSON | I \| SABINE RUN-OF-RIVER | 10 | 10 | 10 | 10 | 10 | 10 |
| HENDERSON | I \| STRIKER LAKE/RESERVOIR | 0 | 0 | 0 | 0 | 0 | 0 |
| KILGORE | D \| CARRIZO-WILCOX AQUIFER \| GREGG COUNTY | 365 | 370 | 370 | 369 | 366 | 361 |
| KILGORE | D \| FORK LAKE/RESERVOIR | 506 | 841 | 841 | 839 | 832 | 821 |
| NEW LONDON | I \| CARRIZO-WILCOX AQUIFER \| RUSK COUNTY | 268 | 268 | 268 | 268 | 268 | 268 |
| OVERTON | I \| CARRIZO-WILCOX AQUIFER \| RUSK COUNTY | 578 | 578 | 578 | 578 | 578 | 578 |
| TATUM | I \| CARRIZO-WILCOX AQUIFER \| RUSK COUNTY | 358 | 348 | 342 | 336 | 336 | 367 |
| WEST GREGG SUD | D \| CARRIZO-WILCOX AQUIFER \| GREGG COUNTY | 27 | 28 | 28 | 27 | 27 | 27 |
| CHALK HILL SUD | I \| CARRIZO-WILCOX AQUIFER \| RUSK COUNTY | 1,043 | 1,043 | 1,043 | 1,043 | 1,043 | 1,043 |
| CROSS ROADS SUD | D \| FORK LAKE/RESERVOIR | 248 | 248 | 249 | 249 | 248 | 248 |
| CROSS ROADS SUD | I \| CARRIZO-WILCOX AQUIFER \| RUSK COUNTY | 397 | 398 | 399 | 399 | 398 | 397 |
| COUNTY-OTHER | I \| CARRIZO-WILCOX AQUIFER \| RUSK COUNTY | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 | 1,800 |
| COUNTY-OTHER | I \| OTHER AQUIFER \| RUSK COUNTY | 81 | 81 | 81 | 81 | 81 | 81 |
| MANUFACTURING | D \| FORK LAKE/RESERVOIR | 1 | 1 | 1 | 1 | 1 | 1 |
| MANUFACTURING | I \| CARRIZO-WILCOX AQUIFER \| RUSK COUNTY | 13 | 14 | 15 | 15 | 16 | 18 |
| MINING | I \| CARRIZO-WILCOX AQUIFER \| RUSK COUNTY | 201 | 201 | 201 | 201 | 201 | 201 |
| MINING | I \| OTHER AQUIFER \| RUSK COUNTY | 214 | 214 | 214 | 214 | 214 | 214 |
| MINING | I \| SABINE OTHER LOCAL SUPPLY | 1,020 | 1,230 | 1,230 | 1,230 | 1,230 | 1,230 |
| STEAM ELECTRIC POWER | I \| CARRIZO-WILCOX AQUIFER \| RUSK COUNTY | 1,279 | 1,279 | 1,279 | 1,279 | 1,279 | 1,279 |
| STEAM ELECTRIC POWER | I \| MARTIN LAKE/RESERVOIR | 25,000 | 25,000 | 25,000 | 25,000 | 25,000 | 25,000 |
| STEAM ELECTRIC POWER | I \| TOLEDO BEND LAKE/RESERVOIR | 17,922 | 17,922 | 17,922 | 17,922 | 17,922 | 17,922 |
| LIVESTOCK | I \| CARRIZO-WILCOX AQUIFER \| RUSK COUNTY | 224 | 232 | 241 | 252 | 262 | 262 |
| LIVESTOCK | I \| SABINE LIVESTOCK LOCAL SUPPLY | 308 | 308 | 308 | 308 | 308 | 308 |
| IRRIGATION | I \| OTHER AQUIFER \| RUSK COUNTY | 170 | 170 | 170 | 170 | 170 | 170 |
| IRRIGATION | I \| SABINE RUN-OF-RIVER | 127 | 127 | 127 | 127 | 127 | 127 |
| **SABINE BASIN TOTAL EXISTING SUPPLY** | | **53,359** | **53,913** | **53,918** | **53,920** | **53,918** | **53,933** |
| **RUSK COUNTY TOTAL EXISTING SUPPLY** | | **64,342** | **64,709** | **64,735** | **64,755** | **64,780** | **64,824** |
| **SABINE COUNTY** | | | | | | | |
| **NECHES BASIN** | | | | | | | |
| PINELAND | I \| CARRIZO-WILCOX AQUIFER \| SABINE COUNTY | 88 | 88 | 88 | 88 | 88 | 88 |
| G M WSC | I \| TOLEDO BEND LAKE/RESERVOIR | 100 | 100 | 100 | 100 | 100 | 100 |
| COUNTY-OTHER | I \| CARRIZO-WILCOX AQUIFER \| RUSK COUNTY | 85 | 85 | 85 | 85 | 85 | 85 |
| COUNTY-OTHER | I \| CARRIZO-WILCOX AQUIFER \| SABINE COUNTY | 10 | 10 | 10 | 10 | 10 | 10 |
| COUNTY-OTHER | I \| SPARTA AQUIFER \| SABINE COUNTY | 40 | 40 | 40 | 40 | 40 | 40 |
| COUNTY-OTHER | I \| TOLEDO BEND LAKE/RESERVOIR | 29 | 28 | 29 | 29 | 29 | 29 |

# Water User Group (WUG) Existing Water Supply

| REGION I | SOURCE REGION \| SOURCE NAME | EXISTING SUPPLY (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **SABINE COUNTY** | | | | | | | |
| **NECHES BASIN** | | | | | | | |
| COUNTY-OTHER | I \| YEGUA-JACKSON AQUIFER \| SABINE COUNTY | 59 | 59 | 59 | 59 | 59 | 59 |
| MANUFACTURING | I \| CARRIZO-WILCOX AQUIFER \| SABINE COUNTY | 45 | 45 | 45 | 45 | 45 | 45 |
| MANUFACTURING | I \| DIRECT REUSE | 20 | 20 | 20 | 20 | 20 | 20 |
| MANUFACTURING | I \| NECHES RUN-OF-RIVER | 182 | 182 | 182 | 182 | 182 | 182 |
| MANUFACTURING | I \| YEGUA-JACKSON AQUIFER \| SABINE COUNTY | 600 | 600 | 600 | 600 | 600 | 600 |
| MINING | I \| TOLEDO BEND LAKE/RESERVOIR | 320 | 319 | 319 | 319 | 320 | 320 |
| MINING | I \| YEGUA-JACKSON AQUIFER \| SABINE COUNTY | 44 | 44 | 44 | 44 | 44 | 44 |
| LIVESTOCK | I \| CARRIZO-WILCOX AQUIFER \| SABINE COUNTY | 8 | 8 | 8 | 8 | 8 | 8 |
| LIVESTOCK | I \| NECHES LIVESTOCK LOCAL SUPPLY | 71 | 71 | 71 | 71 | 71 | 71 |
| LIVESTOCK | I \| SPARTA AQUIFER \| SABINE COUNTY | 3 | 3 | 3 | 3 | 3 | 3 |
| **NECHES BASIN TOTAL EXISTING SUPPLY** | | **1,704** | **1,702** | **1,703** | **1,703** | **1,704** | **1,704** |
| **SABINE BASIN** | | | | | | | |
| HEMPHILL | I \| TOLEDO BEND LAKE/RESERVOIR | 743 | 743 | 743 | 743 | 743 | 743 |
| G M WSC | I \| CARRIZO-WILCOX AQUIFER \| SABINE COUNTY | 270 | 270 | 270 | 270 | 270 | 270 |
| G M WSC | I \| TOLEDO BEND LAKE/RESERVOIR | 126 | 127 | 127 | 127 | 127 | 127 |
| COUNTY-OTHER | I \| CARRIZO-WILCOX AQUIFER \| SABINE COUNTY | 85 | 85 | 85 | 85 | 85 | 85 |
| COUNTY-OTHER | I \| OTHER AQUIFER \| SABINE COUNTY | 3 | 3 | 3 | 3 | 3 | 3 |
| COUNTY-OTHER | I \| TOLEDO BEND LAKE/RESERVOIR | 450 | 451 | 450 | 450 | 450 | 450 |
| MINING | I \| OTHER AQUIFER \| SABINE COUNTY | 234 | 234 | 234 | 234 | 234 | 234 |
| MINING | I \| TOLEDO BEND LAKE/RESERVOIR | 1,680 | 1,681 | 1,681 | 1,681 | 1,680 | 1,680 |
| LIVESTOCK | I \| CARRIZO-WILCOX AQUIFER \| SABINE COUNTY | 3 | 3 | 3 | 3 | 3 | 3 |
| LIVESTOCK | I \| SABINE LIVESTOCK LOCAL SUPPLY | 634 | 634 | 634 | 634 | 634 | 634 |
| LIVESTOCK | I \| SPARTA AQUIFER \| SABINE COUNTY | 3 | 3 | 3 | 3 | 3 | 3 |
| LIVESTOCK | I \| YEGUA-JACKSON AQUIFER \| SABINE COUNTY | 10 | 10 | 10 | 10 | 10 | 10 |
| **SABINE BASIN TOTAL EXISTING SUPPLY** | | **4,241** | **4,244** | **4,243** | **4,243** | **4,242** | **4,242** |
| **SABINE COUNTY TOTAL EXISTING SUPPLY** | | **5,945** | **5,946** | **5,946** | **5,946** | **5,946** | **5,946** |
| **SAN AUGUSTINE COUNTY** | | | | | | | |
| **NECHES BASIN** | | | | | | | |
| SAN AUGUSTINE | I \| SAN AUGUSTINE LAKE/RESERVOIR | 519 | 517 | 517 | 517 | 517 | 517 |
| COUNTY-OTHER | I \| CARRIZO-WILCOX AQUIFER \| NACOGDOCHES COUNTY | 1 | 1 | 1 | 1 | 1 | 1 |
| COUNTY-OTHER | I \| CARRIZO-WILCOX AQUIFER \| SAN AUGUSTINE COUNTY | 428 | 428 | 428 | 428 | 428 | 428 |
| COUNTY-OTHER | I \| GULF COAST AQUIFER \| JASPER COUNTY | 2 | 2 | 2 | 2 | 2 | 2 |
| COUNTY-OTHER | I \| OTHER AQUIFER \| SAN AUGUSTINE COUNTY | 156 | 156 | 156 | 156 | 156 | 156 |
| COUNTY-OTHER | I \| SAN AUGUSTINE LAKE/RESERVOIR | 98 | 100 | 100 | 100 | 100 | 100 |
| COUNTY-OTHER | I \| SPARTA AQUIFER \| SAN AUGUSTINE COUNTY | 79 | 79 | 79 | 79 | 79 | 79 |
| COUNTY-OTHER | I \| YEGUA-JACKSON AQUIFER \| SABINE COUNTY | 4 | 4 | 4 | 4 | 4 | 4 |
| COUNTY-OTHER | I \| YEGUA-JACKSON AQUIFER \| SAN AUGUSTINE COUNTY | 231 | 231 | 231 | 231 | 231 | 231 |
| MANUFACTURING | I \| CARRIZO-WILCOX AQUIFER \| SAN AUGUSTINE COUNTY | 17 | 17 | 17 | 17 | 17 | 17 |
| MINING | I \| OTHER AQUIFER \| SAN AUGUSTINE COUNTY | 1,230 | 1,230 | 1,230 | 1,230 | 1,230 | 1,230 |
| MINING | I \| SAN AUGUSTINE LAKE/RESERVOIR | 468 | 518 | 594 | 609 | 624 | 635 |

# Water User Group (WUG) Existing Water Supply

| REGION I | SOURCE REGION \| SOURCE NAME | EXISTING SUPPLY (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **SAN AUGUSTINE COUNTY** | | | | | | | |
| **NECHES BASIN** | | | | | | | |
| LIVESTOCK | I \| CARRIZO-WILCOX AQUIFER \| SAN AUGUSTINE COUNTY | 339 | 427 | 527 | 644 | 772 | 772 |
| LIVESTOCK | I \| NECHES LIVESTOCK LOCAL SUPPLY | 465 | 465 | 465 | 465 | 465 | 465 |
| LIVESTOCK | I \| SPARTA AQUIFER \| SAN AUGUSTINE COUNTY | 12 | 12 | 12 | 12 | 12 | 12 |
| IRRIGATION | I \| CARRIZO-WILCOX AQUIFER \| SAN AUGUSTINE COUNTY | 56 | 56 | 56 | 56 | 56 | 56 |
| **NECHES BASIN TOTAL EXISTING SUPPLY** | | **4,105** | **4,243** | **4,419** | **4,551** | **4,694** | **4,705** |
| **SABINE BASIN** | | | | | | | |
| G M WSC | I \| CARRIZO-WILCOX AQUIFER \| SAN AUGUSTINE COUNTY | 26 | 26 | 26 | 26 | 26 | 26 |
| G M WSC | I \| TOLEDO BEND LAKE/RESERVOIR | 50 | 50 | 50 | 50 | 50 | 50 |
| COUNTY-OTHER | I \| CARRIZO-WILCOX AQUIFER \| SAN AUGUSTINE COUNTY | 88 | 88 | 88 | 88 | 88 | 88 |
| MINING | I \| SAN AUGUSTINE LAKE/RESERVOIR | 200 | 150 | 74 | 59 | 44 | 33 |
| LIVESTOCK | I \| CARRIZO-WILCOX AQUIFER \| SAN AUGUSTINE COUNTY | 16 | 25 | 36 | 48 | 62 | 62 |
| LIVESTOCK | I \| OTHER AQUIFER \| SAN AUGUSTINE COUNTY | 9 | 9 | 9 | 9 | 9 | 9 |
| LIVESTOCK | I \| SABINE LIVESTOCK LOCAL SUPPLY | 71 | 71 | 71 | 71 | 71 | 71 |
| LIVESTOCK | I \| YEGUA-JACKSON AQUIFER \| SAN AUGUSTINE COUNTY | 9 | 9 | 9 | 9 | 9 | 9 |
| IRRIGATION | I \| CARRIZO-WILCOX AQUIFER \| SAN AUGUSTINE COUNTY | 6 | 6 | 6 | 6 | 6 | 6 |
| **SABINE BASIN TOTAL EXISTING SUPPLY** | | **475** | **434** | **369** | **366** | **365** | **354** |
| **SAN AUGUSTINE COUNTY TOTAL EXISTING SUPPLY** | | **4,580** | **4,677** | **4,788** | **4,917** | **5,059** | **5,059** |
| **SHELBY COUNTY** | | | | | | | |
| **NECHES BASIN** | | | | | | | |
| TIMPSON | I \| CARRIZO-WILCOX AQUIFER \| SHELBY COUNTY | 7 | 7 | 7 | 8 | 8 | 8 |
| COUNTY-OTHER | I \| PINKSTON LAKE/RESERVOIR | 152 | 157 | 161 | 168 | 175 | 183 |
| COUNTY-OTHER | I \| TIMPSON LAKE/RESERVOIR | 350 | 350 | 350 | 350 | 350 | 350 |
| MINING | I \| CARRIZO-WILCOX AQUIFER \| SHELBY COUNTY | 483 | 483 | 483 | 483 | 483 | 482 |
| MINING | I \| TOLEDO BEND LAKE/RESERVOIR | 448 | 364 | 280 | 280 | 0 | 0 |
| LIVESTOCK | I \| CARRIZO-WILCOX AQUIFER \| SHELBY COUNTY | 108 | 108 | 108 | 108 | 108 | 108 |
| LIVESTOCK | I \| NECHES LIVESTOCK LOCAL SUPPLY | 334 | 334 | 334 | 334 | 334 | 334 |
| IRRIGATION | I \| CARRIZO-WILCOX AQUIFER \| SHELBY COUNTY | 16 | 16 | 16 | 16 | 16 | 16 |
| **NECHES BASIN TOTAL EXISTING SUPPLY** | | **1,898** | **1,819** | **1,739** | **1,747** | **1,474** | **1,481** |
| **SABINE BASIN** | | | | | | | |
| CENTER | I \| CARRIZO-WILCOX AQUIFER \| SHELBY COUNTY | 8 | 8 | 8 | 8 | 8 | 178 |
| CENTER | I \| CENTER LAKE/RESERVOIR | 306 | 324 | 340 | 357 | 375 | 362 |
| CENTER | I \| PINKSTON LAKE/RESERVOIR | 1,541 | 1,634 | 1,716 | 1,801 | 1,887 | 1,825 |
| JOAQUIN | I \| TOLEDO BEND LAKE/RESERVOIR | 183 | 188 | 193 | 201 | 208 | 215 |
| TENAHA | I \| CARRIZO-WILCOX AQUIFER \| SHELBY COUNTY | 442 | 442 | 442 | 442 | 442 | 442 |
| TIMPSON | I \| CARRIZO-WILCOX AQUIFER \| SHELBY COUNTY | 558 | 558 | 558 | 558 | 558 | 558 |
| COUNTY-OTHER | I \| CARRIZO-WILCOX AQUIFER \| SHELBY COUNTY | 1,614 | 1,666 | 1,716 | 1,783 | 1,863 | 1,943 |
| COUNTY-OTHER | I \| CENTER LAKE/RESERVOIR | 30 | 31 | 32 | 33 | 35 | 36 |
| COUNTY-OTHER | I \| TOLEDO BEND LAKE/RESERVOIR | 180 | 175 | 170 | 162 | 155 | 148 |
| MANUFACTURING | I \| CARRIZO-WILCOX AQUIFER \| SHELBY COUNTY | 175 | 175 | 175 | 175 | 175 | 175 |

# Water User Group (WUG) Existing Water Supply

| REGION I | SOURCE REGION \| SOURCE NAME | EXISTING SUPPLY (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **SHELBY COUNTY** | | | | | | | |
| **SABINE BASIN** | | | | | | | |
| MANUFACTURING | I \| CENTER LAKE/RESERVOIR | 248 | 269 | 290 | 308 | 331 | 356 |
| MANUFACTURING | I \| DIRECT REUSE | 151 | 164 | 177 | 188 | 202 | 217 |
| MANUFACTURING | I \| PINKSTON LAKE/RESERVOIR | 1,247 | 1,354 | 1,460 | 1,555 | 1,670 | 1,792 |
| MINING | I \| CARRIZO-WILCOX AQUIFER \| SHELBY COUNTY | 1,242 | 1,242 | 1,242 | 1,242 | 1,242 | 1,243 |
| MINING | I \| TOLEDO BEND LAKE/RESERVOIR | 1,152 | 936 | 720 | 720 | 0 | 0 |
| LIVESTOCK | I \| CARRIZO-WILCOX AQUIFER \| SHELBY COUNTY | 458 | 458 | 458 | 458 | 458 | 458 |
| LIVESTOCK | I \| SABINE LIVESTOCK LOCAL SUPPLY | 2,998 | 2,998 | 2,998 | 2,998 | 2,998 | 2,998 |
| IRRIGATION | I \| DIRECT REUSE | 82 | 82 | 82 | 82 | 82 | 82 |
| **SABINE BASIN TOTAL EXISTING SUPPLY** | | **12,615** | **12,704** | **12,777** | **13,071** | **12,689** | **13,028** |
| **SHELBY COUNTY TOTAL EXISTING SUPPLY** | | **14,513** | **14,523** | **14,516** | **14,818** | **14,163** | **14,509** |
| **SMITH COUNTY** | | | | | | | |
| **NECHES BASIN** | | | | | | | |
| TYLER | I \| CARRIZO-WILCOX AQUIFER \| SMITH COUNTY | 2,228 | 2,370 | 2,522 | 2,703 | 2,905 | 3,115 |
| TYLER | I \| PALESTINE LAKE/RESERVOIR | 8,353 | 8,888 | 9,456 | 10,138 | 10,892 | 11,679 |
| TYLER | I \| TYLER LAKE/RESERVOIR | 9,468 | 10,073 | 10,718 | 11,490 | 12,344 | 13,237 |
| ARP | I \| CARRIZO-WILCOX AQUIFER \| SMITH COUNTY | 164 | 168 | 171 | 178 | 185 | 194 |
| BULLARD | I \| CARRIZO-WILCOX AQUIFER \| CHEROKEE COUNTY | 16 | 16 | 16 | 16 | 16 | 16 |
| BULLARD | I \| CARRIZO-WILCOX AQUIFER \| SMITH COUNTY | 587 | 588 | 589 | 590 | 591 | 591 |
| CRYSTAL SYSTEMS INC | D \| CARRIZO-WILCOX AQUIFER \| SMITH COUNTY | 165 | 158 | 138 | 105 | 50 | 0 |
| CRYSTAL SYSTEMS INC | I \| CARRIZO-WILCOX AQUIFER \| SMITH COUNTY | 83 | 67 | 46 | 20 | 0 | 0 |
| DEAN WSC | I \| CARRIZO-WILCOX AQUIFER \| SMITH COUNTY | 765 | 774 | 786 | 808 | 836 | 867 |
| JACKSON WSC | D \| CARRIZO-WILCOX AQUIFER \| SMITH COUNTY | 197 | 207 | 218 | 234 | 253 | 274 |
| LINDALE | I \| CARRIZO-WILCOX AQUIFER \| SMITH COUNTY | 424 | 424 | 424 | 424 | 424 | 424 |
| LINDALE RURAL WSC | I \| CARRIZO-WILCOX AQUIFER \| SMITH COUNTY | 221 | 229 | 239 | 253 | 271 | 290 |
| NEW CHAPEL HILL | I \| CARRIZO-WILCOX AQUIFER \| SMITH COUNTY | 237 | 246 | 255 | 266 | 277 | 289 |
| NOONDAY | I \| CARRIZO-WILCOX AQUIFER \| SMITH COUNTY | 189 | 221 | 254 | 291 | 330 | 369 |
| OVERTON | I \| CARRIZO-WILCOX AQUIFER \| SMITH COUNTY | 33 | 40 | 48 | 56 | 65 | 74 |
| SOUTHERN UTILITIES COMPANY | I \| CARRIZO-WILCOX AQUIFER \| SMITH COUNTY | 5,957 | 6,134 | 6,343 | 6,628 | 6,970 | 7,330 |
| SOUTHERN UTILITIES COMPANY | I \| PALESTINE LAKE/RESERVOIR | 130 | 134 | 138 | 145 | 152 | 160 |
| SOUTHERN UTILITIES COMPANY | I \| TYLER LAKE/RESERVOIR | 147 | 152 | 157 | 164 | 172 | 181 |
| TROUP | I \| CARRIZO-WILCOX AQUIFER \| SMITH COUNTY | 398 | 428 | 459 | 497 | 539 | 582 |
| WHITEHOUSE | I \| CARRIZO-WILCOX AQUIFER \| SMITH COUNTY | 501 | 666 | 839 | 1,035 | 1,245 | 1,463 |
| WHITEHOUSE | I \| PALESTINE LAKE/RESERVOIR | 311 | 311 | 311 | 311 | 311 | 311 |
| WHITEHOUSE | I \| TYLER LAKE/RESERVOIR | 353 | 353 | 353 | 353 | 353 | 353 |
| R-P-M WSC | D \| CARRIZO-WILCOX AQUIFER \| VAN ZANDT COUNTY | 16 | 15 | 15 | 14 | 14 | 14 |
| R-P-M WSC | D \| QUEEN CITY AQUIFER \| VAN ZANDT COUNTY | 15 | 14 | 14 | 13 | 14 | 14 |

# Water User Group (WUG) Existing Water Supply

| REGION I | SOURCE REGION \| SOURCE NAME | EXISTING SUPPLY (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **SMITH COUNTY** | | | | | | | |
| **NECHES BASIN** | | | | | | | |
| WALNUT GROVE WSC | I \| CARRIZO-WILCOX AQUIFER \| SMITH COUNTY | 593 | 593 | 593 | 593 | 593 | 593 |
| WALNUT GROVE WSC | I \| JACKSONVILLE LAKE/RESERVOIR | 13 | 13 | 13 | 13 | 13 | 13 |
| WALNUT GROVE WSC | I \| PALESTINE LAKE/RESERVOIR | 623 | 623 | 623 | 623 | 623 | 623 |
| WALNUT GROVE WSC | I \| TYLER LAKE/RESERVOIR | 706 | 706 | 706 | 706 | 706 | 706 |
| WRIGHT CITY WSC | I \| CARRIZO-WILCOX AQUIFER \| SMITH COUNTY | 403 | 403 | 403 | 403 | 403 | 415 |
| COUNTY-OTHER | I \| CARRIZO-WILCOX AQUIFER \| SMITH COUNTY | 26 | 26 | 26 | 26 | 26 | 26 |
| COUNTY-OTHER | I \| PALESTINE LAKE/RESERVOIR | 100 | 100 | 100 | 100 | 100 | 100 |
| COUNTY-OTHER | I \| QUEEN CITY AQUIFER \| SMITH COUNTY | 584 | 761 | 941 | 1,143 | 1,356 | 1,577 |
| COUNTY-OTHER | I \| TYLER LAKE/RESERVOIR | 113 | 113 | 113 | 113 | 113 | 113 |
| MANUFACTURING | I \| CARRIZO-WILCOX AQUIFER \| SMITH COUNTY | 616 | 648 | 678 | 704 | 740 | 779 |
| MANUFACTURING | I \| OTHER AQUIFER \| SMITH COUNTY | 209 | 209 | 209 | 209 | 209 | 209 |
| MANUFACTURING | I \| PALESTINE LAKE/RESERVOIR | 1,380 | 1,499 | 1,614 | 1,711 | 1,844 | 1,988 |
| MANUFACTURING | I \| TYLER LAKE/RESERVOIR | 1,451 | 1,586 | 1,716 | 1,826 | 1,977 | 2,140 |
| MINING | I \| OTHER AQUIFER \| SMITH COUNTY | 26 | 26 | 26 | 26 | 26 | 26 |
| LIVESTOCK | I \| NECHES LIVESTOCK LOCAL SUPPLY | 605 | 605 | 605 | 605 | 605 | 605 |
| LIVESTOCK | I \| QUEEN CITY AQUIFER \| SMITH COUNTY | 510 | 510 | 510 | 510 | 510 | 510 |
| IRRIGATION | I \| BELLWOOD LAKE/RESERVOIR | 400 | 400 | 400 | 400 | 400 | 400 |
| IRRIGATION | I \| CARRIZO-WILCOX AQUIFER \| SMITH COUNTY | 225 | 225 | 225 | 225 | 225 | 0 |
| IRRIGATION | I \| NECHES RUN-OF-RIVER | 50 | 50 | 50 | 50 | 50 | 50 |
| IRRIGATION | I \| PALESTINE LAKE/RESERVOIR | 487 | 478 | 469 | 462 | 456 | 456 |
| IRRIGATION | I \| QUEEN CITY AQUIFER \| SMITH COUNTY | 324 | 365 | 406 | 446 | 487 | 753 |
| **NECHES BASIN TOTAL EXISTING SUPPLY** | | **40,402** | **42,615** | **44,935** | **47,626** | **50,671** | **53,909** |
| **SMITH COUNTY TOTAL EXISTING SUPPLY** | | **40,402** | **42,615** | **44,935** | **47,626** | **50,671** | **53,909** |
| **TRINITY COUNTY** | | | | | | | |
| **NECHES BASIN** | | | | | | | |
| GROVETON | H \| LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM | 283 | 281 | 283 | 285 | 283 | 285 |
| GROVETON | H \| YEGUA-JACKSON AQUIFER \| TRINITY COUNTY | 29 | 30 | 29 | 28 | 29 | 31 |
| COUNTY-OTHER | H \| LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM | 435 | 436 | 436 | 436 | 435 | 436 |
| COUNTY-OTHER | I \| YEGUA-JACKSON AQUIFER \| TRINITY COUNTY | 560 | 560 | 560 | 560 | 560 | 560 |
| MINING | H \| YEGUA-JACKSON AQUIFER \| TRINITY COUNTY | 5 | 5 | 5 | 5 | 5 | 5 |
| LIVESTOCK | I \| NECHES LIVESTOCK LOCAL SUPPLY | 449 | 449 | 449 | 449 | 449 | 449 |
| LIVESTOCK | I \| YEGUA-JACKSON AQUIFER \| TRINITY COUNTY | 29 | 29 | 29 | 29 | 29 | 29 |
| IRRIGATION | I \| NECHES RUN-OF-RIVER | 62 | 62 | 62 | 62 | 62 | 62 |
| IRRIGATION | I \| YEGUA-JACKSON AQUIFER \| TRINITY COUNTY | 108 | 108 | 108 | 108 | 108 | 108 |
| **NECHES BASIN TOTAL EXISTING SUPPLY** | | **1,960** | **1,960** | **1,961** | **1,962** | **1,960** | **1,965** |
| **TRINITY COUNTY TOTAL EXISTING SUPPLY** | | **1,960** | **1,960** | **1,961** | **1,962** | **1,960** | **1,965** |
| **TYLER COUNTY** | | | | | | | |
| **NECHES BASIN** | | | | | | | |
| COLMESNEIL | I \| GULF COAST AQUIFER \| TYLER COUNTY | 355 | 355 | 355 | 355 | 355 | 355 |

# Water User Group (WUG) Existing Water Supply

| REGION I | SOURCE REGION \| SOURCE NAME | EXISTING SUPPLY (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **TYLER COUNTY** | | | | | | | |
| **NECHES BASIN** | | | | | | | |
| LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY | I \| GULF COAST AQUIFER \| TYLER COUNTY | 5 | 5 | 5 | 5 | 5 | 5 |
| TYLER COUNTY WSC | I \| GULF COAST AQUIFER \| TYLER COUNTY | 1,051 | 1,051 | 1,051 | 1,051 | 1,051 | 1,051 |
| WOODVILLE | I \| GULF COAST AQUIFER \| TYLER COUNTY | 1,159 | 1,159 | 1,159 | 1,159 | 1,159 | 1,159 |
| WOODVILLE | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 4,762 | 4,762 | 4,762 | 4,762 | 4,762 | 4,762 |
| IVANHOE | I \| GULF COAST AQUIFER \| TYLER COUNTY | 217 | 217 | 217 | 217 | 217 | 217 |
| IVANHOE NORTH | I \| GULF COAST AQUIFER \| TYLER COUNTY | 217 | 217 | 217 | 217 | 217 | 217 |
| COUNTY-OTHER | I \| GULF COAST AQUIFER \| TYLER COUNTY | 1,494 | 1,448 | 1,404 | 1,380 | 1,376 | 1,376 |
| MANUFACTURING | I \| GULF COAST AQUIFER \| TYLER COUNTY | 476 | 483 | 490 | 496 | 501 | 506 |
| MINING | I \| GULF COAST AQUIFER \| TYLER COUNTY | 229 | 229 | 229 | 229 | 229 | 229 |
| MINING | I \| NECHES OTHER LOCAL SUPPLY | 8 | 8 | 8 | 8 | 8 | 8 |
| STEAM ELECTRIC POWER | I \| GULF COAST AQUIFER \| TYLER COUNTY | 191 | 191 | 191 | 191 | 191 | 191 |
| STEAM ELECTRIC POWER | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 838 | 838 | 838 | 838 | 838 | 838 |
| LIVESTOCK | I \| GULF COAST AQUIFER \| TYLER COUNTY | 75 | 75 | 75 | 75 | 75 | 75 |
| LIVESTOCK | I \| NECHES LIVESTOCK LOCAL SUPPLY | 239 | 239 | 239 | 239 | 239 | 239 |
| IRRIGATION | I \| GULF COAST AQUIFER \| TYLER COUNTY | 559 | 559 | 559 | 559 | 559 | 559 |
| IRRIGATION | I \| NECHES RUN-OF-RIVER | 123 | 123 | 123 | 123 | 123 | 123 |
| **NECHES BASIN TOTAL EXISTING SUPPLY** | | **11,998** | **11,959** | **11,922** | **11,904** | **11,905** | **11,910** |
| **TYLER COUNTY TOTAL EXISTING SUPPLY** | | **11,998** | **11,959** | **11,922** | **11,904** | **11,905** | **11,910** |
| | | | | | | | |
| **REGION I TOTAL EXISTING SUPPLY** | | **1,027,695** | **1,134,166** | **1,154,625** | **1,174,320** | **1,194,601** | **1,216,723** |

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# Appendix 3-C

# Desired Future Conditions and Modeled Available Groundwater Report

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The TWDB Groundwater Resources Division's Groundwater Availability Modeling Section has prepared GAM Run reports for each Groundwater Management Area (GMA) in Texas. The ETRWPA falls within two of these GMAs, GMA 11 and GMA 14. The reports related to these two GMAs are provided in this appendix.

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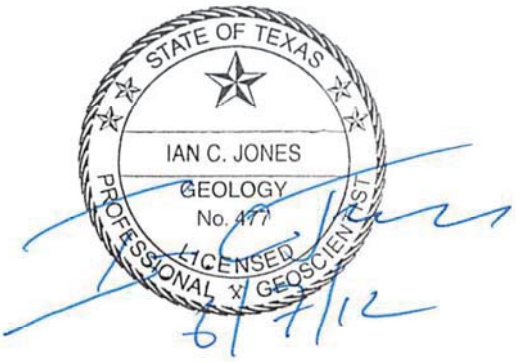
# GAM Run 10-016 MAG (Version 2): Model Run for the Yegua-Jackson, Sparta, Queen City, and Carrizo-Wilcox Aquifers in Groundwater Management Area 11

by Ian C. Jones, Ph.D., P.G., Jerry Shi, Ph.D., P.G., and Oliver Wade, P.G.
Texas Water Development Board
Groundwater Resources Division
Groundwater Availability Modeling Section
(512) 463-6641
June 7, 2012




*The seal appearing on this document was authorized by Ian C. Jones, P.G. 477, on June 7, 2012.*

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# GAM RUN 10-016 MAG (VERSION 2): MODEL RUN FOR THE YEGUA-JACKSON, SPARTA, QUEEN CITY, AND CARRIZO-WILCOX AQUIFERS IN GROUNDWATER MANAGEMENT AREA 11

by Ian C. Jones, Ph.D., P.G., Jerry Shi, Ph.D., P.G., and Wade Oliver, P.G.
Texas Water Development Board
Groundwater Resources Division
Groundwater Availability Modeling Section
(512) 463-6641
June 7, 2012

## *EXECUTIVE SUMMARY:*

The modeled available groundwater for Groundwater Management Area 11 is summarized for the Carrizo-Wilcox (Table 1), Queen City (Table 2), Sparta (Table 3), and Yegua-Jackson (Table 4) aquifers. Modeled available groundwater values for these aquifers are also summarized by county (Table 5), regional planning area (Table 6), river basin (Table 7), and groundwater conservation district (Table 8). The pumping estimates are based on Groundwater Availability Modeling Task 10-009. This previously completed model simulation meets the desired future condition adopted by the members of Groundwater Management Area 11 of an overall average drawdown of 17 feet.

The modeled available groundwater within the groundwater conservation districts that reflects the desired future conditions adopted by Groundwater Management Area 11 declines from approximately 195,000 acre-feet per year in 2010 to 189,000 acre-feet per year in 2060 (Table 8). When areas outside of groundwater conservation districts are considered, the modeled available groundwater is approximately 559,000 acre-feet per year in 2010 and declines to 543,000 acre-feet per year in 2060.

The total modeled available groundwater for each aquifer in Groundwater Management Area 11, including areas outside a groundwater conservation district, is also summarized by groundwater conservation district for each decade between 2010 and 2060 (Tables 9 through 15).

## *REQUESTOR:*

Ms. Monique Norman, General Counsel, and Mr. Len Luscomb, General Manager, of Rusk County Groundwater Conservation District on behalf of Groundwater Management Area 11.

## *DESCRIPTION OF REQUEST:*

In a letter dated May 4th, 2010 and received by the Texas Water Development Board (TWDB) on May 6th, 2010, Ms. Norman and Mr. Luscomb provided the Texas Water Development Board (TWDB) with the desired future condition (DFC) of the Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson aquifers within Groundwater Management Area 11. The desired future condition for the aquifers, as described in Resolution No. 1 and adopted April 13, 2010 by the groundwater conservation districts (GCDs) within Groundwater Management Area 11, is described below:

> *The Desired Future Condition is defined as allowing up to an average draw down of 17 feet that applies throughout [Groundwater Management Area] 11. … The Desired Future Condition of 17 feet average drawdown is based on 178 individual drawdowns by aquifer and county.*

## *METHODS:*

The aquifers referred to above are covered by two groundwater availability models: one for the northern portion of the Carrizo-Wilcox, Queen City, and Sparta aquifers (Fryar and others, 2003; Kelley and others, 2004) and one for the Yegua-Jackson Aquifer (Deeds and others, 2010). The aquifers covered by each of the groundwater availability models are shown in Figures 1 and 2.

In the previously completed Groundwater Availability Modeling Task 10-009, both of these models were run and achieved the above desired future condition (Oliver, 2010). The pumping results for Groundwater Management Area 11 presented here, taken directly from the simulations documented in Oliver (2010), have been divided by county, regional water planning area, river basin, and groundwater conservation district. These areas are shown in Figure 3. See Oliver (2010) for a full description of the methods, assumptions, and results for the groundwater availability model run.

The model results presented in this report were extracted from all areas of the model representing the units of the Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson aquifers. This includes some areas outside the "official" boundaries of the aquifers shown in the 2007 State Water Plan (TWDB, 2007). For this reason, the area over which the average drawdown that meets the desired future condition was calculated may reflect water of quality ranging from fresh to brackish and saline.

## *PARAMETERS AND ASSUMPTIONS:*

### *Northern Portion of the Carrizo-Wilcox, Queen City, and Sparta Aquifers*

The parameters and assumptions for the groundwater availability model run for the northern portion of the Carrizo-Wilcox, Queen City, and Sparta Aquifers are described below:

- Version 2.01 of the groundwater availability model for the northern portion of the Carrizo-Wilcox, Queen City, and Sparta Aquifers was used for this analysis. See Fryar and others (2003) and Kelley and others (2004) for assumptions and limitations of the groundwater availability model for the northern part of the Carrizo-Wilcox, Queen City, and Sparta Aquifers.
- The model includes eight layers, representing:
    1. Sparta Aquifer (Layer 1)
    2. Weches confining unit (Layer 2)
    3. Queen City Aquifer (Layer 3)
    4. Reklaw confining unit (Layer 4)
    5. Carrizo Aquifer (Layer 5)
    6. Upper Wilcox Aquifer (Layer 6)
    7. Middle Wilcox Aquifer (Layer 7)
    8. Lower Wilcox Aquifer (Layer 8)
- In the Sabine Uplift area, a portion of Layer 8, though active in the model, is outside the extent of the Lower Wilcox unit of the Carrizo-Wilcox Aquifer as described in Kelley and others (2004). Because of this, results for Layer 8 in

this area were not included when determining the average drawdown over Groundwater Management Area 11.

- Cells were assigned to individual counties and groundwater conservation districts as shown in the September 14, 2009 version of the cell assignment model grid for the northern portion of the Carrizo-Wilcox, Queen City, and Sparta aquifers.

- Recharge rates are based on average (1961 to 1990) precipitation (Kelley and others, 2004).

***Yegua-Jackson Aquifer***

The parameters and assumptions for the model run using the groundwater availability model for the Yegua-Jackson Aquifer are described below:

- Version 1.01 of the groundwater availability model for the Yegua-Jackson Aquifer was used for this analysis. See Deeds and others (2010) for assumptions and limitations of the groundwater availability model.

- The model includes five layers representing the Yegua-Jackson Aquifer and the overlying Catahoula unit.

- Cells were assigned to individual counties and groundwater conservation districts as shown in the March 23, 2010 version of the cell assignment model grid for the Yegua-Jackson Aquifer.

- The recharge used for the model run represents average recharge as described in Deeds and others (2010).

## *MODELED AVAILABLE GROUNDWATER AND PERMITTING:*

As defined in Chapter 36 of the Texas Water Code, "modeled available groundwater" is the estimated average amount of water that may be produced annually to achieve a desired future condition. This is distinct from "managed available groundwater", which was a permitting value and accounted for the estimated use of the aquifer exempt from permitting. This change was made to reflect changes in statute by the 82nd Texas Legislature, effective September 1, 2011.

Groundwater conservation districts are required to consider modeled available groundwater, along with several other factors, when issuing permits in order to

manage groundwater production to achieve the desired future condition(s). The other factors districts must consider include annual precipitation and production patterns, the estimated amount of pumping exempt from permitting, existing permits, and a reasonable estimate of actual groundwater production under existing permits. The estimated amount of pumping exempt from permitting, which the TWDB is now required to develop after soliciting input from applicable groundwater conservation districts, will be provided in a separate report.

## *RESULTS:*

The modeled available groundwater in Groundwater Management Area 11 from the Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson aquifers that achieves the desired future condition declines from approximately 559,000 acre-feet per year in 2010 to 543,000 acre-feet per year in 2060. Tables 1 through 4 contain the estimates of total pumping for the Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson aquifers, respectively. In these tables, results have been subdivided by county, regional water planning area, and river basin for use in the regional water planning process.

Tables 5 through 7 show the modeled available groundwater for all aquifers summarized by county, regional water planning area, and river basin, respectively, within Groundwater Management Area 11. The modeled available groundwater for all aquifers within and outside the groundwater conservation districts in Groundwater Management Area 11 are presented in Table 8. Tables 9 through 15 show the modeled available groundwater for each model layer—Lower Wilcox Formation, Middle Wilcox Formation, Upper Wilcox Formation, Carrizo Formation, Queen City Aquifer, Sparta Aquifer, and Yegua-Jackson Aquifer— within and outside the groundwater conservation districts in Groundwater Management Area 11.

## *LIMITATIONS:*

The groundwater model used in completing this analysis is the best available scientific tool that can be used to meet the stated objective(s). To the extent that this analysis will be used for planning purposes and/or regulatory purposes related to pumping in the past and into the future, it is important to recognize the assumptions and limitations associated with the use of the results. In reviewing the use of models in environmental regulatory decision-making, the National Research Council (2007) noted:

> "Models will always be constrained by computational limitations, assumptions, and knowledge gaps. They can best be viewed as tools to help inform decisions rather than as machines to generate truth or make decisions. Scientific advances will never make it possible to build a perfect model that accounts for every aspect of reality or to prove that a given model is correct in all respects for a particular regulatory application. These characteristics make evaluation of a regulatory model more complex than solely a comparison of measurement data with model results."

A key aspect of using the groundwater model to evaluate historic groundwater flow conditions includes the assumptions about the location in the aquifer where historic pumping was placed. Understanding the amount and location of historic pumping is as important as evaluating the volume of groundwater flow into and out of the district, between aquifers within the district (as applicable), interactions with surface water (as applicable), recharge to the aquifer system (as applicable), and other metrics that describe the impacts of that pumping. In addition, assumptions regarding precipitation, recharge, and streamflow are specific to a particular historic time period.

Because the application of the groundwater model was designed to address regional scale questions, the results are most effective on a regional scale. The TWDB makes no warranties or representations relating to the actual conditions of any aquifer at a particular location or at a particular time.

It is important for groundwater conservation districts to monitor groundwater pumping and overall conditions of the aquifer. Because of the limitations of the groundwater model and the assumptions in this analysis, it is important that the groundwater conservation districts work with the TWDB to refine this analysis in the future given the reality of how the aquifer responds to the actual amount and location of pumping now and in the future. Historic precipitation patterns also need to be placed in context as future climatic conditions, such as dry and wet year precipitation patterns, may differ and affect groundwater flow conditions.

## *REFERENCES:*

Deeds, N.E., Yan, T., Singh, A., Jones, T.L., Kelley, V.A., Knox, P.R., Young, S.C., 2010, Groundwater availability model for the Yegua-Jackson Aquifer: Final report prepared for the Texas Water Development Board by INTERA, Inc., 582 p.

Fryar, D., Senger, R., Deeds, N., Pickens, J., Jones, T., Whallon, A. J., and Dean, K. E., 2003, Groundwater Availability Model for the Northern Carrizo-Wilcox Aquifer: contract report to the Texas Water Development Board, 529 p.

Kelley, V. A., Deeds, N. E., Fryar, D. G., and Nicot, J. P., 2004, Groundwater availability models for the Queen City and Sparta aquifers: contract report to the Texas Water Development Board, 867 p.

National Research Council, 2007, Models in Environmental Regulatory Decision Making. Committee on Models in the Regulatory Decision Process, National Academies Press, Washington D.C., 287 p.

Oliver, W., 2010, Texas Water Development Board, GAM Task 10-009 Model Run Report, 11 p.

Texas Water Development Board, 2007, Water for Texas – 2007—Volumes I-III; Texas Water Development Board Document No. GP-8-1, 392 p.

**TABLE 1. MODELED AVAILABLE GROUNDWATER FOR THE CARRIZO-WILCOX AQUIFER IN GROUNDWATER MANAGEMENT AREA 11. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE DIVIDED BY COUNTY, REGIONAL WATER PLANNING AREA, AND RIVER BASIN.**

| County | Region | Basin | Year | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Anderson | I | Neches | 4,393 | 4,393 | 4,393 | 4,393 | 4,393 | 4,393 |
| | | Trinity | 5,684 | 5,684 | 5,684 | 5,684 | 5,684 | 5,684 |
| Angelina | I | Neches | 26,414 | 26,414 | 26,414 | 26,414 | 26,414 | 26,414 |
| Bowie | D | Sulphur | 11,126 | 8,216 | 7,976 | 7,533 | 7,533 | 7,083 |
| Camp | D | Cypress | 4,041 | 4,041 | 4,041 | 4,041 | 4,041 | 4,041 |
| Cass | D | Cypress | 2,955 | 2,955 | 2,955 | 2,955 | 2,955 | 2,955 |
| | | Sulphur | 578 | 578 | 578 | 578 | 578 | 578 |
| Cherokee | I | Neches | 11,222 | 11,222 | 11,222 | 11,222 | 11,222 | 11,222 |
| Franklin | D | Cypress | 7,794 | 7,736 | 7,736 | 7,736 | 7,736 | 7,736 |
| | | Sulphur | 1,952 | 1,748 | 1,748 | 1,748 | 1,748 | 1,748 |
| Gregg | D | Cypress | 820 | 820 | 820 | 820 | 820 | 820 |
| | | Sabine | 6,829 | 6,829 | 6,829 | 6,829 | 6,829 | 6,829 |
| Harrison | D | Cypress | 4,892 | 4,873 | 4,839 | 4,787 | 4,772 | 4,728 |
| | | Sabine | 4,019 | 3,964 | 3,947 | 3,911 | 3,911 | 3,911 |
| Henderson | C | Trinity | 5,254 | 5,187 | 5,187 | 5,187 | 5,187 | 5,187 |
| | I | Neches | 3,999 | 3,999 | 3,999 | 3,999 | 3,999 | 3,999 |
| Hopkins | D | Cypress | 253 | 253 | 253 | 253 | 253 | 253 |
| | | Sabine | 2,043 | 2,001 | 2,001 | 2,001 | 2,001 | 2,001 |
| | | Sulphur | 1,137 | 1,137 | 1,137 | 1,137 | 1,137 | 1,137 |
| Houston | I | Neches | 1,924 | 1,924 | 1,924 | 1,924 | 1,924 | 1,924 |
| | | Trinity | 3,432 | 3,432 | 3,432 | 3,432 | 3,432 | 3,432 |
| Marion | D | Cypress | 2,077 | 2,077 | 2,077 | 2,077 | 2,077 | 2,077 |
| Morris | D | Cypress | 2,196 | 2,196 | 2,174 | 2,174 | 2,174 | 2,174 |
| | | Sulphur | 420 | 420 | 384 | 384 | 384 | 384 |
| Nacogdoches | I | Neches | 21,385 | 21,385 | 21,385 | 21,385 | 21,385 | 21,385 |
| Panola | I | Cypress | 6 | 6 | 6 | 6 | 6 | 6 |
| | | Sabine | 9,091 | 8,221 | 8,221 | 8,063 | 8,063 | 8,063 |
| Rains | D | Sabine | 1,703 | 1,703 | 1,620 | 1,620 | 1,620 | 1,583 |
| Red River | D | Sulphur | 0 | 0 | 0 | 0 | 0 | 0 |
| Rusk | I | Neches | 11,776 | 11,776 | 11,766 | 11,766 | 11,766 | 11,747 |
| | | Sabine | 9,067 | 9,067 | 9,067 | 9,067 | 9,067 | 9,067 |
| Sabine | I | Neches | 1,254 | 1,254 | 1,254 | 1,254 | 1,254 | 1,254 |
| | | Sabine | 5,612 | 5,604 | 5,604 | 5,604 | 5,604 | 5,604 |
| San Augustine | I | Neches | 1,490 | 1,490 | 1,490 | 1,490 | 1,490 | 1,490 |
| | | Sabine | 291 | 291 | 291 | 291 | 291 | 291 |
| Shelby | I | Neches | 2,900 | 2,736 | 2,578 | 2,288 | 2,152 | 2,019 |
| | | Sabine | 9,144 | 8,481 | 8,323 | 8,159 | 8,159 | 7,710 |
| Smith | D | Sabine | 12,245 | 12,245 | 12,245 | 12,235 | 12,221 | 12,221 |
| | I | Neches | 21,004 | 21,004 | 21,004 | 21,004 | 21,004 | 21,004 |

**TABLE 1. CONTINUED.**

| County | Region | Basin | Year | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Titus | D | Cypress | 8,051 | 7,516 | 7,214 | 7,063 | 6,833 | 6,833 |
| | | Sulphur | 2,805 | 2,805 | 2,805 | 2,805 | 2,805 | 2,805 |
| Trinity | H | Trinity | 1,101 | 1,101 | 1,101 | 1,101 | 1,101 | 1,101 |
| | I | Neches | 1,114 | 1,114 | 1,114 | 1,114 | 1,114 | 1,114 |
| Upshur | D | Cypress | 5,426 | 5,426 | 5,426 | 5,426 | 5,426 | 5,426 |
| | | Sabine | 1,689 | 1,689 | 1,689 | 1,689 | 1,689 | 1,689 |
| Van Zandt | D | Neches | 4,288 | 4,288 | 4,288 | 4,288 | 4,288 | 4,288 |
| | | Sabine | 4,942 | 4,611 | 4,611 | 4,611 | 4,611 | 4,379 |
| | | Trinity | 1,384 | 1,384 | 1,384 | 1,384 | 1,384 | 1,384 |
| Wood | D | Cypress | 2,053 | 2,053 | 2,053 | 2,053 | 2,053 | 2,053 |
| | | Sabine | 19,663 | 19,486 | 19,398 | 19,355 | 19,280 | 19,258 |
| **Total** | | | **274,938** | **268,835** | **267,687** | **266,340** | **265,870** | **264,484** |

**TABLE 2. MODELED AVAILABLE GROUNDWATER FOR THE QUEEN CITY AQUIFER IN GROUNDWATER MANAGEMENT AREA 11. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE DIVIDED BY COUNTY, REGIONAL WATER PLANNING AREA, AND RIVER BASIN.**

| County | Region | Basin | Year | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Anderson | I | Neches | 9,762 | 9,762 | 9,762 | 9,762 | 9,762 | 9,762 |
| | | Trinity | 9,039 | 9,039 | 9,039 | 9,039 | 9,039 | 9,039 |
| Angelina | I | Neches | 1,093 | 1,093 | 1,093 | 1,093 | 1,093 | 1,093 |
| Camp | D | Cypress | 3,705 | 3,542 | 3,542 | 3,542 | 3,542 | 3,542 |
| Cass | D | Cypress | 35,970 | 35,970 | 35,970 | 35,970 | 35,970 | 35,970 |
| | | Sulphur | 3,223 | 3,223 | 3,223 | 3,223 | 3,223 | 3,223 |
| Cherokee | I | Neches | 22,396 | 22,396 | 22,396 | 22,396 | 22,396 | 22,396 |
| Gregg | D | Cypress | 1,359 | 1,359 | 1,359 | 1,359 | 1,359 | 1,359 |
| | | Sabine | 6,214 | 6,214 | 6,214 | 6,214 | 6,214 | 6,214 |
| Harrison | D | Cypress | 7,890 | 7,890 | 7,890 | 7,890 | 7,890 | 7,890 |
| | | Sabine | 2,483 | 2,483 | 2,483 | 2,483 | 2,483 | 2,483 |
| Henderson | C | Trinity | 3,533 | 3,533 | 3,533 | 3,533 | 3,533 | 3,533 |
| | I | Neches | 12,316 | 12,316 | 12,316 | 12,316 | 12,316 | 12,316 |
| Houston | I | Neches | 131 | 131 | 131 | 131 | 131 | 131 |
| | | Trinity | 279 | 279 | 279 | 279 | 279 | 279 |
| Marion | D | Cypress | 15,549 | 15,549 | 15,549 | 15,549 | 15,549 | 15,549 |
| Morris | D | Cypress | 9,652 | 9,652 | 9,652 | 9,652 | 9,537 | 9,537 |
| Nacogdoches | I | Neches | 5,002 | 5,002 | 5,002 | 5,002 | 5,002 | 5,002 |
| Panola | I | Sabine | 0 | 0 | 0 | 0 | 0 | 0 |
| Rusk | I | Neches | 40 | 40 | 40 | 40 | 40 | 40 |
| | | Sabine | 18 | 18 | 18 | 18 | 18 | 18 |
| Sabine | I | Neches | 0 | 0 | 0 | 0 | 0 | 0 |
| | | Sabine | 0 | 0 | 0 | 0 | 0 | 0 |
| San Augustine | I | Neches | 7 | 7 | 7 | 7 | 7 | 7 |
| | | Sabine | 0 | 0 | 0 | 0 | 0 | 0 |
| Shelby | I | Sabine | 0 | 0 | 0 | 0 | 0 | 0 |
| Smith | D | Sabine | 25,994 | 25,994 | 25,994 | 25,994 | 25,994 | 25,994 |
| | I | Neches | 28,259 | 28,259 | 28,259 | 28,259 | 28,259 | 28,259 |
| Titus | D | Cypress | 138 | 138 | 138 | 138 | 138 | 138 |
| Trinity | H | Trinity | 0 | 0 | 0 | 0 | 0 | 0 |
| | I | Neches | 0 | 0 | 0 | 0 | 0 | 0 |
| Upshur | D | Cypress | 18,324 | 18,324 | 18,324 | 18,324 | 18,143 | 18,143 |
| | | Sabine | 7,246 | 7,246 | 7,246 | 7,246 | 7,246 | 7,246 |
| Van Zandt | D | Neches | 3,814 | 3,814 | 3,814 | 3,814 | 3,814 | 3,814 |
| Wood | D | Cypress | 1,009 | 1,009 | 1,009 | 1,009 | 1,009 | 1,009 |
| | | Sabine | 9,103 | 9,103 | 9,103 | 9,103 | 9,103 | 9,103 |
| **Total** | | | **243,548** | **243,385** | **243,385** | **243,385** | **243,089** | **243,089** |

**TABLE 3. MODELED AVAILABLE GROUNDWATER FOR THE SPARTA AQUIFER IN GROUNDWATER MANAGEMENT AREA 11. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE DIVIDED BY COUNTY, REGIONAL WATER PLANNING AREA, AND RIVER BASIN.**

| County | Region | Basin | Year | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Anderson | I | Neches | 344 | 344 | 344 | 344 | 344 | 344 |
| | | Trinity | 272 | 272 | 272 | 272 | 272 | 272 |
| Angelina | I | Neches | 689 | 689 | 689 | 689 | 689 | 689 |
| Cherokee | I | Neches | 359 | 359 | 359 | 359 | 359 | 359 |
| Houston | I | Neches | 302 | 302 | 302 | 302 | 302 | 302 |
| | | Trinity | 594 | 594 | 594 | 594 | 594 | 594 |
| Nacogdoches | I | Neches | 409 | 409 | 409 | 409 | 409 | 409 |
| Rusk | I | Neches | 4,362 | 0 | 0 | 0 | 0 | 0 |
| Sabine | I | Neches | 61 | 61 | 61 | 61 | 61 | 61 |
| | | Sabine | 235 | 235 | 235 | 235 | 235 | 235 |
| San Augustine | I | Neches | 202 | 202 | 202 | 202 | 202 | 202 |
| | | Sabine | 3 | 3 | 3 | 3 | 3 | 3 |
| Smith | I | Neches | 0 | 0 | 0 | 0 | 0 | 0 |
| | D | Sabine | 0 | 0 | 0 | 0 | 0 | 0 |
| Trinity | I | Neches | 313 | 313 | 313 | 313 | 313 | 313 |
| | H | Trinity | 302 | 302 | 302 | 302 | 302 | 302 |
| Upshur | D | Sabine | 0 | 0 | 0 | 0 | 0 | 0 |
| Wood | D | Sabine | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | | | **8,447** | **4,085** | **4,085** | **4,085** | **4,085** | **4,085** |

**TABLE 4. MODELED AVAILABLE GROUNDWATER FOR THE YEGUA-JACKSON AQUIFER IN GROUNDWATER MANAGEMENT AREA 11. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE DIVIDED BY COUNTY, REGIONAL WATER PLANNING AREA, AND RIVER BASIN.**

| County | Region | Basin | Year | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Angelina | I | Neches | 16,890 | 16,890 | 16,890 | 16,890 | 16,890 | 16,507 |
| Houston | I | Neches | 1,324 | 1,324 | 1,324 | 1,324 | 1,324 | 1,324 |
| | | Trinity | 4,061 | 4,061 | 4,061 | 4,061 | 4,061 | 4,061 |
| Nacogdoches | I | Neches | 235 | 235 | 235 | 235 | 235 | 235 |
| Sabine | I | Neches | 3,724 | 3,724 | 3,724 | 3,724 | 3,724 | 3,724 |
| | | Sabine | 575 | 575 | 575 | 575 | 575 | 575 |
| San Augustine | I | Neches | 2,102 | 2,102 | 2,102 | 2,102 | 2,102 | 2,102 |
| | | Sabine | 9 | 9 | 9 | 9 | 9 | 9 |
| Trinity | H | Trinity | 2,191 | 2,191 | 2,191 | 2,191 | 2,191 | 2,191 |
| | I | Neches | 700 | 700 | 700 | 700 | 700 | 700 |
| **Total** | | | **31,811** | **31,811** | **31,811** | **31,811** | **31,811** | **31,428** |

**TABLE 5. MODELED AVAILABLE GROUNDWATER FOR THE CARRIZO-WILCOX, QUEEN CITY, SPARTA, AND YEGUA-JACKSON AQUIFERS BY COUNTY FOR EACH DECADE BETWEEN 2010 AND 2060. RESULTS ARE IN ACRE-FEET PER YEAR.**

| County | Year | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Anderson | 29,494 | 29,494 | 29,494 | 29,494 | 29,494 | 29,494 |
| Angelina | 45,086 | 45,086 | 45,086 | 45,086 | 45,086 | 44,703 |
| Bowie | 11,126 | 8,216 | 7,976 | 7,533 | 7,533 | 7,083 |
| Camp | 7,746 | 7,583 | 7,583 | 7,583 | 7,583 | 7,583 |
| Cass | 42,726 | 42,726 | 42,726 | 42,726 | 42,726 | 42,726 |
| Cherokee | 33,977 | 33,977 | 33,977 | 33,977 | 33,977 | 33,977 |
| Franklin | 9,746 | 9,484 | 9,484 | 9,484 | 9,484 | 9,484 |
| Gregg | 15,222 | 15,222 | 15,222 | 15,222 | 15,222 | 15,222 |
| Harrison | 19,284 | 19,210 | 19,159 | 19,071 | 19,056 | 19,012 |
| Henderson | 25,102 | 25,035 | 25,035 | 25,035 | 25,035 | 25,035 |
| Hopkins | 3,433 | 3,391 | 3,391 | 3,391 | 3,391 | 3,391 |
| Houston | 12,047 | 12,047 | 12,047 | 12,047 | 12,047 | 12,047 |
| Marion | 17,626 | 17,626 | 17,626 | 17,626 | 17,626 | 17,626 |
| Morris | 12,268 | 12,268 | 12,210 | 12,210 | 12,095 | 12,095 |
| Nacogdoches | 27,031 | 27,031 | 27,031 | 27,031 | 27,031 | 27,031 |
| Panola | 9,097 | 8,227 | 8,227 | 8,069 | 8,069 | 8,069 |
| Rains | 1,703 | 1,703 | 1,620 | 1,620 | 1,620 | 1,583 |
| Red River | 0 | 0 | 0 | 0 | 0 | 0 |
| Rusk | 25,263 | 20,901 | 20,891 | 20,891 | 20,891 | 20,872 |
| Sabine | 11,461 | 11,453 | 11,453 | 11,453 | 11,453 | 11,453 |
| San Augustine | 4,104 | 4,104 | 4,104 | 4,104 | 4,104 | 4,104 |
| Shelby | 12,044 | 11,217 | 10,901 | 10,447 | 10,311 | 9,729 |
| Smith | 87,502 | 87,502 | 87,502 | 87,492 | 87,478 | 87,478 |
| Titus | 10,994 | 10,459 | 10,157 | 10,006 | 9,776 | 9,776 |
| Trinity | 5,721 | 5,721 | 5,721 | 5,721 | 5,721 | 5,721 |
| Upshur | 32,685 | 32,685 | 32,685 | 32,685 | 32,504 | 32,504 |
| Van Zandt | 14,428 | 14,097 | 14,097 | 14,097 | 14,097 | 13,865 |
| Wood | 31,828 | 31,651 | 31,563 | 31,520 | 31,445 | 31,423 |
| **Total** | **558,744** | **548,116** | **546,968** | **545,621** | **544,855** | **543,086** |

**TABLE 6. MODELED AVAILABLE GROUNDWATER FOR THE CARRIZO-WILCOX, QUEEN CITY, SPARTA, AND YEGUA-JACKSON AQUIFERS BY REGIONAL WATER PLANNING AREA FOR EACH DECADE BETWEEN 2010 AND 2060. RESULTS ARE IN ACRE-FEET PER YEAR.**

| Region | Year | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| C | 8,787 | 8,720 | 8,720 | 8,720 | 8,720 | 8,720 |
| D | 269,054 | 264,560 | 263,738 | 263,003 | 262,373 | 261,588 |
| H | 3,594 | 3,594 | 3,594 | 3,594 | 3,594 | 3,594 |
| I | 277,309 | 271,242 | 270,916 | 270,304 | 270,168 | 269,184 |
| **Total** | **558,744** | **548,116** | **546,968** | **545,621** | **544,855** | **543,086** |

**TABLE 7. MODELED AVAILABLE GROUNDWATER FOR THE CARRIZO-WILCOX, QUEEN CITY, SPARTA, AND YEGUA-JACKSON AQUIFERS BY RIVER BASIN FOR EACH DECADE BETWEEN 2010 AND 2060. RESULTS ARE IN ACRE-FEET PER YEAR.**

| Basin | Year | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Cypress | 134,160 | 133,385 | 133,027 | 132,824 | 132,283 | 132,239 |
| Neches | 227,999 | 223,473 | 223,305 | 223,015 | 222,879 | 222,344 |
| Sabine | 138,218 | 136,072 | 135,726 | 135,315 | 135,226 | 134,486 |
| Sulphur | 21,241 | 18,127 | 17,851 | 17,408 | 17,408 | 16,958 |
| Trinity | 37,126 | 37,059 | 37,059 | 37,059 | 37,059 | 37,059 |
| **Total** | **558,744** | **548,116** | **546,968** | **545,621** | **544,855** | **543,086** |

**TABLE 8. MODELED AVAILABLE GROUNDWATER FOR THE CARRIZO-WILCOX, QUEEN CITY, SPARTA, AND YEGUA-JACKSON AQUIFERS BY GROUNDWATER CONSERVATION DISTRICT (GCD) FOR EACH DECADE BETWEEN 2010 AND 2060. RESULTS ARE IN ACRE-FEET PER YEAR. UWCD REFERS TO UNDERGROUND WATER CONSERVATION DISTRICT.**

| District | Year | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Anderson County UWCD | 1,361 | 1,361 | 1,361 | 1,361 | 1,361 | 1,361 |
| Neches & Trinity Valleys GCD | 87,212 | 87,145 | 87,145 | 87,145 | 87,145 | 87,145 |
| Panola GCD | 9,097 | 8,227 | 8,227 | 8,069 | 8,069 | 8,069 |
| Pineywoods GCD | 72,117 | 72,117 | 72,117 | 72,117 | 72,117 | 71,734 |
| Rusk County GCD | 25,263 | 20,901 | 20,891 | 20,891 | 20,891 | 20,872 |
| **Total (excluding non-district areas)** | **195,050** | **189,751** | **189,741** | **189,583** | **189,583** | **189,181** |
| No District | 363,694 | 358,365 | 357,227 | 356,038 | 355,272 | 353,905 |
| **Total (including non-district areas)** | **558,744** | **548,116** | **546,968** | **545,621** | **544,855** | **543,086** |

**TABLE 9. MODELED AVAILABLE GROUNDWATER FOR THE LOWER WILCOX FORMATION BY GROUNDWATER CONSERVATION DISTRICT (GCD) FOR EACH DECADE BETWEEN 2010 AND 2060. RESULTS ARE IN ACRE-FEET PER YEAR. UWCD REFERS TO UNDERGROUND WATER CONSERVATION DISTRICT.**

| District | Year | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Anderson County UWCD | 7 | 7 | 7 | 7 | 7 | 7 |
| Neches & Trinity Valleys GCD | 1,886 | 1,886 | 1,886 | 1,886 | 1,886 | 1,886 |
| Panola GCD | 725 | 725 | 725 | 725 | 725 | 725 |
| Pineywoods GCD | 0 | 0 | 0 | 0 | 0 | 0 |
| Rusk County GCD | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total (excluding non-district areas)** | **2,618** | **2,618** | **2,618** | **2,618** | **2,618** | **2,618** |
| No District | 2,717 | 2,717 | 2,717 | 2,717 | 2,717 | 2,717 |
| **Total (including non-district areas)** | **5,335** | **5,335** | **5,335** | **5,335** | **5,335** | **5,335** |

**TABLE 10. MODELED AVAILABLE GROUNDWATER FOR THE MIDDLE WILCOX FORMATION BY GROUNDWATER CONSERVATION DISTRICT (GCD) FOR EACH DECADE BETWEEN 2010 AND 2060. RESULTS ARE IN ACRE-FEET PER YEAR. UWCD REFERS TO UNDERGROUND WATER CONSERVATION DISTRICT.**

| District | Year | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Anderson County UWCD | 15 | 15 | 15 | 15 | 15 | 15 |
| Neches & Trinity Valleys GCD | 1,719 | 1,719 | 1,719 | 1,719 | 1,719 | 1,719 |
| Panola GCD | 5,764 | 5,764 | 5,764 | 5,764 | 5,764 | 5,764 |
| Pineywoods GCD | 678 | 678 | 678 | 678 | 678 | 678 |
| Rusk County GCD | 8,731 | 8,731 | 8,731 | 8,731 | 8,731 | 8,731 |
| **Total (excluding non-district areas)** | **16,907** | **16,907** | **16,907** | **16,907** | **16,907** | **16,907** |
| No District | 44,427 | 44,223 | 44,194 | 44,179 | 44,179 | 44,165 |
| **Total (including non-district areas)** | **61,334** | **61,130** | **61,101** | **61,086** | **61,086** | **61,072** |

**TABLE 11. MODELED AVAILABLE GROUNDWATER FOR THE UPPER WILCOX FORMATION BY GROUNDWATER CONSERVATION DISTRICT (GCD) FOR EACH DECADE BETWEEN 2010 AND 2060. RESULTS ARE IN ACRE-FEET PER YEAR. UWCD REFERS TO UNDERGROUND WATER CONSERVATION DISTRICT.**

| District | Year | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Anderson County UWCD | 107 | 107 | 107 | 107 | 107 | 107 |
| Neches & Trinity Valleys GCD | 9,652 | 9,652 | 9,652 | 9,652 | 9,652 | 9,652 |
| Panola GCD | 770 | 770 | 770 | 770 | 770 | 770 |
| Pineywoods GCD | 12,581 | 12,581 | 12,581 | 12,581 | 12,581 | 12,581 |
| Rusk County GCD | 5,156 | 5,156 | 5,156 | 5,156 | 5,156 | 5,156 |
| **Total (excluding non-district areas)** | **28,266** | **28,266** | **28,266** | **28,266** | **28,266** | **28,266** |
| No District | 45,600 | 42,690 | 42,396 | 41,968 | 41,968 | 41,495 |
| **Total (including non-district areas)** | **73,866** | **70,956** | **70,662** | **70,234** | **70,234** | **69,761** |

**TABLE 12. MODELED AVAILABLE GROUNDWATER FOR THE CARRIZO FORMATION BY GROUNDWATER CONSERVATION DISTRICT (GCD) FOR EACH DECADE BETWEEN 2010 AND 2060. RESULTS ARE IN ACRE-FEET PER YEAR. UWCD REFERS TO UNDERGROUND WATER CONSERVATION DISTRICT.**

| District | Year | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Anderson County UWCD | 281 | 281 | 281 | 281 | 281 | 281 |
| Neches & Trinity Valleys GCD | 16,885 | 16,818 | 16,818 | 16,818 | 16,818 | 16,818 |
| Panola GCD | 1,838 | 968 | 968 | 810 | 810 | 810 |
| Pineywoods GCD | 34,540 | 34,540 | 34,540 | 34,540 | 34,540 | 34,540 |
| Rusk County GCD | 6,956 | 6,956 | 6,946 | 6,946 | 6,946 | 6,927 |
| **Total (excluding non-district areas)** | **60,500** | **59,563** | **59,553** | **59,395** | **59,395** | **59,376** |
| No District | 73,903 | 71,851 | 71,036 | 70,290 | 69,820 | 68,940 |
| **Total (including non-district areas)** | **134,403** | **131,414** | **130,589** | **129,685** | **129,215** | **128,316** |

**TABLE 13. MODELED AVAILABLE GROUNDWATER FOR THE QUEEN CITY AQUIFER BY GROUNDWATER CONSERVATION DISTRICT (GCD) FOR EACH DECADE BETWEEN 2010 AND 2060. RESULTS ARE IN ACRE-FEET PER YEAR. UWCD REFERS TO UNDERGROUND WATER CONSERVATION DISTRICT.**

| District | Year | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Anderson County UWCD | 951 | 951 | 951 | 951 | 951 | 951 |
| Neches & Trinity Valleys GCD | 56,095 | 56,095 | 56,095 | 56,095 | 56,095 | 56,095 |
| Panola GCD | 0 | 0 | 0 | 0 | 0 | 0 |
| Pineywoods GCD | 6,095 | 6,095 | 6,095 | 6,095 | 6,095 | 6,095 |
| Rusk County GCD | 58 | 58 | 58 | 58 | 58 | 58 |
| **Total (excluding non-district areas)** | **63,199** | **63,199** | **63,199** | **63,199** | **63,199** | **63,199** |
| No District | 180,349 | 180,186 | 180,186 | 180,186 | 179,890 | 179,890 |
| **Total (including non-district areas)** | **243,548** | **243,385** | **243,385** | **243,385** | **243,089** | **243,089** |

**TABLE 14. MODELED AVAILABLE GROUNDWATER FOR THE SPARTA AQUIFER BY GROUNDWATER CONSERVATION DISTRICT (GCD) FOR EACH DECADE BETWEEN 2010 AND 2060. RESULTS ARE IN ACRE-FEET PER YEAR. UWCD REFERS TO UNDERGROUND WATER CONSERVATION DISTRICT.**

| District | Year | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Anderson County UWCD | 0 | 0 | 0 | 0 | 0 | 0 |
| Neches & Trinity Valleys GCD | 975 | 975 | 975 | 975 | 975 | 975 |
| Panola GCD | 0 | 0 | 0 | 0 | 0 | 0 |
| Pineywoods GCD | 1,098 | 1,098 | 1,098 | 1,098 | 1,098 | 1,098 |
| Rusk County GCD | 4,362 | 0 | 0 | 0 | 0 | 0 |
| **Total (excluding non-district areas)** | **6,435** | **2,073** | **2,073** | **2,073** | **2,073** | **2,073** |
| No District | 2,012 | 2,012 | 2,012 | 2,012 | 2,012 | 2,012 |
| **Total (including non-district areas)** | **8,447** | **4,085** | **4,085** | **4,085** | **4,085** | **4,085** |

**TABLE 15. MODELED AVAILABLE GROUNDWATER FOR THE YEGUA-JACKSON AQUIFER BY GROUNDWATER CONSERVATION DISTRICT (GCD) FOR EACH DECADE BETWEEN 2010 AND 2060. RESULTS ARE IN ACRE-FEET PER YEAR. UWCD REFERS TO UNDERGROUND WATER CONSERVATION DISTRICT.**

| District | Year | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Anderson County UWCD | 0 | 0 | 0 | 0 | 0 | 0 |
| Neches & Trinity Valleys GCD | 0 | 0 | 0 | 0 | 0 | 0 |
| Panola GCD | 0 | 0 | 0 | 0 | 0 | 0 |
| Pineywoods GCD | 17,125 | 17,125 | 17,125 | 17,125 | 17,125 | 16,742 |
| Rusk County GCD | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total (excluding non-district areas)** | **17,125** | **17,125** | **17,125** | **17,125** | **17,125** | **16,742** |
| No District | 14,686 | 14,686 | 14,686 | 14,686 | 14,686 | 14,686 |
| **Total (including non-district areas)** | **31,811** | **31,811** | **31,811** | **31,811** | **31,811** | **31,428** |

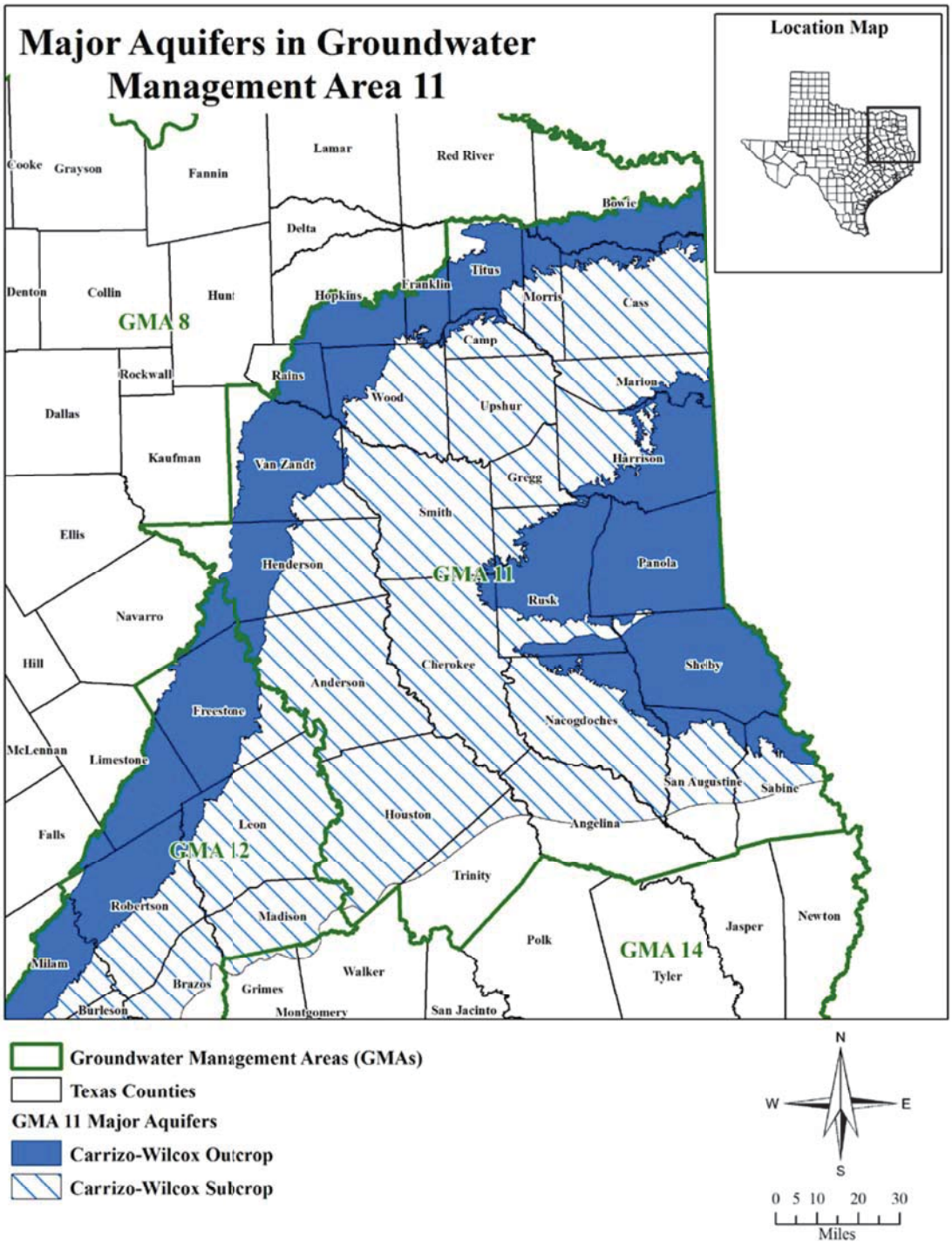



**FIGURE 1. MAP SHOWING THE BOUNDARY OF THE CARRIZO-WILCOX AQUIFER ACCORDING TO THE 2007 STATE WATER PLAN (TWDB, 2007).**

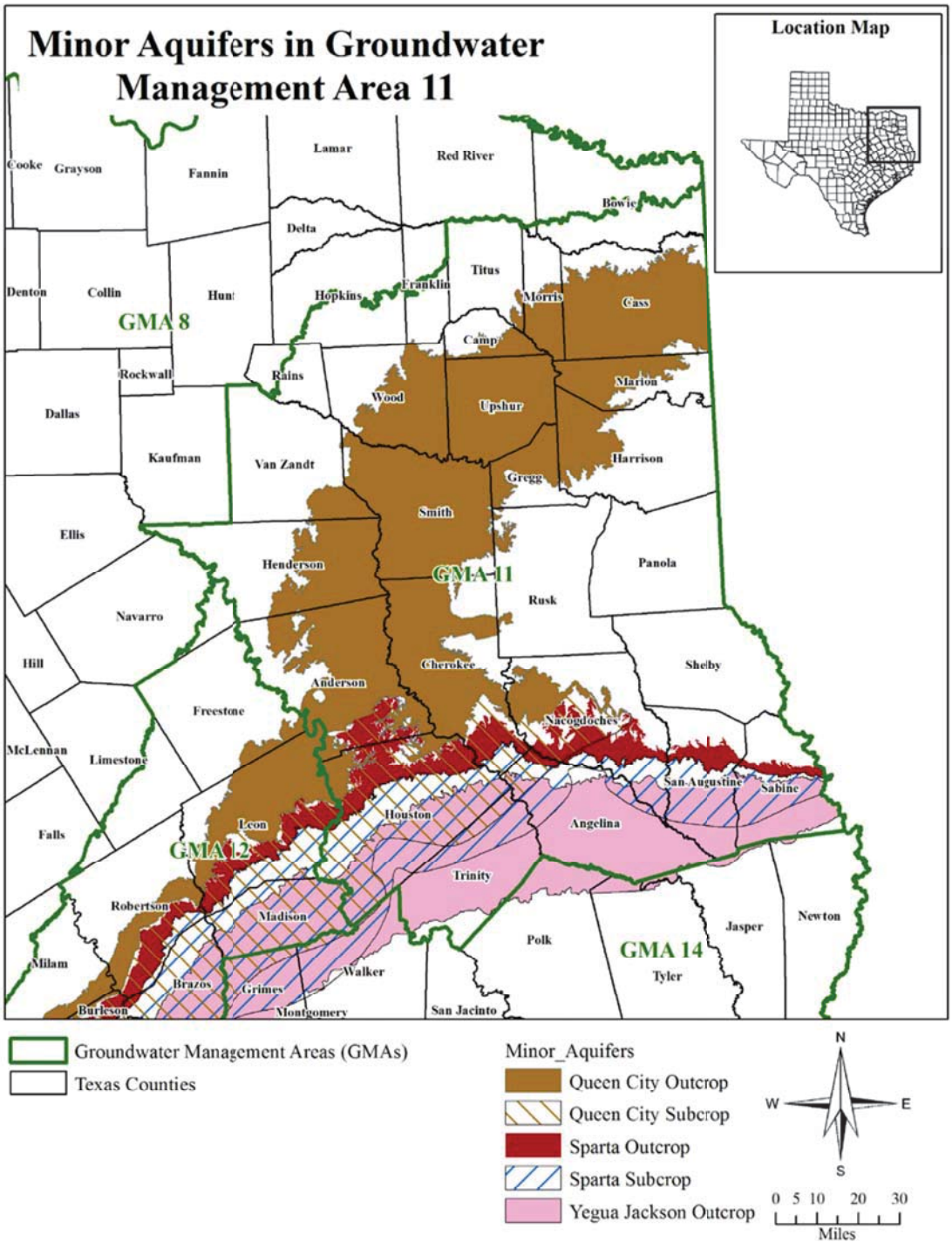



**FIGURE 2. MAP SHOWING THE BOUNDARIES OF THE QUEEN CITY, SPARTA, AND YEGUA-JACKSON AQUIFERS ACCORDING TO THE 2007 STATE WATER PLAN (TWDB, 2007).**

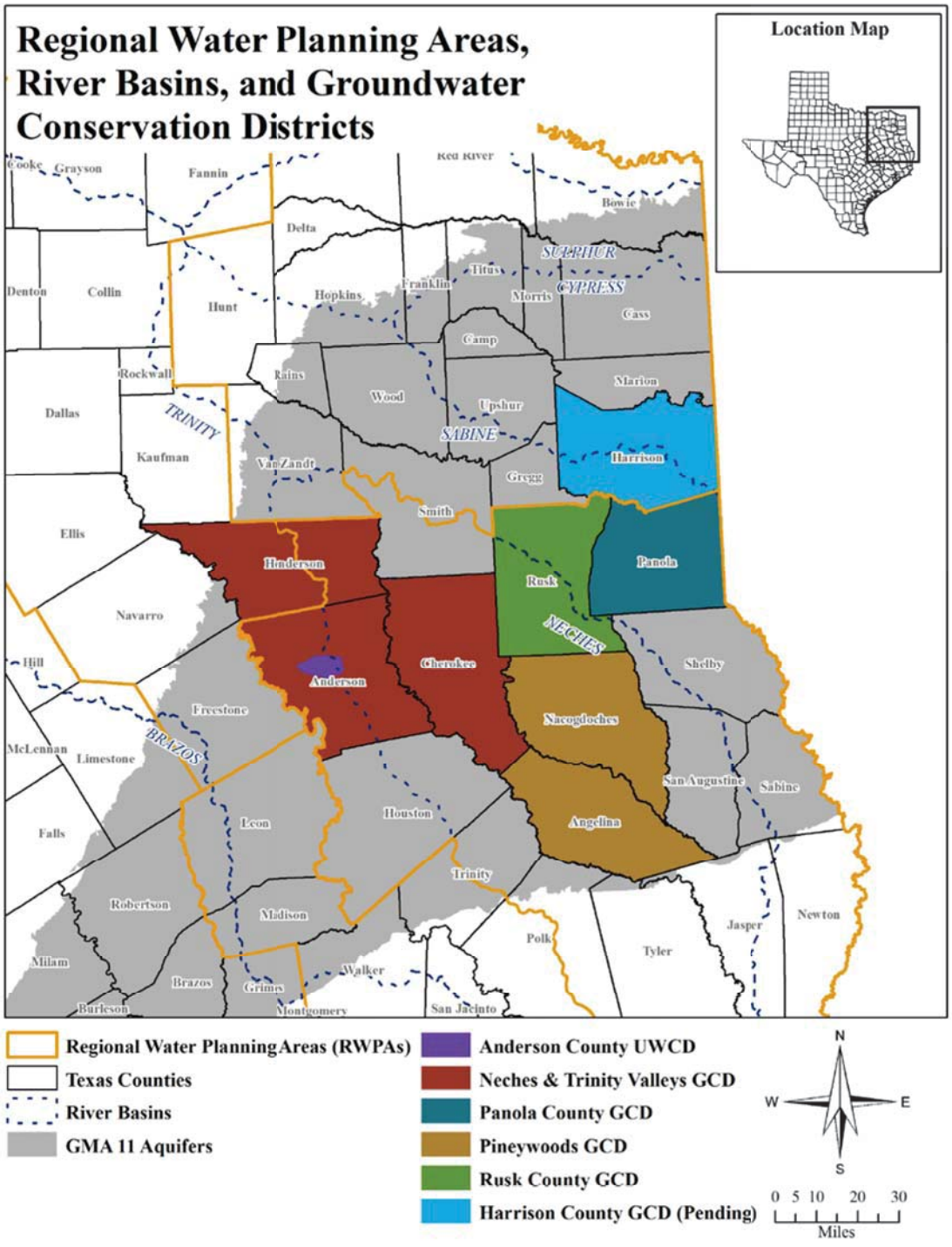



**FIGURE 3. MAP SHOWING REGIONAL WATER PLANNING AREAS, GROUNDWATER CONSERVATION DISTRICTS, COUNTIES, AND RIVER BASINS IN AND NEIGHBORING OF GROUNDWATER MANAGEMENT AREA 11.**

# *Appendix*

**TABLE A1. AVERAGE DRAWDOWN OVER THE 51-YEAR PREDICTIVE GROUNDWATER AVAILABILITY MODEL RUN IN GROUNDWATER MANAGEMENT AREA 11 FOR THE CARRIZO-WILCOX, QUEEN CITY, AND SPARTA AQUIFERS AND WECHES AND REKLAW CONFINING UNITS. ALL VALUES ARE IN FEET. "ANDERSON (ACUWCD)" REFERS TO THE ANDERSON COUNTY UNDERGROUND WATER CONSERVATION DISTRICT WITHIN ANDERSON COUNTY. "ANDERSON (NTVGCD)" REFERS TO THE PORTION OF NECHES AND TRINITY VALLEYS GROUNDWATER CONSERVATION DISTRICT IN ANDERSON COUNTY. NEGATIVE VALUES INDICATE A RISE IN WATER LEVELS.**

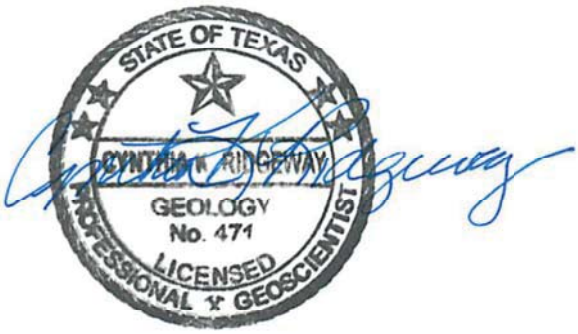
| County | Sparta | Weches (CU) | Queen City | Reklaw (CU) | Carrizo | Upper Wilcox | Middle Wilcox | Lower Wilcox | Overall |
|---|---|---|---|---|---|---|---|---|---|
| Anderson (ACUWCD) | | | 1 | 12 | 35 | 26 | 12 | 5 | 15 |
| Anderson (NTVGCD) | -2 | 1 | 7 | 15 | 36 | 26 | 11 | 4 | 16 |
| Angelina | 10 | 11 | 16 | 22 | 42 | 5 | -18 | -3 | 11 |
| Bowie | | | | | | 21 | 0 | 0 | 1 |
| Camp | | | 12 | 0 | 18 | 17 | 39 | 0 | 19 |
| Cass | | | 8 | 6 | 10 | 7 | 7 | 0 | 8 |
| Cherokee | 7 | 14 | 11 | 11 | 32 | 32 | 15 | 10 | 18 |
| Franklin | | | | -16 | -3 | 7 | 19 | 0 | 11 |
| Gregg | | | 7 | 11 | 42 | 49 | 56 | 79 | 35 |
| Harrison | | | 0 | 2 | 24 | 13 | 5 | 4 | 9 |
| Henderson | | | 4 | 15 | 41 | 32 | 27 | 15 | 23 |
| Hopkins | | | | -22 | -12 | -15 | -28 | 0 | -26 |
| Houston | 2 | 1 | 2 | 15 | 35 | 12 | 2 | -2 | 8 |
| Marion | | | 17 | 11 | 21 | 15 | 15 | 0 | 16 |
| Morris | | | 13 | 10 | 29 | 25 | 23 | 0 | 21 |
| Nacogdoches | 3 | 3 | 11 | 10 | 14 | 11 | -10 | -6 | 4 |
| Panola | | | -11 | -19 | 11 | 2 | 1 | 4 | 2 |
| Rains | | | | | | 7 | -10 | -5 | -8 |
| Rusk | 0 | -46 | -15 | -2 | 6 | 6 | 23 | 21 | 12 |
| Sabine | 5 | 5 | 7 | 15 | 24 | 13 | 6 | 5 | 10 |
| San Augustine | -4 | -4 | -3 | 11 | 20 | 9 | -3 | -2 | 3 |
| Shelby | | | -18 | -19 | 23 | -3 | 3 | 1 | 1 |
| Smith | -5 | -5 | 11 | 34 | 103 | 118 | 92 | 76 | 68 |
| Titus | | | -1 | -3 | 31 | 14 | 5 | 0 | 9 |
| Trinity | 5 | 4 | 4 | 12 | 33 | -3 | -7 | -1 | 6 |
| Upshur | -5 | -5 | 5 | 17 | 56 | 66 | 66 | 97 | 44 |
| Van Zandt | | | 7 | 11 | 31 | 13 | 17 | 11 | 14 |
| Wood | -5 | -7 | -2 | 36 | 110 | 83 | 55 | 114 | 59 |
| **Total** | **3** | **4** | **7** | **15** | **38** | **26** | **15** | **11** | **17** |

# GAM Run 10-038 MAG

**By Mohammad Masud Hassan, P.E.**

Edited and finalized by Shirley Wade to reflect statutory changes effective September 1, 2011

Texas Water Development Board
Groundwater Availability Modeling Section
(512) 936-0883
November 18, 2011




Cynthia K. Ridgeway, the Manager of the Groundwater Availability Modeling Section and Interim Director of the Groundwater Resources Division, is responsible for oversight of work performed by employees under her direct supervision. The seal appearing on this document was authorized by Cynthia K. Ridgeway, P.G. 471 on November 18, 2011.

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## EXECUTIVE SUMMARY:

The modeled available groundwater for the Gulf Coast Aquifer as a result of the desired future conditions adopted by the members of Groundwater Management Area 14 declines from approximately 978,000 acre-feet per year to 844,000 acre-feet per year between 2010 and 2060. This is shown divided by county, regional water planning area, and river basin in Table 2 for use in the regional water planning process. Modeled available groundwater is summarized by county, regional water planning area, river basin, and groundwater conservation district for each unit of the Gulf Coast Aquifer in tables 3 through 18. The estimates were extracted from Groundwater Availability Modeling Run 10-023, Scenario 3, which meets the desired future conditions adopted by Groundwater Management Area 14.

## REQUESTOR:

Mr. Lloyd Behm of the Bluebonnet Groundwater Conservation District on behalf of Groundwater Management Area 14

## DESCRIPTION OF REQUEST:

In a letter dated August 25, 2010, Mr. Lloyd Behm provided the Texas Water Development Board (TWDB) with the desired future conditions of the Gulf Coast Aquifer adopted by the members of Groundwater Management Area 14. As shown in Resolution No. 2010-01, the desired future conditions for the Gulf Coast Aquifer within Groundwater Management Area 14 were stated as average water-level declines (drawdowns) over a specified time period. The average drawdowns (in feet) specified as desired future conditions for Groundwater Management Area 14 are shown in Table 1.

Table 1: Desired future conditions (average drawdown in feet) for the Gulf Coast Aquifer in Groundwater Management Area 14. Negative values indicate a water level rise.

| County | Austin | Brazoria | Brazos | Chambers | Grimes | Hardin | Jasper | Jefferson | Liberty |
|---|---|---|---|---|---|---|---|---|---|
| **Duration (years)** | **52** | **52** | **52** | **52** | **52** | **52** | **52** | **52** | **52** |
| | **Base year 2008** | | | | | | | | |
| Chicot Aquifer | 17 | 45 | - | 43 | 0 | 17 | 10 | 25 | 32 |
| Evangeline Aquifer | 10 | 40 | - | 36 | 5 | 27 | 23 | 26 | 37 |
| Burkeville Confining Unit | 11 | - | - | - | 10 | 23 | 24 | - | 28 |
| Jasper Aquifer | 20 | - | 7 | - | 28 | 37 | 21 | - | 64 |

Table 1: Continued.

| County | Montgomery | | Newtown | Orange | Polk | San Jacinto | Tyler | Walker | Waller | Washington |
|---|---|---|---|---|---|---|---|---|---|---|
| **Duration (years)** | **8** | **44** | **52** | **52** | **52** | **52** | **52** | **52** | **52** | **52** |
| | **Base year 2008** | **Base year 2016** | **Base year 2008** | | | | | | | |
| Chicot Aquifer | 3 | 6 | 9 | 14 | 4 | 5 | 3 | - | 7 | - |
| Evangeline Aquifer | 13 | 25 | 20 | 19 | 4 | 7 | 16 | 10 | 8 | 1 |
| Burkeville Confining Unit | 10 | 23 | 22 | - | 20 | 18 | 19 | 5 | 9 | 17 |
| Jasper Aquifer | 61 | -38 | 18 | - | 41 | 72 | 33 | 33 | 25 | 20 |

In response to receiving the adopted desired future conditions, the Texas Water Development Board has estimated the modeled available groundwater in Groundwater Management Area 14. Since the desired future conditions were divided by unit within the Gulf Coast Aquifer (Chicot Aquifer, Evangeline Aquifer, Burkeville Confining Unit, and Jasper Aquifer), modeled available groundwater is presented separately for each unit.

## METHODS:

The Texas Water Development Board previously completed several predictive groundwater availability model simulations of the Gulf Coast Aquifer to assist the members of Groundwater Management Area 14 in developing desired future conditions. The location of Groundwater Management Area 14, the Gulf Coast Aquifer, and the groundwater availability model cells that represent the aquifer are shown in Figure 1. As described in Resolution No. 2010-01, the management area considered Scenario 3 of GAM Run 10-023 when developing desired future conditions for the Gulf Coast Aquifer (Oliver, 2010). Since each of the above desired future conditions is met in Scenario 3 of GAM Run 10-023, the estimated pumping for Groundwater Management Area 14 presented here was taken directly from that simulation. The pumping was then divided by county, regional water planning area, river basin, and groundwater conservation district (Figure 2).

## PARAMETERS AND ASSUMPTIONS:

The parameters and assumptions for the model run using the groundwater availability model for the northern portion of the Gulf Coast Aquifer are described below:

- The results presented in this report are based on Scenario 3 in GAM Run 10-023 (Oliver, 2010). See GAM Run 10-023 for a full description of the methods, assumptions, and results for the groundwater availability model run.

- We used version 2.01 of the groundwater availability model for the northern portion of the Gulf Coast Aquifer. See Kasmarek and Robinson (2004) and Kasmarek and others (2005) for assumptions and limitations of the model.

- The model includes four layers representing the Chicot Aquifer (Layer 1), the Evangeline Aquifer (Layer 2), the Burkeville Confining Unit (Layer 3), and the

Jasper Aquifer, which includes the more transmissive portions of the Catahoula Formation (Layer 4).

- Cells were assigned to individual counties, river basins, regional water planning areas, and groundwater conservation districts as shown in the August 12, 2010 version of the file that associates the model grid with political and natural boundaries for the Gulf Coast Aquifer.

**Modeled Available Groundwater and Permitting**

As defined in Chapter 36 of the Texas Water Code, "modeled available groundwater" is the estimated average amount of water that may be produced annually to achieve a desired future condition. This is distinct from "managed available groundwater," shown in the draft version of this report dated December 29, 2010, which was a permitting value and accounted for the estimated use of the aquifer exempt from permitting. This change was made to reflect changes in statute by the 82nd Texas Legislature, effective September 1, 2011.

Groundwater conservation districts are required to consider modeled available groundwater, along with several other factors, when issuing permits in order to manage groundwater production to achieve the desired future condition(s). The other factors districts must consider include annual precipitation and production patterns, the estimated amount of pumping exempt from permitting, existing permits, and a reasonable estimate of actual groundwater production under existing permits. The estimated amount of pumping exempt from permitting, which the Texas Water Development Board is now required to develop after soliciting input from applicable groundwater conservation districts, will be provided in a separate report.

**RESULTS:**

The modeled available groundwater for the Gulf Coast Aquifer in Groundwater Management Area 14 as a result of the desired future conditions declines from approximately 978,000 acre-feet per year in 2010 to 844,000 acre-feet per year in 2060. This has been divided by county, regional water planning area, and river basin for each decade between 2010 and 2060 for use in the regional water planning process (Table 2).

The modeled available groundwater for the four units of the Gulf Coast Aquifer is also summarized by county (tables 3 through 6), regional water planning area (tables 7 through 10), river basin (tables 11 through 14), and groundwater conservation district (tables 15 through 18). In tables 15 through 18, the modeled available groundwater both excluding and including areas outside of a groundwater conservation district is shown.

**LIMITATIONS:**

The groundwater model used in developing estimates of modeled available groundwater is the best available scientific tool that can be used to estimate the pumping that will achieve the desired future conditions. Although the groundwater model used in this analysis is the best available scientific tool for this purpose, it, like all models, has limitations. In reviewing the use of models in environmental regulatory decision-making, the National Research Council (2007) noted:

> "Models will always be constrained by computational limitations, assumptions, and knowledge gaps. They can best be viewed as tools to help inform decisions rather than as machines to generate truth or make decisions. Scientific advances will never make it possible to build a perfect model that accounts for every aspect of reality or to prove that a given model is correct in all respects for a particular regulatory application. These characteristics make evaluation of a regulatory model more complex than solely a comparison of measurement data with model results."

A key aspect of using the groundwater model to develop estimates of modeled available groundwater is the need to make assumptions about the location in the aquifer where future pumping will occur. As actual pumping changes in the future, it will be necessary to evaluate the amount of that pumping as well as its location in the context of the assumptions associated with this analysis. Evaluating the amount and location of future pumping is as important as evaluating the changes in groundwater levels, spring flows, and other metrics that describe the condition of the groundwater resources in the area that relate to the adopted desired future condition(s).

Given these limitations, users of this information are cautioned that the modeled available groundwater numbers should not be considered a definitive, permanent description of the amount of groundwater that can be pumped to meet the adopted desired future condition. Because the application of the groundwater model was designed to address regional scale questions, the results are most effective on a regional scale. The TWDB makes no warranties or representations relating to the actual conditions of any aquifer at a particular location or at a particular time.

It is important for groundwater conservation districts to monitor future groundwater pumping as well as whether or not they are achieving their desired future conditions. Because of the limitations of the model and the assumptions in this analysis, it is important that the groundwater conservation districts work with the TWDB to refine the modeled available groundwater numbers given the reality of how the aquifer responds to the actual amount and location of pumping now and in the future.

## REFERENCES:

Oliver, W., 2010, GAM Run 10-023: Texas Water Development Board, GAM Run 10-023 Report, 32 p.

Kasmarek, M.C., and Robinson, J.L., 2004, Hydrogeology and simulation of groundwater flow and land-surface subsidence in the northern part of the Gulf Coast aquifer system, Texas: U.S. Geological Survey Scientific Investigations Report 2004-5102, 111 p.

Kasmarek, M.C., Reece, B.D., and Houston, N.A., 2005, Evaluation of groundwater flow and land-surface subsidence caused by hypothetical withdrawals in the northern part of the northern part of the Gulf Coast aquifer system, Texas: U.S. Geological Survey Scientific Investigations Report 2005-5024, 70 p.

National Research Council, 2007, Models in Environmental Regulatory Decision Making. Committee on Models in the Regulatory Decision Process, National Academies Press, Washington D.C., 287 p.

Texas Water Development Board, 2007, Water for Texas – 2007-Volumes I-III; Texas Water Development Board Document No. GP-8-1, 392 p.

Table 2: Modeled available groundwater for the Gulf Coast Aquifer in Groundwater Management Area 14. Results are in acre-feet per year and are divided by county, regional water planning area, and river basin.

| County | Regional Water Planning Area | River Basin | Year | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Austin | H | Brazos | 6,585 | 6,585 | 6,585 | 6,585 | 6,585 | 6,585 |
| | | Brazos-Colorado | 15,608 | 15,608 | 15,608 | 15,608 | 15,608 | 15,608 |
| | | Colorado | 121 | 121 | 121 | 121 | 121 | 121 |
| Brazoria | H | Brazos | 6,658 | 6,658 | 6,658 | 6,658 | 6,658 | 6,658 |
| | | Brazos-Colorado | 11,648 | 11,648 | 11,648 | 11,648 | 11,648 | 11,648 |
| | | San Jacinto-Brazos | 32,090 | 32,090 | 32,090 | 32,090 | 32,090 | 32,090 |
| Brazos | G | Brazos | 1,189 | 1,189 | 1,189 | 1,189 | 1,189 | 1,189 |
| Chambers | H | Neches-Trinity | 9,527 | 9,527 | 9,527 | 9,527 | 9,527 | 9,527 |
| | | San Jacinto-Brazos | 0 | 0 | 0 | 0 | 0 | 0 |
| | | Trinity | 10,112 | 10,112 | 10,112 | 10,112 | 10,112 | 10,112 |
| | | Trinity-San Jacinto | 2,068 | 2,068 | 2,068 | 2,068 | 2,068 | 2,068 |
| Fort Bend | H | Brazos | 60,217 | 52,923 | 43,673 | 43,189 | 42,862 | 42,953 |
| | | Brazos-Colorado | 20,633 | 22,023 | 18,095 | 17,715 | 17,043 | 17,077 |
| | | San Jacinto | 9,723 | 9,524 | 9,043 | 8,809 | 8,642 | 8,650 |
| | | San Jacinto-Brazos | 23,356 | 24,235 | 21,265 | 22,457 | 23,765 | 23,810 |
| Galveston | H | Neches-Trinity | 0 | 0 | 0 | 0 | 0 | 0 |
| | | San Jacinto-Brazos | 4,774 | 5,257 | 5,867 | 5,841 | 5,814 | 5,815 |
| | | Trinity-San Jacinto | 0 | 0 | 0 | 0 | 0 | 0 |
| Grimes | G | Brazos | 10,889 | 10,889 | 10,889 | 10,889 | 10,889 | 10,889 |
| | | San Jacinto | 2,197 | 2,197 | 2,197 | 2,197 | 2,197 | 2,197 |
| | | Trinity | 764 | 764 | 223 | | | |
| Hardin | I | Neches | 34,821 | 34,821 | 34,821 | 34,821 | 34,821 | 34,821 |
| | | Trinity | 138 | 138 | 138 | 138 | 138 | 138 |
| Harris | H | San Jacinto | 293,855 | 249,851 | 197,553 | 197,326 | 196,992 | 197,270 |
| | | San Jacinto-Brazos | 4,801 | 7,202 | 6,798 | 7,563 | 8,428 | 8,440 |
| | | Trinity-San Jacinto | 6,894 | 5,893 | 5,026 | 5,141 | 5,259 | 5,266 |
| Jasper | I | Neches | 37,659 | 37,620 | 37,541 | 37,541 | 37,541 | 37,541 |
| | | Sabine | 29,953 | 29,953 | 29,953 | 29,953 | 29,953 | 29,953 |
| Jefferson | I | Neches | 804 | 804 | 804 | 804 | 804 | 804 |
| | | Neches-Trinity | 1,641 | 1,641 | 1,641 | 1,641 | 1,641 | 1,641 |
| Liberty | H | Neches | 5,074 | 5,074 | 5,074 | 5,074 | 5,074 | 5,074 |
| | | Neches-Trinity | 364 | 364 | 364 | 364 | 364 | 364 |
| | | San Jacinto | 5,852 | 5,852 | 5,852 | 5,852 | 5,852 | 5,852 |
| | | Trinity | 22,887 | 22,887 | 22,887 | 22,887 | 22,887 | 22,887 |
| | | Trinity-San Jacinto | 8,856 | 8,856 | 8,855 | 8,856 | 8,856 | 8,856 |

Table 2: Continued.

| County | Regional Water Planning Area | River Basin | Year | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Montgomery | H | San Jacinto | 73,264 | 61,629 | 61,629 | 61,629 | 61,629 | 61,629 |
| Newton | I | Neches | 176 | 176 | 176 | 176 | 176 | 176 |
| | | Sabine | 34,001 | 34,001 | 33,963 | 33,963 | 33,963 | 33,963 |
| Orange | I | Neches | 3,925 | 3,925 | 3,925 | 3,925 | 3,925 | 3,925 |
| | | Neches-Trinity | 256 | 256 | 256 | 256 | 256 | 256 |
| | | Sabine | 15,832 | 15,832 | 15,832 | 15,832 | 15,832 | 15,832 |
| Polk | H | Trinity | 21,830 | 21,830 | 21,830 | 21,783 | 21,783 | 21,783 |
| | | Neches | 14,912 | 11,886 | 11,885 | 11,886 | 11,276 | 11,224 |
| San Jacinto | H | San Jacinto | 10,368 | 10,368 | 10,368 | 10,368 | 10,368 | 10,368 |
| | | Trinity | 10,611 | 8,811 | 8,811 | 8,811 | 8,811 | 8,811 |
| Tyler | I | Neches | 38,199 | 38,199 | 38,156 | 38,156 | 38,156 | 38,156 |
| Walker | H | San Jacinto | 9,139 | 9,116 | 9,116 | 9,116 | 9,116 | 9,116 |
| | | Trinity | 8,873 | 8,873 | 8,873 | 8,797 | 8,797 | 8,797 |
| Waller | H | Brazos | 14,933 | 14,933 | 14,933 | 14,933 | 14,933 | 14,933 |
| | | San Jacinto | 26,694 | 26,694 | 26,694 | 26,694 | 26,694 | 26,694 |
| Washington | G | Brazos | 12,972 | 12,972 | 12,972 | 12,604 | 12,604 | 12,604 |
| | | Colorado | 73 | 73 | 73 | 73 | 73 | 73 |
| **Total** | | | **977,816** | **913,948** | **843,660** | **843,666** | **843,820** | **844,244** |

Table 3: Modeled available groundwater for the Chicot Aquifer portion of the Gulf Coast Aquifer summarized by county in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

| County | Year | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Austin | 1,300 | 1,300 | 1,300 | 1,300 | 1,300 | 1,300 |
| Brazoria | 48,125 | 48,125 | 48,125 | 48,125 | 48,125 | 48,125 |
| Chambers | 21,328 | 21,328 | 21,328 | 21,328 | 21,328 | 21,328 |
| Fort Bend | 83,006 | 75,916 | 61,657 | 61,004 | 60,061 | 60,177 |
| Galveston | 4,303 | 4,697 | 5,233 | 5,194 | 5,152 | 5,153 |
| Grimes | 0 | 0 | 0 | 0 | 0 | 0 |
| Hardin | 1,263 | 1,263 | 1,263 | 1,263 | 1,263 | 1,263 |
| Harris | 70,219 | 68,839 | 56,850 | 58,641 | 61,185 | 61,272 |
| Jasper | 10,835 | 10,835 | 10,835 | 10,835 | 10,835 | 10,835 |
| Jefferson | 2,345 | 2,345 | 2,345 | 2,345 | 2,345 | 2,345 |
| Liberty | 14,576 | 14,576 | 14,576 | 14,576 | 14,576 | 14,576 |
| Montgomery | 1,482 | 1,722 | 1,722 | 1,722 | 1,722 | 1,722 |
| Newton | 501 | 501 | 501 | 501 | 501 | 501 |
| Orange | 18,809 | 18,809 | 18,809 | 18,809 | 18,809 | 18,809 |
| Polk | 0 | 0 | 0 | 0 | 0 | 0 |
| San Jacinto | 0 | 0 | 0 | 0 | 0 | 0 |
| Tyler | 0 | 0 | 0 | 0 | 0 | 0 |
| Walker | 0 | 0 | 0 | 0 | 0 | 0 |
| Waller | 300 | 300 | 300 | 300 | 300 | 300 |
| **Total** | **278,392** | **270,556** | **244,844** | **245,943** | **247,502** | **247,706** |

Table 4: Modeled available groundwater for the Evangeline Aquifer portion of the Gulf Coast Aquifer summarized by county in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

| County | Year | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Austin | 20,013 | 20,013 | 20,013 | 20,013 | 20,013 | 20,013 |
| Brazoria | 2,271 | 2,271 | 2,271 | 2,271 | 2,271 | 2,271 |
| Chambers | 379 | 379 | 379 | 379 | 379 | 379 |
| Fort Bend | 30,923 | 32,789 | 30,420 | 31,166 | 32,251 | 32,313 |
| Galveston | 471 | 560 | 634 | 647 | 662 | 662 |
| Grimes | 3,002 | 3,002 | 3,002 | 3,002 | 3,002 | 3,002 |
| Hardin | 33,696 | 33,696 | 33,696 | 33,696 | 33,696 | 33,696 |
| Harris | 234,977 | 193,759 | 152,256 | 151,126 | 149,225 | 149,435 |
| Jasper | 40,755 | 40,755 | 40,755 | 40,755 | 40,755 | 40,755 |
| Jefferson | 100 | 100 | 100 | 100 | 100 | 100 |
| Liberty | 27,669 | 27,669 | 27,669 | 27,669 | 27,669 | 27,669 |
| Montgomery | 39,381 | 38,293 | 38,293 | 38,293 | 38,293 | 38,293 |
| Newton | 21,288 | 21,288 | 21,288 | 21,288 | 21,288 | 21,288 |
| Orange | 1,204 | 1,204 | 1,204 | 1,204 | 1,204 | 1,204 |
| Polk | 8,311 | 8,311 | 8,311 | 8,311 | 8,311 | 8,311 |
| San Jacinto | 8,178 | 8,178 | 8,178 | 8,178 | 8,178 | 8,178 |
| Tyler | 20,592 | 20,592 | 20,592 | 20,592 | 20,592 | 20,592 |
| Walker | 2,001 | 2,001 | 2,001 | 2,001 | 2,001 | 2,001 |
| Waller | 41,027 | 41,027 | 41,027 | 41,027 | 41,027 | 41,027 |
| Washington | 3,239 | 3,239 | 3,239 | 3,239 | 3,239 | 3,239 |
| **Total** | **539,477** | **499,126** | **455,328** | **454,957** | **454,156** | **454,428** |

Table 5: Modeled available groundwater for the Burkeville Confining Unit portion of the Gulf Coast Aquifer summarized by county in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

| County | Year | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Austin | 0 | 0 | 0 | 0 | 0 | 0 |
| Fort Bend | 0 | 0 | 0 | 0 | 0 | 0 |
| Grimes | 0 | 0 | 0 | 0 | 0 | 0 |
| Hardin | 0 | 0 | 0 | 0 | 0 | 0 |
| Harris | 335 | 329 | 256 | 249 | 254 | 254 |
| Jasper | 1 | 1 | 1 | 1 | 1 | 1 |
| Liberty | 0 | 0 | 0 | 0 | 0 | 0 |
| Montgomery | 0 | 0 | 0 | 0 | 0 | 0 |
| Newton | 0 | 0 | 0 | 0 | 0 | 0 |
| Polk | 744 | 744 | 744 | 744 | 744 | 744 |
| San Jacinto | 2,699 | 899 | 899 | 899 | 899 | 899 |
| Tyler | 1 | 1 | 1 | 1 | 1 | 1 |
| Walker | 0 | 0 | 0 | 0 | 0 | 0 |
| Waller | 0 | 0 | 0 | 0 | 0 | 0 |
| Washington | 368 | 368 | 368 | 0 | 0 | 0 |
| **Total** | **4,148** | **2,342** | **2,269** | **1,894** | **1,899** | **1,899** |

Table 6: Modeled available groundwater for the Jasper Aquifer portion of the Gulf Coast Aquifer summarized by county in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

| County | Year | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Austin | 1,001 | 1,001 | 1,001 | 1,001 | 1,001 | 1,001 |
| Brazos | 1,189 | 1,189 | 1,189 | 1,189 | 1,189 | 1,189 |
| Fort Bend | 0 | 0 | 0 | 0 | 0 | 0 |
| Grimes | 10,848 | 10,848 | 10,307 | 10,084 | 10,084 | 10,084 |
| Hardin | 0 | 0 | 0 | 0 | 0 | 0 |
| Harris | 19 | 19 | 15 | 14 | 15 | 15 |
| Jasper | 16,021 | 15,982 | 15,903 | 15,903 | 15,903 | 15,903 |
| Liberty | 788 | 788 | 788 | 788 | 788 | 788 |
| Montgomery | 32,401 | 21,614 | 21,614 | 21,614 | 21,614 | 21,614 |
| Newton | 12,388 | 12,388 | 12,350 | 12,350 | 12,350 | 12,350 |
| Polk | 27,687 | 24,661 | 24,661 | 24,614 | 24,004 | 23,952 |
| San Jacinto | 10,102 | 10,102 | 10,102 | 10,102 | 10,102 | 10,102 |
| Tyler | 17,606 | 17,606 | 17,563 | 17,563 | 17,563 | 17,563 |
| Walker | 16,011 | 15,988 | 15,988 | 15,912 | 15,912 | 15,912 |
| Waller | 300 | 300 | 300 | 300 | 300 | 300 |
| Washington | 9,438 | 9,438 | 9,438 | 9,438 | 9,438 | 9,438 |
| **Total** | **155,799** | **141,924** | **141,219** | **140,872** | **140,263** | **140,211** |

Table 7: Modeled available groundwater for the Chicot Aquifer portion of the Gulf Coast Aquifer summarized by regional water planning area in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

| Regional Water Planning Area | Year | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| G | 0 | 0 | 0 | 0 | 0 | 0 |
| H | 244,639 | 236,803 | 211,091 | 212,190 | 213,749 | 213,953 |
| I | 33,753 | 33,753 | 33,753 | 33,753 | 33,753 | 33,753 |
| **Total** | **278,392** | **270,556** | **244,844** | **245,943** | **247,502** | **247,706** |

Table 8: Modeled available groundwater for the Evangeline Aquifer portion of the Gulf Coast Aquifer, summarized by regional water planning area in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

| Regional Water Planning Area | Year | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| G | 6,241 | 6,241 | 6,241 | 6,241 | 6,241 | 6,241 |
| H | 412,014 | 371,663 | 327,865 | 327,494 | 326,693 | 326,965 |
| I | 121,222 | 121,222 | 121,222 | 121,222 | 121,222 | 121,222 |
| **Total** | **539,477** | **499,126** | **455,328** | **454,957** | **454,156** | **454,428** |

Table 9: Modeled available groundwater for the Burkeville Confining Unit portion of the Gulf Coast Aquifer summarized by regional water planning area in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

| Regional Water Planning Area | Year | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| G | 368 | 368 | 368 | 0 | 0 | 0 |
| H | 3,660 | 1,854 | 1,781 | 1,774 | 1,779 | 1,779 |
| I | 120 | 120 | 120 | 120 | 120 | 120 |
| **Total** | **4,148** | **2,342** | **2,269** | **1,894** | **1,899** | **1,899** |

Table 10: Modeled available groundwater for the Jasper Aquifer portion of the Gulf Coast Aquifer, summarized by regional water planning area in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

| Regional Water Planning Area | Year | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| G | 21,475 | 21,475 | 20,934 | 20,711 | 20,711 | 20,711 |
| H | 77,102 | 66,292 | 66,288 | 66,164 | 66,165 | 66,165 |
| I | 57,222 | 54,157 | 53,997 | 53,997 | 53,387 | 53,335 |
| **Total** | **155,799** | **141,924** | **141,219** | **140,872** | **140,263** | **140,211** |

Table 11: Modeled available groundwater for the Chicot Aquifer portion of the Gulf Coast Aquifer, summarized by river basin in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

| River Basin | Year | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Brazos | 56,046 | 48,386 | 40,433 | 39,803 | 39,240 | 39,305 |
| Brazos-Colorado | 33,286 | 34,676 | 30,748 | 30,368 | 29,696 | 29,730 |
| Colorado | 0 | 0 | 0 | 0 | 0 | 0 |
| Neches | 15,293 | 15,293 | 15,293 | 15,293 | 15,293 | 15,293 |
| Neches-Trinity | 11,751 | 11,751 | 11,751 | 11,751 | 11,751 | 11,751 |
| Sabine | 19,368 | 19,368 | 19,368 | 19,368 | 19,368 | 19,368 |
| San Jacinto | 66,403 | 63,365 | 51,927 | 52,931 | 54,591 | 54,665 |
| San Jacinto-Brazos | 50,045 | 51,558 | 49,627 | 50,634 | 51,578 | 51,604 |
| Trinity | 17,646 | 17,646 | 17,646 | 17,646 | 17,646 | 17,646 |
| Trinity-San Jacinto | 8,554 | 8,513 | 8,051 | 8,149 | 8,339 | 8,344 |
| **Total** | **278,392** | **270,556** | **244,844** | **245,943** | **247,502** | **247,706** |

Table 12: Modeled available groundwater for the Evangeline Aquifer portion of the Gulf Coast Aquifer, summarized by river basin in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

| River Basin | Year | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Brazos | 36,717 | 37,083 | 35,786 | 35,932 | 36,168 | 36,194 |
| Brazos-Colorado | 14,527 | 14,527 | 14,527 | 14,527 | 14,527 | 14,527 |
| Colorado | 23 | 23 | 23 | 23 | 23 | 23 |
| Neches | 78,653 | 78,653 | 78,653 | 78,653 | 78,653 | 78,653 |
| Neches-Trinity | 37 | 37 | 37 | 37 | 37 | 37 |
| Sabine | 44,700 | 44,700 | 44,700 | 44,700 | 44,700 | 44,700 |
| San Jacinto | 317,937 | 275,930 | 234,666 | 233,209 | 231,042 | 231,254 |
| San Jacinto-Brazos | 14,976 | 17,226 | 16,394 | 17,317 | 18,519 | 18,551 |
| Trinity | 22,643 | 22,643 | 22,643 | 22,643 | 22,643 | 22,643 |
| Trinity-San Jacinto | 9,264 | 8,304 | 7,899 | 7,916 | 7,844 | 7,846 |
| **Total** | **539,477** | **499,126** | **455,328** | **454,957** | **454,156** | **454,428** |

Table 13: Modeled available groundwater for the Burkeville Confining Unit portion of the Gulf Coast Aquifer, summarized by river basin in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

| River Basin | Year | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Brazos | 368 | 368 | 368 | 0 | 0 | 0 |
| Brazos-Colorado | 0 | 0 | 0 | 0 | 0 | 0 |
| Colorado | 0 | 0 | 0 | 0 | 0 | 0 |
| Neches | 119 | 119 | 119 | 119 | 119 | 119 |
| Sabine | 1 | 1 | 1 | 1 | 1 | 1 |
| San Jacinto | 335 | 329 | 256 | 249 | 254 | 254 |
| San Jacinto-Brazos | 0 | 0 | 0 | 0 | 0 | 0 |
| Trinity | 3,325 | 1,525 | 1,525 | 1,525 | 1,525 | 1,525 |
| Trinity-San Jacinto | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **4,148** | **2,342** | **2,269** | **1,894** | **1,899** | **1,899** |

Table 14: Modeled available groundwater for the Jasper Aquifer portion of the Gulf Coast Aquifer, summarized by river basin in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

| River Basin | Year | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Brazos | 20,312 | 20,312 | 20,312 | 20,312 | 20,312 | 20,312 |
| Brazos-Colorado | 76 | 76 | 76 | 76 | 76 | 76 |
| Colorado | 171 | 171 | 171 | 171 | 171 | 171 |
| Neches | 41,505 | 38,440 | 38,318 | 38,318 | 37,708 | 37,656 |
| Sabine | 15,717 | 15,717 | 15,679 | 15,679 | 15,679 | 15,679 |
| San Jacinto | 46,417 | 35,607 | 35,603 | 35,602 | 35,603 | 35,603 |
| San Jacinto-Brazos | 0 | 0 | 0 | 0 | 0 | 0 |
| Trinity | 31,601 | 31,601 | 31,060 | 30,714 | 30,714 | 30,714 |
| Trinity-San Jacinto | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **155,799** | **141,924** | **141,219** | **140,872** | **140,263** | **140,211** |

Table 15: Modeled available groundwater for the Chicot Aquifer portion of the Gulf Coast Aquifer, summarized by groundwater conservation district (GCD) in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

| Groundwater Conservation District | Year | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Bluebonnet GCD | 1,600 | 1,600 | 1,600 | 1,600 | 1,600 | 1,600 |
| Brazoria County GCD | 48,125 | 48,125 | 48,125 | 48,125 | 48,125 | 48,125 |
| Brazos Valley GCD | 0 | 0 | 0 | 0 | 0 | 0 |
| Lone Star GCD | 1,482 | 1,722 | 1,722 | 1,722 | 1,722 | 1,722 |
| Lower Trinity GCD | 0 | 0 | 0 | 0 | 0 | 0 |
| Southeast Texas GCD | 12,599 | 12,599 | 12,599 | 12,599 | 12,599 | 12,599 |
| **Total (groundwater conservation districts)** | **63,806** | **64,046** | **64,046** | **64,046** | **64,046** | **64,046** |
| Fort Bend Subsidence District | 83,006 | 75,916 | 61,657 | 61,004 | 60,061 | 60,177 |
| Harris-Galveston Coastal Subsidence District | 74,522 | 73,536 | 62,083 | 63,835 | 66,337 | 66,425 |
| No District | 57,058 | 57,058 | 57,058 | 57,058 | 57,058 | 57,058 |
| **Total (all areas)** | **278,392** | **270,556** | **244,844** | **245,943** | **247,502** | **247,706** |

Table 16: Modeled available groundwater forthe Evangeline Aquifer portion of the Gulf Coast Aquifer, summarized by groundwater conservation district (GCD) in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

| Groundwater Conservation District | Year | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Bluebonnet GCD | 66,043 | 66,043 | 66,043 | 66,043 | 66,043 | 66,043 |
| Brazoria County GCD | 2,271 | 2,271 | 2,271 | 2,271 | 2,271 | 2,271 |
| Brazos Valley GCD | 0 | 0 | 0 | 0 | 0 | 0 |
| Lone Star GCD | 39,381 | 38,293 | 38,293 | 38,293 | 38,293 | 38,293 |
| Lower Trinity GCD | 16,489 | 16,489 | 16,489 | 16,489 | 16,489 | 16,489 |
| Southeast Texas GCD | 116,331 | 116,331 | 116,331 | 116,331 | 116,331 | 116,331 |
| **Total (groundwater conservation districts)** | **240,515** | **239,427** | **239,427** | **239,427** | **239,427** | **239,427** |
| Fort Bend Subsidence District | 30,923 | 32,789 | 30,420 | 31,166 | 32,251 | 32,313 |
| Harris-Galveston Coastal Subsidence District | 235,448 | 194,319 | 152,890 | 151,773 | 149,887 | 150,097 |
| No District | 32,591 | 32,591 | 32,591 | 32,591 | 32,591 | 32,591 |
| **Total (all areas)** | **539,477** | **499,126** | **455,328** | **454,957** | **454,156** | **454,428** |

Table 17: Modeled available groundwater for the Burkeville Confining Unit portion of the Gulf Coast Aquifer, summarized by groundwater conservation district (GCD) in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

| Groundwater Conservation District | Year | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Bluebonnet GCD | 0 | 0 | 0 | 0 | 0 | 0 |
| Brazoria County GCD | 0 | 0 | 0 | 0 | 0 | 0 |
| Brazos Valley GCD | 0 | 0 | 0 | 0 | 0 | 0 |
| Lone Star GCD | 0 | 0 | 0 | 0 | 0 | 0 |
| Lower Trinity GCD | 3,443 | 1,643 | 1,643 | 1,643 | 1,643 | 1,643 |
| Southeast Texas GCD | 2 | 2 | 2 | 2 | 2 | 2 |
| **Total (groundwater conservation districts)** | **3,445** | **1,645** | **1,645** | **1,645** | **1,645** | **1,645** |
| Fort Bend Subsidence District | 0 | 0 | 0 | 0 | 0 | 0 |
| Harris-Galveston Coastal Subsidence District | 335 | 329 | 256 | 249 | 254 | 254 |
| No District | 368 | 368 | 368 | 0 | 0 | 0 |
| **Total (all areas)** | **4,148** | **2,342** | **2,269** | **1,894** | **1,899** | **1,899** |

Table 18: Modeled available groundwater for the Jasper Aquifer portion of the Gulf Coast Aquifer, summarized by groundwater conservation district (GCD) in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

| Groundwater Conservation District | Year | | | | | |
|---|---|---|---|---|---|---|
| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Bluebonnet GCD | 28,160 | 28,137 | 27,596 | 27,297 | 27,297 | 27,297 |
| Brazoria County GCD | 0 | 0 | 0 | 0 | 0 | 0 |
| Brazos Valley GCD | 1,189 | 1,189 | 1,189 | 1,189 | 1,189 | 1,189 |
| Lone Star GCD | 32,401 | 21,614 | 21,614 | 21,614 | 21,614 | 21,614 |
| Lower Trinity GCD | 37,789 | 34,763 | 34,763 | 34,716 | 34,106 | 34,054 |
| Southeast Texas GCD | 46,015 | 45,976 | 45,816 | 45,816 | 45,816 | 45,816 |
| **Total (groundwater conservation districts)** | **145,554** | **131,679** | **130,978** | **130,632** | **130,022** | **129,970** |
| Fort Bend Subsidence District | **0** | **0** | **0** | **0** | **0** | **0** |
| Harris-Galveston Coastal Subsidence District | **19** | **19** | **15** | **14** | **15** | **15** |
| No District | 10,226 | 10,226 | 10,226 | 10,226 | 10,226 | 10,226 |
| **Total (all areas)** | **155,799** | **141,924** | **141,219** | **140,872** | **140,263** | **140,211** |

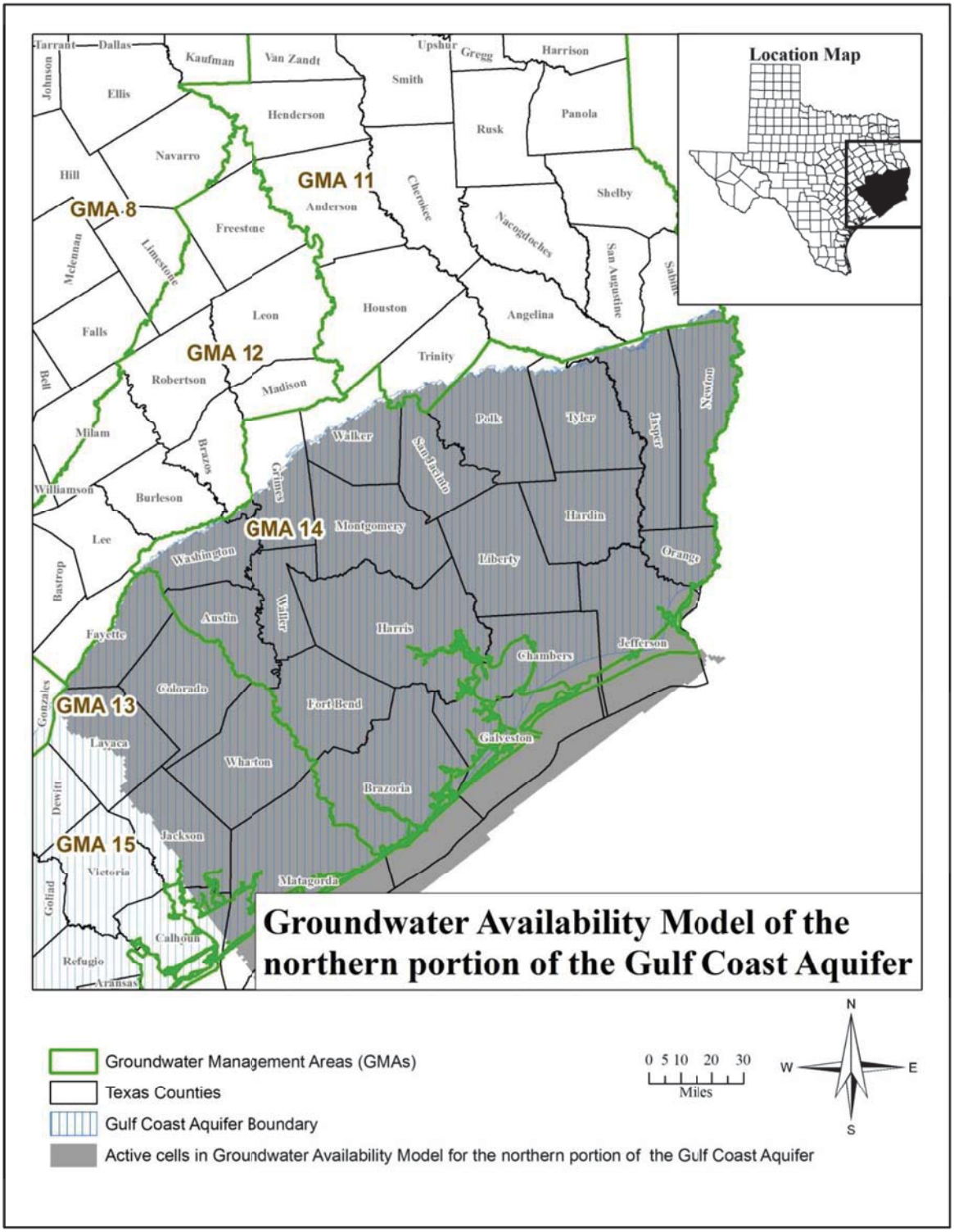


Figure 1: Map showing the areas covered by the groundwater availability model for the northern portion of the Gulf Coast Aquifer.

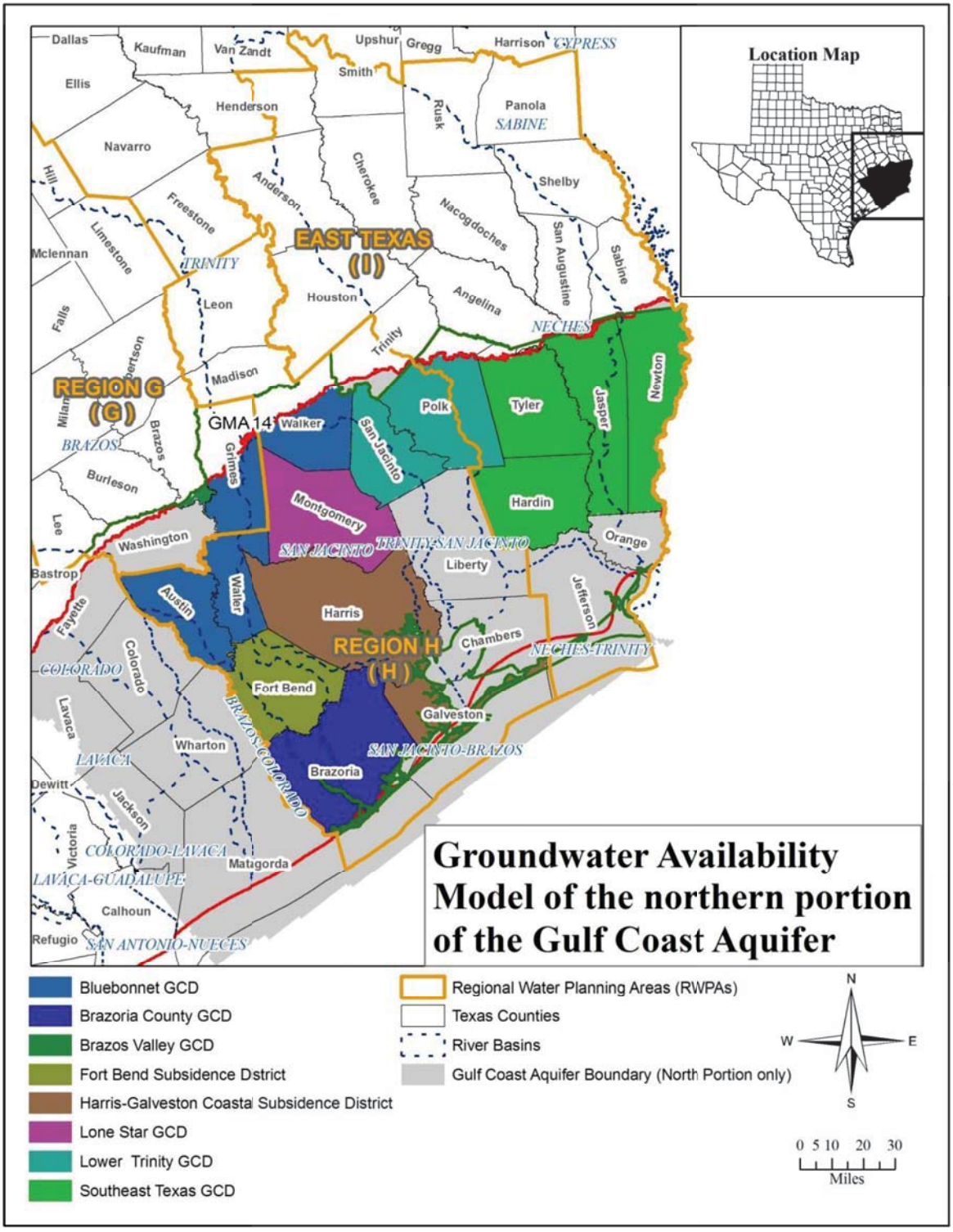


Figure 2: Map showing regional water planning areas (RWPAs), groundwater conservation districts (GCDs), subsidence districts, counties, and river basins in Groundwater Management Area 14.

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# Appendix 3-D

# Water Availability Model Technical Memorandum

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The memorandum included as attachment 3-D describes the method used to determine available supplies from the Neches River for the City of Beaumont for regional water planning. Water availability modeling was used to analyze the supply from the Neches run-of-river and the natural flows of the Neches River.

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# MEMORANDUM

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**TO:** File

**CC:** Simone Kiel

**FROM:** Jon Albright

**SUBJECT:** Beaumont Supplies from Neches River

**DATE:** November 21, 2013

**PROJECT:** Region I PLU12102

---

**Summary**

1. This memorandum describes the method used to determine available supplies from the Neches River for the City of Beaumont for regional water planning. The method is based on a daily analysis of flows in 1956 made by Tom Gooch of Freese and Nichols as part of the negotiations between the City of Beaumont and the Lower Neches Valley Authority (LNVA) in 2011. The 2011 analysis was provided to the TCEQ in response to a priority call by the LNVA. A comparison of results using the Neches WAM is part of the analysis.

2. The calculations for the available supply to Beaumont for regional water planning are preliminary. These calculations will be refined once the City of Beaumont and LNVA demands have been finalized.

3. The City of Beaumont owns Certificate of Adjudication (CA) 06-4415, which authorizes 56,467 acre-feet per year of diversion from the Neches River. The City also has supplies of 9,000 acre-feet per year from the Gulf Coast aquifer and a contract with the Lower Neches Valley Authority (LNVA) for 6,000 acre-feet of water from the Neches River and the Steinhagen/Rayburn system.

4. Table 1 compares the available supplies to preliminary demands for the City of Beaumont for the years 2020 and 2070. Table 1a uses supplies from the Neches WAM Run 3 for 1956, the year with the minimum supply available under the City of Beaumont's water rights. Table 1b shows the same analysis using the results of the daily analysis. Note that the daily analysis shows greater shortages than the WAM analysis.

5. In order to properly calculate the need in the database, Beaumont's supply from the Neches River will need to change from year to year. For example, instead of the maximum supply of 22,234 acre-feet per year, the year 2020 Neches River supply will be 15,934 acre-feet per year and the 2070 Neches River supply will be 21,588 acre-feet per year. This is necessary because the analysis uses a shorter time step (monthly) than the database (yearly).

**Table 1a: 2020 and 2070 Supply and Demand – Worst Year Supplies from WAM Run 3**
Values in Acre-Feet

| Month | CA 4415 Available Supplies from WAM | 2020 Conditions | | | | 2070 Conditions | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Beaumont Demand | CA4415 Supplies Used to Meet Demand | Supplies from Other Sources | Shortage | Beaumont Demand | CA4415 Supplies Used to Meet Demand | Supplies from Other Sources | Shortage |
| Jan-56 | 4,669 | 2,723 | 2,723 | 0 | 0 | 3,962 | 3,962 | 0 | 0 |
| Feb-56 | 4,132 | 2,419 | 2,419 | 0 | 0 | 3,518 | 3,518 | 0 | 0 |
| Mar-56 | 4,495 | 2,623 | 2,623 | 0 | 0 | 3,816 | 3,816 | 0 | 0 |
| Apr-56 | 4,390 | 2,579 | 2,579 | 0 | 0 | 3,749 | 3,749 | 0 | 0 |
| May-56 | 4,832 | 2,842 | 2,842 | 0 | 0 | 4,131 | 4,131 | 0 | 0 |
| Jun-56 | 26 | 2,817 | 26 | 2,791 | 0 | 4,098 | 26 | 4,072 | 0 |
| Jul-56 | 8 | 3,034 | 8 | 3,026 | 0 | 4,409 | 8 | 4,401 | 0 |
| Aug-56 | 6 | 3,006 | 6 | 3,000 | 0 | 4,370 | 6 | 4,364 | 0 |
| Sep-56 | 5 | 2,886 | 5 | 2,881 | 0 | 4,197 | 5 | 2,163 | 2,029 |
| Oct-56 | 484 | 2,874 | 484 | 2,390 | 0 | 4,177 | 484 | 0 | 3,693 |
| Nov-56 | 4,485 | 2,621 | 2,621 | 0 | 0 | 3,812 | 3,812 | 0 | 0 |
| Dec-56 | 4,579 | 2,678 | 2,678 | 0 | 0 | 3,900 | 3,900 | 0 | 0 |
| *Total* | *32,111* | *33,102* | *19,014* | *14,088* | *0* | *48,139* | *27,417* | *15,000* | *5,722* |

**Table 1b: 2020 and 2070 Supply and Demand – Worst Year Supplies from Daily Analysis**
Values in Acre-Feet

| Month | CA 4415 Available Supplies from Daily Analysis | 2020 Conditions | | | | 2070 Conditions | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Beaumont Demand | CA4415 Supplies Used to Meet Demand | Supplies from Other Sources | Shortage | Beaumont Demand | CA4415 Supplies Used to Meet Demand | Supplies from Other Sources | Shortage |
| Jan-56 | 3,901 | 2,723 | 2,723 | 0 | 0 | 3,962 | 3,901 | 61 | 0 |
| Feb-56 | 4,164 | 2,419 | 2,419 | 0 | 0 | 3,518 | 3,518 | 0 | 0 |
| Mar-56 | 3,765 | 2,623 | 2,623 | 0 | 0 | 3,816 | 3,765 | 51 | 0 |
| Apr-56 | 3,701 | 2,579 | 2,579 | 0 | 0 | 3,749 | 3,701 | 48 | 0 |
| May-56 | 3,955 | 2,842 | 2,842 | 0 | 0 | 4,131 | 3,955 | 176 | 0 |
| Jun-56 | 775 | 2,817 | 775 | 2,042 | 0 | 4,098 | 775 | 3,323 | 0 |
| Jul-56 | 0 | 3,034 | 0 | 3,034 | 0 | 4,409 | 0 | 4,409 | 0 |
| Aug-56 | 0 | 3,006 | 0 | 3,006 | 0 | 4,370 | 0 | 4,370 | 0 |
| Sep-56 | 0 | 2,886 | 0 | 2,886 | 0 | 4,197 | 0 | 2,562 | 1,635 |
| Oct-56 | 0 | 2,874 | 0 | 2,874 | 0 | 4,177 | 0 | 0 | 4,177 |
| Nov-56 | 116 | 2,621 | 116 | 1,158 | 1,347 | 3,812 | 116 | 0 | 3,696 |
| Dec-56 | 1,857 | 2,678 | 1,857 | 0 | 821 | 3,900 | 1,857 | 0 | 2,043 |
| *Total* | *22,234* | *33,102* | *15,934* | *15,000* | *2,168* | *48,139* | *21,588* | *15,000* | *11,551* |

6. The remainder of this memorandum describes the calculations in more detail. Attachment 1 contains the actual daily calculations of available supply.

**Water Rights**

7. Table 2 is a summary of the Beaumont (CA 06-4415) and LNVA water rights (CA 06-4411). These two water rights are the primary run-of-the-river diversions from the lower Neches River. LNVA rights are for diversions from both the Neches River and Pine Island Bayou. A canal connects the main stem of the Neches River to the LNVA diversion point on Pine Island Bayou. The LNVA right contains a complex set of maximum diversion rates for the various priorities which vary by location which are discussed in the section on the daily analysis. The LNVA rights also include authorization for Steinhagen and Rayburn Reservoirs, which are not included in Table 2.

**Table 2: Beaumont and LNVA Water Rights**

| Number | Owner | Priority Date | Diversion Amount | Type of Use |
|---|---|---|---|---|
| CA 06-4415 | City of Beaumont | 5-Apr-15 | 6,570 | Municipal |
| | | 8-Jan-25 | 49,897 | Municipal and Industrial |
| | | *Total* | *56,467* | |
| | | | | |
| CA 06-4411 | LNVA | 12-Aug-13 | 107,108 | Municipal, Industrial, Irrigation, Mining |
| | | 8-Nov-13 | 219,252 | |
| | | 31-Dec-24 | 55,516 | |
| | | *Total* | *326,360* | |

**Available Supplies Using WAM**

8. Figure 2 shows the annual diversions from the Neches River under the Beaumont water right from the Neches WAM plus the 15,000 acre-feet per year available from other sources (LNVA contract and groundwater). The Beaumont 2020 and 2070 annual demands are included for reference. The Beaumont diversion of 56,567 acre-feet per year is approximately 89% reliable.

9. Figures 3a and 3b are annual summaries comparing 2020 and 2070 Beaumont demands to available supplies, using the monthly availability from the WAM. For this analysis, each month in the WAM simulation is compared to the projected Beaumont demand for that month. If there is not enough water available from the Neches River, then the 15,000 acre-feet per year

from alternative sources is used if available. Once this supply is used up there is a shortage. In 2020 the three sources are sufficient to meet all Beaumont demands. In 2070, there are shortages in 1966, 1967 and 1971. The maximum shortage of 5,722 acre-feet is in 1956.

**Figure 2: Annual Available Supply from Beaumont Sources Based on Neches WAM**

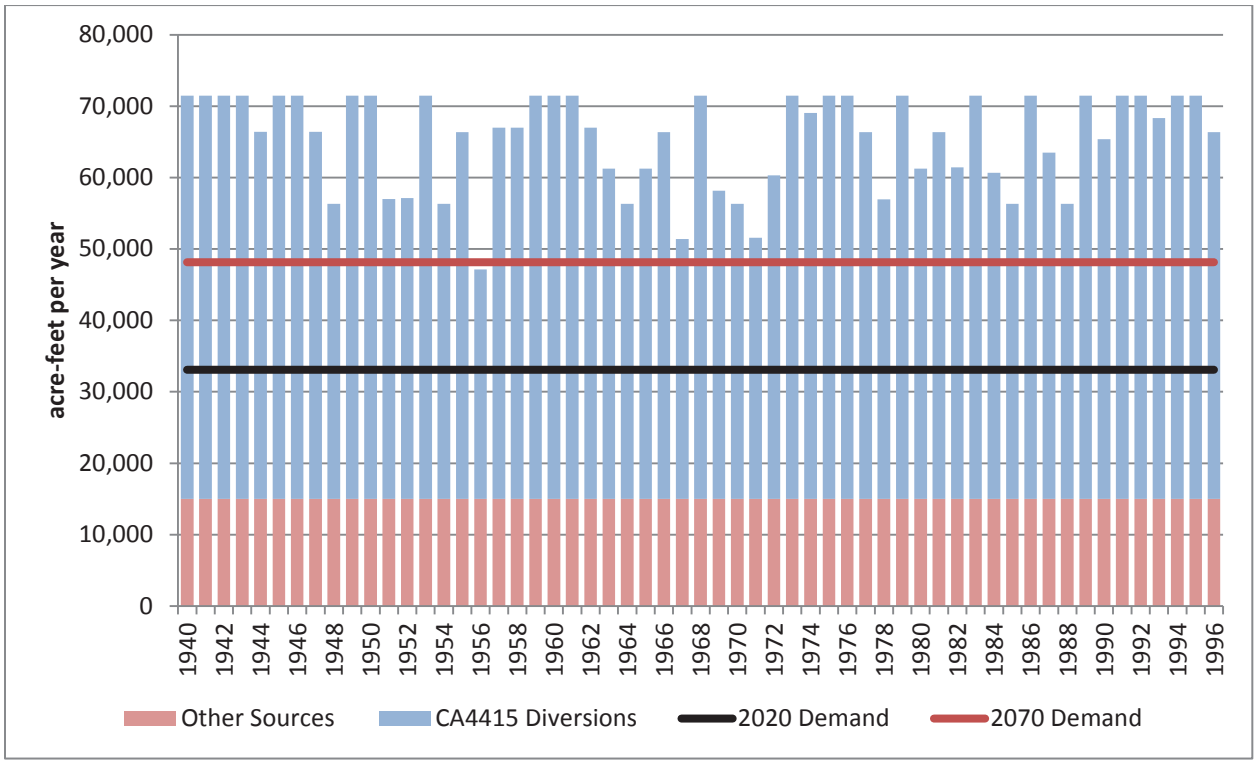


**Figure 3a: Annual Source of Supply Based on Monthly Analysis using WAM – 2020 Conditions**

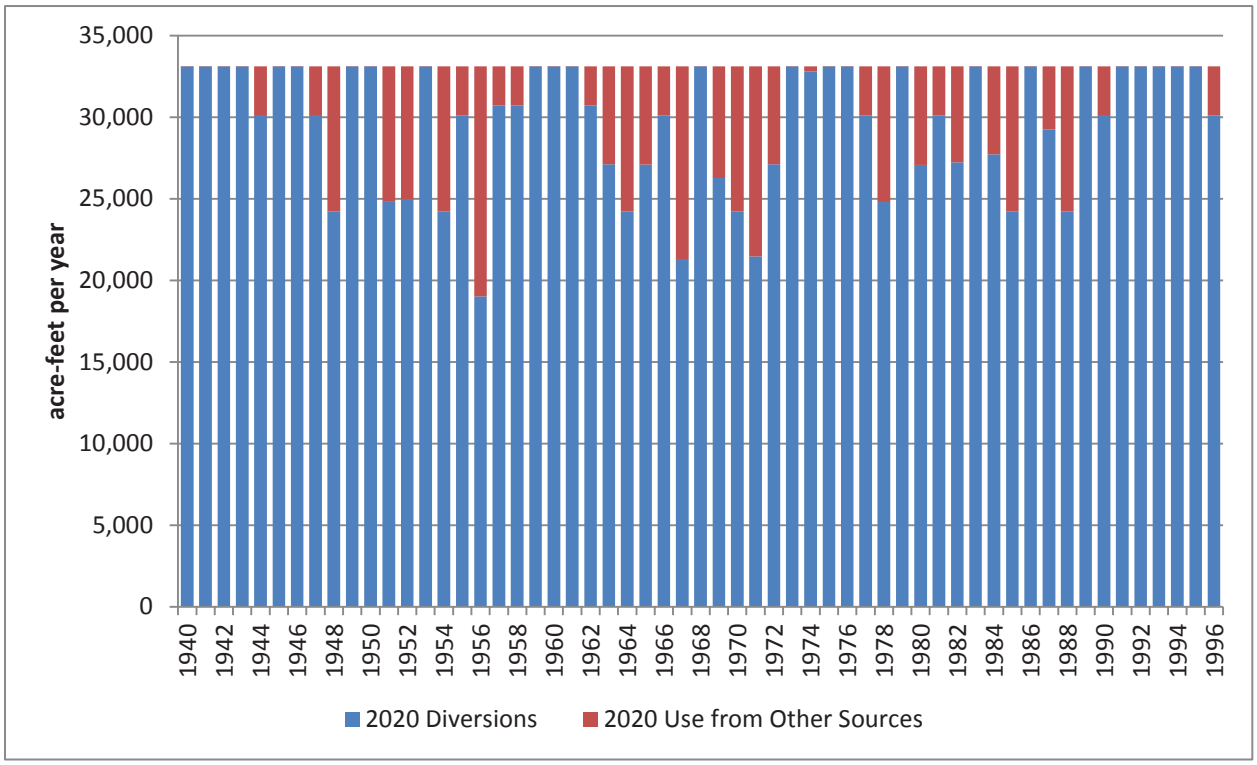
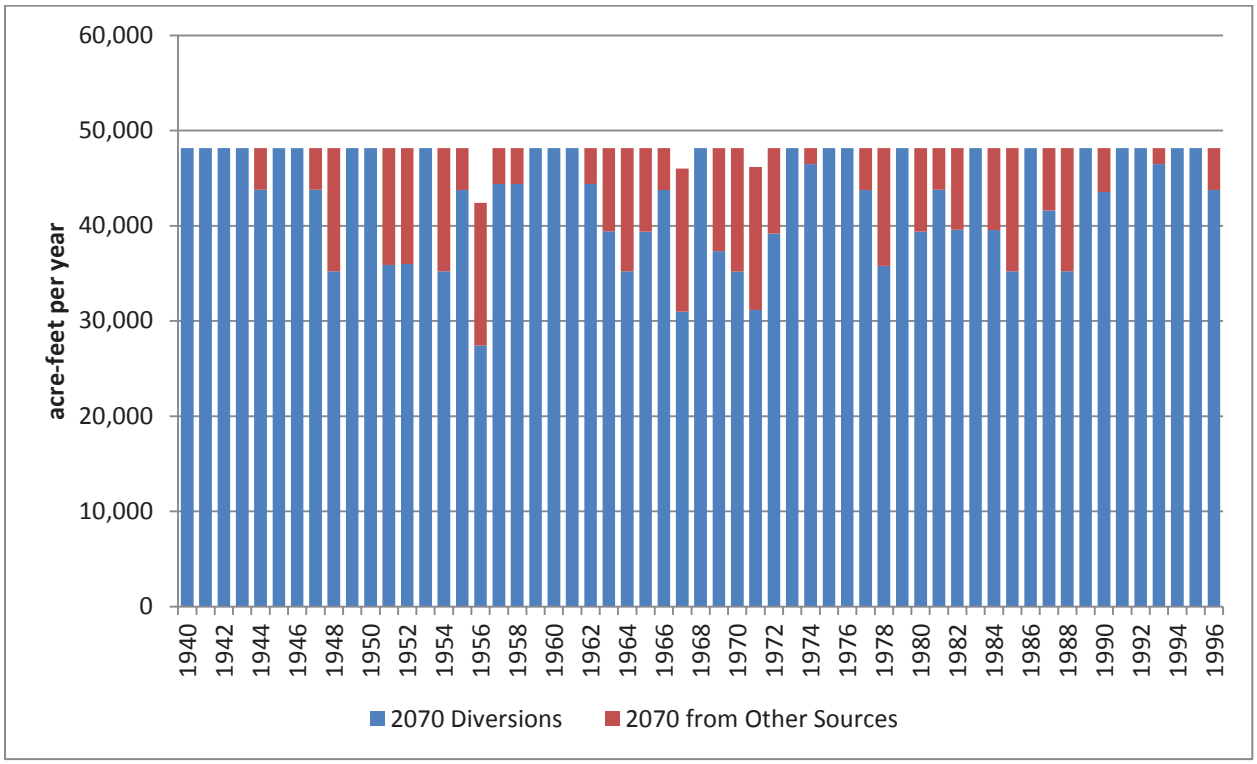



**Figure 3b: Annual Source of Supply Based on Monthly Analysis using WAM – 2070 Conditions**



**Daily Analysis**

10. The preferred method for calculating availability for Beaumont is based on an analysis performed during the negotiations between LNVA and Beaumont in 2011. These negotiations were overseen by TCEQ. Attachment 1 contains a detailed description of the calculations performed as part of the negotiations. The analysis uses daily historical flows for the years 1956, 1967, 2000, 2010 and 2011. 1956 had the lowest availability for Beaumont and was selected for the basis of water availability for Region I.

**ATTACHMENT 1: DESCRIPTION OF DAILY ANALYSIS SPREADSHEET**

The daily analysis spreadsheet includes the following worksheets:

**Worksheet 1 (Analysis of Available Flow at the Salt Water Barrier)** – This worksheet estimates the natural flows for the Neches River at the Salt Water Barrier based on inflow and outflow data from Sam Rayburn and B.A. Steinhagen Reservoirs and USGS streamflow data.

**Worksheet 2 (Adjusted LNVA Analysis of Diversions Assigned to Water Rights)** – This worksheet assigns diversions to various water rights using a modified version of the analysis performed by LNVA. The analysis preserves LNVA's logic and philosophy for allocating flow and diversions by water right. However, the analysis substitutes Freese and Nichols' calculations for available flow (see Worksheet 1, above); uses actual daily diversions by the City of Beaumont (Worksheet 5) instead of the hypothetical diversion in the original LNVA analysis; and divides Beaumont's diversions between 1915 and 1925 priority.

**Worksheet 3 (Corps Data)** – presents the raw inflow and outflow data for Sam Rayburn Reservoir and inflow data for B.A. Steinhagen Reservoir, as extracted from the Corps of Engineers' website: http://www.swf-wc.usace.army.mil/cgi-in/rcshtml.pl?page=Hydrologic. These data are provided as backup for calculations in Worksheet 1.

**Worksheet 4 (USGS Data)** – presents gage flow in cubic feet per second, as extracted from the U.S. Geological Survey website: http://waterdata.usgs.gov/tx/nwis/current/?type=flow. These data are provided as backup for calculations in Worksheet 1.

**Worksheet 5 (Beaumont Diversions)** – presents the daily diversions by the City of Beaumont from the Neches River. This data was provided by Karin Warren of the City of Beaumont to Freese and Nichols, Inc. by Beaumont. Worksheet 5 converts the raw data, provided in million gallons per day, to cubic feet per second (cfs) using the factor 1 MGD = 1.55 cfs. These data are presented as backup for calculations in Worksheet 2.

Worksheets 1 and 2 are discussed in greater detail below.

## WORKSHEET 1 –ANALYSIS OF AVAILABLE FLOW AT THE SALT WATER BARRIER

This table estimates natural flows above the Salt Water Barrier. The columns in the worksheet are developed as follows:

(A) Date. This is the date to which the data apply.

(B) Inflow to Sam Rayburn Reservoir. Obtained from the U.S. Army Corps of Engineers' website. "Adjusted" inflows in cubic feet per second are used for 1 January 2010 through 30 September

2010. Adjusted inflows are not available for dates later than 30 September 2010; calculated inflows from the same data set are used for the period 1 October 2010 through 14 November 2011.

(C) Flow at the Rockland USGS Gage. Daily flow in cfs from the U.S. Geological Survey website.

(D) Estimated Inflow to BA Steinhagen Reservoir (Not Including Releases from Sam Rayburn). This is the estimated inflow to B.A. Steinhagen Reservoir downstream from Sam Rayburn Reservoir and is based on the flow at the Rockland USGS gage multiplied by the drainage area ratio. The drainage area of B.A. Steinhagen Reservoir downstream from Sam Rayburn Reservoir is 4,124 square miles, and the drainage area of the Rockland gage is 3,636 square miles, resulting in a ratio of 1.1342.

(E) Total Natural Inflow above Dams. Calculated in the spreadsheet as the sum of Column B and Column D. This value, expressed in cfs, represents inflow from the portion of the Neches River watershed above Sam Rayburn Reservoir and B. A. Steinhagen Reservoirs.

(F) Natural Inflow above Dams with Negatives set to Zero. As noted previously, natural inflow may be zero during dry periods but cannot be negative. Negative numbers in the spreadsheet represent inconsistent data. This column replicates Column G with the difference that any negative value has been reset to zero.

(G) Flow at Town Bluff Gage. Daily flow in cfs from the U.S. Geological Survey website. Data points after 7/25/2011 are provisional; all prior data are approved. Note that the datum for 10/5/2011 is missing. We have filled in 598 cfs, which is the average of flows for 10/4 and 10/6.

(H) Flow at Evadale Gage. Daily flow in cfs from the U. S. Geological Survey website. Data points after 7/25/2011 are provisional; all prior data are approved. Note that the datum for 10/5/2011 is missing. We have filled in 635 cfs, which is the average of flows for 10/4 and 10/6.

(I) Evadale less Town Bluff (Lagged 1.5 days). Calculated in the spreadsheet as Column H minus the average of the Column G value from one and two days prior. This use of previous days' values for Town Bluff flows represents travel time between the two gages. Scenarios of 1, 1.5, 2, 2.5, and 3 days travel time were tested; 1.5 days travel time produced the fewest negative values and appears to be the best fit.

(J) Corrected Flow from Town Bluff to Evadale. In certain cases, Column I contains negative numbers (highlighted in pink). While flow between the two gages may be zero under some conditions, it should not be negative. We believe these negative numbers are an artifact of varying travel times. Column J represents a manual adjustment to Column I to remove negative inflows by adjusting the inflows of adjacent dates such that no entry is less than zero and the total volume remains unchanged.

(K) Flow at Village Creek near Kountze Gage. Daily flow in cfs from the U.S. Geological Survey website. Data from 10/4/2010 on are provisional. All prior data are approved. Note that the datum for 10/5/2011 is missing. We have filled in 15 cfs, which is the average of flows for 10/4 and 10/6.

(M) Flow at Pine Island Bayou near Sour Lake Gage. Daily flow in cfs from the U.S. Geological Survey website. Data from 10/5/2010 on are provisional; all prior data are approved.

(N) Ungaged Flow. Estimates the ungaged flow between Lake B.A. Steinhagen and the Salt Water Barrier by using a drainage area ratio and flows for the gaged portion of the watershed. The watershed above the Salt Water Barrier (9,789 square miles) minus the portion of the watershed above B.A. Steinhagen Reservoir (7,574 square miles) reflects 2,215 square miles of total watershed below B.A. Steinhagen Reservoir. The gaged portion of this drainage area is the gaged portion of the Pine Island Bayou watershed (336 square miles) plus the gaged portion of the Village Creek watershed (860 square miles) plus the gaged portion of the main stem watershed between the Evadale and Town gages (7,951 square miles minus 7,574 square miles, or 377 square miles). The total gaged portion of the watershed below B.A. Steinhagen is therefore 1,573 square miles (336 + 860 + 377). The ungaged portion of the watershed is 642 square miles (2,215 total – 1,573 gaged). The ratio of 642 square miles (ungaged area) to the gaged portion (1,573 square miles) is 0.41. (The drainage area of each gage is taken from the USGS website.) The spreadsheet accordingly multiplies (Column (H) + Column (K) + Column (L)) by 0.41 to calculate Column N.

(O) Flow Between BA Steinhagen and Neches at the Salt Water Barrier. Computes the total flow between Lake B.A. Steinhagen and the Salt Water Barrier by adding gaged and ungaged flow and is equal to Column (J) + Column (K) + Column (L) + Column (M).

(P) Estimated Natural Flow on Neches at Salt Water Barrier (O + F (Lagged 1.5 Days)). Estimates the total natural flow in the Neches River at the Salt Water Barrier by adding the estimated natural flow from the portion of the watershed below B.A. Steinhagen Reservoir (Column O) to estimated natural flow above the dams (Column F) with a 1.5 day lag for the flow values from the upper portion of the watershed (average of Column F values for 1 and 2 days prior).

## WORKSHEET 2 – ADJUSTED LNVA ANALYSIS OF DIVERSIONS ASSIGNED TO WATER RIGHTS

Unless otherwise indicated, the procedures used to divide available flows among water rights and priorities are the same as the procedures followed by the LNVA in its spreadsheet.

(A) Date. This is the date to which the data apply.

(B) Estimated Natural Flow in the Neches River at the Salt Water Barrier – from Worksheet 1. Calculated by FNI as described in Worksheet 1. Data from Column Q, Worksheet 1, is copied to Column B, Worksheet 2. The computations are described under Worksheet 1 above. The data are different from the data used by LNVA.

(C) LNVA Pumpage at Neches First. Actual LNVA pumping at the Neches First Lift Pump Station, as reported by LNVA on a daily basis, in cfs.

(D) Neches First Year to Date. Cumulative pumping by LNVA at Neches First Pump Station for the year. This value is expressed in acre-feet. It is computed in the spreadsheet by multiplying diversions in cfs by 1.98347 (to convert to acre-feet) and adding each day's value to the prior

day's to determine a cumulative running total.

(E) LNVA Pumpage at Neches BI First. Actual LNVA pumping at the BI First Lift Pump Station, as reported by LNVA on a daily basis, in cfs.

(F) BI First Year to Date. Cumulative pumping by LNVA at BI First Lift Pump Station for the year. This value is expressed in acre-feet. It is computed in the spreadsheet by multiplying diversions in cfs by 1.98347 (to convert to acre-feet) and adding each day's value to the prior day's to determine a cumulative running total.

(G) 8/12/1913 BI First Run-of-the-River Right (up to 450 cfs). Allocates LNVA's diversion at BI First (in cfs) to the most senior water right for that location, limited by the available flow (Column B), the total diversion at BI First lift (Column E), the maximum allowable diversion rate at this priority, and the maximum annual diversion at this location and priority.

(H) Year to Date Use of 1913 BI (Ac-Ft). Cumulative pumping by LNVA at BI First Lift Pump Station at the 1913 priority for the year. This value is expressed in acre-feet. It is computed in the spreadsheet by multiplying diversions in cfs by 1.98347 (to convert to acre-feet) and adding each day's value to the prior day's to determine a cumulative running total. It is used to assure that diversions at the 1913 priority cease when the maximum annual diversion at that priority is reached.

(I) 11/8/1913 Neches First Run-of-the-River Right (up to 588 cfs). Allocates LNVA's diversion at Neches First (in cfs) to the most senior water right for that location, limited by the available flow less flow allocated to BI First 1913 (Column B – Column G), the total diversion at Neches First lift (Column C), the maximum allowable diversion rate at this priority, and the maximum annual diversion at this location and priority.

(J) Year to Date Use of 1913 Neches (Ac-Ft). Cumulative pumping by LNVA at Neches First Lift Pump Station at the 1913 priority for the year. This value is expressed in acre-feet. It is computed in the spreadsheet by multiplying diversions in cfs by 1.98347 (to convert to acre-feet) and adding each day's value to the prior day's to determine a cumulative running total. It is used to assure that diversions at the 1913 priority cease when the maximum annual diversion at that priority is reached.

(K) Beaumont Diversion from Neches (cfs). Actual diversion by the City of Beaumont, expressed in cfs. Data for diversions in mgd were provided by the City of Beaumont by email from Karen Warren to Tom Gooch, FNI, dated 14 November 2011. The original data are included in Worksheet 5 as Column B. This column was on in LNVA's computations.

(L) 4/15/1915 City of Beaumont Right Diversion. The portion of Beaumont's diversion that can be made with available water at a 1915 priority. It is limited to the lesser of actual diversions; available flow less diversions by LNVA under their 1913 rights (The lesser of Column K and Column B – Column G – Column I); the maximum allowable diversion rate at this priority; and the maximum annual diversion at this priority. In their computations, LNVA used an assumed 50 cfs diversion by LNVA rather than actual diversions (which were always less than 50 cfs) in this column.

(M) Year to Date Use of 1915 Beaumont (Ac-Ft) (Acre-feet). Cumulative pumping by Beaumont at Neches First Lift Pump Station at the 1913 priority for the year. This value is expressed in acre-feet. It is computed in the spreadsheet by multiplying cumulative diversions in cfs by 1.98347 (to convert to acre-feet). It is used to assure that diversions at the 1915 priority cease when the maximum annual diversion at that priority is reached.

(N) 12/31/1924 BI First Right. These are diversions by LNVA at the BI First Lift Pump Station that are allocated to LNVA's 1924 water right. They are limited by the difference between total diversions at BI First Lift (Column E) and diversions allocated to the 1913 priority (Column G), the difference between total available flow (Column B) and flows allocated to prior water rights (Columns G, I, and L), the 30 cfs diversion rate available under this right, and the total annual amount available under this right. There is a slight difference from the LNVA spreadsheet in this column. Rather than limiting diversions to (Column B – Column G – Column I – Column L), LNVA limited diversions to (Column B – Column G – Column I). This difference (correcting what appears to be a minor miscalculation by LNVA) does not significantly affect the results.

(O) 12/31/1924 Neches First Right. These are diversions by LNVA at the Neches First Lift Pump Station that are allocated LNVA's 1924 water right. They are limited by the difference between total diversions at BI First Lift (Column C) and diversions allocated to the 1913 priority (Column I), the difference between total available flow (Column B) and flows allocated to prior water rights (Columns G, I, L, and N), the 45 cfs diversion rate available under this right, and the total annual amount available under this right.

(P) Total of 1924 BI and Neches First Lift Year to Date Diversions. Cumulative pumping by LNVA at BI and Neches First Lift Pump Stations at the 1924 priority for the year. This value is expressed in acre-feet. It is computed in the spreadsheet by multiplying 1924 priority diversions in cfs at both pump stations by 1.98347 (to convert to acre-feet) and adding each day's value to the prior day's to determine a cumulative running total. It is used to assure that diversions at the 1924 priority cease when the maximum annual diversion at that priority is reached.

(Q) 1/8/1925 City of Beaumont Right Diversion. The portion of Beaumont's diversion that can be made with available water at a 1925 priority. It is limited to the lesser of actual diversions less diversions at the 1915 priority (Column K – Column L); available flow less diversions by LNVA under their 1913 and 1924 rights and by Beaumont at its 1915 right (Column B – Column G – Column I – Column L – Column N – Column O); and the maximum allowable diversion rate less diversions at the 1915 priority.

(R) Diversions by Beaumont in Excess of Available Flow. This is equal to Column K – Column L – Column Q. These diversions could be taken from channel storage or, as LNVA points out, could come from LNVA's releases from upstream reservoirs.

(S) 11/12/1963 Actual Diversions of Water from Storage. The amount of water LNVA diverts from releases of stored water on the day in question. It is equal to LNVA's total diversions (Column C + Column E) less the diversions allocated to run-of-the-river water rights (Column G + Column I + Column N + Column O).

(T) Total Year to Date Diversions from Storage. Cumulative diversions by LNVA of water released

from reservoir storage for the year. This value is expressed in acre-feet. It is computed in the spreadsheet by multiplying diversions of water released from storage (Column S) in cfs by 1.98347 (to convert to acre-feet) and adding each day's value to the prior day's to determine a cumulative running total. It is used to assure that diversions of water released from storage do not exceed the maximum annual amount.

(U) 11/12/1963 – Called Releases of Water from Storage. The amount of water that was released from storage in upstream reservoirs for the day. This was provided by LNVA.

(V) Total Year to Date Diversions from Storage. Cumulative water released from reservoir storage for the year. This value is expressed in acre-feet. It is computed in the spreadsheet by multiplying water released from storage (Column U) in cfs by 1.98347 (to convert to acre-feet) and adding each day's value to the prior day's to determine a cumulative running total. It is used to assure that water released from storage does not exceed the maximum annual amount.

# Appendix 4-A

# Identified Water Needs/Surplus

# DB17 Report

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The following appendix includes a copy of the Water User Group Identified Needs/Surplus data from the TWDB Data Web Interface known as the DB17. The summary is divided by Water User Group, county, and basin.

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# Water User Group (WUG) Needs/Surplus

| REGION I | WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **ANDERSON COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| BRUSHY CREEK WSC | 147 | 150 | 155 | 158 | 158 | 158 |
| FRANKSTON | 149 | 142 | 140 | 136 | 130 | 124 |
| PALESTINE | 0 | 0 | 0 | 0 | 0 | 0 |
| WALSTON SPRINGS WSC | 8 | 11 | 16 | 22 | 23 | 23 |
| COUNTY-OTHER | 48 | 48 | 48 | 48 | 48 | 48 |
| MANUFACTURING | 0 | 0 | 0 | 0 | 0 | 0 |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| STEAM ELECTRIC POWER | (11,306) | (13,218) | (15,549) | (18,390) | (21,853) | (25,968) |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | 263 | 263 | 263 | 263 | 263 | 263 |
| **TRINITY BASIN** | | | | | | |
| BRUSHY CREEK WSC | 293 | 295 | 298 | 300 | 301 | 301 |
| ELKHART | 179 | 177 | 178 | 181 | 182 | 182 |
| FOUR PINES WSC | 213 | 213 | 218 | 222 | 223 | 224 |
| PALESTINE | 0 | 0 | 0 | 0 | 0 | 0 |
| THE CONSOLIDATED WSC | 167 | 169 | 172 | 174 | 173 | 171 |
| WALSTON SPRINGS WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 260 | 260 | 260 | 260 | 260 | 260 |
| MANUFACTURING | 0 | 0 | 0 | 0 | 0 | 0 |
| MINING | 53 | 33 | 29 | 50 | 72 | 89 |
| LIVESTOCK | 21 | 21 | 21 | 21 | 21 | 21 |
| IRRIGATION | 1,104 | 1,104 | 1,104 | 1,104 | 1,104 | 1,104 |
| **ANGELINA COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| ANGELINA WSC | 272 | 272 | 268 | 258 | 248 | 239 |
| BURKE | 0 | 0 | 0 | 0 | 0 | 0 |
| CENTRAL WCID OF ANGELINA COUNTY | 397 | 382 | 355 | 330 | 308 | 288 |
| DIBOLL | 2,042 | 2,024 | 2,007 | 1,976 | 1,948 | 1,922 |
| FOUR WAY SUD | 726 | 707 | 689 | 670 | 650 | 631 |
| HUDSON | 254 | 245 | 236 | 224 | 209 | 216 |
| HUDSON WSC | 750 | 722 | 698 | 676 | 657 | 639 |
| HUNTINGTON | 826 | 821 | 816 | 810 | 800 | 792 |
| LUFKIN | 0 | 0 | 0 | 0 | 0 | 0 |
| REDLAND WSC | 577 | 579 | 570 | 561 | 553 | 546 |
| ZAVALLA | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 397 | 359 | 313 | 224 | 144 | 69 |
| MANUFACTURING | (10,722) | (12,009) | (13,313) | (14,470) | (15,705) | (17,037) |
| MINING | (473) | (572) | (397) | (299) | (224) | (167) |
| STEAM ELECTRIC POWER | 15,802 | 15,802 | 15,802 | 15,802 | 15,802 | 15,802 |
| LIVESTOCK | 89 | 89 | 89 | 89 | 89 | 89 |
| IRRIGATION | 331 | 331 | 331 | 331 | 331 | 331 |
| **CHEROKEE COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| ALTO | 259 | 242 | 224 | 200 | 173 | 142 |
| ALTO RURAL WSC | 98 | 58 | 2 | (66) | (137) | (215) |
| BULLARD | 15 | 13 | 11 | 9 | 7 | 6 |
| CRAFT-TURNEY WSC | 0 | 0 | 0 | 0 | 0 | 0 |

# Water User Group (WUG) Needs/Surplus

| REGION I | WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **CHEROKEE COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| JACKSONVILLE | 0 | 0 | 0 | 0 | 0 | 0 |
| NEW SUMMERFIELD | 97 | 87 | 76 | 61 | 44 | 25 |
| NORTH CHEROKEE WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| RUSK | 383 | 314 | 241 | 143 | 31 | 8 |
| RUSK RURAL WSC | 192 | 174 | 155 | 124 | 87 | 45 |
| SOUTHERN UTILITIES COMPANY | 0 | 0 | 0 | 0 | 0 | 0 |
| TROUP | 0 | 0 | 0 | 0 | 0 | 0 |
| WELLS | 243 | 234 | 225 | 212 | 197 | 181 |
| WRIGHT CITY WSC | 33 | 29 | 24 | 18 | 11 | 0 |
| COUNTY-OTHER | 675 | 625 | 571 | 495 | 404 | 304 |
| MANUFACTURING | 11 | 11 | 11 | 11 | 11 | 11 |
| MINING | (238) | (247) | (210) | (147) | (84) | (40) |
| STEAM ELECTRIC POWER | 3,210 | 2,907 | 2,538 | 2,088 | 1,540 | 1,165 |
| LIVESTOCK | 132 | 132 | 132 | 132 | 132 | 132 |
| IRRIGATION | 81 | 76 | 72 | 68 | 65 | 65 |
| **HARDIN COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| KOUNTZE | 786 | 795 | 803 | 807 | 807 | 807 |
| LUMBERTON | 0 | 0 | 0 | 0 | 0 | 0 |
| LUMBERTON MUD | 3,601 | 3,392 | 3,246 | 3,130 | 3,021 | 2,937 |
| NORTH HARDIN WSC | 1,362 | 1,345 | 1,320 | 1,301 | 1,287 | 1,276 |
| SILSBEE | 724 | 736 | 748 | 753 | 748 | 742 |
| SOUR LAKE | 654 | 649 | 645 | 642 | 637 | 633 |
| WEST HARDIN WSC | 502 | 498 | 495 | 491 | 488 | 485 |
| COUNTY-OTHER | 11 | 11 | 11 | 11 | 11 | 11 |
| MANUFACTURING | 6 | 6 | 6 | 6 | 6 | 6 |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 63 | 63 | 63 | 63 | 63 | 63 |
| IRRIGATION | 0 | 0 | 0 | 0 | 0 | 0 |
| **TRINITY BASIN** | | | | | | |
| LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY | 0 | 0 | 0 | 0 | 0 | 0 |
| WEST HARDIN WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| **HENDERSON COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| ATHENS | (2) | (3) | (2) | (1) | (17) | (33) |
| BERRYVILLE | 0 | 0 | 0 | 0 | 0 | 0 |
| BETHEL-ASH WSC | 334 | 283 | 245 | 201 | 161 | 125 |
| BROWNSBORO | 0 | 0 | 0 | 0 | 0 | 0 |
| BRUSHY CREEK WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| CHANDLER | 269 | 154 | 57 | (77) | (196) | (312) |
| FRANKSTON | 6 | 8 | 9 | 11 | 13 | 15 |
| MURCHISON | 0 | 0 | 0 | 0 | 0 | 0 |
| R-P-M WSC | (3) | (17) | (26) | (39) | (52) | (63) |
| VIRGINIA HILL WSC | 104 | 87 | 72 | 50 | 27 | 0 |
| COUNTY-OTHER | 540 | 540 | 540 | 540 | 540 | 540 |

# Water User Group (WUG) Needs/Surplus

| REGION I | WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **HENDERSON COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| MANUFACTURING | 24 | 16 | 8 | 1 | 1 | 1 |
| MINING | 42 | 33 | 42 | 60 | 79 | 91 |
| LIVESTOCK | 1,612 | 1,539 | 1,481 | 1,406 | 1,016 | 765 |
| IRRIGATION | 388 | 372 | 366 | 362 | 310 | 278 |
| **HOUSTON COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| GRAPELAND | 202 | 203 | 207 | 208 | 209 | 208 |
| THE CONSOLIDATED WSC | 561 | 570 | 579 | 583 | 580 | 577 |
| COUNTY-OTHER | 12 | 15 | 16 | 16 | 16 | 16 |
| MANUFACTURING | 12 | 10 | 9 | 8 | 7 | 6 |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 608 | 566 | 521 | 472 | 419 | 351 |
| IRRIGATION | 6 | (22) | (51) | (84) | (121) | (170) |
| **TRINITY BASIN** | | | | | | |
| CROCKETT | 727 | 742 | 755 | 757 | 743 | 725 |
| GRAPELAND | 311 | 314 | 315 | 317 | 316 | 316 |
| LOVELADY | 105 | 105 | 107 | 108 | 109 | 108 |
| THE CONSOLIDATED WSC | 800 | 826 | 850 | 861 | 855 | 847 |
| COUNTY-OTHER | 179 | 182 | 181 | 181 | 181 | 180 |
| MANUFACTURING | 24 | 25 | 26 | 26 | 27 | 27 |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | (756) | (974) | (1,213) | (1,478) | (1,770) | (2,169) |
| **JASPER COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| JASPER | 3,091 | 3,091 | 3,114 | 3,130 | 3,133 | 3,133 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MANUFACTURING | 352 | (3,049) | (6,021) | (8,250) | (8,335) | (8,420) |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 217 | 217 | 217 | 217 | 217 | 217 |
| IRRIGATION | 58 | 58 | 58 | 58 | 58 | 58 |
| **SABINE BASIN** | | | | | | |
| JASPER COUNTY WCID #1 | 849 | 861 | 866 | 866 | 866 | 866 |
| KIRBYVILLE | 182 | 183 | 189 | 194 | 194 | 194 |
| MAURICEVILLE SUD | 43 | 43 | 41 | 39 | 38 | 38 |
| COUNTY-OTHER | 192 | 233 | 310 | 353 | 362 | 362 |
| MANUFACTURING | 4 | 3 | 1 | 0 | 0 | 0 |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 217 | 217 | 217 | 217 | 217 | 217 |
| IRRIGATION | 33 | 33 | 33 | 33 | 33 | 33 |
| **JEFFERSON COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| BEAUMONT | 0 | 0 | (169) | (759) | (1,488) | (2,331) |
| BEVIL OAKS | 0 | 0 | 0 | 0 | 0 | 0 |
| CHINA | 0 | 0 | 0 | 0 | 0 | 0 |
| GROVES | 0 | 0 | 0 | 0 | 0 | 0 |
| JEFFERSON COUNTY WCID #10 | 0 | 0 | 0 | 0 | 0 | 0 |

# Water User Group (WUG) Needs/Surplus

| REGION I | WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **JEFFERSON COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| MEEKER MUD | 20 | 17 | 13 | 6 | 3 | 0 |
| NEDERLAND | 0 | 0 | 0 | 0 | 0 | 0 |
| NOME | 0 | 0 | 0 | 0 | 0 | 0 |
| PORT ARTHUR | 0 | 0 | 0 | 0 | 0 | 0 |
| PORT NECHES | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 18 | 18 | 15 | (22) | (57) | (89) |
| MANUFACTURING | (93,772) | (135,897) | (141,948) | (148,018) | (154,093) | (160,406) |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| STEAM ELECTRIC POWER | (13,426) | (15,696) | (18,464) | (21,838) | (25,951) | (30,839) |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | 3,253 | 2,608 | 2,166 | 2,009 | 2,172 | 2,422 |
| **NECHES-TRINITY BASIN** | | | | | | |
| BEAUMONT | 0 | 0 | (331) | (1,486) | (2,914) | (4,565) |
| CHINA | 0 | 0 | 0 | 0 | 0 | 0 |
| GROVES | 0 | 0 | 0 | 0 | 0 | 0 |
| JEFFERSON COUNTY WCID #10 | 0 | 0 | 0 | 0 | 0 | 0 |
| MEEKER MUD | 61 | 50 | 38 | 19 | 8 | 0 |
| NEDERLAND | 0 | 0 | 0 | 0 | 0 | 0 |
| NOME | 0 | 0 | 0 | 0 | 0 | 0 |
| PORT ARTHUR | 0 | 0 | 0 | 0 | 0 | 0 |
| PORT NECHES | 0 | 0 | 0 | 0 | 0 | 0 |
| WEST JEFFERSON COUNTY MWD | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 359 | 414 | 412 | (658) | (1,867) | (3,207) |
| MANUFACTURING | (86,689) | (125,576) | (131,158) | (136,761) | (142,368) | (148,197) |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 63 | 63 | 63 | 63 | 63 | 63 |
| IRRIGATION | 43,228 | 34,660 | 28,777 | 26,689 | 28,867 | 32,178 |
| **NACOGDOCHES COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| APPLEBY WSC | 285 | 222 | 157 | 82 | 0 | 0 |
| CUSHING | 105 | 94 | 82 | 69 | 53 | 37 |
| D&M WSC | 289 | 200 | 108 | 4 | (112) | (234) |
| GARRISON | 340 | 318 | 296 | 270 | 241 | 211 |
| LILLY GROVE SUD | 332 | 292 | 250 | 202 | 148 | 90 |
| MELROSE WSC | 304 | 259 | 213 | 158 | 95 | 28 |
| NACOGDOCHES | 0 | 0 | 0 | 0 | 0 | 0 |
| SWIFT WSC | 238 | 201 | 163 | 116 | 63 | 6 |
| WODEN WSC | 440 | 414 | 386 | 352 | 312 | 269 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MANUFACTURING | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 |
| MINING | (5,475) | (2,975) | (118) | 226 | 567 | 818 |
| STEAM ELECTRIC POWER | 369 | (799) | (2,224) | (3,961) | (6,078) | (8,594) |
| LIVESTOCK | (1,644) | (1,837) | (2,061) | (2,320) | (2,617) | (3,059) |
| IRRIGATION | 109 | 109 | 109 | 109 | 109 | 109 |
| **NEWTON COUNTY** | | | | | | |
| **SABINE BASIN** | | | | | | |
| MAURICEVILLE SUD | 40 | 38 | 37 | 35 | 35 | 34 |

# Water User Group (WUG) Needs/Surplus

| REGION I | WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **NEWTON COUNTY** | | | | | | |
| **SABINE BASIN** | | | | | | |
| NEWTON | 40 | 49 | 57 | 62 | 63 | 63 |
| SOUTH NEWTON WSC | 144 | 144 | 144 | 144 | 144 | 144 |
| COUNTY-OTHER | 456 | 500 | 538 | 547 | 550 | 550 |
| MANUFACTURING | 0 | 0 | 0 | 0 | 0 | 0 |
| MINING | (115) | (59) | 35 | 105 | 168 | 207 |
| STEAM ELECTRIC POWER | (690) | (3,080) | (5,994) | (9,545) | (13,875) | (19,021) |
| LIVESTOCK | 138 | 138 | 138 | 138 | 138 | 138 |
| IRRIGATION | 5 | 5 | 5 | 5 | 5 | 5 |
| **ORANGE COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| BRIDGE CITY | 10 | 11 | 13 | 12 | 11 | 10 |
| MAURICEVILLE SUD | 71 | 71 | 69 | 68 | 68 | 68 |
| ORANGEFIELD WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| PORT ARTHUR | 0 | 0 | 0 | 0 | 0 | 0 |
| ROSE CITY | 498 | 497 | 497 | 495 | 494 | 493 |
| VIDOR | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MANUFACTURING | 0 | (89) | (208) | (314) | (433) | (561) |
| MINING | 10 | 8 | 8 | 8 | 5 | 0 |
| STEAM ELECTRIC POWER | 825 | (14) | (1,038) | (2,286) | (3,807) | (4,846) |
| LIVESTOCK | 102 | 102 | 102 | 102 | 102 | 102 |
| IRRIGATION | (932) | (996) | (1,039) | (1,054) | (1,038) | (1,014) |
| **NECHES-TRINITY BASIN** | | | | | | |
| BRIDGE CITY | 4 | 5 | 7 | 6 | 5 | 4 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| **SABINE BASIN** | | | | | | |
| BRIDGE CITY | 0 | 9 | 18 | 13 | 7 | 2 |
| MAURICEVILLE SUD | 838 | 838 | 823 | 815 | 806 | 800 |
| ORANGE | 0 | 0 | 0 | 0 | 0 | 0 |
| ORANGEFIELD WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| PINEHURST | 0 | 0 | 0 | 0 | 0 | 0 |
| SOUTH NEWTON WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| VIDOR | 0 | 0 | 0 | 0 | 0 | 0 |
| WEST ORANGE | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MANUFACTURING | (2,532) | (8,390) | (14,231) | (19,416) | (25,247) | (31,550) |
| MINING | 8 | 5 | 6 | 5 | 3 | 0 |
| LIVESTOCK | 16 | 16 | 16 | 16 | 16 | 16 |
| IRRIGATION | (1,500) | (1,689) | (1,819) | (1,866) | (1,817) | (1,744) |
| **PANOLA COUNTY** | | | | | | |
| **CYPRESS BASIN** | | | | | | |
| COUNTY-OTHER | 1 | 0 | 0 | 0 | 0 | 0 |
| MINING | 2 | 2 | 2 | 2 | 4 | 4 |
| LIVESTOCK | 15 | 15 | 15 | 15 | 15 | 15 |
| **SABINE BASIN** | | | | | | |
| BECKVILLE | 448 | 437 | 431 | 425 | 419 | 414 |
| CARTHAGE | 0 | 0 | 0 | 0 | 0 | 0 |

# Water User Group (WUG) Needs/Surplus

| REGION I | WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **PANOLA COUNTY** | | | | | | |
| **SABINE BASIN** | | | | | | |
| GILL WSC | 74 | 75 | 77 | 76 | 75 | 74 |
| TATUM | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 179 | 165 | 171 | 155 | 125 | 98 |
| MANUFACTURING | (134) | (156) | (176) | (194) | (230) | (309) |
| MINING | 3,317 | 3,639 | 4,263 | 4,576 | 5,833 | 5,706 |
| LIVESTOCK | 175 | 175 | 175 | 175 | 175 | 175 |
| IRRIGATION | 510 | 510 | 510 | 510 | 510 | 510 |
| **POLK COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| CORRIGAN | 67 | 51 | 39 | 23 | 11 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MANUFACTURING | 9 | 9 | 9 | 9 | 9 | 9 |
| MINING | 63 | 89 | 114 | 140 | 166 | 177 |
| LIVESTOCK | 277 | 277 | 277 | 277 | 277 | 277 |
| IRRIGATION | 341 | 341 | 341 | 341 | 341 | 341 |
| **RUSK COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| HENDERSON | 2,682 | 2,371 | 2,062 | 1,710 | 1,325 | 922 |
| NEW LONDON | 118 | 98 | 76 | 52 | 27 | 0 |
| OVERTON | 39 | 34 | 28 | 22 | 15 | 7 |
| WRIGHT CITY WSC | 27 | 22 | 18 | 12 | 6 | 0 |
| COUNTY-OTHER | 753 | 647 | 534 | 379 | 195 | 0 |
| MANUFACTURING | 31 | 31 | 31 | 31 | 31 | 31 |
| MINING | (1,075) | (1,814) | (1,742) | (1,666) | (1,603) | (1,598) |
| LIVESTOCK | 289 | 280 | 267 | 255 | 242 | 242 |
| IRRIGATION | 245 | 245 | 245 | 245 | 245 | 245 |
| **SABINE BASIN** | | | | | | |
| CHALK HILL SUD | 720 | 700 | 679 | 650 | 615 | 579 |
| CROSS ROADS SUD | 407 | 395 | 383 | 363 | 336 | 309 |
| EASTON | 0 | 0 | 0 | 0 | 0 | 0 |
| ELDERVILLE WSC | 73 | 61 | 48 | 34 | 18 | 1 |
| HENDERSON | 447 | 394 | 340 | 278 | 212 | 142 |
| KILGORE | 148 | 422 | 356 | 277 | 182 | 78 |
| NEW LONDON | 95 | 77 | 61 | 42 | 21 | 0 |
| OVERTON | 79 | 33 | (12) | (65) | (123) | (184) |
| TATUM | 118 | 87 | 59 | 28 | 0 | 2 |
| WEST GREGG SUD | 10 | 10 | 9 | 7 | 5 | 3 |
| COUNTY-OTHER | 689 | 614 | 535 | 426 | 297 | 159 |
| MANUFACTURING | 1 | 1 | 1 | 1 | 1 | 1 |
| MINING | 0 | (278) | (213) | (143) | (83) | (79) |
| STEAM ELECTRIC POWER | 16,743 | 12,099 | 6,439 | (462) | (8,873) | (18,868) |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | 253 | 253 | 253 | 253 | 253 | 253 |
| **SABINE COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| G M WSC | 4 | 3 | 3 | 3 | 3 | 3 |
| PINELAND | 5 | 10 | 13 | 14 | 14 | 14 |

# Water User Group (WUG) Needs/Surplus

| REGION I | WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **SABINE COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| COUNTY-OTHER | 214 | 214 | 215 | 215 | 215 | 215 |
| MANUFACTURING | 380 | 311 | 241 | 179 | 123 | 62 |
| MINING | 124 | 145 | 171 | 196 | 222 | 240 |
| LIVESTOCK | 57 | 48 | 37 | 25 | 11 | 11 |
| **SABINE BASIN** | | | | | | |
| G M WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| HEMPHILL | 437 | 441 | 445 | 448 | 448 | 448 |
| COUNTY-OTHER | 398 | 408 | 413 | 414 | 414 | 414 |
| MINING | 654 | 768 | 904 | 1,036 | 1,168 | 1,262 |
| LIVESTOCK | 516 | 467 | 410 | 344 | 273 | 273 |
| **SAN AUGUSTINE COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| SAN AUGUSTINE | 0 | 9 | 17 | 18 | 19 | 19 |
| COUNTY-OTHER | 417 | 442 | 462 | 472 | 475 | 475 |
| MANUFACTURING | 9 | 8 | 7 | 6 | 5 | 4 |
| MINING | (2,102) | (1,102) | 419 | 718 | 1,014 | 1,236 |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | 0 | 0 | 0 | 0 | 0 | 0 |
| **SABINE BASIN** | | | | | | |
| G M WSC | 28 | 28 | 28 | 28 | 28 | 28 |
| COUNTY-OTHER | 81 | 82 | 82 | 82 | 82 | 82 |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 18 | 18 | 18 | 18 | 18 | 18 |
| IRRIGATION | 0 | 0 | 0 | 0 | 0 | 0 |
| **SHELBY COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| TIMPSON | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 188 | 183 | 177 | 171 | 163 | 155 |
| MINING | 12 | 24 | 64 | 209 | 72 | 178 |
| LIVESTOCK | (564) | (756) | (991) | (1,276) | (1,625) | (1,625) |
| IRRIGATION | 9 | 9 | 9 | 9 | 9 | 9 |
| **SABINE BASIN** | | | | | | |
| CENTER | 8 | 8 | 8 | 8 | 8 | 7 |
| JOAQUIN | 46 | 46 | 46 | 46 | 46 | 46 |
| TENAHA | 215 | 204 | 194 | 183 | 171 | 159 |
| TIMPSON | 386 | 379 | 372 | 365 | 356 | 347 |
| COUNTY-OTHER | 117 | 110 | 103 | 93 | 82 | 72 |
| MANUFACTURING | 311 | 323 | 334 | 344 | 357 | 370 |
| MINING | 30 | 63 | 165 | 536 | 186 | 460 |
| LIVESTOCK | (803) | (1,619) | (2,611) | (3,823) | (5,299) | (5,299) |
| IRRIGATION | 63 | 63 | 63 | 63 | 63 | 63 |
| **SMITH COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| ARP | 0 | 0 | 0 | 0 | 0 | 0 |
| BULLARD | (51) | (223) | (397) | (587) | (783) | (985) |
| CRYSTAL SYSTEMS INC | (12) | (105) | (219) | (356) | (510) | (642) |
| DEAN WSC | 0 | 0 | 0 | 0 | 0 | 0 |

# Water User Group (WUG) Needs/Surplus

| REGION I | WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **SMITH COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| JACKSON WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| LINDALE | (52) | (180) | (310) | (451) | (596) | (746) |
| LINDALE RURAL WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| NEW CHAPEL HILL | 0 | 0 | 0 | 0 | 0 | 0 |
| NOONDAY | 0 | 0 | 0 | 0 | 0 | 0 |
| OVERTON | 0 | 0 | 0 | 0 | 0 | 0 |
| R-P-M WSC | (1) | (6) | (10) | (15) | (19) | (23) |
| SOUTHERN UTILITIES COMPANY | 0 | 0 | 0 | 0 | 0 | 0 |
| TROUP | 0 | 0 | 0 | 0 | 0 | 0 |
| TYLER | 0 | 0 | 0 | 0 | 0 | 0 |
| WALNUT GROVE WSC | 917 | 773 | 622 | 449 | 264 | 71 |
| WHITEHOUSE | 0 | 0 | 0 | 0 | 0 | 0 |
| WRIGHT CITY WSC | 130 | 108 | 84 | 55 | 22 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MANUFACTURING | (1,464) | (1,655) | (1,838) | (1,993) | (2,206) | (2,437) |
| MINING | (108) | (113) | (114) | (83) | (54) | (32) |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | 0 | 0 | 0 | 0 | 0 | 0 |
| **TRINITY COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| GROVETON | 254 | 252 | 254 | 257 | 254 | 255 |
| COUNTY-OTHER | 765 | 762 | 761 | 767 | 756 | 746 |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | (330) | (330) | (330) | (330) | (330) | (330) |
| **TYLER COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| COLMESNEIL | 207 | 209 | 212 | 213 | 213 | 213 |
| IVANHOE | 125 | 127 | 129 | 130 | 130 | 130 |
| IVANHOE NORTH | 155 | 157 | 158 | 159 | 159 | 159 |
| LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY | 0 | 0 | 0 | 0 | 0 | 0 |
| TYLER COUNTY WSC | 390 | 412 | 433 | 445 | 447 | 447 |
| WOODVILLE | 5,013 | 5,021 | 5,031 | 5,037 | 5,038 | 5,038 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MANUFACTURING | 0 | 0 | 0 | 0 | 0 | 0 |
| MINING | 77 | 39 | 87 | 134 | 182 | 208 |
| STEAM ELECTRIC POWER | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 26 | 26 | 26 | 26 | 26 | 26 |
| IRRIGATION | 7 | 7 | 7 | 7 | 7 | 7 |

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# WWP (NEEDS)/SURPLUS

| WHOLESALE WATER PROVIDER | WWP (NEEDS)/SURPLUS (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| ANGELINA NECHES RIVER AUTHORITY | (68,492) | (72,629) | (73,386) | (73,032) | (72,831) | (128,775) |
| ANGELINA NACOGDOCHES WCID #1 | 7,077 | 6,250 | (2,866) | (3,692) | (4,519) | (5,305) |
| ATHENS MUNICIPAL WATER AUTHORITY | 1,283 | 920 | 599 | 170 | (2,597) | (5,986) |
| CITY OF BEAUMONT | 0 | 0 | (578) | (2,570) | (4,994) | (7,754) |
| CITY OF CARTHAGE | 2,839 | 2,799 | 2,767 | 2,730 | 2,653 | 2,570 |
| CITY OF CENTER | 756 | 511 | 278 | 55 | (196) | (450) |
| HOUSTON COUNTY WCID #1 | (1,813) | (1,843) | (2,122) | (2,147) | (2,429) | (2,463) |
| CITY OF JACKSONVILLE | 2,915 | 2,635 | 2,344 | 1,947 | 1,475 | 955 |
| LOWER NECHES VALLEY AUTHORITY | 642,968 | 514,337 | 498,421 | 482,660 | 466,462 | 449,560 |
| CITY OF LUFKIN | 8,894 | 8,307 | 7,757 | 7,213 | 6,627 | 6,035 |
| CITY OF NACOGDOCHES | 13,415 | 12,163 | 10,898 | 9,562 | 8,066 | 6,510 |
| PANOLA COUNTY FRESH WATER SUPPLY DISTRICT | 4,201 | 3,648 | 3,546 | 3,425 | 3,226 | 2,464 |
| CITY OF PORT ARTHUR | 0 | 0 | 0 | 0 | 0 | 0 |
| SABINE RIVER AUTHORITY | 642,875 | 624,319 | 346,838 | 124,727 | 86,754 | 9,196 |
| CITY OF TYLER | 12,394 | 10,178 | 7,861 | 5,238 | 2,204 | (1,014) |
| UPPER NECHES RIVER MUNICIPAL WATER AUTHORITY | (4,831) | (6,849) | (8,869) | (10,892) | (60,169) | (62,190) |
| **TOTAL WWP NEEDS/SURPLUS** | **1,264,481** | **1,104,746** | **793,488** | **545,394** | **429,732** | **263,353** |

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# Appendix 4-B

# Second-Tier Identified Water Need DB17 Report

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This appendix will include a copy of the Second-Tier Identified Water Need data from the TWDB Data Web Interface known as the DB17. The summary will be divided by Wholesale Water Provider and Wholesale Water Provider, county, and river basin after implementation of conservation and direct reuse water management strategies. The TWDB will make this DB17 report available to RWPGs after submittal of the 2016 Initially Prepared Plan.

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# Water User Group (WUG) Second-Tier Identified Water Need

| REGION I | WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **ANDERSON COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| BRUSHY CREEK WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| FRANKSTON | 0 | 0 | 0 | 0 | 0 | 0 |
| PALESTINE | 0 | 0 | 0 | 0 | 0 | 0 |
| WALSTON SPRINGS WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MANUFACTURING | 0 | 0 | 0 | 0 | 0 | 0 |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| STEAM ELECTRIC POWER | 11,306 | 13,218 | 15,549 | 18,390 | 21,853 | 25,968 |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | 0 | 0 | 0 | 0 | 0 | 0 |
| **TRINITY BASIN** | | | | | | |
| BRUSHY CREEK WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| ELKHART | 0 | 0 | 0 | 0 | 0 | 0 |
| FOUR PINES WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| PALESTINE | 0 | 0 | 0 | 0 | 0 | 0 |
| THE CONSOLIDATED WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| WALSTON SPRINGS WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MANUFACTURING | 0 | 0 | 0 | 0 | 0 | 0 |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | 0 | 0 | 0 | 0 | 0 | 0 |
| **ANGELINA COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| ANGELINA WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| BURKE | 0 | 0 | 0 | 0 | 0 | 0 |
| CENTRAL WCID OF ANGELINA COUNTY | 0 | 0 | 0 | 0 | 0 | 0 |
| DIBOLL | 0 | 0 | 0 | 0 | 0 | 0 |
| FOUR WAY SUD | 0 | 0 | 0 | 0 | 0 | 0 |
| HUDSON | 0 | 0 | 0 | 0 | 0 | 0 |
| HUDSON WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| HUNTINGTON | 0 | 0 | 0 | 0 | 0 | 0 |
| LUFKIN | 0 | 0 | 0 | 0 | 0 | 0 |
| REDLAND WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| ZAVALLA | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MANUFACTURING | 10,722 | 12,009 | 13,313 | 14,470 | 15,705 | 17,037 |
| MINING | 473 | 572 | 397 | 299 | 224 | 167 |
| STEAM ELECTRIC POWER | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | 0 | 0 | 0 | 0 | 0 | 0 |
| **CHEROKEE COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| ALTO | 0 | 0 | 0 | 0 | 0 | 0 |
| ALTO RURAL WSC | 0 | 0 | 0 | 59 | 128 | 204 |
| BULLARD | 0 | 0 | 0 | 0 | 0 | 0 |
| CRAFT-TURNEY WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| JACKSONVILLE | 0 | 0 | 0 | 0 | 0 | 0 |

# Water User Group (WUG) Second-Tier Identified Water Need

| REGION I | WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **CHEROKEE COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| NEW SUMMERFIELD | 0 | 0 | 0 | 0 | 0 | 0 |
| NORTH CHEROKEE WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| RUSK | 0 | 0 | 0 | 0 | 0 | 0 |
| RUSK RURAL WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| SOUTHERN UTILITIES COMPANY | 0 | 0 | 0 | 0 | 0 | 0 |
| TROUP | 0 | 0 | 0 | 0 | 0 | 0 |
| WELLS | 0 | 0 | 0 | 0 | 0 | 0 |
| WRIGHT CITY WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MANUFACTURING | 0 | 0 | 0 | 0 | 0 | 0 |
| MINING | 238 | 247 | 210 | 147 | 84 | 40 |
| STEAM ELECTRIC POWER | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | 0 | 0 | 0 | 0 | 0 | 0 |
| **HARDIN COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| KOUNTZE | 0 | 0 | 0 | 0 | 0 | 0 |
| LUMBERTON | 0 | 0 | 0 | 0 | 0 | 0 |
| LUMBERTON MUD | 0 | 0 | 0 | 0 | 0 | 0 |
| NORTH HARDIN WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| SILSBEE | 0 | 0 | 0 | 0 | 0 | 0 |
| SOUR LAKE | 0 | 0 | 0 | 0 | 0 | 0 |
| WEST HARDIN WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MANUFACTURING | 0 | 0 | 0 | 0 | 0 | 0 |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | 0 | 0 | 0 | 0 | 0 | 0 |
| **TRINITY BASIN** | | | | | | |
| LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY | 0 | 0 | 0 | 0 | 0 | 0 |
| WEST HARDIN WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| **HENDERSON COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| ATHENS | 1 | 2 | 0 | 0 | 14 | 29 |
| BERRYVILLE | 0 | 0 | 0 | 0 | 0 | 0 |
| BETHEL-ASH WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| BROWNSBORO | 0 | 0 | 0 | 0 | 0 | 0 |
| BRUSHY CREEK WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| CHANDLER | 0 | 0 | 0 | 61 | 166 | 276 |
| FRANKSTON | 0 | 0 | 0 | 0 | 0 | 0 |
| MURCHISON | 0 | 0 | 0 | 0 | 0 | 0 |
| R-P-M WSC | 3 | 17 | 26 | 39 | 52 | 63 |
| VIRGINIA HILL WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MANUFACTURING | 0 | 0 | 0 | 0 | 0 | 0 |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |

# Water User Group (WUG) Second-Tier Identified Water Need

| REGION I | WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **HENDERSON COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | 0 | 0 | 0 | 0 | 0 | 0 |
| **HOUSTON COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| GRAPELAND | 0 | 0 | 0 | 0 | 0 | 0 |
| THE CONSOLIDATED WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MANUFACTURING | 0 | 0 | 0 | 0 | 0 | 0 |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | 0 | 22 | 51 | 84 | 121 | 170 |
| **TRINITY BASIN** | | | | | | |
| CROCKETT | 0 | 0 | 0 | 0 | 0 | 0 |
| GRAPELAND | 0 | 0 | 0 | 0 | 0 | 0 |
| LOVELADY | 0 | 0 | 0 | 0 | 0 | 0 |
| THE CONSOLIDATED WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MANUFACTURING | 0 | 0 | 0 | 0 | 0 | 0 |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | 756 | 974 | 1,213 | 1,478 | 1,770 | 2,169 |
| **JASPER COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| JASPER | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MANUFACTURING | 0 | 3,049 | 6,021 | 8,250 | 8,335 | 8,420 |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | 0 | 0 | 0 | 0 | 0 | 0 |
| **SABINE BASIN** | | | | | | |
| JASPER COUNTY WCID #1 | 0 | 0 | 0 | 0 | 0 | 0 |
| KIRBYVILLE | 0 | 0 | 0 | 0 | 0 | 0 |
| MAURICEVILLE SUD | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MANUFACTURING | 0 | 0 | 0 | 0 | 0 | 0 |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | 0 | 0 | 0 | 0 | 0 | 0 |
| **JEFFERSON COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| BEAUMONT | 0 | 0 | 0 | 0 | 0 | 0 |
| BEVIL OAKS | 0 | 0 | 0 | 0 | 0 | 0 |
| CHINA | 0 | 0 | 0 | 0 | 0 | 0 |
| GROVES | 0 | 0 | 0 | 0 | 0 | 0 |
| JEFFERSON COUNTY WCID #10 | 0 | 0 | 0 | 0 | 0 | 0 |
| MEEKER MUD | 0 | 0 | 0 | 0 | 0 | 0 |
| NEDERLAND | 0 | 0 | 0 | 0 | 0 | 0 |
| NOME | 0 | 0 | 0 | 0 | 0 | 0 |

# Water User Group (WUG) Second-Tier Identified Water Need

| REGION I | WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **JEFFERSON COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| PORT ARTHUR | 0 | 0 | 0 | 0 | 0 | 0 |
| PORT NECHES | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 22 | 57 | 89 |
| MANUFACTURING | 93,772 | 135,897 | 141,948 | 148,018 | 154,093 | 160,406 |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| STEAM ELECTRIC POWER | 13,426 | 15,696 | 18,464 | 21,838 | 25,951 | 30,839 |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | 0 | 0 | 0 | 0 | 0 | 0 |
| **NECHES-TRINITY BASIN** | | | | | | |
| BEAUMONT | 0 | 0 | 0 | 0 | 0 | 0 |
| CHINA | 0 | 0 | 0 | 0 | 0 | 0 |
| GROVES | 0 | 0 | 0 | 0 | 0 | 0 |
| JEFFERSON COUNTY WCID #10 | 0 | 0 | 0 | 0 | 0 | 0 |
| MEEKER MUD | 0 | 0 | 0 | 0 | 0 | 0 |
| NEDERLAND | 0 | 0 | 0 | 0 | 0 | 0 |
| NOME | 0 | 0 | 0 | 0 | 0 | 0 |
| PORT ARTHUR | 0 | 0 | 0 | 0 | 0 | 0 |
| PORT NECHES | 0 | 0 | 0 | 0 | 0 | 0 |
| WEST JEFFERSON COUNTY MWD | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 658 | 1,867 | 3,207 |
| MANUFACTURING | 86,689 | 125,576 | 131,158 | 136,761 | 142,368 | 148,197 |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | 0 | 0 | 0 | 0 | 0 | 0 |
| **NACOGDOCHES COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| APPLEBY WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| CUSHING | 0 | 0 | 0 | 0 | 0 | 0 |
| D&M WSC | 0 | 0 | 0 | 0 | 112 | 234 |
| GARRISON | 0 | 0 | 0 | 0 | 0 | 0 |
| LILLY GROVE SUD | 0 | 0 | 0 | 0 | 0 | 0 |
| MELROSE WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| NACOGDOCHES | 0 | 0 | 0 | 0 | 0 | 0 |
| SWIFT WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| WODEN WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MANUFACTURING | 0 | 0 | 0 | 0 | 0 | 0 |
| MINING | 5,475 | 2,975 | 118 | 0 | 0 | 0 |
| STEAM ELECTRIC POWER | 0 | 799 | 2,224 | 3,961 | 6,078 | 8,594 |
| LIVESTOCK | 1,644 | 1,837 | 2,061 | 2,320 | 2,617 | 3,059 |
| IRRIGATION | 0 | 0 | 0 | 0 | 0 | 0 |
| **NEWTON COUNTY** | | | | | | |
| **SABINE BASIN** | | | | | | |
| MAURICEVILLE SUD | 0 | 0 | 0 | 0 | 0 | 0 |
| NEWTON | 0 | 0 | 0 | 0 | 0 | 0 |
| SOUTH NEWTON WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MANUFACTURING | 0 | 0 | 0 | 0 | 0 | 0 |

# Water User Group (WUG) Second-Tier Identified Water Need

| REGION I | WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **NEWTON COUNTY** | | | | | | |
| **SABINE BASIN** | | | | | | |
| MINING | 115 | 59 | 0 | 0 | 0 | 0 |
| STEAM ELECTRIC POWER | 690 | 3,080 | 5,994 | 9,545 | 13,875 | 19,021 |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | 0 | 0 | 0 | 0 | 0 | 0 |
| **ORANGE COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| BRIDGE CITY | 0 | 0 | 0 | 0 | 0 | 0 |
| MAURICEVILLE SUD | 0 | 0 | 0 | 0 | 0 | 0 |
| ORANGEFIELD WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| PORT ARTHUR | 0 | 0 | 0 | 0 | 0 | 0 |
| ROSE CITY | 0 | 0 | 0 | 0 | 0 | 0 |
| VIDOR | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MANUFACTURING | 0 | 89 | 208 | 314 | 433 | 561 |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| STEAM ELECTRIC POWER | 0 | 14 | 1,038 | 2,286 | 3,807 | 4,846 |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | 932 | 996 | 1,039 | 1,054 | 1,038 | 1,014 |
| **NECHES-TRINITY BASIN** | | | | | | |
| BRIDGE CITY | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| **SABINE BASIN** | | | | | | |
| BRIDGE CITY | 0 | 0 | 0 | 0 | 0 | 0 |
| MAURICEVILLE SUD | 0 | 0 | 0 | 0 | 0 | 0 |
| ORANGE | 0 | 0 | 0 | 0 | 0 | 0 |
| ORANGEFIELD WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| PINEHURST | 0 | 0 | 0 | 0 | 0 | 0 |
| SOUTH NEWTON WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| VIDOR | 0 | 0 | 0 | 0 | 0 | 0 |
| WEST ORANGE | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MANUFACTURING | 2,532 | 8,390 | 14,231 | 19,416 | 25,247 | 31,550 |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | 1,500 | 1,689 | 1,819 | 1,866 | 1,817 | 1,744 |
| **PANOLA COUNTY** | | | | | | |
| **CYPRESS BASIN** | | | | | | |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| **SABINE BASIN** | | | | | | |
| BECKVILLE | 0 | 0 | 0 | 0 | 0 | 0 |
| CARTHAGE | 0 | 0 | 0 | 0 | 0 | 0 |
| GILL WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| TATUM | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MANUFACTURING | 134 | 156 | 176 | 194 | 230 | 309 |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |

# Water User Group (WUG) Second-Tier Identified Water Need

| REGION I | WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **PANOLA COUNTY** | | | | | | |
| **SABINE BASIN** | | | | | | |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | 0 | 0 | 0 | 0 | 0 | 0 |
| **POLK COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| CORRIGAN | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MANUFACTURING | 0 | 0 | 0 | 0 | 0 | 0 |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | 0 | 0 | 0 | 0 | 0 | 0 |
| **RUSK COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| HENDERSON | 0 | 0 | 0 | 0 | 0 | 0 |
| NEW LONDON | 0 | 0 | 0 | 0 | 0 | 0 |
| OVERTON | 0 | 0 | 0 | 0 | 0 | 0 |
| WRIGHT CITY WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MANUFACTURING | 0 | 0 | 0 | 0 | 0 | 0 |
| MINING | 1,075 | 1,814 | 1,742 | 1,666 | 1,603 | 1,598 |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | 0 | 0 | 0 | 0 | 0 | 0 |
| **SABINE BASIN** | | | | | | |
| CHALK HILL SUD | 0 | 0 | 0 | 0 | 0 | 0 |
| CROSS ROADS SUD | 0 | 0 | 0 | 0 | 0 | 0 |
| EASTON | 0 | 0 | 0 | 0 | 0 | 0 |
| ELDERVILLE WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| HENDERSON | 0 | 0 | 0 | 0 | 0 | 0 |
| KILGORE | 0 | 0 | 0 | 0 | 0 | 0 |
| NEW LONDON | 0 | 0 | 0 | 0 | 0 | 0 |
| OVERTON | 0 | 0 | 0 | 0 | 0 | 0 |
| TATUM | 0 | 0 | 0 | 0 | 0 | 0 |
| WEST GREGG SUD | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MANUFACTURING | 0 | 0 | 0 | 0 | 0 | 0 |
| MINING | 0 | 278 | 213 | 143 | 83 | 79 |
| STEAM ELECTRIC POWER | 0 | 0 | 0 | 462 | 8,873 | 18,868 |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | 0 | 0 | 0 | 0 | 0 | 0 |
| **SABINE COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| G M WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| PINELAND | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MANUFACTURING | 0 | 0 | 0 | 0 | 0 | 0 |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| **SABINE BASIN** | | | | | | |
| G M WSC | 0 | 0 | 0 | 0 | 0 | 0 |

# Water User Group (WUG) Second-Tier Identified Water Need

| REGION I | WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **SABINE COUNTY** | | | | | | |
| **SABINE BASIN** | | | | | | |
| HEMPHILL | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| **SAN AUGUSTINE COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| SAN AUGUSTINE | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MANUFACTURING | 0 | 0 | 0 | 0 | 0 | 0 |
| MINING | 2,102 | 1,102 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | 0 | 0 | 0 | 0 | 0 | 0 |
| **SABINE BASIN** | | | | | | |
| G M WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | 0 | 0 | 0 | 0 | 0 | 0 |
| **SHELBY COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| TIMPSON | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 564 | 756 | 991 | 1,276 | 1,625 | 1,625 |
| IRRIGATION | 0 | 0 | 0 | 0 | 0 | 0 |
| **SABINE BASIN** | | | | | | |
| CENTER | 0 | 0 | 0 | 0 | 0 | 0 |
| JOAQUIN | 0 | 0 | 0 | 0 | 0 | 0 |
| TENAHA | 0 | 0 | 0 | 0 | 0 | 0 |
| TIMPSON | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MANUFACTURING | 0 | 0 | 0 | 0 | 0 | 0 |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 803 | 1,619 | 2,611 | 3,823 | 5,299 | 5,299 |
| IRRIGATION | 0 | 0 | 0 | 0 | 0 | 0 |
| **SMITH COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| ARP | 0 | 0 | 0 | 0 | 0 | 0 |
| BULLARD | 40 | 199 | 367 | 549 | 736 | 929 |
| CRYSTAL SYSTEMS INC | 10 | 102 | 215 | 351 | 504 | 634 |
| DEAN WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| JACKSON WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| LINDALE | 49 | 174 | 302 | 440 | 584 | 732 |
| LINDALE RURAL WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| NEW CHAPEL HILL | 0 | 0 | 0 | 0 | 0 | 0 |
| NOONDAY | 0 | 0 | 0 | 0 | 0 | 0 |
| OVERTON | 0 | 0 | 0 | 0 | 0 | 0 |
| R-P-M WSC | 1 | 6 | 10 | 15 | 19 | 23 |

# Water User Group (WUG) Second-Tier Identified Water Need

| REGION I | WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **SMITH COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| SOUTHERN UTILITIES COMPANY | 0 | 0 | 0 | 0 | 0 | 0 |
| TROUP | 0 | 0 | 0 | 0 | 0 | 0 |
| TYLER | 0 | 0 | 0 | 0 | 0 | 0 |
| WALNUT GROVE WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| WHITEHOUSE | 0 | 0 | 0 | 0 | 0 | 0 |
| WRIGHT CITY WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MANUFACTURING | 1,464 | 1,655 | 1,838 | 1,993 | 2,206 | 2,437 |
| MINING | 108 | 113 | 114 | 83 | 54 | 32 |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | 0 | 0 | 0 | 0 | 0 | 0 |
| **TRINITY COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| GROVETON | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | 330 | 330 | 330 | 330 | 330 | 330 |
| **TYLER COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| COLMESNEIL | 0 | 0 | 0 | 0 | 0 | 0 |
| IVANHOE | 0 | 0 | 0 | 0 | 0 | 0 |
| IVANHOE NORTH | 0 | 0 | 0 | 0 | 0 | 0 |
| LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY | 0 | 0 | 0 | 0 | 0 | 0 |
| TYLER COUNTY WSC | 0 | 0 | 0 | 0 | 0 | 0 |
| WOODVILLE | 0 | 0 | 0 | 0 | 0 | 0 |
| COUNTY-OTHER | 0 | 0 | 0 | 0 | 0 | 0 |
| MANUFACTURING | 0 | 0 | 0 | 0 | 0 | 0 |
| MINING | 0 | 0 | 0 | 0 | 0 | 0 |
| STEAM ELECTRIC POWER | 0 | 0 | 0 | 0 | 0 | 0 |
| LIVESTOCK | 0 | 0 | 0 | 0 | 0 | 0 |
| IRRIGATION | 0 | 0 | 0 | 0 | 0 | 0 |

***Second-tier needs are WUG split needs adjusted to include the implementation of recommended demand reduction and direct reuse water management strategies.**

# Water User Group (WUG) Second-Tier Identified Water Need Summary

## REGION I

| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
|---|---|---|---|---|---|---|
| **MUNICIPAL** | 104 | 500 | 920 | 1,514 | 2,315 | 3,124 |
| **COUNTY-OTHER** | 0 | 0 | 0 | 680 | 1,924 | 3,296 |
| **MANUFACTURING** | 195,313 | 286,821 | 308,893 | 329,416 | 348,617 | 368,917 |
| **MINING** | 9,586 | 7,160 | 2,794 | 2,338 | 2,048 | 1,916 |
| **STEAM ELECTRIC POWER** | 25,422 | 32,807 | 43,269 | 56,482 | 80,437 | 108,136 |
| **LIVESTOCK** | 3,011 | 4,212 | 5,663 | 7,419 | 9,541 | 9,983 |
| **IRRIGATION** | 3,518 | 4,011 | 4,452 | 4,812 | 5,076 | 5,427 |

*Second-tier needs are WUG split needs adjusted to include the implementation of recommended demand reduction and direct reuse water management strategies.

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# Appendix 4-C

# Source Water Balance DB17 Report

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The following appendix includes a copy of the Source Water Balance data from the TWDB Data Web Interface known as the DB17. The summary is divided by source, county, basin, and salinity.

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# Source Water Balance (Availability- WUG Supply)

## REGION I

| GROUNDWATER | COUNTY | BASIN | SALINITY | SOURCE WATER BALANCE (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| CARRIZO-WILCOX AQUIFER | ANDERSON | NECHES | FRESH | 2,564 | 2,504 | 2,517 | 2,564 | 2,589 | 2,601 |
| CARRIZO-WILCOX AQUIFER | ANDERSON | TRINITY | FRESH | 976 | 932 | 977 | 1,035 | 1,045 | 1,044 |
| CARRIZO-WILCOX AQUIFER | ANGELINA | NECHES | FRESH | 3,152 | 2,808 | 2,485 | 2,166 | 1,820 | 1,760 |
| CARRIZO-WILCOX AQUIFER | CHEROKEE | NECHES | FRESH | 4,910 | 4,791 | 4,669 | 4,502 | 4,307 | 3,995 |
| CARRIZO-WILCOX AQUIFER | HENDERSON | NECHES | FRESH | 243 | 282 | 311 | 279 | 239 | 195 |
| CARRIZO-WILCOX AQUIFER | HOUSTON | NECHES | FRESH | 522 | 522 | 522 | 522 | 522 | 522 |
| CARRIZO-WILCOX AQUIFER | HOUSTON | TRINITY | FRESH | 1,709 | 1,602 | 1,487 | 1,362 | 1,227 | 1,054 |
| CARRIZO-WILCOX AQUIFER | NACOGDOCHES | NECHES | FRESH | 11,867 | 11,465 | 11,023 | 10,544 | 9,994 | 9,312 |
| CARRIZO-WILCOX AQUIFER | PANOLA | CYPRESS | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| CARRIZO-WILCOX AQUIFER | PANOLA | SABINE | FRESH | 3,534 | 3,533 | 3,374 | 3,373 | 3,371 | 3,369 |
| CARRIZO-WILCOX AQUIFER | RUSK | NECHES | FRESH | 5,558 | 5,524 | 5,504 | 5,486 | 5,440 | 5,411 |
| CARRIZO-WILCOX AQUIFER | RUSK | SABINE | FRESH | 2,389 | 2,380 | 2,370 | 2,359 | 2,343 | 2,306 |
| CARRIZO-WILCOX AQUIFER | SABINE | NECHES | FRESH | 1,236 | 1,236 | 1,236 | 1,236 | 1,236 | 1,236 |
| CARRIZO-WILCOX AQUIFER | SABINE | SABINE | FRESH | 5,113 | 5,113 | 5,113 | 5,113 | 5,113 | 5,113 |
| CARRIZO-WILCOX AQUIFER | SAN AUGUSTINE | NECHES | FRESH | 629 | 541 | 441 | 324 | 196 | 196 |
| CARRIZO-WILCOX AQUIFER | SAN AUGUSTINE | SABINE | FRESH | 176 | 167 | 156 | 144 | 130 | 130 |
| CARRIZO-WILCOX AQUIFER | SHELBY | NECHES | FRESH | 877 | 719 | 429 | 292 | 159 | 159 |
| CARRIZO-WILCOX AQUIFER | SHELBY | SABINE | FRESH | 5,229 | 5,019 | 4,805 | 4,738 | 4,209 | 3,959 |
| CARRIZO-WILCOX AQUIFER | SMITH | NECHES | FRESH | 6,868 | 6,250 | 5,577 | 4,580 | 2,672 | 981 |
| CARRIZO-WILCOX AQUIFER | TRINITY | NECHES | FRESH | 1,114 | 1,114 | 1,114 | 1,114 | 1,114 | 1,114 |
| GULF COAST AQUIFER | HARDIN | NECHES | FRESH | 7,609 | 7,309 | 7,099 | 6,964 | 6,955 | 6,981 |
| GULF COAST AQUIFER | HARDIN | TRINITY | FRESH | 104 | 103 | 102 | 102 | 101 | 101 |
| GULF COAST AQUIFER | JASPER | NECHES | FRESH | 60 | 0 | 5 | 19 | 33 | 39 |
| GULF COAST AQUIFER | JASPER | SABINE | FRESH | 26,688 | 26,703 | 26,719 | 26,735 | 26,751 | 26,759 |
| GULF COAST AQUIFER | JEFFERSON | NECHES | FRESH | 443 | 426 | 406 | 365 | 331 | 293 |
| GULF COAST AQUIFER | JEFFERSON | NECHES-TRINITY | FRESH | 829 | 819 | 805 | 780 | 739 | 687 |
| GULF COAST AQUIFER | NEWTON | NECHES | FRESH | 176 | 176 | 176 | 176 | 176 | 176 |
| GULF COAST AQUIFER | NEWTON | SABINE | FRESH | 30,749 | 30,635 | 30,558 | 30,488 | 30,421 | 30,348 |
| GULF COAST AQUIFER | ORANGE | NECHES | FRESH | 222 | 183 | 161 | 132 | 54 | 0 |
| GULF COAST AQUIFER | ORANGE | NECHES-TRINITY | FRESH | 162 | 162 | 162 | 162 | 162 | 162 |
| GULF COAST AQUIFER | ORANGE | SABINE | FRESH | 279 | 232 | 134 | 40 | 0 | 0 |
| GULF COAST AQUIFER | POLK | NECHES | FRESH | 10,054 | 9,917 | 9,787 | 9,055 | 8,892 | 8,782 |

# Source Water Balance (Availability- WUG Supply)

## REGION I

| GROUNDWATER | COUNTY | BASIN | SALINITY | SOURCE WATER BALANCE (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| GULF COAST AQUIFER | TYLER | NECHES | FRESH | 32,171 | 32,167 | 32,204 | 32,222 | 32,221 | 32,216 |
| OTHER AQUIFER \| UNDIFFERENTIATED | ANDERSON | TRINITY | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| OTHER AQUIFER \| UNDIFFERENTIATED | ANGELINA | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| OTHER AQUIFER \| UNDIFFERENTIATED | CHEROKEE | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| OTHER AQUIFER \| UNDIFFERENTIATED | HENDERSON | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| OTHER AQUIFER \| UNDIFFERENTIATED | HENDERSON | TRINITY | FRESH | 81 | 81 | 81 | 81 | 81 | 81 |
| OTHER AQUIFER \| UNDIFFERENTIATED | HOUSTON | NECHES | FRESH | 196 | 220 | 244 | 267 | 291 | 301 |
| OTHER AQUIFER \| UNDIFFERENTIATED | HOUSTON | TRINITY | FRESH | 518 | 562 | 605 | 650 | 694 | 713 |
| OTHER AQUIFER \| UNDIFFERENTIATED | NACOGDOCHES | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| OTHER AQUIFER \| UNDIFFERENTIATED | POLK | NECHES | FRESH | 287 | 287 | 287 | 287 | 287 | 287 |
| OTHER AQUIFER \| UNDIFFERENTIATED | RUSK | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| OTHER AQUIFER \| UNDIFFERENTIATED | RUSK | SABINE | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| OTHER AQUIFER \| UNDIFFERENTIATED | SABINE | SABINE | FRESH | 99 | 99 | 99 | 99 | 99 | 99 |
| OTHER AQUIFER \| UNDIFFERENTIATED | SAN AUGUSTINE | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| OTHER AQUIFER \| UNDIFFERENTIATED | SMITH | NECHES | FRESH | 687 | 687 | 687 | 687 | 687 | 687 |
| OTHER AQUIFER \| UNDIFFERENTIATED | TRINITY | NECHES | FRESH | 700 | 700 | 700 | 700 | 700 | 700 |
| QUEEN CITY AQUIFER | ANDERSON | NECHES | FRESH | 8,846 | 8,846 | 8,846 | 8,846 | 8,846 | 8,846 |
| QUEEN CITY AQUIFER | ANDERSON | TRINITY | FRESH | 8,405 | 8,405 | 8,405 | 8,405 | 8,405 | 8,405 |
| QUEEN CITY AQUIFER | ANGELINA | NECHES | FRESH | 1,093 | 1,093 | 1,093 | 1,093 | 1,093 | 1,093 |
| QUEEN CITY AQUIFER | CHEROKEE | NECHES | FRESH | 21,337 | 21,337 | 21,337 | 21,337 | 21,337 | 21,337 |
| QUEEN CITY AQUIFER | HENDERSON | NECHES | FRESH | 12,103 | 12,103 | 12,103 | 12,103 | 12,103 | 12,103 |
| QUEEN CITY AQUIFER | HOUSTON | NECHES | FRESH | 117 | 117 | 117 | 117 | 117 | 117 |
| QUEEN CITY AQUIFER | HOUSTON | TRINITY | FRESH | 216 | 216 | 216 | 216 | 216 | 216 |
| QUEEN CITY AQUIFER | NACOGDOCHES | NECHES | FRESH | 4,697 | 4,697 | 4,697 | 4,697 | 4,697 | 4,697 |
| QUEEN CITY AQUIFER | RUSK | NECHES | FRESH | 40 | 40 | 40 | 40 | 40 | 40 |
| QUEEN CITY AQUIFER | RUSK | SABINE | FRESH | 18 | 18 | 18 | 18 | 18 | 18 |
| QUEEN CITY AQUIFER | SAN AUGUSTINE | NECHES | FRESH | 7 | 7 | 7 | 7 | 7 | 7 |
| QUEEN CITY AQUIFER | SAN AUGUSTINE | SABINE | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| QUEEN CITY AQUIFER | SMITH | NECHES | FRESH | 26,841 | 26,623 | 26,402 | 26,160 | 25,906 | 25,419 |
| QUEEN CITY AQUIFER | TRINITY | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| SPARTA AQUIFER | ANDERSON | NECHES | FRESH | 181 | 181 | 181 | 181 | 181 | 181 |
| SPARTA AQUIFER | ANDERSON | TRINITY | FRESH | 144 | 144 | 144 | 144 | 144 | 144 |
| SPARTA AQUIFER | ANGELINA | NECHES | FRESH | 501 | 501 | 501 | 501 | 501 | 501 |
| SPARTA AQUIFER | CHEROKEE | NECHES | FRESH | 202 | 202 | 202 | 202 | 202 | 202 |
| SPARTA AQUIFER | HOUSTON | NECHES | FRESH | 243 | 243 | 243 | 243 | 243 | 243 |

# Source Water Balance (Availability- WUG Supply)

## REGION I

| GROUNDWATER | COUNTY | BASIN | SALINITY | SOURCE WATER BALANCE (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| SPARTA AQUIFER | HOUSTON | TRINITY | FRESH | 494 | 494 | 494 | 494 | 494 | 494 |
| SPARTA AQUIFER | NACOGDOCHES | NECHES | FRESH | 253 | 253 | 253 | 253 | 253 | 253 |
| SPARTA AQUIFER | SABINE | NECHES | FRESH | 18 | 18 | 18 | 18 | 18 | 18 |
| SPARTA AQUIFER | SABINE | SABINE | FRESH | 232 | 232 | 232 | 232 | 232 | 232 |
| SPARTA AQUIFER | SAN AUGUSTINE | NECHES | FRESH | 111 | 111 | 111 | 111 | 111 | 111 |
| SPARTA AQUIFER | SAN AUGUSTINE | SABINE | FRESH | 3 | 3 | 3 | 3 | 3 | 3 |
| SPARTA AQUIFER | TRINITY | NECHES | FRESH | 313 | 313 | 313 | 313 | 313 | 313 |
| YEGUA-JACKSON AQUIFER | ANGELINA | NECHES | FRESH | 12,024 | 12,013 | 12,005 | 11,995 | 11,603 | 11,593 |
| YEGUA-JACKSON AQUIFER | HOUSTON | NECHES | FRESH | 1,324 | 1,324 | 1,324 | 1,324 | 1,324 | 1,324 |
| YEGUA-JACKSON AQUIFER | HOUSTON | TRINITY | FRESH | 3,810 | 3,810 | 3,810 | 3,810 | 3,810 | 3,810 |
| YEGUA-JACKSON AQUIFER | NACOGDOCHES | NECHES | FRESH | 209 | 209 | 209 | 209 | 209 | 209 |
| YEGUA-JACKSON AQUIFER | POLK | NECHES | FRESH | 354 | 354 | 354 | 354 | 354 | 354 |
| YEGUA-JACKSON AQUIFER | SABINE | NECHES | FRESH | 3,017 | 3,017 | 3,017 | 3,017 | 3,017 | 3,017 |
| YEGUA-JACKSON AQUIFER | SABINE | SABINE | FRESH | 565 | 565 | 565 | 565 | 565 | 565 |
| YEGUA-JACKSON AQUIFER | SAN AUGUSTINE | NECHES | FRESH | 1,871 | 1,871 | 1,871 | 1,871 | 1,871 | 1,871 |
| YEGUA-JACKSON AQUIFER | SAN AUGUSTINE | SABINE | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| YEGUA-JACKSON AQUIFER | TRINITY | NECHES | FRESH | 3 | 3 | 3 | 3 | 3 | 3 |
| **GROUNDWATER TOTAL SOURCE WATER BALANCE** | | | | **280,372** | **277,333** | **274,265** | **270,626** | **265,637** | **261,608** |

## REGION I

| REUSE | COUNTY | BASIN | SALINITY | SOURCE WATER BALANCE (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| DIRECT REUSE | ORANGE | SABINE | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| DIRECT REUSE \| IRRIGATION/MANUFACTURING | SHELBY | SABINE | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| DIRECT REUSE \| MANUFACTURING | SABINE | SABINE | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| INDIRECT REUSE \| IRRIGATION | JEFFERSON | NECHES-TRINITY | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| **REUSE TOTAL SOURCE WATER BALANCE** | | | | **0** | **0** | **0** | **0** | **0** | **0** |

## REGION I

| SURFACE WATER | COUNTY | BASIN | SALINITY | SOURCE WATER BALANCE (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| ATHENS LAKE/RESERVOIR | RESERVOIR | NECHES | FRESH | 1,911 | 1,693 | 1,574 | 1,441 | 1,000 | 673 |
| BELLWOOD LAKE/RESERVOIR | RESERVOIR | NECHES | FRESH | 550 | 550 | 550 | 550 | 550 | 550 |
| CENTER LAKE/RESERVOIR | RESERVOIR | SABINE | FRESH | 1,290 | 1,250 | 1,212 | 1,176 | 1,133 | 1,120 |
| CHEROKEE LAKE/RESERVOIR | RESERVOIR | SABINE | FRESH | 8,684 | 8,440 | 8,195 | 7,947 | 7,710 | 7,477 |

# Source Water Balance (Availability- WUG Supply)

## REGION I

| SURFACE WATER | COUNTY | BASIN | SALINITY | SOURCE WATER BALANCE (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| CYPRESS LIVESTOCK LOCAL SUPPLY | PANOLA | CYPRESS | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| HOUSTON COUNTY LAKE/RESERVOIR | RESERVOIR | TRINITY | FRESH | 3,500 | 3,500 | 3,500 | 3,500 | 3,500 | 3,500 |
| JACKSONVILLE LAKE/RESERVOIR | RESERVOIR | NECHES | FRESH | 3,068 | 2,872 | 2,668 | 2,390 | 2,060 | 1,695 |
| KURTH LAKE/RESERVOIR | RESERVOIR | NECHES | FRESH | 7,487 | 7,253 | 7,033 | 6,815 | 6,581 | 6,035 |
| LAKE NACONICHE/RESERVOIR | RESERVOIR | NECHES | FRESH | 4,500 | 4,500 | 4,500 | 4,500 | 4,500 | 4,500 |
| MARTIN LAKE/RESERVOIR | RESERVOIR | SABINE | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| MURVAUL LAKE/RESERVOIR | RESERVOIR | SABINE | FRESH | 14,882 | 14,290 | 14,157 | 14,000 | 13,725 | 12,923 |
| NACOGDOCHES LAKE/RESERVOIR | RESERVOIR | NECHES | FRESH | 9,656 | 8,698 | 7,742 | 6,741 | 5,645 | 4,521 |
| NECHES LIVESTOCK LOCAL SUPPLY | ANDERSON | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES LIVESTOCK LOCAL SUPPLY | ANGELINA | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES LIVESTOCK LOCAL SUPPLY | CHEROKEE | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES LIVESTOCK LOCAL SUPPLY | HARDIN | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES LIVESTOCK LOCAL SUPPLY | HENDERSON | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES LIVESTOCK LOCAL SUPPLY | HOUSTON | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES LIVESTOCK LOCAL SUPPLY | JASPER | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES LIVESTOCK LOCAL SUPPLY | NACOGDOCHES | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES LIVESTOCK LOCAL SUPPLY | ORANGE | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES LIVESTOCK LOCAL SUPPLY | POLK | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES LIVESTOCK LOCAL SUPPLY | RUSK | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES LIVESTOCK LOCAL SUPPLY | SABINE | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES LIVESTOCK LOCAL SUPPLY | SAN AUGUSTINE | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES LIVESTOCK LOCAL SUPPLY | SHELBY | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES LIVESTOCK LOCAL SUPPLY | SMITH | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES LIVESTOCK LOCAL SUPPLY | TRINITY | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES LIVESTOCK LOCAL SUPPLY | TYLER | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES OTHER LOCAL SUPPLY | CHEROKEE | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES OTHER LOCAL SUPPLY | JEFFERSON | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES OTHER LOCAL SUPPLY | NACOGDOCHES | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES OTHER LOCAL SUPPLY | POLK | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |

# Source Water Balance (Availability- WUG Supply)

## REGION I

| SURFACE WATER | COUNTY | BASIN | SALINITY | SOURCE WATER BALANCE (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| NECHES OTHER LOCAL SUPPLY | TYLER | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES RUN-OF-RIVER | ANDERSON | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES RUN-OF-RIVER | ANGELINA | NECHES | FRESH | 74 | 74 | 74 | 74 | 74 | 74 |
| NECHES RUN-OF-RIVER | CHEROKEE | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES RUN-OF-RIVER | HARDIN | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES RUN-OF-RIVER | HOUSTON | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES RUN-OF-RIVER | JASPER | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES RUN-OF-RIVER | JEFFERSON | NECHES | BRACKISH | 752,152 | 752,152 | 752,152 | 752,152 | 752,152 | 752,152 |
| NECHES RUN-OF-RIVER | NACOGDOCHES | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES RUN-OF-RIVER | ORANGE | NECHES | BRACKISH | 17,310 | 17,310 | 17,310 | 17,310 | 17,310 | 17,310 |
| NECHES RUN-OF-RIVER | RUSK | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES RUN-OF-RIVER | SABINE | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES RUN-OF-RIVER | SMITH | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES RUN-OF-RIVER | TRINITY | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES RUN-OF-RIVER | TYLER | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES RUN-OF-RIVER \| ANGELINA & NECHES RIVER AUTHORITY | SHELBY | NECHES | FRESH | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 |
| NECHES RUN-OF-RIVER \| BEAUMONT | JEFFERSON | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES RUN-OF-RIVER \| PINE ISLAND BAYOU | JASPER | NECHES | FRESH | 9,084 | 0 | 0 | 0 | 0 | 0 |
| NECHES-TRINITY LIVESTOCK LOCAL SUPPLY | JEFFERSON | NECHES-TRINITY | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| NECHES-TRINITY OTHER LOCAL SUPPLY | JEFFERSON | NECHES-TRINITY | FRESH | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 |
| NECHES-TRINITY RUN-OF-RIVER | JEFFERSON | NECHES-TRINITY | FRESH | 1,160 | 1,160 | 1,160 | 1,160 | 1,160 | 1,160 |
| PALESTINE LAKE/RESERVOIR | RESERVOIR | NECHES | FRESH | 189,452 | 186,766 | 184,049 | 181,225 | 178,289 | 175,309 |
| PINKSTON LAKE/RESERVOIR | RESERVOIR | NECHES | FRESH | 860 | 655 | 463 | 276 | 68 | 0 |
| RUSK CITY LAKE/RESERVOIR | RESERVOIR | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| SABINE LIVESTOCK LOCAL SUPPLY | JASPER | SABINE | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| SABINE LIVESTOCK LOCAL SUPPLY | NEWTON | SABINE | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| SABINE LIVESTOCK LOCAL SUPPLY | ORANGE | SABINE | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| SABINE LIVESTOCK LOCAL SUPPLY | PANOLA | SABINE | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| SABINE LIVESTOCK LOCAL SUPPLY | RUSK | SABINE | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| SABINE LIVESTOCK LOCAL SUPPLY | SABINE | SABINE | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| SABINE LIVESTOCK LOCAL SUPPLY | SAN AUGUSTINE | SABINE | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| SABINE LIVESTOCK LOCAL SUPPLY | SHELBY | SABINE | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |

# Source Water Balance (Availability- WUG Supply)

## REGION I

| SURFACE WATER | COUNTY | BASIN | SALINITY | SOURCE WATER BALANCE (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| SABINE OTHER LOCAL SUPPLY | NEWTON | SABINE | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| SABINE OTHER LOCAL SUPPLY | ORANGE | SABINE | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| SABINE OTHER LOCAL SUPPLY | RUSK | SABINE | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| SABINE RUN-OF-RIVER | NEWTON | SABINE | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| SABINE RUN-OF-RIVER | ORANGE | SABINE | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| SABINE RUN-OF-RIVER | ORANGE | SABINE | BRACKISH | 267,000 | 267,000 | 267,000 | 267,000 | 267,000 | 267,000 |
| SABINE RUN-OF-RIVER | PANOLA | SABINE | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| SABINE RUN-OF-RIVER | RUSK | SABINE | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| SABINE RUN-OF-RIVER \| SRA CANAL | NEWTON | SABINE | FRESH | 70,364 | 70,364 | 70,364 | 70,364 | 70,364 | 70,364 |
| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | RESERVOIR | NECHES | FRESH | 661,066 | 569,519 | 554,181 | 540,411 | 526,638 | 512,023 |
| SAN AUGUSTINE LAKE/RESERVOIR | RESERVOIR | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| STRIKER LAKE/RESERVOIR | RESERVOIR | NECHES | FRESH | 7,077 | 6,250 | 5,423 | 4,597 | 3,770 | 2,984 |
| TIMPSON LAKE/RESERVOIR | RESERVOIR | NECHES | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| TOLEDO BEND LAKE/RESERVOIR | RESERVOIR | SABINE | FRESH | 723,022 | 723,021 | 723,021 | 723,021 | 723,021 | 723,021 |
| TOLEDO BEND LAKE/RESERVOIR \| LOUISIANA PORTION | RESERVOIR | SABINE-LOUISIANA | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| TRINITY LIVESTOCK LOCAL SUPPLY | ANDERSON | TRINITY | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| TRINITY LIVESTOCK LOCAL SUPPLY | HOUSTON | TRINITY | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| TRINITY RUN-OF-RIVER | ANDERSON | TRINITY | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| TRINITY RUN-OF-RIVER | HOUSTON | TRINITY | FRESH | 0 | 0 | 0 | 0 | 0 | 0 |
| TYLER LAKE/RESERVOIR | RESERVOIR | NECHES | FRESH | 18,571 | 17,791 | 16,974 | 16,045 | 14,988 | 13,875 |
| **SURFACE WATER TOTAL SOURCE WATER BALANCE** | | | | **2,774,720** | **2,667,108** | **2,645,302** | **2,624,695** | **2,603,238** | **2,580,266** |
| | | | | | | | | | |
| **REGION I TOTAL SOURCE WATER BALANCE** | | | | **3,055,092** | **2,944,441** | **2,919,567** | **2,895,321** | **2,868,875** | **2,841,874** |

# Appendix 4-D

# Supply vs Demand

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The following appendix includes a copy of the Water User Group (WUG) Category summary report data from the TWDB Data Web Interface known as the DB17. The summary presents supply, demand, and population (where applicable) for each of the seven summary WUGs.

1. Municipal
2. County-Other
3. Manufacturing
4. Mining
5. Steam Electric Power
6. Livestock
7. Irrigation

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# Water User Group (WUG) Category Summary

| REGION I | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
|---|---|---|---|---|---|---|
| **MUNICIPAL** | | | | | | |
| POPULATION | 887,998 | 950,261 | 1,007,610 | 1,068,183 | 1,129,870 | 1,193,676 |
| DEMANDS (acre-feet per year) | 158,273 | 164,784 | 171,262 | 179,762 | 189,621 | 200,182 |
| EXISTING SUPPLIES (acre-feet per year) | 199,616 | 204,378 | 208,309 | 212,559 | 217,462 | 222,918 |
| NEEDS (acre-feet per year)* | (121) | (534) | (1,476) | (3,902) | (6,947) | (10,333) |
| **COUNTY-OTHER** | | | | | | |
| POPULATION | 263,558 | 283,712 | 302,071 | 320,684 | 339,973 | 359,976 |
| DEMANDS (acre-feet per year) | 30,373 | 31,518 | 32,895 | 34,778 | 37,001 | 39,425 |
| EXISTING SUPPLIES (acre-feet per year) | 37,322 | 38,350 | 39,563 | 39,947 | 40,397 | 40,885 |
| NEEDS (acre-feet per year)* | 0 | 0 | 0 | (680) | (1,924) | (3,296) |
| **MANUFACTURING** | | | | | | |
| DEMANDS (acre-feet per year) | 608,667 | 800,989 | 838,639 | 874,546 | 909,373 | 945,886 |
| EXISTING SUPPLIES (acre-feet per year) | 424,528 | 524,922 | 540,430 | 555,752 | 571,334 | 587,497 |
| NEEDS (acre-feet per year)* | (195,313) | (286,821) | (308,893) | (329,416) | (348,617) | (368,917) |
| **MINING** | | | | | | |
| DEMANDS (acre-feet per year) | 27,523 | 24,547 | 18,169 | 15,488 | 12,986 | 12,093 |
| EXISTING SUPPLIES (acre-feet per year) | 22,329 | 22,235 | 21,684 | 21,151 | 20,679 | 20,853 |
| NEEDS (acre-feet per year)* | (9,586) | (7,160) | (2,794) | (2,338) | (2,048) | (1,916) |
| **STEAM ELECTRIC POWER** | | | | | | |
| DEMANDS (acre-feet per year) | 82,018 | 95,544 | 112,035 | 132,137 | 156,640 | 184,714 |
| EXISTING SUPPLIES (acre-feet per year) | 93,545 | 93,545 | 93,545 | 93,545 | 93,545 | 93,545 |
| NEEDS (acre-feet per year)* | (25,422) | (32,807) | (43,269) | (56,482) | (80,437) | (108,136) |
| **LIVESTOCK** | | | | | | |
| DEMANDS (acre-feet per year) | 24,027 | 25,549 | 27,361 | 29,521 | 32,081 | 32,764 |
| EXISTING SUPPLIES (acre-feet per year) | 25,667 | 25,806 | 25,983 | 26,173 | 26,070 | 25,992 |
| NEEDS (acre-feet per year)* | (3,011) | (4,212) | (5,663) | (7,419) | (9,541) | (9,983) |
| **IRRIGATION** | | | | | | |
| DEMANDS (acre-feet per year) | 177,919 | 187,894 | 194,851 | 197,546 | 195,445 | 192,186 |
| EXISTING SUPPLIES (acre-feet per year) | 224,688 | 224,930 | 225,111 | 225,193 | 225,114 | 225,033 |
| NEEDS (acre-feet per year)* | (3,518) | (4,011) | (4,452) | (4,812) | (5,076) | (5,427) |
| **REGION TOTALS** | | | | | | |
| POPULATION | 1,151,556 | 1,233,973 | 1,309,681 | 1,388,867 | 1,469,843 | 1,553,652 |
| DEMANDS (acre-feet per year) | 1,108,800 | 1,330,825 | 1,395,212 | 1,463,778 | 1,533,147 | 1,607,250 |
| EXISTING SUPPLIES (acre-feet per year) | 1,027,695 | 1,134,166 | 1,154,625 | 1,174,320 | 1,194,601 | 1,216,723 |
| NEEDS (acre-feet per year)* | (236,971) | (335,545) | (366,547) | (405,049) | (454,590) | (508,008) |

*WUG supplies and projected demands are entered for each of a WUG's region-county-basin divisions. The needs shown in the WUG Category Summary report are calculated by first deducting the WUG split's projected demand from its total existing water supply volume. If the WUG split has a greater existing supply volume than projected demand in any given decade, this amount is considered a surplus volume. Before aggregating the difference between supplies and demands to the WUG category level, calculated surpluses are updated to zero so that only the WUGs with needs in the decade are included with the Needs totals.

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# Appendix 4-E

# Socioeconomic Impact Analysis

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A socioeconomic impact analysis of not meeting identified water needs has been conducted by the TWDB. The following appendix includes the full report and analysis from the TWDB.

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WUG Unmet Need data report from the TWDB Data Web Interface (DB17)

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# Water User Group (WUG) Unmet Needs

| REGION I | WUG UNMET NEEDS (ACRE-FEET PER YEAR) | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **ANDERSON COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| STEAM ELECTRIC POWER | 0 | 0 | 0 | 0 | 0 | 4,336 |
| **ANGELINA COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| MANUFACTURING | 4,722 | 0 | 0 | 0 | 0 | 0 |
| **HENDERSON COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| ATHENS | 0 | 0 | 0 | 0 | 0 | 15 |
| **TRINITY COUNTY** | | | | | | |
| **NECHES BASIN** | | | | | | |
| IRRIGATION | 330 | 330 | 330 | 330 | 330 | 330 |

*WUG supplies and projected demands are entered for each of a WUG's region-county-basin divisions. The unmet needs shown in the WUG Unmet Needs report are calculated by first deducting the WUG split's projected demand from the sum of its total existing water supply volume and all associated recommended water management strategy water volumes. If the WUG split has a greater future supply volume than projected demand in any given decade, this amount is considered a surplus volume. In order to display only unmet needs associated with the WUG split, these surplus volumes are updated to a zero and the unmet needs water volumes are shown as absolute values.

# Water User Group (WUG) Unmet Needs Summary

## REGION I

| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
|---|---|---|---|---|---|---|
| **MUNICIPAL** | 0 | 0 | 0 | 0 | 0 | 15 |
| **COUNTY-OTHER** | 0 | 0 | 0 | 0 | 0 | 0 |
| **MANUFACTURING** | 4,722 | 0 | 0 | 0 | 0 | 0 |
| **MINING** | 0 | 0 | 0 | 0 | 0 | 0 |
| **STEAM ELECTRIC POWER** | 0 | 0 | 0 | 0 | 0 | 4,336 |
| **LIVESTOCK** | 0 | 0 | 0 | 0 | 0 | 0 |
| **IRRIGATION** | 330 | 330 | 330 | 330 | 330 | 330 |

*WUG supplies and projected demands are entered for each of a WUG's region-county-basin divisions. The unmet needs shown in the WUG Unmet Needs Summary report are calculated by first deducting the WUG split's projected demand from the sum of its total existing water supply volume and all associated recommended water management strategy water volumes. If the WUG split has a greater future supply volume than projected demand in any given decade, this amount is considered a surplus volume. Before aggregating the difference between supplies and demands to the WUG category level, calculated surpluses are updated to zero so that only the WUGs with unmet needs in the decade are included with the Needs totals. Unmet needs water volumes are shown as absolute values.

# Socioeconomic Impacts of Projected Water Shortages for the Region I Regional Water Planning Area

**Prepared in Support of the 2016 Region I Regional Water Plan**

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September, 2015

# Table of Contents

## Executive Summary

Evaluating the social and economic impacts of not meeting identified water needs is a required part of the regional water planning process. The Texas Water Development Board (TWDB) estimates those impacts for regional water planning groups, and summarizes the impacts in the state water plan. The analysis presented is for the Region I Regional Water Planning Group.

Based on projected water demands and existing water supplies, the Region I planning group identified water needs (potential shortages) that would occur within its region under a repeat of the drought of record for six water use categories. The TWDB then estimated the socioeconomic impacts of those needs—if they are not met—for each water use category and as an aggregate for the region.

The analysis was performed using an economic modeling software package, IMPLAN (Impact for Planning Analysis), as well as other economic analysis techniques, and represents a snapshot of socioeconomic impacts that may occur during a single year during a drought of record within each of the planning decades. For each water use category, the evaluation focused on estimating income losses and job losses. The income losses represent an approximation of gross domestic product (GDP) that would be foregone if water needs are not met.

The analysis also provides estimates of financial transfer impacts, which include tax losses (state, local, and utility tax collections); water trucking costs; and utility revenue losses. In addition, social impacts were estimated, encompassing lost consumer surplus (a welfare economics measure of consumer wellbeing); as well as population and school enrollment losses.

It is estimated that not meeting the identified water needs in Region I would result in an annually combined lost income impact of approximately $20.4 billion in 2020, increasing to $28.1 billion in 2070 (Table ES-1). In 2020, the region would lose approximately 92,000 jobs, and by 2070 job losses would increase to approximately 111,000.

All impact estimates are in year 2013 dollars and were calculated using a variety of data sources and tools including the use of a region-specific IMPLAN model, data from the TWDB annual water use estimates, the U.S. Census Bureau, Texas Agricultural Statistics Service, and Texas Municipal League.

**Table ES-1: Region I Socioeconomic Impact Summary**

| Regional Economic Impacts | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
|---|---|---|---|---|---|---|
| **Income losses ($ millions)*** | $20,408 | $24,297 | $23,015 | $24,409 | $26,065 | $28,108 |
| **Job losses** | 92,203 | 102,185 | 93,660 | 98,990 | 105,134 | 111,205 |
| **Financial Transfer Impacts** | **2020** | **2030** | **2040** | **2050** | **2060** | **2070** |
| **Tax losses on production and imports ($ millions)*** | $1,779 | $1,772 | $1,410 | $1,454 | $1,504 | $1,568 |
| **Water trucking costs ($ millions)*** | - | - | - | - | $0 | $0 |
| **Utility revenue losses ($ millions)*** | $0 | $1 | $4 | $12 | $20 | $34 |
| **Utility tax revenue losses ($ millions)*** | $0 | $0 | $0 | $0 | $0 | $0 |
| **Social Impacts** | **2020** | **2030** | **2040** | **2050** | **2060** | **2070** |
| **Consumer surplus losses ($ millions)*** | $0 | $0 | $1 | $2 | $5 | $9 |
| **Population losses** | 16,928 | 18,761 | 17,196 | 18,175 | 19,303 | 20,417 |
| **School enrollment losses** | 3,132 | 3,471 | 3,181 | 3,362 | 3,571 | 3,777 |

**** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000.***

# 1 Introduction

Water shortages during a repeat of the drought of record would likely curtail or eliminate certain economic activity in businesses and industries that rely heavily on water. Insufficient water supplies could not only have an immediate and real impact on existing businesses and industry, but they could also adversely and chronically affect economic development in Texas. From a social perspective, water supply reliability is critical as well. Shortages could disrupt activity in homes, schools and government and could adversely affect public health and safety. For these reasons, it is important to evaluate and understand how water supply shortages during drought could impact communities throughout the state.

Administrative rules (31 Texas Administrative Code §357.33 (c)) require that regional water planning groups evaluate the social and economic impacts of not meeting water needs as part of the regional water planning process, and rules direct the TWDB staff to provide technical assistance upon request. Staff of the TWDB's Water Use, Projections, & Planning Division designed and conducted this analysis in support of the Region I Regional Water Planning Group.

This document summarizes the results of the analysis and discusses the methodology used to generate the results. Section 1 summarizes the water needs calculation performed by the TWDB based on the regional water planning group's data. Section 2 describes the methodology for the impact assessment and discusses approaches and assumptions specific to each water use category (i.e., irrigation, livestock, mining, steam-electric, municipal and manufacturing). Section 3 presents the results for each water use category with results summarized for the region as a whole. Appendix A presents details on the socioeconomic impacts by county.

## 1.1 Identified Regional Water Needs (Potential Shortages)

As part of the regional water planning process, the TWDB adopted water demand projections for each water user group (WUG) with input from the planning groups. WUGs are composed of cities, utilities, combined rural areas (designated as county-other), and the county-wide water use of irrigation, livestock, manufacturing, mining and steam-electric power. The demands are then compared to the existing water supplies of each WUG to determine potential shortages, or needs, by decade. Existing water supplies are legally and physically accessible for immediate use in the event of drought. Projected water demands and existing supplies are compared to identify either a surplus or a need for each WUG.

Table 1-1 summarizes the region's identified water needs in the event of a repeat of drought of the record. Demand management, such as conservation, or the development of new infrastructure to increase supplies are water management strategies that may be recommended by the planning group to meet those needs. This analysis assumes that no strategies are implemented, and that the identified needs correspond to future water shortages. Note that projected water needs generally increase over time, primarily due to anticipated population and economic growth. To provide a general sense of proportion, total projected needs as an overall percentage of total demand by water use category are presented in aggregate in Table 1-1. Projected needs for individual water user groups within the aggregate vary greatly, and may reach 100% for a given WUG and water use category. Detailed water needs by WUG and county appear in Chapter 4 of the 2016 Region I Regional Water Plan.

**Table 1-1 Regional Water Needs Summary by Water Use Category**

| Water Use Category | | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
|---|---|---|---|---|---|---|---|
| **Irrigation** | Water Needs (acre-feet per year) | 3,518 | 4,011 | 4,452 | 4,812 | 5,076 | 5,427 |
| | % of the category's total water demand | 2% | 2% | 2% | 2% | 3% | 3% |
| **Livestock** | Water Needs (acre-feet per year) | 3,011 | 4,212 | 5,663 | 7,419 | 9,541 | 9,983 |
| | % of the category's total water demand | 13% | 16% | 21% | 25% | 30% | 30% |
| **Manufacturing** | Water Needs (acre-feet per year) | 196,450 | 287,997 | 310,077 | 330,608 | 349,817 | 370,080 |
| | % of the category's total water demand | 32% | 36% | 37% | 38% | 38% | 39% |
| **Mining** | Water Needs (acre-feet per year) | 9,796 | 7,160 | 2,794 | 2,338 | 2,048 | 1,916 |
| | % of the category's total water demand | 36% | 29% | 15% | 15% | 16% | 16% |
| **Municipal** | Water Needs (acre-feet per year) | 120 | 535 | 1,483 | 4,597 | 8,889 | 13,646 |
| | % of the category's total water demand | <0.5% | <0.5% | 1% | 2% | 4% | 6% |
| **Steam-electric power** | Water Needs (acre-feet per year) | 25,422 | 33,529 | 44,283 | 57,789 | 82,036 | 110,014 |
| | % of the category's total water demand | 31% | 35% | 40% | 44% | 52% | 60% |
| **Total water needs (acre-feet per year)** | | **238,317** | **337,444** | **368,752** | **407,563** | **457,407** | **511,066** |

# 2 Economic Impact Assessment Methodology Summary

This portion of the report provides a summary of the methodology used to estimate the potential economic impacts of future water shortages. The general approach employed in the analysis was to obtain estimates for income and job losses on the smallest geographic level that the available data would support, tie those values to their accompanying historic water use estimate (volume), and thereby determine a maximum impact per acre-foot of shortage for each of the socioeconomic measures. The calculations of economic impacts were based on the overall composition of the economy using many underlying economic "sectors." Sectors in this analysis refer to one or more of the 440 specific production sectors of the economy designated within IMPLAN (Impact for Planning Analysis), the economic impact modeling software used for this assessment. Economic impacts within this report are

estimated for approximately 310 of those sectors, with the focus on the more water intense production sectors. The economic impacts for a single water use category consist of an aggregation of impacts to multiple related economic sectors.

## 2.1 Impact Assessment Measures

A required component of the regional and state water plans is to estimate the potential economic impacts of shortages due to a drought of record. Consistent with previous water plans, several key variables were estimated and are described in Table 2-1.

**Table 2-1 Socioeconomic Impact Analysis Measures**

| Regional Economic Impacts | Description |
|---|---|
| **Income losses - value added** | The value of output less the value of intermediate consumption; it is a measure of the contribution to GDP made by an individual producer, industry, sector, or group of sectors within a year. For a shortage, value added is a measure of the income losses to the region, county, or WUG and includes the direct, indirect and induced monetary impacts on the region. |
| **Income losses - electrical power purchase costs** | Proxy for income loss in the form of additional costs of power as a result of impacts of water shortages. |
| **Job losses** | Number of part-time and full-time jobs lost due to the shortage. |
| **Financial Transfer Impacts** | **Description** |
| **Tax losses on production and imports** | Sales and excise taxes (not collected due to the shortage), customs duties, property taxes, motor vehicle licenses, severance taxes, other taxes, and special assessments less subsidies. |
| **Water trucking costs** | Estimate for shipping potable water. |
| **Utility revenue losses** | Foregone utility income due to not selling as much water. |
| **Utility tax revenue losses** | Foregone miscellaneous gross receipts tax collections. |
| **Social Impacts** | **Description** |
| **Consumer surplus losses** | A welfare measure of the lost value to consumers accompanying less water use. |
| **Population losses** | Population losses accompanying job losses. |
| **School enrollment losses** | School enrollment losses (K-12) accompanying job losses. |

### 2.1.1 Regional Economic Impacts

Two key measures were included within the regional economic impacts classification: income losses and job losses. Income losses presented consist of the sum of value added losses and additional purchase costs of electrical power. Job losses are also presented as a primary economic impact measure.

#### *Income Losses - Value Added Losses*

Value added is the value of total output less the value of the intermediate inputs also used in production of the final product. Value added is similar to Gross Domestic Product (GDP), a familiar measure of the productivity of an economy. The loss of value added due to water shortages was estimated by input-output analysis using the IMPLAN software package, and includes the direct, indirect, and induced monetary impacts on the region.

#### *Income Losses - Electric Power Purchase Costs*

The electrical power grid and market within the state is a complex interconnected system. The industry response to water shortages, and the resulting impact on the region, are not easily modeled using traditional input/output impact analysis and the IMPLAN model. Adverse impacts on the region will occur, and were represented in this analysis by the additional costs associated with power purchases from other generating plants within the region or state. Consequently, the analysis employed additional power purchase costs as a proxy for the value added impacts for that water use category, and these are included as a portion of the overall income impact for completeness.

For the purpose of this analysis, it was assumed that power companies with insufficient water will be forced to purchase power on the electrical market at a projected higher rate of 5.60 cents per kilowatt hour. This rate is based upon the average day-ahead market purchase price of electricity in Texas from the recent drought period in 2011.

#### *Job Losses*

The number of jobs lost due to the economic impact was estimated using IMPLAN output associated with the water use categories noted in Table 1-1. Because of the difficulty in predicting outcomes and a lack of relevant data, job loss estimates were not calculated for the steam-electric power production or for certain municipal water use categories.

### 2.1.2 Financial Transfer Impacts

Several of the impact measures estimated within the analysis are presented as supplemental information, providing additional detail concerning potential impacts on a sub-portion of the economy or government. Measures included in this category include lost tax collections (on production and imports), trucking costs for imported water, declines in utility revenues, and declines in utility tax revenue collected by the state. Many of these measures are not solely adverse, with some having both positive and negative impacts. For example, cities and residents would suffer if forced to pay large costs for trucking in potable water. Trucking firms, conversely, would benefit from the transaction. Additional detail for each of these measures follows.

### *Tax Losses on Production and Imports*

Reduced production of goods and services accompanying water shortages adversely impacts the collection of taxes by state and local government. The regional IMPLAN model was used to estimate reduced tax collections associated with the reduced output in the economy.

### *Water Trucking Costs*

In instances where water shortages for a municipal water user group were estimated to be 80 percent or more of water demands, it was assumed that water would be trucked in to support basic consumption and sanitation needs. For water shortages of 80 percent or greater, a fixed cost of $20,000 per acre-foot of water was calculated and presented as an economic cost. This water trucking cost was applied for both the residential and non-residential portions of municipal water needs and only impacted a small number of WUGs statewide.

### *Utility Revenue Losses*

Lost utility income was calculated as the price of water service multiplied by the quantity of water not sold during a drought shortage. Such estimates resulted from city-specific pricing data for both water and wastewater. These water rates were applied to the potential water shortage to determine estimates of lost utility revenue as water providers sold less water during the drought due to restricted supplies.

### *Utility Tax Losses*

Foregone utility tax losses included estimates of uncollected miscellaneous gross receipts taxes. Reduced water sales reduce the amount of utility tax that would be collected by the State of Texas for water and wastewater service sales.

## 2.1.3 Social Impacts

### *Consumer Surplus Losses of Municipal Water Users*

Consumer surplus loss is a measure of impact to the wellbeing of municipal water users when their water use is restricted. Consumer surplus is the difference between how much a consumer is willing and able to pay for the commodity (i.e., water) and how much they actually have to pay. The difference is a benefit to the consumer's wellbeing since they do not have to pay as much for the commodity as they would be willing to pay. However, consumer's access to that water may be limited, and the associated consumer surplus loss is an estimate of the equivalent monetary value of the negative impact to the consumer's wellbeing, for example, associated with a diminished quality of their landscape (i.e., outdoor use). Lost consumer surplus estimates for reduced outdoor and indoor use, as well as residential and commercial/institutional demands, were included in this analysis. Consumer surplus is an attempt to measure effects on wellbeing by monetizing those effects; therefore, these values should not be added to the other monetary impacts estimated in the analysis.

Lost consumer surplus estimates varied widely by location and type. For a 50 percent shortage, the estimated statewide consumer surplus values ranged from $55 to $2,500 per household (residential use), and from $270 to $17,400 per firm (non-residential).

#### *Population and School Enrollment Losses*

Population losses due to water shortages, as well as the related loss of school enrollment, were based upon the job loss estimates and upon a recent study of job layoffs and the resulting adjustment of the labor market, including the change in population.[1] The study utilized Bureau of Labor Statistics data regarding layoffs between 1996 and 2013, as well as Internal Revenue Service data regarding migration, to model an estimate of the change in the population as the result of a job layoff event. Layoffs impact both out-migration, as well as in-migration into an area, both of which can negatively affect the population of an area. In addition, the study found that a majority of those who did move following a layoff moved to another labor market rather than an adjacent county. Based on this study, a simplified ratio of job and net population losses was calculated for the state as a whole: for every 100 jobs lost, 18 people were assumed to move out of the area. School enrollment losses were estimated as a proportion of the population lost.

## 2.2 Analysis Context

The context of the economic impact analysis involves situations where there are physical shortages of surface or groundwater due to drought of record conditions. Anticipated shortages may be nonexistent in earlier decades of the planning horizon, yet population growth or greater industrial, agricultural or other sector demands in later decades may result in greater overall demand, exceeding the existing supplies. Estimated socioeconomic impacts measure what would happen if water user groups experience water shortages for a period of one year. Actual socioeconomic impacts would likely become larger as drought of record conditions persist for periods greater than a single year.

### 2.2.1 IMPLAN Model and Data

Input-Output analysis using the IMPLAN (Impact for Planning Analysis) software package was the primary means of estimating value added, jobs, and taxes. This analysis employed county and regional level models to determine key impacts. IMPLAN is an economic impact model, originally developed by the U.S. Forestry Service in the 1970's to model economic activity at varying geographic levels. The model is currently maintained by the Minnesota IMPLAN Group (MIG Inc.) which collects and sells county and state specific data and software. The year 2011 version of IMPLAN, employing data for all 254 Texas counties, was used to provide estimates of value added, jobs, and taxes on production for the economic sectors associated with the water user groups examined in the study. IMPLAN uses 440 sector-specific Industry Codes, and those that rely on water as a primary input were assigned to their relevant planning water user categories (manufacturing, mining, irrigation, etc.). Estimates of value added for a water use category were obtained by summing value added estimates across the relevant IMPLAN sectors

[1] Foote, Andrew, Grosz, Michel, Stevens, Ann. "Locate Your Nearest Exit: Mass Layoffs and Local Labor Market Response." University of California, Davis. April 2015. http://paa2015.princeton.edu/uploads/150194

associated with that water use category. Similar calculations were performed for the job and tax losses on production and import impact estimates.

Note that the value added estimates, as well as the job and tax estimates from IMPLAN, include three components:

- *Direct effects* representing the initial change in the industry analyzed;
- *Indirect effects* that are changes in inter-industry transactions as supplying industries respond to reduced demands from the directly affected industries; and,
- *Induced effects* that reflect changes in local spending that result from reduced household income among employees in the directly and indirectly affected industry sectors.

### 2.2.2 Elasticity of Economic Impacts

The economic impact of a water need is based on the relative size of the water need to the water demand for each water user group (Figure 2-1). Smaller water shortages, for example, less than 5 percent, were anticipated to result in no initial negative economic impact because water users are assumed to have a certain amount of flexibility in dealing with small shortages. As a water shortage deepens, however, such flexibility lessens and results in actual and increasing economic losses, eventually reaching a representative maximum impact estimate per unit volume of water. To account for such ability to adjust, an elasticity adjustment function was used in estimating impacts for several of the measures. Figure 2-1 illustrates the general relationship for the adjustment functions. Negative impacts are assumed to begin accruing when the shortage percentage reaches the lower bound b1 (10 percent in Figure 2-1), with impacts then increasing linearly up to the 100 percent impact level (per unit volume) once the upper bound for adjustment reaches the b2 level shortage (50 percent in Figure 2-1 example).

Initially, the combined total value of the three value added components (direct, indirect, and induced) was calculated and then converted into a per acre-foot economic value based on historical TWDB water use estimates within each particular water use category. As an example, if the total, annual value added for livestock in the region was $2 million and the reported annual volume of water used in that industry was 10,000 acre-feet, the estimated economic value per acre-foot of water shortage would be $200 per acre-foot. Negative economic impacts of shortages were then estimated using this value as the maximum impact estimate ($200 per acre-foot in the example) applied to the anticipated shortage volume in acre-feet and adjusted by the economic impact elasticity function. This adjustment varied with the severity as percentage of water demand of the anticipated shortage. If one employed the sample elasticity function shown in Figure 2-1, a 30% shortage in the water use category would imply an economic impact estimate of 50% of the original $200 per acre-foot impact value (i.e., $100 per acre-foot).

Such adjustments were not required in estimating consumer surplus, nor for the estimates of utility revenue losses or utility tax losses. Estimates of lost consumer surplus relied on city-specific demand curves with the specific lost consumer surplus estimate calculated based on the relative percentage of the city's water shortage. Estimated changes in population as well as changes in school enrollment were indirectly related to the elasticity of job losses.

Assumed values for the bounds b1 and b2 varied with water use category under examination and are presented in Table 2-2.

**Figure 2-1 Example Economic Impact Elasticity Function (as applied to a single water user's shortage)**

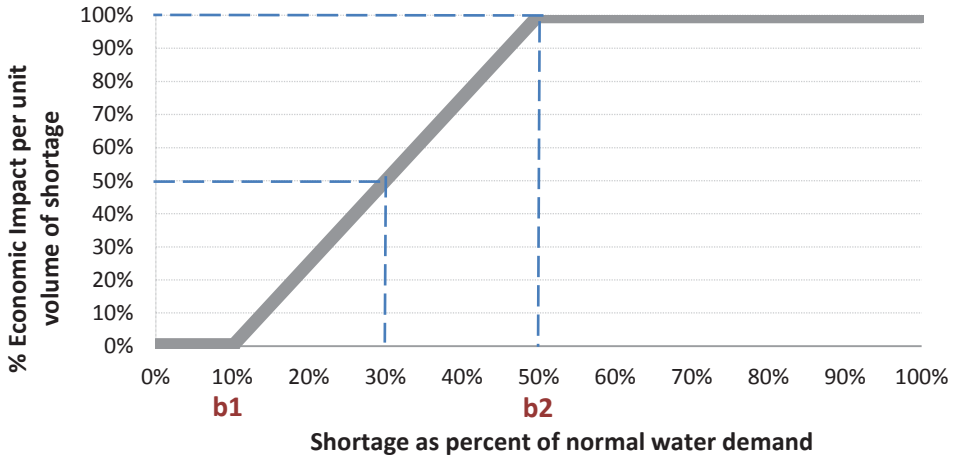


**Table 2-2 Economic Impact Elasticity Function Lower and Upper Bounds**

| Water Use Category | Lower Bound (b1) | Upper Bound (b2) |
|---|---|---|
| **Irrigation** | **5%** | **50%** |
| **Livestock** | **5%** | **10%** |
| **Manufacturing** | **10%** | **50%** |
| **Mining** | **10%** | **50%** |
| **Municipal (non-residential water intensive)** | **50%** | **80%** |
| **Steam-electric power** | **20%** | **70%** |

## 2.3 Analysis Assumptions and Limitations

Modeling of complex systems requires making assumptions and accepting limitations. This is particularly true when attempting to estimate a wide variety of economic impacts over a large geographic area and into future decades. Some of the key assumptions and limitations of the methodology include:

1. The foundation for estimating socioeconomic impacts of water shortages resulting from a drought are the water needs (potential shortages) that were identified as part of the regional water planning process. These needs have some uncertainty associated with them, but serve as a reasonable basis for evaluating potential economic impacts of a drought of record event.

2. All estimated socioeconomic impacts are snapshot estimates of impacts for years in which water needs were identified (i.e., 2020, 2030, 2040, 2050, 2060, and 2070). The estimates are independent and distinct "what if" scenarios for each particular year, and water shortages are assumed to be temporary events resulting from severe drought conditions. The evaluation assumed that no recommended water management strategies are implemented. In other words, growth occurs, future shocks are imposed on an economy at 10-year intervals, and the resulting impacts are estimated. Note that the estimates presented were not cumulative (i.e., summing up expected impacts from today up to the decade noted), but were simply an estimate of the magnitude of annual socioeconomic impacts should a drought of record occur in each particular decade based on anticipated supplies and demands for that same decade.

3. Input-output models such as IMPLAN rely on a static profile of the structure of the economy as it appears today. This presumes that the relative contributions of all sectors of the economy would remain the same, regardless of changes in technology, supplies of limited resources, and other structural changes to the economy that may occur into the future. This was a significant assumption and simplification considering the 50-year time period examined in this analysis. To presume an alternative future economic makeup, however, would entail positing many other major assumptions that would very likely generate as much or more error.

4. This analysis is not a cost-benefit analysis. That approach to evaluating the economic feasibility of a specific policy or project employs discounting future benefits and costs to their present value dollars using some assumed discount rate. The methodology employed in this effort to estimate the economic impacts of future water shortages did not use any discounting procedures to weigh future costs differently through time.

5. Monetary figures are reported in constant year 2013 dollars.

6. Impacts are annual estimates. The estimated economic model does not reflect the full extent of impacts that might occur as a result of persistent water shortages occurring over an extended duration. The drought of record in most regions of Texas lasted several years.

7. Value added estimates are the primary estimate of the economic impacts within this report. One may be tempted to add consumer surplus impacts to obtain an estimate of total adverse economic impacts to the region, but the consumer surplus measure represents the change to the wellbeing of households (and other water users), not an actual change in the flow of dollars through the economy. The two categories (value added and consumer surplus) are both valid impacts but should not be summed.

8. The value added, jobs, and taxes on production and import impacts include the direct, indirect and induced effects described in Section 2.2.1. Population and school enrollment losses also indirectly include such effects as they are based on the associated losses in employment. The remaining measures (consumer surplus, utility revenue, utility taxes, additional electrical power purchase costs, and potable water trucking costs), however, do not include any induced or indirect effects.

9. The majority of impacts estimated in this analysis may be considered smaller than those that might occur under drought of record conditions. Input-output models such as IMPLAN only capture "backward linkages" on suppliers (including households that supply labor to directly affected industries). While this is a common limitation in these types of economic impact modeling efforts, it is important to note that "forward linkages" on the industries that use the outputs of the directly affected industries can also be very important. A good example is impacts on livestock operators. Livestock producers tend to suffer substantially during droughts, not because there is not enough water for their stock, but because reductions in available pasture and higher prices for purchased hay have significant economic effects on their operations. Food processors could be in a similar situation if they cannot get the grains or other inputs that they need. These effects are not captured in IMPLAN, which is one reason why the impact estimates are likely conservative.

10. The methodology did not capture "spillover" effects between regions – or the secondary impacts that occur outside of the region where the water shortage is projected to occur.

11. The model did not reflect dynamic economic responses to water shortages as they might occur, nor does the model reflect economic impacts associated with a recovery from a drought of record including:
    a. The likely significant economic rebound to the landscaping industry immediately following a drought;
    b. The cost and years to rebuild liquidated livestock herds (a major capital item in that industry);
    c. Direct impacts on recreational sectors (i.e., stranded docks and reduced tourism); or,
    d. Impacts of negative publicity on Texas' ability to attract population and business in the event that it was not able to provide adequate water supplies for the existing economy.

12. Estimates for job losses and the associated population and school enrollment changes may exceed what would actually occur. In practice, firms may be hesitant to lay off employees, even in difficult economic times. Estimates of population and school enrollment changes are based on regional evaluations and therefore do not accurately reflect what might occur on a statewide basis.

13. The results must be interpreted carefully. It is the general and relative magnitudes of impacts as well as the changes of these impacts over time that should be the focus rather than the absolute numbers. Analyses of this type are much better at predicting relative percent differences brought about by a shock to a complex system (i.e., a water shortage) than the precise size of an impact. To illustrate, assuming that the estimated economic impacts of a drought of record on the manufacturing and mining water user categories are $2 and $1 million, respectively, one should be more confident that the economic impacts on manufacturing are twice as large as those on mining and that these impacts will likely be in the millions of dollars. But one should have less confidence that the actual total economic impact experienced would be $3 million.

# 3 Analysis Results

This section presents a breakdown of the results of the regional analysis for Region I. Projected economic impacts for six water use categories (irrigation, livestock. municipal, manufacturing, mining, and steam-electric power) are also reported by decade.

## 3.1 Overview of the Regional Economy

Table 3-1 presents the 2011 economic baseline as represented by the IMPLAN model and adjusted to 2013 dollars for Region I. In year 2011, Region I generated about $53 billion in gross state product associated with 552,000 jobs based on the 2011 IMPLAN data. These values represent an approximation of the current regional economy for a reference point.

**Table 3-1 Region I Economy**

| Income ($ millions)* | Jobs | Taxes on production and imports ($ millions)* |
|---|---|---|
| **$53,483** | **552,206** | **$4,030** |

***[1]Year 2013 dollars based on 2011 IMPLAN model value added estimates for the region.***

The remainder of Section 3 presents estimates of potential economic impacts for each water use category that could reasonably be expected in the event of water shortages associated with a drought of record and if no recommended water management strategies were implemented.

## 3.2 Impacts for Irrigation Water Shortages

Three of the 20 counties in the region are projected to experience water shortages in the irrigated agriculture water use category for one or more decades within the planning horizon. Estimated impacts to this water use category appear in Table 3-2. Note that tax collection impacts were not estimated for this water use category. IMPLAN data indicates a negative tax impact (i.e., increased tax collections) for the associated production sectors, primarily due to past subsidies from the federal government. Two factors led to excluding any reported tax impacts: 1) Federal support (subsidies) has lessened greatly since the year 2011 IMPLAN data was collected, and 2) It was not considered realistic to report increasing tax revenue collections for a drought of record.

**Table 3-2 Impacts of Water Shortages on Irrigation in Region**

| Impact Measure | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
|---|---|---|---|---|---|---|
| **Income losses ($ millions)*** | $0 | $0 | $1 | $1 | $1 | $1 |
| **Job losses** | 11 | 15 | 19 | 24 | 30 | 38 |

**** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000.***

## 3.3 Impacts for Livestock Water Shortages

Two of the 20 counties in the region are projected to experience water shortages in the livestock water use category for one or more decades within the planning horizon. Estimated impacts to this water use category appear in Table 3-3. Note that tax impacts are not reported for this water use category for similar reasons that apply to the irrigation water use category described above.

**Table 3-3 Impacts of Water Shortages on Livestock in Region**

| Impact Measures | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
|---|---|---|---|---|---|---|
| **Income losses ($ millions)*** | $78 | $109 | $147 | $193 | $248 | $260 |
| **Jobs losses** | 1,790 | 2,474 | 3,299 | 4,296 | 5,500 | 5,777 |

**** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000***

## 3.4 Impacts for Municipal Water Shortages

Six of the 20 counties in the region are projected to experience water shortages in the municipal water use category for one or more decades within the planning horizon. Impact estimates were made for the two subtypes of use within municipal use: residential, and non-residential. The latter includes commercial and institutional users. Consumer surplus measures were made for both residential and non-residential demands. In addition, available data for the non-residential, water-intensive portion of municipal demand allowed use of IMPLAN and TWDB Water Use Survey data to estimate income loss, jobs, and taxes. Trucking cost estimates, calculated for shortages exceeding 80 percent, assumed a fixed cost of $20,000 per acre-foot to transport water for municipal use. The estimated impacts to this water use category appear in Table 3-4.

**Table 3-4 Impacts of Water Shortages on Municipal Water Users in Region**

| Impact Measures | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
|---|---|---|---|---|---|---|
| **Income losses[1] ($ millions)*** | - | - | $0 | $2 | $11 | $22 |
| **Job losses[1]** | - | - | 4 | 38 | 217 | 443 |
| **Tax losses on production and imports[1] ($ millions)*** | - | - | $0 | $0 | $1 | $2 |
| **Consumer surplus losses ($ millions)*** | $0 | $0 | $1 | $2 | $5 | $9 |
| **Trucking costs ($ millions)*** | - | - | - | - | $0 | $0 |
| **Utility revenue losses ($ millions)*** | $0 | $1 | $4 | $12 | $20 | $34 |
| **Utility tax revenue losses ($ millions)*** | $0 | $0 | $0 | $0 | $0 | $0 |

*[1] Estimates apply to the water-intensive portion of non-residential municipal water use.*
** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000.*

## 3.5 Impacts of Manufacturing Water Shortages

Manufacturing water shortages in the region are projected to occur in 7 of the 20 counties in the region for at least one decade of the planning horizon. Estimated impacts to this water use category appear in Table 3-5.

**Table 3-5 Impacts of Water Shortages on Manufacturing in Region**

| Impacts Measures | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
|---|---|---|---|---|---|---|
| **Income losses ($ millions)*** | $13,586 | $19,631 | $20,688 | $21,742 | $22,837 | $24,006 |
| **Job losses** | 58,545 | 80,644 | 85,926 | 91,069 | 96,554 | 102,535 |
| **Tax losses on production and Imports ($ millions)*** | $849 | $1,222 | $1,289 | $1,356 | $1,426 | $1,501 |

** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000.*

## 3.6 Impacts of Mining Water Shortages

Mining water shortages in the region are projected to occur in 7 of the 20 counties in the region for at least one decade of the planning horizon. Estimated impacts to this water use type appear in Table 3-6.

**Table 3-6 Impacts of Water Shortages on Mining in Region**

| Impact Measures | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
|---|---|---|---|---|---|---|
| **Income losses ($ millions)*** | $5,778 | $3,428 | $765 | $615 | $486 | $410 |
| **Job losses** | 31,856 | 19,052 | 4,411 | 3,562 | 2,832 | 2,413 |
| **Tax losses on production and Imports ($ millions)*** | $930 | $551 | $121 | $98 | $77 | $65 |

**** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000.***

## 3.7 Impacts of Steam-Electric Water Shortages

Steam-electric water shortages in the region are projected to occur in 6 of the 20 counties in the region for at least one decade of the planning horizon. Estimated impacts to this water use category appear in Table 3-7.

Note that estimated economic impacts to steam-electric water users:

- Are reflected as an income loss proxy in the form of the estimated additional purchasing costs for power from the electrical grid that could not be generated due to a shortage;
- Do not include estimates of impacts on jobs. Because of the unique conditions of power generators during drought conditions and lack of relevant data, it was assumed that the industry would retain, perhaps relocating or repurposing, their existing staff in order to manage their ongoing operations through a severe drought.
- Does not presume a decline in tax collections. Associated tax collections, in fact, would likely increase under drought conditions since, historically, the demand for electricity increases during times of drought, thereby increasing taxes collected on the additional sales of power.

**Table 3-7 Impacts of Water Shortages on Steam-Electric Power in Region**

| Impact Measures | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
|---|---|---|---|---|---|---|
| **Income Losses ($ millions)*** | $965 | $1,129 | $1,414 | $1,856 | $2,482 | $3,409 |

**** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000.***

## 3.8 Regional Social Impacts

Projected changes in population, based upon several factors (household size, population, and job loss estimates), as well as the accompanying change in school enrollment, were also estimated and are summarized in Table 3-8.

**Table 3-8 Region-wide Social Impacts of Water Shortages in Region**

| Impact Measures | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
|---|---|---|---|---|---|---|
| **Consumer surplus losses ($ millions)*** | $0 | $0 | $1 | $2 | $5 | $9 |
| **Population losses** | 16,928 | 18,761 | 17,196 | 18,175 | 19,303 | 20,417 |
| **School enrollment losses** | 3,132 | 3,471 | 3,181 | 3,362 | 3,571 | 3,777 |

**** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000.***

# Appendix A - County Level Summary of Estimated Economic Impacts for Region I

County level summary of estimated economic impacts of not meeting identified water needs by water use category and decade (in 2013 dollars, rounded). Values presented only for counties with projected economic impacts for at least one decade.

**** Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000***

| | | Income losses (Million $)* | | | | | | Job losses | | | | | | Consumer Surplus losses (Million $)* | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| County | Water Use Category | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| ANDERSON | STEAM ELECTRIC POWER | $441 | $516 | $607 | $718 | $853 | $1,014 | - | - | - | - | - | - | - | - | - | - | - | - |
| **ANDERSON Total** | | **$441** | **$516** | **$607** | **$718** | **$853** | **$1,014** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| ANGELINA | MANUFACTURING | $1,256 | $1,406 | $1,559 | $1,695 | $1,839 | $1,995 | 16,159 | 18,099 | 20,064 | 21,808 | 23,669 | 25,677 | - | - | - | - | - | - |
| ANGELINA | MINING | $318 | $384 | $267 | $201 | $150 | $112 | 1,745 | 2,110 | 1,464 | 1,103 | 826 | 616 | - | - | - | - | - | - |
| **ANGELINA Total** | | **$1,573** | **$1,790** | **$1,826** | **$1,895** | **$1,990** | **$2,107** | **17,904** | **20,209** | **21,529** | **22,911** | **24,495** | **26,293** | **-** | **-** | **-** | **-** | **-** | **-** |
| CHEROKEE | MINING | $160 | $166 | $141 | $99 | $56 | $21 | 878 | 911 | 775 | 542 | 310 | 115 | - | - | - | - | - | - |
| CHEROKEE | MUNICIPAL | - | - | - | - | $0 | $0 | - | - | - | - | 1 | 2 | $0 | $0 | $0 | $0 | $0 | $0 |
| **CHEROKEE Total** | | **$160** | **$166** | **$141** | **$99** | **$56** | **$21** | **878** | **911** | **775** | **542** | **311** | **117** | **$0** | **$0** | **$0** | **$0** | **$0** | **$0** |
| HENDERSON | MANUFACTURING | - | - | - | $0 | $2 | $10 | - | - | - | 1 | 13 | 73 | - | - | - | - | - | - |
| HENDERSON | MUNICIPAL | - | - | - | - | - | $0 | - | - | - | - | - | 1 | $0 | $0 | $0 | $0 | $0 | $0 |
| **HENDERSON Total** | | **-** | **-** | **-** | **$0** | **$2** | **$10** | **-** | **-** | **-** | **1** | **13** | **74** | **$0** | **$0** | **$0** | **$0** | **$0** | **$0** |
| HOUSTON | IRRIGATION | $0 | $0 | $0 | $0 | $0 | $1 | 4 | 7 | 11 | 16 | 22 | 29 | - | - | - | - | - | - |
| **HOUSTON Total** | | **$0** | **$0** | **$0** | **$0** | **$0** | **$1** | **4** | **7** | **11** | **16** | **22** | **29** | **-** | **-** | **-** | **-** | **-** | **-** |
| JEFFERSON | MANUFACTURING | $12,206 | $18,066 | $18,909 | $19,757 | $20,607 | $21,489 | 41,483 | 61,399 | 64,262 | 67,146 | 70,032 | 73,032 | - | - | - | - | - | - |
| JEFFERSON | MUNICIPAL | - | - | - | - | - | - | - | - | - | - | - | - | - | - | $0 | $0 | $1 | $2 |
| JEFFERSON | STEAM ELECTRIC POWER | $524 | $613 | $721 | $852 | $1,013 | $1,204 | - | - | - | - | - | - | - | - | - | - | - | - |
| **JEFFERSON Total** | | **$12,730** | **$18,679** | **$19,630** | **$20,610** | **$21,620** | **$22,693** | **41,483** | **61,399** | **64,262** | **67,146** | **70,032** | **73,032** | **-** | **-** | **$0** | **$0** | **$1** | **$2** |
| NACOGDOCHES | LIVESTOCK | $42 | $47 | $53 | $59 | $67 | $78 | 1,027 | 1,148 | 1,288 | 1,449 | 1,635 | 1,911 | - | - | - | - | - | - |
| NACOGDOCHES | MINING | $3,677 | $1,998 | - | - | - | - | 20,195 | 10,974 | - | - | - | - | - | - | - | - | - | - |
| NACOGDOCHES | MUNICIPAL | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | $0 | $0 |
| NACOGDOCHES | STEAM ELECTRIC POWER | - | - | $36 | $110 | $225 | $376 | - | - | - | - | - | - | - | - | - | - | - | - |
| **NACOGDOCHES Total** | | **$3,719** | **$2,045** | **$88** | **$170** | **$292** | **$454** | **21,222** | **12,121** | **1,288** | **1,449** | **1,635** | **1,911** | **-** | **-** | **-** | **-** | **$0** | **$0** |
| NEWTON | MINING | $15 | $3 | - | - | - | - | 87 | 15 | - | - | - | - | - | - | - | - | - | - |
| NEWTON | STEAM ELECTRIC POWER | - | - | $51 | $160 | $334 | $573 | - | - | - | - | - | - | - | - | - | - | - | - |

| | | Income losses (Million $)* | | | | | | Job losses | | | | | | Consumer Surplus losses (Million $)* | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| County | Water Use Category | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| **NEWTON Total** | | **$15** | **$3** | **$51** | **$160** | **$334** | **$573** | **87** | **15** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| ORANGE | IRRIGATION | $0 | $0 | $0 | $0 | $0 | $0 | 7 | 8 | 8 | 9 | 8 | 8 | - | - | - | - | - | - |
| ORANGE | MANUFACTURING | - | $11 | $51 | $103 | $175 | $267 | - | 81 | 374 | 750 | 1,279 | 1,946 | - | - | - | - | - | - |
| ORANGE | STEAM ELECTRIC POWER | - | - | - | $15 | $58 | $97 | - | - | - | - | - | - | - | - | - | - | - | - |
| **ORANGE Total** | | **$0** | **$11** | **$52** | **$118** | **$234** | **$364** | **7** | **89** | **382** | **759** | **1,287** | **1,954** | **-** | **-** | **-** | **-** | **-** | **-** |
| PANOLA | MANUFACTURING | - | $0 | $1 | $1 | $2 | $5 | - | 4 | 9 | 15 | 28 | 74 | - | - | - | - | - | - |
| **PANOLA Total** | | **-** | **$0** | **$1** | **$1** | **$2** | **$5** | **-** | **4** | **9** | **15** | **28** | **74** | **-** | **-** | **-** | **-** | **-** | **-** |
| RUSK | MINING | $190 | $376 | $351 | $313 | $279 | $276 | 1,156 | 2,283 | 2,133 | 1,904 | 1,694 | 1,679 | - | - | - | - | - | - |
| RUSK | MUNICIPAL | - | - | - | - | - | - | - | - | - | - | - | - | - | - | $0 | $0 | $0 | $0 |
| RUSK | STEAM ELECTRIC POWER | - | - | - | - | - | $146 | - | - | - | - | - | - | - | - | - | - | - | - |
| **RUSK Total** | | **$190** | **$376** | **$351** | **$313** | **$279** | **$422** | **1,156** | **2,283** | **2,133** | **1,904** | **1,694** | **1,679** | **-** | **-** | **$0** | **$0** | **$0** | **$0** |
| SAN AUGUSTINE | MINING | $1,412 | $495 | - | - | - | - | 7,753 | 2,717 | - | - | - | - | - | - | - | - | - | - |
| **SAN AUGUSTINE Total** | | **$1,412** | **$495** | **-** | **-** | **-** | **-** | **7,753** | **2,717** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| SHELBY | LIVESTOCK | $36 | $62 | $94 | $133 | $181 | $181 | 763 | 1,326 | 2,011 | 2,847 | 3,866 | 3,866 | - | - | - | - | - | - |
| **SHELBY Total** | | **$36** | **$62** | **$94** | **$133** | **$181** | **$181** | **763** | **1,326** | **2,011** | **2,847** | **3,866** | **3,866** | **-** | **-** | **-** | **-** | **-** | **-** |
| SMITH | MANUFACTURING | $125 | $147 | $168 | $186 | $212 | $240 | 903 | 1,062 | 1,217 | 1,349 | 1,533 | 1,734 | - | - | - | - | - | - |
| SMITH | MINING | $7 | $7 | $6 | $2 | $0 | $0 | 42 | 43 | 39 | 13 | 3 | 3 | - | - | - | - | - | - |
| SMITH | MUNICIPAL | - | - | $0 | $2 | $11 | $22 | - | - | 4 | 38 | 216 | 440 | $0 | $0 | $0 | $2 | $5 | $7 |
| **SMITH Total** | | **$131** | **$154** | **$175** | **$190** | **$223** | **$262** | **945** | **1,104** | **1,260** | **1,401** | **1,752** | **2,177** | **$0** | **$0** | **$0** | **$2** | **$5** | **$7** |
| **Regional Total** | | **$20,408** | **$24,297** | **$23,015** | **$24,409** | **$26,065** | **$28,108** | **92,203** | **102,185** | **93,660** | **98,990** | **105,134** | **111,205** | **$0** | **$0** | **$1** | **$2** | **$5** | **$9** |

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# Appendix 4-F

# Socioeconomic Impact Analysis Letter

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This appendix includes the letter from the ETRWPG requesting that the TWDB conduct a socioeconomic impact analysis of not meeting identified water needs for the region. The letter is signed by Mr. Kelley Holcomb, the Chair of the ETRWPG.

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**Region I**
East Texas Regional
Water Planning Group

Kelley Holcomb, Chair
P.O. Box 387
Lufkin TX 75902
936-633-7543

July 13, 2015

Mr. Kevin Patteson
Executive Administrator
Texas Water Development Board
1700 North Congress
Austin, Texas 78711-3231

Re: Request for the Texas Water Development Board to Conduct a Socioeconomic Impact Analysis for the East Texas Regional Water Planning Area (Region I)

Dear Mr. Patteson:

At the Region I, East Texas Regional Water Planning Group (RWPG) regular meeting held on January 28, 2015, the RWPG discussed and approved a request for the Texas Water Development Board (TWDB) to provide technical assistance in conducting a socioeconomic impact analysis for the 2016 East Texas Regional Water Plan. The RWPG respectfully requests that the analysis be conducted utilizing information specific to Region I East Texas Regional Water Planning Area and that the models correspond to the needs of region.

If you have questions or need additional information, please don't hesitate to call me at 936-633-7543.

Respectfully,

Kelley Holcomb, Chair
East Texas Regional Water Planning Group

cc: Lann Bookout, Texas Water Development Board
Temple McKinnon, Texas Water Development Board
Lila Fuller, City of Nacogdoches
Rex Hunt, Alan Plummer Associates, Inc.

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# Appendix 5A-A

# Screening Criteria for Potentially Feasible Water Management Strategies

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The screening criteria used to assess the feasibility of potential strategies in the ETRWPA are provided as follows. These criteria were adopted as guidelines, and strategies could be retained or dismissed at the discretion of the ETRWPG.

## 5A-A.1 General

- Feasible strategy must have an identified sponsor or authority.
- Feasible strategy must consider the end use. This includes water quality, distance to end use, etc. For example, long transmission systems with pumping are not likely to be economically feasible for irrigation use.
- Strategy should provide a reasonable percentage of the projected need (except conservation, which will be evaluated for all needs).
- Strategy must meet existing federal and state regulations.
- Strategies must be based on proven technology.
- Strategy must be able to be implemented.
- Strategy must be appropriate for regional water planning.

## 5A-A.2 Evaluation by Water Strategy Type

In accordance with 31 TAC Chapter 357.7, the ETRWPG must evaluate all WMSs the regional water planning group determines to be potentially feasible. The types of WMSs to be evaluated are described below.

**5A-A.2.1 Water Conservation.** The guidelines for water planning require that water conservation be considered as a strategy for every identified need. If water conservation is not adopted, the reason must be documented. Water conservation in the ETRWPA is driven more by economics than lack of readily available supply, and therefore, not every user will have the need to implement conservation. Additional screening criteria for conservation strategies were adopted to comply with this general policy. The criteria are outlined below.

- Municipal conservation strategies will be evaluated for municipal WUGs that have a need identified during the planning period and a current per capita water use greater than 140 gpcd. This is the TWDB recommended goal for municipal users based on the Conservation Task Force recommendations. Municipal conservation will not be evaluated for WUGs with current usage less than 140 gpcd.
- Industrial, commercial and institutional (ICI) conservation strategies will be considered for cities with ICI use that exceeds 20 percent of the city's total water use.
- Industrial conservation will be evaluated for counties with manufacturing demands greater than 1,000 ac-ft per year and/or have identifiable industries with water use greater than 500 ac-ft per year.
- Steam-electric power water demands consider a high level of conservation in the development of the projections. No additional conservation measures will be considered for steam-electric power.
- Irrigation conservation measures will be considered by crop type and water source.
- Conservation will not be considered for livestock or mining water demands. The cost of water in these industries comprises a small percentage of the overall business cost, and it is not expected that these industries will see an economic benefit to water conservation.

**5A-A.2.2 Drought Management Measures.** Drought management WMSs are implemented in response to drought conditions. These strategies provide a safety factor for water users during drought. Drought management measures will not be adopted as strategies to meet long-range needs.

**5A-A.2.3 Wastewater Reuse.** Reuse projects will be considered on a case-by-case basis. Both direct and indirect reuse will be considered, as appropriate.

**5A-A.2.4 Expanded Use of Existing Supplies.** Use of existing supplies should be optimized, where possible, to meet new demands. Following is a discussion of how various types of existing supplies might be expanded.

**Connection of Existing Supplies**. The connection of existing supplies will be considered on a case-by-case basis. In general, supplies should be owned by the water group with a need for additional supply or available to that group for purchase or permitting.

**System Operation.** New or additional system operations may be considered if they are feasible and the owner wishes to adopt such strategies. Existing operating policies will be considered during evaluation of available supplies.

**Conjunctive Use of Groundwater and Surface Water.** The conjunctive use of groundwater and surface water supplies may be considered when groundwater supplies are available. Applicable groundwater conservation district rules will be considered for such conjunctive systems.

**Reallocation of Reservoir Storage.** Reallocation of reservoir storage will be considered if the owner is amenable to reallocation and, where reallocation in federal reservoirs is being considered (such as from flood to conservation storage), an appropriate and willing local sponsor can be found to sponsor a federal study.

**Voluntary Redistribution of Water Resources.** Voluntary redistribution with the involved parties will be considered and the ETRWPG will come to a consensus on an approach. If the involved parties are not interested, this option will not be pursued.

**Voluntary Subordination of Existing Water Rights.** Voluntary subordination of existing water rights will be considered if the involved parties are amenable to the strategy. Alternatively, the ETRWPG may recommend that the water right holder consider selling water under their water right to the willing buyer.

**Yield Enhancement.** ETRWPG will consider yield enhancement projects, as appropriate, for the water source and identified need.

**Water Quality Improvement.** Water quality improvement projects will be considered for municipal supplies that bring the existing water supply into compliance with state and federal regulations. General water quality projects may be considered if they improve the usability of the water source to help meet demands.

### 5A-A.2.5 New Supply Development.

The development of new water supplies may be necessary to meet new water demands. A discussion of the development of new water supplies follows.

**Surface Water Resources.** New surface water resources that can be permitted will be considered, provided a reasonable amount of supply to meet the identified need is located within a reasonable distance of the end users, and recommended new sources would be expected to provide water supplies at a reasonable cost.

**Groundwater Resources.** The ETRWPG will consider groundwater supplies in areas where additional groundwater is available.

**Brush Control.** Brush control is not considered a cost effective water supply strategy in the ETRWPA due to the large amount of rainfall and lack of invasive brush species, and will not be considered as a WMS.

**Precipitation Enhancement.** The ETRWPA has an abundance of precipitation. Precipitation enhancement will not be considered as a WMS.

**Desalination.** The ETRWPG will consider desalination on a case-by-case basis.

**Water Right Cancellation.** The ETRWPG will generally not pursue water right cancellation as a means of obtaining additional water supplies. Instead, the ETRWPG will recommend that the water right holder consider selling water under their water right to the willing buyer.

**Aquifer Storage and Recovery.** Aquifer storage and recovery (ASR) will be considered where the structure of the aquifer is such that this method is applicable. An ASR study must have already been performed to consider an area feasible for an ASR project.

**5A-A.2.6 Interbasin Transfers**. The ETRWPG will recommend interbasin transfers when necessary to transport water from the source to its destination. Interbasin transfers will be evaluated in accordance with current regulations. The process for selection of the WMSs is described as follows:

1. Define groupings or common areas with supply deficiencies.
2. Develop comprehensive list of potentially feasible strategies, per screening process.
3. Contact potential suppliers/WUGs to determine current strategies under consideration.
4. Prepare qualitative rating based on cost, reliability, environmental impact, impacts on other water resources, impacts on agricultural and natural resources, and political acceptability for the various strategies.
5. Select one or more strategies as appropriate for each need or group.
6. Contact each WUG with a need and confirm the selected strategies are acceptable.
7. Present proposed WMSs to the ETRWPG in a public meeting for discussion, modification, and approval.

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# Appendix 5A-B

# Potentially Feasible Water Management Strategies

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Appendix 5A-B includes a summary of potentially feasible water management strategies considered and a list of Potentially Feasible Strategies identified for all WUGs with needs.

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## ETRWPA - Potentially Feasible Water Management Strategies Considered for WUGs and WWPs with Identified Needs

| | Every WUG Entity and WWP with an Identified Need | | | WMSs REQUIRED TO BE CONSIDERED BY STATUTE | | | | | | | | | | | ADDITIONAL | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number | Water User Group Name/WWP Name | County | Maximum Need 2020-2070 (acf/yr) | Conservation | Drought Management | Reuse | Reallocation of Storage | Voluntary Transfers | Conjunctive Use | Expansion of Existing | New Supplies | Regional Water Supply | Improvement of Water Quality | Emergency Transfer of Water | System Optimization, Subordination, & Precip. Enhancement | Brush Control | Weather Modification | Desalination | Aquifer Storage and Recovery | Cancellation of Water Rights | Interbasin Transfers |
| 1 | Steam Electric Power | Anderson | 25,968 | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ■ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 2 | Manufacturing | Angelina | 17,195 | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ■ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 3 | Mining | Angelina | 573 | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 4 | Alto Rural WSC | Cherokee | 215 | ■ | ☐ | ☐ | ☐ | ■ | ☐ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 5 | Mining | Cherokee | 247 | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 6 | Steam Electric Power | Cherokee | 20,000 | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 7 | Athens | Henderson | 33 | ■ | ☐ | ■ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 8 | Chandler | Henderson | 312 | ■ | ☐ | ☐ | ☐ | ■ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 9 | Irrigation | Houston | 2,340 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 10 | Manufacturing | Jasper | 8,420 | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 11 | Beaumont | Jefferson | 6,896 | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 12 | County Other | Jefferson | 3,413 | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 13 | Manufacturing | Jefferson | 309,322 | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 14 | Steam Electric Power | Jefferson | 30,839 | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 15 | D&M WSC | Nacogdoches | 234 | ■ | ☐ | ☐ | ■ | ☐ | ☐ | ☐ | ■ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 16 | Livestock | Nacogdoches | 3,059 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 17 | Mining | Nacogdoches | 5,475 | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 18 | Steam Electric Power | Nacogdoches | 10,472 | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 19 | Mining | Newton | 115 | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 20 | Steam Electric Power | Newton | 19,021 | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 21 | Irrigation | Orange | 2,758 | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 22 | Manufacturing | Orange | 31,850 | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 23 | Steam Electric Power | Orange | 4,846 | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 24 | Manufacturing | Panola | 309 | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 25 | Overton | Rusk | 215 | ■ | ☐ | ☐ | ☐ | ■ | ☐ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 26 | Mining | Rusk | 2,092 | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 27 | Steam Electric Power | Rusk | 18,868 | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 28 | Mining | San Augustine | 2,102 | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 29 | Livestock | Shelby | 6,925 | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 30 | Bullard | Smith | 995 | ■ | ☐ | ☐ | ☐ | ■ | ☐ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 31 | Crystal Systems Inc | Smith | 642 | ■ | ☐ | ☐ | ☐ | ■ | ☐ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 32 | Lindale | Smith | 826 | ■ | ☐ | ☐ | ☐ | ■ | ☐ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 33 | R-P-M WSC | Smith | 23 | ■ | ☐ | ☐ | ☐ | ■ | ☐ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 34 | Manufacturing | Smith | 2,712 | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 35 | Mining | Smith | 32 | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ☐ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 36 | Irrigation | Trinity | 331 | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ■ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 37 | Angelina Neches River Authority | Angelina | 102,826 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ■ | ■ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 38 | Athens MWA | Trinity | 5,986 | ☐ | ☐ | ■ | ☐ | ☐ | ☐ | ■ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 39 | Angelina Nacogdoches WCID #1 | Henderson | 5,305 | ☐ | ☐ | ☐ | ■ | ☐ | ☐ | ■ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 40 | City of Center | Shelby | 2,242 | ☐ | ☐ | ■ | ☐ | ■ | ☐ | ■ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 41 | Houston County WCID #1 | Houston | 2,463 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ■ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 42 | City of Jacksonville | Cherokee | 1,700 | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ■ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 43 | Lower Neches Valley Authority | Cherokee | 200,000 | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ■ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 44 | City of Lufkin | Angelina | 28,000 | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ■ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 45 | City of Nacogdoches | Nacogdoches | 8,500 | ☐ | ☐ | ☐ | ☐ | ■ | ☐ | ■ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 46 | Sabine River Authority | Orange | 89,680 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ■ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 47 | City of Tyler | Orange | 16,815 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ■ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 48 | Upper Neches River Municipal Water Authority | Orange | 62,190 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ■ | ■ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

| Sponsor | WMS |
|---|---|
| Multiple Entities | Municipal conservation |
| Multiple Entities | Irrigation conservation |
| Multiple Entities | Reuse (Direct and Indirect, Potable and Non-Potable) |
| Multiple Entities | Purchase from Provider (Voluntary Transfer) |
| Anderson County Steam Electric Power | Purchase from Provider (Voluntary Transfer) |
| Angelina County Manufacturing | Purchase from Provider (Voluntary Transfer) |
| Angelina County Mining | Purchase from Provider (Voluntary Transfer) |
| Cherokee County Alto Rural WSC | Municipal conservation |
| Cherokee County Alto Rural WSC | News Wells in Carrizo Wilcox |
| Cherokee County Mining | Purchase from Provider (Voluntary Transfer) |
| Cherokee County Steam Electric Power | Purchase from Provider (Voluntary Transfer) |
| Henderson County Athens | Municipal conservation |
| Henderson County Athens | Purchase from Provider (Voluntary Transfer) |
| Henderson County Chandler | Municipal conservation |
| Henderson County Chandler | Purchase from Provider (Voluntary Transfer) |
| Houston County Irrigation | New Wells in Yegua-Jackson |
| Jasper County Manufacturing | Purchase from Provider (Voluntary Transfer) |
| Jefferson County Beaumont | Municipal conservation |
| Jefferson County Other | Purchase from Provider (Voluntary Transfer) |
| Jefferson County Manufacturing | Purchase from Provider (Voluntary Transfer) |
| Jefferson County Steam Electric Power | Purchase from Provider (Voluntary Transfer) |
| Jefferson County Port Arthur | Municipal conservation |
| Nacogdoches County D&M WSC | New Supply (Regional Water System) |
| Nacogdoches County Livestock | New Wells in Carrizo Wilcox |
| Nacogdoches County Mining | Purchase from Provider (Voluntary Transfer) |
| Nacogdoches County Steam Electric Power | Purchase from Provider (Voluntary Transfer) |
| Nacogdoches County Steam Electric Power | New Wells in Carrizo Wilcox |
| Newton County Mining | Purchase from Provider (Voluntary Transfer) |
| Newton County Steam Electric Power | Purchase from Provider (Voluntary Transfer) |
| Orange County Irrigation | Purchase from Provider (Voluntary Transfer) |
| Orange County Manufacturing | Purchase from Provider (Voluntary Transfer) |
| Orange County Steam Electric Power | Purchase from Provider (Voluntary Transfer) |
| Panola County Manufacturing | Purchase from Provider (Voluntary Transfer) |
| Rusk County Overton | Municipal conservation |
| Rusk County Overton | Purchase from Provider (Voluntary Transfer) |
| Rusk County Mining | Purchase from Provider (Voluntary Transfer) |
| Rusk County Steam Electric Power | Purchase from Provider (Voluntary Transfer) |
| San Augustine County Mining | Purchase from Provider (Voluntary Transfer) |
| Shelby County Livestock | Purchase from Provider (Voluntary Transfer) |
| Smith County Bullard | Municipal conservation |
| Smith County Bullard | New Wells in Carrizo Wilcox |
| Smith County Bullard | Purchase from Provider (Voluntary Transfer) |
| Smith County Crystal Systems Inc | Municipal conservation |
| Smith County Crystal Systems Inc | New Wells in Carrizo Wilcox |
| Smith County Crystal Systems Inc | Purchase from Provider (Voluntary Transfer) |
| Smith County Lindale | Municipal conservation |
| Smith County Lindale | New Wells in Carrizo Wilcox |
| Smith County Lindale | Purchase from Provider (Voluntary Transfer) |
| Smith County R-P-M WSC | Municipal conservation |
| Smith County R-P-M WSC | New Wells in Carrizo Wilcox |
| Smith County R-P-M WSC | Purchase from Provider (Voluntary Transfer) |
| Smith County Manufacturing | New Wells in Carrizo Wilcox |
| Smith County Manufacturing | Purchase from Provider (Voluntary Transfer) |

## ETRWPA - Potentially Feasible Water Management Strategies for WUGs and WWPs with Identified Needs (cont)

| Sponsor | WMS |
|---|---|
| Smith Count Mining | New Wells in Carrizo Wilcox |
| Smith Count Mining | Purchase from Provider (Voluntary Transfer) |
| Trinity County Irrigation | Purchase from Provider (Voluntary Transfer) |
| Angelina Neches River Authority | New Supplies (Lake Columbia) |
| Angelina Neches River Authority | Regional Water Treatment Plant and Distribution System |
| Angelina Neches River Authority | New Supplies (Groundwater Wells) |
| Angelina Neches River Authority | New Supplies (Run-of-River) |
| Athens MWA | Reuse (Direct and Indirect, Potable and Non-Potable) |
| Athens MWA | New Supplies (Groundwater Wells) |
| Athens MWA | Pump Station Improvements |
| Angelina Nacogdoches WCID #1 | Rreallocation of Storage |
| Angelina Nacogdoches WCID #1 | New Supplies (Dredging) |
| City of Center | Reuse (Direct and Indirect, Potable and Non-Potable) |
| City of Center | Purchase from Provider (Voluntary Transfer) |
| Houston County WCID #1 | New Supplies (Permit Amendment) |
| Houston County WCID #1 | New Supplies (Groundwater Wells) |
| City of Jacksonville | Purchase from Provider (Voluntary Transfer) |
| Lower Neches Valley Authority | Purchase from Provider (Voluntary Transfer) |
| Lower Neches Valley Authority | New Supplies (Permit Amendment) |
| City of Lufkin | Purchase from Provider (Voluntary Transfer) |
| City of Nacogdoches | Purchase from Provider (Voluntary Transfer) |
| Sabine River Authority | New Supplies (Permit Amendment) |
| Sabine River Authority | Pump Station |
| City of Tyler | Raw Water and Treated Water Transmission |
| Upper Neches River Municipal Water Authority | New Supplies (Run-of-River) |

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# Appendix 5B-A

# Technical Memorandums of Water Management Analysis

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| | |
|---|---|
| Trinity Irrigation | 5B-A-108 |
| Conservation Strategies | 5B-A-111 |
| ANRA Lake Columbia | 5B-A-114 |
| ANRA Water Treatment Plant | 5B-A-120 |
| ANRA Groundwater Wells | 5B-A-124 |
| ANRA Run-of-River Supplies | 5B-A-127 |
| Athens MWA Fish Hatcheries | 5B-A-129 |
| Athens MWA Groundwater Wells | 5B-A-131 |
| Athens MWA Pump Station | 5B-A-134 |
| Angelina Nacogdoches WCID #1 Lake Striker Volumetric Survey | 5B-A-137 |
| Angelina Nacogdoches WCID #1 Lake Striker Dredging | 5B-A-139 |
| Angelina Nacogdoches WCID #1 Lake Striker Normal Pool Elevation Adjustment | 5B-A-141 |
| City of Beaumont Conservation | 5B-A-143 |
| City of Center Reuse Pipeline | 5B-A-145 |
| City of Center Toledo Bend Pipeline | 5B-A-148 |
| City of Center Volumetric Surveys | 5B-A-151 |
| Houston County WCID #1 Permit Amendment | 5B-A-153 |
| Houston County WCID #1 Groundwater Wells | 5B-A-155 |
| City of Jacksonville Raw Water Transmission System | 5B-A-158 |
| LNVA Purchase from SRA | 5B-A-161 |
| LNVA Sam Rayburn Permit Amendment | 5B-A-164 |
| LNVA Transfer to Region H | 5B-A-166 |
| LNVA Constructed Levy | 5B-A-169 |
| City of Lufkin Raw Water Transmission | 5B-A-172 |
| Nacogdoches Raw Water Transmission | 5B-A-177 |
| City of Port Arthur Conservation | 5B-A-180 |
| SRA Toledo Bend Permit Amendment | 5B-A-182 |
| SRA Pump Station | 5B-A-184 |
| City of Tyler Lake Palestine Expansions | 5B-A-186 |
| UNRMWA Run-of-River Supplies | 5B-A-189 |

## DESCRIPTION

The 2016 Plan includes a total of 72 recommended water management strategies (WMS) developed to ensure the East Texas Regional Water Planning Area continues to appropriately plan for water demands for the area's citizens, industries, and communities. Appendix 5B-A provides the required evaluation of each proposed WMS, contained in a technical memorandum for each strategy. As required, each technical memorandum addresses the following elements:

- Project 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 2016 Plan, PLOCs have been analyzed using the TWDB's costing tool, except where more detailed costs analysis has been provided by the WUG or WWP. In accordance with TWDB Guidance (Exhibit C, First Amended General Guidelines for Regional Water Planning Development – October 2012), 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 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 GIS mapping software and 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 costs for operation and maintenance infrastructure are generally based on percentages of estimated construction cost of the infrastructure. In addition, purchased water costs, power costs are included.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR ANDERSON STEAM ELECTRIC POWER

| | |
|---|---|
| **Water User Group Name:** | Anderson County – Steam Electric Power |
| **Strategy Name:** | Purchase from City of Palestine |
| **Strategy ID:** | AND-SEP1 |
| **Strategy Type:** | New Surface Water Source |
| **Potential Supply Quantity:** | 11,306 – 21,632 ac-ft per year (Varies)<br>(10.08 – 19.3 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020 |
| **Project Capital Cost:** | $44,576,000 (September, 2013) |
| **Annual Cost:** | $12,367,000 |
| **Unit Water Cost (Rounded):** | $522 per ac-ft<br>($1.6 per 1,000 gallons) |

## PROJECT DESCRIPTION

Steam Electric Power demand is expected to grow significantly over the planning period and two recommended strategies were identified to meet this need. This strategy is a recommended strategy for steam electric power water users in Anderson County and involves a contract between individual steam electric power users and the City of Palestine from Neches run-of-river and Lake Palestine supplies. The cost for supply from the source of supply 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 Palestine 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 steam electric power need projected for Anderson County by the East Texas Regional Water Planning Group. A contract with City of Palestine for their share for supplies in Lake Palestine is the recommended strategy. However, City of Palestine's share of Lake Palestine supplies does not address all the need for steam electric power demand in Anderson County. . The WUG will have an unmet need in 2070 but no strategies were proposed to address this unmet need because the ETRWPG believes that the demands for this decade are over estimated. The strategy discussed in this technical memorandum is developed for the maximum amount available from City of Palestine for water management strategies, after current commitments have been addressed. The reliability of this water supply is considered high due to the availability of water projected in the Neches River using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on sales with the City of Palestine. The quantity of supply from this strategy represents a contract of 11,306 acre feet per year in 2020 and increasing to a maximum amount of 21,632 ac-ft per year for 2070.

## ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between Anderson County and the City of Palestine 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 Anderson County.

## 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. The capital costs assumed 21 miles of pipeline (the approximate distance from the Neches River to the center of Anderson County), a pump station with an intake, and one terminal storage tank with 4 MG 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 2016 East Texas Regional Water Plan.

| | | | | | | |
|---|---|---|---|---|---|---|
| **WUG** | **Anderson Steam Electric Power** | | | | | |
| **WMS** | **New Pipeline from Lake Palestine to Anderson County (City of Palestine)** | | | | | |
| **VOL** | **21,632** ac-ft per year | 19.3 MGD | | | | |
| **CAPITAL COSTS** | **Size** | **Quantity** | **Units** | **Unit Price** | | **Cost** |
| **Transmission Facilities** | | | | | | |
| Pipeline | 46 in. | 110,880 | ft | $ | 228 | $25,265,114 |
| Right of Way Easements | | 110,880 | ft | $ | 16 | $1,906,080 |
| Storage Tanks | 4.00 MG | 1 | LS | $ | 1,267,691 | $1,267,691 |
| Contingencies (30%, engineering done) | | | | | | $8,595,050 |
| **Pipeline Subtotal** | 21 | **Miles** | | | | **$37,033,935** |
| | | | 1763 | | | |
| Pump Station | | 32 MG | HP | $ | 4,060,515 | $4,060,515 |
| Contingencies (35%, engineering done) | | | | | | $1,421,180 |
| **Pump Station Subtotal** | | | | | | **$5,481,695** |
| Environmental and Permitting | | | | | | $553,000 |
| **Construction Total** | | | | | | **$43,069,000** |
| Interest During Construction | | | 12 | Months | | $1,507,000 |
| **TOTAL CAPITAL COST** | | | | | | **$44,576,000** |
| **ANNUAL COSTS** | **Size** | **Quantity** | **Units** | **Unit Price** | | **Cost** |
| Debt Service (5.5% for 20 years) | | | | | | $3,730,000 |
| Operational Costs* | | | | | | $8,636,645 |
| **Total Annual Costs** | | | | | | **$12,367,000** |
| **UNIT COSTS (Until Amortized)** | | | | | | |
| Cost per acre-ft | | | | | | $522 |
| Cost per 1000 gallons | | | | | | $1.60 |
| **UNIT COSTS (After Amortization)** | | | | | | |
| Cost per acre-ft | | | | | | $365 |
| Cost per 1000 gallons | | | | | | $1.12 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

This strategy benefits steam electric power water 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. A contract to pull water from the Neches River will reduce demands on other water supplies in Anderson 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 Anderson County Steam Electric Power recommended strategy to purchase water from the City of Palestine supplies was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 3 | 21,632 ac-ft per year |
| **Reliability** | 4 | Reliable Supply |
| **Cost** | 3 | Medium Cost |
| **Environmental Factors** | 4 | Low Impacts |
| **Impact on Other State Water Resources** | 4 | No known impacts to other projects. |
| **Threat to Agricultural Resources/Rural Areas** | 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** | 1 | Local Sponsorship Unknown |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

2011 East Texas Regional Water Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR ANGELINA MANUFACTURING

| | |
|---|---|
| **Water User Group Name:** | Angelina Manufacturing |
| **Strategy Name:** | Purchase from Lufkin (Lake Kurth/Sam Rayburn) |
| **Strategy ID:** | ANGL-MFG |
| **Strategy Type:** | Existing Surface Water Source |
| **Potential Supply Quantity:** | 6,000 – 17,195 ac-ft per year (Varies)<br>(5.4 – 15.4 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020-2070 |
| **Project Annual Cost:** | $1,955,000 (Lake Kurth) (September, 2013)<br>$3,648,000 (Sam Rayburn to Kurth) (September, 2013) |
| **Capital Cost:** | $0 |
| **Unit Water Cost (Rounded):** | $326 per ac-ft<br>($1.00 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is a recommended strategy for Manufacturing in Angelina County and involves a contract between individual manufacturers and the City of Lufkin for raw water from Lake Kurth. Beginning in 2030, the City of Lufkin will begin transferring water from Sam Rayburn Lake to Lake Kurth, making more water available to meet manufacturing demands near Lake Kurth. Since 2011, The City of Lufkin installed a transmission system from Lake Kurth to multiple manufacturing water users. Therefore, the only cost for additional supply from the City of Lufkin is the cost of raw water. Ultimately, this cost will need to be negotiated with the City of Lufkin and will reflect the City's 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

The City of Lufkin currently supplies approximately 3,000 ac-ft per year to meet manufacturing demands in Angelina County. The quantity of supply from this strategy represents a contract increase of 6,000 ac-ft per year, beginning in 2020, and increases to 17,195 ac-ft per year, beginning in 2070. The supply available in 2020 is limited by the available supply of Lake Kurth to the City of Lufkin. In 2030 through 2070, the supply is limited to the manufacturing need projected by the East Texas Regional Water Planning Group. These supplies are considered highly reliable in 2020; however, the supply beginning in 2030 is dependent on the City of Lufkin implementing their water management strategies.

## ENVIRONMENTAL CONSIDERATIONS

There are not any significant environmental considerations associated with this strategy. A contract between manufacturers and the City of Lufkin 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 Lake Kurth.

## 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, but an annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a low cost compared to other strategies in the 2016 East Texas Regional Water Plan.

| | | | | | |
|---|---|---|---|---|---|
| **WUGNAME:** | **Angelina Manufacturing Purchase from** | | | | |
| **STRATEGY:** | **Lufkin** | | | | |
| **Raw Water Quantity:** | **6,000** | AF/Y | | 5.35 MGD | |
| **Treated Water Quantity:** | **0** | AF/Y | | 0.00 MGD | |
| **CONSTRUCTION COSTS** | | | | | |
| **ANNUAL CONTRACT COSTS** | **Size** | **Quantity** | **Unit** | **Cost** | |
| Operational Costs* | | 1,955,000 | 1000 gal | | $1,955,000 |
| **ANNUAL COSTS** | | | | | |
| **Total Annual Costs** | | | | | **$1,955,000** |
| **UNIT COSTS (Until Amortized)** | | | | | |
| Per Acre-Foot of water | | | | | $326 |
| Per 1,000 Gallons | | | | | $1.00 |
| **UNIT COSTS (After Amortization)** | | | | | |
| Per Acre-Foot | | | | NA | |
| Per 1,000 Gallons | | | | NA | |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

| | | | | | |
|---|---|---|---|---|---|
| **WUGNAME:** | **Angelina Manufacturing Purchase from** | | | | |
| **STRATEGY:** | **Lufkin** | | | | |
| **Raw Water Quantity:** | **11,195** | AF/Y | 9.99 MGD | | |
| **Treated Water Quantity:** | **0** | AF/Y | 0.00 MGD | | |

| **CONSTRUCTION COSTS** | | | | |
|---|---|---|---|---|
| **ANNUAL CONTRACT COSTS** | **Size** | **Quantity** | **Unit** | **Cost** |
| Operational Costs* | | 3,648,000 | 1000 gal | $3,648,000 |

| **ANNUAL COSTS** | |
|---|---|
| **Total Annual Costs** | **$3,648,000** |

| **UNIT COSTS (Until Amortized)** | |
|---|---|
| Per Acre-Foot of water | $326 |
| Per 1,000 Gallons | $1.00 |

| **UNIT COSTS (After Amortization)** | |
|---|---|
| Per Acre-Foot | NA |
| Per 1,000 Gallons | NA |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## 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 Lake Kurth 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 Manufacturing recommended strategy to purchase water from the City of Lufkin was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 17,195 ac-ft per year |
| **Reliability** | 5 | Reliable Supply |
| **Cost** | 4 | Low Cost |
| **Environmental Factors** | 4 | Low Impacts |
| **Impact on Other State Water Resources** | 4 | No known impacts to other projects. |
| **Threat to Agricultural Resources/Rural Areas** | 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** | 1 | Local Sponsor unknown |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

2011 East Texas Regional Water Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR ANGELINA MINING

| | |
|---|---|
| **Water User Group Name:** | Angelina Mining |
| **Strategy Name:** | Purchase from Angelina Neches River Authority (Angelina River) |
| **Strategy ID:** | ANGL-MIN |
| **Strategy Type:** | Existing Surface Water Source |
| **Potential Supply Quantity:** | 168 – 573 ac-ft per year (Varies)<br>(0.1 – 0.5 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020 |
| **Project Capital Cost:** | $4,005,000 (September, 2013) |
| **Annual Cost:** | $942,000 |
| **Unit Water Cost (Rounded):** | $1,644 per ac-ft<br>($5.05 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 the Angelina River as their permit allows. The cost for supply from the Angelina 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 Angelina River using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on sales with the Angelina Neches River Authority and their application for 10,000 ac-ft per year from the Angelina River (Strategy ID: ANRA-ROR). The quantity of supply from this strategy represents a contract of 573 ac-ft per year, beginning in 2020, and decreases to 168 ac-ft per year, 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 Angelina County.

## 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. The capital costs assumed 8 miles of pipeline (the approximate distance from the Angelina 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 to high cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the length of pipeline required.

| | | | | | | |
|---|---|---|---|---|---|---|
| **WUG NAME:** | **Angelina Mining** | | | | | |
| **STRATEGY:** | **Purchase from ANRA (Angelina River)** | | | | | |
| **Quantity:** | **573** AF/Y | | | 0.77 MGD | | |
| **CAPITAL COSTS** | | | | | | |
| **Pipeline** | **Size** | **Quantity** | **Unit** | | **Unit Price** | **Cost** |
| Pipeline Rural | 10 in. | 42,240 | LF | | $31 | $1,322,167 |
| Right of Way Easements Rural (ROW) | | 42,240 | LF | | $16 | $726,110 |
| **Subtotal of Pipeline** | **8** | **miles** | | | | **$2,445,277** |
| **Pump Station(s)** | | | | | | |
| Pump with intake | 34 HP | 1 | LS | | $766,000 | $766,000 |
| Booster Pump Station | | 0 | LS | | | |
| Engineering and Contingencies (35%) | | | | | | $268,100 |
| **Subtotal of Pump Station(s)** | | | | | | **$1,034,100** |
| **Storage Tanks** | 0.10 MG | 1 | LS | | $169,549 | $169,549 |
| Engineering and Contingencies (35%) | | | | | | $59,342 |
| **Subtotal of Storage Tanks** | | | | | | **$228,891** |
| Permitting and Mitigation | | | | | | $228,000 |
| **Construction Total** | | | | | | **$3,936,000** |
| Interest During Construction | | | | 6 | Months | $69,000 |
| **TOTAL COST** | | | | | | **$4,005,000** |
| **ANNUAL COSTS** | | | | | | |
| Debt Service (5.5% for 20 years) | | | | | | $335,000 |
| Operational Costs* | | | | | | $607,000 |
| **Total Annual Costs** | | | | | | **$942,000** |
| **UNIT COSTS (Until Amortized)** | | | | | | |
| Per Acre-Foot of treated water | | | | | | $1,644 |
| Per 1,000 Gallons | | | | | | $5.05 |
| **UNIT COSTS (After Amortization)** | | | | | | |
| Per Acre-Foot | | | | | | $1,059 |
| Per 1,000 Gallons | | | | | | $3.25 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## 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 Angelina 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 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 573 ac-ft per year |
| **Reliability** | 3 | Moderate Reliable Supply |
| **Cost** | 2 | Medium Cost |
| **Environmental Factors** | 4 | Low Impacts |
| **Impact on Other State Water Resources** | 4 | No known impacts to other projects. |
| **Threat to Agricultural Resources/Rural Areas** | 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** | 1 | Local Sponsor unknown |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

2011 East Texas Regional Water Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR CHEROKEE ALTO RURAL WSC

| | |
|---|---|
| **Water User Group Name:** | Cherokee County Alto Rural WSC |
| **Strategy Name:** | New wells in Carrizo-Wilcox Aquifer |
| **Strategy ID:** | CHER-ALT |
| **Strategy Type:** | New Groundwater Source |
| **Potential Supply Quantity:** | 66 - 215 ac-ft per year<br>(0.05 – 0.19 MGD) |
| **Implementation Decade:** | 2050 |
| **Development Timeline:** | 2050 |
| **Project Capital Cost:** | $2,682,000 (September 2013) |
| **Annual Cost:** | $303,000 |
| **Unit Water Cost (Rounded):** | $1,212 per ac-ft<br>($3.72 per 1,000 gallons) |

## PROJECT DESCRIPTION

Alto Rural WSC is a municipal water user in Cherokee County. This water user currently relies on groundwater in the Carrizo Wilcox aquifer in Cherokee County. Alto Rural WSC has a small need starting in 2050 and the maximum need is approximately 215 ac-ft per year. To meet this need, it is recommended that Alto Rural WSC continue to use supplies from Carrizo Wilcox by drilling additional wells. This strategy is a recommended strategy for Alto Rural WSC in Cherokee County and involves the development of one well located within the Carrizo-Wilcox Aquifer as this aquifer has been identified as a potential source of water in Cherokee County. This well will provide approximately 400 ac-ft per year and are assumed to have a water depth of 300 feet. A peaking factor of two was assumed for the well, and the cost estimate includes conveyance infrastructure in order to capture the peak annual supply.

## SUPPLY DEVELOPMENT

The supply is required only in the later part of the planning cycle, for decades 2050 to 2070. Currently, all of the existing needs are being met by supplies from the Carrizo Wilcox aquifer. There are sufficient supplies available in the Cherokee County Carrizo Wilcox to develop the supply needed for this water management strategy. It is assumed that the well will provide 400 ac-ft per year to meet Alto Rural WSC's needs in Cherokee County providing a total yield required for the strategy. 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 of surface water in close proximity. The impact to the environment due to pipeline construction is expected to be temporary and minimal. New wells have a potential decrease in the groundwater-surface water nexus, which could reduce base flows. Impacts to environmental water needs, habitat, and cultural resources are expected to be low. There are no bays or estuaries

in close proximity of Cherokee County.

## 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. The capital costs assumed 1.2 miles of pipeline, one well, a peaking factor of two, and a maximum well yield of 500 gpm for each well. This equates to $1,212 per acre-foot ($3.72 per 1,000 gallons); after the infrastructure is fully paid (30 years), the cost drops to $318 per acre-foot ($0.98 per 1,000 gallons). Overall, this strategy has a medium cost compared to other strategies in the 2016 East Texas Regional Water Plan.

**WUG: Cherokee County Alto Rural WSC**
WMS: Cherokee County - GW Wells

| | | | | | |
|---|---|---|---|---|---|
| Supply | 250 | Acre-feet per year | 155 | gpm | |
| Depth to Water | 300 | ft | | | |
| Well Depth | 800 | ft | | | |
| Well Size | 12 | in | | | |
| Wells Needed | 1 | | | | |

| **Construction Costs** | | Number | | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| Water Wells | | 1 | | $597,327 | $597,327 |
| Connection to Transmission System | | 1 | | $50,000 | $50,000 |
| Engineering and Contingencies (30% for pipes, 35% for others) | | | | | $224,000 |
| **Subtotal of Well(s)** | | | | | **$871,327** |
| **Transmission System** | Size | Quantity | Unit | Unit Cost | Total Cost |
| Pipeline - Rural | 6 in. | 6,336 | LF | $18 | $115,000 |
| Pump Station | 36 HP | 1 | EA | $913,000 | $913,000 |
| Ground Storage Tank | 0.06 MG | 1 | EA | $124,984 | $124,984 |
| Easement - Rural | | 6,336 | LF | $16 | $108,900 |
| Engineering and Contingencies (30% for pipes, 35% for others) | | | | | $398,000 |
| **Subtotal for Transmission** | | 1 | miles | | **$1,659,884** |
| Permitting and Mitigation | | | | | $60,000 |
| **Construction Total** | | | | | $2,591,000 |
| Interest During Construction | | | 12 Months | | $91,000 |
| **TOTAL CAPITAL COST** | | | | | **$2,682,000** |

| | |
|---|---|
| Debt Service (5.5% for 20 years) | $224,000 |
| Operational Costs* | $79,400 |
| **Total Annual Cost** | **$303,000** |

| | |
|---|---|
| **UNIT COSTS (Until Amortized)** | |
| Cost per ac-ft | $1,212 |
| Cost per 1000 gallons | $3.72 |
| **UNIT COSTS (After Amortization)** | |
| Cost per ac-ft | $318 |
| Cost per 1000 gallons | $0.98 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

This strategy benefits municipal user Alto Rural WSC 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. New wells in the county will reduce demands on other water supplies in Cherokee 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 recommended strategy to drill new wells in Cherokee County for Alto Rural WSC's use was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 250 ac-ft per year |
| **Reliability** | 4 | Highly Reliable Supply |
| **Cost** | 2 | Moderate to High Cost |
| **Environmental Factors** | 4 | Low Impacts |
| **Impact on Other State Water Resources** | 4 | No known impacts to other projects. |
| **Threat to Agricultural Resources/Rural Areas** | 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** | 3 | Local Sponsorship by Alto Rural WSC |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

Discussions with Regional Water Planning Group.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR CHEROKEE MINING

| | |
|---|---|
| **Water User Group Name:** | Cherokee Mining |
| **Strategy Name:** | Purchase from Angelina Neches River Authority (Angelina River) |
| **Strategy ID:** | CHER-MIN |
| **Strategy Type:** | Existing Surface Water Source |
| **Potential Supply Quantity:** | 238 – 40 ac-ft per year (Varies)<br>(0.2 – 0.03 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020 |
| **Project Capital Cost:** | $4,214,000 (September, 2013) |
| **Annual Cost:** | $640,000 |
| **Unit Water Cost (Rounded):** | $2,560 per ac-ft<br>($7.86 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is a recommended strategy for Mining in Cherokee County and involves a contract between individual mining water users and the Angelina Neches River Authority for raw water from the Angelina River as their permit allows. The cost for supply from the Angelina 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 Angelina River using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on sales with the Angelina Neches River Authority and their application for 30,000 ac-ft per year from the Angelina River (Strategy ID: ANGL-ROR). The quantity of supply from this strategy represents a contract of 238 ac-ft per year, beginning in 2020, and decreases to 40 ac-ft per year, 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 Cherokee 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 Cherokee County.

## 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. The capital costs assumed 7 miles of pipeline (the approximate distance from the Angelina River to the center of Cherokee County), a pump station with an intake, and one terminal storage tank with 0.2 MG 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 to high cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the length of pipeline required.

| | | | | | | |
|---|---|---|---|---|---|---|
| **WUG NAME:** | **Cherokee Mining** | | | | | |
| **STRATEGY:** | **Purchase from ANRA (Angelina River)** | | | | | |
| **Quantity:** | **250** AF/Y | | | 0.22 MGD | | |
| **CAPITAL COSTS** | | | | | | |
| **Pipeline** | **Size** | **Quantity** | **Unit** | | **Unit Price** | **Cost** |
| Pipeline Rural | 12 in. | 36,960 | LF | | $35 | $1,306,000 |
| Right of Way Easements Rural (ROW) | | 36,960 | LF | | $26 | $1,043,790 |
| **Subtotal of Pipeline** | **7** | **miles** | | | | **$2,741,790** |
| **Pump Station(s)** | | | | | | |
| Pump with intake | 8 HP | 1 | LS | | $663,040 | $663,000 |
| Booster Pump Station | 0 HP | 1 | LS | | $0 | $0 |
| Engineering and Contingencies (35%) | | | | | | $232,050 |
| **Subtotal of Pump Station(s)** | | | | | | **$895,050** |
| **Storage Tanks** | 0.20 MG | 1 | LS | | $224,165 | $224,165 |
| Engineering and Contingencies (35%) | | | | | | $78,458 |
| **Subtotal of Storage Tanks** | | | | | | **$302,623** |
| Permitting and Mitigation | | | | | | $203,000 |
| **Construction Total** | | | | | | **$4,142,000** |
| Interest During Construction | | | | 6 | Months | $72,000 |
| **TOTAL COST** | | | | | | **$4,214,000** |
| **ANNUAL COSTS** | | | | | | |
| Debt Service (5.5% for 20 years) | | | | | | $353,000 |
| Operational Costs* | | | | | | $287,000 |
| **Total Annual Costs** | | | | | | **$640,000** |
| **UNIT COSTS (Until Amortized)** | | | | | | |
| Per Acre-Foot of treated water | | | | | | $2,560 |
| Per 1,000 Gallons | | | | | | $7.86 |
| **UNIT COSTS (After Amortization)** | | | | | | |
| Per Acre-Foot | | | | | | $1,148 |
| Per 1,000 Gallons | | | | | | $3.52 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

This strategy benefits mining users 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. A contract to pull water from the Angelina River will reduce demands on other water supplies in Cherokee 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 Cherokee 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 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 250 ac-ft per year |
| **Reliability** | 4 | Medium Reliable Supply |
| **Cost** | 2 | Moderate to High Cost |
| **Environmental Factors** | 4 | Low Impacts |
| **Impact on Other State Water Resources** | 4 | No known impacts to other projects. |
| **Threat to Agricultural Resources/Rural Areas** | 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** | 3 | Sponsor identified |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

Discussions with Angelina Neches River Authority.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR CHEROKEE STEAM ELECTRIC POWER

| | |
|---|---|
| **Water User Group Name:** | Cherokee SEP |
| **Strategy Name:** | Purchase from Angelina Neches River Authority (Angelina River) |
| **Strategy ID:** | CHER-SEP |
| **Strategy Type:** | Existing Surface Water Source |
| **Potential Supply Quantity:** | 8,000 – 20,000 ac-ft per year (Varies)<br>(0.2 – 0.03 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020 |
| **Project Capital Cost:** | $16,735,000 (September, 2013) |
| **Annual Cost:** | $21,514,000 |
| **Unit Water Cost (Rounded):** | $1,076 per ac-ft<br>($3.09 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is a recommended strategy for Steam Electric Power users in Cherokee County and involves a contract between individual steam electric power water users and the Angelina Neches River Authority for raw water from the Angelina River as their permit allows. The cost for supply from the Angelina 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. There is no identified need for steam electric power user in the Cherokee Count of ETRWPA. However, few prospective steam electric power users have expressed interest in securing water supply and communicated with Angelina Neches River Authority for a potential connection. The purpose of this strategy is to discuss the water management strategy to meet that prospective need.

## SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the need to meet the potential interest expressed by the steam electric power users in Cherokee 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 Angelina River using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on sales with the Angelina Neches River Authority and their application for 30,000 ac-ft per year from the Angelina River (Strategy ID: ANGL-ROR). The quantity of supply from this strategy represents a contract of 8,000 ac-ft per year, beginning in 2020, and increases to 20,000 ac-ft per year, beginning in 2070.

## ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between steam electric power water users in Cherokee 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 Cherokee County.

## 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. The capital costs assumed 7 miles of pipeline (the approximate distance from the Angelina River to the center of Cherokee County), a pump station with an intake, and one terminal storage tank with 3.35 MG 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 to high cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the length of pipeline required.

| | | | | | | |
|---|---|---|---|---|---|---|
| **WUG NAME:** | **Cherokee Steam Electric Power** | | | | | |
| **STRATEGY:** | **Purchase from ANRA (Angelina River)** | | | | | |
| **Quantity:** | **20,000** AF/Y | | | 17.84 MGD | | |
| **CAPITAL COSTS** | | | | | | |
| **Pipeline** | | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
| Pipeline Rural | | 40 in. | 36,960 | LF | $194 | $7,153,000 |
| Right of Way Easements Rural (ROW) | | | 36,960 | LF | $26 | $1,043,790 |
| **Subtotal of Pipeline** | | **7** | **miles** | | | **$10,342,790** |
| **Pump Station(s)** | | | | | | |
| Pump with intake | | 1050 HP | 1 | LS | $3,251,948 | $3,252,000 |
| Booster Pump Station | | 0 HP | 1 | LS | $0 | $0 |
| Engineering and Contingencies (35%) | | | | | | $1,138,020 |
| **Subtotal of Pump Station(s)** | | | | | | **$4,390,200** |
| **Storage Tanks** | | 3.35 MG | 1 | LS | $1,119,227 | $1,119,227 |
| Engineering and Contingencies (35%) | | | | | | $391,729 |
| **Subtotal of Storage Tanks** | | | | | | **$1,510,956** |
| Permitting and Mitigation | | | | | | $203,000 |
| **Construction Total** | | | | | | **$16,447,000** |
| Interest During Construction | | | | 6 | Months | $288,000 |
| **TOTAL COST** | | | | | | **$16,735,000** |
| **ANNUAL COSTS** | | | | | | |
| Debt Service (5.5% for 20 years) | | | | | | $1,400,000 |
| Operational Costs* | | | | | | $20,114,000 |
| **Total Annual Costs** | | | | | | **$21,514,000** |
| **UNIT COSTS (Until Amortized)** | | | | | | |
| Per Acre-Foot of treated water | | | | | | $1,056 |
| Per 1,000 Gallons | | | | | | $3.30 |
| **UNIT COSTS (After Amortization)** | | | | | | |
| Per Acre-Foot | | | | | | $1,006 |
| Per 1,000 Gallons | | | | | | $3.09 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

This strategy benefits steam electric power users 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. A contract to pull water from the Angelina River will reduce demands on other water supplies in Cherokee 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 Cherokee steam electric power 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 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 20,000 ac-ft per year |
| **Reliability** | 4 | Medium Reliable Supply |
| **Cost** | 2 | Moderate to High Cost |
| **Environmental Factors** | 4 | Low Impacts |
| **Impact on Other State Water Resources** | 4 | No known impacts to other projects. |
| **Threat to Agricultural Resources/Rural Areas** | 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** | 3 | Sponsor identified |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

Discussions with Angelina Neches River Authority.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR HENDERSON CHANDLER

| | |
|---|---|
| **Water User Group Name:** | Henderson County – City of Chandler |
| **Strategy Name:** | Purchase from City of Tyler |
| **Strategy ID:** | HDSN-CHN |
| **Strategy Type:** | Existing Surface Water Source |
| **Potential Supply Quantity:** | 77– 312 ac-ft per year (Varies)<br>(0.06– 0.3 MGD) |
| **Implementation Decade:** | 2050 |
| **Development Timeline:** | 2050 |
| **Project Capital Cost:** | $1,866,000 (September, 2013) |
| **Annual Cost:** | $302,000 |
| **Unit Water Cost (Rounded):** | $863 per ac-ft<br>($2.65 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is a recommended strategy for City of Chandler in Henderson County and involves a contract between City of Chandler and the City of Tyler from Lake Palestine supplies. The cost for supply from the Lake Palestine 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 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 municipal need projected for City of Chandler in Henderson County by the East Texas Regional Water Planning Group. The reliability of this water supply is considered high due to the availability of water projected in the City of Tyler contracted portion of Lake Palestine using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on sales with the City of Tyler. The quantity of supply from this strategy represents a contract of 77 ac-ft per year, beginning in 2050, and increasing to 312 ac-ft per year by 2070.

## ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between City of Chandler in Henderson County 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 Angelina County.

## 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. The capital costs assumed 2 miles of pipeline (the approximate distance from the Lake Palestine to the center of Henderson County), a pump station with an intake, and one terminal storage tank with 0.1 MG 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 to high cost compared to other strategies in the 2016 East Texas Regional Water Plan.

| | | | | | | |
|---|---|---|---|---|---|---|
| **WUG** | **Henderson - City of Chandler** | | | | | |
| **WMS** | **Purchase from City of Tyler** | | | | | |
| **VOL** | **350** | ac-ft per year | 0.3 MGD | | | |
| **CAPITAL COSTS** | | **Size** | **Quantity** | **Units** | **Unit Price** | **Cost** |
| **Transmission Facilities** | | | | | | |
| Pipeline | | 8 in. | 10,560 | ft | $28 | $298,554 |
| Right of Way Easements | | | 10,560 | ft | $16 | $181,500 |
| Storage Tanks | | 0.10 MG | 1 | LS | $174,179 | $174,179 |
| Contingencies (30%, engineering done) | | | | | | $150,529 |
| **Pipeline Subtotal** | | 2 | **miles** | | | **$804,761** |
| | | | MGD | HPW | | |
| Pump Station | | | 0.37 | 14 | $695,964 | $695,964 |
| Contingencies (35%, engineering done) | | | | | | $243,587 |
| **Pump Station Subtotal** | | | | | | **$939,551** |
| Environmental and Permitting | | | | | | $78,000 |
| **Construction Total** | | | | | | **$1,822,000** |
| Interest During Construction | | | | 12 | Months | $64,000 |
| **TOTAL CAPITAL COST** | | | | | | **$1,886,000** |
| **ANNUAL COSTS** | | | | | | |
| Debt Service (5.5% for 20 years) | | | | | | $158,000 |
| Operational Costs* | | | | | | $144,287 |
| **TOTAL ANNUAL COST** | | | | | | **$302,000** |
| **UNIT COSTS (Until Amortized)** | | | | | | |
| Cost per acre-ft | | | | | | $863 |
| Cost per 1000 gallons | | | | | | $2.65 |
| **UNIT COSTS (After Amortization)** | | | | | | |
| Cost per acre-ft | | | | | | $411 |
| Cost per 1000 gallons | | | | | | $1.26 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

This strategy benefits municipal 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. 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 City of Chandler recommended strategy to purchase water from the City of Tyler was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 350 ac-ft per year |
| **Reliability** | 4 | Reliable Supply |
| **Cost** | 3 | Medium Cost |
| **Environmental Factors** | 4 | Low Impacts |
| **Impact on Other State Water Resources** | 4 | No known impacts to other projects. |
| **Threat to Agricultural Resources/Rural Areas** | 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** | 3 | Local Sponsorship by City of Chandler |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

Discussions with Regional Water Planning Group and City of Tyler.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR HOUSTON IRRIGATION

| | |
|---|---|
| **Water User Group Name:** | Houston Irrigation |
| **Strategy Name:** | New wells in Yegua-Jackson Aquifer |
| **Strategy ID:** | HOUS-IRR |
| **Strategy Type:** | New Groundwater Source |
| **Potential Supply Quantity:** | 2,340 ac-ft per year<br>(2.16 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020 |
| **Project Capital Cost:** | $12,926,000 (September, 2013) |
| **Annual Cost:** | $1,647,000 |
| **Unit Water Cost (Rounded):** | $704 per ac-ft<br>($2.16 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is a recommended strategy for Irrigation in Houston County and involves the development of six wells located within the Yegua-Jackson Aquifer as this aquifer has been identified as a potential source of water in Houston County. These wells will provide approximately 2,420 ac-ft per year and are assumed to have a water depth of 300 feet. 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 provide 500 ac-ft per year to meet irrigation demands in Houston County providing a total strategy yield of 2,420 ac-ft per year for every decade in the planning period (2020-2070). A target yield for this strategy was set to the highest need projected by the East Texas Regional Water Planning Group; the highest need occurs in 2070. 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 of surface water in close proximity. The impact to the environment due to pipeline construction is expected to be temporary and minimal. New wells have a potential decrease in the groundwater-surface water nexus, which could reduce base flows. Impacts to environmental water needs, habitat, and cultural resources are expected to be low. There are no bays or estuaries in close proximity of Houston County.

## 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. The capital costs assumed 3 miles of pipeline, 20 wells, a peaking factor of two, and a maximum well yield of 150 gpm for each well. This equates to $704 per acre-foot ($2.16 per 1,000 gallons); after the infrastructure is fully paid (30 years), the cost drops to $241 per acre-foot ($0.74 per 1,000 gallons). Overall, this strategy has a low cost compared to other strategies in the 2016 East Texas Regional Water Plan.

**WUG: Houston County Irrigation**
WMS: Houston County, Yegua-Jackson Aquifer

| | | | |
|---|---|---|---|
| Supply | 2,340 | Ac-ft/yr | 1,451 gpm |
| Depth to Water | 300 | | |
| Well Depth | 820 | | |
| Well Size | 12 | in | |
| Wells Needed | 20 | | |

| **Construction Costs** | Number | Unit Cost | Total Cost |
|---|---|---|---|
| Water Wells | 20 | $191,607 | $3,832,146 |
| Connection to Transmission System | 20 | $50,000 | $1,000,000 |
| Engineering and Contingencies (30% for pipelines, 35% for other items) | | | $1,641,000 |
| **Subtotal of Well(s)** | | | **$6,473,146** |

| **Transmission System** | Size | Quantity | Unit | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| Pipeline - Rural | 18 in. | 15,840 | LF | $69 | $1,088,000 |
| Pump Station | 327 HP | 1 | EA | $2,716,000 | $2,716,000 |
| Ground Storage Tank | 0.52 MG | 1 | EA | $385,028 | $385,028 |
| Easement - Rural | | 15,840 | LF | $16 | $ 272,250 |
| Engineering and Contingencies (30% for pipelines, 35% for other items) | | | | | $1,412,000 |
| **Subtotal for Transmission** | | **3** | **miles** | | **5,873,278** |

| | | | | |
|---|---|---|---|---|
| Permitting and Mitigation | | | | $143,000 |
| **Construction Total** | | | | **$12,489,000** |
| Interest During Construction | 12 | Months | | $437,000 |
| **TOTAL CAPITAL COST** | | | | **$12,926,000** |

| | |
|---|---|
| Debt Service (5.5% for 20 years) | $1,082,000 |
| Operational Costs* | $564,700 |
| **Total Annual Cost** | **$1,647,000** |

| **UNIT COSTS (Until Amortized)** | |
|---|---|
| Cost per ac-ft | $704 |
| Cost per 1000 gallons | $2.16 |

| **UNIT COSTS (After Amortization)** | |
|---|---|
| Cost per ac-ft | $241 |
| Cost per 1000 gallons | $0.74 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

This strategy benefits irrigation 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 because it provides water for economic growth.

Based on the analyses provided above, the recommended strategy to drill new wells in Houston County for irrigation use was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 2,340 ac-ft per year |
| **Reliability** | 4 | Reliable Supply |
| **Cost** | 3 | Medium Cost |
| **Environmental Factors** | 4 | Low to Medium Impacts |
| **Impact on Other State Water Resources** | 4 | No Known Impacts. |
| **Threat to Agricultural Resources/Rural Areas** | 5 | No Impacts to Rural Areas. Positively benefits Agricultural Resources. |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 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

2011 East Texas Regional Water Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR JASPER MANUFACTURING

| | |
|---|---|
| **Water User Group Name:** | Jasper Manufacturing |
| **Strategy Name:** | Purchase from Lower Neches Valley Authority (Sam Rayburn) |
| **Strategy ID:** | JASP-MFG |
| **Strategy Type:** | Existing Surface Water Source |
| **Potential Supply Quantity:** | 3,046 – 8,420 ac-ft per year<br>(2.7 – 7.5 MGD) |
| **Implementation Decade:** | 2030 |
| **Development Timeline:** | 2030 |
| **Project Capital Cost:** | $33,497,000 (September 2013) |
| **Annual Cost:** | $6,059,000 |
| **Unit Water Cost (Rounded):** | $720 per ac-ft<br>($2.21 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is a recommended strategy for Manufacturing in Jasper County and involves a contract between individual manufacturing water users and the Lower Neches Valley Authority for raw water from Sam Rayburn as their permit allows. The cost for supply from Sam Rayburn 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 Lower Neches Valley 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 highest manufacturing need projected in Jasper County by the East Texas Regional Planning Group during the planning period (2020-2070). The reliability of this water supply is considered high due to the availability of water projected in Sam Rayburn using the Texas Water Development Board's Water Availability Models. In addition, this strategy is not dependent on any other water management strategies in the 2016 East Texas Regional Water Plan. The quantity of supply from this strategy represents a contract of 3,046 ac-ft per year, beginning in 2030, and increases to 8,420 ac-ft per year, beginning in 2070.

## ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between manufacturing water users in Jasper County and the Lower Neches Valley 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 Jasper County.

## 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. The capital costs assumed 22 miles of pipeline (the approximate distance from Sam Rayburn to the center of Jasper 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 2016 East Texas Regional Water Plan due to the length of pipeline required.

| | | | | | | |
|---|---|---|---|---|---|---|
| **WUG NAME:** | **Jasper Manufacturing** | | | | | |
| **STRATEGY:** | **Purchase from Lower Neches Valley Authority (Sam Rayburn)** | | | | | |
| **Raw Water Quantity:** | **8,420** AF/Y | | | 7.51 MGD | | |
| **CAPITAL COSTS** | | | | | | |
| **Pipeline** | **Size** | **Quantity** | **Unit** | | **Unit Price** | **Cost** |
| Pipeline Rural | 30 in. | 116,160 | LF | | $137 | $15,951,000 |
| Pipeline Urban | 30 in. | 0 | LF | | $192 | $0 |
| Right of Way Easements Rural (ROW) | | 116,160 | LF | | $26 | $3,280,530 |
| Right of Way Easements Urban (ROW) | | 0.0 | LF | | | $0 |
| Engineering and Contingencies (30%) | | | | | | $4,785,000 |
| **Subtotal of Pipeline** | **22** | **miles** | | | | **$24,016,530** |
| | | | | | | |
| **Pump Station(s)** | | | | | | |
| Pump with intake | 356 HP | 1 | LS | | $2,105,000 | $2,105,000 |
| Booster Pump Station | 356 HP | 1 | LS | | $2,863,000 | $2,863,000 |
| Engineering and Contingencies (35%) | | | | | | $1,738,800 |
| **Subtotal of Pump Station(s)** | | | | | | **$6,706,800** |
| | | | | | | |
| **Storage Tanks** | 1.9 MG | 1 | LS | | $772,596 | $772,596 |
| Engineering and Contingencies (35%) | | | | | | $270,409 |
| **Subtotal of Storage Tanks** | | | | | | **$1,043,005** |
| | | | | | | |
| **Permitting and Mitigation** | | | | | | $598,000 |
| **Construction Total** | | | | | | **$32,364,000** |
| **Interest During Construction** | | | | 12 | Months | $1,133,000 |
| **TOTAL CAPITAL COST** | | | | | | **$33,497,000** |
| | | | | | | |
| Debt Service (5.5% for 20 years) | | | | | | $2,803,000 |
| Electricity ($0.09 kWh) | | | | | | $209,000 |
| Operational Costs* | | | | | | $3,256,000 |
| **Total Annual Costs** | | | | | | **$6,059,000** |
| | | | | | | |
| **UNIT COSTS (Until Amortized)** | | | | | | |
| Per Acre-Foot of treated water | | | | | | $720 |
| Per 1,000 Gallons | | | | | | $2.21 |
| **UNIT COSTS (After Amortization)** | | | | | | |
| Per Acre-Foot | | | | | | $387 |
| Per 1,000 Gallons | | | | | | $1.19 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

This strategy benefits manufacturing users 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 Sam Rayburn will reduce demands on other water supplies in Jasper 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 Jasper Manufacturing recommended strategy to purchase water from the Lower Neches Valley Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 8,420 ac-ft per year |
| **Reliability** | 4 | Reliable Supply |
| **Cost** | 3 | Medium Cost |
| **Environmental Factors** | 4 | 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 |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 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

2011 East Texas Regional Water Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR JEFFERSON COUNTY-OTHER

| | |
|---|---|
| **Water User Group Name:** | Jefferson County-Other |
| **Strategy Name:** | Purchase from Lower Neches Valley Authority (Sam Rayburn) |
| **Strategy ID:** | JEFF-CTR |
| **Strategy Type:** | Existing Surface Water Source |
| **Potential Supply Quantity:** | 797 – 3,413 ac-ft per year<br>(0.7 – 3.0 MGD) |
| **Implementation Decade:** | 2050 |
| **Development Timeline:** | 2050 |
| **Project Capital Cost:** | $14,236,000 (September, 2013) |
| **Annual Cost:** | $2,521,000 |
| **Unit Water Cost (Rounded):** | $739 per ac-ft<br>($2.27 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is a recommended strategy for County-Other in Jefferson County and involves a contract between individual municipal water users and the Lower Neches Valley Authority for raw water from Sam Rayburn, as their permit allows. The cost for supply from Sam Rayburn includes the contractual cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the Lower Neches Valley 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 water need projected for County-Other in Jefferson County by the East Texas Regional Planning Group during the planning period (2020-2070). The quantity of supply from this strategy represents a contract of 797 ac-ft per year, beginning in 2050, and increases over time to 3,413 ac-ft per year, beginning in 2070. The reliability of this water supply is considered high due to the availability of water projected in Sam Rayburn using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on coordination with the Lower Neches Valley Authority. This strategy is not dependent on any other water management strategies in the 2016 East Texas Regional Water Plan.

## ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between municipal water users in Jefferson County, categorized by the Texas Water Development Board as County-Other, 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. This analysis was performed assuming that a project site would be chosen that had minimal impact to bays or

estuaries in Jefferson County.

## 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. The capital costs assumed 12 miles of pipeline (25% of the approximate distance across Jefferson 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 to low cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the length of pipeline required.

| | | | | | |
|---|---|---|---|---|---|
| **WUG NAME:** | **Jefferson County-Other** | | | | |
| **STRATEGY:** | **Purchase from Lower Neches Valley Authority** | | | | |
| **Raw Water Quantity:** | **3,413** AF/Y | | | 4.6 MGD | |
| **CAPITAL COSTS** | | | | | |
| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
| Pipeline Rural | 20 in. | 63,360 | LF | $81 | $5,118,000 |
| Pipeline Urban | 20 in. | 0 | LF | $112 | $0 |
| Right of Way Easements Rural (ROW) | | 63,360 | LF | $26 | $1,789,370 |
| Engineering and Contingencies (30%) | | | | | $1,535,000 |
| **Pump Station(s)** | | | | | |
| Pump with intake | 120 HP | 1 | LS | $1,000,000 | $1,000,000 |
| Booster Pump Station | 120 HP | 1 | LS | $1,651,000 | $1,651,000 |
| Engineering and Contingencies (35%) | | | | | $927,850 |
| **Subtotal of Pump Station(s)** | | | | | **$3,578,850** |
| **Storage Tanks** | 3.0 MG | 1 | LS | $1,040,950 | $1,040,950 |
| Engineering and Contingencies (35%) | | | | | $364,332 |
| **Subtotal of Storage Tanks** | | | | | **$1,405,282** |
| **Permitting and Mitigation** | | | | | $328,000 |
| **CONSTRUCTION TOTAL** | | | | | **$13,754,502** |
| **Interest During Construction** | | | 12 | Months | $481,000 |
| **TOTAL CAPITAL COST** | | | | | **$14,236,000** |
| **ANNUAL COSTS** | | | | | |
| Debt Service (5.5% for 20 years) | | | | | $1,191,000 |
| Operational Costs* | | | | | $1,330,000 |
| **Total Annual Costs** | | | | | **$2,521,000** |
| **UNIT COSTS (Until Amortized)** | | | | | |
| Per Acre-Foot of treated water | | | | | $739 |
| Per 1,000 Gallons | | | | | $2.27 |
| **UNIT COSTS (After Amortization)** | | | | | |
| Per Acre-Foot | | | | | $390 |
| Per 1,000 Gallons | | | | | $1.20 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## 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 pull water from Sam Rayburn will reduce demands on other water supplies in Jefferson County and will have no other apparent impact on other State water resources.

Based on the analyses provided above, the Jefferson County-Other recommended strategy to purchase water from the Lower Neches Valley Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 3,413 ac-ft per year |
| **Reliability** | 4 | Reliable Supply |
| **Cost** | 3 | Medium Cost |
| **Environmental Factors** | 4 | Low Impacts |
| **Impact on Other State Water Resources** | 4 | No Known Impacts. |
| **Threat to Agricultural Resources/Rural Areas** | 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** | 1 | Local Sponsorship unknown |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

2011 East Texas Regional Water Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR JEFFERSON MANUFACTURING

| | |
|---|---|
| **Water User Group Name:** | Jefferson Manufacturing |
| **Strategy Name:** | Purchase from Lower Neches Valley Authority (Sam Rayburn) |
| **Strategy ID:** | JEFF-MFG |
| **Strategy Type:** | Existing Surface Water Source |
| **Potential Supply Quantity:** | 181,181 – 309,322 ac-ft per year<br>(162 – 276 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020 |
| **Project Capital Cost:** | $312,255,000 |
| **Annual Cost:** | $139,694,000 |
| **Unit Water Cost (Rounded):** | $452 per ac-ft<br>($1.39 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is a recommended strategy for Manufacturing in Jefferson County and involves a contract between individual manufacturers and the Lower Neches Valley Authority for raw water from their Sam Rayburn system, as their permit allows. The Lower Neches Valley Authority currently supplies water to manufacturing water users in Jefferson County. Therefore, the only cost for additional supply from is the contractual cost of raw water. Ultimately, this cost will need to be negotiated with the Lower Neches Valley Authority 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

The Lower Neches Valley Authority is projected to supply Jefferson Manufacturing with over 230,000 ac-ft per year beginning in 2020; this supplies increases through 2070. The strategy recommended for Jefferson Manufacturing is equal to the need projected for this entity during the planning period (2020-2070). The contract required for this strategy increases their supply by 181,181 ac-ft per year beginning in 2020 and increases over time to 309,322 ac-ft per year beginning in 2070. 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. A contract between manufacturers in Jefferson County and the Lower Neches Valley 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. Since this strategy does not include any new construction, there is no impact expected to bays or estuaries located in Jefferson County.

## 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. A regional rate for raw surface water was used for the purchase costs. Overall, this strategy has a low unit cost compared to other strategies in the 2016 East Texas Regional Water Plan.

| | | | | | |
|---|---|---|---|---|---|
| **WUG NAME:** | **Jefferson Manufacturing** | | | | |
| **STRATEGY:** | **Purchase from Lower Neches Valley Authority (Sam Rayburn)** | | | | |
| **Raw Water Quantity:** | **309,322** AF/Y | | | 414 MGD | |
| **CAPITAL COSTS** | | | | | |
| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
| Pipeline Rural | 102 in. | 89,760 | 2 | $867 | $155,706,000 |
| Pipeline Urban | 102 in. | 0 | LF | $1,215 | $0 |
| Right of Way Easements Rural (ROW) | | 89,760 | 2 | $26 | $2,534,950 |
| Right of Way Easements Urban (ROW) | | 0 | 0 | $0 | $0 |
| **Subtotal of Pipeline** | **17** | **miles** | | | **$204,952,950** |
| **Pump Station(s)** | | | | | |
| Pump with intake | 17737 HP | 1 | LS | $22,175,000 | $22,175,000 |
| Booster Pump Station | 17737 HP | 1 | LS | $26,293,000 | $26,293,000 |
| Engineering and Contingencies (35%) | | | | | $16,963,800 |
| **Subtotal of Pump Station(s)** | | | | | **$65,431,800** |
| **Storage Tanks** | 8.6 MG | 6 | LS | $2,588,768 | $15,532,607 |
| Engineering and Contingencies (35%) | | | | | $5,436,412 |
| **Subtotal of Storage Tanks** | | | | | **$20,969,019** |
| **Permitting and Mitigation** | | | | | $473,000 |
| **CONSTRUCTION TOTAL** | | | | | **$291,827,000** |
| **Interest During Construction** | | | 24 | Months | $20,428,000 |
| **TOTAL CAPITAL COST** | | | | | **$312,255,000** |
| **ANNUAL COSTS** | | | | | |
| Debt Service (5.5% for 20 years) | | | | | $26,129,000 |
| Operational Costs* | | | | | $113,565,060 |
| **Total Annual Costs** | | | | | **$139,694,000** |
| **UNIT COSTS (Until Amortized)** | | | | | |
| Per Acre-Foot of treated water | | | | | $452 |
| Per 1,000 Gallons | | | | | $1.39 |
| **UNIT COSTS (After Amortization)** | | | | | |
| Per Acre-Foot | | | | | $398 |
| Per 1,000 Gallons | | | | | $1.22 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## 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 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 Jefferson Manufacturing recommended strategy to purchase water from the Lower Neches Valley Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 309,322 ac-ft per year |
| **Reliability** | 4 | Reliable Supply |
| **Cost** | 4 | Low Cost |
| **Environmental Factors** | 4 | Low Impacts |
| **Impact on Other State Water Resources** | 4 | No Known Impacts. |
| **Threat to Agricultural Resources/Rural Areas** | 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** | 1 | Local Sponsorship unknown |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

2011 East Texas Regional Water Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR JEFFERSON STEAM ELECTRIC POWER

| | |
|---|---|
| **Water User Group Name:** | Jefferson Steam Electric Power |
| **Strategy Name:** | Purchase from Lower Neches Valley Authority (Sam Rayburn) |
| **Strategy ID:** | JEFF-SEP |
| **Strategy Type:** | Existing Surface Water Source |
| **Potential Supply Quantity:** | 13,426 – 30,839 ac-ft per year<br>(12.0 – 27.5 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020 |
| **Project Capital Cost:** | $54,518,000 (September) |
| **Annual Cost:** | $15,645,000 |
| **Unit Water Cost (Rounded):** | $507 per ac-ft<br>($1.56 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is a recommended strategy for Steam Electric Power in Jefferson County and involves a contract between individual steam electric power water users and the Lower Neches Valley Authority for raw water from their Sam Rayburn system, as their permit allows. The cost for supply from Sam Rayburn includes the contractual cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the Lower Neches Valley 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 water need projected for Steam Electric Power in Jefferson County by the East Texas Regional Planning Group during the planning period (2020-2070). The quantity of supply from this strategy represents a contract of 13,426 ac-ft per year, beginning in 2020, and increases over time to 30,839 ac-ft per year, beginning in 2070. The reliability of this water supply is considered high due to the availability of water projected in Sam Rayburn using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on coordination with the Lower Neches Valley Authority. This strategy is not dependent on any other water management strategies in the 2016 East Texas Regional Water Plan.

## ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between steam electric power water users in Jefferson County 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. This analysis was performed assuming that a project site would be chosen that had minimal impact to bays or estuaries in Jefferson County.

## 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. The capital costs assumed 17 miles of pipeline (25% of the approximate distance across Jefferson County), a pump station with an intake, and a booster pump station. 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 to low cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the length of pipeline required.

| | | | | | |
|---|---|---|---|---|---|
| **WUG NAME:** | **Jefferson Steam Electric Power** | | | | |
| **STRATEGY:** | **Purchase from Lower Neches Valley Authority** | | | | |
| | | | | 41.27 | |
| **Raw Water Quantity:** | **30,839** | AF/Y | | MGD | |
| **CAPITAL COSTS** | | | | | |
| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
| Pipeline Rural | 60 in. | 89,760 | LF | $307 | $27,552,000 |
| Right of Way Easements Rural (ROW) | | 89,760 | LF | $26 | $2,534,950 |
| Engineering and Contingencies (30%) | | | | | $8,266,000 |
| **Subtotal of Pipeline** | **17** | **miles** | | | **$38,352,950** |
| **Pump Station(s)** | | | | | |
| Pump with intake | 733 HP | 1 | LS | $2,666,000 | $2,666,000 |
| Booster Pump Station | 733 HP | 1 | LS | $4,806,000 | $4,806,000 |
| Engineering and Contingencies (35%) | | | | | $2,615,200 |
| **Subtotal of Pump Station(s)** | | | | | **$10,087,200** |
| Storage Tanks | 5.2 MG | 1 | LS | $1,509,159 | $1,509,159 |
| Engineering and Contingencies (35%) | | | | | $528,206 |
| **Subtotal of Storage Tanks** | | | | | **$2,037,365** |
| **Permitting and Mitigation** | | | | | $473,000 |
| **Construction Total** | | | | | **$50,951,000** |
| **Interest During Construction** | | | 24 | Months | $3,567,000 |
| **TOTAL CAPITAL COST** | | | | | **$54,518,000** |
| Debt Service (5.5% for 20 years) | | | | | $4,562,000 |
| Operational Costs* | | | | | $11,083,000 |
| **Total Annual Costs** | | | | | **$15,645,000** |
| **UNIT COSTS (Until Amortized)** | | | | | |
| Per Acre-Foot of treated water | | | | | $507 |
| Per 1,000 Gallons | | | | | $1.56 |
| **UNIT COSTS (After Amortization)** | | | | | |
| Per Acre-Foot | | | | | $377 |
| Per 1,000 Gallons | | | | | $1.16 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## 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 pull water from Sam Rayburn will reduce demands on other water supplies in Jefferson County and will have no other apparent impact on other State water resources.

Based on the analyses provided above, the Jefferson County-Other recommended strategy to purchase water from the Lower Neches Valley Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 30,839 ac-ft per year |
| **Reliability** | 4 | Reliable Supply |
| **Cost** | 4 | Low Cost |
| **Environmental Factors** | 4 | Low Impacts |
| **Impact on Other State Water Resources** | 4 | No Known Impacts. |
| **Threat to Agricultural Resources/Rural Areas** | 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** | 1 | Local Sponsorship unknown |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

2011 East Texas Regional Water Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR NACOGDOCHES LAKE NACONICHE

| | |
|---|---|
| **Water User Group Name:** | Nacogdoches County Multiple Water Users |
| **Strategy Name:** | Lake Naconiche Regional Water System |
| **Strategy ID:** | NACN-LK |
| **Strategy Type:** | New Surface Water Source |
| **Potential Supply Quantity:** | 1,700 ac-ft per year<br>(1.5 MGD) |
| **Implementation Decade:** | 2030 |
| **Development Timeline:** | 2030 |
| **Project Capital Cost:** | $34,492,000 (September, 2013) |
| **Annual Cost:** | $5,273,000 |
| **Unit Water Cost (Rounded):** | $3,102 per ac-ft<br>($9.52 per 1,000 gallons) |

## PROJECT DESCRIPTION

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 study was completed in 1992 that evaluated a potential regional water system using water from Lake Naconiche. To provide water to Nacogdoches County-Other users and several rural WSCs, it is recommended to develop this source for water supply. A brief description of the proposed strategy is presented below.

## SUPPLY DEVELOPMENT

Lake Naconiche is located in northeast Nacogdoches County on Naconiche Creek. It 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 for diversions for municipal use. According to the Neches WAM, the firm yield of the lake would be approximately 3,239 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. It could possibly be one of the entities served or a new water provider dedicated to the operation of this system.

The project is initially sized for 3 MGD peak capacity. 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. Overall unit costs are estimated at $9.52 per 1,000 gallons during amortization. After amortization, costs will decrease to $4.31 per 1,000 gallons. 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 by each user.

## ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. The project 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 Nacogdoches County.

## PERMITTING AND DEVELOPMENT

The water right permit for Lake Naconiche has to be changed from recreational use to multi-purpose use.

## 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. The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has moderate to high cost compared to other strategies in the 2016 East Texas Regional Water Plan.

| | | | | | |
|---|---|---|---|---|---|
| **WUG** | **Nacogdoches County-Other** | | | | |
| **WMS** | **Lake Naconiche Regional Water System - Phase 1** | | | | |
| AMOUNT (ac-ft per year): | **1,700** | 1.5 MGD | 3.0 MGD | | |
| **CAPITAL COSTS** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
| **Pipeline** | | | | | |
| Right of Way Easements Rural (ROW) | | 147,840 | LF | $26 | $4,175,270 |
| Engineering and Contingencies (30%) | | | | | $1,612,000 |
| **Subtotal of Pipeline** | | | | | **$11,159,270** |
| **Pump Station(s)** | | | | | |
| Pump Station | 188 HP | 1 | LS | $1,997,000 | $1,997,000 |
| Lake Intake | 188 HP | 1 | LS | $1,561,000 | $500,000 |
| Engineering and Contingencies (35%) | | | | | $874,000 |
| **Subtotal of Pump Station(s)** | | | | | **$3,371,000** |
| **Storage Tanks** | 0.38 MG | 1 | LS | $314,000 | **$314,000** |
| Engineering and Contingencies (35%) | | | | | $110,000 |
| **Subtotal of Storage Tanks** | | | | | **$424,000** |
| **Water Treatment Plant** | | | | | |
| Water Treatment Plant | 3.0 MGD | 1 | LS | $11,896,000 | **$11,896,000** |
| Engineering and Contingencies (35%) | | | | | $4,164,000 |
| **Subtotal of Pump Station(s)** | | | | | **$16,060,000** |
| Permitting and Mitigation - infrastructure | | | | | $754,066 |
| **Construction Total** | | | | | **$31,768,000** |
| Water rights Permitting | | | | | $500,000 |
| Interest During Construction | | | 24 | Months | $2,224,000 |
| **TOTAL COST** | | | | | **$34,492,000** |
| **ANNUAL COSTS** | | | | | |
| Operational Costs* | | | | | $2,387,000 |
| **Total Annual Costs** | | | | | **$5,273,000** |
| **UNIT COSTS (Until Amortized)** | | | | | |
| Per Acre-Foot of treated water | | | | | $3,102 |
| Per 1,000 Gallons | | | | | $9.52 |
| **UNIT COSTS (After Amortization)** | | | | | |
| Per Acre-Foot | | | | | $1,431 |
| Per 1,000 Gallons | | | | | $4.39 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## 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 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 economic growth.

Based on the analyses provided above, the Lake Naconiche Regional System is identified as a recommended strategy for Nacogdoches County and it was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 1,700 ac-ft per year |
| **Reliability** | 4 | Reliable Supply |
| **Cost** | 2 | Medium to Moderate High Cost |
| **Environmental Factors** | 4 | Low to Medium Impacts |
| **Impact on Other State Water Resources** | 4 | Low Impacts. |
| **Threat to Agricultural Resources/Rural Areas** | 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** | 4 | Sponsor identified and committed. |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

2011 East Texas Regional Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR NACOGDOCHES D&M WSC

| | |
|---|---|
| **Water User Group Name:** | Nacogdoches County D&M WSC |
| **Strategy Name:** | New wells in Carrizo-Wilcox Aquifer |
| **Strategy ID:** | NACW-DMW |
| **Strategy Type:** | New Groundwater Source |
| **Potential Supply Quantity:** | 250 ac-ft per year<br>(0.22 MGD) |
| **Implementation Decade:** | 2060 |
| **Development Timeline:** | 2060 |
| **Project Capital Cost:** | $3,484,000 (September 2013) |
| **Annual Cost:** | $384,000 |
| **Unit Water Cost (Rounded):** | $1,536 per ac-ft<br>($4.71 per 1,000 gallons) |

## PROJECT DESCRIPTION

D&M WSC is a municipal water user in Nacogdoches County. This water user currently relies on groundwater in the Carrizo Wilcox aquifer in Nacogdoches County. D&M WSC has a small need starting in 2060 and the maximum need is approximately 234 ac-ft per year. To meet this need, it is recommended that D&M WSC continue to use supplies from Carrizo Wilcox by drilling additional wells. This strategy is a recommended strategy for D&M WSC in Nacogdoches County and involves the development of two wells located within the Carrizo-Wilcox Aquifer as this aquifer has been identified as a potential source of water in Nacogdoches County. These wells will provide approximately 400 ac-ft per year and are assumed to have a water depth of 600 feet. 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

The supply is required only in the later part of the planning cycle, for decades 2060 and 2070. Currently, all of the existing needs are being met by supplies from the Carrizo Wilcox aquifer. There are sufficient supplies available in the Nacogdoches County Carrizo Wilcox to develop the supply needed for this water management strategy. It is assumed that each well will provide 200 ac-ft per year to meet D&M WSC's needs in Nacogdoches County providing a total yield required for the strategy. 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 of surface water in close proximity. The impact to the environment due to pipeline construction is expected to be temporary and minimal. New wells have a potential decrease in the groundwater-surface water nexus, which could reduce base flows. Impacts to environmental water needs, habitat, and cultural resources are expected to be low. There are no bays or estuaries in close proximity of Nacogdoches County.

## 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. The capital costs assumed four miles of pipeline, two wells, a peaking factor of two, and a maximum well yield of 250 gpm for each well. This equates to $1,538 per acre-foot ($4.72 per 1,000 gallons); after the infrastructure is fully paid (30 years), the cost drops to $370 per acre-foot ($1.14 per 1,000 gallons). Overall, this strategy has a moderate to high cost compared to other strategies in the 2016 East Texas Regional Water Plan.

**WUG: Nacogdoches County D & M WSC**
**WMS: Nacogdoches County - Carrizo Aquifer Wells**

| | | | |
|---|---|---|---|
| Supply | 250 | Ac-ft/yr | (155 gpm) |
| Depth to Water | 300 | | |
| Well Depth | 600 | | |
| Well Size | 12 | in | |
| Wells Needed | 2 | | |

| **Construction Costs** | Number | Unit Cost | Total Cost |
|---|---|---|---|
| Water Wells | 2 | $394,954 | $789,908 |
| Connection to Transmission System | 2 | $50,000 | $100,000 |
| Engineering and Contingencies (30% for pipelines, 35% for other items) | | | $306,000 |
| **Subtotal of Well(s)** | | | **$1,195,908** |

| **Transmission System** | Size | Quantity | Unit | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| Pipeline - Rural | 6 in. | 21,120 | LF | $18 | $384,000 |
| Pump Station | 49 HP | 1 | EA | $789,000 | $789,000 |
| Ground Storage Tank | 0.06 MG | 1 | EA | $124,984 | $124,984 |
| Easement - Rural | | 21,120 | LF | $16 | $363,110 |
| Engineering and Contingencies (30% for pipelines, 35% for other items) | | | | | $435,000 |
| **Subtotal for Transmission** | | **4** | **miles** | | **2,096,094** |

| | | | |
|---|---|---|---|
| Permitting and Mitigation | | | $132,000 |
| **Construction Total** | | | **$3,424,000** |
| Interest During Construction | 6 | Months | $60,000 |
| **TOTAL CAPITAL COST** | | | **$3,484,000** |

| | |
|---|---|
| Debt Service (5.5% for 20 years) | $292,000 |
| Operational Costs* | $92,400 |
| **Total Annual Cost** | **$384,000** |

| **UNIT COSTS (Until Amortized)** | |
|---|---|
| Cost per ac-ft | $1,536 |
| Cost per 1000 gallons | $4.71 |

| **UNIT COSTS (After Amortization)** | |
|---|---|
| Cost per ac-ft | $370 |
| Cost per 1000 gallons | $1.14 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

This strategy benefits municipal user D&M WSC 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. New wells in the county will reduce 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 economic growth.

Based on the analyses provided above, the recommended strategy to drill new wells in Nacogdoches County for D&M WSC's use was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 250 ac-ft per year |
| **Reliability** | 4 | Highly Reliable Supply |
| **Cost** | 3 | Moderate to High Cost |
| **Environmental Factors** | 4 | Low to No Impacts |
| **Impact on Other State Water Resources** | 4 | No known impacts to other projects. |
| **Threat to Agricultural Resources/Rural Areas** | 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 | Sponsor identified but uncommitted. |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

Discussions with Regional Water Planning Group.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR NACOGDOCHES LIVESTOCK

| | |
|---|---|
| **Water User Group Name:** | Nacogdoches County Livestock |
| **Strategy Name:** | New wells in Carrizo-Wilcox Aquifer |
| **Strategy ID:** | NACW-LTK |
| **Strategy Type:** | New Groundwater Source |
| **Potential Supply Quantity:** | 3,059 ac-ft per year<br>(2.7 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020 |
| **Project Capital Cost:** | $23,770,000 (September 2013) |
| **Annual Cost:** | $2,766,000 |
| **Unit Water Cost (Rounded):** | $904 per ac-ft<br>($2.77 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is a recommended strategy for livestock users in Nacogdoches County and involves the development of 22 wells located within the Carrizo-Wilcox Aquifer as this aquifer has been identified as a potential source of water in Nacogdoches County. These wells will provide approximately 3,000 ac-ft per year and are assumed to have a water depth of 300 feet. 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

The supply is required for all decades of the planning cycle to help meet the needs. Currently, local supply provides half of the supply for the livestock needs and the remainder is taken from the Carrizo Wilcox aquifer. There are sufficient supplies available in the Nacogdoches County Carrizo Wilcox to develop the supply needed for this water management strategy. It is assumed that each well will provide 200 ac-ft per year to meet livestock demands in Nacogdoches County providing a total yield required for the strategy. 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 of surface water in close proximity. The impact to the environment due to pipeline construction is expected to be temporary and minimal. New wells have a potential decrease in the groundwater-surface water nexus, which could reduce base flows. Impacts to environmental water needs, habitat, and cultural resources are expected to be low. There are no bays or estuaries in close proximity of Nacogdoches County.

## 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. The capital costs assumed 10 miles of pipeline, 22 wells, a peaking factor of two, and a maximum well yield of 250 gpm for each well. This equates to $904 per acre-foot ($2.77 per 1,000 gallons); after the infrastructure is fully paid (30 years), the cost drops to $254 per acre-foot ($0.78 per 1,000 gallons). Overall, this strategy has a medium cost compared to other strategies in the 2016 East Texas Regional Water Plan.

**WUG: Nacogdoches County Livestock**
**WMS: Nacogdoches County - Carrizo Aquifer Wells**

| | | | | |
|---|---|---|---|---|
| Supply | 3,059 | Ac-ft/yr | 1,897 | gpm |
| Depth to Water | 300 | | | |
| Well Depth | 500 | | | |
| Well Size | 6 | in | | |
| Wells Needed | 22 | | | |

| **Construction Costs** | Number | Unit Cost | Total Cost |
|---|---|---|---|
| Water Wells | 22 | $365,789 | $8,047,359 |
| Connection to Transmission System | 22 | $50,000 | $1,100,000 |
| Engineering and Contingencies (30% for pipelines, 35% for other items) | | | $3,147,000 |
| **Subtotal of Well(s)** | | | **$12,294,359** |

| **Transmission System** | Size | Quantity | Unit | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| Pipeline - Rural | 20 in. | 52,800 | LF | $81 | $4,265,000 |
| Pump Station | 553 HP | 1 | EA | $2,423,000 | $2,423,000 |
| Ground Storage Tank | 0.68 MG | 1 | EA | $463,432 | $463,432 |
| Easement - Rural | | 52,800 | LF | $16 | $907,720 |
| Engineering and Contingencies (30% for pipelines, 35% for other items) | | | | | $2,290,000 |
| **Subtotal for Transmission** | | **10** | **miles** | | **10,349,152** |

| | | | |
|---|---|---|---|
| Permitting and Mitigation | | | $322,000 |
| **Construction Total** | | | **$22,966,000** |
| Interest During Construction | 12 | Months | $804,000 |
| **TOTAL CAPITAL COST** | | | **$23,770,000** |

| | |
|---|---|
| Debt Service (5.5% for 20 years) | $1,989,000 |
| Operational Costs* | $777,000 |
| **Total Annual Cost** | **$2,766,000** |

| **UNIT COSTS (Until Amortized)** | |
|---|---|
| Cost per ac-ft | $904 |
| Cost per 1000 gallons | $2.77 |

| **UNIT COSTS (After Amortization)** | |
|---|---|
| Cost per ac-ft | $254 |
| Cost per 1000 gallons | $0.78 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

This strategy benefits livestock 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. New wells in the county will reduce 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 economic growth.

Based on the analyses provided above, the recommended strategy to drill new wells in Nacogdoches County for livestock use was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 3,059 ac-ft per year |
| **Reliability** | 4 | Highly Reliable Supply |
| **Cost** | 3 | Medium Cost |
| **Environmental Factors** | 4 | Low to No Impacts |
| **Impact on Other State Water Resources** | 4 | No known impacts to other projects. |
| **Threat to Agricultural Resources/Rural Areas** | 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** | 1 | Local Sponsorship unknown |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

2011 East Texas Regional Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR NACOGDOCHES MINING

| | |
|---|---|
| **Water User Group Name:** | Nacogdoches County Mining |
| **Strategy Name:** | Purchase from Angelina Neches River Authority (Angelina River) |
| **Strategy ID:** | NACW-MIN |
| **Strategy Type:** | New Surface Water Source |
| **Potential Supply Quantity:** | 5,475– 118 ac-ft per year (Varies)<br>(4.88 – 0.15 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020 |
| **Project Capital Cost:** | $12,465,000 (September, 2013) |
| **Annual Cost:** | $6,650,000 |
| **Unit Water Cost (Rounded):** | $1,209 per ac-ft<br>($3.71 per 1,000 gallons) |

## PROJECT DESCRIPTION

Mining users in Nacogdoches County show a projected need in the early decades of the planning cycle. This strategy is a recommended strategy for Mining in Nacogdoches County and involves a contract between individual mining water users and the Angelina Neches River Authority for raw water from the Angelina River, as their permit allows. Potential mining customers in Nacogdoches County have reached out to Angelina Neches River Authority for a contract to sell water. It is assumed that the individual mining customers will develop the infrastructure required to access supplies from Angelina River to the project location. The cost for supply from the Angelina 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 Nacogdoches County by the East Texas Regional Water Planning Group. Currently mining needs are met by local supplies in Nacogdoches County and groundwater supplies from other aquifers in the County. The recommended source of supply for the future mining needs will be the run-of-river supplies from Angelina River that Angelina Neches River Authority is applying for. The reliability of this water supply is considered medium due to the availability of water projected in the Angelina River using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on sales with the Angelina Neches River Authority and their application for 30,000 ac-ft per year from the Angelina River (Strategy ID: ANRA-ROR). The quantity of supply from this strategy represents a contract of 5,475 ac-ft per year, beginning in 2020 and decreases to 118 ac-ft per year by 2040.

## 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 Nacogdoches 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 Nacogdoches County.

## 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. The capital costs assumed 9.5 miles of pipeline (approximate distance from the potential location for run-of-river diversions on Angelina River to the center of Nacogdoches County), a pump station with an intake and one terminal storage tank with 1.2 MG 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 2016 East Texas Regional Water Plan due to the length of pipeline required.

| | | | | | |
|---|---|---|---|---|---|
| **WUG NAME:** | **Nacogdoches County Mining** | | | | |
| **STRATEGY:** | **Purchase from ANRA (Angelina ROR)** | | | | |
| **Raw Water Quantity:** | **5,500** Ac-ft/yr | | | 9.81 MGD | |
| **CAPITAL COSTS** | | | | | |
| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
| Pipeline Rural | 24 in. | 50,160 | LF | $103 | $5,166,000 |
| Pipeline Urban | 24 in. | 0 | LF | $144 | $0 |
| Right of Way Easements Rural (ROW) | | 50,160 | LF | $26 | $1,416,580 |
| Engineering and Contingencies (30%) | | | | | $1,550,000 |
| **Subtotal of Pipeline** | **9.5** | **miles** | | | **$8,132,580** |
| **Pump Station(s)** | | | | | |
| Pump with intake | 345 HP | 1 | LS | $2,056,000 | $2,056,000 |
| Booster Pump Station | 0 HP | 0 | LS | $0 | $0 |
| Engineering and Contingencies (35%) | | | | | $719,600 |
| **Subtotal of Pump Station(s)** | | | | | **$2,775,600** |
| **Storage Tanks** | 1.2 MG | 1 | LS | $643,607 | $643,607 |
| Engineering and Contingencies (35%) | | | | | $225,262 |
| **Subtotal of Storage Tanks** | | | | | **$868,869** |
| Permitting and Mitigation | | | | | $265,500 |
| **Construction Total** | | | | | **$12,043,000** |
| Interest During Construction | | | 12 | Months | $422,000 |
| **TOTAL CAPITAL COST** | | | | | **$12,465,000** |
| **ANNUAL COSTS** | | | | | |
| Debt Service (5.5% for 20 years) | | | | | $1,043,000 |
| Operational Costs* | | | | | $5,607,000 |
| **Total Annual Costs** | | | | | **$6,650,000** |
| **UNIT COSTS (Until Amortized)** | | | | | |
| Per Acre-Foot of treated water | | | | | $1,209 |
| Per 1,000 Gallons | | | | | $3.71 |
| **UNIT COSTS (After Amortization)** | | | | | |
| Per Acre-Foot | | | | | $1,019 |
| Per 1,000 Gallons | | | | | $3.13 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

This strategy benefits mining 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. A contract to pull water from the Angelina River will reduce 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 economic growth.

Based on the analyses provided above, the Nacogdoches 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 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 5,475 ac-ft per year |
| **Reliability** | 3 | Medium Reliable Supply |
| **Cost** | 3 | Medium Cost |
| **Environmental Factors** | 4 | Low to No Impacts |
| **Impact on Other State Water Resources** | 4 | No known impacts to other projects. |
| **Threat to Agricultural Resources/Rural Areas** | 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** | 4 | Sponsor identified and committed to the strategy |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

2011 East Texas Regional Water Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR NACOGDOCHES STEAM ELECTRIC POWER

| | |
|---|---|
| **Water User Group Name:** | Nacogdoches County Steam Electric Power |
| **Strategy Name:** | Purchase from Angelina Neches River Authority (Angelina River) |
| **Strategy ID:** | NACW-SEP1 |
| **Strategy Type:** | New Surface Water Source |
| **Potential Supply Quantity:** | 799– 8,594 ac-ft per year (Varies)<br>(0.7– 7.6 MGD) |
| **Implementation Decade:** | 2030 |
| **Development Timeline:** | 2030 |
| **Project Capital Cost:** | $25,805,000 (September, 2013) |
| **Annual Cost:** | $5,264,000 |
| **Unit Water Cost (Rounded):** | $619 per ac-ft<br>($1.9 per 1,000 gallons) |

## PROJECT DESCRIPTION

There is significant growth in the steam electric power water use in Nacogdoches County. Currently, the steam electric power needs in this County are being met by supplies from Lake Striker. Since the increase in demand is significant, starting at 799 ac-ft per year in 2030 and increasing to 8,594 ac-ft per year, multiple water management strategies are proposed to address this need. This strategy is a recommended strategy for steam electric power users in Nacogdoches County and involves a contract between individual steam electric power water users and the Angelina Neches River Authority for raw water from Angelina River, as their permit allows. It is assumed that the individual steam electric power customers will develop the infrastructure required to access supplies from Angelina River to the project location. The cost for supply from the Angelina 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 steam electric power need projected in Nacogdoches County by the East Texas Regional Water Planning Group. Currently steam electric power needs are met by surface water supplies from Lake Striker. Lake Striker supplies are contracted out for the planning cycle and there are no additional supplies currently available to help meet the needs for steam electric power users in Nacogdoches County. The recommended source of supply for the future steam electric power needs will be the transmission system connection to Lake Columbia supply that Angelina Neches River Authority is developing. The reliability of this water supply is considered medium to high due to the availability of water projected for Lake Columbia using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on sales with the Angelina Neches River Authority and their plan for developing Lake Columbia supplies. The quantity of supply from this strategy represents a contract of 799 ac-ft per year, beginning in 2020 and increasing to a maximum amount of 8,500 ac-ft per year by 2070. The additional needs for steam electric power will be addressed by a second strategy discussed in another technical memorandum.

## ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between steam electric power water users in Nacogdoches 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 Nacogdoches County.

## 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. The capital costs assumed 9.5 miles of pipeline (approximate distance from the potential location for releases from Lake Columbia on Angelina River to the center of Nacogdoches County), a pump station with an intake, and one terminal storage tank with 0.9 MG 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 low to medium cost compared to other strategies in the 2016 East Texas Regional Water Plan.

| | | | | | |
|---|---|---|---|---|---|
| **WUG NAME:** | **Nacogdoches County Steam Electric Power** | | | | |
| **STRATEGY:** | **Purchase from ANRA** | | | | |
| **Raw Water Quantity:** | **8,500** Ac-ft/yr | | | 15.17 MGD | |
| **CAPITAL COSTS** | | | | | |
| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
| Pipeline Rural | 60 in. | 50,160 | LF | $307 | $15,397,000 |
| Pipeline Urban | 60 in. | 0 | LF | $430 | $0 |
| Right of Way Easements Rural (ROW) | | 50,160 | LF | $26 | $1,416,580 |
| Right of Way Easements Urban (ROW) | | 0.0 | LF | $0 | $0 |
| **Subtotal of Pipeline** | **9.5** | **miles** | | | **$21,432,580** |
| **Pump Station(s)** | | | | | |
| Pump with intake | 282 HP | 1 | LS | $1,802,000 | $1,802,000 |
| Booster Pump Station | 0 HP | 0 | LS | $0 | $0 |
| Engineering and Contingencies (35%) | | | | | $630,700 |
| **Subtotal of Pump Station(s)** | | | | | **$2,432,700** |
| **Storage Tanks** | 0.9 MG | 1 | LS | $593,305 | $593,305 |
| Engineering and Contingencies (35%) | | | | | $207,657 |
| **Subtotal of Storage Tanks** | | | | | **$800,962** |
| **Permitting and Mitigation** | | | | | $265,500 |
| **CONSTRUCTION TOTAL** | | | | | **$24,931,742** |
| **Interest During Construction** | | | 12 | Months | $873,000 |
| **TOTAL CAPITAL COST** | | | | | **$25,805,000** |
| **ANNUAL COSTS** | | | | | |
| Debt Service (5.5% for 20 years) | | | | | $2,159,000 |
| Operational Costs* | | | | | $3,105,000 |
| **Total Annual Costs** | | | | | **$5,264,000** |
| **UNIT COSTS (Until Amortized)** | | | | | |
| Per Acre-Foot of treated water | | | | | $619 |
| Per 1,000 Gallons | | | | | $1.90 |
| **UNIT COSTS (After Amortization)** | | | | | |

| | |
|---|---|
| Per Acre-Foot | $365 |
| Per 1,000 Gallons | $1.12 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

This strategy benefits mining 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. A contract to pull water from the Angelina River will reduce 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 economic growth. Based on the analyses provided above, the Nacogdoches Steam Electric Power 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 2016 East Texas Regional Water Plan. The results are in table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 8,500 ac-ft per year |
| **Reliability** | 3 | Medium Reliable Supply |
| **Cost** | 3 | Low to Medium Cost |
| **Environmental Factors** | 4 | Low to No Impacts |
| **Impact on Other State Water Resources** | 4 | Low Impacts. |
| **Threat to Agricultural Resources/Rural Areas** | 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** | 1 | Local Sponsorship unknown |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

2011 East Texas Regional Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR NACOGDOCHES STEAM ELECTRIC POWER

| | |
|---|---|
| **Water User Group Name:** | Nacogdoches County Steam Electric Power |
| **Strategy Name:** | New wells in Carrizo-Wilcox Aquifer/Transfer from Houston County WCID#1 |
| **Strategy ID:** | NACW-SEP2 |
| **Strategy Type:** | New Groundwater Source |
| **Potential Supply Quantity:** | 3,989 ac-ft per year /1,000 ac-ft per year (1.78 MGD) |
| **Implementation Decade:** | 2070 |
| **Development Timeline:** | 2070 |
| **Project Capital Cost:** | $16,021,000 (September 2013) |
| **Annual Cost:** | $1,875,000 |
| **Unit Water Cost (Rounded):** | $938 per ac-ft ($2.88 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is a recommended strategy for Steam Electric Power users in Nacogdoches County and involves the development of ten wells located within the Carrizo-Wilcox Aquifer as this aquifer has been identified as a potential source of water in Nacogdoches County. These wells will provide approximately 4,000 ac-ft per year and are assumed to have a water depth of 300 feet. 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. Additionally, this strategy also assumes a 1,000 ac-ft transfer of groundwater supplies from Houston County WCID #1 to Nacogdoches Steam Electric Power users.

## SUPPLY DEVELOPMENT

The supply is only required in 2070 as other water management strategies help meet the need in the interim years. It is assumed that each well will provide 250 ac-ft per year to meet steam electric power demands in Nacogdoches County providing a total strategy yield of 3,989 ac-ft per year for 2070. An additional 1,000 ac-ft per year was also supplied from Houston County WCID#1 as a surplus in all decades. A target yield for this strategy was set to the highest need projected by the East Texas Regional Water Planning Group in 2070. 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 of surface water in close proximity. The impact to the environment due to pipeline construction is expected to be temporary and minimal. New wells have a potential decrease in the groundwater-surface water nexus, which could reduce base flows. Impacts to environmental water needs, habitat, and cultural resources are expected to be low. There are no bays or estuaries in close proximity of Nacogdoches County.

## 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. The capital costs assumed 9.5 miles of pipeline, ten wells, a peaking factor of two, and a maximum well yield of 250 gpm for each well. This equates to $938 per acre-foot ($2.88 per 1,000 gallons); after the infrastructure is fully paid (30 years), the cost drops to $267 per acre-foot ($0.82 per 1,000 gallons). Overall, this strategy has a medium cost compared to other strategies in the 2016 East Texas Regional Water Plan.

**WUG: Nacogdoches County Steam Electric Power**
WMS: Nacogdoches County - Carrizo Aquifer Wells

| | | | | |
|---|---|---|---|---|
| Supply | 2,000 | Acre-feet per year | 1,240 | gpm |
| Depth to Water | 300 | | | |
| Well Depth | 600 | | | |
| Well Size | 12 | in | | |
| Wells Needed | 10 | | | |

| **Construction Costs** | Number | Unit Cost | Total Cost |
|---|---|---|---|
| Water Wells | 10 | $394,954 | $3,949,539 |
| Connection to Transmission System | 10 | $50,000 | $500,000 |
| Engineering and Contingencies (30% for pipelines, 35% for other items) | | | $1,532,000 |
| **Subtotal of Well(s)** | | | **$5,981,539** |

| **Transmission System** | Size | Quantity | Unit | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| Pipeline - Rural | 16 in. | 50,160 | LF | $58 | $2,887,000 |
| Pump Station | 393 HP | 1 | EA | $3,057,000 | $3,057,000 |
| Ground Storage Tank | 0.45 MG | 1 | EA | $347,345 | $347,345 |
| Easement - Rural | | 50,160 | LF | $16 | $862,290 |
| Engineering and Contingencies (30% for pipelines, 35% for other items) | | | | | $2,058,000 |
| **Subtotal for Transmission** | | **9.5** | **miles** | | **9,211,635** |

| | | | |
|---|---|---|---|
| Permitting and Mitigation | | | $285,500 |
| **Construction Total** | | | **$15,479,000** |
| Interest During Construction | 12 | Months | $542,000 |
| **TOTAL CAPITAL COST** | | | **$16,021,000** |

| | |
|---|---|
| Debt Service (5.5% for 20 years) | $1,341,000 |
| Operational Costs* | $533,500 |
| **Total Annual Cost** | **$1,875,000** |

| **UNIT COSTS (Until Amortized)** | |
|---|---|
| Cost per ac-ft | $938 |
| Cost per 1000 gallons | $2.88 |

| **UNIT COSTS (After Amortization)** | |
|---|---|
| Cost per ac-ft | $267 |
| Cost per 1000 gallons | $0.82 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

This strategy benefits steam electric 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. New wells in the county will reduce 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 economic growth.

Based on the analyses provided above, the recommended strategy to drill new wells in Nacogdoches County for steam electric power use was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 2,000 ac-ft per year |
| **Reliability** | 4 | Highly Reliable Supply |
| **Cost** | 3 | Medium Cost |
| **Environmental Factors** | 4 | Low to No Impacts |
| **Impact on Other State Water Resources** | 4 | No known impacts to other projects. |
| **Threat to Agricultural Resources/Rural Areas** | 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** | 1 | Local Sponsorship unknown |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

2011 East Texas Regional Water Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR NEWTON MINING

| | |
|---|---|
| **Water User Group Name:** | Newton Mining |
| **Strategy Name:** | Purchase from Sabine River Authority (Toledo Bend) |
| **Strategy ID:** | NEWT-MIN |
| **Strategy Type:** | Existing Surface Water Source |
| **Potential Supply Quantity:** | 59 – 115 ac-ft per year<br>(0.05 – 0.10 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020 |
| **Project Capital Cost:** | $0 (May 2015) |
| **Annual Cost:** | $111,000 |
| **Unit Water Cost (Rounded):** | $965 per ac-ft<br>($2.96 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is a recommended strategy for Mining in Newton County and involves a contract between individual mining water users and the Sabine River Authority from their Toledo Bend system, as their permit allows. The Sabine River Authority currently supplies water to mining water users in Newton County. Therefore, the only cost for additional supply from is the contractual cost of raw water. Ultimately, this cost will need to be negotiated with the Sabine River Authority 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

Currently, the Sabine River Authority is the only provider of water to mining users in Newton County. Therefore, this recommended strategy calls for a contract amendment equal to the projected need of Newton Mining during the planning period. The contract required for this strategy increases their supply by 115 ac-ft per year beginning in 2020 and decreases to 59 ac-ft per year beginning in 2030. Newton mining is not projected to have a need from 2040 through 2070. These supplies are considered highly reliable because the supply is available in Toledo Bend and the infrastructure is already in place; however, the supply is dependent on coordination with the Sabine River Authority.

## ENVIRONMENTAL CONSIDERATIONS

There are not any significant environmental considerations associated with this strategy. A contract between mining water users in Newton County and the Sabine River 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. There are no bays or estuaries located in Newton County.

## 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, but an annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water equal to $3.00 per 1,000 gallons. Overall, this strategy has a medium cost compared to other strategies in the 2016 East Texas Regional Water Plan.

| | | | | |
|---|---|---|---|---|
| **WUG NAME:** | **Newton Mining** | | | |
| **STRATEGY:** | **Purchase from Sabine River Authority (Toledo Bend)** | | | |
| | | | 0.15 | |
| **Raw Water Quantity:** | **115** | AF/Y | MGD | |
| **CONSTRUCTION COSTS** | | | | |
| **ANNUAL CONTRACT COSTS** | | | | |
| **ANNUAL COSTS** | | | | |
| **Operational Costs*** | | | | **$111,000** |
| **UNIT COSTS (Until Amortized)** | | | | |
| Per Acre-Foot of treated water | | | | $965 |
| Per 1,000 Gallons | | | | $2.96 |
| **UNIT COSTS (After Amortization)** | | | | |
| Per Acre-Foot | | | NA | |
| Per 1,000 Gallons | | | NA | |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

This strategy benefits mining water users in Newton 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 Sabine River Authority's Toledo Bend system will reduce demands on other water supplies in Newton 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 Newton Mining recommended strategy to purchase water from the Sabine River Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 115 ac-ft per year |
| **Reliability** | 4 | Highly Reliable Supply |
| **Cost** | 3 | Medium Cost |
| **Environmental Factors** | 4 | Low to No Impacts |
| **Impact on Other State Water Resources** | 4 | No known impacts to other projects. |
| **Threat to Agricultural Resources/Rural Areas** | 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** | 1 | Local Sponsorship unknown |
| **Implementation Issues** | 4 | Limited Risk |

## REFERENCES

2011 East Texas Regional Water Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS
# TECHNICAL MEMORANDUM FOR NEWTON STEAM ELECTRIC POWER

| | |
|---|---|
| **Water User Group Name:** | Newton Steam Electric Power |
| **Strategy Name:** | Purchase from Sabine River Authority (Toledo Bend) |
| **Strategy ID:** | NEWT-SEP |
| **Strategy Type:** | Existing Surface Water Source |
| **Potential Supply Quantity:** | 690 – 19,021 ac-ft per year<br>(0.6 – 17.0 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020 |
| **Project Capital Cost:** | $38,170,000 (May 2015) |
| **Annual Cost:** | $10,091,000 |
| **Unit Water Cost (Rounded):** | $531 per ac-ft<br>($1.63 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is a recommended strategy for Steam Electric Power in Newton County and involves a contract between individual steam electric power water users and the Sabine River Authority for raw water from their Toledo Bend system, as their permit allows. The cost for supply from the Toledo Bend system includes the contractual cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the Sabine 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 water need projected for Steam Electric Power in Newton County by the East Texas Regional Planning Group during the planning period (2020-2070). The quantity of supply from this strategy represents a contract of 690 ac-ft per year, beginning in 2020, and increases over time to 19,021 ac-ft per year, beginning in 2070. The reliability of this water supply is considered high due to the availability of water projected in the Toledo Bend system using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on coordination with the Sabine River Authority. This strategy is not dependent on any other water management strategies in the 2016 East Texas Regional Water Plan.

## ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between steam electric power water users in Newton County and the Sabine River 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. There are no bays or estuaries within Newton County.

## 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. The capital costs assumed 15 miles of pipeline (50% of the approximate distance across Newton County), a pump station with an intake, and a booster pump station. 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 to low cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the length of pipeline required.

| | | | | | |
|---|---|---|---|---|---|
| **WUG NAME:** | **Newton Steam Electric Power** | | | | |
| **STRATEGY:** | **Purchase from Sabine River Authority (Toledo Bend)** | | | | |
| **Raw Water Quantity:** | **19,021** Ac-ft/yr | | | 34.0 MGD | |
| **CAPITAL COSTS** | | | | | |
| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
| Pipeline Rural | 48 in. | 79,200 | LF | $239 | $18,953,000 |
| **Subtotal of Pipeline** | **15** | **miles** | | | **$26,875,740** |
| **Pump Station(s)** | | | | | |
| Pump with intake | 463 HP | 1 | LS | $2,364,000 | $2,364,000 |
| Booster Pump Station | 463 HP | 1 | LS | $3,417,000 | $3,417,000 |
| Engineering and Contingencies (35%) | | | | | $2,023,350 |
| **Subtotal of Pump Station(s)** | | | | | **$7,804,350** |
| **Storage Tanks** | 4.2 MG | 1 | LS | $1,315,816 | **$1,315,816** |
| Engineering and Contingencies (35%) | | | | | $460,536 |
| **Subtotal of Storage Tanks** | | | | | **$1,776,352** |
| Permitting and Mitigation | | | | | $423,000 |
| **Construction Total** | | | | | **$36,879,000** |
| Interest During Construction | | | 12 | Months | $1,291,000 |
| **TOTAL CAPITAL COST** | | | | | **$38,170,000** |
| **ANNUAL COSTS** | | | | | |
| Debt Service (5.5% for 20 years) | | | | | $3,194,000 |
| Operational Costs* | | | | | $6,897,000 |
| **Total Annual Costs** | | | | | **$10,091,000** |
| **UNIT COSTS (Until Amortized)** | | | | | |
| Per Acre-Foot of treated water | | | | | $531 |
| Per 1,000 Gallons | | | | | $1.63 |
| **UNIT COSTS (After Amortization)** | | | | | |
| Per Acre-Foot | | | | | $380 |
| Per 1,000 Gallons | | | | | $1.17 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

This strategy benefits steam electric power water users in Newton 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 Toledo Bend system will reduce demands on other water supplies in Newton County and will have no other apparent impact on other State water resources.

Based on the analyses provided above, the Newton Steam Electric Power recommended strategy to purchase water from the Sabine River Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 19,021 ac-ft per year |
| **Reliability** | 4 | Highly Reliable Supply |
| **Cost** | 3 | Low to Medium Cost |
| **Environmental Factors** | 4 | Low to No Impacts |
| **Impact on Other State Water Resources** | 4 | No known impacts to other projects. |
| **Threat to Agricultural Resources/Rural Areas** | 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** | 1 | Local Sponsorship unknown |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

2011 East Texas Regional Water Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR ORANGE IRRIGATION

| | |
|---|---|
| **Water User Group Name:** | Orange Irrigation |
| **Strategy Name:** | Purchase from Sabine River Authority (Sabine River) |
| **Strategy ID:** | ORAN-IRR |
| **Strategy Type:** | Existing Surface Water Source |
| **Potential Supply Quantity:** | 2,432 – 2,758 ac-ft per year<br>(2.17– 2.46 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020 |
| **Project Capital Cost:** | $13,281,000 (September 2013) |
| **Annual Cost:** | $2,293,000 |
| **Unit Water Cost (Rounded):** | $764 per ac-ft<br>($2.35 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is a recommended strategy for irrigation water users in Orange County and involves a contract between individual irrigators and the Sabine River Authority for raw water from the Sabine River, as their permit allows. The cost for supply from the Sabine River includes the contractual cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the Sabine 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 water need projected for irrigation users in Orange County projected by the East Texas Regional Planning Group during the planning period (2020-2070). The quantity of supply from this strategy represents a contract of 2,432 ac-ft per year, beginning in 2020, and increases over time to 2,758 ac-ft per year by 2070. The reliability of this water supply is considered high due to the availability of water projected in the Sabine River using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on coordination with the Sabine River Authority. This strategy is not dependent on any other water management strategies in the 2016 East Texas Regional Water Plan.

## ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between irrigators in Orange County and the Sabine River 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. Sabine River Authority already supplies to some irrigation users in Orange County. The strategy is highly reliable since some of the transmission connections may be already in place.

## 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. The capital costs assumed 13 miles of pipeline (the approximate distance from the Sabine River to the center of Orange County), a pump station with an intake, a booster pump station, and a terminal storage tank (0.7 million gallon). 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 2016 East Texas Regional Water Plan due to the length of pipeline required and the large supply volume.

| | | | | | | |
|---|---|---|---|---|---|---|
| **WUG NAME:** | **Orange County Irrigation** | | | | | |
| **STRATEGY:** | **Purchase from Sabine River Authority (Sabine River)** | | | | | |
| **Raw Water Quantity:** | **3,000** | Ac-ft/yr | | | 5.4 MGD | |
| **CAPITAL COSTS** | | | | | | |
| **Pipeline** | **Size** | **Quantity** | | **Unit** | **Unit Price** | **Cost** |
| Pipeline Rural | 18 in. | 68,640 | | LF | $69 | $4,713,000 |
| Right of Way Easements Rural (ROW) | | 68,640 | | LF | $26 | $1,938,530 |
| Engineering and Contingencies (30%) | | | | | | $1,414,000 |
| **Subtotal of Pipeline** | **13** | **miles** | | | | **$8,065,530** |
| **Pump Station(s)** | | | | | | |
| Pump with intake | 131 HP | 1 | | LS | $1,091,000 | $1,091,000 |
| Booster Pump Station | 131 HP | 1 | | LS | $1,707,000 | $1,707,000 |
| Engineering and Contingencies (35%) | | | | | | $979,300 |
| **Subtotal of Pump Station(s)** | | | | | | **$3,777,300** |
| Storage Tanks | 0.7 MG | | 1 | LS | $456,706 | $456,706 |
| Engineering and Contingencies (35%) | | | | | | $159,847 |
| **Subtotal of Storage Tanks** | | | | | | **$616,553** |
| Permitting and Mitigation | | | | | | $373,000 |
| **CONSTRUCTION TOTAL** | | | | | | **$12,832,000** |
| Interest During Construction | | | | 12 | Months | $449,000 |
| **TOTAL CAPITAL COST** | | | | | | **$13,281,000** |
| **ANNUAL COSTS** | | | | | | |
| Debt Service (5.5% for 20 years) | | | | | | $1,111,000 |
| Operational Costs* | | | | | | $1,182,000 |
| **Total Annual Costs** | | | | | | **$2,293,000** |
| **UNIT COSTS (Until Amortized)** | | | | | | |
| Per Acre-Foot of treated water | | | | | | $764 |
| Per 1,000 Gallons | | | | | | $2.35 |
| **UNIT COSTS (After Amortization)** | | | | | | |
| Per Acre-Foot | | | | | | $419 |
| Per 1,000 Gallons | | | | | | $1.29 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

This strategy benefits irrigation water users in Orange County and is expected to have a positive impact on their water supply security. Sabine River Authority currently supplies water to some irrigators in Orange County. Therefore, this strategy is highly reliable as some of the connections may already be in place and the strategy may be just an extension of current contracts. 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 Sabine River will reduce demands on other water supplies in Orange County and will have no other apparent impact on other State water resources.

Based on the analyses provided above, the Orange Irrigation recommended strategy to purchase water from the Sabine River Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 3,000 ac-ft per year |
| **Reliability** | 4 | Highly Reliable Supply |
| **Cost** | 3 | Medium Cost |
| **Environmental Factors** | 4 | Low to No Impacts |
| **Impact on Other State Water Resources** | 4 | No known impacts to other projects. |
| **Threat to Agricultural Resources/Rural Areas** | 5 | Positive Impacts to Agricultural Resources |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 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

2011 East Texas Regional Water Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR ORANGE MANUFACTURING

| | |
|---|---|
| **Water User Group Name:** | Orange Manufacturing |
| **Strategy Name:** | Purchase from Sabine River Authority (Sabine River) |
| **Strategy ID:** | ORAN-MFG |
| **Strategy Type:** | Existing Surface Water Source |
| **Potential Supply Quantity:** | 2,532– 32,111 ac-ft per year (2.56– 29.8 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020 |
| **Project Capital Cost:** | $42,621,000 (September 2013) |
| **Annual Cost:** | $14,949,000 |
| **Unit Water Cost (Rounded):** | $467 per ac-ft ($1.43 per 1,000 gallons) |

## PROJECT DESCRIPTION

Manufacturing demands in Orange County are projected to increase significantly over the planning period in ETRWPA. This strategy is a recommended strategy for Manufacturing in Orange County and involves a contract between individual manufacturing water users and the Sabine River Authority for raw water from the Sabine River, as their permit allows. The cost for supply from the Sabine River includes the contractual cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the Sabine 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 water need projected for manufacturing users in Orange County projected by the East Texas Regional Planning Group during the planning period (2020-2070). The quantity of supply from this strategy represents a contract of 2,532 ac-ft per year, beginning in 2020, and increases over time to 32,111 ac-ft per year by 2070. The reliability of this water supply is considered high due to the availability of water projected in the Sabine River using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on coordination with the Sabine River Authority. This strategy is not dependent on any other water management strategies in the 2016 East Texas Regional Water Plan.

## ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between manufacturing water users in Orange County and the Sabine River 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. Sabine River Authority already supplies to some manufacturing users in Orange County so the strategy is highly reliable since some of the transmission connections may be already in place.

## 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. The capital costs assumed 13 miles of pipeline (the approximate distance from the Sabine River to the center of Orange County), a pump station with an intake, a booster pump station, and a terminal storage tank (3.6 million gallon). 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 2016 East Texas Regional Water Plan due to the length of pipeline required and the large supply volume.

| | | | | | |
|---|---|---|---|---|---|
| **WUG NAME:** | **Orange County Manufacturing** | | | | |
| **STRATEGY:** | **Purchase from Sabine River Authority (Sabine River)** | | | | |
| **Raw Water Quantity:** | **33,477** AF/Y | | | 42.8 MGD | |
| **CAPITAL COSTS** | | | | | |
| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
| Pipeline Rural | 60 in. | 68,640 | LF | $307 | $21,069,000 |
| Right of Way Easements Rural (ROW) | | 68,640 | LF | $26 | $1,938,530 |
| Engineering and Contingencies (30%) | | | | | $6,321,000 |
| **Subtotal of Pipeline** | **13** | **miles** | | | **$29,328,530** |
| **Pump Station(s)** | | | | | |
| Pump with intake | 718 HP | 1 | LS | $2,601,000 | $2,601,000 |
| Booster Pump Station | 718 HP | 1 | LS | $4,731,000 | $4,731,000 |
| Engineering and Contingencies (35%) | | | | | $2,566,200 |
| **Subtotal of Pump Station(s)** | | | | | **$9,898,200** |
| **Storage Tanks** | 3.6 MG | 1 | LS | $1,170,516 | $1,170,516 |
| Engineering and Contingencies (35%) | | | | | $409,681 |
| **Subtotal of Storage Tanks** | | | | | **$1,580,197** |
| Permitting and Mitigation | | | | | $373,000 |
| **Construction Total** | | | | | **$41,180,000** |
| Interest During Construction | | | 12 | Months | $1,441,000 |
| **TOTAL CAPITAL COST** | | | | | **$42,621,000** |
| **ANNUAL COSTS** | | | | | |
| Debt Service (5.5% for 20 years) | | | | | $3,566,000 |
| Operational Costs* | | | | | $11,383,000 |
| **Total Annual Costs** | | | | | **$14,949,000** |
| **UNIT COSTS (Until Amortized)** | | | | | |
| Per Acre-Foot of treated water | | | | | $467 |
| Per 1,000 Gallons | | | | | $1.43 |
| **UNIT COSTS (After Amortization)** | | | | | |
| Per Acre-Foot | | | | | $372 |
| Per 1,000 Gallons | | | | | $1.14 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

This strategy benefits manufacturing water users in Orange 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 Sabine River will reduce demands on other water supplies in Orange County and will have no other apparent impact on other State water resources.

Based on the analyses provided above, the Orange Manufacturing recommended strategy to purchase water from the Sabine River Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 33,477 ac-ft per year |
| **Reliability** | 4 | Highly Reliable Supply |
| **Cost** | 2 | Low Cost |
| **Environmental Factors** | 4 | Low Impacts |
| **Impact on Other State Water Resources** | 4 | No known impacts to other projects. |
| **Threat to Agricultural Resources/Rural Areas** | 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** | 1 | Local Sponsorship unknown |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

2011 East Texas Regional Water Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR ORANGE STEAM ELECTRIC POWER

| | |
|---|---|
| **Water User Group Name:** | Orange Steam Electric Power |
| **Strategy Name:** | Purchase from Sabine River Authority (Sabine River) |
| **Strategy ID:** | ORAN-SEP |
| **Strategy Type:** | Existing Surface Water Source |
| **Potential Supply Quantity:** | 1,038 – 4,846 ac-ft per year<br>(0.92– 4.3 MGD) |
| **Implementation Decade:** | 2040 |
| **Development Timeline:** | 2040 |
| **Project Capital Cost:** | $15,847,000 (September 2013) |
| **Annual Cost:** | $3,077,000 |
| **Unit Water Cost (Rounded):** | $686 per ac-ft<br>($2.1 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is a recommended strategy for Steam Electric Power in Orange County and involves a contract between individual steam electric power water users and the Sabine River Authority for raw water from the Sabine River, as their permit allows. The cost for supply from the Sabine River includes the contractual cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the Sabine 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 water need projected for Steam Electric Power in Orange County projected by the East Texas Regional Planning Group during the planning period (2020-2070). The quantity of supply from this strategy represents a contract of 1,038 ac-ft per year, beginning in 2040, and increases over time to 4,846 ac-ft per year by 2070. The reliability of this water supply is considered high due to the availability of water projected in the Sabine River using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on coordination with the Sabine River Authority. This strategy is not dependent on any other water management strategies in the 2016 East Texas Regional Water Plan.

## ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between steam electric power water users in Orange County and the Sabine River 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.

## 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. The capital costs assumed 13 miles of pipeline (the approximate distance from the Sabine River to the center of Orange County), a pump station with an intake, a booster pump station, and a terminal storage tank (0.5 million gallon). 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 2016 East Texas Regional Water Plan due to the length of pipeline required and the large supply volume.

**WUG NAME:** **Orange Steam Electric Power**
**STRATEGY:** **Purchase from Sabine River Authority (Sabine River)**
**Raw Water Quantity:** **4,486** AF/Y 6.0 MGD
**CAPITAL COSTS**
**TRANSMISSION FACILITIES**

| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
|---|---|---|---|---|---|
| Pipeline Rural | 20 in. | 68,640 | LF | $81 | $5,545,000 |
| Right of Way Easements Rural (ROW) | | 68,640 | LF | $26 | $1,938,530 |
| Engineering and Contingencies (30%) | | | | | $1,664,000 |
| **Subtotal of Pipeline** | **13** | **miles** | | | **$9,147,530** |
| **Pump Station(s)** | | | | | |
| Pump with intake | 228 HP | 1 | LS | $1,712,000 | $1,712,000 |
| Booster Pump Station | 228 HP | 1 | LS | $2,203,000 | $2,203,000 |
| Engineering and Contingencies (35%) | | | | | $1,370,250 |
| **Subtotal of Pump Station(s)** | | | | | **$5,285,250** |
| **Storage Tanks** | 0.5 MG | 1 | LS | $374,451 | $374,451 |
| Engineering and Contingencies (35%) | | | | | $131,058 |
| **Subtotal of Storage Tanks** | | | | | **$505,509** |
| **Permitting and Mitigation** | | | | | $373,000 |
| **CONSTRUCTION TOTAL** | | | | | **$15,311,289** |
| **Interest During Construction** | | | 12 | Months | $536,000 |
| **TOTAL CAPITAL COST** | | | | | **$15,847,000** |
| **ANNUAL COSTS** | | | | | |
| Debt Service (5.5% for 20 years) | | | | | $1,326,000 |
| Operational Costs* | | | | | $1,751,000 |
| **Total Annual Costs** | | | | | **$3,077,000** |
| **UNIT COSTS (Until Amortized)** | | | | | |
| Per Acre-Foot of treated water | | | | | $686 |
| Per 1,000 Gallons | | | | | $2.10 |
| **UNIT COSTS (After Amortization)** | | | | | |
| Per Acre-Foot | | | | | $419 |
| Per 1,000 Gallons | | | | | $1.28 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

This strategy benefits steam electric power water users in Orange 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 Sabine River will reduce demands on other water supplies in Orange County and will have no other apparent impact on other State water resources.

Based on the analyses provided above, the Orange Steam Electric Power recommended strategy to purchase water from the Sabine River Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 4,846 ac-ft per year |
| **Reliability** | 4 | Highly Reliable Supply |
| **Cost** | 3 | Medium Cost |
| **Environmental Factors** | 4 | Low Impacts |
| **Impact on Other State Water Resources** | 4 | No known impacts to other projects. |
| **Threat to Agricultural Resources/Rural Areas** | 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** | 1 | Local Sponsorship unknown |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

2011 East Texas Regional Water Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR PANOLA MANUFACTURING

| | |
|---|---|
| **Water User Group Name:** | Panola County Manufacturing |
| **Strategy Name:** | Purchase from City of Carthage |
| **Strategy ID:** | PANL-MFG |
| **Strategy Type:** | Existing Surface Water Source |
| **Potential Supply Quantity:** | 134 – 309 ac-ft per year<br>(0.12 – 0.27 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020 |
| **Project Capital Cost:** | $0 |
| **Annual Cost:** | $101,000 |
| **Unit Water Cost (Rounded):** | $327 per ac-ft<br>($1.00 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is a recommended strategy for manufacturing water users in Panola County and involves a contract between individual manufacturing water users and the City of Carthage from their supplies in Carrizo Wilcox or Lake Murvaul. The City of Carthage currently supplies water to manufacturing water users in Panola County. Therefore, the only cost for additional supply from is the contractual cost of raw water. Ultimately, this cost will need to be negotiated with the City of Carthage 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

Currently, the City of Carthage is the only provider of water to manufacturing users in Panola County. There are some self-supplied groundwater used by some manufacturing water users in the County. Therefore, this recommended strategy calls for a contract amendment equal to the projected need of Panola County manufacturing demand during the planning period. The contract required for this strategy increases their supply by 134 ac-ft per year beginning in 2020 to 309 ac-ft per year by 2070. These supplies are considered highly reliable because the supply is available in City of Carthage sources of supply and the infrastructure is already in place; however, the supply is dependent on coordination with the City of Carthage. The supply source may be any of the existing supply sources available for City of Carthage.

## ENVIRONMENTAL CONSIDERATIONS

There are not any significant environmental considerations associated with this strategy. A contract between manufacturing water users in Panola County and the City of Carthage 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. There are no bays or estuaries located in Newton County.

## 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, but an annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a low cost compared to other strategies in the 2016 East Texas Regional Water Plan.

| | | | | |
|---|---|---|---|---|
| **WUG NAME:** | **Panola Manufacturing** | | | |
| | **Purchase from** | | | |
| **STRATEGY:** | **Carthage** | | | |
| **Raw Water Quantity:** | **309** | AF/Y | 0.41 MGD | |
| **CONSTRUCTION COSTS** | | | | |
| **ANNUAL CONTRACT COSTS** | | | | |
| **ANNUAL COSTS** | | | | |
| Operational Costs* | | | | **$101,000** |
| **UNIT COSTS (Until Amortized)** | | | | |
| Per Acre-Foot of treated water | | | | $327 |
| Per 1,000 Gallons | | | | $1.00 |
| **UNIT COSTS (After Amortization)** | | | | |
| Per Acre-Foot | | | NA | |
| Per 1,000 Gallons | | | NA | |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

This strategy benefits manufacturing water users in Panola 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 Carthage supply sources will reduce demands on other water supplies in Panola 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 Panola County Manufacturing recommended strategy to purchase water from the City of Carthage was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 309 ac-ft per year |
| **Reliability** | 4 | Very Reliable Supply |
| **Cost** | 4 | Low Cost |
| **Environmental Factors** | 4 | Low Impacts |
| **Impact on Other State Water Resources** | 4 | No known impacts to other projects. |
| **Threat to Agricultural Resources/Rural Areas** | 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** | 1 | No Local Sponsor identified |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

Discussions with Regional Water Planning Group and Groundwater Management Areas.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR RUSK MINING

| | |
|---|---|
| **Water User Group Name:** | Rusk Mining |
| **Strategy Name:** | Purchase from Angelina Neches River Authority (Angelina River) |
| **Strategy ID:** | RUSK-MIN |
| **Strategy Type:** | Existing Surface Water Source |
| **Potential Supply Quantity:** | 1,075 – 2,092 ac-ft per year (Varies)<br>(1.0 – 1.9 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020 |
| **Project Capital Cost:** | $14,158,000 (May 2015) |
| **Annual Cost:** | $3,420,000 |
| **Unit Water Cost (Rounded):** | $1,635 per ac-ft<br>($5.02 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is a recommended strategy for Mining in Ruck County and involves a contract between individual mining water users and the Angelina Neches River Authority for raw water from the Angelina River, as their permit allows. The cost for supply from the Angelina 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 Rusk 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 Angelina River using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on sales with the Angelina Neches River Authority and their application for 10,000 ac-ft per year from the Angelina River (Strategy ID: ANRA-ROR). The quantity of supply from this strategy represents a contract of 1,075 ac-ft per year, beginning in 2020, increases to 2,092 ac-ft per year, beginning in 2030, and decreases over the next four decades to 1,677 ac-ft per year, beginning in 2070.

## 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 Rusk 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 Rusk County.

## 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. The capital costs assumed 16 miles of pipeline (50% of the approximate distance across Rusk 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 2016 East Texas Regional Water Plan due to the length of pipeline required.

| | | | | | |
|---|---|---|---|---|---|
| **WUG NAME:** | **Rusk Mining** | | | | |
| **STRATEGY:** | **Purchase from Angelina Neches River Authority** | | | | |
| **Raw Water Quantity:** | **2,092** AF/Y | | | 3.7 MGD | |
| **CAPITAL COSTS** | | | | | |
| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
| Pipeline Rural | 16 in. | 84,480 | LF | $58 | $4,862,000 |
| Right of Way Easements Rural (ROW) | | 84,480 | LF | $26 | $2,385,900 |
| Engineering and Contingencies (30%) | | | | | $1,459,000 |
| **Subtotal of Pipeline** | **16** | **miles** | | | **$8,706,900** |
| **Pump Station(s)** | | | | | |
| Pump with intake | 98 HP | 1 | LS | $828,000 | $828,000 |
| Booster Pump Station | 98 HP | 1 | LS | $1,529,000 | $1,529,000 |
| Engineering and Contingencies (35%) | | | | | $824,950 |
| **Subtotal of Pump Station(s)** | | | | | **$3,181,950** |
| Storage Tanks | 2.8 MG | 1 | LS | $993,963 | $993,963.22 |
| Engineering and Contingencies (35%) | | | | | $347,887 |
| **Subtotal of Storage Tanks** | | | | | **$1,341,850** |
| **Permitting and Mitigation** | | | | | $448,000 |
| **CONSTRUCTION TOTAL** | | | | | **$13,678,700** |
| **Interest During Construction** | | | 12 | Months | $479,000 |
| **TOTAL CAPITAL COST** | | | | | **$14,158,000** |
| **ANNUAL COSTS** | | | | | |
| Debt Service (5.5% for 20 years) | | | | | $1,185,000 |
| Operational Costs* | | | | | $2,235,000 |
| **Total Annual Costs** | | | | | **$3,420,000** |
| **UNIT COSTS (Until Amortized)** | | | | | |
| Per Acre-Foot of treated water | | | | | $1,635 |
| Per 1,000 Gallons | | | | | $5.02 |
| **UNIT COSTS (After Amortization)** | | | | | |
| Per Acre-Foot | | | | | $1,095 |
| Per 1,000 Gallons | | | | | $3.36 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

This strategy benefits mining users in Rusk 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 Angelina River will reduce demands

on other water supplies in Rusk 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 Rusk 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 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 2,092 ac-ft per year |
| **Reliability** | 3 | Medium Reliable Supply |
| **Cost** | 2 | Medium Cost |
| **Environmental Factors** | 4 | Low to No Impacts |
| **Impact on Other State Water Resources** | 4 | No known impacts to other projects. |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low Impact |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No known Impacts |
| **Major Impacts on Key Water Quality Parameters** | 4 | No known Impacts |
| **Political Feasibility** | 4 | Sponsor Identified and committed. |
| **Implementation Issues** | 4 | No known risk |

## REFERENCES

Discussions with Angelina River Water Authority.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR RUSK STEAM ELECTRIC POWER

| | |
|---|---|
| **Water User Group Name:** | Rusk Steam Electric Power |
| **Strategy Name:** | Purchase from Sabine River Authority (Sabine River) |
| **Strategy ID:** | RUSK-SEP |
| **Strategy Type:** | Existing Surface Water Source |
| **Potential Supply Quantity:** | 462 – 18,868 ac-ft per year<br>(0.4 – 16.8 MGD) |
| **Implementation Decade:** | 2050 |
| **Development Timeline:** | 2050 |
| **Project Capital Cost:** | $57,718,000 (September 2013) |
| **Annual Cost:** | $11,855,000 |
| **Unit Water Cost (Rounded):** | $628 per ac-ft<br>($1.93 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is a recommended strategy for Steam Electric Power in Rusk County and involves a contract between individual steam electric power water users and the Sabine River Authority for raw water from the Sabine River, as their permit allows. The cost for supply from the Sabine River includes the contractual cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the Sabine 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 water need projected for Steam Electric Power in Rusk County projected by the East Texas Regional Planning Group during the planning period (2020-2070). The quantity of supply from this strategy represents a contract of 462 ac-ft per year, beginning in 2020, and increases over time to 18,868 ac-ft per year, beginning in 2070. The reliability of this water supply is considered high due to the availability of water projected in the Sabine River using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on coordination with the Sabine River Authority. This strategy is not dependent on any other water management strategies in the 2016 East Texas Regional Water Plan.

## ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between steam electric power water users in Rusk County and the Sabine River 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. There are no bays or estuaries within Rusk County.

## 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. The capital costs assumed 25 miles of pipeline (the approximate distance from the Sabine River to the center of Rusk County), a pump station with an intake, a booster pump station, and a terminal storage tank (14 million gallon). 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 2016 East Texas Regional Water Plan due to the length of pipeline required and the large capacity of the terminal storage.

| | | | | | |
|---|---|---|---|---|---|
| **WUG NAME:** | **Rusk Steam Electric Power** | | | | |
| **STRATEGY:** | **Purchase from Sabine River Authority (Sabine River)** | | | | |
| **Raw Water Quantity:** | **18,868** AF/Y | | | 33.7 MGD | |
| **CAPITAL COSTS** | | | | | |
| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
| Pipeline Rural | 48 in. | 132,000 | LF | $239 | $31,588,000 |
| Right of Way Easements Rural (ROW) | | 132,000 | LF | $26 | $3,727,900 |
| Engineering and Contingencies (30%) | | | | | $9,476,000 |
| **Subtotal of Pipeline** | **25** | **miles** | | | **$44,791,900** |
| **Pump Station(s)** | | | | | |
| Pump with intake | 556 HP | 1 | LS | $2,425,000 | $2,425,000 |
| Booster Pump Station | 556 HP | 1 | LS | $3,897,000 | $3,897,000 |
| Engineering and Contingencies (35%) | | | | | $2,212,700 |
| **Subtotal of Pump Station(s)** | | | | | **$8,534,700** |
| Storage Tanks | 4.2 MG | 1 | LS | $1,308,393 | $1,308,393 |
| Engineering and Contingencies (35%) | | | | | $457,937 |
| **Subtotal of Storage Tanks** | | | | | **$1,766,330** |
| Permitting and Mitigation | | | | | $673,000 |
| **CONSTRUCTION TOTAL** | | | | | **$55,765,930** |
| **Interest During Construction** | | | 12 | Months | $1,952,000 |
| **TOTAL CAPITAL COST** | | | | | **$57,718,000** |
| **ANNUAL COSTS** | | | | | |
| Debt Service (5.5% for 20 years) | | | | | $4,830,000 |
| Operational Costs* | | | | | $7,025,000 |
| **Total Annual Costs** | | | | | **$11,855,000** |
| **UNIT COSTS (Until Amortized)** | | | | | |
| Per Acre-Foot of treated water | | | | | $628 |
| Per 1,000 Gallons | | | | | $1.93 |
| **UNIT COSTS (After Amortization)** | | | | | |
| Per Acre-Foot | | | | | $392 |
| Per 1,000 Gallons | | | | | $1.20 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

This strategy benefits steam electric power water users in Rusk 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 Sabine River will reduce demands on other water supplies in Rusk County and will have no other apparent impact on other State water resources.

Based on the analyses provided above, the Rusk Steam Electric Power recommended strategy to purchase water from the Sabine River Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 18,868 ac-ft per year |
| **Reliability** | 4 | Highly Reliable Supply |
| **Cost** | 3 | Medium Cost |
| **Environmental Factors** | 4 | Low to No Impacts |
| **Impact on Other State Water Resources** | 4 | No known impacts to other projects. |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low Impact |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | |
| **Major Impacts on Key Water Quality Parameters** | 4 | No known Impacts |
| **Political Feasibility** | 1 | Local Sponsorship unknown |
| **Implementation Issues** | 4 | No known risk |

## REFERENCES

Discussions with Sabine River Authority.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR SAN AUGUSTINE MINING

| | |
|---|---|
| **Water User Group Name:** | San Augustine County Mining |
| **Strategy Name:** | Purchase from Angelina Neches River Authority |
| **Strategy ID:** | SAUG-MIN |
| **Strategy Type:** | Existing Surface Water Source |
| **Potential Supply Quantity:** | 2,102 – 1,102 ac-ft per year<br>(1.87 – 0.98 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020 |
| **Project Capital Cost:** | $21,064,000 (September 2013) |
| **Annual Cost:** | $4,035,000 |
| **Unit Water Cost (Rounded):** | $1,920 per ac-ft<br>($5.89 per 1,000 gallons) |

## PROJECT DESCRIPTION

San Augustine County shows shortages for mining users for the decades 2020 and 2030. The mining water users have a contract with Angelina Neches River Authority to use Angelina Neches River Authority's supplies to meet the water needs. Current supply is from other aquifer and San Augustine City Lake. This strategy is a recommended strategy for mining users in San Augustine County and involves a contract between mining water users and the Angelina Neches River Authority for raw water from the run-of-river supplies on Angelina River. The cost for supply from the Angelina River includes the contractual 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 water need projected for mining in Shelby County projected by the East Texas Regional Planning Group during the planning period (2020-2070). The shortage manifests for decades 2020 and 2030. The quantity of supply from this strategy represents a contract of 2,102 ac-ft per year, beginning in 2020, and drops to 1,102 ac-ft per year in 2030. Angelina Neches River Authority put in an application for 10,000 ac-ft per year of run-of-river supplies and the application is administratively complete. Angelina Neches River Authority has a water management strategy in the 2016 Plan to apply for additional run-of-river supplies to address the mining demands in the region. Because of the nature of the application and the process involved in securing the water rights, this supply is not considered very reliable at this time. Therefore, this strategy is dependent on successful execution of Angelina Neches River Authority's water management strategies in the 2016 East Texas Regional Water Plan to secure additional run-of-river supplies.

## 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 San Augustine County and the Angelina Neches River 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.

## PERMITTING AND DEVELOPMENT

There are permitting and supply development issues associated with this strategy. Angelina Neches River Authority has to work with Texas Commission on Environmental Quality to furnish all the required documentation required for the successful procurement of the new and currently pending run-of-river water right applications. Also, the availability of this supply is potentially limited to the environmental flow requirements and supply availability in the Angelina River in that region.

## 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 30 miles of pipeline (the approximate distance from Angelina River to the center of San Augustine County), a pump station with an intake, and a terminal storage tank (0.4 million gallon). The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water equal to $3.00 per 1,000 gallons. Overall, this strategy has a medium to high cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the length of pipeline required and the quantity of supply delivered for the infrastructure.

| | | | | | | |
|---|---|---|---|---|---|---|
| **WUG NAME:** | **San Augustine Mining** | | | | | |
| **STRATEGY:** | **Angelina River** | | | | | |
| **Quantity:** | **2,102** | AF/Y | | 2.81 MGD | | |
| **CAPITAL COSTS** | | | | | | |
| **Pipeline** | | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
| Pipeline Rural | | 18 in. | 158,400 | LF | $69 | $10,876,000 |
| Right of Way Easements Rural (ROW) | | | 158,400 | LF | $16 | $2,723,050 |
| **Subtotal of Pipeline** | | | | | | **$16,862,050** |
| **Pump Station(s)** | | | | | | |
| Pump with intake | | 207 HP | 1 | LS | $1,678,000 | $1,678,000 |
| Engineering and Contingencies (35%) | | | | | | $587,300 |
| **Subtotal of Pump Station(s)** | | | | | | **$2,265,300** |
| **Storage Tanks** | | 0.4 MG | 1 | LS | $331,000 | **$331,000** |
| Engineering and Contingencies (35%) | | | | | | $115,850 |
| **Subtotal of Storage Tanks** | | | | | | **$446,850** |
| **Permitting and Mitigation** | | | | | | $778,000 |
| **CONSTRUCTION TOTAL** | | | | | | **$20,352,200** |
| **Interest During Construction** | | | | 12 | Months | $712,000 |
| **TOTAL COST** | | | | | | **$21,064,000** |
| **ANNUAL COSTS** | | | | | | |
| Debt Service (5.5% for 20 years) | | | | | | $1,763,000 |
| Operational Costs* | | | | | | $2,272,000 |
| **Total Annual Costs** | | | | | | **$4,035,000** |

**UNIT COSTS (Until Amortized)**

| | |
|---|---|
| Per Acre-Foot of treated water | $1,920 |
| Per 1,000 Gallons | $5.89 |

**UNIT COSTS (After Amortization)**

| | |
|---|---|
| Per Acre-Foot | $1,108 |
| Per 1,000 Gallons | $3.40 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

This strategy benefits mining water users in San Augustine 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 Angelina River will reduce demands on other water supplies in San Augustine County and will have no other apparent impact on other State water resources.

Based on the analyses provided above, the recommended strategy for mining users in San Augustine County 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 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 2,102 ac-ft per year |
| **Reliability** | 4 | Reliable Supply |
| **Cost** | 2 | Medium to Moderate Cost |
| **Environmental Factors** | 4 | Low to No Impacts |
| **Impact on Other State Water Resources** | 4 | No known impacts to other projects. |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low Impact |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No known Impacts |
| **Major Impacts on Key Water Quality Parameters** | 4 | No known Impacts |
| **Political Feasibility** | 4 | Local Sponsor Identified |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

Discussions with Angelina Neches River Authority.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR SHELBY LIVESTOCK

| | |
|---|---|
| **Water User Group Name:** | Shelby County Livestock |
| **Strategy Name:** | Purchase from Sabine River Authority (Sabine River) |
| **Strategy ID:** | SHEL-LTK |
| **Strategy Type:** | Existing Surface Water Source |
| **Potential Supply Quantity:** | 1,368 – 6,925 ac-ft per year<br>(1.22 – 6.17 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020 |
| **Project Capital Cost:** | $25,238,000 (September 2013) |
| **Annual Cost:** | $4,893,000 |
| **Unit Water Cost (Rounded):** | $699 per ac-ft<br>($2.15 per 1,000 gallons) |

## PROJECT DESCRIPTION

Livestock water demands are projected to increase significantly in Shelby County, partially due to the growing poultry industry. Current supply is from Carrizo-Wilcox aquifer and local surface water supplies. It is recommended that any large-scale user should obtain surface water from Toledo Bend Reservoir through a contract with Sabine River Authority. This strategy is a recommended strategy for livestock users in Shelby County and involves a contract between livestock water users and the Sabine River Authority for raw water from the Sabine River, as their permit allows. The cost for supply from the Sabine River includes the contractual cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the Sabine 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 water need projected for Livestock in Shelby County projected by the East Texas Regional Planning Group during the planning period (2020-2070). The quantity of supply from this strategy represents a contract of 1,368 ac-ft per year, beginning in 2020, and increases over time to 6,925 ac-ft per year, beginning in 2070. The reliability of this water supply is considered high due to the availability of water projected in the Sabine River using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on coordination with the Sabine River Authority. This strategy is not dependent on any other water management strategies in the 2016 East Texas Regional Water Plan.

## ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between livestock water users in Rusk County and the Sabine River 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. There are no bays or estuaries within Rusk County.

## 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. The capital costs assumed 19 miles of pipeline (the approximate distance from the Sabine River to the center of Shelby County), a pump station with an intake, a booster pump station, and a terminal storage tank (1.2 million gallon). 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 2016 East Texas Regional Water Plan due to the length of pipeline required and the large quantity of supply.

| | | | | | | |
|---|---|---|---|---|---|---|
| **WUG NAME:** | **Shelby County - Livestock** | | | | | |
| **STRATEGY:** | **Purchase from Toledo Bend, SRA** | | | | | |
| **Quantity:** | **7,000** AF/Y | | | 9.37 MGD | | |
| **CAPITAL COSTS** | | | | | | |
| **Pipeline** | | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
| Pipeline Rural | | 24 in. | 100,320 | LF | $103 | $10,332,000 |
| Pipeline Urban | | 24 in. | 0 | LF | $144 | $0 |
| Right of Way Easements Rural (ROW) | | | 100,320 | LF | $16 | $1,724,580 |
| Right of Way Easements Urban (ROW) | | | | | | $0 |
| Engineering and Contingencies (30%) | | | | | | $3,100,000 |
| **Subtotal of Pipeline** | | | | | | **$15,156,580** |
| **Pump Station(s)** | | | | | | |
| Pump with intake | | 444 HP | 1 | LS | $2,352,000 | $2,352,000 |
| Booster Pump Station | | 444 HP | 1 | LS | $3,320,000 | $3,320,000 |
| Engineering and Contingencies (35%) | | | | | | $1,985,200 |
| **Subtotal of Pump Station(s)** | | | | | | **$7,657,200** |
| **Storage Tanks** | | 1.2 MG | 1 | LS | $791,000 | $791,000 |
| Engineering and Contingencies (35%) | | | | | | $276,850 |
| **Subtotal of Storage Tanks** | | | | | | **$1,067,850** |
| Permitting and Mitigation | | | | | | $503,000 |
| **CONSTRUCTION TOTAL** | | | | | | **$24,384,630** |
| **Interest During Construction** | | | | 12 | Months | $853,000 |
| **TOTAL COST** | | | | | | **$25,238,000** |
| **ANNUAL COSTS** | | | | | | |
| Debt Service (5.5% for 20 years) | | | | | | $2,112,000 |
| Operational Costs* | | | | | | $2,781,000 |
| **Total Annual Costs** | | | | | | **$4,893,000** |
| **UNIT COSTS (Until Amortized)** | | | | | | |
| Per Acre-Foot of treated water | | | | | | $699 |
| Per 1,000 Gallons | | | | | | $2.15 |
| **UNIT COSTS (After Amortization)** | | | | | | |
| Per Acre-Foot | | | | | | $431 |
| Per 1,000 Gallons | | | | | | $1.32 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

This strategy benefits livestock water users 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 Sabine River will reduce demands on other water supplies in Shelby County and will have no other apparent impact on other State water resources.

Based on the analyses provided above, the recommended strategy for livestock users in Shelby County to purchase water from the Sabine River Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 7,000 ac-ft per year |
| **Reliability** | 4 | Highly Reliable Supply |
| **Cost** | 3 | Medium Cost |
| **Environmental Factors** | 4 | Low Impacts |
| **Impact on Other State Water Resources** | 4 | No known impacts to other projects. |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low Impact |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | |
| **Major Impacts on Key Water Quality Parameters** | 4 | No known Impacts |
| **Political Feasibility** | 1 | No Local Sponsor identified |
| **Implementation Issues** | 4 | No known Risks |

## REFERENCES

Discussions with Sabine River Authority.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR SMITH BULLARD

| | |
|---|---|
| **Water User Group Name:** | Smith County Bullard |
| **Strategy Name:** | Purchase from City of Tyler |
| **Strategy ID:** | SMTH-BLD |
| **Strategy Type:** | Existing Surface Water Source |
| **Potential Supply Quantity:** | 51 – 985 ac-ft per year<br>(0.05 – 0.88 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020 |
| **Project Capital Cost:** | $5,260,000 (September 2013) |
| **Annual Cost:** | $848,000 |
| **Unit Water Cost (Rounded):** | $852 per ac-ft<br>($2.62 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is a recommended strategy for municipal water user Bullard in Smith County and involves a contract between individual Bullard and the City of Tyler for raw water. Bullard is located in ETRWPA region of Smith County. Bullard currently obtains most of its supply from Carrizo Wilcox and sales from North Cherokee WSC. A feasible strategy would be to continue using groundwater from Carrizo Wilcox. However, this cannot be recommended because of the MAG limitations in Smith County. Therefore, a contract to use City of Tyler's supplies is the recommended strategy for Bullard. In addition to this, municipal conservation is another recommended strategy. Discussion on Conservation strategies is included in a separate technical memorandum. The cost for supply from the City of Tyler includes the contractual 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. City of Tyler may have existing infrastructure near the service area for this water user and that can be used to deliver supplies to Bullard's customers. 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 need projected for Bullard in Smith County projected by the East Texas Regional Planning Group during the planning period (2020-2070). The quantity of supply from this strategy represents a contract of 57 ac-ft per year in 2020, increasing to 995 ac-ft per year in 2070. The reliability of this water supply is considered high due to the availability of water in City of Tyler's sources of supply. City of Tyler owns Lake Tyler and has contract for water from Lake Palestine. In addition to this, the City also has groundwater supplies in the Smith County Carrizo Wilcox. City of Tyler will decide the appropriate source of supply that is in close proximity to the water user location. However, this strategy is dependent on coordination with the City of Tyler. Depending on the source of supply City of Tyler choses for this water user, this strategy may be dependent on the completion of Tyler's construction of transmission system to access the full amount of Lake Palestine supplies. This is a recommended water management strategy for City of Tyler in 2016 Regional Water Plan.

## ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between Bullard and the City of Tyler 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. There are no bays or estuaries within Smith County.

## 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. The capital costs assumed ten miles of pipeline (the approximate distance from the City of Tyler supplies to Bullard's service area in Smith County), a pump station with an intake, and a terminal storage tank (0.2 million gallon). The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a moderate cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the yield generated by the infrastructure required.

| | | | | | |
|---|---|---|---|---|---|
| **WUG NAME:** | **Smith County - Bullard** | | | | |
| **STRATEGY:** | **Purchase from City of Tyler** | | | | |
| **Quantity:** | **985** AF/Y | | | 0.88 MGD | |
| **CAPITAL COSTS** | | | | | |
| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
| Pipeline Rural | 10 in. | 52,800 | LF | $31 | $1,653,000 |
| Right of Way Easements Rural (ROW) | | 52,800 | LF | $16 | $907,720 |
| Engineering and Contingencies (30%) | | | | | $496,000 |
| **Subtotal of Pipeline** | | | | | **$3,056,720** |
| **Pump Station(s)** | | | | | |
| Pump with intake | 128 HP | 1 | LS | $1,065,000 | $1,065,000 |
| Booster Pump Station | 0 HP | 1 | LS | $0 | $0 |
| Engineering and Contingencies (35%) | | | | | $372,750 |
| **Subtotal of Pump Station(s)** | | | | | **$1,437,750** |
| Storage Tanks | 0.2 MG | 1 | LS | $229,000 | $229,000 |
| Engineering and Contingencies (35%) | | | | | $80,150 |
| **Subtotal of Storage Tanks** | | | | | **$309,150** |
| Permitting and Mitigation | | | | | $278,000 |
| **CONSTRUCTION TOTAL** | | | | | **$5,081,620** |
| **Interest During Construction** | | | 12 | Months | $178,000 |
| **TOTAL COST** | | | | | **$5,260,000** |
| **ANNUAL COSTS** | | | | | |
| Debt Service (5.5% for 20 years) | | | | | $440,000 |
| Operational Costs* | | | | | $408,000 |
| **Total Annual Costs** | | | | | **$848,000** |
| **UNIT COSTS (Until Amortized)** | | | | | |
| Per Acre-Foot of treated water | | | | | $852 |
| Per 1,000 Gallons | | | | | $2.62 |
| **UNIT COSTS (After Amortization)** | | | | | |
| Per Acre-Foot | | | | | $444 |

Per 1,000 Gallons $1.36

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

This strategy benefits municipal water users in Smith County and is expected to have a positive impact on their water supply security. The Carrizo Wilcox aquifer is currently over-allocated in Smith County and City of Tyler's supplies provide relief to the Carrizo Wilcox aquifer as more entities switch from groundwater to purchase water from City of Tyler. 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's supplies will reduce demands on other water supplies in Smith and Anderson Counties and will have no other apparent impact on other State water resources.

Based on the analyses provided above, the recommended strategy for Bullard to purchase water from the City of Tyler was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 985 ac-ft per year |
| **Reliability** | 4 | Highly Reliable Supply |
| **Cost** | 3 | Moderate Cost |
| **Environmental Factors** | 4 | Low to No Impacts |
| **Impact on Other State Water Resources** | 4 | No known impacts to other projects. |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low Impact |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No Impacts |
| **Major Impacts on Key Water Quality Parameters** | 4 | No known Impacts |
| **Political Feasibility** | 2 | Sponsor identified but uncommitted |
| **Implementation Issues** | 4 | Limited Risk |

## REFERENCES

Discussions with City of Tyler.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR SMITH CRYSTAL SYSTEMS INC.

| | |
|---|---|
| **Water User Group Name:** | Smith County Crystal Systems Inc. |
| **Strategy Name:** | Purchase from City of Tyler |
| **Strategy ID:** | SMTH-CYS |
| **Strategy Type:** | Existing Surface Water Source |
| **Potential Supply Quantity:** | 12 – 642 ac-ft per year<br>(0.01 – 0.57 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020 |
| **Project Capital Cost:** | $2,021,000 (September 2013) |
| **Annual Cost:** | $417,000 |
| **Unit Water Cost (Rounded):** | $650 per ac-ft<br>($1.99 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is a recommended strategy for municipal water user Crystal Systems Inc. in Smith County and involves a contract between individual Crystal Systems Inc. and the City of Tyler for raw water. Lindale is located both in Region D and ETRWPA. Crystal Systems Inc. currently obtains most of its supply from Carrizo Wilcox in Region D and ETRWPA. A feasible strategy would be to continue using groundwater from Carrizo Wilcox. However, this cannot be recommended because of the MAG limitations in Smith County. Therefore, a contract to use City of Tyler's supplies is the recommended strategy for Crystal Systems Inc. In addition to this, municipal conservation is another recommended strategy. Discussion on Conservation strategies is included in a separate technical memorandum. The cost for supply from the City of Tyler includes the contractual 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. City of Tyler may have existing infrastructure near the service area for this water user and that can be used to deliver supplies to Crystal System Inc. customers. 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 need projected for Crystal Systems Inc. in Smith County projected by the East Texas Regional Planning Group during the planning period (2020-2070). The quantity of supply from this strategy represents a contract of 12 ac-ft per year in 2020, increasing to 642 ac-ft per year in 2070. The reliability of this water supply is considered high due to the availability of water in City of Tyler's sources of supply. City of Tyler owns Lake Tyler and has contract for water from Lake Palestine. In addition to this, the City also has groundwater supplies in the Smith County Carrizo Wilcox. City of Tyler will decide the appropriate source of supply that is in close proximity to the water user location. However, this strategy is dependent on coordination with the City of Tyler. Depending on the source of supply City of Tyler choses for this water user, this strategy may be dependent on the completion of Tyler's construction of transmission system to access the full amount of Lake Palestine supplies. This is a recommended water management strategy for City of Tyler in 2016 Regional Water Plan.

## ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between Crystal System Inc. and the City of Tyler 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. There are no bays or estuaries within Smith County.

## 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. The capital costs assumed two miles of pipeline (the approximate distance from the City of Tyler supplies to Crystal Systems Inc. service area in Smith County), a pump station with an intake, and a terminal storage tank (0.1 million gallon). The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a moderate cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the yield generated by the infrastructure required.

| | | | | | | |
|---|---|---|---|---|---|---|
| **WUG NAME:** | **Smith County - Crystal Systems Inc.** | | | | | |
| **STRATEGY:** | **Purchase from City of Tyler** | | | | | |
| **Quantity:** | **642** AF/Y | | 0.86 MGD | | | |
| **CAPITAL COSTS** | | | | | | |
| **Pipeline** | **Size** | **Quantity** | **Unit** | | **Unit Price** | **Cost** |
| Pipeline Rural | 8 in. | 10,560 | LF | | $28 | $299,000 |
| Right of Way Easements Rural (ROW) | | 10,560 | LF | | $16 | $181,500 |
| Engineering and Contingencies (30%) | | | | | | $90,000 |
| **Subtotal of Pipeline** | | | | | | **$570,500** |
| **Pump Station(s)** | | | | | | |
| Pump with intake | 37 HP | 1 | LS | | $769,000 | $769,000 |
| Engineering and Contingencies (35%) | | | | | | $269,150 |
| **Subtotal of Pump Station(s)** | | | | | | **$1,038,150** |
| **Storage Tanks** | 0.1 MG | 1 | LS | | $197,000 | **$197,000** |
| Engineering and Contingencies (35%) | | | | | | $68,950 |
| **Subtotal of Storage Tanks** | | | | | | **$265,950** |
| Permitting and Mitigation | | | | | | $78,000 |
| **CONSTRUCTION TOTAL** | | | | | | **$1,952,600** |
| Interest During Construction | | | | 12 | Months | $68,000 |
| **TOTAL COST** | | | | | | **$2,021,000** |
| Debt Service (5.5% for 20 years) | | | | | | $169,000 |
| Operational Costs* | | | | | | $248,000 |
| **Total Annual Costs** | | | | | | **$417,000** |
| **UNIT COSTS (Until Amortized)** | | | | | | |
| Per Acre-Foot of treated water | | | | | | $650 |
| Per 1,000 Gallons | | | | | | $1.99 |
| **UNIT COSTS (After Amortization)** | | | | | | |
| Per Acre-Foot | | | | | | $405 |
| Per 1,000 Gallons | | | | | | $1.24 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

This strategy benefits municipal water users in Smith County and is expected to have a positive impact on their water supply security. The Carrizo Wilcox aquifer is currently over-allocated in Smith County and City of Tyler's supplies provide relief to the Carrizo Wilcox aquifer as more entities switch from groundwater to purchase water from City of Tyler. 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's supplies will reduce demands on other water supplies in Smith and Anderson Counties and will have no other apparent impact on other State water resources.

Based on the analyses provided above, the recommended strategy for Crystal Systems Inc. to purchase water from the City of Tyler was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results are in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 3 | 642 ac-ft per year |
| **Reliability** | 4 | Highly Reliable Supply |
| **Cost** | 3 | Moderate Cost |
| **Environmental Factors** | 4 | Low Impacts |
| **Impact on Other State Water Resources** | 4 | No known impacts to other projects. |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low Impact |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No known Impacts |
| **Major Impacts on Key Water Quality Parameters** | 4 | No known Impacts |
| **Political Feasibility** | 1 | Sponsor unidentified |
| **Implementation Issues** | 4 | No known Risk |

## REFERENCES

Discussions with City of Tyler.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR SMITH LINDALE

| | |
|---|---|
| **Water User Group Name:** | Smith Lindale |
| **Strategy Name:** | Purchase from City of Tyler |
| **Strategy ID:** | SMTH-LDL |
| **Strategy Type:** | Existing Surface Water Source |
| **Potential Supply Quantity:** | 52 – 797 ac-ft per year<br>(0.04 – 0.72MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020 |
| **Project Capital Cost:** | $5,803,000 (September 2013) |
| **Annual Cost:** | $862,000 |
| **Unit Water Cost (Rounded):** | $1,044 per ac-ft<br>($3.20 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is a recommended strategy for municipal water user Lindale in Smith County and involves a contract between individual Lindale and the City of Tyler for raw water. Lindale is located both in Region D and ETRWPA. Lindale currently obtains most of its supply from Carrizo Wilcox. A feasible strategy would be to continue using groundwater from Carrizo Wilcox. However, this cannot be recommended because of the MAG limitations in Smith County. Therefore, a contract to use City of Tyler's supplies is the recommended strategy for Lindale. In addition to this, municipal conservation is another recommended strategy. Discussion on Conservation strategies is included in a separate technical memorandum. The cost for supply from the City of Tyler includes the contractual 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 need projected for Lindale in Smith County projected by the East Texas Regional Planning Group during the planning period (2020-2070). The quantity of supply from this strategy represents a contract of 46 ac-ft per year in 2020, increasing to 797 ac-ft per year in 2070. The reliability of this water supply is considered high due to the availability of water in City of Tyler's sources of supply. City of Tyler owns Lake Tyler and has contract for water from Lake Palestine. In addition to this, the City also has groundwater supplies in the Smith County Carrizo Wilcox. City of Tyler will decide the appropriate source of supply that is in close proximity to the water user location. However, this strategy is dependent on coordination with the City of Tyler. Depending on the source of supply City of Tyler choses for this water user, this strategy may be dependent on the completion of Tyler's construction of transmission system to access the full amount of Lake Palestine supplies. This is a recommended water management strategy for City of Tyler in 2016 Regional Water Plan.

## ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between Lindale and the City of Tyler 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. There are no bays or estuaries within Smith County.

## 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. The capital costs assumed 10 miles of pipeline (the approximate distance from the City of Tyler supplies to Lindale service area in Smith County), a pump station with an intake, and a terminal storage tank (0.1 million gallon). The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a moderate cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the yield generated by the infrastructure required.

| | | | | | |
|---|---|---|---|---|---|
| **WUG NAME:** | **Smith County - Lindale** | | | | |
| **STRATEGY:** | **Purchase from City of Tyler** | | | | |
| **Quantity:** | **797** AF/Y | | 0.72 MGD | | |
| **CAPITAL COSTS** | | | | | |
| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
| Pipeline Rural | 8 in. | 52,800 | LF | $28 | $1,493,000 |
| Pipeline Urban | 8 in. | 0 | LF | $39 | $0 |
| Right of Way Easements Rural (ROW) | | 52,800 | LF | $16 | $907,720 |
| Right of Way Easements Urban (ROW) | | | | | $0 |
| Engineering and Contingencies (30%) | | | | | $448,000 |
| **Subtotal of Pipeline** | | | | | **$2,848,720** |
| **Pump Station(s)** | | | | | |
| Pump with intake | 195 HP | 1 | LS | $1,623,00 0 | $1,623,000 |
| Booster Pump Station | 0 HP | 1 | LS | $0 | $0 |
| Engineering and Contingencies (35%) | | | | | $568,050 |
| **Subtotal of Pump Station(s)** | | | | | **$2,191,050** |
| Storage Tanks | 0.1 MG | 1 | LS | $214,000 | $214,000 |
| Engineering and Contingencies (35%) | | | | | $74,900 |
| **Subtotal of Storage Tanks** | | | | | **$288,900** |
| **Permitting and Mitigation** | | | | | $278,000 |
| **CONSTRUCTION TOTAL** | | | | | **$5,606,670** |
| **Interest During Construction** | | | 12 | Months | $196,000 |
| **TOTAL COST** | | | | | **$5,803,000** |
| **ANNUAL COSTS** | | | | | |
| Debt Service (5.5% for 20 years) | | | | | $486,000 |
| Operational Costs* | | | | | $376,000 |
| **Total Annual Costs** | | | | | **$862,000** |
| **UNIT COSTS (Until Amortized)** | | | | | |
| Per Acre-Foot of treated water | | | | | $1,044 |

| | |
|---|---|
| Per 1,000 Gallons | $3.20 |

**UNIT COSTS (After Amortization)**

| | |
|---|---|
| Per Acre-Foot | $511 |
| Per 1,000 Gallons | $1.57 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

This strategy benefits Lindale in Smith County and is expected to have a positive impact on their water supply security. The Carrizo Wilcox aquifer is currently overallocated in Smith County and City of Tyler's supplies provide relief to the Carrizo Wilcox aquifer as more entities switch from groundwater to purchase water from City of Tyler. 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's supplies will reduce demands on other water supplies in Smith and Anderson Counties and will have no other apparent impact on other State water resources.

Based on the analyses provided above, the recommended strategy for Lindale to purchase water from the City of Tyler was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 797 ac-ft per year |
| **Reliability** | 4 | Highly Reliable Supply |
| **Cost** | 2 | Moderate Cost |
| **Environmental Factors** | 4 | Low to No Impacts |
| **Impact on Other State Water Resources** | 4 | No known impacts to other projects. |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low Impact |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No known Impacts |
| **Major Impacts on Key Water Quality Parameters** | 4 | No known Impacts |
| **Political Feasibility** | 1 | No Sponsor identified |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

Discussions with City of Tyler.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR SMITH MANUFACTURING

| | |
|---|---|
| **Water User Group Name:** | Smith Manufacturing |
| **Strategy Name:** | Purchase from City of Tyler |
| **Strategy ID:** | SMTH-MFG |
| **Strategy Type:** | Existing Surface Water Source |
| **Potential Supply Quantity:** | 1,764– 2,879 ac-ft per year (1.55 – 2.4 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020 |
| **Project Capital Cost:** | $7,204,000 (September 2013) |
| **Annual Cost:** | $1,698,000 |
| **Unit Water Cost (Rounded):** | $590 per ac-ft ($1.81 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is a recommended strategy for Manufacturing in Smith County and involves a contract between individual manufacturing water users and the City of Tyler for raw water. City of Tyler already supplies to most of the manufacturing users in the Smith County so in some cases, it might just be an extension of the contract with current customers. This strategy will serve both the East Texas Region and North East Texas Region (Region D) manufacturing demand in Smith County. The cost for supply from the City of Tyler includes the contractual 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 need projected for manufacturing in Smith County projected by the East Texas Regional Planning Group during the planning period (2020-2070). The quantity of supply from this strategy represents a contract of 1,764 ac-ft per year in 2020, increasing to 2,879 ac-ft per year in 2070. The reliability of this water supply is considered high due to the availability of water in City of Tyler's sources of supply. City of Tyler owns Lake Tyler and has contract for water from Lake Palestine. In addition to this, the City also has groundwater supplies in the Smith County Carrizo Wilcox. City of Tyler will decide the appropriate source of supply that is in close proximity to the water user location. However, this strategy is dependent on coordination with the City of Tyler. Depending on the source of supply City of Tyler choses for this water user, this strategy may be dependent on the completion of Tyler's construction of transmission system to access the full amount of Lake Palestine supplies. This is a recommended water management strategy for City of Tyler in 2016 Regional Water Plan.

## ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between manufacturing water users in Smith County and the City of Tyler 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. There are no bays or estuaries within Smith County.

## 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. The capital costs assumed eight miles of pipeline (the approximate distance from the City of Tyler supplies to center of Smith County), a pump station with an intake, and a terminal storage tank (0.5 million gallon). The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a high cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the yield generated by the infrastructure required.

| | | | | | | |
|---|---|---|---|---|---|---|
| **WUG NAME:** | **Smith County - Manufacturing** | | | | | |
| **STRATEGY:** | **Purchase from City of Tyler** | | | | | |
| **Quantity:** | **2,879** | AF/Y | | 3.85 MGD | | |
| **CAPITAL COSTS** | | | | | | |
| **Pipeline** | | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
| Pipeline Rural | | 16 in. | 42,240 | LF | $58 | $2,431,000 |
| Pipeline Urban | | 16 in. | 0 | LF | $81 | $0 |
| Right of Way Easements Rural (ROW) | | | 42,240 | LF | $16 | $726,110 |
| Right of Way Easements Urban (ROW) | | | | | | $0 |
| Engineering and Contingencies (30%) | | | | | | $729,000 |
| **Subtotal of Pipeline** | | | | | | **$3,886,110** |
| **Pump Station(s)** | | | | | | |
| Pump with intake | | 254 HP | 1 | LS | $1,755,000 | $1,755,000 |
| Booster Pump Station | | 0 HP | 1 | LS | $0 | $0 |
| Engineering and Contingencies (35%) | | | | | | $614,250 |
| **Subtotal of Storage Tanks** | | | | | | **$2,369,250** |
| **Storage Tanks** | | 0.5 MG | 1 | LS | $402,000 | **$402,000** |
| Engineering and Contingencies (35%) | | | | | | $140,700 |
| **Subtotal of Pump Station(s)** | | | | | | **$542,700** |
| **Permitting and Mitigation** | | | | | | $228,000 |
| **CONSTRUCTION TOTAL** | | | | | | **$7,026,060** |
| **Interest During Construction** | | | | 12 | Months | $246,000 |
| **TOTAL COST** | | | | | | **$7,272,000** |
| **ANNUAL COSTS** | | | | | | |
| Debt Service (5.5% for 20 years) | | | | | | $609,000 |
| Operational Costs* | | | | | | $1,089,000 |
| **Total Annual Costs** | | | | | | **$1,698,000** |

**UNIT COSTS (Until Amortized)**

| | |
|---|---|
| Per Acre-Foot of treated water | $590 |
| Per 1,000 Gallons | $1.81 |

**UNIT COSTS (After Amortization)**

| | |
|---|---|
| Per Acre-Foot | $404 |
| Per 1,000 Gallons | $1.24 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

This strategy benefits manufacturing water users in Smith County and is expected to have a positive impact on their water supply security. Since Tyler is already supplying to Smith County's manufacturing demands, it would be easy to set up contracts with City of Tyler. 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's supplies will reduce demands on other water supplies in Smith and Anderson Counties and will have no other apparent impact on other State water resources.

Based on the analyses provided above, the Smith County Manufacturing recommended strategy to purchase water from the City of Tyler was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 2,879 ac-ft per year |
| **Reliability** | 4 | Highly Reliable Supply |
| **Cost** | 3 | Medium Cost |
| **Environmental Factors** | 4 | Low to No Impacts |
| **Impact on Other State Water Resources** | 4 | No known impacts to other projects. |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low Impact |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No known Impacts |
| **Major Impacts on Key Water Quality Parameters** | 4 | No known Impacts |
| **Political Feasibility** | 1 | No sponsor identified |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

Discussions with City of Tyler.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR SMITH MINING

| | |
|---|---|
| **Water User Group Name:** | Smith Mining |
| **Strategy Name:** | Purchase from City of Tyler |
| **Strategy ID:** | SMTH-MIN |
| **Strategy Type:** | Existing Surface Water Source |
| **Potential Supply Quantity:** | 114 ac-ft per year<br>(0.1 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020 |
| **Project Capital Cost:** | $3,103,000 (September) |
| **Annual Cost:** | $402,000 |
| **Unit Water Cost (Rounded):** | $3,526 per ac-ft<br>($10.82 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is a recommended strategy for Mining in Smith County and involves a contract between individual mining water users and the City of Tyler for raw water from the Sabine River, as their permit allows. The cost for supply from the City of Tyler includes the contractual 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 need projected for mining in Smith County projected by the East Texas Regional Planning Group during the planning period (2020-2070). The quantity of supply from this strategy represents a contract of 114 ac-ft per year. It should be noted that mining demands for this county reduce over the course of the planning cycle and drop to 32 ac-ft per year by 2070. The reliability of this water supply is considered high due to the availability of water in City of Tyler's sources of supply. City of Tyler owns Lake Tyler and has contract for water from Lake Palestine. In addition to this, the City also has groundwater supplies in the Smith County Carrizo Wilcox. City of Tyler will decide the appropriate source of supply that is in close proximity to the water user location. However, this strategy is dependent on coordination with the City of Tyler. Depending on the source of supply City of Tyler choses for this water user, this strategy may be dependent on the completion of Tyler's construction of transmission system to access the full amount of Lake Palestine supplies. This is a recommended water management strategy for City of Tyler in 2016 Regional Water Plan.

## 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 Smith County and the City of Tyler 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. There are no bays or estuaries within Smith County.

## 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. The capital costs assumed eight miles of pipeline (the approximate distance from the City of Tyler supplies to center of Smith County), a pump station with an intake, and a terminal storage tank (0.1 million gallon). The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water equal to $3.00 per 1,000 gallons. Overall, this strategy has a high cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the yield generated by the infrastructure required.

| | | | | | | |
|---|---|---|---|---|---|---|
| **WUG NAME:** | **Smith County - Mining** | | | | | |
| **STRATEGY:** | **Purchase from City of Tyler** | | | | | |
| **Quantity:** | **114** AF/Y | | | 0.15 MGD | | |
| **CAPITAL COSTS** | | | | | | |
| **Pipeline** | | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
| Pipeline Rural | | 6 in. | 42,240 | LF | $18 | $768,000 |
| Pipeline Urban | | 6 in. | 0 | LF | $25 | $0 |
| Right of Way Easements Rural (ROW) | | | 42,240 | LF | $16 | $726,110 |
| Right of Way Easements Urban (ROW) | | | | | | $0 |
| Engineering and Contingencies (30%) | | | | | | $230,000 |
| **Subtotal of Pipeline** | | | | | | **$1,724,110** |
| **Pump Station(s)** | | | | | | |
| Pump with intake | | 5 HP | 1 | LS | $620,000 | $620,000 |
| Booster Pump Station | | 0 HP | 1 | LS | $0 | $0 |
| Engineering and Contingencies (35%) | | | | | | $217,000 |
| **Subtotal of Pump Station(s)** | | | | | | **$837,000** |
| Storage Tanks | | **0.1 MG** | **1** | **LS** | $193,000 | **$193,000** |
| Engineering and Contingencies (35%) | | | | | | $67,550 |
| **Subtotal of Storage Tanks** | | | | | | **$260,550** |
| **Permitting and Mitigation** | | | | | | $228,000 |
| **CONSTRUCTION TOTAL** | | | | | | **$3,049,660** |
| **Interest During Construction** | | | | 6 | Months | $53,000 |
| **TOTAL COST** | | | | | | **$3,103,000** |
| **ANNUAL COSTS** | | | | | | |
| Debt Service (5.5% for 20 years) | | | | | | $260,000 |
| Operational Costs* | | | | | | $142,000 |
| **Total Annual Costs** | | | | | | **$402,000** |
| **UNIT COSTS (Until Amortized)** | | | | | | |
| Per Acre-Foot of treated water | | | | | | $3,526 |
| Per 1,000 Gallons | | | | | | $10.82 |
| **UNIT COSTS (After Amortization)** | | | | | | |
| Per Acre-Foot | | | | | | $1,263 |
| Per 1,000 Gallons | | | | | | $3.88 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## 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's supplies will reduce demands on other water supplies in Smith and Anderson Counties and will have no other apparent impact on other State water resources.

Based on the analyses provided above, the Smith County Mining recommended strategy to purchase water from the City of Tyler was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 114 ac-ft per year |
| **Reliability** | 4 | Highly Reliable Supply |
| **Cost** | 2 | Moderate to High Cost |
| **Environmental Factors** | 4 | Low to No Impacts |
| **Impact on Other State Water Resources** | 4 | No known impacts to other projects. |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low Impact |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No known Impacts |
| **Major Impacts on Key Water Quality Parameters** | 4 | No known Impacts |
| **Political Feasibility** | 1 | No Sponsor identified |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

Discussions with City of Tyler.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR TRINITY IRRIGATION

| | |
|---|---|
| **Water User Group Name:** | Trinity Irrigation |
| ***Alternative Strategy Name:*** | Purchase from County-Other (Yegua-Jackson Aquifer) |
| ***Alternative Strategy ID:*** | TRTY-IRR1 |
| ***Alternative Strategy Type:*** | Existing Groundwater Source |
| **Potential Supply Quantity:** | 331 ac-ft per year<br>(0.3 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020 |
| **Project Capital Cost:** | $2,174,000 (September 2013) |
| **Annual Cost:** | $327,000 |
| **Unit Water Cost (Rounded):** | $988 per ac-ft<br>($3.03 per 1,000 gallons) |

## PROJECT DESCRIPTION

This Fourth Planning Cycle of regional water planning is the first cycle where the Texas Water Development Board projects an Irrigation demand (500 ac-ft per year) in Trinity County. The East Texas Regional Water Planning Group believes this demand may have been overestimated and has decided to leave 331 ac-ft per year of the projected demand unmet.

In the event that this demand is not overestimated, the group has decided to create an *alternative strategy* for Irrigation in Trinity County. The strategy involves a contract between individual irrigation water users and individual entities aggregated together by the Texas Water Development Board as Trinity County-Other. The cost for supply from Trinity County-Other 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 individual County-Other entities and will reflect the wholesale water rates of the 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 ground water.

## SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the irrigation need projected in Trinity County by the East Texas Regional Water Planning Group. The reliability of this water supply is considered medium because the wells required to pump groundwater are already in place and the water is available from the Yegua-Jackson aquifer according to the Texas Water Development Board's groundwater availability models. However, this strategy is dependent upon coordination with individual County-Other entities and assumes that these entities would be willing to sell their unused groundwater supplies to irrigation water users. This strategy is not dependent on any other water management strategies in the 2016 East Texas Regional Water Plan. The quantity of supply from this strategy represents a contract of 331 ac-ft per year, beginning in 2020, and remains constant through the end of the planning period, 2070.

## ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between irrigation water users in Trinity County and individual County-Other entities

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 Trinity County.

## 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. The capital costs include 3 miles of pipeline (assumed water would be purchased within close proximity to where it will be used), a pump station with an intake, 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 ground water. Overall, this strategy has a medium cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the small rate of water associated with the strategy.

| | | | | | |
|---|---|---|---|---|---|
| **WUG NAME:** | **Trinity Irrigation** | | | | |
| ***Alternative Strategy:*** | ***Purchase from County-Other (Groundwater)*** | | | | |
| **Groundwater Quantity:** | **331** AF/Y | | | 0.44 MGD | |
| **CAPITAL COSTS** | | | | | |
| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
| Pipeline Rural | 6 in. | 15,840 | LF | $18 | $288,000 |
| Right of Way Easements Rural (ROW) | | 15,840.0 | LF | $16 | $272,250 |
| Engineering and Contingencies (30%) | | | | | $86,000 |
| **Subtotal of Pipeline** | **3** | **miles** | | | **$646,250** |
| **Pump Station(s)** | | | | | |
| Booster Pump Station | 26 HP | 1 | LS | $754,000 | $754,000 |
| Engineering and Contingencies (35%) | | | | | $263,900 |
| **Subtotal of Pump Station(s)** | | | | | **$1,017,900** |
| Storage Tanks | 0.3 MG | 1 | LS | $274,151 | **$274,151** |
| Engineering and Contingencies (35%) | | | | | $95,953 |
| **Subtotal of Storage Tanks** | | | | | **$370,104** |
| **Permitting and Mitigation** | | | | | $103,000 |
| **CONSTRUCTION TOTAL** | | | | | **$2,137,254** |
| **Interest During Construction** | | | 6 | Months | $37,000 |
| **TOTAL CAPITAL COST** | | | | | **$2,174,000** |
| **ANNUAL COSTS** | | | | | |
| Debt Service (5.5% for 20 years) | | | | | $182,000 |
| Operational Costs* | | | | | $145,000 |
| **Total Annual Costs** | | | | | **$327,000** |
| **UNIT COSTS (Until Amortized)** | | | | | |
| Per Acre-Foot of treated water | | | | | $988 |
| Per 1,000 Gallons | | | | | $3.03 |
| **UNIT COSTS (After Amortization)** | | | | | |
| Per Acre-Foot | | | | | $462 |
| Per 1,000 Gallons | | | | | $1.42 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

This *alternative strategy* benefits irrigation users 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. A contract to purchase groundwater from individual County-Other entities 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.

Based on the analyses provided above, the Trinity Irrigation *alternative strategy* to purchase water from the Trinity County-Other was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 3 | 331 acre feet per year |
| **Reliability** | 4 | Reliable Supply |
| **Cost** | 3 | Low to Medium Cost |
| **Environmental Factors** | 4 | Low to No Impacts |
| **Impact on Other State Water Resources** | 4 | No Impacts |
| **Threat to Agricultural Resources/Rural Areas** | 4 | No Impacts |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No Impacts |
| **Major Impacts on Key Water Quality Parameters** | 4 | No Impacts |
| **Political Feasibility** | 1 | Sponsor Unknown at this time. |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

2011 East Texas Regional Water Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR CONSERVATION

| | |
|---|---|
| **Project Name:** | Municipal Conservation – Multiple Water Users |
| **Project ID:** | WUG_CONS |
| **Project Type:** | Conservation |
| **Potential Supply Quantity (Rounded):** | Varies, Specific to WUG |
| **Implementation Decade:** | 2020 (Project Year) |
| **Development Timeline:** | 1 years |
| **Project Capital Cost:** | $0 (Sept. 2013) |
| **Annual Cost:** | Varies, Specific to WUG |
| **Unit Water Cost (Rounded):** | Varies, Specific to WUG |

## PROJECT DESCRIPTION

Water Conservation best management practices were evaluated for municipal water user groups that have a projected per capita water use greater than 140 gpcd and have either demonstrated needs in the planning period or recommended water management strategies that involve interbasin transfer. Evaluated water conservation practices included enhanced public and school education, water conservation pricing, and an enhanced water loss control program. In ETRWPA, water conservation strategies are identified for the following list of municipal water user groups.

1) Alto Rural WSC, Cherokee County
2) City of Bullard, Smith County
3) City of Chandler, Henderson County
4) City of Crystal Systems Inc., Smith County
5) City of Lindale, Smith County
6) City of Overton, Rusk County
7) R-P-M WSC, Smith County
8) Woodville, Tyler County

Discussion of the basic conservation measures, conservation savings, and the corresponding annual costs for these municipal water user groups is discussed in this technical memorandum.

In addition to this basic and advanced conservation strategies are proposed for the following wholesale water providers with municipal customers.

1) City of Beaumont – Advanced Conservation
2) City of Port Arthur – Advanced Conservation
3) Athens Municipal Water Authority – Municipal Conservation for City of Athens in Region C

The conservation strategies for City of Beaumont and City of Port Arthur are also discussed in separate technical memorandums for wholesale water providers. Discussion of City of Athens conservation strategy can be found in the 2016 Region C Water Plan.

## SUPPLY DEVELOPMENT

The supply for this strategy represents conservation savings due to enhanced public and school education, water conservation pricing implementation, and an enhanced water loss control program. Below is a table showing the conservation savings for the municipal water user groups.

| Total Supply Savings from Conservation Strategy (Acre Feet per Year) | | | | | | |
|---|---|---|---|---|---|---|
| **Water User Group Name** | **2020** | **2030** | **2040** | **2050** | **2060** | **2070** |
| **ALTO RURAL WSC** | 0 | 0 | 5 | 7 | 9 | 11 |
| **ATHENS MWA** | See City of Athens Conservation Strategy 2016 Region C Plan | | | | | |
| **BEAUMONT** | 0 | 3,238 | 5,341 | 7,047 | 8,579 | 9,966 |
| **BULLARD** | 11 | 24 | 30 | 38 | 47 | 56 |
| **CHANDLER** | 0 | 0 | 0 | 16 | 30 | 36 |
| **CRYSTAL SYSTEMS INC** | 4 | 9 | 12 | 15 | 19 | 22 |
| **LINDALE** | 8 | 17 | 22 | 28 | 34 | 41 |
| **OVERTON** | 17 | 18 | 106 | 181 | 241 | 289 |
| **PORT ARTHUR** | 4,992 | 7,450 | 8,516 | 9,616 | 10,340 | 9,767 |
| **WOODVILLE** | 0 | 0 | 10 | 16 | 18 | 19 |
| **R-P-M WSC** | 4 | 23 | 36 | 54 | 71 | 86 |
| **Grand Total** | **5,033** | **10,762** | **14,150** | **17,147** | **19,559** | **20,499** |

## ENVIRONMENTAL CONSIDERATIONS

No environmental considerations associated with this strategy.

## PERMITTING AND DEVELOPMENT

No additional permitting required for this strategy

## PLANNING LEVEL OPINION OF COST

No capital costs were identified for the conservation strategies. Below is a summary of annual costs and the unit costs for the water users with conservation strategies.

| | Capital Cost ($) | Annual Cost ($) | Unit Cost (S per acre feet) | Unit Cost ($ per 1,000 gallons) |
|---|---|---|---|---|
| ALTO RURAL WSC | - | $4,648 | $423 | $1.30 |
| ATHENS MWA | - | See City of Athens Conservation Strategy 2016 Region C Plan | | |
| BEAUMONT | $52,623,000 | $2,271,000 | $317 | $0.97 |
| BULLARD | - | $11,789 | $489 | $1.50 |
| CHANDLER | - | $5,812 | $489 | $1.50 |
| CRYSTAL SYSTEMS INC | - | $3,129 | $325 | $1.00 |
| LINDALE | - | $7,967 | $454 | $1.39 |
| OVERTON | $2,105,000 | $111,298 | $914 | $2.81 |
| PORT ARTHUR | $50,075,000 | $2,169,000 | $367 | $1.13 |
| R-P-M WSC | - | $7,967 | $454 | $1.39 |
| WOODVILLE | - | $3,992 | $489 | $1.50 |

## PROJECT EVALUATION

Based on the analysis provided above, the municipal conservation project was evaluated across eleven 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** | | Varies, Specific to Entities |
| **Reliability** | 4 | Reliable Supply |
| **Cost** | 3-4 | Low to Medium Cost |
| **Environmental Factors** | 5 | Low Impacts |
| **Impact on Other State Water Resources** | 5 | No Impacts |
| **Threat to Agricultural Resources/Rural Areas** | 5 | No Impacts |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 5 | No Impacts |
| **Major Impacts on Key Water Quality Parameters** | 5 | No Impacts |
| **Political Feasibility** | 2 | Sponsor identified but not committed |
| **Implementation Issues** | 4 | Limited Risk |

## REFERENCES

2011 East Texas Regional Water Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR ANRA LAKE COLUMBIA

| | |
|---|---|
| **Project Name:** | Lake Columbia |
| **Project ID:** | ANRA-COL |
| **Project Type:** | New Surface Water Source |
| **Potential Supply Quantity (Rounded):** | 75,600 ac-ft per year<br>(67.4 MGD) |
| **Implementation Decade:** | 2030 (Project Year) |
| **Development Timeline:** | 5-10 years |
| **Project Capital Cost:** | $344,498,000 (Sept. 2013) |
| **Unit Water Cost (Rounded):** | $333 per ac-ft (during loan period)<br>$13 per ac-ft (after loan period) |

## PROJECT DESCRIPTION

Project Description for the Lake Columbia Strategy is based on the information provided by Angelina and Neches River Authority (ANRA) and summarized in the October 2014 Draft Dallas Long Range Water Supply Plan. 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 2011 East Texas Regional Water Plan (ETRWP). Angelina Neches River Authority has been granted a water right permit (Permit No. 4228) by the TCEQ to impound 195,500 acre feet per year and to divert 85,507 acre feet per year (76.3 MGD) for municipal and industrial purposes. Angelina Neches River Authority currently has contracted with customers for 53 percent of the 85,507 ac-ft per year permit of the proposed Lake Columbia reservoir. The City of Dallas is also considering Lake Columbia as a recommended strategy. After considering the local needs in the East Texas Region, Dallas' projected share of the proposed Lake Columbia project is 56,000 ac-ft per year by 2070. This water management strategy for Angelina Neches River Authority was developed to address the total current contracted and potential future customer demand through the construction of Lake Columbia. Angelina Neches River Authority holds the water right for the supply source and will be the project sponsor. It was specified in the 2014 Draft Dallas Long Range Supply Plan that Dallas will be responsible for 70 percent of the dam, reservoir land acquisition, and relocations, and Angelina Neches River Authority will be responsible for the remaining 30 percent of the reservoir construction and land acquisitions costs. This cost split is subject to change during the potential negotiations between Dallas and Angelina Neches River Authority. The Lake Columbia dam site is located two to three miles downstream of Highway 79 on Mud Creek in Cherokee County. The contributing drainage area for the reservoir is approximately 384 square miles. The total conservation pool volume is 195,500 acre feet per year and the top of conservation pool is at the elevation of 315 ft MSL. The conservation pool covers an area of approximately 10,133 acres and the flood pool covers an additional area of 1,367 acres.

## CURRENT CONTRACTED AND POTENTIAL CUSTOMERS

Angelina Neches River Authority has contracts with several customers in East Texas Regional Planning Area. The water suppliers currently under contract with Angelina Neches River Authority are listed in Table 1 below along with the current participation percentage. Also included below is Table 2 showing the potential future customers for Angelina Neches River Authority and their corresponding demands. The contract amounts are based on the full permitted diversion. The development of infrastructure to deliver the water to the end users is discussed in separate strategies.

| Customers for Lake Columbia | | | | |
|---|---|---|---|---|
| **Recipient** | **County** | **Basin** | **Percent Participation in Columbia** | **Contract Amount (ac-ft per year)** |
| **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 | 10.0% | 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 | 10.0% | 8,551 |
| **Additional Customers for Lake Columbia** | | | | |
| City of Dallas | | Trinity | | 56,050 |

**Table 2. Potential Future Customer Demand (ac-ft per year) for Lake Columbia**

| Recipient | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
|---|---|---|---|---|---|---|
| Holmwood Utility | 65 | 70 | 70 | 70 | 70 | 70 |
| Steam Electric Demand – Cherokee | 8,000 | 15,000 | 20,000 | 20,000 | 20,000 | 20,000 |
| Manufacturing – Rusk County Refinery | 5,600 | 5,600 | 5,600 | 5,600 | 5,600 | 5,600 |
| Mining - Angelina | 474 | 573 | 398 | 300 | 225 | 168 |
| Mining - Cherokee | 238 | 247 | 210 | 147 | 84 | 40 |
| Mining - Nacogdoches | 5,475 | 2,975 | 118 | 0 | 0 | 0 |
| Mining – San Augustine | 2,102 | 1,102 | 0 | 0 | 0 | 0 |
| Mining – Rusk | 1,075 | 2,092 | 1,955 | 1,809 | 1,686 | 1,677 |
| Total Future Customer Demand | **23,028** | **27,658** | **28,350** | **27,926** | **27,665** | **27,555** |

## SUPPLY DEVELOPMENT

Firm yield for Lake Columbia was determined by means of the water availability analysis using the Neches Basin Water Availability Model (WAM). This model was downloaded from TCEQ website in 2009. The firm yield of the Lake was estimated to be 75,600 acre feet per year in 2020 and reducing to 75,350 acre feet per year in 2070. It should be noted that the water management strategies for the reservoir development and the transmission connections were all based on the firm supplies available

from Lake Columbia. The firm yield reported in the October, 2014 Draft Dallas Long Range Water Supply Plan is very similar to the firm yield generated using the WAM models.

## ENVIRONMENTAL CONSIDERATIONS

The summary of environmental considerations was developed based on the known environmental factors that have been discussed in the Draft Environmental Impact Study (DEIS).

Habitat – The footprint of Lake Columbia will impact approximately 5,746.5 acres of waters of the U.S., including 3,689 acres of forested wetlands and the remainder comprised of shrub and emergent wetlands (144 and 1,518 acres, respectively), open water, streams and a hillside bog.

Environmental Flows – The current TCEQ Permit No. 4228 allowing the construction and operation of Lake Columbia does not require any instream flow releases. However, if Dallas wants to move water from Lake Columbia in Neches Basin to Trinity River Basin, an amendment to the Permit is required to allow interbasin transfers. Amendments to the Permit may be subject to recently adopted instream flow standards.

Bays and Estuaries – Lake Columbia project is over 280 river miles upstream from the Neches estuary at Sabine Lake and is therefore expected to have no measureable effect on the fresh water inflows into Sabine Lake and Sabine Lake estuary. Recognizing the diminishing effect of upstream distance on bay and estuary inflows, the Texas Water Code (Section 11.147) requires consideration of such effects only if a proposed project is within 200 river miles of the coast.

Threatened and Endangered Species - The Lake Columbia project area includes six federally listed species, five of which are also listed by the state. The state lists fourteen additional species within Smith and Cherokee Counties where the lake would be developed.

| Environmental Factors | Level of Concern |
|---|---|
| Habitat | High |
| Environmental Water Needs | Medium Impact |
| Bay and Estuaries | Low Impact |
| Threatened and Endangered Species | Low Impact |
| Wetlands | High (5,351.5 acres of wetlands) |

## PERMITTING AND DEVELOPMENT

Angelina Neches River Authority has a water right for Lake Columbia and is currently seeking a 404 permit for construction. A draft environmental impact study (DEIS) has been prepared for Lake Columbia by the USACE. The DEIS was published on January 29, 2010 and public and agency comments were provided on March 30, 2010. Currently, the Lake Columbia project is subject to completion of the EIS and issuance of a 404 permit from the U.S Army Corps of Engineers (USACE).

Lake Columbia is in the permitting phase, and has contracts with several local participants. According to Angelina Neches River Authority, the participants have the right of first refusal to contract for water in the next phase of the project. The Texas Water Development Board is a 47% participant and has the right of refusal for 35.9 MGD (40,188 acre feet per year) of supply. Process for water contracts will be initiated after the issuance of the Section 404 permit from the USACE.

If Dallas were to participate in the Lake Columbia project, the current permit no. 4228 has to be amended

for an interbasin transfer from the Neches to the Trinity basin. There is a potential that the authorized diversions from Lake Columbia project may be subject to some reductions due to the environmental flow standards that may be applied during the amendment process.

| Permit | Regulatory Entity | Potential Challenges |
|---|---|---|
| Water Right Permit Amendment | TCEQ | May require interbasin transfer authorization for Dallas to transfer water from Neches to Trinity basin. |
| 404 | USACE | Required to proceed with construction in waters of the US. |

## PLANNING LEVEL OPINION OF COST

Both Angelina Neches River Authority and participating entities will share in the costs associated with the Lake Columbia water management strategy. Construction costs are divided into three separate categories: reservoir, water treatment plant and transmission system. A planning level opinion of cost (PLOC) for the construction of the reservoir is included below. A planning level opinion of cost (PLOC) for the water treatment plant and distribution system is included in a separate Tech Memo. For reservoir construction, unit costs are based on the WAM Run 3 yield estimate of 75,600 ac-ft per year. The detailed cost estimate below represents the total cost for the construction of the project. It was noted in the Dallas Long Range Supply Plan that Dallas will bear responsibility for 70 percent of reservoir construction and relocation costs and Angelina Neches River Authority will be responsible for the remaining 30 percent. However, the actual percent distribution of the project cost will be determined based on the future negotiations between Angelina Neches River Authority and other participants.

**WWP NAME:** **ANRA**
**STRATEGY:** **Lake Columbia**
**AMOUNT (ac-ft per year):** **75,600**

| **Dam** | **Cost** |
|---|---|
| Embankment | $27,396,279 |
| Internal Drainage | $657,684 |
| Slope Protection & Crest Roadway | $4,627,905 |
| Service Spillway | $6,393,169 |
| Outlet Works | $1,310,317 |
| Instrumentation | $694,686 |
| Miscellaneous Items | $5,324,652 |
| Engineering | $7,573,517 |
| Contingencies | $9,280,959 |
| **Sub Total For Dam** | **$63,259,169** |
| | |
| **Transportation Conflicts** | |
| Roads | $3,292,439 |
| Highways | $35,969,978 |
| Railroads | $30,452,793 |
| Erosion Protection | $4,432,898 |
| Engineering | $11,632,584 |
| Contingencies | $14,829,581 |
| **Subtotal for Transportation Conflicts** | **$100,610,273** |
| | |
| **Utility Conflicts** | |

| | |
|---|---|
| Communications | $2,701,029 |
| Electric Utilities | $16,200,606 |
| Oil and Gas | $4,049,069 |
| Water Utilities | $170,992 |
| Engineering | $69,365 |
| Contingencies | $4,624,298 |
| **Subtotal for Utility Conflicts** | **$27,815,358** |
| | |
| **Project Site Acquisition** | |
| Property Purchase | $24,540,441 |
| Conservation Easement | $1,778,251 |
| Survey and Appraisal | $1,391,536 |
| Professional Fees | $807,856 |
| Engineering | $876,500 |
| Contingencies | $5,703,637 |
| **Sub Total for Project Site Acquisition** | **$35,098,220** |
| | |
| **Mitigation** | |
| Mitigation | $91,804,133 |
| Contingencies | $7,780,067 |
| **Sub Total for Mitigation** | **$99,584,200** |
| | |
| Cultural Resources | |
| Archeological/Historical Resources | $14,861,326 |
| Engineering | $297,251 |
| **Contingencies** | $2,972,306 |
| **Sub Total for Cultural Resources** | **$18,130,884** |
| | |
| **TOTAL CONSTRUCTION COST** | **$344,498,000** |
| | |
| **ANNUAL COSTS** | |
| Debt Service for Reservoirs (5.5% for 40 years) | $13,465,711 |
| Debt Service for Relocations (5.5% for 20 years) | $10,746,571 |
| Operation & Maintenance | $948,900 |
| **Total Annual Costs** | **$25,161,000** |
| | |
| **UNIT COSTS (Until Amortized)** | |
| Per Acre-Foot of treated water | $332.8 |
| Per 1,000 Gallons | $1.02 |
| | |
| **UNIT COSTS (After Amortization)** | |
| Per Acre-Foot | $12.6 |
| Per 1,000 Gallons | $0.04 |

## PROJECT EVALUATION

Based on the analysis provided above, the Lake Columbia Reservoir Construction project was evaluated across eleven 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** | 4 | 75,600 acre feet per year |
| **Reliability** | 4 | Reliable Supply |
| **Cost** | 4 | Medium Cost |
| **Environmental Factors** | 3 | Medium Impacts |
| **Impact on Other State Water Resources** | 4 | No Impacts |
| **Threat to Agricultural Resources/Rural Areas** | 4 | No Impacts |
| **Interbasin Transfers** | | Yes, if Dallas uses the Supplies |
| **Other Natural Resources** | 4 | No Impacts |
| **Major Impacts on Key Water Quality Parameters** | 4 | No Impacts |
| **Political Feasibility** | 4 | Local Sponsor is ANRA |
| **Implementation Issues** | 3 | Contract with City of Dallas |

## REFERENCES

October 2014 Draft Dallas Long Range Water Supply Plan.

2011 East Texas Regional Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR ANRA WTP

| | |
|---|---|
| **Project Name:** | ANRA Treatment Plant and Distribution System |
| **Project ID:** | ANRA-WTP |
| **Project Type:** | Existing Surface Water Source |
| **Potential Supply Quantity (Rounded):** | 22,232 ac-ft per year<br>(10 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 5 years |
| **Project Capital Cost:** | $117,250,000 (Sept. 2013) |
| **Unit Water Cost (Rounded):** | $1,883per ac-ft (during loan period)<br>$5.78 per 1,000 gallons |

## PROJECT DESCRIPTION

Project Description for the Lake Columbia Strategy is based on the information summarized in the October 2014 Draft Dallas Long Range Water Supply Plan. Angelina Nacogdoches 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 2011 East Texas Regional Water Plan (ETRWP). Angelina Neches River Authority has been granted a water right permit (Permit No. 4228) by the TCEQ to impound 195,500 acre feet per year and to divert 85,507 acre feet per year (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 per year 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 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. Therefore, a recommended water management strategy for Angelina Neches River Authority is to construct a Water Treatment Plant and the distribution system to supply treated water to these customers. Transmission system costs are shared among the contracted suppliers that receive treated water.

**Customers for Lake Columbia**

| Recipient | County | Basin | Percent Participation in Columbia | Contract Amount (ac-ft per year) |
|---|---|---|---|---|
| **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 | 10.0% | 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 | 10.0% | 8,551 |
| **Additional Customers for Lake Columbia** | | | | |
| City of Dallas | | Trinity | | 56,050 |

## SUPPLY DEVELOPMENT

The supply for this strategy comes from Lake Columbia. The firm yield for Lake Columbia was determined by means of the water availability analysis using the Neches Basin Water Availability Model (WAM). This model was downloaded from TCEQ website in 2009. The firm yield of the Lake was estimated to be 75,600 acre feet per year in 2020 and dropping down to 75,350 acre feet per year in 2070. The water management strategies for the water treatment plant and transmission connections were all based on the firm supplies available from Lake Columbia.

## STRATEGY DESCRIPTION

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.

## 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 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 5.5% 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.

**WWP NAME:** **Angelina Neches River Authority**
**STRATEGY:** **Regional Water Treatment Facilities**
**Quantity:** **22,232 AF/Y** 30 MGD Peak
**CONSTRUCTION COSTS**

| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
|---|---|---|---|---|---|
| Pipeline Subtotal | . | | | | $14,768,000 |
| Engineering and Contingencies (30%) | | | | | $4,430,000 |
| **Subtotal of Pipeline** | | | | | **$24,269,440** |
| **Pump Station(s)** | | | | | |
| Pump with intake & building | 3157 HP | 2 | LS | $5,641,000 | $11,282,000 |
| Engineering and Contingencies (35%) | | | | | $3,948,700 |
| **Subtotal of Pump Station(s)** | | | | | **$15,230,700** |
| **Water Treatment Plant** | 30 MGD | 1 | LS | $52,792,000 | **$52,792,000** |
| **Storage Tanks** | 3.7 MG | 1 | LS | $1,154,320 | **$1,154,000** |
| Engineering and Contingencies (35%) | | | | | $18,881,100 |
| **Subtotal** | | | | | **$72,827,100** |
| Permitting and Mitigation | | | | | $957,746 |
| **Construction Total** | | | | | **$113,284,986** |
| Interest During Construction | | | 12 | Months | $3,965,000 |
| **TOTAL COST** | | | | | **$117,250,000** |

**ANNUAL COSTS**

| | |
|---|---|
| Debt Service (5.5% for 20 years) | $9,811,000 |
| Electricity ($0.09 kWh) | $1,292,000 |
| Operational Costs* | $41,859,000 |
| **UNIT COSTS (Until Amortized)** | |
| Per Acre-Foot of treated water | $1,883 |
| Per 1,000 Gallons | $5.78 |
| **UNIT COSTS (After Amortization)** | |
| Per Acre-Foot | $1,442 |
| Per 1,000 Gallons | $4.42 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

Based on the analysis provided above, the Angelina Neches River Authority Regional Water Treatment Facilities project was evaluated across eleven 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** | 4 | 22,232 ac-ft per year |
| **Reliability** | 3 | Highly Reliable Supply |
| **Cost** | 2 | Medium to High Cost |
| **Environmental Factors** | 4 | Low Impacts |
| **Impact on Other State Water Resources** | 4 | Low Impact |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No known Impacts |
| **Major Impacts on Key Water Quality Parameters** | 4 | No known Impacts |
| **Political Feasibility** | 4 | Local Sponsorship by ANRA |
| **Implementation Issues** | 3 | Dependent on Lake Columbia Construction |

## REFERENCES

2011 East Texas Regional Plan

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR ANRA GW WELLS

| | |
|---|---|
| **Project Name:** | ANRA Groundwater Wells |
| **Project ID:** | ANRA-GW |
| **Project Type:** | New Groundwater Source |
| **Potential Supply Quantity (Rounded):** | 5,600 ac-ft per year<br>(5 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 3 years |
| **Project Capital Cost:** | $26,023,000 (Sept. 2013) |
| **Unit Water Cost (Rounded):** | $578 per ac-ft (during loan period)<br>$1.78 per 1,000 gallons |

## PROJECT DESCRIPTION

Angelina Neches River Authority will plan to develop groundwater wells in Cherokee and Rusk counties to supply water to manufacturing demand in Rusk County. The list of customers is presented in the table below. Angelina Neches River Authority will develop approximately 5,600 ac-ft per year.

## SUPPLY DEVELOPMENT

The supply for this strategy comes from Carrizo Wilcox aquifer in Cherokee and Rusk counties. Based on the supplies reported in the Modeled Available Groundwater (MAG) reports, there are sufficient groundwater supplies available in Cherokee and Rusk counties for this strategy. It was noted that developing this strategy will not result in over allocation of groundwater supplies in those counties.

## 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 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 5.5% interest rate over a period of 20 years.

**WWP NAME: ANRA - New Ground Water Wells**
WMS: New Wells in Cherokee and Rusk Counties

| | | | | |
|---|---|---|---|---|
| Supply | 5,600 | Ac-ft/yr | 3,472 | gpm |
| Depth to Water | 300 | ft | | |
| Well Depth | 1,000 | ft | | |
| Well Yield | 200 | gpm | | |
| Well Size | 12 | in | | |

| **Construction Costs** | Number | Unit Cost | Total Cost |
|---|---|---|---|
| Water Wells | 18 | $478,389 | $8,611,003 |
| Connection to Transmission System | 18 | $50,000 | $900,000 |
| Engineering and Contingencies (30% for pipelines, 35% for other items) | | | $3,284,000 |
| **Subtotal of Well(s)** | | | **$12,795,003** |

| **Transmission System** | Size | Quantity | Unit | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| Pipeline - Rural | 24 in. | 26,400 | LF | $103 | $2,719,000 |
| Pump Station | 890 HP | 1 | EA | $5,617,000 | $5,617,000 |
| Ground Storage Tank | 0.63 MG | 1 | EA | $435,189 | $435,189 |
| Easement - Rural | | 26,400 | LF | $16 | $453,860 |
| Engineering and Contingencies (30% for pipelines, 35% for other items) | | | | | $2,934,000 |
| **Subtotal for Transmission** | | **5** | **miles** | | **12,159,049** |

| | | | |
|---|---|---|---|
| Permitting and Mitigation | | | $189,000 |
| Construction Total | | | $25,143,052 |
| Interest During Construction | 12 | Months | $880,000 |
| **TOTAL CAPITAL COST** | | | **$26,023,000** |

| | |
|---|---|
| Debt Service (5.5% for 20 years) | $2,178,000 |
| Operational Costs* | $1,061,490 |
| **Total Annual Cost** | **$3,239,000** |

| **UNIT COSTS (Until Amortized)** | |
|---|---|
| Cost per ac-ft | $578 |
| Cost per 1000 gallons | $1.78 |

| **UNIT COSTS (After Amortization)** | |
|---|---|
| Cost per ac-ft | $190 |
| Cost per 1000 gallons | $0.58 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

Based on the analysis provided above, the ANRA Groundwater Wells project was evaluated across eleven 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** | 4 | 5,600 ac-ft per year |
| **Reliability** | 4 | Highly Reliable Supply |
| **Cost** | 3 | Low to Medium Costs |
| **Environmental Factors** | 4 | Low Impacts |
| **Impact on Other State Water Resources** | 4 | Low Impact |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No known Impacts |
| **Major Impacts on Key Water Quality Parameters** | 4 | No known Impacts |
| **Political Feasibility** | 4 | Local Sponsorship by ANRA |
| **Implementation Issues** | 4 | No known Implementation Risks |

## REFERENCES

Discussions with Angelina Neches River Authority.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS
# TECHNICAL MEMORANDUM FOR ANRA RUN-OF-RIVER SUPPLIES

| | |
|---|---|
| **Project Name:** | ANRA Run-of-River Supplies |
| **Project ID:** | ANRA-ROR |
| **Project Type:** | New Surface Water Source |
| **Potential Supply Quantity (Rounded):** | 30,000 ac-ft per year (27 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 5 years |
| **Project Capital Cost:** | NA |
| **Unit Water Cost (Rounded):** | NA |

## PROJECT DESCRIPTION

In addition, Angelina Neches River Authority has been approached to supply water for mining purposes Angelina, Cherokee, Nacogdoches, Shelby, San Augustine, Rusk, and Sabine counties. The mining demand will be met with run-of-the-river diversions. Additional potential customer are the steam electric power plant owners in Cherokee county. Angelina Neches River Authority has already applied for 10,000 ac-ft per year of run-of-the-river supplies from Mud Creek in Cherokee County. The application process for this permit is administratively complete. Angelina Neches River Authority is planning to apply for additional 20,000 ac-ft per year of run-of-the-river supplies in Cherokee County. With the additional supplies from these two sources, Angelina Neches River Authority can meet the mining and steam electric power customer demand. A table summarizing the potential demands for these customers is provided below.

| Recipient | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
|---|---|---|---|---|---|---|
| Holmwood Utility | 65 | 70 | 70 | 70 | 70 | 70 |
| Steam Electric Demand – Cherokee | 8,000 | 15,000 | 20,000 | 20,000 | 20,000 | 20,000 |
| Manufacturing – Rusk County Refinery | 5,600 | 5,600 | 5,600 | 5,600 | 5,600 | 5,600 |
| Mining - Angelina | 474 | 573 | 398 | 300 | 225 | 168 |
| Mining - Cherokee | 238 | 247 | 210 | 147 | 84 | 40 |
| Mining - Nacogdoches | 5,475 | 2,975 | 118 | 0 | 0 | 0 |
| Mining – San Augustine | 2,102 | 1,102 | 0 | 0 | 0 | 0 |
| Mining – Rusk | 1,075 | 2,092 | 1,955 | 1,809 | 1,686 | 1,677 |
| Total Future Customer Demand | **23,028** | **27,658** | **28,350** | **27,926** | **27,665** | **27,555** |

## SUPPLY DEVELOPMENT

The supply for this strategy comes from run-of-the-river supplies in Cherokee County. Angelina Neches River Authority will submit a permit application to TCEQ for the new run-of-river supplies of 20,000 ac-ft per year and will monitor the application status for the current permit for run-of-river supplies of 10,000 ac-ft per year.

## ENVIRONMENTAL CONSIDERATIONS

The environmental flow rules for Neches basin may impact the supply available to Angelina Neches River Authority for the run-of-river water rights. Other than the process required to complete the application process, there are no significant environmental considerations for this strategy.

## PERMITTING AND DEVELOPMENT

Angelina Neches River Authority will apply for a water right permit for the new run-of-river supplies in Cherokee County. The permitting process is dependent on the TCEQ guidelines for granting run-of-river application requests

## PLANNING LEVEL OPINION OF COST

Other than the planning levels costs and the lawyer fees for tracking the permit applications, there are not additional costs involved with this strategy. It is assumed that the customers contracted for this supply will develop the infrastructure to access the supplies from the run-of-river supply source in Cherokee County.

## PROJECT EVALUATION

Based on the analysis provided above, the Angelina Neches River Authority Run-of-River Supplies project was evaluated across eleven 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** | 4 | 30,000 ac-ft per year (Permit Application for 10,000 ac-ft per year already administratively complete, 20,000 ac-ft per year new run-of-river supplies) |
| **Reliability** | 3 | Medium Reliable Supply |
| **Cost** | 5 | No Cost (Other than Administrative and Lawyer Fees) |
| **Environmental Factors** | 4 | Low to No Impacts |
| **Impact on Other State Water Resources** | 4 | Low Impacts |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No known Impacts |
| **Major Impacts on Key Water Quality Parameters** | 4 | No known Impacts |
| **Political Feasibility** | 4 | Local Sponsorship by ANRA |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

2011 East Texas Regional Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS
# TECHNICAL MEMORANDUM FOR ATHENS MWA FISH HATCHERIES

| | |
|---|---|
| **Water User Group Name:** | Athens MWA |
| **Strategy Name:** | Indirect Reuse of Flows from Fish Hatcheries |
| **Strategy ID:** | AMWA-FH |
| **Strategy Type:** | Existing Surface Water Source |
| **Potential Supply Quantity:** | 2,872 ac-ft per year<br>(2.6 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020 |
| **Project Capital Cost:** | $0 (September 2013) |
| **Annual Cost:** | $0 per ac-ft |
| **Unit Water Cost (Rounded):** | $0 per ac-ft<br>($0 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is a recommended strategy for Athens MWA. The strategy involves an indirect reuse project from the flows returned by the Fish Hatcheries to Lake Athens.

Athens MWA has a contract to supply 3,023 acre feet per year to the Fish Hatcheries. The Fish Hatcheries have 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 obligations 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 per year of additional supply. Athens MWA has to apply for a permit amendment on their permit to provide water to fish hatcheries to be able to utilize the flows returned by the fish hatcheries.

## SUPPLY DEVELOPMENT

The fish hatcheries return approximately 95 to 100 percent of the water diverted from Lake Athens. Assuming that 95% of the water 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 the 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 engineering and lawyer fees.

## PROJECT EVALUATION

The recommended strategy for infrastructure improvements was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 2,872 acre feet per year |
| **Reliability** | 4 | Highly Reliable Supply |
| **Cost** | 5 | No Cost (Excluding Administrative and Lawyer Fees) |
| **Environmental Factors** | 4 | Low to No Impacts |
| **Impact on Other State Water Resources** | 4 | Low Impact |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No Impacts on other natural resources |
| **Major Impacts on Key Water Quality Parameters** | 4 | No Major Impacts |
| **Political Feasibility** | 4 | Athens MWA is the Local Sponsor. Sponsor is committed. |
| **Implementation Issues** | 3 | Requires agreement with Fish Hatcheries |

## REFERENCES

2011 East Texas Regional Water Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS
# TECHNICAL MEMORANDUM FOR ATHENS MWA GROUNDWATER WELLS

| | |
|---|---|
| **Water User Group Name:** | Athens MWA |
| ***Alternative Strategy Name:*** | Additional Groundwater Wells in Carrizo Wilcox |
| ***Alternative Strategy ID:*** | AMWA-GW |
| ***Alternative Strategy Type:*** | New Groundwater Source |
| **Potential Supply Quantity:** | 4,840 ac-ft per year<br>(4.3 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020 |
| **Project Capital Cost:** | $9,456,000 (September 2013) |
| **Annual Cost:** | $1,340,000 per ac-ft |
| **Unit Water Cost (Rounded):** | $277 per ac-ft<br>($0.85 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is an alternate strategy for Athens MWA. The strategy involves addition of new groundwater wells in the Carrizo Wilcox aquifer in Henderson County.

Athens MWA is currently pursuing developing groundwater from Carrizo Wilcox aquifer on the property near Lake Athens. It is anticipated that eight new wells (@ 750 gpm each) would be drilled to provide a total of 4.3 MGD of groundwater supply. The water would be transported directly from the well field to the distribution system. The first well will be online in 2016. It should be noted that although Athens MWA has permits to develop the wells, this strategy cannot be included in the 2016 Regional Plan as a recommended strategy for this entity because of the MAG limitations. The Carrizo Wilcox in Henderson County (both in Region C and I) is severely limited by its availability for additional wells. Therefore, the groundwater wells is included as an alternate strategy for Athens MWA in the 2016 Regional Plan. The strategy will be changed to a recommended strategy if the MAG volumes are updated in the near future. Since this is the primary strategy for Athens MWA and the construction is already under-way, the 2016 Regional Plan will show shortages for Athens MWA, which in reality will be addressed by the well field development.

## SUPPLY DEVELOPMENT

The project involves drilling eight new wells @ 750 gpm each to produce a total supply of 4.3 MGD or 4,840 acre feet per year. The project will be developed in phases and the first well is expected to be online by 2016. The additional wells will be added over the planning period as and when required.

## ENVIRONMENTAL CONSIDERATIONS

No environmental issues identified.

## PERMITTING AND DEVELOPMENT

Athens MWA already has permits to drill the wells. The yield from the new wells is above the MAG limits for 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 availability and the project will be converted to a recommended strategy.

## PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) is provided below.

**WWP: Athens MWA - Groundwater Wells**
WMS: New Wells in Carrizo-Wilcox Aquifer

| | | | | |
|---|---|---|---|---|
| Supply | 4,840 | Acre-feet per year | 3,001 | gpm |
| Depth to Water | 300 | ft | | |
| Well Depth | 800 | ft | | |
| Well Yield | 250 | gpm | | |
| Well Size | 12 | in | | |
| Wells Needed | 12 | | | |

| **Construction Costs** | Number | | Unit Cost | Total Cost |
|---|---|---|---|---|
| Water Wells | 12 | | $460,014 | $5,520,167 |
| Connection to Transmission System | 12 | | $50,000 | $600,000 |
| Ground Storage Tank | 1.08 MG | 1 | $627,330 | $627,330 |
| Engineering and Contingencies (30% for pipelines, 35% for other) | | | | $2,332,000 |
| **Subtotal of Well(s)** | | | | **$9,079,498** |
| Permitting and Mitigation | | | | $57,000 |
| **Construction Total** | | | | **$9,136,000** |
| Interest During Construction | | 12 | Months | $320,000 |
| **TOTAL CAPITAL COST** | | | | **$9,456,000** |
| Debt Service (5.5% for 20 years) | | | | $791,000 |
| Operational Costs* | | | | $549,200 |
| **Total Annual Cost** | | | | **$1,340,000** |
| **UNIT COSTS (First 30 Years)** | | | | |
| Cost per ac-ft | | | | $277 |
| Cost per 1000 gallons | | | | $0.85 |
| **UNIT COSTS (After 30 Years)** | | | | |
| Cost per ac-ft | | | | $114 |
| Cost per 1000 gallons | | | | $0.35 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

The recommended strategy for infrastructure improvements was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 4,840 acre feet per year |
| **Reliability** | 2 | No reliable because of MAG overallocation |
| **Cost** | 2 | Low Cost |
| **Environmental Factors** | 4 | Low Impacts |
| **Impact on Other State Water Resources** | 4 | Low Impact |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No Impacts on other natural resources |
| **Major Impacts on Key Water Quality Parameters** | 4 | No Major Impacts |
| **Political Feasibility** | 4 | Athens MWA is the local sponsor committed to implement the strategy |
| **Implementation Issues** | 1 | Supply from this strategy exceeds MAG limits for Henderson County in Regions C and I. |

## REFERENCES

Discussions with Athens Municipal Water Authority.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR ATHENS MWA PUMP STATION

| | |
|---|---|
| **Water User Group Name:** | Athens MWA |
| **Strategy Name:** | Pump Station Improvements |
| **Strategy ID:** | AMWA-WTP |
| **Strategy Type:** | Existing Surface Water Source |
| **Potential Supply Quantity:** | 1,121 ac-ft per year<br>(0 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020 |
| **Project Capital Cost:** | $2,900,000 (September 2013) |
| **Annual Cost:** | $399,000 per ac-ft |
| **Unit Water Cost (Rounded):** | $59 per ac-ft<br>($0.18 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is a recommended strategy for Athens MWA. The strategy involves infrastructure improvements at the water treatment plant owned by Athens MWA. The improvements will be applied to the existing booster pump station located at the water treatment plant.

Existing treatment capacity for City of Athens is 8 MGD, with a 7.5 MGD treated water pipeline to the city of Athens. The total yield from Lake Athens and the groundwater well at the WTP property is approximately 6 MGD. The WTP has sufficient capacity to treat the current supplies. Since the future supply from the groundwater wells will be directly added to the distribution system, there is no need for WTP capacity improvements. However, the Booster pump station at the WTP is limited by its capacity (5 MGD) and age. Athens MWA plans to replace the existing pump station with a new 8 MGD pump station. Therefore, the recommended water management strategy for Athens MWA is to address the booster pump station infrastructure improvements at the WTP.

In this strategy, the existing booster pump station will be replaced by a new booster pump station of 6 MGD average capacity and 9 MGD peak capacity.

## SUPPLY DEVELOPMENT

No additional supplies associated with this strategy. This strategy will ensure access to the permitted supply from Lake Athens and the amount that is treated at the water treatment plant.

## ENVIRONMENTAL CONSIDERATIONS

No known environmental impacts associated with this strategy.

## PERMITTING AND DEVELOPMENT

No permitting issues associated with this strategy

## PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for the infrastructure improvements is provided below.

**WWP: Athens MWA**

**WMS: Booster PS Improvements at Athens WTP**

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | 1.5 | | | |
| Amount: | 6,726 | Acre-Feet/Year | 6 | MGD | | Average |
| | | | 9 | MGD | | Peak |
| **CONSTRUCTION COSTS** | | | | | | |
| **Pump Station(s)** | | | | | | |
| Booster PS @ WTP | HP | 217 | 1 | LS | $2,061,286 | $2,061,286 |
| Engineering and Contingencies (35%) | | | | | | $721,000 |
| **Subtotal of Pump Station(s)** | | | | | | **$2,782,286** |
| Permitting and Mitigation | | | 1 | LS | | $20,000 |
| **CONSTRUCTION TOTAL** | | | | | | **$2,802,286** |
| **Interest During Construction** | | | | 12 | Months | $98,000 |
| **TOTAL CAPITAL COST** | | | | | | **$2,900,000** |
| **ANNUAL COSTS TREATED WATER** | | | | | | |
| Debt Service (5.5% for 20 years) | | | | | | $243,000 |
| Operational Costs* | | | | | | $156,317 |
| **Total Annual Costs** | | | | | | **$399,000** |
| **UNIT COSTS (During Amortization)** | | | | | | |
| Per Acre-Foot of treated water | | | | | | $59 |
| Per 1,000 Gallons of treated water | | | | | | $0.18 |
| **UNIT COSTS (After Amortization)** | | | | | | |
| Per Acre-Foot of treated water | | | | | | $37 |
| Per 1,000 Gallons of treated water | | | | | | $0.11 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

The recommended strategy for infrastructure improvements was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 1,121 acre-feet per year |
| **Reliability** | 4 | Highly Reliable Supply |
| **Cost** | 5 | Low Cost |
| **Environmental Factors** | 4 | Low Impacts |
| **Impact on Other State Water Resources** | 4 | Low Impact |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No Impacts on other natural resources |
| **Major Impacts on Key Water Quality Parameters** | 4 | No Major Impacts |
| **Political Feasibility** | 5 | Athens MWA is the identified sponsor committed to the strategy |
| **Implementation Issues** | 4 | No known risk |

## REFERENCES

Discussions with Athens Municipal Water Authority.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR ANWCID#1 LAKE STRIKER

| | |
|---|---|
| **Project Name:** | Volumetric Surveys of Lake Striker |
| **Project ID:** | ANCD-VOL |
| **Project Type:** | Existing Surface Water Source |
| **Potential Supply Quantity (Rounded):** | NA |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2 years |
| **Project Capital Cost:** | NA |
| **Unit Water Cost (Rounded):** | NA |

## 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.

## SUPPLY DEVELOPMENT

There may be some potential for additional yield at Lake Striker. At this time it is not known how much (if any) additional yield will be realized.

## 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

Texas Water Development Board conducts the volumetric surveys so Angelina Nacogdoches WCID #1 will coordinate with the Board on the timing of the volumetric surveys. No additional permitting issues known at this time.

## 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 eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | | NA |
| **Reliability** | | NA |
| **Cost** | 5 | No Significant Costs |
| **Environmental Factors** | 4 | No Impacts |
| **Impact on Other State Water Resources** | 4 | No Impacts |
| **Threat to Agricultural Resources/Rural Areas** | 4 | No Impacts |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No Impacts on other natural resources |
| **Major Impacts on Key Water Quality Parameters** | 4 | No Impacts |
| **Political Feasibility** | 4 | AN WCID#1 is local sponsor committed to the strategy |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

Discussions with Angelina Nacogdoches WCID #1.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR AN WCID#1 LAKE STRIKER DREDGING

| | |
|---|---|
| **Project Name:** | Hydraulic Dredging of Lake Striker |
| **Project ID:** | ANCD-DRE |
| **Project Type:** | Existing Surface Water Source |
| **Potential Supply Quantity (Rounded):** | 2,100 ac-ft per year |
| **Implementation Decade:** | 2040 |
| **Development Timeline:** | 2 years |
| **Project Capital Cost:** | $23,716,000 |
| **Unit Water Cost (Rounded):** | NA |

## PROJECT DESCRIPTION

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 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.

## SUPPLY DEVELOPMENT

At this time it is not known how much (if any) additional yield will be realized from the hydraulic dredging. Angelina Nacogdoches WCID #1 expects to develop approximately 2,100 ac-ft per year of additional supplies from the dredging operations

## ENVIRONMENTAL CONSIDERATIONS

No known environmental considerations at this time but these would be studied in further details during the dredging.

## PERMITTING AND DEVELOPMENT

The process for conducting hydraulic dredging does not have too many permitting issues.

## PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) was not developed for this strategy. Angelina Nacogdoches WCID #1 provided an estimate of the total cost for the hydraulic dredging strategy. The planning level capital cost estimate for the dredging operations is approximately $23,716,000.

## 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 eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 3 | 2,100 acre-feet per year |
| **Reliability** | 3 | Moderate Reliable Supply |
| **Cost** | 4 | Low Cost |
| **Environmental Factors** | 4 | Low Impact |
| **Impact on Other State Water Resources** | 4 | Low Impact |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No Impacts on other natural resources |
| **Major Impacts on Key Water Quality Parameters** | 4 | No Impacts |
| **Political Feasibility** | 5 | AN WCID #1 is the local sponsor committed to the strategy |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

Discussions with Angelina Nacogdoches WCID #1.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR AN WCID#1 FOR LAKE STRIKER NORMAL POOL ADJUSTMENT

| | |
|---|---|
| **Project Name:** | Normal Pool Elevation Adjustment of Lake Striker |
| **Project ID:** | ANCD-NPA |
| **Project Type:** | Existing Surface Water Source |
| **Potential Supply Quantity (Rounded):** | 3,500 acre-feet per year |
| **Implementation Decade:** | 2070 |
| **Development Timeline:** | 5 years |
| **Project Capital Cost:** | NA |
| **Unit Water Cost (Rounded):** | NA |

## PROJECT DESCRIPTION

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. It is not clear at this stage the additional yield associated with the normal pool elevation adjustment. The timing for the potential normal pool elevation adjustment is 2070.

## 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 3,500 acre-feet per year.

## ENVIRONMENTAL CONSIDERATIONS

No known environmental considerations at this time but these would be studied in further details during the normal pool elevation adjustment process.

## PERMITTING AND DEVELOPMENT

The process for 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. Angelina Nacogdoches WCID #1 will incur some costs in the form of engineering consulting fees and lawyer fees when they begin working on the normal pool elevation adjustment process. Other than that, no additional costs are anticipated for this strategy.

## 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 eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 3,500 acre-feet per year |
| **Reliability** | 3 | Medium Reliable Supply |
| **Cost** | 5 | No Cost (Excluding Administrative and Lawyer Fees) |
| **Environmental Factors** | 4 | Low Impact |
| **Impact on Other State Water Resources** | 4 | Low Impact |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No Impacts on other natural resources |
| **Major Impacts on Key Water Quality Parameters** | 4 | No Impacts |
| **Political Feasibility** | 3 | AN WCID #1 is the local sponsor |
| **Implementation Issues** | 3 | Limited Risk |

## REFERENCES

Discussions with Angelina Nacogdoches WCID #1.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR CITY OF BEAUMONT

| | |
|---|---|
| **Project Name:** | City of Beaumont – Municipal Conservation |
| **Project ID:** | BEAU-CONS |
| **Project Type:** | Conservation |
| **Potential Supply Quantity (Rounded):** | 9,966 ac-ft per year |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 1 years |
| **Project Capital Cost:** | $52,623,000 (Sept. 2013) |
| **Unit Water Cost (Rounded):** | $317 per ac-ft (during loan period)<br>$0.97 (per 1,000 gallons) |

## PROJECT DESCRIPTION

The City of Beaumont is projected to have a water shortage beginning in 2040. In 2011, the City had an average per capita consumption of 219 gpcd, well over the statewide goal of 140 gpcd. After performing a conservation cost estimate, the ETRWPG believes a water conservation strategy for the City is economically achievable. This recommended strategy includes planning level opinion of probable construction cost estimates related to enhanced public and school education, water conservation pricing implementation, and an enhanced water loss control program. The proposed municipal conservation strategy would reduce Beaumont's demand by more than their projected need; therefore, municipal conservation is the only recommended WMS for the City.

## SUPPLY DEVELOPMENT

The supply for this strategy represents conservation savings due to enhanced public and school education, water conservation pricing implementation, and an enhanced water loss control program.

## ENVIRONMENTAL CONSIDERATIONS

No environmental considerations associated with this strategy.

## PERMITTING AND DEVELOPMENT

No additional permitting required for this strategy

## PLANNING LEVEL OPINION OF COST

No capital costs were assumed for Beaumont's Conservation strategy. The annual cost for this strategy is $2,271,000. The unit cost is $317 per ac-ft of supply and $0.97 per 1,000 gallons of supply.

## PROJECT EVALUATION

Based on the analysis provided above, the City of Beaumont Municipal Conservation project was evaluated across eleven 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** | 4 | 9,966 ac-ft per year |
| **Reliability** | 4 | Reliable Supply |
| **Cost** | 4 | Low Cost |
| **Environmental Factors** | 4 | Low Impacts |
| **Impact on Other State Water Resources** | 4 | Low Impact |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No Impacts |
| **Major Impacts on Key Water Quality Parameters** | 4 | No known Impacts |
| **Political Feasibility** | 3 | City of Beaumont is the local sponsor |
| **Implementation Issues** | 4 | No known risks |

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR CITY OF CENTER REUSE PIPELINE

| | |
|---|---|
| **Project Name:** | City of Center Reuse Pipeline from WWTP to Lake Center |
| **Project ID:** | CENT-REU |
| **Project Type:** | Existing Surface Water Source |
| **Potential Supply Quantity (Rounded):** | 1,120 ac-ft/yr<br>(1 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 5 years |
| **Project Capital Cost:** | $13,579,000 (Sept. 2013) |
| **Project Annual Cost:** | $1,672,000 (Sept. 2013) |
| **Unit Water Cost (Rounded):** | $1,493 per ac-ft (during loan period)<br>$4.58 per 1,000 gallons. |

## PROJECT DESCRIPTION

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 2020 to 2060 and a small shortage in 2070. The City is planning water management strategies to proactively prepare for satisfying any additional demand in the decades through 2060 and also to address the shortage in 2070. One of the recommended water management strategies is to add the return flows from City's WWTP to Lake Center. The City is permitted to use the return flows from the East Bank WWTP. The discharge point for the treated effluent from the WWTP is on a tributary to Mill Creek upstream of Lake Center. The City is planning an indirect reuse project by means of a reuse pipeline from East Bank WWTP to Lake Center. The total capacity for the indirect reuse project will be approximately 1 MGD (1,121 ac-ft per year) and the project will be online in 2020.

## SUPPLY DEVELOPMENT

Supply is readily available at the East Bank WWTP owned and operated by the City. City has a permit to use the return flows origination from the WWTP.

## ENVIRONMENTAL CONSIDERATIONS

Impacts of the return flows on the receiving water body's water quality parameters needs to be analyzed in detail. Additional environmental considerations may apply during the permitting process.

## PERMITTING AND DEVELOPMENT

The City needs to apply for a bed and banks permit to put the supplies in Lake Center.

## 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 Lake Center. The transmission system cost estimate also includes a 90 HP pump station, expansion of the treatment plant to treat the additional supplies.

**WWP NAME:** **City of Center**
**STRATEGY:** **Pipeline from East Bank WWTP to Lake Center**
**Quantity:** **1,120** AF/Y 1.50 MGD

**CAPITAL COSTS**

| **Pipeline to Lake Nacogdoches** | **Size** | **Qty** | **Unit** | **Unit Price** | **Cost** |
|---|---|---|---|---|---|
| Pipeline Rural | 10 in. | 2,000 | LF | $31 | $63,000 |
| Pipeline Urban | 10 in. | 19,164 | LF | $44 | $851,000 |
| Right of Way Easements Rural (ROW) | | 2,000 | LF | $26 | $56,430 |
| Right of Way Easements Urban (ROW) | | 19,164.0 | ACRE | $65 | $1,241,000 |
| Right of Way Easements Urban (ROW) | | 19,164 | LF | $154 | $3,247,420 |
| Engineering and Contingencies (30%) | | | | | $274,000 |
| | | | | | |
| **Pump Station(s)** | | | | | |
| Pump with intake & building | 90 HP | 1 | LS | $821,000 | $821,000 |
| Ground Storage Tank | | 0.19 MG | 1 | $63,438 | $63,438 |
| Engineering and Contingencies (35%) | | | | | $309,553 |
| **Subtotal of Pump Station(s)** | | | | | **$1,193,991** |
| | | | | | |
| **Water Treatment Facility** | | | | | |
| Expand Existing Water Treatment Plant | 1 MGD | 1 | LS | $4,490,000 | $4,490,000 |
| Engineering and Contingencies (35%) | | | | | $1,571,500 |
| **Subtotal of WTP** | | | | | **$6,061,500** |
| | | | | | |
| Permitting and Mitigation | | | | | $131,206 |
| **Construction Total** | | | | | **$13,120,000** |
| Interest During Construction | | | 12 | Months | $459,000 |
| **TOTAL COST** | | | | | **$13,579,000** |

**ANNUAL COSTS**

| | |
|---|---|
| Debt Service (5.5% for 20 years) | $1,136,000 |
| Operational Costs* | $536,000 |
| **Total Annual Costs** | **$1,672,000** |

**UNIT COSTS (Until Amortized)**

| | |
|---|---|
| Per Acre-Foot of treated water | $1,493 |
| Per 1,000 Gallons | $4.58 |

**UNIT COSTS (After Amortization)**

| | |
|---|---|
| Per Acre-Foot | $479 |
| Per 1,000 Gallons | $1.47 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## 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 1,120 ac-ft per year 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 eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 1,120 ac-ft per year. |
| **Reliability** | 5 | Highly Reliable Supply |
| **Cost** | 2 | Medium Cost |
| **Environmental Factors** | 3 | Medium Impacts |
| **Impact on Other State Water Resources** | 4 | Low Impact |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No Impacts on other natural resources |
| **Major Impacts on Key Water Quality Parameters** | 3 | Impact of the return flows on the quality of the receiving bodies |
| **Political Feasibility** | 4 | City of Center is the local sponsor committed to this strategy |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

Discussions with City of Center.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS
# TECHNICAL MEMORANDUM FOR CITY OF CENTER TOLEDO BEND PIPELINE

| | |
|---|---|
| **Project Name:** | Pipeline from Toledo Bend to Lake Center |
| **Project ID:** | CENT-TOL |
| **Project Type:** | Existing Surface Water Source |
| **Potential Supply Quantity (Rounded):** | 2,242 ac-ft per year<br>(5 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 5 years |
| **Project Capital Cost:** | $27,775,000 (Sept. 2013) |
| **Project Annual Cost:** | $3,462,000 (Sept. 2013) |
| **Unit Water Cost (Rounded):** | $1,544 per ac-ft (during loan period)<br>$4.74 per ac-ft (1,000 gallons of water) |

## PROJECT DESCRIPTION

To meet the current demands and higher expected future demands, the City has proposed this water management strategy for the planning period. The City is planning to purchase water from Sabine River Authority to transfer water from Toledo Bend Lake to Lake Center. The City will construct the raw water transmission pipeline from Toledo Bend Reservoir to Lake Center. At this time, it is not clear the total amount of water that will be transferred through this pipeline. For planning purposes, it is assumed that the pipeline will be delivering approximately 2 MGD (2,242 ac-ft per year).

## SUPPLY DEVELOPMENT

Supply is available from the Toledo Bend Reservoir owned and operated by Sabine River Authority. After honoring the current contracted amounts, SRA has sufficient supplies to provide the amount requested by City of Center.

## ENVIRONMENTAL CONSIDERATIONS

There may be some minor impacts of adding water from SRA's Toledo Bend Reservoir to Lake Center. There are not additional environmental considerations known at this time.

## PERMITTING AND DEVELOPMENT

No additional permitting issues associated with the project. City of Center will need to sign a contract with Sabine River Authority for the purchase of the water.

## PLANNING LEVEL OPINION OF COST

Included below is a planning level opinion of cost for the transmission system from Toledo Bend to Lake Center. Planning level opinion of probable construction cost estimates include a 16-inch pipeline from Toledo Bend to Lake Center, an intake and a booster pump station, and storage tanks. The annual costs are calculated assuming 5.5% interest rate and 20 years of return period. The estimate includes the cost for the purchase of raw water from SRA. For purposes of developing costs for purchasing water, costs were estimated at the regional rate chosen for the ETRWPA. Actual costs will be determined during contract negotiations.

**WWP NAME:** **City of Center**
**STRATEGY:** **Pipeline from Toledo Bend to Lake Center**

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | 3.00 | | |
| **Quantity:** | **2,242** | AF/Y | | MGD | | |
| **CAPITAL COSTS** | | | | | | |
| **Pipeline** | | **Size** | **Qty** | **Unit** | **Unit Price** | **Cost** |
| Pipeline Rural | | 16 in. | 100,529 | LF | $58 | $5,786,000 |
| Right of Way Easements Rural (ROW) | | | 100,529 | LF | $26 | $2,839,100 |
| Engineering and Contingencies (30%) | | | | | | $1,736,000 |
| **Subtotal of Pipeline** | | **19** | **Miles** | | | **$10,361,100** |
| | | | | | | |
| **Pump Station(s)** | | | | | | |
| Pump with intake & building | | 130 HP | 1 | LS | $1,076,000 | $1,076,000 |
| Booster Pump Station | | 130 HP | 1 | LS | $1,698,000 | $1,698,000 |
| Storage Tanks | | 0.38 MG | 1 | EA | $126,990 | $127,000 |
| Engineering and Contingencies (35%) | | | | | | $1,015,350 |
| **Subtotal of Pump Station(s)** | | | | | | **$3,916,350** |
| | | | | | | |
| **Water Treatment Facility** | | | | | | |
| Expand Existing Water Treatment Plant | | 3 MGD | 1 | LS | $8,260,000 | $8,260,000 |
| Engineering and Contingencies (35%) | | | | | | $2,891,000 |
| **Subtotal of WTP** | | | | | | **$11,151,000** |
| | | | | | | |
| Permitting and Mitigation | | | | | | $529,990 |
| **Construction Total** | | | | | | **$25,958,440** |
| Interest During Construction | | | | 24 | Months | $1,817,000 |
| **TOTAL COST** | | | | | | **$27,775,000** |
| | | | | | | |
| Debt Service (5.5% for 20 years) | | | | | | $2,324,000 |
| Operational Costs* | | | | | | $1,138,000 |
| **Total Annual Costs** | | | | | | **$3,462,000** |
| **UNIT COSTS (Until Amortized)** | | | | | | |
| Per Acre-Foot of treated water | | | | | | $1,544 |
| Per 1,000 Gallons | | | | | | $4.74 |
| **UNIT COSTS (After Amortization)** | | | | | | |
| Per Acre-Foot | | | | | | $865 |
| Per 1,000 Gallons | | | | | | $2.65 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

The addition of the additional 2,242 ac-ft per year 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 eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 2,242 ac-ft per year. |
| **Reliability** | 4 | Highly Reliable Supply |
| **Cost** | 2 | Medium Cost |
| **Environmental Factors** | 4 | Low Impact |
| **Impact on Other State Water Resources** | 4 | Low Impact |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No Impacts on other natural resources |
| **Major Impacts on Key Water Quality Parameters** | 4 | Minor Impact of the addition of raw water on the quality of the receiving bodies |
| **Political Feasibility** | 4 | City of Center is the local sponsor committed to this strategy |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

Discussions with City of Center.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS
# TECHNICAL MEMORANDUM FOR CITY OF CENTER VOLUMETRIC SURVEYS

| | |
|---|---|
| **Project Name:** | Volumetric Surveys of Lake Center and Lake Pinkston |
| **Project ID:** | CENT-VOL |
| **Project Type:** | Existing Surface Water Source |
| **Potential Supply Quantity (Rounded):** | NA |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2 years |
| **Project Capital Cost:** | NA |
| **Unit Water Cost (Rounded):** | NA |

## PROJECT DESCRIPTION

To meet the current demands and higher expected future demands, the City has proposed a feasible water management strategy. City of Center is considering a strategy to conduct volumetric survey of Lake Center and Pinkston Reservoir to develop an accurate estimate of the lake yields. City of Center will coordinate with the Texas Water Development Board to get on a schedule for the lake volumetric survey. TWDB will charge a fixed fee for conducting volumetric surveys. This is not a recommended or alternative strategy in the 2016 regional water plan.

## SUPPLY DEVELOPMENT

There may be some potential for additional yield at Lake Pinkston but it is not expected to see any additional supplies at Lake Center.

## 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

Texas Water Development Board conducts the volumetric surveys so City of Center coordinate with the Board on the timing of the volumetric surveys. No additional permitting issues known at this time.

## PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) was not developed for this strategy. TWDB charges a nominal fee for conducting the volumetric surveys but it is not clear what that amount would be in early planning stages.

## PROJECT EVALUATION

The addition of the additional yield from Lake Center and Lake Pinkston will help City of Center supply to the increasing demand in Shelby County. City of Center believes that the manufacturing demand reported 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 eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | | NA |
| **Reliability** | | NA |
| **Cost** | 4 | Low Cost |
| **Environmental Factors** | 4 | Low Impact |
| **Impact on Other State Water Resources** | 4 | Low Impact |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No Impacts on other natural resources |
| **Major Impacts on Key Water Quality Parameters** | 4 | No Impacts |
| **Political Feasibility** | 4 | City of Center is the local sponsor committed to this strategy |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

Discussions with City of Center.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR HOUSTON COUNTY WCID #1 PERMIT AMENDMENT

| | |
|---|---|
| **Water User Group Name:** | Houston County WCID #1 |
| **Strategy Name:** | Permit Amendment for Houston County Lake |
| **Strategy ID:** | HCWC-PA |
| **Strategy Type:** | Existing Surface Water Source |
| **Potential Supply Quantity:** | 3,500 ac-ft per year<br>(3.1 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020 |
| **Project Capital Cost:** | $0 |
| **Annual Cost:** | $0 per ac-ft |
| **Unit Water Cost (Rounded):** | $0 per ac-ft<br>($0 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is a recommended strategy for Houston County WCID #1 located in Houston County. The strategy involves a permit amendment to take 3,500 ac-ft per year from Houston County Lake in addition to the 3,500 ac-ft per year included in their existing permit.

## SUPPLY DEVELOPMENT

Houston County WCID #1 was originally permitted for 7,000 ac-ft per year from Houston County Lake; in 1987, this supply was reduced by the Texas Commission on Environmental Quality (TCEQ) to 3,500 ac-ft per year. Houston County WCID #1 has applied for a permit amendment to return their permitted diversion to the firm yield of the lake, 7,000 ac-ft per year, and add industrial use to the permit. The reliability of this water supply is considered medium because while the firm yield of the lake allows for this permit amendment, the amendment is dependent upon decisions made by the TCEQ.

## ENVIRONMENTAL CONSIDERATIONS

The yield of this strategy will be dependent upon negotiations with the 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. There are no bays or estuaries in close proximity Houston County.

## PERMITTING AND DEVELOPMENT

This permit amendment is dependent upon coordination with the TCEQ.

## PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) was not developed for this strategy because costs associated with the permit amendment are considered minimal. Any costs incurred by Houston County WCID #1 will be related to engineering and lawyer fees.

## 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. A contract to pull water from Houston County Lake 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 permit amendment for existing surface water supplies will be beneficial because it provides water for economic growth.

Based on the analyses provided above, the Houston County WCID #1 recommended strategy for a permit amendment was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 3,500 acre feet per year |
| **Reliability** | 3 | Medium Reliable Supply |
| **Cost** | 5 | No Cost (Excluding Administrative and Lawyer Fees) |
| **Environmental Factors** | 4 | Low Impact |
| **Impact on Other State Water Resources** | 4 | Low Impact |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No Impacts on other natural resources |
| **Major Impacts on Key Water Quality Parameters** | 4 | No Impacts |
| **Political Feasibility** | 4 | Sponsored by Houston County WCID #1 |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

2011 East Texas Regional Water Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR HOUSTON COUNTY WCID #1 GROUNDWATER WELLS

| | |
|---|---|
| **Water User Group Name:** | Houston County WCID #1 |
| ***Alternative Strategy Name:*** | New wells in Carrizo-Wilcox Aquifer |
| ***Alternative Strategy ID*:** | HCWC-GW |
| **Strategy Type:** | New Groundwater Source |
| **Potential Supply Quantity:** | 3,500 ac-ft per year<br>(3.1 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020 |
| **Project Capital Cost:** | $22,793,000 (September, 2013) |
| **Annual Cost:** | $2,613,000 per ac-ft |
| **Unit Water Cost (Rounded):** | $747 per ac-ft<br>($2.29 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is an *alternative* 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. This project will only be implemented if Houston County WCID #1 is unable to attain a permit amendment for 3,500 ac-ft per year from Houston County Lake (Strategy ID: HCWC-PA).

## SUPPLY DEVELOPMENT

It is assumed that each well will have a maximum yield of 200 ac-ft per year to meet both municipal and non-municipal demands in Houston County providing a total strategy yield of 3,500 ac-ft per year for every decade in the planning period (2020-2070). A target yield for this strategy was set by Houston County WCID #1; this value corresponds to the amount listed in their recommended strategy for a permit amendment (Strategy ID: HCWC-PA). 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 of surface water in close proximity. The impact to the environment due to pipeline construction is expected to be temporary and minimal. New wells have a potential decrease in the groundwater-surface water nexus, which could reduce base flows. Impacts to environmental water needs, habitat, and cultural resources are expected to be low. In addition, there are no bays or estuaries in close proximity of Houston County.

## 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. The capital costs assumed 3 miles of pipeline, nine wells, a peaking factor of two, and a maximum well yield of 200 gpm for each well. This equates to $747 per acre-foot ($2.29 per 1,000 gallons); after the infrastructure if fully paid for (30 years), the cost drops to $202per acre-foot ($0.62 per 1,000 gallons). Overall, this strategy has a low cost compared to other strategies in the 2016 East Texas Regional Water Plan.

**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 | $410,587 | $9,032,913 |
| Connection to Transmission System | 22 | $50,000 | $1,100,000 |
| Engineering and Contingencies (30% for pipelines, 35% for other items) | | | $3,492,000 |
| **Subtotal of Well(s)** | | | **$13,624,913** |

| **Transmission System** | Size | Quantity | Unit | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| Pipeline - Rural | 20 in. | 15,840 | LF | $81 | $1,280,000 |
| Pump Station | 505 HP | 1 | EA | $3,632,000 | $3,632,000 |
| Ground Storage Tank | 0.78 MG | 1 | EA | $511,521 | $511,521 |
| Easement - Rural | | 15,840 | LF | $16 | $272,250 |
| Engineering and Contingencies (30% for pipelines, 35% for other items) | | | | | $1,834,000 |
| **Subtotal for Transmission** | | **3** | **miles** | | **7,529,771** |

| | | | |
|---|---|---|---|
| Permitting and Mitigation | | | $147,000 |
| **Construction Total** | | | $21,301,684 |
| Interest During Construction | 24 | Months | $1,491,000 |
| **TOTAL CAPITAL COST** | | | **$22,793,000** |

| | |
|---|---|
| Debt Service (5.5% for 20 years) | $1,907,000 |
| Operational Costs* | $705,863 |
| **Total Annual Cost** | **$2,613,000** |

| **UNIT COSTS (First 30 Years)** | |
|---|---|
| Cost per ac-ft | $747 |
| Cost per 1000 gallons | $2.29 |

| **UNIT COSTS (After 30 Years)** | |
|---|---|
| Cost per ac-ft | $202 |
| Cost per 1000 gallons | $0.62 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## 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.

Based on the analyses provided above, the *alternative* strategy to drill new wells in Houston County for the customers of Houston County WCID #1 was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 3,500 acre feet per year |
| **Reliability** | 3 | Medium Reliable Supply |
| **Cost** | 3 | Medium Cost |
| **Environmental Factors** | 4 | Low Impact |
| **Impact on Other State Water Resources** | 4 | Low Impact |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No Impacts on other natural resources |
| **Major Impacts on Key Water Quality Parameters** | 4 | No known impacts to water quality |
| **Political Feasibility** | 4 | Sponsored by Houston County WCID #1 |
| **Implementation Issues** | 3 | Dependent on HC WCID #1 permit amendment application and the TCEQ |

## REFERENCES

2011 East Texas Regional Water Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR CITY OF JACKSONVILLE RAW WATER TRANSMISSION

| | |
|---|---|
| **Project Name:** | Lake Columbia to Jacksonville Raw Water Transmission System |
| **Project ID:** | JACK-COL |
| **Project Type:** | Existing Surface Water Source |
| **Potential Supply Quantity (Rounded):** | 1,700 ac-ft per year<br>(3 MGD) |
| **Implementation Decade:** | 2040 |
| **Development Timeline:** | 5 years |
| **Project Capital Cost:** | $20,645,000 (Sept. 2013) |
| **Project Annual Cost:** | $2,645,000 (Sept. 2013) |
| **Unit Water Cost (Rounded):** | $1,556 per ac-ft (during loan period)<br>$4.77 (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 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 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 acre feet per year (3 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.

## 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 100 HP intake pump station and a 3 MGD water treatment plant for treating the raw water. The annual costs are calculated assuming 5.5% interest rate and 20 years of return period. The estimate includes the cost for the purchase of raw water from Angelina Neches River Authority.

| | | | | | |
|---|---|---|---|---|---|
| **WWPNAME:** | **Jacksonville** | **STRATEGY:** | | **Lake Columbia Pipeline** | |
| **Quantity for Phase I** | **1,700** AF/Y | | | 2.27 MGD | |
| **CAPITAL COSTS** | | | | | |
| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
| Pipeline Rural | 16 in. | 23,544 | LF | $58 | $1,355,000 |
| Pipeline Urban | 16 in. | 3,000 | LF | $81 | $242,000 |
| Right of Way Easements Rural (ROW) | | 23,544 | LF | $16 | $404,690 |
| Right of Way Easements Urban (ROW) | | 3,000 | LF | $26 | $84,700 |
| Engineering and Contingencies (30%) | | | | | $479,000 |
| **Subtotal of Pipeline** | | | | | **$2,565,390** |
| | | | | | |
| **Pump Station(s)** | | | | | |
| Pump with intake & building | 100 HP | 1 | LS | $829,000 | $829,000 |
| Storage Tanks | 0.28 MG | 1 | EA | $96,290 | $96,000 |
| Engineering and Contingencies (35%) | | | | | $323,750 |
| **Subtotal of Pump Station(s)** | | | | | **$1,248,750** |
| | | | | | |
| **Water Treatment Facility** | | | | | |
| New Water Treatment Plant | 3 MGD | 1 | LS | $11,833,000 | $11,833,000 |
| Engineering and Contingencies (35%) | | | | | $4,141,550 |
| **Subtotal of WTP** | | | | | **$15,974,550** |
| | | | | | |
| **Permitting and Mitigation** | | | | | $158,231 |
| **CONSTRUCTION TOTAL** | | | | | **$19,947,000** |
| **Interest During Construction** | | | 12 | Months | $698,000 |
| **TOTAL COST** | | | | | **$20,645,000** |
| | | | | | |
| **ANNUAL COSTS** | | | | | |
| Debt Service (5.5% for 20 years) | | | | | $1,728,000 |
| Operational Costs* | | | | | $917,000 |
| **Total Annual Costs** | | | | | **$2,645,000** |
| | | | | | |
| **UNIT COSTS (Until Amortized)** | | | | | |
| Per Acre-Foot of treated water | | | | | $1,556 |
| Per 1,000 Gallons | | | | | $4.77 |
| **UNIT COSTS (After Amortization)** | | | | | |
| Per Acre-Foot | | | | | $539 |
| Per 1,000 Gallons | | | | | $1.66 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

Based on the analysis provided above, the Lake Columbia to Jacksonville Raw Water Transmission System project was evaluated across eleven 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** | 4 | 1,700 ac-ft per year |
| **Reliability** | 4 | Highly Reliable Supply |
| **Cost** | 2 | Medium to Moderate High Costs |
| **Environmental Factors** | 4 | Low Impacts |
| **Impact on Other State Water Resources** | 4 | Low Impact |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No known Impacts |
| **Major Impacts on Key Water Quality Parameters** | 4 | No known Impacts |
| **Political Feasibility** | 4 | City of Jacksonville is the local sponsor committed to this project |
| **Implementation Issues** | 3 | Dependent on the completion of Lake Columbia construction |

## REFERENCES

2011 East Texas Regional Water Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 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<br>(178.4 MGD) |
| **Implementation Decade:** | 2040 |
| **Development Timeline:** | 2040 |
| **Project Capital Cost:** | $399,955,000 (September, 2013) – LNVA estimates $350 million |
| **Annual Cost:** | $105,144,000 |
| **Unit Water Cost (Rounded):** | $526 per ac-ft<br>($1.61 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is a recommended strategy for the Lower Neches Valley Authority and involves a contract to take raw surface water from the Sabine River Authority's Toledo Bend system as their permit allows. The cost for supply from the Sabine River Authority 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 Sabine 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 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 2040 and continuing through the end of the planning period, 2070. 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 to the environment due to pipeline construction is expected to be moderate. In addition, a contract between the Lower Neches Valley Authority and Sabine 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 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

This strategy is dependent on the Sabine River Authority completing a project to move the location of one of their existing pump stations.

## 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 13 miles of pipeline and 17 miles of open canals (distance determined by the Lower Neches Valley Authority), one pump station with an intake, and two booster pump station. The annual cost was estimated assuming a debt service of 6% for 20 years and using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a low cost compared to other strategies in the 2016 East Texas Regional Water Plan.

| | | | | | | |
|---|---|---|---|---|---|---|
| **WUG NAME:** | **Lower Neches Valley Authority** | | | | | |
| **STRATEGY:** | **Purchase from Sabine River Authority (Toledo Bend)** | | | | | |
| **Raw Water Quantity:** | **200,000** AF/Y | | | 356.8 MGD | | |
| **CONSTRUCTION COSTS** | | | | | | |
| **Pipeline** | | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
| Pipeline/Canal Rural | | 144 in. | 158,400 | LF | $1,527 | $241,829,000 |
| Right of Way Easements Rural (ROW) | | | 158,400 | LF | $26 | $4,473,480 |
| Engineering and Contingencies (30%) | | | | | | $72,549,000 |
| **Subtotal of Pipeline/Canal** | | **30** | **miles** | | | **$318,851,480** |
| **Pump Station(s)** | | | | | | |
| Pump with intake | | 2953 HP | 1 | LS | $5,410,000 | $5,410,000 |
| Booster Pump Station | | 2953 HP | 2 | LS | $9,934,000 | $19,868,000 |
| Engineering and Contingencies (35%) | | | | | | $8,847,300 |
| **Subtotal of Pump Station(s)** | | | | | | **$34,125,300** |
| Storage Tanks | | 7.0 MG | 3 | LS | $2,009,754 | $6,029,262 |
| Engineering and Contingencies (35%) | | | | | | $2,110,242 |
| **Subtotal of Storage Tanks** | | | | | | **$8,139,504** |
| Permitting and Mitigation | | | | | | $834,000 |
| **Construction Total** | | | | | | **$361,950,284** |
| Interest During Construction | | | | 36 | Months | $38,005,000 |
| **TOTAL CAPITAL COST** | | | | | | **$399,955,000** |
| **ANNUAL COSTS** | | | | | | |
| Debt Service (5.5% for 20 years) | | | | | | $33,468,000 |
| Operational Costs* | | | | | | $71,676,000 |
| **Total Annual Costs** | | | | | | **$105,144,000** |
| **UNIT COSTS (Until Amortized)** | | | | | | |
| Per Acre-Foot of treated water | | | | | | $526 |
| Per 1,000 Gallons | | | | | | $1.61 |
| **UNIT COSTS (After Amortization)** | | | | | | |
| Per Acre-Foot | | | | | | $358 |
| Per 1,000 Gallons | | | | | | $1.10 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## 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. 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 Toledo Bend system will reduce demands on Toledo Bend and the Sabine River 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 Lower Neches Valley recommended strategy to purchase water from the Sabine River Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 200,000 ac-ft per year |
| **Reliability** | 4 | Highly Reliable Supply |
| **Cost** | 4 | Low Cost |
| **Environmental Factors** | 4 | Low to Medium Impacts to the environment |
| **Impact on Other State Water Resources** | 4 | Low Impact |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No known Impacts |
| **Major Impacts on Key Water Quality Parameters** | 4 | No known Impacts |
| **Political Feasibility** | 4 | Local sponsorship by Lower Neches Valley Authority |
| **Implementation Issues** | 3 | Contract with SRA |

## REFERENCES

2011 East Texas Regional Water Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR LNVA PERMIT AMENDMENT

| | |
|---|---|
| **Water User Group Name:** | Lower Neches Valley Authority |
| **Strategy Name:** | Permit Amendment for Lake Sam Rayburn |
| **Strategy ID:** | LNVA-PA |
| **Strategy Type:** | Existing Surface Water Source |
| **Potential Supply Quantity:** | 28,000 ac-ft per year<br>(25 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020 |
| **Project Capital Cost:** | $0 (May 2015) |
| **Annual Cost:** | $0 |
| **Unit Water Cost (Rounded):** | $0 per ac-ft<br>($0 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is a recommended strategy for the Lower Neches Valley Authority to apply to the Texas Commission on Environmental Quality (TCEQ) for additional yield from Lake Sam Rayburn.

## SUPPLY DEVELOPMENT

The volume associated with this strategy is 28,000 ac-ft per year, beginning in 2020, and continuing through the planning period, 2070. The volume of water is the supply created by the Corps of Engineers when they raised the conservation pool from 164.0 ft msl to 164.4 ft msl in 1969. The reliability of this water supply is considered high because the firm yield of the lake allows for this permit amendment; however, the amendment is dependent upon decisions made by the TCEQ.

## ENVIRONMENTAL CONSIDERATIONS

The implementation of this strategy would not require construction of additional infrastructure; therefore, the environmental impacts associated with this projected are expected to be minimal. In addition, the project should have minimum impacts to environmental water needs and the surrounding habitat, and no impacts to cultural resources in the area are expected. There are no bays or estuaries in close proximity to Lake Sam Rayburn.

## PERMITTING AND DEVELOPMENT

The implementation of this strategy would not require additional infrastructure or studies. However, this permit amendment is dependent upon coordination with the TCEQ.

## PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) was not developed for this strategy because costs associated with the permit amendment are considered minimal. Any costs incurred by the Lower Neches Valley Authority will be related to engineering and lawyer fees.

## 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. An amendment to allow the Lower Neches Valley Authority to pull water from Lake Sam Rayburn will reduce demands on other water supplies in Jefferson County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this permit amendment for existing surface water supplies will be beneficial because it provides water for economic growth.

Based on the analyses provided above, the Lower Neches Valley Authority recommended strategy for a permit amendment was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 28,000 ac-ft per year |
| **Reliability** | 5 | Highly Reliable Supply |
| **Cost** | 5 | No Cost (Excluding Administrative and Lawyer Fees) |
| **Environmental Factors** | 4 | Low to Medium Impacts to the environment |
| **Impact on Other State Water Resources** | 4 | Low Impact |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No known Impacts |
| **Major Impacts on Key Water Quality Parameters** | 4 | No known Impacts |
| **Political Feasibility** | 4 | Sponsorship by Lower Neches Valley Authority |
| **Implementation Issues** | 4 | Limited risk; dependent on TCEQ |

## REFERENCES

2011 East Texas Regional Water Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR LNVA TRANSFER TO REGION H

| | |
|---|---|
| **Water User Group Name:** | Lower Neches Valley Authority |
| **Strategy Name:** | Transfer to Region H (Sam Rayburn) |
| **Strategy ID:** | LNVA-RGH |
| **Strategy Type:** | Existing Surface Water Source |
| **Potential Supply Quantity:** | 55,000 ac-ft per year<br>(44.6 MGD) |
| **Implementation Decade:** | 2040 |
| **Development Timeline:** | 2040 |
| **Project Capital Cost:** | $48,949,000 (September, 2013) |
| **Annual Cost:** | $23,905,000 |
| **Unit Water Cost (Rounded):** | $435 per ac-ft<br>($1.33 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is a recommended strategy for the Lower Neches Valley Authority to provide conveyance from their Sam Rayburn system to Irrigation customers located in Liberty County (Region H) and represents replacement water for the Devers Canal System from water sold to SJRA in the 1990s. Delivery will occur during the 6-month irrigation season. The cost for this project includes terminal storage and infrastructure related to water conveyance. Ultimately, individual irrigation water users will make contracts with the Lower Neches Valley Authority to purchase the water supply created by this project. The cost for raw water will need to be negotiated with the Lower Neches Valley Authority and will reflect the wholesale water rates of this entity 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 55,000 ac-ft per year beginning in 2040 and continuing through the end of the planning period, 2070. The reliability of this water supply is considered high due to the availability of water from the Sam Rayburn system.

## ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline and canal construction is expected to be moderate, but the conveyance of water from Sam Rayburn to Liberty County should have a minimum impact to environmental water needs in Jefferson County, 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 Liberty 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

The development of this strategy is dependent on the long term planning goals of the Lower Neches Valley Authority and irrigation customers in Liberty 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 8 miles of pipeline, 5 miles of canals (distances determined by the Lower Neches Valley Authority), one pump station with an intake, one booster pump station, and one ground storage tank. The annual cost was estimated assuming a debt service of 6% for 20 years. Overall, this strategy has a low cost compared to other strategies in the 2016 East Texas Regional Water Plan.

| | | | | | | |
|---|---|---|---|---|---|---|
| **WUG NAME:** | **Lower Neches Valley Authority** | | | | | |
| **STRATEGY:** | **Transfer to Region H (Sam Rayburn)** | | | | | |
| **Raw Water Quantity:** | **55,000** | AF/Y | | 49.1 | MGD | |
| **CAPITAL COSTS** | | | | | | |
| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | | **Cost** |
| Pipeline Rural | 54 in. | 42,240 | LF | $274 | | $11,558,000 |
| Canals Rural | 54 in. | 26,400 | LF | $383 | | $10,103,000 |
| Right of Way Easements Rural (ROW) | | 42,240 | LF | $26 | | $1,192,950 |
| Right of Way Easements Urban (ROW) | | 26,400 | LF | $154 | | $4,473,480 |
| Engineering and Contingencies (30%) | | | | | | $6,498,000 |
| **Subtotal of Pipeline/Canal** | **8** | **miles** | | | | **$33,825,000** |
| **Pump Station(s)** | | | | | | |
| Pump with intake | 4904 HP | 1 | LS | | $7,622,000 | $7,622,000 |
| Engineering and Contingencies (35%) | | | | | | $2,667,700 |
| **Subtotal of Pump Station(s)** | | | | | | **$10,290,000** |
| Storage Tanks | 6 MG | 1 | LS | | $2,078,705 | $2,078,705 |
| Engineering and Contingencies (35%) | | | | | | $727,547 |
| **Subtotal of Storage Tanks** | | | | | | **$2,806,000** |
| Permitting and Mitigation | | | | | | $373,000 |
| **Construction Total** | | | | | | **$47,294,000** |
| Interest During Construction | | | 12 | Months | | $1,655,000 |
| **TOTAL CAPITAL COST** | | | | | | **$48,949,000** |
| **ANNUAL COSTS** | | | | | | |
| Debt Service (5.5% for 20 years) | | | | | | $4,096,000 |
| Operational Costs* | | | | | | $19,809,000 |
| **Total Annual Costs** | | | | | | **$23,905,000** |
| **UNIT COSTS (Until Amortized)** | | | | | | |
| Per Acre-Foot of treated water | | | | | | $435 |
| Per 1,000 Gallons | | | | | | $1.33 |
| **UNIT COSTS (After Amortization)** | | | | | | |
| Per Acre-Foot | | | | | | $360 |
| Per 1,000 Gallons | | | | | | $1.11 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

This strategy benefits irrigation water users in eastern Liberty County who may become customers of the Lower Neches Valley Authority; this strategy is expected to have a positive impact on the water supply security of these future customers. In the future, this supply could also serve municipal and manufacturing demands in Liberty County. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. This project will reduce demands on water resources located in Liberty 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 Lower Neches Valley recommended strategy to transfer water to irrigation water users in Liberty County was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 55,000 ac-ft per year |
| **Reliability** | 4 | Highly Reliable Supply |
| **Cost** | 4 | Low Cost |
| **Environmental Factors** | 4 | Low to Medium Impacts to the environment |
| **Impact on Other State Water Resources** | 4 | Low Impact |
| **Threat to Agricultural Resources/Rural Areas** | 5 | No Negative Impacts (Benefits Agricultural Users) |
| **Interbasin Transfers** | | Yes |
| **Other Natural Resources** | 4 | No known Impacts |
| **Major Impacts on Key Water Quality Parameters** | 3 | Potential Impacts due to IBT |
| **Political Feasibility** | 4 | Sponsorship by Lower Neches Valley Authority |
| **Implementation Issues** | 3 | Potential implementation issues due to IBT |

## REFERENCES

Discussions with Lower Neches Valley Authority.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR LNVA CONSTRUCTED LEVY

| | |
|---|---|
| **Water User Group Name:** | Lower Neches Valley Authority |
| **Strategy Name:** | Constructed Levy |
| **Strategy ID:** | LNVA-JEFF |
| **Strategy Type:** | Existing Surface Water Source |
| **Potential Supply Quantity:** | 1,600 ac-ft per year<br>(0.7 MGD) |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2020 |
| **Project Capital Cost:** | $34,989,000 (September, 2013) |
| **Annual Cost:** | $3,055,000 |
| **Unit Water Cost (Rounded):** | $1,909 per ac-ft<br>($5.86 per 1,000 gallons) |

## PROJECT DESCRIPTION

This strategy is a recommended strategy for the Lower Neches Valley Authority to provide conveyance from their Sam Rayburn system to Irrigation customers located in Liberty County (Region H). The cost for this project includes terminal storage and infrastructure related to water conveyance. Ultimately, individual irrigation water users will make contracts with the Lower Neches Valley Authority to purchase the water supply created by this project. The cost for raw water will need to be negotiated with the Lower Neches Valley Authority and will reflect the wholesale water rates of this entity at the time a contract is made.

## SUPPLY DEVELOPMENT

As requested by the Lower Neches Valley Authority, the quantity of supply from this strategy represents a one day supply of all of their municipal and industrial customers in Jefferson County. This is equal to 1,600 ac-ft per year beginning in 2020 and continuing through the end of the planning period, 2070. The reliability of this water supply is considered high due to the availability of water from the Sam Rayburn system. In addition, the Lower Neches Valley Authority would be not be dependent on the sponsorship of another entity.

## ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to the installation of a terminal storage reservoir would be minimal. In addition, the project would have minimal to no impacts on environmental water needs in Jefferson County, the surrounding habitat, and the cultural resources in the area. There are no bays or estuaries in close proximity to the project area located in Jefferson County. However, 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

The development of this strategy is dependent on the long term planning goals of the Lower Neches Valley Authority.

## 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 a storage capacity of 500 million gallons and one pump station to fill the reservoir. The proposed reservoir capacity is equal to a 3-day supply of municipal and industrial customers in South Jefferson County. The annual cost was estimated assuming a debt service of 6% 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 2016 East Texas Regional Water Plan.

| | | | | | |
|---|---|---|---|---|---|
| **WUGNAME:** | **Lower Neches Valley Authority** | | | | |
| **STRATEGY:** | **Terminal Storage Reservoir in Jefferson County (Sam Rayburn)** | | | | |
| **Raw Water Quantity:** | **1,600** acre-feet | | | 521 MG | |
| **TERMINAL STORAGE RESERVOIR (1 day of storage = 521 MG)** | | | | | |
| **Construction** | | **Quantity** | **Unit** | **Unit Price** | **Cost** |
| Excavation | | 168,600 | CY | $5 | $860,000 |
| Compacted Fill | | 875,700 | CY | $8 | $7,181,000 |
| Gravel (Drain) | | 6,400 | CY | $103 | $658,000 |
| Soil Cement (1 foot) | | 92,600 | CY | $87 | $8,093,000 |
| Flex Road Base (8 inches) | | 3,400 | CY | $93 | $315,000 |
| HDPE Liner | | 2,482,000 | SF | $1 | $2,978,000 |
| Inlet and Outlet Structures | | 1 | LS | $1,540,000 | $1,540,000 |
| Electrical Building and Controls | | 1 | LS | $1,540,000 | $1,540,000 |
| Engineering and Contingencies (30%) | | | | | $6,950,000 |
| **Subtotal of Construction** | | | | | **$30,115,000** |
| **Pump Station(s)** | | | | | |
| Pump with intake | 932 HP | 1 | LS | $3,118,000 | $3,118,000 |
| Booster Pump Station | 0 HP | 0 | LS | $0 | $0 |
| Engineering and Contingencies (35%) | | | | | $1,091,300 |
| **Subtotal of Pump Station(s)** | | | | | **$4,209,300** |
| Permitting and Mitigation | | | | | $63,000 |
| **Construction Total** | | | | | **$34,387,300** |
| Interest During Construction | | | 6 | Months | $602,000 |
| **TOTAL CAPITAL COST** | | | | | **$34,989,000** |
| **ANNUAL COSTS** | | | | | |
| Debt Service (5.5% for 20 years) | | | | | $2,928,000 |
| Operational Costs* | | | | | $127,000 |
| **Total Annual Costs** | | | | | **$3,055,000** |
| **UNIT COSTS (Until Amortized)** | | | | | |
| Per Acre-Foot of treated water | | | | | $1,909 |
| Per 1,000 Gallons | | | | | $5.86 |
| **UNIT COSTS (After Amortization)** | | | | | |
| Per Acre-Foot | | | | | $86 |
| Per 1,000 Gallons | | | | | $0.26 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

This strategy benefits municipal and industrial customers of the Lower Neches Valley Authority 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. This project will have no impact to the demands on water resources in Jefferson County or to any other State water resources.

Based on the analyses provided above, the Lower Neches Valley recommended strategy to store water from their Sam Rayburn system in Jefferson County was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 1,600 ac-ft per year |
| **Reliability** | 4 | Highly Reliable Supply |
| **Cost** | 2 | Medium to High Cost |
| **Environmental Factors** | 4 | Low impacts to the environment from construction |
| **Impact on Other State Water Resources** | 4 | Low Impact |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No known Impacts |
| **Major Impacts on Key Water Quality Parameters** | 4 | No known Impacts |
| **Political Feasibility** | 1 | Sponsorship by Lower Neches Valley Authority |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

Discussions with Lower Neches Valley Authority.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR CITY OF LUFKIN

| | |
|---|---|
| **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:** | 28,000 ac-ft per year<br>(25 MGD) |
| **Implementation Decade:** | 2030 |
| **Development Timeline:** | 2030-2050 |
| **Project Capital Cost:** | Phase 1: $49,368,000<br>Phase 2: $37,863,000<br>Phase 3: $2,760,000 (September, 2013) |
| **Annual Cost:** | Phase 1: $12,503,000<br>Phase 2: $23,373,000<br>Phase 3: $22,797,000 |
| **Unit Water Cost (Rounded):** | Phase 1: $1,115 per ac-ft ($3.42 per 1,000 gallons)<br>Phase 2: $1,051 per ac-ft ($3.23 per 1,000 gallons)<br>Phase 3: $814 per ac-ft ($2.50 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 per year. 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 per year (10 MGD), 22,420 ac-ft per year (20 MGD) in 2040, and 28,000 ac-ft per year (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 6% for 20 years as well as electrical and operation and maintenance costs. Overall, this strategy has a low cost compared to other strategies in the 2016 East Texas Regional Water Plan.

| | | | | | |
|---|---|---|---|---|---|
| **PHASE 1 - 2030 DECADE** | | **Total Capacity (ac-ft per year)** | | | **11,210** |
| **Treated Water Quantity** | **11,210** | AF/Y | | **10** | MGD |
| **Pipeline & Treatment Facility** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
| Pipeline from Sam Rayburn | 36 in. | 65,500 | LF | $171 | $11,177,000 |
| Right of Way Easements Rural (ROW) | | 65,500 | LF | $26 | $1,849,870 |
| Engineering and Contingencies (30%) | | | | | $3,353,000 |
| **Subtotal of Pipeline** | **12.4** | **Miles** | | | **$16,379,870** |
| | | | | | |
| **Pump Station(s)** | | | | | |
| Lake Intake and Pump Station | 600 HP | 1 | LS | $2,454,000 | $2,454,000 |
| Booster Pump Station | 500 HP | 0 | LS | $3,607,000 | $0 |
| Engineering and Contingencies (35%) | | | | | $858,900 |
| **Subtotal of Pump Station(s)** | | | | | **$3,312,900** |
| | | | | | |
| **Water Treatment Facility** | | | | | |
| Storage | 5.00 MG | 1 | EA | $1,464,000 | $1,464,000 |
| Water Treatment Facility | 10 MGD | 1 | LS | $17,860,000 | $17,860,000 |
| Engineering and Contingencies (35%) | | | | | $6,763,400 |
| **Subtotal of WTP** | | | | | **$26,087,400** |
| | | | | | |
| **Permitting and Mitigation** | | | | | $358,133 |
| **CONSTRUCTION TOTAL** | | | | | **$46,138,000** |
| **Interest During Construction** | | | 24 | Months | $3,230,000 |
| **PHASE I TOTAL CAPITAL COST** | | | | | **$49,368,000** |
| | | | | | |
| Debt Service (5.5% for 20 years) | | | | | $4,131,000 |
| Debt Service from Previous Phase | | | | | $0 |
| Operational Costs* | | | | | $4,514,000 |
| **Total Annual Costs** | | | | | **$12,503,000** |

| | |
|---|---|
| **UNIT COSTS (Until Amortized)** | |
| Per Acre-Foot of treated water | $1,115 |
| Per 1,000 Gallons | $3.42 |
| **UNIT COSTS (After Amortization)** | |
| Per Acre-Foot | $747 |
| Per 1,000 Gallons | $2.29 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

| | | | | | | |
|---|---|---|---|---|---|---|
| **PHASE 2 - 2040 DECADE** | | **Total Capacity (ac-ft per year)** | | | **22,240** | |
| **Treated Water Quantity** | **11,210** | AF/Y | | | **10** | MGD |
| **Upgrades to Pump Stations** | | | | | | |
| Lake Intake and Pump Station | 600 HP | 1 | LS | $2,454,000 | | $2,454,000 |
| Booster Pump Station | 500 HP | 0 | LS | $3,607,000 | | $0 |
| Engineering and Contingencies (35%) | | | | | | $858,900 |
| **Subtotal of Pump Station(s)** | | | | | | **$3,312,900** |
| **Water Treatment Facility** | | | | | | |
| Storage | 0.00 MG | 0 | EA | $0 | | $0 |
| Upgrade Treatment Facility | 15 MGD | 1 | LS | $23,491,000 | | $23,491,000 |
| Engineering and Contingencies (35%) | | | | | | $8,221,850 |
| **Subtotal of WTP** | | | | | | **$31,712,850** |
| **Permitting and Mitigation** | | | | | | $360,409 |
| **CONSTRUCTION TOTAL** | | | | | | **$35,386,000** |
| **Interest During Construction** | | | | 24 | Months | $2,477,000 |
| **PHASE 2 TOTAL CAPITAL COST** | | | | | | **$37,863,000** |
| Debt Service (5.5% for 20 years) | | | | | | $3,168,000 |
| Debt Service from Previous Phase | | | | | | $4,131,000 |
| Operational Costs* | | | | | | $8,417,000 |
| **Total Annual Costs** | | | | | | **$23,373,000** |
| **UNIT COSTS (Until Amortized)** | | | | | | |
| Per Acre-Foot of treated water | | | | | | $1,051 |
| Per 1,000 Gallons | | | | | | $3.23 |
| **UNIT COSTS (After Amortization)** | | | | | | |
| Per Acre-Foot | | | | | | $723 |
| Per 1,000 Gallons | | | | | | $2.22 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

| | | | | | | |
|---|---|---|---|---|---|---|
| **PHASE 3 - 2050 DECADE** | **Total Capacity (ac-ft per year)** | | | | **28,000** | |
| **Treated Water Quantity** | **5,760** | AF/Y | | | **5** | MGD |
| **Pump Station(s)** | | | | | | |
| Lake Intake and Pump Station | 200 HP | 1 | LS | $1,666,000 | | $1,666,000 |
| Booster Pump Station | 500 HP | 0 | LS | $3,607,000 | | $0 |
| Engineering and Contingencies (35%) | | | | | | $583,100 |
| **Subtotal of Pump Station(s)** | | | | | | **$2,249,100** |
| **Water Treatment Facility** | | | | | | |
| Storage | 5.00 MG | 0 | EA | $1,464,000 | | $0 |
| Water Treatment Facility | 10 MGD | 0 | LS | $17,860,000 | | $0 |

| | | | |
|---|---|---|---|
| Engineering and Contingencies (35%) | | | $0 |
| **Subtotal of WTP** | | | **$0** |
| **Permitting and Mitigation** | | | $330,133 |
| **CONSTRUCTION TOTAL** | | | **$2,579,000** |
| **Interest During Construction** | 24 | Months | $181,000 |
| **PHASE 3 TOTAL CAPITAL COST** | | | **$2,760,000** |
| Debt Service (5.5% for 20 years) | | | $231,000 |
| Debt Service from Previous Phase | | | $3,168,000 |
| Operational Costs* | | | $9,776,000 |
| **Total Annual Costs** | | | **$22,797,000** |
| **UNIT COSTS (Until Amortized)** | | | |
| Per Acre-Foot of treated water | | | $814 |
| Per 1,000 Gallons | | | $2.50 |
| **UNIT COSTS (After Amortization)** | | | |
| Per Acre-Foot | | | $693 |
| Per 1,000 Gallons | | | $2.13 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## 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 (Strategy ID: ANGL-MFG1). 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 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 28,000 ac-ft per year |
| **Reliability** | 4 | Highly Reliable Supply |
| **Cost** | 3 | Medium Cost |
| **Environmental Factors** | 4 | Minimum to moderate impacts to the environment from construction |
| **Impact on Other State Water Resources** | 4 | Low Impact |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No known Impacts |
| **Major Impacts on Key Water Quality Parameters** | 4 | No known Impacts |
| **Political Feasibility** | 4 | Sponsorship by City of Lufkin |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

2011 East Texas Regional Water Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR NACOGDOCHES RAW WATER TRANSMISSION

| | |
|---|---|
| **Project Name:** | Lake Columbia to Nacogdoches Raw Water Transmission System |
| **Project ID:** | NACP-COL |
| **Project Type:** | Existing Surface Water Source |
| **Potential Supply Quantity (Rounded):** | 8,500 ac-ft per year<br>(7.6 MGD) |
| **Implementation Decade:** | 2030 |
| **Development Timeline:** | 2 years |
| **Project Capital Cost:** | $35,829,000 (Sept. 2013) |
| **Project Annual Cost:** | $5,995,000 (Sept. 2013) |
| **Unit Water Cost (Rounded):** | $705 per ac-ft (during loan period)<br>$2.16 (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 8,500 acre feet. It is assumed that the transmission strategy will be developed for a potential supply of 8,500 acre feet per year (7.6 MGD). 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.

## 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 and 4.5 miles of pipeline in rural areas. The transmission system cost estimate also includes the cost of 400 HP intake pump station and a 12 MGD water treatment plant for treating the raw water. The annual costs are calculated assuming 5.5% interest rate and 20 years of return period. The estimate includes the cost for the purchase of raw water from Angelina Neches River Authority.

**WWP NAME:** **Nacogdoches**
**STRATEGY:** **Lake Columbia Transmission System**

**Quantity:** **8,500** AF/Y 11.37 MGD

**CAPITAL COSTS**

| **Pipeline to Lake Nacogdoches** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
|---|---|---|---|---|---|
| Pipeline Rural | 30 in. | 18,117 | LF | $137 | $2,488,000 |
| Right of Way Easements Rural (ROW) | | 18,117 | LF | $16 | $311,410 |
| Engineering and Contingencies (30%) | | | | | $746,000 |
| **Subtotal of Pipeline** | | | | | **$3,545,410** |
| **Pump Station(s)** | | | | | |
| Pump with intake & building | 344 HP | 1 | LS | $2,048,000 | $2,048,000 |
| Booster Pump Station | 0 HP | 1 | LS | $0 | $0 |
| Engineering and Contingencies (35%) | | | | | $716,800 |
| **Subtotal of Pump Station(s)** | | | | | **$2,764,800** |
| | | | | | |
| **Water Treatment Facility** | | | | | |
| Expand Existing Water Treatment Plant | 11 MGD | 1 | LS | $19,363,000 | $19,363,000 |
| Storage Tanks | 1.42 MG | 1 | LS | $665,000 | $665,000 |
| Engineering and Contingencies (35%) | | | | | $7,009,800 |
| **Subtotal of WTP** | | | | | **$27,037,800** |
| | | | | | |
| Permitting and Mitigation | | | | | $136,529 |
| **Construction Total** | | | | | **$33,485,000** |
| Interest During Construction | | | 24 | Months | $2,344,000 |
| **TOTAL COST** | | | | | **$35,829,000** |

**ANNUAL COSTS**

| | |
|---|---|
| Debt Service (5.5% for 20 years) | $2,998,000 |
| Operational Costs* | $2,997,000 |
| **Total Annual Costs** | **$5,995,000** |

**UNIT COSTS (Until Amortized)**

| | |
|---|---|
| Per Acre-Foot of treated water | $705 |
| Per 1,000 Gallons | $2.16 |

**UNIT COSTS (After Amortization)**

| | |
|---|---|
| Per Acre-Foot | $353 |
| Per 1,000 Gallons | $1.08 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

Based on the analysis provided above, the Lake Columbia to Nacogdoches Raw Water Transmission System project was evaluated across eleven 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** | 4 | 8,500 ac-ft per year |
| **Reliability** | 4 | Highly Reliable Supply |
| **Cost** | 3 | Medium Cost |
| **Environmental Factors** | 4 | Low Impacts |
| **Impact on Other State Water Resources** | 4 | Low Impact |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No known Impacts |
| **Major Impacts on Key Water Quality Parameters** | 4 | No known Impacts |
| **Political Feasibility** | 4 | City of Nacogdoches is the local sponsor |
| **Implementation Issues** | 3 | Dependent on the completion of Lake Columbia project |

## REFERENCES

2011 East Texas Regional Water Plan

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS
# TECHNICAL MEMORANDUM FOR CITY OF PORT ARTHUR CONSERVATION

| | |
|---|---|
| **Project Name:** | City of Port Arthur – Municipal Conservation |
| **Project ID:** | PORT-CONS |
| **Project Type:** | Conservation |
| **Potential Supply Quantity (Rounded):** | 10,340 ac-ft per year |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 1 years |
| **Project Capital Cost:** | $50,075,000 (Sept. 2013) |
| **Unit Water Cost (Rounded):** | $333 per ac-ft (during loan period)<br>$1.02(per 1,000 gallons) |

## PROJECT DESCRIPTION

The City provides treated water to municipal users both inside and outside their city limits and industrial users including Cheniere LNG and Motiva Enterprises. Port Arthur is not projected to have a water shortage within the planning period. However, the City had an average per capita consumption of 320 gpcd in 2011. This value is well over the statewide goal of 140 gpcd. In addition, their 2013 Water Loss Report submitted to the TWDB had a total percent loss of over 66%. After performing a conservation analysis, the ETRWPG believes a water conservation strategy for the City is economically achievable. The recommended water management strategy for Port Arthur is water conservation, which includes planning level opinion of probable construction cost estimates related to enhanced public and school education, water conservation pricing implementation, and an enhanced water loss control program.

## SUPPLY DEVELOPMENT

The supply for this strategy represents conservation savings due to enhanced public and school education, water conservation pricing implementation, and an enhanced water loss control program.

## ENVIRONMENTAL CONSIDERATIONS

No environmental considerations associated with this strategy.

## PERMITTING AND DEVELOPMENT

No additional permitting required for this strategy

## PLANNING LEVEL OPINION OF COST

The planning level opinion of cost (PLOC) for this strategy includes no capital costs; the annual cost for this strategy is $2,150,000. The unit cost is $333 per ac-ft of supply and $1.02 per 1,000 gallons of supply.

## PROJECT EVALUATION

Based on the analysis provided above, the City of Port Arthur Municipal Conservation project was evaluated across eleven 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** | 4 | 10,340 ac-ft per year |
| **Reliability** | 4 | Reliable Supply |
| **Cost** | 4 | Low Cost |
| **Environmental Factors** | 4 | Low Impacts |
| **Impact on Other State Water Resources** | 4 | Low Impact |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No known Impacts |
| **Major Impacts on Key Water Quality Parameters** | 4 | No known Impacts |
| **Political Feasibility** | 4 | City of Port Arthur is the local sponsor |
| **Implementation Issues** | 4 | No known risks |

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS
# TECHNICAL MEMORANDUM FOR SRA TOLEDO BEND PERMIT AMENDMENT

| | |
|---|---|
| **Project Name:** | Sabine River Authority – Toledo Bend Permit Amendment |
| **Project ID:** | SRA-TB |
| **Project Type:** | New Surface Water Source |
| **Potential Supply Quantity (Rounded):** | 293,300 ac-ft per year |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 1 years |
| **Project Capital Cost:** | $0 (Sept. 2013) |
| **Unit Water Cost (Rounded):** | $0 per ac-ft (during loan period)<br>$0 (per 1,000 gallons) |

## PROJECT DESCRIPTION

To support the increased use of water from Toledo Bend reservoir, the SRA has submitted a permit amendment to TCEQ to fully utilize Texas' share of the reservoir's firm yield. The application requested an additional 293,300 ac-ft per year of supply based on the TCEQ-approved Sabine River Basin WAM. The application has been declared administratively complete and TCEQ is currently reviewing the permit request. For planning purposes, the supply available from the permit amendment is based on the unpermitted yield for Toledo Bend as determined by the Sabine WAM that was used for regional water planning. The actual amount will be determined through the permitting process.

## SUPPLY DEVELOPMENT

The volume associated with this strategy is the amount SRA is planning to request from Toledo Bend Reservoir. Water Availability Modeling using Sabine WAM (without environmental flows) has indicated that the actual supplies available are less than the amount requested for the permit. The actual supplies are approximately 215,300 ac-ft per year in 2020, reducing to 195,000 ac-ft per year due to sedimentation issues.

## ENVIRONMENTAL CONSIDERATIONS

The implementation of this strategy would not require construction of additional infrastructure; therefore, the environmental impacts associated with this projected are expected to be minimal. In addition, the project should have minimum impacts to environmental water needs and the surrounding habitat, and no impacts to cultural resources in the area are expected.

## PERMITTING AND DEVELOPMENT

The implementation of this strategy would not require additional infrastructure or studies. However, this permit amendment is dependent upon coordination with the TCEQ.

## PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) was not developed for this strategy because costs associated with the permit amendment are considered minimal. Any costs incurred by the Lower Neches Valley Authority will be related to engineering and lawyer fees.

## PROJECT EVALUATION

This strategy benefits both municipal and non-municipal customers of the Sabine River 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. An amendment to allow the Sabine River Authority to pull water from Toledo Bend Reservoir will reduce demands on other water supplies in the region and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this permit amendment for existing surface water supplies will be beneficial because it provides water for economic growth.

Based on the analyses provided above, the Sabine River Authority recommended strategy for a permit amendment was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 293,300 ac-ft per year |
| **Reliability** | 3 | Moderately Reliable Supply |
| **Cost** | 5 | No Cost (Excluding Administrative and Lawyer Fees) |
| **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 |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No known risks |
| **Major Impacts on Key Water Quality Parameters** | 4 | No known risks |
| **Political Feasibility** | 5 | Sabine River Authority is the local sponsor |
| **Implementation Issues** | 3 | Permit Approval by TCEQ |

## REFERENCES

2011 East Texas Regional Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR SRA PUMP STATION

| | |
|---|---|
| **Project Name:** | Sabine River Authority – Pump Station |
| **Project ID:** | SRA-PS |
| **Project Type:** | Existing Surface Water Source |
| **Potential Supply Quantity (Rounded):** | 89,680 ac-ft per year |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 2 years |
| **Project Capital Cost:** | $72,832,675 (Sept. 2013) |
| **Unit Water Cost (Rounded):** | $812.2 per ac-ft |

## PROJECT DESCRIPTION

SRA is also considering another water management strategy for a new raw water Pump Station. SRA intends to construct a new raw water Pump Station along the Sabine River, approximately 7 miles upstream of the existing raw water pump station. A water management strategy for developing the raw water Pump Station infrastructure is included in the list of strategies for SRA. The infrastructure improvements will include a 80 MGD raw water intake Pump Station, settling basin for the Sabine River supplies, and pipeline connecting the proposed Pump Station to the existing SRA canal system.

## SUPPLY DEVELOPMENT

Additional supply available from this water management strategy is approximately 89,680 ac-ft per year. The implementation of this strategy restores access to SRA's supplies from Toledo Bend.

## ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be moderate. The strategy will have minimum impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. Before this project could be pursued, Sabine River Authority would need to perform a site selection study to identify environmental impacts associated with the project.

## PERMITTING AND DEVELOPMENT

No known issues identified.

## PLANNING LEVEL OPINION OF COST

A detailed cost estimate was provided by SRA based on a detailed preliminary engineering study that was conducted for the Sabine River pump station and pipelines associated with this strategy. The recommended infrastructure configuration assumes construction of a pump station structure capable of future expansion by addition of pumps. The pump station, pipeline, and intake structure will contain enough capacity for potential transfer of Toledo Bend supplies to Jefferson County. An 80 MGD pump station with structure constructed for 285 MGD, a 72-inch pipeline and power supply to accommodate 285 MGD were considered for the cost estimate.

- Pump Station Cost - $27,729,100
- Pipeline Cost - $45,103,575
- Total Construction Cost - $72,832,675

## PROJECT EVALUATION

This strategy benefits both municipal and non-municipal customers of the Sabine River 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. Infrastructure Improvements will allow the Sabine River Authority to pull water from Toledo Bend Reservoir, will reduce demands on other water supplies in the region, and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this infrastructure improvement strategy allows better access to existing surface water supplies and will be beneficial to the region because it provides water for economic growth.

Based on the analyses provided above, the Sabine River Authority recommended strategy for infrastructure improvements was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

| Criteria | Rating | Explanation |
|---|---|---|
| **Quantity** | 4 | 89,680 ac-ft per year |
| **Reliability** | 4 | Reliable Supply |
| **Cost** | 3 | Medium Cost |
| **Environmental Factors** | 4 | Low Impacts |
| **Impact on Other State Water Resources** | 4 | Low Impact |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No known Impacts |
| **Major Impacts on Key Water Quality Parameters** | 4 | No known Impacts |
| **Political Feasibility** | 5 | Sabine River Authority is the local sponsor. |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

Discussions with Sabine River Authority.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR CITY OF TYLER LAKE PALESTINE EXPANSION

| | |
|---|---|
| **Project Name:** | City of Tyler – Lake Palestine Expansion |
| **Project ID:** | TYLR-PAL |
| **Project Type:** | Existing Surface Water Source |
| **Potential Supply Quantity (Rounded):** | 16,815 ac-ft per year |
| **Implementation Decade:** | 2020 |
| **Development Timeline:** | 1 years |
| **Project Capital Cost:** | $93,050,000 (Sept. 2013) |
| **Project Annual Cost:** | $15,135,000 (Sept. 2013) |
| **Unit Water Cost (Rounded):** | $900 per ac-ft (during loan period)<br>$2.76 (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 Inc., 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 2016 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 2030, 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 per year 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. The reliability of this water supply is not considered high due to reduction in Lake Palestine yield due to sedimentation issues.

## 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 5.5% for 20 years as well as electrical and operation and maintenance costs. Overall, this strategy has a low cost compared to other strategies in the 2016 East Texas Regional Water Plan.

| | | | | | |
|---|---|---|---|---|---|
| **WWP NAME:** | **City of Tyler** | | | | |
| **STRATEGY:** | **Lake Palestine Expansion** | | | | |
| | | | 30 | | |
| **Quantity:** | **16,815** AF/Y | | MGD | | |
| **CAPITAL COSTS** | | | | | |
| **Pipeline** | **Size** | **Quantity** | **Unit** | **Unit Price** | **Cost** |
| Pipeline Rural | 36 in. | 23,400 | LF | $171 | $3,993,000 |
| Pipeline Urban | 36 in. | 3,000 | LF | $239 | $718,000 |
| Right of Way Easements Rural (ROW) | | 23,400 | LF | $26 | $660,880 |
| Right of Way Easements Urban (ROW) | | 3,000 | LF | $154 | $508,310 |
| Engineering and Contingencies (30%) | | | | | $1,413,000 |
| **Subtotal of Pipeline** | | | | | **$7,293,190** |
| | | | | | |
| **Pump Station(s)** | | | | | |
| Ground Storage Tanks | 1.88 MG | 1 | LS | $771,000 | $771,000 |
| Booster Pump Station | 1400 HP | 1 | LS | $7,173,000 | $7,173,000 |
| Engineering and Contingencies (35%) | | | | | $2,780,400 |
| **Subtotal of Pump Station(s)** | | | | | **$10,724,400** |
| | | | | | |
| **Water Treatment Facility** | | | | | |
| Expand Water Treatment Plant | 30 MGD | 1 | LS | $53,135,000 | $53,135,000 |
| Engineering and Contingencies (35%) | | | | | $18,597,250 |
| **Subtotal of WTP** | | | | | **$71,732,250** |
| | | | | | |
| Permitting and Mitigation | | | | | $153,000 |
| **CONSTRUCTION TOTAL** | | | | | **$89,903,000** |
| Interest During Construction | | | 12 | Months | $3,147,000 |
| **TOTAL COST** | | | | | **$93,050,000** |
| | | | | | |
| Debt Service (5.5% for 20 years) | | | | | $7,786,000 |
| Operational Costs* | | | | | $7,349,000 |
| **Total Annual Costs** | | | | | **$15,135,000** |
| | | | | | |
| **UNIT COSTS (Until Amortized)** | | | | | |
| Per Acre-Foot of treated water | | | | | $900 |
| Per 1,000 Gallons | | | | | $2.76 |

**UNIT COSTS (After Amortization)**

| | |
|---|---|
| Per Acre-Foot | $780 |
| Per 1,000 Gallons | $2.40 |

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

## PROJECT EVALUATION

Based on the analysis provided above, the City of Tyler Lake Palestine Expansion project was evaluated across eleven 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** | 4 | 16,815 ac-ft per year |
| **Reliability** | 4 | Moderately Reliable Supply |
| **Cost** | 3 | Medium Cost |
| **Environmental Factors** | 4 | Low Impacts |
| **Impact on Other State Water Resources** | 4 | Low Impact |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No known Impacts |
| **Major Impacts on Key Water Quality Parameters** | 4 | No known Impacts |
| **Political Feasibility** | 3 | City of Tyler is the local sponsor |
| **Implementation Issues** | 4 | No known risks |

## REFERENCES

2011 East Texas Regional Water Plan.

# ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS
# TECHNICAL MEMORANDUM FOR UNRMWA RUN-OF-RIVER SUPPLIES

| | |
|---|---|
| **WMS Name:** | Neches River Run-of-River Diversion |
| **WMS Project ID:** | UNM-ROR |
| **WMS Type:** | New Surface Water Source |
| **Potential Supply Quantity (Rounded):** | 68,625 ac-ft/yr (61.2 MGD) |
| **Implementation Decade:** | 2020 (2020) |
| **Development Timeline:** | 2-4 years |
| **Strategy Capital Cost:** | $444,085,000 (Sept. 2011) |
| **Strategy Annual Cost:** | $41,285,000 (Sept 2011) |
| **Unit Water Cost (Rounded):** | $1.85 per 1,000 gallons (during loan period) |

## STRATEGY DESCRIPTION

Lake Fastrill was a recommended water management strategy for Upper Neches River MWA in the approved *2006 ETRWPA Water Plan* and the *2007 State Water Plan* and was designated by the Texas Legislature as a unique site for reservoir development. The lake was intended to meet projected water supply needs for the Dallas and water user groups in Anderson, Cherokee, Henderson, and Smith counties in Region I. A decision of the United States Supreme Court on February 22, 2010 not to hear the appeals of the State of Texas and Dallas has effectively supported the creation of the Neches River National Wildlife Refuge (NRNWR) and rendered the development of Lake Fastrill extremely unlikely.

The Neches Run-of-the-River Diversion strategy is one potential alternative to Lake Fastrill and recommended strategy for Upper Neches River MWA in the 2016 ETRWPA Regional Plan. It would involve run-of-the-river diversions from the Neches River in Anderson and Cherokee Counties downstream of Lake Palestine and the Neches River National Wildlife Refuge and upstream of the Weches Dam site. The run-of-the-river diversions would be subject to senior water rights and environmental flow restrictions and would not be available at all times. Hence, the run-of-the-river project would include one or more "off-channel" storage reservoirs located on tributaries of the Neches River in Anderson and Cherokee counties which would be refilled during periods when water is available for diversion from the Neches River.

Using the run-of-river diversions operated as a system with Lake Palestine is the recommended strategy. Run-of-river diversions operated as a system with off-channel tributary storage and as conjunctive use along with groundwater are proposed as alternative strategies. All the potentially feasible WMSs for UNRMWA and City of Dallas are discussed in the 2015 Report *Upper Neches River Water Supply Project Feasibility Study.*

It was stated in the feasibility study that "The selected Upper Neches Project strategy includes a new river intake and pump station for a run-of-river diversion from the Neches River near the SH 21 crossing. Facilities include a small diversion dam on the Neches River, a river intake and pump station, and a transmission pipeline and booster pump station with delivery to the IPL pump station site near Lake Palestine." It is anticipated that this project will be online by 2060 and will provide 62 MGD (68,625

acre-feet/year) of supply. Hence, the run-of-river project would be operated as a system with Lake Palestine using available storage capacity therein during drought.

## STRATEGY DEVELOPMENT

Neches Run-of-River Diversions with Lake Palestine (Recommended). This recommended strategy includes run-of-river diversions near SH 21 on Neches River operated as a system with storage in Lake Palestine. UNRMWA will be the project sponsor for this WMS. . 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. New facilities required for this WMS 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.

The feasibility report includes multiple infrastructure alternatives for the recommended strategy, each resulting in a different amount of firm yield at Lake Palestine. It should be noted that the project configuration for the recommended WMS for UNRMWA in the 2016 ETRWPA Regional Plan is different from the configuration discussed in Dallas' October 2014 *Draft Long Range Water Supply Plan* (Draft LRWSP). The project configuration discussed in the City of Dallas Draft LRWSP resulted in a firm yield of 47,250 ac-ft per year (42 MGD) that is projected to meet Dallas needs starting 2060, whereas the project configuration developed for UNRMWA in the 2016 ETRWPA Regional Plan resulted in a firm yield of 68,625 ac-ft per year (61.2 MGD) and it is projected to meet both Dallas demands and the ETRWPA water needs. The unit cost of this strategy is approximately $602/acft/yr during the debt service period.

Neches Run-of-River Diversions with Tributary Storage (Alternative). The first alternate strategy for DWU includes new run-of-river diversions from the Neches River segment between the existing Rocky Point diversion dam and the Weches dam site with storage in a new tributary or off-channel reservoir. This alternative strategy includes system operations with Lake Palestine. System operations of this alternate strategy with Lake Palestine could result in a firm yield of 75,000 acft/yr (67 MGD) at a unit cost of $434/acft/yr during the debt service period. Facilities for implementation of this WMS include a small diversion dam on the Neches River, a high capacity river intake pump station, a transmission pipeline to the reservoir, and a tributary or off-channel reservoir. The interruptible run-of-river diversions will be backed up using stored water in the tributary or off-channel reservoir. Run-of-river diversions and any impoundment of local runoff in a tributary or off-channel reservoir are subject to inflow passage for senior water rights and environmental protection.

Neches Run-of-River Diversions with Groundwater (Alternative). A conjunctive use WMS is the second proposed alternative strategy for DWU. The WMS includes new run-of-river diversions from the Neches River segment between the existing Rocky Point diversion dam and the Weches dam site with groundwater supplies from new wells in Carrizo, Wilcox, and Queen City aquifers in Anderson and Cherokee Counties. System operations of this alternate strategy with Lake Palestine could result in a firm yield of 84,875 acft/yr (76 MGD) at a unit cost of $414/acft/yr during the debt service period. This alternative strategy includes system operations with Lake Palestine. New facilities for the implementation of this WMS include a small diversion dam on the Neches River, a river intake and pump station, wells located on properties controlled by Campbell Timberland Management, LLC and Forestar (USA) Real Estate Group, Inc., and a transmission system for the delivery of the supplies to the potential customers.

The interruptible run-of-river supplies will be backed up using groundwater delivered to the run-of-river diversion point using bed and banks of the Neches River and several tributary streams. The run-of-river diversions are subject to inflow passage for senior water rights and environmental protection, but the groundwater supplies are not.

## SUPPLY DEVELOPMENT

Availability of the Run-of-River supplies was determined using the Neches Basin Water Availability Model and reported in the 2014 Report *Upper Neches River Water Supply Project Feasibility Study.*

## PERMITTING AND DEVELOPMENT

The Neches River Run-of-the-River Diversion would require a new water rights permit and an interbasin transfer permit.

### Cost Analysis

The cost estimates for the Run-of-River strategy were obtained from the 2014 Report *Upper Neches River Water Supply Project Feasibility Study.* Additional details of the cost estimates can be obtained from the report.

## WATER MANAGEMENT STRATEGY EVALUATION

Based on the analysis provided above, the Neches River Run-of-the-River Diversion strategy was evaluated across eleven different criteria for the purpose of quick comparison against alternative strategies 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** | 4 | 68,625 ac-ft per year |
| **Reliability** | 4 | Reliable Supply |
| **Cost** | 3 | Low – Medium Cost |
| **Environmental Factors** | 3 | Medium Impacts |
| **Impact on Other State Water Resources** | 4 | Low Impacts |
| **Threat to Agricultural Resources/Rural Areas** | 4 | Low Impacts |
| **Interbasin Transfers** | | No |
| **Other Natural Resources** | 4 | No known Impacts |
| **Major Impacts on Key Water Quality Parameters** | 4 | No known Impacts |
| **Political Feasibility** | 3 | UNRMWA is the local sponsor for this strategy |
| **Implementation Issues** | 2 | Need to secure the run-of-river rights |

## WATER USER GROUP APPLICATION

The Neches River Run-of-the-River Diversion strategy was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the strategy as well as other factors that may relate to the auditability of the strategy to the WUGs served.

## REFERENCES

Discussions with Upper Neches River Municipal Water Authority.

# Appendix 5B-B

# Quantification of Environmental Impacts of Water Management Strategies and Strategy Evaluation Matrix

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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 (WMS) for development of the 2016 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, Wholesale water providers (WWP) supplies and existing contracts were reviewed to determine the needs. Appropriate WMSs were developed for the WWPs to address the needs. In some cases, WMSs were developed for WUGs and WWPs that wanted to increase their system reliability and develop additional supplies even if there was no immediate need.

The viability of the WMS for a given WUG or WWP was determined by using the following considerations:

- Is it preferable to identify a groundwater or surface water or reuse or demand reduction strategy for the WUG/WWP?
- Does this strategy alone meet the entire need for the WUG/WWP or does it need to be paired with other strategy?
- Is the strategy within the reasonable proximity to the location of the water need?
- Is this the most preferred strategy for the WUG/WWP?
- Is the unit cost supportable by the WUG/WWP?

- Are there any flaws identified with the implementation or formulation of the strategy for the WUG/WWP?

After the strategies are developed based on the initial screening process, each WMS was evaluated based on the matrix criteria listed below. Each WMS was given a score from one to five for each analysis criterion and a matrix of rated WMS was developed. The analysis criteria include the following:

- 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

Included below is a discussion of the analysis criterion. A summary of the scoring used for ranking the strategies for each one of the criterion in the evaluation matrix is included in Table 5B-B.2. The evaluation matrix with the ranks for the WMSs is included in Table 5B-B.3.

**Quantity** is evaluated and scored based on the percentage of the WUG/WWP need the given WMS is expected to meet.

**Reliability** is evaluated based on the potential for the water to be available during drought. Strategies in which there is considerable competition for water or temporary supplies are rated as low reliability. Strategies that use water from a source that would not

exceed 90% of available supply is rated as medium reliability. Strategies that use water from a source that would not exceed 80% of available supply is rated as high reliability. The reliability ranges are presented in Table 5B-B.2.

**Cost** is evaluated based on the gradation of the unit cost for the given WMS compared to the range defining the scores 1 to 5. The ranges are presented in Table 5B-B.2 below.

**Environmental impacts** from the WMS to the existing conditions were quantified using the environmental matrix to determine the score of the 'Environmental Factors' category on the Evaluation Matrix. Each category is quantitatively assessed and assigned a ranking from 1 to 5. The Overall Environmental Impacts column averages all of the rankings assigned to the strategy. This value is also illustrated in the Evaluation Matrix as the Environmental Factors rank. Table 5B-B.1 shows the correlation between the rank assigned within each category. The Environmental Matrix takes into consideration the following categories:

- Total Acres Impacted
- Total Wetland Acres Impacted
- Environmental Water Needs
- Habitat
- Threatened and Endangered Species
- Cultural Resources
- Bays & Estuaries

**Table 5B-B.1 - Environmental Matrix Category Ranking Correlation**

| Rank | Acres Impacted | Threatened and Endangered Species | All Remaining Categories |
|---|---|---|---|
| 1 | Greater than 500 Acres and/or Wetlands | Greater than 20 | High Impact |
| 2 | 100-500 Acres | Between 15-20 | Medium Impact |
| 3 | 50-100 Acres | Between 10-15 or 'varies' | Low Impact |
| 4 | 0-50 Acres | Between 5-10 | No Impact to Low Impact |
| 5 | None | Between 0-5 (or n/a) | No Impact |

**Acres 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):

- 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

**Wetland Acres** refers to the number of acres that are classified as wetlands are impacted by implementation of the strategy. The only strategy 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. It was conservatively assumed that majority of the strategies will have a low impact on the environmental water needs (unless more detailed information was available).

**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. It was assumed that strategies with less than 100 acres impacted will have a low impact and strategies above 100 acres impacted will have a medium impact.

**Threatened and Endangered Species** refers to how the strategy will 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
- 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. It was conservatively assumed that all strategies implementing infrastructure will have a low impact on cultural resources.

**Bays and Estuaries** Impact to Bays and Estuaries (if any) due to the WMSs was identified and quantified accordingly.

**Threat to Agricultural Resources/Rural Areas** is quantified based on the impacts to water supplies to these users. If a strategy will reduce the available water to agricultural or rural areas by the greater of 10% current use or 5,000 ac-ft/yr, the strategy is determined to have high impacts. If the entity already holds water rights for the strategy, the impacts would be low.

**Interbasin Transfer** is quantified by means of a yes or no qualifier. If there is an interbasin transfer triggered because of the WMS then the impact is quantified as a “yes” and if there is no interbasin transfer triggered, then the impact is quantified as a “no”.

**Other Natural Resources** is quantified based on the impact of the WMS to other natural resources in the region. If the strategy significantly alters the natural condition of other resources, the strategy is determined to have high impacts. If the strategy does not alter the natural condition of other resources, the strategy is determined to have no impacts.

**Major Impacts on Key Water Quality Parameters** is quantified based on the impact that the implementation of the strategy will have on the area's applicable water quality.

**Political Feasibility** evaluates the local preference and likelihood for public support or opposition created by the WMS. This evaluation also takes into consideration if a local sponsor is identifiable and committed to implementing the WMS.

**Implementation Issues** evaluates the potential for factors such as permitting and land acquisition to affect the WMS. 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.

## Table 5B-B.2 – ETRWPA WMS Evaluation Matrix Rating Criteria

| Category | Rating Criteria | | | | |
|---|---|---|---|---|---|
| | 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) | $1,000 to $5,000/ac-ft (Medium-High) | $500 to $1,000/ac-ft (Medium) | $0 to $500/ac-ft (Low) | No Cost |
| **Environmental Factors** | Significant Negative Impacts | Medium Negative Impacts | Low Negative Impacts | Low Negative Impacts/Some Positive Impacts | High Positive Impacts |
| **Impact on Other State Water Resources** | Significant Negative Impacts | Medium Negative Impacts | Low Negative Impacts | Low Negative Impacts/Some Positive Impacts | High Positive Impacts |
| **Threat to Agricultural Resources/Rural Areas** | Significant Negative Impacts | Medium Negative Impacts | Low Negative Impacts | Low Negative Impacts/Some Positive Impacts | High Positive Impacts |
| **Interbasin Transfers** | Yes/No | | | | |
| **Other Natural Resources** | Significant Negative Impacts | Medium Negative Impacts | Low Negative Impacts | Low Negative Impacts/Some Positive Impacts | High Positive Impacts |
| **Major Impacts on Key Water Quality Parameters** | Significant Negative Impacts | Medium Negative Impacts | Low Negative Impacts | Low Negative Impacts/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 High Implementation Issues | Low Implementation Issues | Low Implementation Issues | Low to No Implementation Issues |

**Table 5B-B.3 – ETRWPA WMS Evaluation Matrix Rankings for Recommended and Alternative Water Management Strategies (Alternative strategies are identified in italics)**

| Number | County | Entity | Basin Used | Strategy | Strategy Key | Quantity (Ac-Ft/Yr) | Quantity | Reliability | Cost ($/Ac-Ft) | Cost | Impacts of Strategy on: | | | | | | Political Feasibility | Implementation Issues |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Environmental Factors | Water Resources and Other WMS | Agricultural Resources/ Rural Areas | Interbasin Transfers | Other Natural Resources | Key Water Quality Parameters | | |
| # | Name | Name(s) | Name | Name | Name | (Ac-Ft/Yr) | (1-5) | (1-5) | $ | (1-5) | (1-5) | (1-5) | (1-5) | | (1-5) | (1-5) | (1-5) | (1-5) |
| 1 | Anderson | Steam Electric Power | Neches | Purchase from City of Palestine | AND-SEP1 | 23,669 | 3 | 4 | $522 | 3 | 4 | 4 | 4 | No | 4 | 4 | 1 | 4 |
| 2 | Angelina | Manufacturing | Neches | Purchase from Lufkin | ANGL-MFG | 17,195 | 4 | 5 | $326 | 4 | 4 | 4 | 4 | No | 4 | 4 | 1 | 4 |
| 3 | Angelina | Mining | Neches | Purchase from ANRA | ANGL-MIN | 573 | 4 | 3 | $1,644 | 2 | 4 | 4 | 4 | No | 4 | 4 | 1 | 4 |
| 4 | Cherokee | Alto Rural WSC | Neches | New wells in Carrizo-Wilcox Aquifer | CHER-ALT | 250 | 4 | 4 | $1,212 | 2 | 4 | 4 | 4 | No | 4 | 4 | 3 | 4 |
| 5 | Cherokee | Mining | Neches | Purchase from ANRA | CHER-MIN | 250 | 4 | 4 | $2,560 | 2 | 4 | 4 | 4 | No | 4 | 4 | 3 | 4 |
| 6 | Cherokee | Steam Electric Power | Neches | Purchase from ANRA | CHER-SEP | 20,000 | 4 | 4 | $1,056 | 2 | 4 | 4 | 4 | No | 4 | 4 | 3 | 4 |
| 7 | Henderson | Chandler | Neches | Purchase from City of Tyler | HDSN-CHN | 350 | 4 | 4 | $863 | 3 | 4 | 4 | 4 | No | 4 | 4 | 3 | 4 |
| 8 | Houston | Irrigation | Neches | New wells in Yegua-Jackson Aquifer | HOUS-IRR | 2,340 | 4 | 4 | $704 | 3 | 4 | 4 | 5 | No | 4 | 4 | 1 | 4 |
| 9 | Jasper | Manufacturing | Neches | Purchase from LNVA | JASP-MFG | 8,420 | 4 | 4 | $720 | 3 | 4 | 4 | 4 | No | 4 | 4 | 1 | 4 |
| 10 | Jefferson | County-Other | Neches | Purchase from LNVA | JEFF-CTR | 3,413 | 4 | 4 | $739 | 3 | 4 | 4 | 4 | No | 4 | 4 | 1 | 4 |
| 11 | Jefferson | Manufacturing | Neches | Purchase from LNVA | JEFF-MFG | 309,322 | 4 | 4 | $452 | 4 | 4 | 4 | 4 | No | 4 | 4 | 1 | 4 |
| 12 | Jefferson | Steam Electric Power | Neches | Purchase from LNVA | JEFF-SEP | 30,839 | 4 | 4 | $507 | 4 | 4 | 4 | 4 | No | 4 | 4 | 1 | 4 |
| 13 | Nacogdoches | County-Other | Neches | Lake Naconiche Regional Water System | NACN-LK | 1,700 | 4 | 4 | $3,102 | 2 | 4 | 4 | 4 | No | 4 | 4 | 4 | 4 |
| 14 | Nacogdoches | D&M WSC | Neches | New wells in Carrizo-Wilcox Aquifer | NACW-DMW | 250 | 4 | 4 | $1,536 | 3 | 4 | 4 | 4 | No | 4 | 4 | 2 | 4 |
| 15 | Nacogdoches | Livestock | Neches | New wells in Carrizo-Wilcox Aquifer | NACW-LTK | 3,059 | 4 | 4 | $904 | 3 | 4 | 4 | 4 | No | 4 | 4 | 1 | 4 |
| 16 | Nacogdoches | Mining | Neches | Purchase from ANRA | NACW-MIN | 5,475 | 4 | 3 | $1,209 | 3 | 4 | 4 | 4 | No | 4 | 4 | 4 | 4 |

**Table 5B-B.3 – ETRWPA WMS Evaluation Matrix Rankings for Recommended and Alternative Water Management Strategies (Alternative strategies are identified in italics)**

| Number | County | Entity | Basin Used | Strategy | Strategy Key | Quantity (Ac-Ft/Yr) | Quantity | Reliability | Cost ($/Ac-Ft) | Cost | Impacts of Strategy on: | | | | | | Political Feasibility | Implementation Issues |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Environmental Factors | Water Resources and Other WMS | Agricultural Resources/ Rural Areas | Interbasin Transfers | Other Natural Resources | Key Water Quality Parameters | | |
| # | Name | Name(s) | Name | Name | Name | (Ac-Ft/Yr) | (1-5) | (1-5) | $ | (1-5) | (1-5) | (1-5) | (1-5) | | (1-5) | (1-5) | (1-5) | (1-5) |
| 17 | Nacogdoches | Steam Electric Power | Neches | Purchase from ANRA | NACW-SEP1 | 8,500 | 4 | 3 | $619 | 3 | 4 | 4 | 4 | No | 4 | 4 | 1 | 4 |
| 18 | Nacogdoches | Steam Electric Power | Neches | New wells in Carrizo-Wilcox Aquifer | NACW-SEP2 | 2,000 | 4 | 4 | $938 | 3 | 4 | 4 | 4 | No | 4 | 4 | 1 | 4 |
| 19 | Newton | Mining | Neches | Purchase from SRA | NEWT-MIN | 115 | 4 | 4 | $965 | 3 | 4 | 4 | 4 | No | 4 | 4 | 1 | 4 |
| 20 | Newton | Steam Electric Power | Neches | Purchase from SRA | NEWT-SEP | 19,021 | 4 | 4 | $531 | 3 | 4 | 4 | 4 | No | 4 | 4 | 1 | 4 |
| 21 | Orange | Irrigation | Sabine | Purchase from SRA | ORAN-IRR | 2,758 | 4 | 4 | $764 | 3 | 4 | 4 | 5 | No | 4 | 4 | 1 | 4 |
| 22 | Orange | Manufacturing | Sabine | Purchase from SRA | ORAN-MFG | 31,850 | 4 | 4 | $467 | 2 | 4 | 4 | 4 | No | 4 | 4 | 1 | 4 |
| 23 | Orange | Steam Electric Power | Sabine | Purchase from SRA | ORAN-SEP | 4,486 | 4 | 4 | $686 | 3 | 4 | 4 | 4 | No | 4 | 4 | 1 | 4 |
| 24 | Panola | Manufacturing | Sabine | Purchase from City of Carthage | PANL-MFG | 309 | 4 | 4 | $327 | 4 | 4 | 4 | 4 | No | 4 | 4 | 1 | 4 |
| 25 | Rusk | Mining | Neches | Purchase from ANRA | RUSK-MIN | 2,092 | 4 | 3 | $1,635 | 2 | 4 | 4 | 4 | No | 4 | 4 | 4 | 4 |
| 26 | Rusk | Steam Electric Power | Neches | Purchase from SRA | RUSK-SEP | 18,868 | 4 | 4 | $628 | 3 | 4 | 4 | 4 | No | 4 | 4 | 1 | 4 |
| 27 | San Augustine | Mining | Neches | Purchase from ANRA | SAUG-MIN | 2,012 | 4 | 4 | $1,920 | 2 | 4 | 4 | 4 | No | 4 | 4 | 4 | 4 |
| 28 | Shelby | Livestock | Sabine | Purchase from SRA | SHEL-LTK | 6,925 | 4 | 4 | $699 | 3 | 4 | 4 | 4 | No | 4 | 4 | 1 | 4 |
| 29 | Smith | Bullard | Neches/Trinity | Purchase from City of Tyler | SMTH-BLD | 995 | 4 | 4 | $852 | 3 | 4 | 4 | 4 | No | 4 | 4 | 2 | 4 |
| 30 | Smith | Crystal Systems Inc. | Neches/Trinity | Purchase from City of Tyler | SMTH-CYS | 642 | 3 | 4 | $650 | 3 | 4 | 4 | 4 | No | 4 | 4 | 1 | 4 |
| 31 | Smith | Lindale | Neches/Trinity | Purchase from City of Tyler | SMTH-LDL | 826 | 4 | 4 | $1,044 | 2 | 4 | 4 | 4 | No | 4 | 4 | 1 | 4 |
| 32 | Smith | Manufacturing | Neches/Trinity | Purchase from City of Tyler | SMTH-MFG | 2,879 | 4 | 4 | $590 | 3 | 4 | 4 | 4 | No | 4 | 4 | 1 | 4 |
| 33 | Smith | Mining | Neches/Trinity | Purchase from City of Tyler | SMTH-MIN | 114 | 4 | 4 | $3,526 | 2 | 4 | 4 | 4 | No | 4 | 4 | 1 | 4 |

**Table 5B-B.3 – ETRWPA WMS Evaluation Matrix Rankings for Recommended and Alternative Water Management Strategies (Alternative strategies are identified in italics)**

| Number | County | Entity | Basin Used | Strategy | Strategy Key | Quantity (Ac-Ft/Yr) | Quantity | Reliability | Cost ($/Ac-Ft) | Cost | Impacts of Strategy on: | | | | | | Political Feasibility | Implementation Issues |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Environmental Factors | Water Resources and Other WMS | Agricultural Resources/ Rural Areas | Interbasin Transfers | Other Natural Resources | Key Water Quality Parameters | | |
| # | Name | Name(s) | Name | Name | Name | (Ac-Ft/Yr) | (1-5) | (1-5) | $ | (1-5) | (1-5) | (1-5) | (1-5) | | (1-5) | (1-5) | (1-5) | (1-5) |
| *34* | *Trinity* | *Irrigation* | *Trinity* | *Purchase from County Other (Yegua-Jackson Aquifer)* | *TRTY-IRR1* | *331* | *3* | *4* | *$988* | *3* | *4* | *4* | *4* | *No* | *4* | *4* | *1* | *4* |
| 35 | Multiple | Multiple | - | Conservation | WUG-CONS | - | - | 4 | - | 3 | 5 | 5 | 5 | No | 5 | 5 | 2 | 4 |
| 36 | Angelina | Angelina Neches River Authority | Neches | Lake Columbia | ANRA-COL | 75,600 | 4 | 4 | $333 | 4 | 3 | 4 | 4 | No | 4 | 4 | 4 | 3 |
| 37 | Angelina | Angelina Neches River Authority | Neches | ANRA Water Treatment Plant and Distribution System | ANRA-WTP | 22,232 | 4 | 3 | $1,883 | 2 | 4 | 4 | 4 | No | 4 | 4 | 4 | 3 |
| 38 | Angelina | Angelina Neches River Authority | Neches | ANRA Groundwater wells | ANRA-GW | 5,600 | 4 | 4 | $578 | 3 | 4 | 4 | 4 | No | 4 | 4 | 4 | 4 |
| 39 | Angelina | Angelina Neches River Authority | Neches | ANRA Run of River Supplies | ANRA-ROR | 30,000 | 4 | 3 | - | 5 | 4 | 4 | 4 | No | 4 | 4 | 4 | 4 |
| 40 | Henderson | Athens MWA | Trinity | Indirect Reuse of Flows from Fish Hatcheries | AMWA-FH | 2,872 | 4 | 4 | - | 5 | 4 | 4 | 4 | No | 4 | 4 | 4 | 3 |
| *41* | *Henderson* | *Athens MWA* | *Trinity* | *Additional Groundwater wells in Carrizo Wilcox* | *AMWA-GW* | *4,840* | *4* | *2* | *$277* | *2* | *4* | *4* | *4* | *No* | *4* | *4* | *4* | *1* |
| 42 | Henderson | Athens MWA | Trinity | Pump Station Improvements | AMWA-WTP | 1,121 | 4 | 4 | $59 | 5 | 4 | 4 | 4 | No | 4 | 4 | 5 | 4 |
| 43 | Henderson | Angelina Nacogdoches WCID#1 | Neches | Volumetric Surveys of Lake Striker | ANCD-VOL | - | - | - | - | 5 | 4 | 4 | 4 | No | 4 | 4 | 4 | 4 |
| 44 | Henderson | Angelina Nacogdoches WCID#1 | Neches | Hydraulic Dredging of Lake Striker | ANCD-DRE | 2,100 | 3 | 3 | - | 4 | 4 | 4 | 4 | No | 4 | 4 | 5 | 4 |
| 45 | Henderson | Angelina Nacogdoches WCID#1 | Neches | Normal Pool Elevation Adjustment of Lake Striker | ANCD-NPA | 3,500 | 4 | 3 | - | 5 | 4 | 4 | 4 | No | 4 | 4 | 3 | 3 |
| 46 | Jefferson | Beaumont | Neches-Trinity | Municipal Conservation | BEAU-CONS | 9,966 | 4 | 4 | $317 | 4 | 4 | 4 | 4 | No | 4 | 4 | 3 | 4 |

**Table 5B-B.3 – ETRWPA WMS Evaluation Matrix Rankings for Recommended and Alternative Water Management Strategies (Alternative strategies are identified in italics)**

| Number | County | Entity | Basin Used | Strategy | Strategy Key | Quantity (Ac-Ft/Yr) | Quantity | Reliability | Cost ($/Ac-Ft) | Cost | Impacts of Strategy on: | | | | | | Political Feasibility | Implementation Issues |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Environmental Factors | Water Resources and Other WMS | Agricultural Resources/ Rural Areas | Interbasin Transfers | Other Natural Resources | Key Water Quality Parameters | | |
| # | Name | Name(s) | Name | Name | Name | (Ac-Ft/Yr) | (1-5) | (1-5) | $ | (1-5) | (1-5) | (1-5) | (1-5) | | (1-5) | (1-5) | (1-5) | (1-5) |
| 47 | Shelby | Center | Sabine | Reuse Pipeline from WWTP to Lake Center | CENT-REU | 1,120 | 4 | 5 | $1,493 | 2 | 3 | 4 | 4 | No | 4 | 3 | 4 | 4 |
| 48 | Shelby | Center | Sabine | Pipeline from Toledo Bend to Lake Center | CENT-TOL | 2,242 | 4 | 4 | $1,544 | 2 | 4 | 4 | 4 | No | 4 | 4 | 4 | 4 |
| 49 | Shelby | Center | Sabine | Volumetric Surveys | CENT-VOL | - | NA | NA | - | 4 | 4 | 4 | 4 | No | 4 | 4 | 4 | 4 |
| 50 | Houston | Houston County WCID#1 | Neches | Permit Amendment for Houston County Lake | HCWC-PA | 3,500 | 4 | 3 | - | 5 | 4 | 4 | 4 | No | 4 | 4 | 4 | 4 |
| *51* | *Houston* | *Houston County WCID#1* | *Neches* | *New wells in Carrizo-Wilcox Aquifer* | *HCWC-GW* | *3,500* | *4* | *3* | *$747* | *3* | *4* | *4* | *4* | *No* | *4* | *4* | *4* | *3* |
| 52 | Cherokee | Jacksonville | Neches | Lake Columbia to Jacksonville Raw Water Transmission System | JACK-COL | 1,700 | 4 | 4 | $1,556 | 2 | 4 | 4 | 4 | No | 4 | 4 | 4 | 3 |
| 53 | Jefferson | Lower Neches Valley Authortiy | Neches-Trinity | Purchase from SRA | LNVA-SRA | 200,000 | 4 | 4 | $526 | 4 | 4 | 4 | 4 | No | 4 | 4 | 4 | 3 |
| 54 | Jefferson | Lower Neches Valley Authortiy | Neches-Trinity | Permit Amendment for Lake Sam Rayburn | LNVA-PA | 28,000 | 4 | 5 | - | 5 | 4 | 4 | 4 | No | 4 | 4 | 4 | 4 |
| 55 | Jefferson | Lower Neches Valley Authortiy | Neches-Trinity | Transfer to Region H (Sam Rayburn) | LNVA-RGH | 55,000 | 4 | 4 | $435 | 4 | 4 | 4 | 5 | Yes | 4 | 3 | 4 | 3 |
| 56 | Jefferson | Lower Neches Valley Authortiy | Neches-Trinity | Constructed Levy | LNVA-JEFF | 1,600 | 4 | 4 | $1,909 | 2 | 4 | 4 | 4 | No | 4 | 4 | 1 | 4 |
| 57 | Angelina | Lufkin | Neches | Conveyance from Sam Rayburn to Kurth Lake | LUFK-RAY | 28,000 | 4 | 4 | $814 | 3 | 4 | 4 | 4 | No | 4 | 4 | 4 | 4 |

**Table 5B-B.3 – ETRWPA WMS Evaluation Matrix Rankings for Recommended and Alternative Water Management Strategies (Alternative strategies are identified in italics)**

| Number | County | Entity | Basin Used | Strategy | Strategy Key | Quantity (Ac-Ft/Yr) | Quantity | Reliability | Cost ($/Ac-Ft) | Cost | Impacts of Strategy on: | | | | | | Political Feasibility | Implementation Issues |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Environmental Factors | Water Resources and Other WMS | Agricultural Resources/ Rural Areas | Interbasin Transfers | Other Natural Resources | Key Water Quality Parameters | | |
| # | Name | Name(s) | Name | Name | Name | (Ac-Ft/Yr) | (1-5) | (1-5) | $ | (1-5) | (1-5) | (1-5) | (1-5) | | (1-5) | (1-5) | (1-5) | (1-5) |
| 58 | Nacogdoches | Nacogdoches | Neches | Lake Columbia to Nacogdoches Raw Water Transmission System | NACP-COL | 8,500 | 4 | 4 | $705 | 3 | 4 | 4 | 4 | No | 4 | 4 | 4 | 3 |
| 59 | Jefferson | Port Arthur | Neches-Trinity | Municipal Conservation | PORT-CONS | 10,340 | 4 | 4 | $333 | 4 | 4 | 4 | 4 | No | 4 | 4 | 4 | 4 |
| 60 | Orange | Sabine River Authority | Sabine | SRA Toledo Bend Amendment | SRA-TB | 293,300 | 4 | 3 | - | 5 | 4 | 4 | 4 | No | 4 | 4 | 5 | 3 |
| 61 | Orange | Sabine River Authority | Sabine | SRA Pump Station | SRA-PS | 89,680 | 4 | 4 | $812 | 3 | 4 | 4 | 4 | No | 4 | 4 | 5 | 4 |
| 62 | Smith | Tyler | Neches | City of Tyler - Lake Palestine Expansion | TYLR-PAL | 16,815 | 4 | 4 | $900 | 3 | 4 | 4 | 4 | No | 4 | 4 | 3 | 4 |
| 63 | Anderson | Upper Neches River Municipal Water Authority | Neches | Neches Run-of-River Diversion | UNM-ROR | 68,625 | 4 | 4 | $602 | 3 | 3 | 4 | 4 | No | 4 | 4 | 3 | 2 |

# Appendix 5B-C

# Recommended Water Management Strategies by WUG

# DB17 Report

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This appendix includes a copy of the Water User Group Recommended Water Management Strategy data from the TWDB Data Web Interface known as the DB17. The summary is divided by Water User Group.

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# Recommended Water User Group (WUG) Water Management Strategies (WMS)

## WUG Entity Primary Region: I

**Water Management Strategy Supplies**

| WUG Entity Name | WMS Sponsor Region | WMS Name | Source Name | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 | Unit Cost 2020 | Unit Cost 2070 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ALTO | I | ANRA-COL - LAKE COLUMBIA | I \| COLUMBIA LAKE/RESERVOIR | 0 | 428 | 428 | 428 | 428 | 85 | N/A | $333 |
| ALTO RURAL WSC | I | ALRU ENHANCED PUBLIC AND SCHOOL EDUCATION | DEMAND REDUCTION | 0 | 0 | 5 | 7 | 9 | 11 | N/A | $489 |
| ALTO RURAL WSC | I | CHE-ALT - ALTO RURAL WSC | I \| CARRIZO-WILCOX AQUIFER \| CHEROKEE COUNTY | 0 | 0 | 0 | 61 | 130 | 250 | N/A | $13 |
| ARP | I | ANRA-COL - LAKE COLUMBIA | I \| COLUMBIA LAKE/RESERVOIR | 0 | 428 | 428 | 428 | 428 | 85 | N/A | $13 |
| BEAUMONT | I | BEAU ENHANCED PUBLIC AND SCHOOL EDUCATION | DEMAND REDUCTION | 0 | 413 | 540 | 688 | 859 | 1,055 | N/A | $57 |
| BEAUMONT | I | BEAU ENHANCED WATER LOSS CONTROL PROGRAM | DEMAND REDUCTION | 0 | 2,670 | 4,477 | 6,015 | 7,353 | 8,516 | N/A | $260 |
| BEAUMONT | I | BEAU WATER CONSERVATION PRICING | DEMAND REDUCTION | 0 | 155 | 324 | 344 | 368 | 395 | N/A | $0 |
| BETHEL-ASH WSC | C | CONSERVATION - BETHEL-ASH WSC | DEMAND REDUCTION | 1 | 2 | 3 | 4 | 5 | 7 | $0 | $0 |
| BETHEL-ASH WSC | C | CONSERVATION, WATER LOSS CONTROL - BETHEL-ASH WSC | DEMAND REDUCTION | 1 | 1 | 0 | 0 | 0 | 0 | $397 | N/A |
| BULLARD | I | BULL ENHANCED PUBLIC AND SCHOOL EDUCATION | DEMAND REDUCTION | 4 | 7 | 10 | 14 | 19 | 24 | $489 | $489 |
| BULLARD | I | BULL WATER CONSERVATION PRICING | DEMAND REDUCTION | 7 | 17 | 20 | 24 | 28 | 32 | $0 | $0 |
| BULLARD | I | TYL-PAL-EXISTING SURPLUS FOR TYLER | I \| PALESTINE LAKE/RESERVOIR | 49 | 215 | 385 | 570 | 760 | 955 | $896 | $896 |
| CENTER | I | CENT-REU-CITY OF CENTER REUSE | I \| CENTER LAKE/RESERVOIR | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | 1,120 | $1493 | $479 |
| CENTER | I | CENT-TOL - TOLEDO BEND PIPELINE | I \| TOLEDO BEND LAKE/RESERVOIR | 0 | 0 | 2,242 | 2,242 | 2,242 | 2,242 | N/A | $865 |
| CHANDLER | I | CHAN ENHANCED PUBLIC AND SCHOOL EDUCATION | DEMAND REDUCTION | 0 | 0 | 0 | 6 | 9 | 12 | N/A | $489 |
| CHANDLER | I | CHAN WATER CONSERVATION PRICING | DEMAND REDUCTION | 0 | 0 | 0 | 10 | 21 | 24 | N/A | $0 |
| CHANDLER | I | TYL-PAL-EXISTING SURPLUS FOR TYLER | I \| PALESTINE LAKE/RESERVOIR | 0 | 0 | 0 | 350 | 350 | 350 | N/A | $411 |
| COUNTY-OTHER, CHEROKEE | I | ANRA-COL - LAKE COLUMBIA | I \| COLUMBIA LAKE/RESERVOIR | 0 | 3,848 | 3,848 | 3,848 | 3,848 | 767 | N/A | $13 |
| COUNTY-OTHER, HENDERSON | C | CONSERVATION - HENDERSON COUNTY | DEMAND REDUCTION | 1 | 2 | 2 | 3 | 3 | 3 | $0 | $0 |
| COUNTY-OTHER, HENDERSON | C | CONSERVATION, WATER LOSS CONTROL - HENDERSON | DEMAND REDUCTION | 2 | 2 | 0 | 0 | 0 | 0 | $456 | N/A |
| COUNTY-OTHER, HENDERSON | C | DWU - MAIN STEM REUSE | C \| TRINITY INDIRECT REUSE | 0 | 0 | 0 | 0 | 11 | 0 | N/A | N/A |
| COUNTY-OTHER, HENDERSON | C | SULPHUR BASIN SUPPLY | D \| MARVIN NICHOLS LAKE/RESERVOIR | 0 | 0 | 0 | 0 | 0 | 14 | N/A | $1131 |
| COUNTY-OTHER, HENDERSON | C | SULPHUR BASIN SUPPLY | D \| WRIGHT PATMAN LAKE/RESERVOIR | 0 | 0 | 0 | 4 | 5 | 5 | N/A | $1131 |
| COUNTY-OTHER, HENDERSON | C | TRWD - ADDITIONAL CEDAR CREEK AND RICHLAND-CHAMBERS | C \| TRINITY INDIRECT REUSE | 0 | 5 | 8 | 3 | 3 | 2 | N/A | $239 |
| COUNTY-OTHER, HENDERSON | C | TRWD - ADDITIONAL CEDAR CREEK AND RICHLAND-CHAMBERS | C \| TRWD LAKE/RESERVOIR SYSTEM | 0 | 1 | 1 | 1 | 1 | 1 | N/A | $239 |
| COUNTY-OTHER, HENDERSON | C | TRWD - CEDAR CREEK WETLANDS | C \| TRINITY INDIRECT REUSE | 0 | 8 | 13 | 16 | 10 | 6 | N/A | $114 |
| COUNTY-OTHER, HENDERSON | C | TRWD - TEHUACANA | C \| TEHUACANA LAKE/RESERVOIR | 0 | 0 | 6 | 8 | 3 | 3 | N/A | $149 |
| COUNTY-OTHER, JEFFERSON | I | JEFF-CTR CONTRACT EXPANSION | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 0 | 0 | 0 | 797 | 2,041 | 3,413 | N/A | $390 |
| COUNTY-OTHER, JEFFERSON - UNASSIGNED WATER VOLUMES | I | CONSTRUCTED LEVY | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 1,600 | 1,600 | 1,600 | 1,600 | 1,600 | 1,600 | $1909 | $86 |

# Recommended Water User Group (WUG) Water Management Strategies (WMS)

**Water Management Strategy Supplies**

| WUG Entity Name | WMS Sponsor Region | WMS Name | Source Name | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 | Unit Cost 2020 | Unit Cost 2070 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| COUNTY-OTHER, NACOGDOCHES | I | ANRA-COL - LAKE COLUMBIA | I \| COLUMBIA LAKE/RESERVOIR | 0 | 428 | 428 | 428 | 428 | 85 | N/A | $13 |
| COUNTY-OTHER, NACOGDOCHES - UNASSIGNED WATER VOLUMES | I | LK-NACN-LAKE NACONICHE REGIONAL WATER SYSTEM | I \| LAKE NACONICHE/RESERVOIR | 1,700 | 1,700 | 1,700 | 1,700 | 1,700 | 1,700 | $3102 | $1431 |
| COUNTY-OTHER, TRINITY | H | WATER LOSS REDUCTION, COUNTY-OTHER - TRINITY COUNTY | DEMAND REDUCTION | 7 | 13 | 19 | 24 | 30 | 35 | $555 | $554 |
| D&M WSC | I | NACW-DMW - NACOGDOCHES D&M WSC | I \| CARRIZO-WILCOX AQUIFER \| NACOGDOCHES COUNTY | 0 | 0 | 0 | 0 | 112 | 250 | N/A | $370 |
| G M WSC | I | GM-WSC | I \| TOLEDO BEND LAKE/RESERVOIR | 284 | 283 | 283 | 283 | 283 | 283 | $2215 | $2215 |
| HENDERSON | I | LAKE STRIKER DREDGING | I \| STRIKER LAKE/RESERVOIR | 0 | 0 | 5,600 | 5,600 | 5,600 | 5,600 | N/A | $476 |
| HOUSTON COUNTY WCID #1 - UNASSIGNED WATER VOLUMES | I | HCWC PERMIT AMENDMENT | I \| HOUSTON COUNTY LAKE/RESERVOIR | 1,978 | 1,978 | 1,728 | 1,728 | 1,478 | 1,478 | $0 | $0 |
| IRRIGATION, HENDERSON | I | AMWA ATHENS FISH HATCHERY REUSE | I \| NECHES INDIRECT REUSE | 0 | 0 | 0 | 0 | 29 | 32 | N/A | $0 |
| IRRIGATION, HENDERSON | I | AMWA-BOOSTER PUMPSTATION IMPROVEMENTS | I \| ATHENS LAKE/RESERVOIR | 2 | 9 | 6 | 3 | 1 | 0 | $59 | N/A |
| IRRIGATION, HOUSTON | I | HOUS-IRR NEW WELLS | I \| YEGUA-JACKSON AQUIFER \| HOUSTON COUNTY | 757 | 997 | 1,265 | 1,563 | 1,892 | 2,340 | $704 | $241 |
| IRRIGATION, ORANGE | I | SRA-INF-PUMPSTATION | I \| TOLEDO BEND LAKE/RESERVOIR | 2,432 | 2,685 | 2,858 | 2,920 | 2,855 | 2,758 | $764 | $419 |
| JACKSON WSC | I | ANRA-COL - LAKE COLUMBIA | I \| COLUMBIA LAKE/RESERVOIR | 0 | 855 | 855 | 855 | 855 | 855 | N/A | $13 |
| JACKSONVILLE | I | ANRA-COL - LAKE COLUMBIA | I \| COLUMBIA LAKE/RESERVOIR | 0 | 4,275 | 4,275 | 4,275 | 4,275 | 4,275 | N/A | $13 |
| LIVESTOCK, HENDERSON | I | AMWA ATHENS FISH HATCHERY REUSE | I \| NECHES INDIRECT REUSE | 2,145 | 2,183 | 2,215 | 2,250 | 1,482 | 902 | $0 | $0 |
| LIVESTOCK, HENDERSON | I | AMWA-BOOSTER PUMPSTATION IMPROVEMENTS | I \| ATHENS LAKE/RESERVOIR | 33 | 152 | 106 | 63 | 18 | 0 | $59 | N/A |
| LIVESTOCK, NACOGDOCHES | I | NACW-LTK - NACOGDOCHES LIVESTOCK | I \| CARRIZO-WILCOX AQUIFER \| NACOGDOCHES COUNTY | 1,644 | 1,837 | 2,061 | 2,320 | 2,617 | 3,059 | $904 | $254 |
| LIVESTOCK, SHELBY | I | SHEL-LTK NEW CONTRACT | I \| TOLEDO BEND LAKE/RESERVOIR | 1,367 | 2,375 | 3,602 | 5,099 | 6,924 | 6,924 | $699 | $431 |
| LOWER NECHES VALLEY AUTHORITY - UNASSIGNED WATER VOLUMES | I | LNVA PERMIT AMENDMENT | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 28,000 | 28,000 | 28,000 | 28,000 | 28,000 | 28,000 | $0 | $0 |
| LOWER NECHES VALLEY AUTHORITY - UNASSIGNED WATER VOLUMES | I | LNVA-SRA NEW CONTRACT | I \| TOLEDO BEND LAKE/RESERVOIR | 0 | 0 | 0 | 200,000 | 200,000 | 200,000 | N/A | $526 |
| LUFKIN | I | LUFK-RAY SAM RAYBURN INFRASTRUCTURE | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 0 | 5,043 | 14,949 | 19,372 | 18,137 | 16,805 | N/A | $693 |
| MANUFACTURING, ANGELINA | I | ANGL-MFG CONTRACT EXPANSION | I \| KURTH LAKE/RESERVOIR | 6,000 | 6,000 | 6,000 | 6,000 | 6,000 | 6,000 | $326 | $326 |
| MANUFACTURING, ANGELINA | I | LUFK-RAY SAM RAYBURN INFRASTRUCTURE | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 0 | 6,167 | 7,471 | 8,628 | 9,863 | 11,195 | N/A | $326 |
| MANUFACTURING, JASPER | I | JASP-MFG CONTRACT EXPANSION | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 0 | 3,049 | 6,021 | 8,250 | 8,335 | 8,420 | N/A | $387 |
| MANUFACTURING, JEFFERSON | I | JEFF-MFG CONTRACT EXPANSION | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 181,181 | 262,193 | 273,826 | 285,499 | 297,181 | 309,323 | $452 | $398 |

# Recommended Water User Group (WUG) Water Management Strategies (WMS)

**Water Management Strategy Supplies**

| WUG Entity Name | WMS Sponsor Region | WMS Name | Source Name | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 | Unit Cost 2020 | Unit Cost 2070 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MANUFACTURING, ORANGE | I | SRA-INF-PUMPSTATION | I \| TOLEDO BEND LAKE/RESERVOIR | 3,943 | 9,890 | 15,850 | 21,141 | 27,092 | 33,477 | $467 | $372 |
| MANUFACTURING, PANOLA | I | PANL-MFG-INFRASTRUCTURE | I \| CARRIZO-WILCOX AQUIFER \| PANOLA COUNTY | 134 | 156 | 176 | 194 | 230 | 309 | $327 | $327 |
| MANUFACTURING, RUSK | I | ANRA-GW-NEW WELLS IN CARRIZO WILCOX AQUIFER IN RUSK COUNTY | I \| CARRIZO-WILCOX AQUIFER \| CHEROKEE COUNTY | 1,600 | 1,600 | 1,600 | 1,600 | 1,600 | 1,600 | $578 | $190 |
| MANUFACTURING, RUSK | I | ANRA-GW-NEW WELLS IN CARRIZO WILCOX AQUIFER IN RUSK COUNTY | I \| CARRIZO-WILCOX AQUIFER \| RUSK COUNTY | 4,000 | 4,000 | 4,000 | 4,000 | 4,000 | 4,000 | $578 | $190 |
| MANUFACTURING, SMITH | I | TYL-PAL-EXISTING SURPLUS FOR TYLER | I \| PALESTINE LAKE/RESERVOIR | 2,039 | 2,257 | 2,467 | 2,645 | 2,889 | 3,154 | $590 | $404 |
| MINING, ANGELINA | I | ANRA-RUN-OF-RIVER (SUBMITTED APPLICATION) | I \| NECHES RUN-OF-RIVER | 474 | 573 | 398 | 300 | 225 | 168 | $1644 | $1059 |
| MINING, CHEROKEE | I | ANRA-RUN-OF-RIVER (NEW APPLICATION) | I \| NECHES RUN-OF-RIVER | 238 | 247 | 210 | 147 | 84 | 40 | $2560 | $1148 |
| MINING, HOUSTON | I | HCWC PERMIT AMENDMENT | I \| HOUSTON COUNTY LAKE/RESERVOIR | 0 | 0 | 250 | 250 | 500 | 500 | N/A | $0 |
| MINING, NACOGDOCHES | I | ANRA-RUN-OF-RIVER (SUBMITTED APPLICATION) | I \| NECHES RUN-OF-RIVER | 5,475 | 2,975 | 118 | 0 | 0 | 0 | $1209 | N/A |
| MINING, NEWTON | I | SRA-INF-PUMPSTATION | I \| TOLEDO BEND LAKE/RESERVOIR | 115 | 59 | 0 | 0 | 0 | 0 | $965 | N/A |
| MINING, RUSK | I | ANRA-RUN-OF-RIVER (SUBMITTED APPLICATION) | I \| NECHES RUN-OF-RIVER | 1,075 | 2,092 | 1,955 | 1,809 | 1,774 | 1,765 | $1635 | $1095 |
| MINING, SAN AUGUSTINE | I | ANRA-RUN-OF-RIVER (SUBMITTED APPLICATION) | I \| NECHES RUN-OF-RIVER | 2,102 | 1,102 | 0 | 0 | 0 | 0 | $1920 | N/A |
| MINING, TRINITY | H | EXPANDED USE OF GROUNDWATER, TRINITY COUNTY | H \| CARRIZO-WILCOX AQUIFER \| TRINITY COUNTY | 100 | 100 | 100 | 100 | 100 | 100 | $2188 | $1283 |
| NACOGDOCHES | I | ANRA-COL - LAKE COLUMBIA | I \| COLUMBIA LAKE/RESERVOIR | 0 | 8,551 | 8,551 | 8,551 | 8,551 | 8,551 | N/A | $13 |
| NEW LONDON | I | ANRA-COL - LAKE COLUMBIA | I \| COLUMBIA LAKE/RESERVOIR | 0 | 855 | 855 | 855 | 855 | 170 | N/A | $1442 |
| NEW SUMMERFIELD | I | ANRA-COL - LAKE COLUMBIA | I \| COLUMBIA LAKE/RESERVOIR | 0 | 2,565 | 2,565 | 2,565 | 2,565 | 511 | N/A | $1442 |
| NORTH CHEROKEE WSC | I | ANRA-COL - LAKE COLUMBIA | I \| COLUMBIA LAKE/RESERVOIR | 0 | 4,275 | 4,275 | 4,275 | 4,275 | 852 | N/A | $539 |
| OVERTON | I | OVER ENHANCED PUBLIC AND SCHOOL EDUCATION | DEMAND REDUCTION | 0 | 0 | 5 | 6 | 9 | 11 | N/A | $489 |
| OVERTON | I | OVER ENHANCED WATER LOSS CONTROL PROGRAM | DEMAND REDUCTION | 17 | 18 | 97 | 167 | 223 | 269 | $0 | $425 |
| OVERTON | I | OVER WATER CONSERVATION PRICING | DEMAND REDUCTION | 0 | 0 | 4 | 8 | 9 | 9 | N/A | $0 |
| PORT ARTHUR | I | PORT ENHANCED PUBLIC AND SCHOOL EDUCATION | DEMAND REDUCTION | 266 | 331 | 392 | 456 | 521 | 585 | $227 | $103 |
| PORT ARTHUR | I | PORT ENHANCED WATER LOSS CONTROL PROGRAM | DEMAND REDUCTION | 4,629 | 6,922 | 7,929 | 8,966 | 9,626 | 8,988 | $182 | $135 |
| PORT ARTHUR | I | PORT WATER CONSERVATION PRICING | DEMAND REDUCTION | 99 | 198 | 196 | 195 | 195 | 195 | $0 | $0 |
| RUSK | I | ANRA-COL - LAKE COLUMBIA | I \| COLUMBIA LAKE/RESERVOIR | 0 | 4,275 | 4,275 | 4,275 | 4,275 | 852 | N/A | $13 |
| RUSK RURAL WSC | I | ANRA-COL - LAKE COLUMBIA | I \| COLUMBIA LAKE/RESERVOIR | 0 | 855 | 855 | 855 | 855 | 170 | N/A | $13 |
| SABINE RIVER AUTHORITY - UNASSIGNED WATER VOLUMES | I | SRA-INF-PUMPSTATION | I \| TOLEDO BEND LAKE/RESERVOIR | 82,500 | 73,952 | 63,940 | 53,788 | 42,051 | 29,578 | $1443 | $1443 |
| SABINE RIVER AUTHORITY - UNASSIGNED WATER VOLUMES | I | SRA-TOL - PERMIT AMENDMENT FOR TOLEDO BEND | I \| TOLEDO BEND LAKE/RESERVOIR | 215,300 | 210,800 | 206,200 | 201,600 | 197,000 | 195,000 | $0 | $0 |
| STEAM ELECTRIC POWER, ANDERSON | I | ANDE-SEP1 ANDERSON STEAM ELECTRIC POWER | I \| PALESTINE LAKE/RESERVOIR | 11,306 | 13,218 | 15,549 | 18,390 | 21,853 | 21,632 | $522 | $365 |
| STEAM ELECTRIC POWER, CHEROKEE | I | ANRA-RUN-OF-RIVER (NEW APPLICATION) | I \| NECHES RUN-OF-RIVER | 8,000 | 15,000 | 20,000 | 20,000 | 20,000 | 20,000 | $1076 | $1006 |

# Recommended Water User Group (WUG) Water Management Strategies (WMS)

**Water Management Strategy Supplies**

| WUG Entity Name | WMS Sponsor Region | WMS Name | Source Name | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 | Unit Cost 2020 | Unit Cost 2070 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| STEAM ELECTRIC POWER, JEFFERSON | I | JEFF-SEP NEW CONTRACT | I \| SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM | 13,426 | 15,696 | 18,464 | 21,838 | 25,951 | 30,839 | $507 | $377 |
| STEAM ELECTRIC POWER, NACOGDOCHES | I | HCWC PERMIT AMENDMENT | I \| HOUSTON COUNTY LAKE/RESERVOIR | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | $0 | $0 |
| STEAM ELECTRIC POWER, NACOGDOCHES | I | NACW-SEP1 - NACOGDOCHES STEAM ELECTRIC POWER PURCHASE FROM ANRA | I \| CARRIZO-WILCOX AQUIFER \| NACOGDOCHES COUNTY | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 1,989 | $938 | $267 |
| STEAM ELECTRIC POWER, NACOGDOCHES | I | NACW-SEP1 - NACOGDOCHES STEAM ELECTRIC POWER PURCHASE FROM ANRA | I \| NACOGDOCHES LAKE/RESERVOIR | 8,500 | 8,500 | 7,742 | 6,741 | 5,645 | 4,521 | $619 | $365 |
| STEAM ELECTRIC POWER, NACOGDOCHES | I | NACW-SEP2 - NEW WELLS IN CARRIZO WILCOX | I \| CARRIZO-WILCOX AQUIFER \| NACOGDOCHES COUNTY | 0 | 0 | 0 | 0 | 0 | 2,000 | N/A | $938 |
| STEAM ELECTRIC POWER, NEWTON | I | SRA-INF-PUMPSTATION | I \| TOLEDO BEND LAKE/RESERVOIR | 690 | 3,080 | 5,994 | 9,545 | 13,875 | 19,021 | $531 | $380 |
| STEAM ELECTRIC POWER, ORANGE | I | SRA-INF-PUMPSTATION | I \| TOLEDO BEND LAKE/RESERVOIR | 0 | 14 | 1,038 | 2,286 | 3,807 | 4,846 | N/A | $419 |
| STEAM ELECTRIC POWER, RUSK | I | RUSK-SEP NEW CONTRACT | I \| SABINE RUN-OF-RIVER | 0 | 0 | 0 | 462 | 8,873 | 18,868 | N/A | $628 |
| THE CONSOLIDATED WSC | H | EXPANDED USE OF GROUNDWATER, WALKER COUNTY | H \| YEGUA-JACKSON AQUIFER \| WALKER COUNTY | 100 | 100 | 100 | 100 | 100 | 100 | $2188 | $1283 |
| THE CONSOLIDATED WSC | I | HCWC PERMIT AMENDMENT | I \| HOUSTON COUNTY LAKE/RESERVOIR | 522 | 522 | 522 | 522 | 522 | 522 | $0 | $0 |
| TROUP | I | ANRA-COL - LAKE COLUMBIA | I \| COLUMBIA LAKE/RESERVOIR | 0 | 4,275 | 4,275 | 4,275 | 4,275 | 852 | N/A | $1442 |
| WEST HARDIN WSC | H | WATER LOSS REDUCTION, WEST HARDIN WSC | DEMAND REDUCTION | 1 | 3 | 5 | 7 | 8 | 11 | $555 | $554 |
| WHITEHOUSE | I | ANRA-COL - LAKE COLUMBIA | I \| COLUMBIA LAKE/RESERVOIR | 0 | 8,551 | 8,551 | 8,551 | 8,551 | 1,704 | N/A | $1442 |
| WOODVILLE | I | WOOD ENHANCED PUBLIC AND SCHOOL EDUCATION | DEMAND REDUCTION | 0 | 0 | 6 | 7 | 9 | 10 | N/A | $387 |
| WOODVILLE | I | WOOD WATER CONSERVATION PRICING | DEMAND REDUCTION | 0 | 0 | 4 | 9 | 9 | 9 | N/A | $0 |
| | | | | | | | | | | | |
| **Region I Total RecommendedWMS Supplies** | | | | 599,966 | 751,751 | 791,241 | 1,017,932 | 1,045,731 | 1,050,074 | | |

# Recommended Projects Associated with Water Management Strategies

## Project Sponosr Region: I

| Sponsor Name | Is Sponsor a WWP? | Project Name | Project Description | Capital Cost | Online Decade |
|---|---|---|---|---|---|
| ALTO RURAL WSC | N | CHE-ALT - NEW WELLS IN CARRIZO WILCOX | CONVEYANCE/TRANSMISSION PIPELINE; LOWER GROUNDWATER WELL PUMP; MULTIPLE WELLS/WELL FIELD; STORAGE TANK | $2,682,000 | 2050 |
| ANGELINA & NECHES RIVER AUTHORITY | Y | ANRA-COL - LAKE COLUMBIA CONSTRUCTION | RESERVOIR CONSTRUCTION | $344,498,000 | 2030 |
| ANGELINA & NECHES RIVER AUTHORITY | Y | ANRA-GW-NEW GROUNDWATER WELLS INFRASTRUCTURE | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK | $26,023,000 | 2020 |
| ANGELINA & NECHES RIVER AUTHORITY | Y | ANRA-WTP-WTP CONSTRUCTION | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK; WATER TREATMENT PLANT EXPANSION | $117,250,000 | 2030 |
| ANGELINA & NECHES RIVER AUTHORITY | Y | CHER-MIN-INFRASTRUCTURE | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK | $4,214,000 | 2020 |
| ANGELINA NACOGDOCHES WCID #1 | Y | LAKE-STRIKER-DREDGING | DREDGE TO RECOVER CAPACITY | $23,716,000 | 2040 |
| ANGELINA NACOGDOCHES WCID #1 | Y | STRIKER-VOLUMETRIC SURVEY | NEW AGREEMENT | $25,000 | 2020 |
| ATHENS MUNICIPAL WATER AUTHORITY | Y | AMWA-WTP - ATHENS MWA BOOSTER PS IMPROVEMENTS | PUMP STATION | $2,900,000 | 2020 |
| BEAUMONT | Y | BEAU ENHANCED WATER LOSS CONTROL PROGRAM | WATER LOSS CONTROL | $52,623,000 | 2030 |
| BULLARD | N | SMTH-BLD-INFRASTRUCTURE | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK | $5,260,000 | 2020 |
| CENTER | Y | CENT-REU-PIPELINE FROM WWTP TO LAKE CENTER | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK; WATER TREATMENT PLANT EXPANSION | $13,579,000 | 2020 |
| CENTER | Y | CENT-TOL-TOLEDO BEND TO CENTER | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK; WATER TREATMENT PLANT EXPANSION | $27,775,000 | 2040 |
| CHANDLER | N | HDSN-CHN – PURCHASE FROM TYLER | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION | $1,886,000 | 2020 |
| COUNTY-OTHER, JEFFERSON | N | JEFF-CTR INFRASTRUCTURE | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK | $14,236,000 | 2050 |
| COUNTY-OTHER, NACOGDOCHES | N | NACN-LK - LAKE NACONICHE INFRASTRUCTURE | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK; WATER TREATMENT PLANT EXPANSION | $34,492,000 | 2040 |
| CRYSTAL SYSTEMS INC | N | SMTH-CYS - INFRASTRUCTURE | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK | $2,021,000 | 2020 |
| D&M WSC | N | NACW-DMW - NEW WELLS IN CARRIZO AQUIFER | CONVEYANCE/TRANSMISSION PIPELINE; LOWER GROUNDWATER WELL PUMP; MULTIPLE WELLS/WELL FIELD; STORAGE TANK | $3,484,000 | 2020 |
| G M WSC | N | GM-WSC-ELEVATED TANK | STORAGE TANK | $745,500 | 2020 |
| G M WSC | N | GM-WSC-SURFACE WATER PLANT IMPROVEMENTS | WATER TREATMENT PLANT EXPANSION | $2,483,000 | 2020 |
| G M WSC | N | GM-WSC-WATER SYSTEM EXPANSION | CONVEYANCE/TRANSMISSION PIPELINE | $1,990,490 | 2020 |
| G M WSC | N | GM-WSC-WATERLINE IMPROVEMENTS | CONVEYANCE/TRANSMISSION PIPELINE | $2,680,400 | 2020 |
| HOUSTON COUNTY WCID #1 | Y | HCWC-GW INFRASTRUCTURE | CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD | $22,793,000 | 2020 |
| IRRIGATION, HOUSTON | N | HOUS-IRR INFRASTRUCTURE | MULTIPLE WELLS/WELL FIELD; CONVEYANCE/TRANSMISSION PIPELINE | $12,926,000 | 2020 |
| IRRIGATION, ORANGE | N | ORAN-IRR-INFRASTRUCTURE | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK | $13,281,000 | 2020 |
| IRRIGATION, TRINITY | N | TRTY-IRR INFRASTRUCTURE | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK | $2,174,000 | 2020 |
| JACKSONVILLE | Y | JACK-COL | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK; WATER TREATMENT PLANT EXPANSION | $20,645,000 | 2030 |
| LINDALE | N | SMTH-LDL-INFRASTRUCTURE | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK | $5,803,000 | 2020 |

# Recommended Projects Associated with Water Management Strategies

| Sponsor Name | Is Sponsor a WWP? | Project Name | Project Description | Capital Cost | Online Decade |
|---|---|---|---|---|---|
| LIVESTOCK, NACOGDOCHES | N | NACW-LTK - NEW WELLS IN CARRIZO WILCOX | CONVEYANCE/TRANSMISSION PIPELINE; LOWER GROUNDWATER WELL PUMP; MULTIPLE WELLS/WELL FIELD; STORAGE TANK | $23,770,000 | 2020 |
| LIVESTOCK, SHELBY | N | SHEL-LTK INFRASTRUCTURE | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK | $25,238,000 | 2020 |
| LOWER NECHES VALLEY AUTHORITY | Y | LNVA-JEFF - CONSTRUCTED LEVY | PUMP STATION; RESERVOIR CONSTRUCTION | $34,989,000 | 2020 |
| LOWER NECHES VALLEY AUTHORITY | Y | LNVA-SRA INFRASTRUCTURE | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK | $399,955,000 | 2040 |
| LUFKIN | Y | LUFK-RAY PHASE 1 | CONVEYANCE/TRANSMISSION PIPELINE; NEW WATER TREATMENT PLANT; PUMP STATION; STORAGE TANK | $49,368,000 | 2030 |
| LUFKIN | Y | LUFK-RAY PHASE 2 | PUMP STATION; WATER TREATMENT PLANT EXPANSION | $37,863,000 | 2040 |
| LUFKIN | Y | LUFK-RAY PHASE 3 | PUMP STATION | $2,760,000 | 2050 |
| MANUFACTURING, JASPER | N | JASP-MFG INFRASTRUCTURE | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK | $33,497,000 | 2030 |
| MANUFACTURING, JEFFERSON | N | JEFF-MFG INFRASTRUCTURE | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK | $312,255,000 | 2020 |
| MANUFACTURING, ORANGE | N | ORAN-MFG | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK | $42,621,000 | 2020 |
| MANUFACTURING, SMITH | N | SMTH-MFG-INFRASTRUCTURE | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK | $7,272,000 | 2020 |
| MINING, ANGELINA | N | ANGL-MIN-INFRASTRUCTURE | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK | $4,005,000 | 2020 |
| MINING, NACOGDOCHES | N | NACW-MIN-INFRASTRUCTURE | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK | $12,465,000 | 2020 |
| MINING, RUSK | N | RUSK-MIN | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK | $14,158,000 | 2020 |
| MINING, SAN AUGUSTINE | N | SAUG-MIN-INFRASTRUCTURE | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK | $21,064,000 | 2020 |
| MINING, SMITH | N | SMTH-MIN-INFRASTRUCTURE | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK | $3,103,000 | 2020 |
| NACOGDOCHES | Y | NACP-COL | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK; WATER TREATMENT PLANT EXPANSION | $35,829,000 | 2040 |
| OVERTON | N | OVER ENHANCED WATER LOSS CONTROL PROGRAM | WATER LOSS CONTROL | $2,105,000 | 2040 |
| PORT ARTHUR | Y | PORT ENHANCED WATER LOSS CONTROL PROGRAM | WATER LOSS CONTROL | $50,075,000 | 2020 |
| SABINE RIVER AUTHORITY | Y | SRA-INF - PUMPSTATION FOR SRA | CANAL LINING; CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK | $72,832,675 | 2020 |
| STEAM ELECTRIC POWER, ANDERSON | N | AND-SEP1 - PIPELINE FROM LAKE PALESTINE - CONTRACT WITH CITY OF PALESTINE | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION | $44,576,000 | 2020 |
| STEAM ELECTRIC POWER, CHEROKEE | N | CHER-SEP INFRASTRUCTURE | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK | $16,735,000 | 2020 |
| STEAM ELECTRIC POWER, JEFFERSON | N | JEFF-SEP INFRASTRUCTURE | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK | $54,518,000 | 2020 |
| STEAM ELECTRIC POWER, NACOGDOCHES | N | NACW-SEP1 - LAKE COLUMBIA INFRASTRUCTURE | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK | $25,805,000 | 2030 |
| STEAM ELECTRIC POWER, NACOGDOCHES | N | NACW-SEP2 - NEW WELLS IN CARRIZO WILCOX | CONVEYANCE/TRANSMISSION PIPELINE; LOWER GROUNDWATER WELL PUMP; MULTIPLE WELLS/WELL FIELD; STORAGE TANK | $16,021,000 | 2070 |
| STEAM ELECTRIC POWER, NEWTON | N | NEWT-SEP INFRASTRUCTURE | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK | $38,170,000 | 2020 |
| STEAM ELECTRIC POWER, ORANGE | N | ORAN-SEP | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK | $15,847,000 | 2020 |
| STEAM ELECTRIC POWER, RUSK | N | RUSK-SEP INFRASTRUCTURE | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK | $57,718,000 | 2050 |
| TYLER | Y | TYL-PAL - PALESTINE INFRASTRUCTURE | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; WATER TREATMENT PLANT EXPANSION | $93,050,000 | 2030 |
| UPPER NECHES RIVER MUNICIPAL WATER AUTHORITY | Y | UNM-ROR-NECHES RUN OF RIVER INFRASTRUCTURE | CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK | $444,085,000 | 2020 |

# Recommended Projects Associated with Water Management Strategies

| | |
|---|---|
| **Region I Total Recommended Capital Cost** | **$2,753,935,065** |

***Projects with a capital cost of zero are excluded from the report list.**

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# Appendix 5B-D

# Alternate Water Management Strategies by WUG

# DB17 Report

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This appendix includes a copy of the Water User Group Alternate Water Management Strategy data from the TWDB Data Web Interface known as the DB17. The summary is divided by Water User Group.

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# Alternative Water User Group (WUG) Water Management Strategies (WMS)

## WUG Entity Primary Region: I

| | | | | Water Management Strategy Supplies | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **WUG Entity Name** | **WMS Sponsor Region** | **WMS Name** | **Source Name** | **2020** | **2030** | **2040** | **2050** | **2060** | **2070** | **Unit Cost 2020** | **Unit Cost 2070** |
| ATHENS MUNICIPAL WATER AUTHORITY - UNASSIGNED WATER VOLUMES | C | ALTERNATIVE - ATHENS MWA NEW WELLS | C \| CARRIZO-WILCOX AQUIFER \| HENDERSON COUNTY | 0 | 0 | 0 | 0 | 0 | 0 | N/A | N/A |
| HOUSTON COUNTY WCID #1 - UNASSIGNED WATER VOLUMES | I | HCWC-GW1 NEW WELLS | I \| CARRIZO-WILCOX AQUIFER \| HOUSTON COUNTY | 1,054 | 1,054 | 1,054 | 1,054 | 1,054 | 1,054 | $225 | $225 |
| HOUSTON COUNTY WCID #1 - UNASSIGNED WATER VOLUMES | I | HCWC-GW2 AVAILABILITY INCREASE | I \| CARRIZO-WILCOX AQUIFER \| HOUSTON COUNTY | 2,446 | 2,446 | 2,446 | 2,446 | 2,446 | 2,446 | $522 | $522 |
| IRRIGATION, TRINITY | I | TRTY-IRR NEW CONTRACT | I \| YEGUA-JACKSON AQUIFER \| TRINITY COUNTY | 331 | 331 | 331 | 331 | 331 | 331 | $988 | $988 |
| | | | | | | | | | | | |
| **Region I Total Alternative WMS Supplies** | | | | 3,831 | 3,831 | 3,831 | 3,831 | 3,831 | 3,831 | | |

# Alternative Projects Associated with Water Management Strategies

## Project Sponsor Region: I

| Sponsor Name | Is Sponsor a WWP? | Project Name | Project Description | Capital Cost | Online Decade |
|---|---|---|---|---|---|
| | | | **Region I Total Alternative Capital Cost** | | |

*Projects with a capital cost of zero are excluded from the report list.

# Appendix 5B-E

# Management Supply Factor DB17 Report

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This appendix will include a copy of the Management Supply Factor data from the TWDB Data Web Interface known as the DB17. The summary will be divided by Water User Group and Wholesale Water Provider by decade. Management supply factors may be used to take into account uncertainties associated with:

- Projections of populations;
- Projections of water demands;
- Climate variability;
- Yield of recommended WMSs;
- Permitting or other uncertainties impacting implementation of projects; and/or
- Other uncertainties.

The TWDB will make this DB17 report available to RWPGs after submittal of the 2016 Initially Prepared Plan.

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# Water User Group (WUG) Management Supply Factor

| REGION I | WUG MANAGEMENT SUPPLY FACTOR | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| ALTO | 2.0 | 3.5 | 3.3 | 3.0 | 2.8 | 1.6 |
| ALTO RURAL WSC | 1.2 | 1.1 | 1.0 | 1.0 | 1.0 | 1.0 |
| ANGELINA WSC | 2.1 | 2.1 | 2.1 | 2.0 | 1.9 | 1.8 |
| APPLEBY WSC | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 1.0 |
| ARP | 1.0 | 3.5 | 3.5 | 3.4 | 3.3 | 1.4 |
| BEAUMONT | 1.0 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| BECKVILLE | 4.4 | 4.0 | 3.9 | 3.7 | 3.6 | 3.5 |
| BERRYVILLE | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| BETHEL-ASH WSC | 1.8 | 1.7 | 1.5 | 1.4 | 1.3 | 1.2 |
| BEVIL OAKS | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| BRIDGE CITY | 1.0 | 1.0 | 1.1 | 1.0 | 1.0 | 1.0 |
| BROWNSBORO | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| BRUSHY CREEK WSC | 2.5 | 2.5 | 2.6 | 2.6 | 2.6 | 2.5 |
| BULLARD | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| BURKE | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| CARTHAGE | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| CENTER | 1.6 | 1.6 | 2.6 | 2.6 | 2.5 | 2.4 |
| CENTRAL WCID OF ANGELINA COUNTY | 1.8 | 1.8 | 1.7 | 1.6 | 1.5 | 1.5 |
| CHALK HILL SUD | 3.2 | 3.0 | 2.9 | 2.7 | 2.4 | 2.2 |
| CHANDLER | 1.4 | 1.2 | 1.1 | 1.3 | 1.2 | 1.1 |
| CHINA | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| COLMESNEIL | 2.4 | 2.4 | 2.5 | 2.5 | 2.5 | 2.5 |
| CORRIGAN | 1.3 | 1.2 | 1.2 | 1.1 | 1.0 | 1.0 |
| COUNTY-OTHER, ANDERSON | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| COUNTY-OTHER, ANGELINA | 1.2 | 1.2 | 1.2 | 1.1 | 1.1 | 1.0 |
| COUNTY-OTHER, CHEROKEE | 1.6 | 4.7 | 4.5 | 4.1 | 3.8 | 1.7 |
| COUNTY-OTHER, HARDIN | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| COUNTY-OTHER, HENDERSON | 1.4 | 1.5 | 1.5 | 1.5 | 1.5 | 1.6 |
| COUNTY-OTHER, HOUSTON | 2.0 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 |
| COUNTY-OTHER, JASPER | 1.1 | 1.1 | 1.1 | 1.2 | 1.2 | 1.2 |
| COUNTY-OTHER, JEFFERSON | 1.1 | 1.1 | 1.1 | 1.0 | 1.0 | 1.0 |
| COUNTY-OTHER, NACOGDOCHES | 1.0 | 1.3 | 1.3 | 1.3 | 1.2 | 1.0 |
| COUNTY-OTHER, NEWTON | 1.5 | 1.5 | 1.6 | 1.6 | 1.6 | 1.6 |
| COUNTY-OTHER, ORANGE | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| COUNTY-OTHER, PANOLA | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| COUNTY-OTHER, RUSK | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 |
| COUNTY-OTHER, SABINE | 5.1 | 5.5 | 5.7 | 5.8 | 5.8 | 5.8 |
| COUNTY-OTHER, SAN AUGUSTINE | 1.8 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 |
| COUNTY-OTHER, SHELBY | 1.2 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| COUNTY-OTHER, TRINITY | 3.2 | 3.1 | 3.1 | 3.2 | 3.1 | 3.0 |
| COUNTY-OTHER, TYLER | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| CRAFT-TURNEY WSC | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| CROCKETT | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |
| CROSS ROADS SUD | 2.7 | 2.6 | 2.4 | 2.3 | 2.1 | 1.9 |
| CUSHING | 1.8 | 1.7 | 1.6 | 1.4 | 1.3 | 1.2 |
| D&M WSC | 1.3 | 1.2 | 1.1 | 1.0 | 1.0 | 1.0 |
| DEAN WSC | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| DIBOLL | 4.0 | 3.9 | 3.8 | 3.7 | 3.5 | 3.4 |
| ELKHART | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 |
| FOUR PINES WSC | 1.6 | 1.6 | 1.7 | 1.7 | 1.7 | 1.7 |

# Water User Group (WUG) Management Supply Factor

| REGION I | WUG MANAGEMENT SUPPLY FACTOR | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| FOUR WAY SUD | 2.5 | 2.4 | 2.3 | 2.2 | 2.1 | 2.1 |
| FRANKSTON | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.5 |
| G M WSC | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |
| GARRISON | 2.5 | 2.3 | 2.1 | 1.9 | 1.7 | 1.6 |
| GRAPELAND | 3.4 | 3.5 | 3.6 | 3.7 | 3.7 | 3.7 |
| GROVES | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| HEMPHILL | 2.4 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| HENDERSON | 1.8 | 1.7 | 2.8 | 2.5 | 2.3 | 2.1 |
| HUDSON | 1.7 | 1.6 | 1.6 | 1.5 | 1.5 | 1.5 |
| HUDSON WSC | 2.8 | 2.7 | 2.5 | 2.4 | 2.3 | 2.2 |
| HUNTINGTON | 4.6 | 4.5 | 4.4 | 4.3 | 4.1 | 4.0 |
| IRRIGATION, ANDERSON | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| IRRIGATION, ANGELINA | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 |
| IRRIGATION, CHEROKEE | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| IRRIGATION, HARDIN | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| IRRIGATION, HENDERSON | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.8 |
| IRRIGATION, HOUSTON | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| IRRIGATION, JASPER | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| IRRIGATION, JEFFERSON | 1.3 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| IRRIGATION, NACOGDOCHES | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 |
| IRRIGATION, NEWTON | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| IRRIGATION, ORANGE | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| IRRIGATION, PANOLA | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 |
| IRRIGATION, POLK | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 |
| IRRIGATION, RUSK | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| IRRIGATION, SAN AUGUSTINE | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| IRRIGATION, SHELBY | 3.8 | 3.8 | 3.8 | 3.8 | 3.8 | 3.8 |
| IRRIGATION, SMITH | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| IRRIGATION, TRINITY | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 |
| IRRIGATION, TYLER | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| IVANHOE | 2.4 | 2.4 | 2.5 | 2.5 | 2.5 | 2.5 |
| IVANHOE NORTH | 3.5 | 3.6 | 3.7 | 3.7 | 3.7 | 3.7 |
| JACKSON WSC | 1.0 | 3.0 | 2.9 | 2.7 | 2.5 | 2.4 |
| JACKSONVILLE | 1.0 | 2.5 | 2.4 | 2.3 | 2.2 | 2.1 |
| JASPER | 2.8 | 2.8 | 2.9 | 2.9 | 2.9 | 2.9 |
| JASPER COUNTY WCID #1 | 4.8 | 5.1 | 5.2 | 5.2 | 5.2 | 5.2 |
| JEFFERSON COUNTY WCID #10 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| JOAQUIN | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 |
| KIRBYVILLE | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| KOUNTZE | 4.1 | 4.2 | 4.4 | 4.4 | 4.4 | 4.4 |
| LILLY GROVE SUD | 1.8 | 1.6 | 1.5 | 1.4 | 1.2 | 1.1 |
| LIVESTOCK, ANDERSON | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| LIVESTOCK, ANGELINA | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| LIVESTOCK, CHEROKEE | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| LIVESTOCK, HARDIN | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 |
| LIVESTOCK, HENDERSON | 3.4 | 3.4 | 3.4 | 3.3 | 2.7 | 2.2 |
| LIVESTOCK, HOUSTON | 1.4 | 1.3 | 1.3 | 1.2 | 1.2 | 1.1 |
| LIVESTOCK, JASPER | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 |
| LIVESTOCK, JEFFERSON | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| LIVESTOCK, NACOGDOCHES | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |

# Water User Group (WUG) Management Supply Factor

| REGION I | WUG MANAGEMENT SUPPLY FACTOR | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| LIVESTOCK, NEWTON | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 |
| LIVESTOCK, ORANGE | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |
| LIVESTOCK, PANOLA | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| LIVESTOCK, POLK | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |
| LIVESTOCK, RUSK | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| LIVESTOCK, SABINE | 4.6 | 3.4 | 2.6 | 2.0 | 1.6 | 1.6 |
| LIVESTOCK, SAN AUGUSTINE | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| LIVESTOCK, SHELBY | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| LIVESTOCK, SMITH | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| LIVESTOCK, TRINITY | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| LIVESTOCK, TYLER | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| LOVELADY | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 |
| LUFKIN | 1.0 | 1.8 | 3.2 | 3.8 | 3.5 | 3.2 |
| LUMBERTON | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| LUMBERTON MUD | 5.6 | 5.3 | 5.0 | 4.9 | 4.7 | 4.5 |
| MANUFACTURING, ANDERSON | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| MANUFACTURING, ANGELINA | 0.7 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| MANUFACTURING, CHEROKEE | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| MANUFACTURING, HARDIN | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| MANUFACTURING, HOUSTON | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| MANUFACTURING, JASPER | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| MANUFACTURING, JEFFERSON | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| MANUFACTURING, NACOGDOCHES | 4.9 | 4.6 | 4.3 | 4.1 | 3.9 | 3.7 |
| MANUFACTURING, NEWTON | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| MANUFACTURING, ORANGE | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| MANUFACTURING, PANOLA | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| MANUFACTURING, POLK | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| MANUFACTURING, RUSK | 18.8 | 17.5 | 16.5 | 15.8 | 14.8 | 13.8 |
| MANUFACTURING, SABINE | 1.8 | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 |
| MANUFACTURING, SAN AUGUSTINE | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.3 |
| MANUFACTURING, SHELBY | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| MANUFACTURING, SMITH | 1.1 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| MANUFACTURING, TYLER | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| MAURICEVILLE SUD | 2.4 | 2.4 | 2.4 | 2.3 | 2.3 | 2.3 |
| MEEKER MUD | 1.2 | 1.2 | 1.1 | 1.1 | 1.0 | 1.0 |
| MELROSE WSC | 1.6 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 |
| MINING, ANDERSON | 1.4 | 1.2 | 1.2 | 1.3 | 1.7 | 2.2 |
| MINING, ANGELINA | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| MINING, CHEROKEE | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| MINING, HARDIN | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| MINING, HOUSTON | 1.0 | 1.0 | 2.3 | 3.1 | 10.8 | 23.7 |
| MINING, JASPER | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| MINING, JEFFERSON | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| MINING, NACOGDOCHES | 1.0 | 1.0 | 1.0 | 1.2 | 1.6 | 2.2 |
| MINING, NEWTON | 1.0 | 1.0 | 1.1 | 1.5 | 2.2 | 2.9 |
| MINING, ORANGE | 1.1 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| MINING, PANOLA | 1.6 | 1.6 | 1.8 | 2.1 | 2.6 | 2.4 |
| MINING, RUSK | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| MINING, SABINE | 1.5 | 1.7 | 1.9 | 2.2 | 2.6 | 2.9 |
| MINING, SAN AUGUSTINE | 1.0 | 1.0 | 1.3 | 1.6 | 2.1 | 2.9 |

# Water User Group (WUG) Management Supply Factor

| REGION I | WUG MANAGEMENT SUPPLY FACTOR | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| MINING, SHELBY | 1.0 | 1.0 | 1.1 | 1.4 | 1.2 | 1.6 |
| MINING, TRINITY | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 |
| MINING, TYLER | 1.5 | 1.2 | 1.6 | 2.3 | 4.3 | 8.2 |
| MURCHISON | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| NACOGDOCHES | 1.0 | 2.2 | 2.1 | 2.0 | 1.9 | 1.8 |
| NEDERLAND | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| NEW CHAPEL HILL | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| NEW LONDON | 1.5 | 3.4 | 3.1 | 2.9 | 2.6 | 1.3 |
| NEW SUMMERFIELD | 1.6 | 17.0 | 15.9 | 14.7 | 13.5 | 3.4 |
| NEWTON | 1.1 | 1.1 | 1.1 | 1.1 | 1.2 | 1.2 |
| NOME | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| NOONDAY | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| NORTH CHEROKEE WSC | 1.0 | 7.7 | 7.3 | 6.8 | 6.3 | 2.0 |
| NORTH HARDIN WSC | 3.5 | 3.4 | 3.3 | 3.2 | 3.1 | 3.0 |
| ORANGE | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| ORANGEFIELD WSC | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| OVERTON | 1.2 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| PALESTINE | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| PINEHURST | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| PINELAND | 1.1 | 1.1 | 1.2 | 1.2 | 1.2 | 1.2 |
| PORT ARTHUR | 1.3 | 1.4 | 1.4 | 1.5 | 1.5 | 1.5 |
| PORT NECHES | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| REDLAND WSC | 3.9 | 3.9 | 3.7 | 3.6 | 3.5 | 3.4 |
| ROSE CITY | 6.8 | 6.7 | 6.7 | 6.6 | 6.5 | 6.4 |
| RUSK | 1.4 | 5.2 | 4.9 | 4.5 | 4.1 | 1.6 |
| RUSK RURAL WSC | 1.5 | 3.7 | 3.5 | 3.3 | 3.0 | 1.4 |
| SAN AUGUSTINE | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| SILSBEE | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.8 |
| SOUR LAKE | 3.3 | 3.3 | 3.2 | 3.2 | 3.1 | 3.1 |
| SOUTH NEWTON WSC | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| SOUTHERN UTILITIES COMPANY | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| STEAM ELECTRIC POWER, ANDERSON | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.8 |
| STEAM ELECTRIC POWER, ANGELINA | 16.8 | 16.8 | 16.8 | 16.8 | 16.8 | 16.8 |
| STEAM ELECTRIC POWER, CHEROKEE | 7.3 | 9.6 | 10.2 | 8.6 | 7.2 | 6.5 |
| STEAM ELECTRIC POWER, JEFFERSON | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| STEAM ELECTRIC POWER, NACOGDOCHES | 2.7 | 2.3 | 1.9 | 1.5 | 1.2 | 1.1 |
| STEAM ELECTRIC POWER, NEWTON | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| STEAM ELECTRIC POWER, ORANGE | 1.2 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| STEAM ELECTRIC POWER, RUSK | 1.6 | 1.4 | 1.2 | 1.0 | 1.0 | 1.0 |
| STEAM ELECTRIC POWER, TYLER | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| SWIFT WSC | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 |
| TATUM | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 1.0 |
| TENAHA | 1.9 | 1.9 | 1.8 | 1.7 | 1.6 | 1.6 |
| THE CONSOLIDATED WSC | 2.2 | 2.3 | 2.3 | 2.4 | 2.3 | 2.3 |
| TIMPSON | 3.2 | 3.0 | 2.9 | 2.8 | 2.7 | 2.6 |
| TROUP | 1.0 | 10.7 | 10.0 | 9.3 | 8.7 | 2.4 |
| TYLER | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| TYLER COUNTY WSC | 1.6 | 1.6 | 1.7 | 1.7 | 1.7 | 1.7 |
| VIDOR | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| WALNUT GROVE WSC | 1.9 | 1.7 | 1.5 | 1.3 | 1.2 | 1.0 |

# Water User Group (WUG) Management Supply Factor

| REGION I | WUG MANAGEMENT SUPPLY FACTOR | | | | | |
|---|---|---|---|---|---|---|
| | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
| WALSTON SPRINGS WSC | 1.0 | 1.0 | 1.0 | 1.1 | 1.1 | 1.1 |
| WELLS | 2.7 | 2.6 | 2.4 | 2.2 | 2.1 | 1.9 |
| WEST HARDIN WSC | 2.7 | 2.7 | 2.6 | 2.6 | 2.6 | 2.6 |
| WEST JEFFERSON COUNTY MWD | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| WEST ORANGE | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| WHITEHOUSE | 1.0 | 7.4 | 6.7 | 6.0 | 5.5 | 1.8 |
| WODEN WSC | 2.3 | 2.2 | 2.0 | 1.8 | 1.7 | 1.5 |
| WOODVILLE | 6.5 | 6.6 | 6.7 | 6.7 | 6.7 | 6.7 |
| WRIGHT CITY WSC | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 |
| ZAVALLA | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |

*WUG supplies and projected demands are entered for each of a WUG's region-county-basin divisions. To calculate the Management Supply Factor for each WUG as a whole, not split by region-county-basin the combined total of existing and future supply is divided by the total projected demand.

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# Appendix 5C-A

# Model Water Conservation Plan for Public Water Suppliers

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This appendix includes a Model Water Conservation Plan for Municipal Water Users in the ETRWPA. The model plan addresses the latest Texas Commission on Environment Quality requirements and is intended to be modified by each user to best reflect the activities appropriate to the entity. The model plan also includes sample appendices required:

- Appendix A – List of References
- Appendix B – Texas Commission on Environmental Quality Rules on Municipal Water Conservation Plans
- Appendix C – TCEQ Utility Profile
- Appendix D – TCEQ Water Conservation Implementation Report
- Appendix E – TWDB Annual Water Conservation Report
- Appendix F – City Council Resolution Adopting Plan

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# Water Conservation Plan for [Entity]

# Date

## TABLE OF CONTENTS

## APPENDICES

# Water Conservation Plan for [Entity]

## 1. INTRODUCTION AND OBJECTIVES

Recognizing the need for efficient use of existing water supplies, the Texas Commission on Environmental Quality (TCEQ) has developed guidelines and requirements governing the development of water conservation plans for public water suppliers.

The objectives of this water conservation plan are as follows:

- To reduce water consumption from the levels that would prevail without conservation efforts.
- To reduce the loss and waste of water.
- To improve efficiency in the use of water.
- To document the level of recycling and reuse in the water supply.
- To extend the life of current water supplies by reducing the rate of growth in demand.

The water conservation plan presented in this document is a model water conservation plan intended for use as a template by retail public water suppliers in Region I. This model plan includes all of the elements required by TCEQ. In order to modify this plan, each water supplier will need to do the following:

- Complete the TCEQ water utility profile (provided in Appendix C).
- Complete the TCEQ water conservation implementation report (provided in Appendix D).
- Complete the Texas Water Development Board (TWDB) annual water conservation report (provided in Appendix E).
- Set five- and ten-year goals for per capita water use.
- Adopt ordinance(s) or regulation(s) approving the model plan.

The final adopted version should be provided to the TCEQ and the TWDB.

## 2. TEXAS COMMISSION ON ENVIRONMENTAL QUALITY RULES

### 2.1 Conservation Plans

The TCEQ rules governing development of water conservation plans for public water suppliers are contained in Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.2 of the Texas Administrative Code, which is included in Appendix B. For the purpose of these rules, a water conservation plan is defined as "A strategy or combination of strategies for reducing the volume of water withdrawn from a water supply source, for reducing the loss or waste of water, for maintaining or improving the efficiency in the use of water, for increasing the recycling and reuse of water, and for preventing the pollution of water."[1] The elements in the TCEQ water conservation rules covered in this conservation plan are listed below.

Minimum Conservation Plan Requirements

The minimum requirements in the Texas Administrative Code for Water Conservation Plans for Public Water Suppliers are covered in this report as follows:

- 288.2(a)(1)(A) – Utility Profile – Section 3 and Appendix C
- 288.2(a)(1)(B) – Record Management System – Section 4
- 288.2(a)(1)(C) – Specification of Goals – Section 5
- 288.2(a)(1)(D) – Accurate Metering – Section 6.1
- 288.2(a)(1)(E) – Universal Metering – Section 6.1
- 288.2(a)(1)(F) – Determination and Control of Water Loss – Section 6.2
- 288.2(a)(1)(G) – Public Education and Information Program – Section 7
- 288.2(a)(1)(H) – Non-Promotional Water Rate Structure – Section 8
- 288.2(a)(1)(I) – Reservoir System Operation Plan – Section 9.2

[1] Title 30 of the Texas Administrative Code, Part 1, Chapter 288, Subchapter A, Rules 288.1 and 288.2, and Subchapter B, Rule 288.20, downloaded from http://www.tnrcc.state.tx.us/oprd/rules/pdflib/288a.pdf, May 2014.

- 288.2(a)(1)(J) – Means of Implementation and Enforcement – Section 10
- 288.2(a)(1)(K) – Coordination with Regional Water Planning Group – Section 9.5
- 288.2(c) – Review and Update Plan – Section 10

Conservation Additional Requirements (Population over 5,000)

The Texas Administrative Code includes additional requirements for water conservation plans for cities with a population over 5,000:

- 288.2(a)(2)(A) – Leak Detection, Repair, and Water Loss Accounting – Sections 6.2, 6.3, and 6.4
- 288.2(a)(2)(B) – Requirement for Water Conservation Plans by Wholesale Customers – Section 9.4

Additional Conservation Strategies

TCEQ rules also list additional optional but not required conservation strategies, which may be adopted by suppliers. The following optional strategies are included in this plan:

- 288.2(a)(3)(A) – Conservation Oriented Water Rates – Section 8
- 288.2(a)(3)(B) – Ordinances, Plumbing Codes or Rules on Water-Conserving Fixtures – Section 9.1
- 288.2(a)(3)(F) – Considerations for Landscape Water Management Regulations – Section 9.3
- 288.2(a)(3)(G) – Monitoring Method – Section 6.4

## 3. WATER UTILITY PROFILE

Appendix C to this water conservation plan is a sample water utility profile based on the format recommended by the TCEQ.

*[Water supplier is to complete the utility profile and provide information on the public water supply system and customers if appropriate for this section.]*

## 4. RECORD MANAGEMENT SYSTEM

As required by TAC Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.2(a)(1)(B), the record management system allows for the separation of water sales and uses into single-family residential, multi-family residential, commercial, public/institutional, industrial, agricultural, and wholesale categories. This information will be included in an annual water conservation implementation report, as described in Section 6.4 below.

For those entities whose record management systems do not currently allow for the separation of water sales as described above, they will move to implement such a system upon the purchase of new billing software.

## 5. SPECIFICATION OF WATER CONSERVATION GOALS

*[Current TCEQ rules require the adoption of specific water conservation goals for a water conservation plan. As part of plan adoption, each water supplier will develop 5-year and 10-year targets for water savings to include goals for water loss programs and goals for municipal use in total gallons per capita per day (GPCD) and residential GPCD.]*

The goals for this water conservation plan include the following:

- Strive to attain the total per capita municipal water use below the specified amount in gallons per capita per day shown in the "Targets and Goals" section of Appendix D using a 5-year rolling average calculation. ( See 5-year and 10-year goals in Appendix D).
- Similarly, strive to attain residential per capita water use of *[gpcd]* by *[5 years]* and *[gpcd]* by *[10 years]*.
- Conduct water audits as required by the TCEQ and maintain water loss to *[insert amount]* percent of the total water used through existing and new maintenance programs.
- Raise public awareness of water conservation and encourage responsible public

behavior by a public education and information program, as discussed in Section 7.

## 6. METERING, WATER USE RECORDS, CONTROL OF UNACCOUNTED WATER, AND LEAK DETECTION AND REPAIR

One of the key elements in water conservation is careful tracking of water use and control of losses through illegal diversions and leaks. Careful metering of water deliveries and water use, detection and repair of leaks in the distribution system and regular monitoring of unaccounted water are important in controlling losses. *[Water suppliers serving a population of 5,000 people or more or a having a projected population of greater than 5,000 people or more within the next ten years must include the following elements in their water conservation plans:]*

### 6.1 Metering of Customer and Public Uses and Meter Testing, Repair, and Replacement

All customers of wholesale or retail public water suppliers, including public and governmental users, should be metered. In many cases, water suppliers already meter all of their water users. For those water suppliers who do not currently meter all of their water uses, these entities will implement a program to meter all water uses within the next five years.

Most water suppliers test and replace their customer meters on a regular basis. All customer meters should be replaced on a 15-year cycle. Those who do not currently have a meter testing and replacement program will implement such a program over the next five years.

### 6.2 Determination and Control of Water Loss

Total water loss is the volume of water diverted or purchased minus water delivered to customers minus authorized but unmetered uses. (Authorized but unmetered uses would include use for fire fighting, releases for flushing of lines, etc.) The TWDB water loss

audit worksheet divides total water loss into apparent losses and real losses:

- Apparent water loss is water which is used by customers but for which the utility is not compensated. Reducing apparent losses increases the city's utility revenue but does not reduce water usage. Apparent water losses include:
  - Inaccuracies in customer meters. (Customer meters tend to run more slowly as they age and under-report actual use.)
  - Losses due to illegal connections and theft.
  - Systematic data handling errors
- Real water loss is water which is physically lost from the water system before it can be used by customers. Identifying and preventing real losses decreases a utility's costs and decreases water usage. Real water losses include:
  - Reported leaks.
  - Unreported leaks.

Measures to control water loss are part of the routine operations of water suppliers. Water audits are useful methods of accounting for water usage within a system. Water audits will be conducted by water suppliers in order to decrease water loss. Maintenance crews and personnel will look for and report evidence of leaks in the water distribution system. The leak detection and repair program is described in Section 6.3 below. Meter readers are asked to watch for and report signs of illegal connections, so they can be addressed quickly. Water loss is calculated as part of the water conservation implementation report (Appendix D) and the annual water conservation report (Appendix E).

### 6.3 Leak Detection and Repair

City crews and personnel will look for and report evidence of leaks in the water distribution system. Areas of the water distribution system in which numerous leaks and line breaks occur are targeted for replacement as funds are available.

## 6.4 Monitoring of Effectiveness and Efficiency - Water Conservation Reports

*[Entities that are required to submit a water conservation plan must also submit a water conservation implementation report with the plan (30 TAC 288.30(2). This report includes statistics from the previous five-year implementation period. The TCEQ has provided a template on its web site.*[5]

*The Texas Water Development Board (TWDB) also requires entities that serve 3,300 connections or more, that hold a surface water right, or that are applying for or receiving more than $500,000 in financial assistance from the TWDB to file an annual water conservation report with the TWDB by May 1 each year. This report includes statistics from the previous year. The TWDB has provided a template on its web site.*[6]*]*

A completed five-year water conservation implementation report is attached in Appendix D. The city will use this report to monitor the effectiveness and efficiency of the water conservation program and to plan conservation-related activities. In this report, the city has documented water use accounting, system data, per-capita water use and water loss, water conservation programs and activities, and estimated water savings for previous five years. In addition, the city has compared current per capita water use to the targets and goals established in this plan (Section 4.3).

An annual water conservation report will be completed by *[insert date]* of the following year and will be submitted to the TWDB. This report will record water use accounting, system data, targets and goals, per-capita water use and water loss, and water conservation programs and activities for the previous year. The report will be used to monitor the effectiveness and efficiency of the water conservation program and to plan conservation-related activities for the next year. The report for *[last year]* is attached in Appendix E.

## 7. CONTINUING PUBLIC EDUCATION AND INFORMATION CAMPAIGN

The continuing public education and information campaign on water conservation includes the following elements: *[Water provider is to select the appropriate measures for its system.]*

- Insert water conservation information with water bills. Inserts will include material developed by the [water supplier] staff and material obtained from the TWDB, the TCEQ, and other sources.
- Encourage local media coverage of water conservation issues and the importance of water conservation.
- Make the *Texas Smartscape CD*, water conservation brochures, and other water conservation materials available to the public.
- Make information on water conservation available on its website (if any) and include links to the *Texas Smartscape* website and to information on water conservation on the TWDB and TCEQ web sites.
- Provide water conservation materials to schools and utilize existing age-appropriate education programs available through the TCEQ and TWDB.
- Support the State-initiated Water Conservation Awareness and Education Campaign.

## 8. WATER RATE STRUCTURE

*[If a water supplier has a decreasing block rate structure, it is recommended that a flat rate or increasing rate structure be adopted.]*

An increasing block rate water structure that is intended to encourage water conservation and discourage excessive use and waste of water will be adopted upon completion of the next rate study or within five years. An example water rate structure is as follows:

Residential Rates

1. Monthly minimum charge. This can (but does not have to) include up to 2,000 gallons water use with no additional charge.
2. Base charge per 1,000 gallons up to the approximate average residential use.
3. 2nd tier (from the average to 2 times the approximate average) at 1.25 to 2.0 times the base charge.
4. 3rd tier (above 2 times the approximate average) at 1.25 to 2.0 times the 2nd tier.
5. The residential rate can also include a lower tier for basic household use up to 4,000 gallons per month or so.

Commercial/Industrial Rates

Commercial/industrial rates should include at least 2 tiers, with rates for the 2nd tier at 1.25 to 2.0 times the first tier.

*[If a water supplier has an increasing rate structure, state the current rate structure as follows.]*

The [water supplier] has adopted an increasing block rate water structure that is intended to encourage water conservation and discourage excessive use and waste of water. The water rate structure adopted on *[insert date]* is as follows:

Residential Rates

*[To be completed by the supplier]*

Commercial/Industrial Rates

*[To be completed by the supplier]*

## 9. OTHER WATER CONSERVATION MEASURES

### 9.1 Ordinances, Plumbing Codes, or Rules on Water-Conserving Fixtures

The State of Texas has required water-conserving fixtures in new construction and renovations since 1992. The state standards call for flows of no more than 2.2 gallons per minute (gpm) for faucets, 2.5 gpm for showerheads, and 1.28 gallons per flush for toilets. These standards assure that all new construction and renovations will use water-conserving fixtures.

Federal rules require that all clothes washers manufactured by 2007 use 9.5 gallons of water per cubic foot per cycle or less. These standards became more stringent for commercial clothes washers in 2013 and are scheduled to become more stringent for residential clothes washers in 2015 and again in 2018.

Federal rules require that all residential dishwashers manufactured on or after May 30, 2013, must achieve water consumption of 5 gallons per cycle or less.

The potential savings from these efficient fixtures can be significant, but historically have been difficult to measure independently from other factors.

### 9.2 Reservoir System Operation Plan

*[Insert description of reservoir system operation plan if public supplier has such a plan.]*

*or*

The [water supplier] purchases water from [name] and does not have surface water supplies for which to implement a reservoir system operation plan.

### 9.3 Considerations for Landscape Water Management Regulations (Optional)

*[The water supplier may choose to adopt landscape water management regulations as part of the development of this water conservation plan. These regulations are intended to minimize waste in landscape irrigation. The proposed regulations might include the following elements:*

- *Require that all new irrigation systems be in compliance with state design and installation regulations (TAC Title 30, Part 1, Chapter 344).*
- *Prohibit irrigation systems that spray directly onto impervious surfaces or onto other non-irrigated areas. (Wind-driven water drift will be taken into consideration.)*
- *Prohibit use of poorly maintained sprinkler systems that waste water.*
- *Prohibit outdoor watering during any form of precipitation.*
- *Enforce the regulations by a system of warnings followed by fines for continued or repeat violations.*
- *Implement other measures to encourage off-peak water use.]*

### 9.4 Requirement for Water Conservation Plans by Wholesale Customers

*[Required for cities with populations over 5,000.]*

Every contract for the wholesale sale of water by customers that is entered into, renewed, or extended after the adoption of this water conservation plan will include a requirement that the wholesale customer and any wholesale customers of that wholesale customer develop and implement a water conservation plan meeting the requirements of Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.2 of the Texas Administrative Code. The requirement will also extend to each successive wholesale customer in the resale of the water.

### 9.5 Coordination with Regional Water Planning Group

In accordance with TCEQ regulations, a copy of this adopted water conservation plan will be sent to the East Texas Region water planning group.

## 10. IMPLEMENTATION AND ENFORCEMENT OF THE WATER CONSERVATION PLAN

A copy of [an ordinance, order, or resolution] adopted by the [City Council or governing board] regarding this water conservation plan is attached to and made part of this plan

(Appendix F). The [ordinance, order, or resolution] designates responsible officials to implement and enforce the water conservation plan.

As required by TCEQ rules, the City will review this water conservation plan every five years, beginning in *[five years from date of plan]*. The plan will be updated as appropriate based on new or updated information. As the plan is reviewed and subsequently updated, a copy of the revised water conservation plan will be submitted to the TCEQ, the TWDB, and the East Texas Region water planning group for their records.

# *Appendix A*

*List of References*

## Appendix A
## List of References


(1) Title 30 of the Texas Administrative Code, Part 1, Chapter 288, Subchapter A, Rules 288.1 and 288.2, and Subchapter B, Rule 288.20, downloaded from http://www.tceq.texas.gov/assets/public/legal/rules/rules/pdflib/288a.pdf, May 2014.


The following conservation plans and related documents were reviewed in the development of this plan.


(2) Freese and Nichols, Inc.: *Draft Model Water Conservation Plan for North Texas Municipal Water District Member Cities and Customers,* prepared for the North Texas Municipal Water District, Fort Worth, February 2014.

(3) Freese and Nichols, Inc.: *Water Resource and Emergency Management Plan*, prepared for the North Texas Municipal Water District, Fort Worth, April 2014.

(4) Dallas Water Utilities: *City of Dallas Drought Contingency Plan*, adopted by the City Council, Dallas, February 26, 2014.

(5) Texas Commission on Environmental Quality: *Drought Contingency Plan for a Retail Public Water Supplier*, accessed online at http://www.tceq.texas.gov/assets/public/permitting/watersupply/drought/20191.doc, June 2014.

(6) Texas Commission on Environmental Quality: *Utility Profile and Water Conservation Plan Requirements for Municipal Use by Retail Public Water Suppliers*, TCEQ Form No. 10218, revised June 14, 2013, accessed online at http://www.tceq.texas.gov/assets/public/permitting/forms/10218.docx, June 2014..

(7) Texas Commission on Environmental Quality: *Water Conservation Implementation Report Public Water Supplier*, TCEQ Form No. 20646, revised September 18, 2013, accessed online at http://www.tceq.texas.gov/assets/public/permitting/watersupply/conservation/20646.docx, June 2014.

(8) Texas Water Development Board, *Water Conservation Plan Report – Retail Water Supplier*, TWDB Form No. 1966, revised August 13, 2013, accessed online at http://www.twdb.texas.gov/conservation/municipal/plans/doc/RWS_1966.pdf, June 2014.

(9) Texas Water Development Board: *Report 362 Water Conservation Best Management Practices Guide,* Austin, November 2004.

# *Appendix B*

*Texas Commission on Environmental Quality Rules on Municipal Water Conservation Plans*

**Texas Administrative Code**

| | |
|---|---|
| **TITLE 30** | ENVIRONMENTAL QUALITY |
| **PART 1** | TEXAS COMMISSION ON ENVIRONMENTAL QUALITY |
| **CHAPTER 288** | WATER CONSERVATION PLANS, DROUGHT CONTINGENCY PLANS, GUIDELINES AND REQUIREMENTS |
| **SUBCHAPTER A** | WATER CONSERVATION PLANS |
| **RULE §288.2** | **Water Conservation Plans for Municipal Uses by Public Water Suppliers** |

(a) A water conservation plan for municipal water use by public water suppliers must provide information in response to the following. If the plan does not provide information for each requirement, the public water supplier shall include in the plan an explanation of why the requirement is not applicable.

(1) Minimum requirements. All water conservation plans for municipal uses by public water suppliers must include the following elements:

(A) a utility profile in accordance with the Texas Water Use Methodology, including, but not limited to, information regarding population and customer data, water use data (including total gallons per capita per day (GPCD) and residential GPCD), water supply system data, and wastewater system data;

(B) a record management system which allows for the classification of water sales and uses into the most detailed level of water use data currently available to it, including, if possible, the sectors listed in clauses (i) - (vi) of this subparagraph. Any new billing system purchased by a public water supplier must be capable of reporting detailed water use data as described in clauses (i) - (vi) of this subparagraph:

(i) residential;
(I) single family;
(II) multi-family;
(ii) commercial;
(iii) institutional;
(iv) industrial;
(v) agricultural; and,
(vi) wholesale.

(C) specific, quantified five-year and ten-year targets for water savings to include goals for water loss programs and goals for municipal use in total GPCD and residential GPCD. The goals established by a public water supplier under this subparagraph are not enforceable;

(D) metering device(s), within an accuracy of plus or minus 5.0% in order to measure and account for the amount of water diverted from the source of supply;

(E) a program for universal metering of both customer and public uses of water, for meter testing and repair, and for periodic meter replacement;

(F) measures to determine and control water loss (for example, periodic visual inspections along distribution lines; annual or monthly audit of the water system to determine illegal connections; abandoned services; etc.);

(G) a program of continuing public education and information regarding water conservation;

(H) a water rate structure which is not "promotional," i.e., a rate structure which is cost-based and which does not encourage the excessive use of water;

(I) a reservoir systems operations plan, if applicable, providing for the coordinated operation of reservoirs owned by the applicant within a common watershed or river basin in order to optimize available water supplies; and

(J) a means of implementation and enforcement which shall be evidenced by:

(i) a copy of the ordinance, resolution, or tariff indicating official adoption of the water conservation plan by the water supplier; and

(ii) a description of the authority by which the water supplier will implement and enforce the conservation plan; and

(K) documentation of coordination with the regional water planning groups for the service area of the public water supplier in order to ensure consistency with the appropriate approved regional water plans.

(2) Additional content requirements. Water conservation plans for municipal uses by public drinking water suppliers serving a current population of 5,000 or more and/or a projected population of 5,000 or more within the next ten years subsequent to the effective date of the plan must include the following elements:

(A) a program of leak detection, repair, and water loss accounting for the water transmission, delivery, and distribution system;

(B) a requirement in every wholesale water supply contract entered into or renewed after official adoption of the plan (by either ordinance, resolution, or tariff), and including any contract extension, that each successive wholesale customer develop and implement a water conservation plan or water conservation measures using the applicable elements in this chapter. If the customer intends to resell the water, the contract between the initial supplier and customer must provide that the contract for the resale of the water must have water conservation requirements so that each successive customer in the resale of the water will be required to implement water conservation measures in accordance with the provisions of this chapter.

(3) Additional conservation strategies. Any combination of the following strategies shall be selected by the water supplier, in addition to the minimum requirements in paragraphs (1) and (2) of this subsection, if they are necessary to achieve the stated water conservation goals of the plan. The commission may require that any of the following strategies be implemented by the water supplier if the commission determines that the strategy is necessary to achieve the goals of the water conservation plan:

(A) conservation-oriented water rates and water rate structures such as uniform or increasing block rate schedules, and/or seasonal rates, but not flat rate or decreasing block rates;

(B) adoption of ordinances, plumbing codes, and/or rules requiring water-conserving plumbing fixtures to be installed in new structures and existing structures undergoing substantial modification or addition;

(C) a program for the replacement or retrofit of water-conserving plumbing fixtures in existing structures;

(D) reuse and/or recycling of wastewater and/or graywater;

(E) a program for pressure control and/or reduction in the distribution system and/or for customer connections;

(F) a program and/or ordinance(s) for landscape water management;

(G) a method for monitoring the effectiveness and efficiency of the water conservation plan; and

(H) any other water conservation practice, method, or technique which the water supplier shows to be appropriate for achieving the stated goal or goals of the water conservation plan.

(b) A water conservation plan prepared in accordance with 31 TAC §363.15 (relating to Required Water Conservation Plan) of the Texas Water Development Board and substantially meeting the requirements of this section and other applicable commission rules may be submitted to meet application requirements in accordance with a memorandum of understanding between the commission and the Texas Water Development Board.

(c) A public water supplier for municipal use shall review and update its water conservation plan, as appropriate, based on an assessment of previous five-year and ten-year targets and any other new or updated information. The public water supplier for municipal use shall review and update the next revision of its water conservation plan every five years to coincide with the regional water planning group.

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**Source Note:** The provisions of this §288.2 adopted to be effective May 3, 1993, 18 TexReg 2558; amended to be effective February 21, 1999, 24 TexReg 949; amended to be effective April 27, 2000, 25 TexReg 3544; amended to be effective October 7, 2004, 29 TexReg 9384; amended to be effective December 6, 2012, 37 TexReg 9515

# *Appendix C*

*TCEQ Utility Profile*

# Texas Commission on Environmental Quality

## UTILITY PROFILE AND WATER CONSERVATION PLAN REQUIREMENTS FOR MUNICIPAL WATER USE BY RETAIL PUBLIC WATER SUPPLIERS

This form is provided to assist retail public water suppliers in water conservation plan development. If you need assistance in completing this form or in developing your plan, please contact the conservation staff of the Resource Protection Team in the Water Availability Division at (512) 239-4691.

Name: Click to add text

Address: _____

Telephone Number: (  ) _____ Fax: (  ) _____

Water Right No.(s): _____

Regional Water Planning Group: _____

Form Completed by: _____

Title: _____

Person responsible for implementing conservation program: _____ Phone: (  ) _____

Signature: _____ Date: /  / _____

**NOTE: If the plan does not provide information for each requirement, include an explanation of why the requirement is not applicable.**

## UTILITY PROFILE

## I. POPULATION AND CUSTOMER DATA

### *A. Population and Service Area Data*

1. Attach a copy of your service-area map and, if applicable, a copy of your Certificate of Convenience and Necessity (CCN).

2. Service area size (in square miles):
   (Please attach a copy of service-area map)

3. Current population of service area:

4. Current population served for:
   Water _____
   Wastewater _____

5. Population served for previous five years:

| *Year* | *Population* |
|---|---|
| | |
| | |
| | |
| | |
| | |

6. Projected population for service area in the following decades:

| *Year* | *Population* |
|---|---|
| 2020 | |
| 2030 | |
| 2040 | |
| 2050 | |
| 2060 | |

7. List source or method for the calculation of current and projected population size.

### *B. Customers Data*

Senate Bill 181 requires that uniform consistent methodologies for calculating water use and conservation be developed and available to retail water providers and certain other water use sectors as a guide for preparation of water use reports, water conservation plans, and reports on water conservation efforts. A water system must provide the most detailed level of customer and water use data available to it, however, any new billing system purchased must be capable of reporting data for each of the sectors listed below. http://www.tceq.texas.gov/assets/public/permitting/watersupply/water_rights/sb181_guidance.pdf

1. Current number of active connections. Check whether multi-family service is counted as ☐ Residential or ☐ Commercial?

| *Treated Water Users* | *Metered* | *Non-Metered* | **Totals** |
|---|---|---|---|
| Residential | | | |
| Single-Family | | | |
| Multi-Family | | | |
| Commercial | | | |
| Industrial/Mining | | | |
| Institutional | | | |
| Agriculture | | | |
| Other/Wholesale | | | |

2. List the number of new connections per year for most recent three years.

| *Year* | | | |
|---|---|---|---|
| *Treated Water Users* | | | |
| Residential | | | |
| Single-Family | | | |
| Multi-Family | | | |
| Commercial | | | |
| Industrial/Mining | | | |
| Institutional | | | |
| Agriculture | | | |
| Other/Wholesale | | | |

3. List of annual water use for the five highest volume customers.

| *Customer* | *Use (1,000 gal/year)* | *Treated or Raw Water* |
|---|---|---|
| 1. | | |
| 2. | | |
| 3. | | |
| 4. | | |
| 5. | | |

## II. WATER USE DATA FOR SERVICE AREA

*A. Water Accounting Data*

1. List the amount of water use for the previous five years (in 1,000 gallons). Indicate whether this is ☐ diverted or ☐ treated water.

| *Year* | | | | | |
|---|---|---|---|---|---|
| *Month* | | | | | |
| January | | | | | |
| February | | | | | |
| March | | | | | |
| April | | | | | |
| May | | | | | |
| June | | | | | |
| July | | | | | |
| August | | | | | |
| September | | | | | |
| October | | | | | |
| November | | | | | |
| December | | | | | |
| **Totals** | | | | | |

Describe how the above figures were determine (e.g, from a master meter located at the point of a diversion from the source, or located at a point where raw water enters the treatment plant, or from water sales).

2. Amount of water (in 1,000 gallons) delivered/sold as recorded by the following account types for the past five years.

| *Year* | | | | | |
|---|---|---|---|---|---|
| *Account Types* | | | | | |
| Residential | | | | | |
| Single-Family | | | | | |
| Multi-Family | | | | | |
| Commercial | | | | | |
| Industrial/Mining | | | | | |
| Institutional | | | | | |
| Agriculture | | | | | |
| Other/Wholesale | | | | | |

3. List the previous records for water loss for the past five years (the difference between water diverted or treated and water delivered or sold).

| *Year* | *Amount (gallons)* | *Percent %* |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |

*B. Projected Water Demands*

If applicable, attach or cite projected water supply demands from the applicable Regional Water Planning Group for the next ten years using information such as population trends, historical water use, and economic growth in the service area over the next ten years and any additional water supply requirements from such growth.

## III. WATER SUPPLY SYSTEM DATA

*A. Water Supply Sources*

List all current water supply sources and the amounts authorized (in acre feet) with each.

| *Water Type* | *Source* | *Amount Authorized* |
|---|---|---|
| Surface Water | | |
| Groundwater | | |
| Contracts | | |
| Other | | |

*B. Treatment and Distribution System*

1. Design daily capacity of system (MGD):

2. Storage capacity (MGD):
   a. Elevated _____
   b. Ground _____

3. If surface water, do you recycle filter backwash to the head of the plant?
   ☐ Yes ☐ No If yes, approximate amount (MGD):

## IV. WASTEWATER SYSTEM DATA

*A. Wastewater System Data (if applicable)*

1. Design capacity of wastewater treatment plant(s) (MGD):

2. Treated effluent is used for ☐ on-site irrigation, ☐ off-site irrigation, for ☐ plant wash-down, and/or for ☐ chlorination/dechlorination.

   If yes, approximate amount (in gallons per month):

3. Briefly describe the wastewater system(s) of the area serviced by the water utility. Describe how treated wastewater is disposed. Where applicable, identify treatment plant(s) with the TCEQ name and number, the operator, owner, and the receiving stream if wastewater is discharged.

*B. Wastewater Data for Service Area (if applicable)*

1. Percent of water service area served by wastewater system: _____%

2. Monthly volume treated for previous five years (in 1,000 gallons):

| *Year* | | | | | |
|---|---|---|---|---|---|
| *Month* | | | | | |
| January | | | | | |
| February | | | | | |
| March | | | | | |
| April | | | | | |
| May | | | | | |
| June | | | | | |
| July | | | | | |
| August | | | | | |
| September | | | | | |
| October | | | | | |
| November | | | | | |
| December | | | | | |
| **Totals** | | | | | |

# *Appendix D*

*TCEQ Water Conservation Implementation Report*

# Texas Commission on Environmental Quality

**Water Conservation Implementation Report**

## Public Water Supplier

This five year report must be completed by entities that are required to submit a water conservation plan to the TCEQ in accordance with Title 30 Texas Administrative Code, Chapter 288. Please complete this report and submit it to the TCEQ. If you need assistance in completing this form, please contact the Resource Protection Team in the Water Availability Division at (512) 239-4691.

## CONTACT INFORMATION

Name of Entity:

Public Water Supply Identification Number (PWS ID): Click here to enter text.
CCN numbers: Click here to enter text.
Water Right Permit numbers: Click here to enter text.
Wastewater ID numbers: Click here to enter text.

Check all that apply:

- ☐ Retail Public Water Supplier
- ☐ Wholesale Public Water Supplier

Address: Click here to enter text. City: Click here to enter text. Zip Code: Click here to enter text.

Email: Click here to enter text. Telephone Number: Click here to enter text.

Regional Water Planning Group: Click here to enter text.Map

Groundwater Conservation District: Click here to enter text.Map

Form Completed By: Click here to enter text. Title: Click here to enter text.

Signature: _____ Date: Click here to enter a date.

Contact information for the person or department responsible for implementing the water conservation plan:

Name: Click here to enter text. Phone: Click here to enter text. Email: Click here to enter text.

Report Completed on Date: Click here to enter a date.

Reporting Period (**check only one**):

☐ Fiscal Period Begin: Click here to enter a date. Period End: Click here to enter a date.
☐ Calendar Period Begin: Click here to enter a date. Period End: Click here to enter a date.

Please check all of the following that apply to your entity:

☐ A surface water right holder of 1,000 acre-feet/year or more for non-irrigation uses
☐ A surface water right holder of 10,000 acre-feet/year or more for irrigation uses

*Important*

*If your entity meets the following description, please skip page 3 and go directly to page 4.*

Your entity is a Wholesale Public Water Supplier that ONLY provides wholesale water services for public consumption. For example, you only provide wholesale water to other municipalities or water districts.

# Water Use Accounting

## Retail Water Sold: *All retail water sold for public use and human consumption.*

**Helpful Hints:** There are two options available for you to provide the requested information. Both options ask the same information; however, the level of detail and break down of information differs between the two options. Please select just one option that works best for your entity and fill in the fields as completely as possible.

Fields that are gray are entered by the user. Select fields that are white and press F9 to updated fields.

For the five-year reporting period, enter the gallons of **RETAIL water sold** in each major water use category. Use **only one** of the following options.

### Option 1

| **Water Use Category*** | **Gallons Sold** |
|---|---|
| Single Family Residential | |
| Multi-Family Residential | |
| **TOTAL Residential Use**[1] | 0 |
| Industrial | |
| Commercial | |
| Institutional | |
| **TOTAL Retail Water Sold**[2] | 0 |

1. [SF Res +MF Res = Residential Use]
2. [Res +Ind +Com +Ins = Retail Water Sold]

### Option 2

| **Water Use Category *** | **Gallons Sold** |
|---|---|
| Residential<br>Select all of the sectors that your account for as "Residential".<br>☐Single Family ☐ Multi-Family | |
| Commercial<br>Please select all of the sectors that your account for as "Commercial".<br>☐ Commercial ☐ Multi-Family ☐ Industrial ☐ Institutional | |
| Industrial<br>Please select all of the sectors that your account for as "Industrial".<br>☐Industrial ☐ Commercial ☐ Institutional | |
| Other<br>Please select all of the sectors that your account for as "Other".<br>☐Commercial ☐Multi-Family ☐ Industrial ☐ Institutional | |
| **TOTAL Retail Water Sold**[1] | 0.00 |

1. [Res +Com +Ind + Other = Retail Water Sold]

## **Wholesale Water Exported:** *Wholesale water sold or transferred out of the distribution system.*

For the five-year reporting period, enter the gallons of **WHOLESALE water exported** to each major water use category.

| **Water Use Category*** | **Gallons of Exported Wholesale Water** |
|---|---|
| Municipal Customers | |
| Agricultural Customers | |
| Industrial Customers | |
| Commercial Customers | |
| Institutional Customers | |
| **TOTAL Wholesale Water Exported** [1] | **0.00** |

1. [Mun +Agr +Ind +Com +Ins = Wholesale Water Exported]

# System Data

Fields that are gray are entered by the user. Select fields that are white and hit F9 to updated fields.

| | **Total Gallons During the Five-Year Reporting Period** |
|---|---|
| **Water Produced:** Volume produced from own sources | |
| **Wholesale Water Imported :** Purchased wholesale water imported from other sources into the distribution system | |
| **Wholesale Water Exported:** Wholesale water sold or transferred out of the distribution system (Insert Total Volume calculated on Page 4) | |
| **TOTAL System Input :** Total water supplied to the infrastructure | 0.00<br>[Produced + Imported – Exported = System Input] |
| **Retail Water Sold :** All retail water sold for public use and human consumption (Insert Total Residential Use from Option 1 or Option 2 calculated on Page 3) | |
| **Other Consumption Authorized for Use but not Sold:**<br>- back flushing water - line flushing<br>- storage tank cleaning - golf courses<br>- fire department use - parks<br>- municipal government offices | |
| **TOTAL Authorized Water Use:** All water that has been authorized for use or consumption. | 0.00<br>[Retail Water Sold + Other Consumption = Total Authorized] |
| **Apparent Losses – Water that has been consumed but not properly measured**<br>(Includes customer meter accuracy, systematic data discrepancy, un- authorized consumption such as theft) | |
| **Real Losses – Physical losses from the distribution system prior to reaching the customer destination**<br>(Includes physical losses from system or mains, reported breaks and leaks, storage overflow) | |
| **Unidentified Water Losses** | 0.00<br>[System Input- Total Authorized - Apparent Losses - Real Losses = Unidentified Water Losses] |
| **TOTAL Water Loss** | 0.00<br>[Apparent + Real + Unidentified = Total Water Loss] |

## Targets and Goals

In the table below, please provide the **specific and quantified five and ten-year targets for water savings** listed in your water conservation plan.

Fields that are gray are entered by the user. Select fields that are white and hit F9 to update fields.

| Date | Target for: Total GPCD | Target for: Water Loss (expressed in GPCD) | Target for: Water Loss Percentage (expressed in Percentage) |
|---|---|---|---|
| **Five-year target date:** dd/mm/yyyy | | | % |
| **Ten-year target date:** dd/mm/yyyy | | | % |

**Are targets in the water conservation plan being met?** Yes ☐ No ☐

**If these targets are not being met, provide an explanation as to why, including any progress on these targets:** Click here to enter text.

## Gallons per Capita per Day (GPCD) and Water Loss

Compare your current gpcd and water loss to the above targets and goals set in your previous water conservation plan.

| Total System Input in Gallons | Permanent Population | Current GPCD |
|---|---|---|
| [Produced + Imported – Exported = System Input] | | [ (System Input ÷ Permanent Population) /5/ 365 ] |

Permanent Population is the total permanent population of the service area. This includes single family, multi-family, and group quarter populations.

| Total Residential Use | Permanent Population | Residential GPCD |
|---|---|---|
| | | [ (Residential Use ÷ Residential Population) / 5/ 365 ] |

Residential Population is the total residential population of the service area including single & multi-family population.

| Total Water Loss | Total System Input in Gallons | Permanent Population | Water Loss calculated in | |
|---|---|---|---|---|
| | | | GPCD [1] | Percent [2] |
| [Apparent + Real + Unidentified = Total Water Loss] | [Water Produced + Wholesale Imported - Wholesale Exported] | | | |

1. [Total Water Loss ÷ Permanent Population] / 5/ 365 = Water Loss GPCD]
2. [Total Water Loss ÷ Total System Input] x 100 = Water Loss Percentage]

# Water Conservation Programs and Activities

*As you complete this section, please review your water conservation plan to see if you are making progress towards meeting your stated goals.*

Fields that are gray are entered by the user. Select fields that are white and hit F9 to updated fields.

## 1. Water Conservation Plan

What year did your entity adopt, or revise, their most recent water conservation plan: Click here to enter text.

Does the plan incorporate Best Management Practices? Yes ☐ No ☐

## 2. Water Conservation Programs

For the reporting period, please select the types of activities and programs that have been actively administered, and estimate the expense and savings that incurred in implementing the conservation activities and programs for the past five years. Leave the field blank if unknown:

| Program or Activity | Estimated Expenses | Estimated Gallons Saved |
|---|---|---|
| Conservation Analysis & Planning | | |
| ☐ Conservation Coordinator | | |
| ☐ Water Survey for Single-Family and Multi-Family Customers | | |
| Financial | | |
| ☐ Wholesale Agency Assistance Programs | | |
| ☐ Water Conservation Pricing/ Rate Structures | | |
| System Operations | | |
| ☐ Water Loss Audits | | |
| ☐ Leak Detection | | |
| ☐ Universal Metering and Metering Repair | | |
| Landscaping | | |
| ☐ Landscape Irrigation Conservation and | | |

| | | |
|---|---|---|
| Incentives | | |
| ☐ Athletic Fields Conservation | | |
| ☐ Golf Course Conservation | | |
| ☐ Park Conservation | | |
| Education & Public Awareness | | |
| ☐ School Education | | |
| ☐ Public Information | | |
| Rebate, Retrofit, and Incentive Programs | | |
| ☐ Conservation Programs for ICI Accounts | | |
| ☐ Residential Clothes Washer Incentive Program | | |
| ☐ Water Wise Landscape Design and Conversion Programs | | |
| ☐ Showerhead, Aerator, and Toilet Flapper Retrofit | | |
| ☐ Residential Toilet Replacement Programs | | |
| ☐ Rainwater Harvesting Incentive Program | | |
| ☐ ICI Incentive Programs | | |
| Conservation Technology | | |
| ☐ Recycling and Reuse Programs (Water or Wastewater Effluent) | | |
| ☐ Rainwater Harvesting and Condensate Reuse Programs | | |
| Regulatory and Enforcement | | |
| ☐ Prohibition on Wasting Water | | |
| **TOTAL** | $ 0.00 | 0 |

## 3. Reuse (Water or Wastewater Effluent)

For the reporting period, please provide the following data regarding the types of direct and indirect reuse activities that were administered for the past five years:

| Reuse Activity | Estimated Volume (in gallons) |
|---|---|
| On-site irrigation | |
| Plant wash down | |
| Chlorination/de-chlorination | |
| Industrial | |
| Landscape irrigation (parks, golf courses) | |
| Agricultural | |
| Other, please describe: | |
| **Estimated Volume of Recycled or Reuse** | 0 |

## 4. Water Savings

For the five-year reporting period, estimate the total savings that resulted from your overall water conservation activities and programs?

| **Estimated Gallons Saved** (Total from Conservation Programs Table) | **Estimated Gallons Recycled or Reused** (Total from Reuse Table) | **Total Volume of Water Saved** [1] | **Dollar Value of Water Saved** [2] |
|---|---|---|---|
| | | 0 | |

1. [Estimated Gallons Saved + Estimated Gallons Recycled or Reused = Total Volume Saved]
2. Estimate this value by taking into account water savings, the cost of treatment or purchase of your water, and any deferred capital costs due to conservation.

## 5. Conservation Pricing / Conservation Rate Structures

During the five-year reporting period, have your rates or rate structure changed? Yes ☐ No ☐

Please indicate the type of rate pricing structures that you use:

| | | |
|---|---|---|
| ☐ Uniform rates | ☐ Water Budget Based rates | ☐ Surcharge - seasonal |
| ☐ Flat rates | ☐ Excess Use Rates | ☐ Surcharge - drought |
| ☐ Inclining/ Inverted Block | ☐ Drought Demand rates | ☐ Surcharge - usage demand |
| ☐ Declining Block rates | ☐ Tailored rates | |
| ☐ Seasonal rates | | |

## 6. Public Awareness and Education Program

For the five-year reporting period, please check the appropriate boxes regarding any public awareness and educational activities that your entity has provided:

| | **Implemented** | **Number/Unit** |
|---|---|---|
| *Example: Brochures Distributed* | ☐ | *10,000/year* |
| *Example: Educational School Programs* | ☐ | *50 students/month* |
| Brochures Distributed | ☐ | |
| Messages Provided on Utility Bills | ☐ | |
| Press Releases | ☐ | |
| TV Public Service Announcements | ☐ | |
| Radio Public Service Announcements | ☐ | |
| Educational School Programs | ☐ | |
| Displays, Exhibits, and Presentations | ☐ | |
| Community Events | ☐ | |

| | | |
|---|---|---|
| Social Media campaigns | ☐ | |
| Facility Tours | ☐ | |
| Other : | ☐ | |

## 7. Leak Detection

During the five-year reporting period, how many leaks were repaired in the system or at service connections: Click here to enter text.

Please check the appropriate boxes regarding the main cause of water loss in your system during the reporting period:

☐ Leaks and breaks
☐ Un-metered utility or city uses
☐ Master meter problems
☐ Customer meter problems
☐ Record and data problems
☐ Other: Click here to enter text.
☐ Other: Click here to enter text.

## 8. Universal Metering and Meter Repair

For the five-year reporting period, please provide the following information regarding meter repair:

| | Total Number | Total Tested | Total Repaired |
|---|---|---|---|
| Production Meters | | | |
| Meters larger than 1 ½" | | | |
| Meters 1 ½ or smaller | | | |

Does your system have automated meter reading? Yes ☐ No ☐

## 9. Conservation Communication Effectiveness

In your opinion, how would you rank the effectiveness of your conservation activities in reaching the following types of customers for the past five years?

| | **Do not have activities or programs that target this type customer.** | **Less Than Effective** | **Somewhat Effective** | **Highly Effective** |
|---|---|---|---|---|
| Residential Customers | ☐ | ☐ | ☐ | ☐ |
| Industrial Customers | ☐ | ☐ | ☐ | ☐ |
| Institutional Customers | ☐ | ☐ | ☐ | ☐ |
| Commercial Customers | ☐ | ☐ | ☐ | ☐ |
| Agricultural Customers | ☐ | ☐ | ☐ | ☐ |

## 10. Drought Contingency and Emergency Water Demand Management

During the five-year reporting period, did you implement your Drought Contingency Plan?

Yes ☐ No ☐

If yes, indicate the number of days that your water use restrictions were in effect: Click here to enter text.

If yes, please check all the appropriate reasons for your drought contingency efforts going into effect.

| | |
|---|---|
| ☐ Water Supply Shortage | ☐ Equipment Failure |
| ☐ High Seasonal Demand | ☐ Impaired Infrastructure |
| ☐ Capacity Issues | ☐ Other: |

**If you have any questions on how to fill out this form or about the Water Conservation program, please contact us at 512/239-4691.**

Individuals are entitled to request and review their personal information that the agency gathers on its forms. They may also have any errors in their information corrected. To review such information, contact us at 512-239-3282.

# *Appendix E*

*TWDB Annual Water Conservation Report*

# Water Conservation Plan Annual Report
# Retail Water Supplier

## CONTACT INFORMATION

Name of Entity: _____

Public Water Supply Identification Number (PWS ID): _____

Certificate of Convenience and Necessity (CCN) Number: _____

Surface Water Rights ID Number: _____

Wastewater ID Number: _____

Check all that apply:

☐ Retail Water Supplier

☐ Wholesale Water Supplier

☐ Wastewater Treatment Utility

Address: _____ City: _____ Zip Code: _____

Email: _____ Telephone Number: _____

Regional Water Planning Group: _____ Map

Groundwater Conservation District: _____ Map

Form Completed By: _____ Title: _____

Date:

Reporting Period (**check only one**):

○ Fiscal Period Begin (mm/yyyy) Period End (mm/yyyy)

○ Calendar Period Begin (mm/yyyy) Period End (mm/yyyy)

Check all of the following that apply to your entity:

☐ Receive financial assistance of $500,000 or more from TWDB

☐ Have 3,300 or more retail connections

☐ Have a water right with TCEQ

# SYSTEM DATA

**Retail Customer Categories***

- Residential Single Family
- Residential Multi-family
- Industrial
- Commercial
- Institutional
- Agricultural

**Recommended Customer Categories for classifying your customer water use. For definitions, refer to Guidance and Methodology on Water Conservation and Water Use.*

1. For this reporting period, select the category(s) used to classify customer water use:

☐ Residential Single Family
☐ Residential Multi-family
☐ Industrial
☐ Commercial
☐ Institutional
☐ Agricultural

2. For this reporting period, enter the gallons of **metered retail water** used by each customer category. If the Customer Category does not apply, enter zero or leave blank.

| Retail Customer Category | Number of Connections | Gallons Metered |
|---|---|---|
| Residential Single Family | | |
| Residential Multi-family | | |
| Industrial | | |
| Commercial | | |
| Institutional | | |
| Agricultural | | |
| **Total Retail Water Metered**[1] | 0 | 0 |

1. Residential + Industrial + Commercial + Institutional + Agricultural = Total Retail Water Metered

# Water Use Accounting

| | Total Gallons During the Reporting Period |
|---|---|
| **Water Produced:** Water from permitted sources such as rivers, lakes, streams, and wells. *Same as line 14 of the water loss audit.* | |
| **Wholesale Water Imported:** Purchased wholesale water transferred into the system. *Same as line 15 of the water loss audit.* | |
| **Wholesale Water Exported:** Wholesale water sold or transferred out of the system. *Same as line 16 of the water loss audit.* | |
| **System Input:** Total water supplied to system and available for retail use. | 0<br>Produced + Imported – Exported = System Input |
| **Total Retail Water Metered** | 0 |
| **Other Authorized Consumption:** Water that is authorized for other uses such as the following: This water may be metered or unmetered. *Same as the total of lines 19, 20, and 21 of the water loss audit.*<br>- back flushing - line flushing<br>- storage tank cleaning - municipal golf courses/parks<br>C. fire department use<br>D. municipal government offices | |
| **Total Authorized Use:** All water that has been authorized for use. | 0<br>Total Retail Water + Other Authorized Consumption = Total Authorized Use |
| **Apparent Losses:** Water that has been consumed but not properly measured or billed. *Same as line 28 of the water loss audit.*<br>(*Includes losses due to customer meter accuracy, systematic data discrepancy, unauthorized consumption such as theft*) | |
| **Real Losses**: Physical losses from the distribution system prior to reaching the customer destination. *Same as line 29 of the water loss audit.*<br>(*Includes physical losses from system or mains, reported breaks and leaks, or storage overflow*) | |
| **Unidentified Water Losses:** Unreported losses not known or quantified. | 0<br>System Input - Total Authorized Use - Apparent Losses - Real Losses = Unidentified Water Losses |
| **Total Water Loss** | 0<br>Apparent + Real + Unidentified = Total Water Loss |

## Targets and Goals

Provide the **specific and quantified five and ten-year targets** as listed in your current Water Conservation Plan. Target dates and numbers should match your current Water Conservation Plan.

| Achieve Date | Target for Total GPCD | Target for Water Loss (expressed in GPCD) | Target for Water Loss Percentage (expressed in percentage) |
|---|---|---|---|
| **Five-year target date:** _____ | | | |
| **Ten-year target date:** _____ | | | |

## Gallons Per Capita per Day (GPCD) and Water Loss

Provide current GPCD and water loss totals. To see if you are making progress towards your stated goals, compare these totals to the above targets and goals. Provide the population and residential water use of your service area.

| Total System Input in Gallons | Permanent Population[1] | Total GPCD |
|---|---|---|
| 0<br>Water Produced + Wholesale Imported - Wholesale Exported | | (System Input ÷ Permanent Population) ÷ 365 |

1. Permanent Population is the total permanent population of the service area, including single family, multi-family, and group quarter populations.

| Residential Use in Gallons (Single Family + Multi-family ) | Residential Population[1] | Residential GPCD |
|---|---|---|
| | | (Residential Use ÷ Residential Population) ÷ 365 |

1. Residential Population is the total residential population of the service area, including only single family and multi-family populations.

| Total Water Loss | Permanent Population | Water Loss GPCD[1] | Water Loss Percent[2] |
|---|---|---|---|
| 0<br>Apparent + Real + Unidentified = Total Water Loss | | | 0% |

1. (Total Water Loss ÷ Permanent Population) ÷ 365 = Water Loss GPCD
2. (Total Water Loss ÷ Total System Input) x 100 = Water Loss Percentage

# Water Conservation Programs and Activities

*As you complete this section, review your utility's water conservation plan to see if you are making progress towards meeting your stated goals.*

1. What year did your entity adopt or revise the most recent Water Conservation Plan? _____

2. Does the Plan incorporate Best Management Practices? ○ Yes ○ No

3. Using the table below select the types of Best Management Practices or water conservation strategies actively administered during this reporting period and estimate the savings incurred in implementing water conservation activities and programs. Leave fields blank if unknown.

Methods and techniques for determining gallons saved are unique to each utility as they conduct internal effective cost analyses and long-term financial planning. Texas Best Management Practices can be found at TWDB's Water Conservation Best Management Practices webpage. The Alliance for Water Efficiency Water Conservation Tracking Tool may offer guidance on determining and calculating savings for individual BMPs.

| Best Management Practice | Check if Implemented | Estimated Gallons Saved |
|---|---|---|
| **Conservation Analysis and Planning** | | |
| Conservation Coordinator | ☐ | |
| Cost Effective Analysis | ☐ | |
| Water Survey for Single Family and Multi-family Customers | ☐ | |
| **Financial** | | |
| Wholesale Agency Assistance Programs | ☐ | |
| Water Conservation Pricing | ☐ | |
| **System Operations** | | |
| Metering New Connections and Retrofitting Existing Connections | ☐ | |
| System Water Audit and Loss Control | ☐ | |
| **Landscaping** | | |
| Landscape Irrigation Conservation and Incentives | ☐ | |
| Athletic Fields Conservation | ☐ | |
| Golf Course Conservation | ☐ | |
| Park Conservation | ☐ | |
| **Education and Public Awareness** | | |
| School Education | ☐ | |
| Public Information | ☐ | |
| **Rebate, Retrofit, and Incentive Programs** | | |
| Conservation Programs for ICI Accounts | ☐ | |
| Residential Clothes Washer Incentive Program | ☐ | |
| Water Wise Landscape Design and Conversion Programs | ☐ | |

| | | |
|---|---|---|
| Showerhead, Aerator, and Toilet Flapper Retrofit | ☐ | |
| Residential Toilet Replacement Programs | ☐ | |
| ICI Incentive Programs | ☐ | |
| **Conservation Technology** | | |
| Water Reuse | ☐ | |
| New Construction Graywater | ☐ | |
| Rainwater Harvesting and Condensate Reuse | ☐ | |
| **Regulatory and Enforcement** | | |
| Prohibition on Wasting Water | ☐ | |
| Other, please describe: | | |
| **Total Gallons of Water Saved** | | 0 |

4. For this reporting period, provide the estimated gallons of direct or indirect reuse activities.

| Reuse Activity | Estimated Volume (in gallons) |
|---|---|
| On-site irrigation | |
| Plant wash down | |
| Chlorination/de-chlorination | |
| Industrial | |
| Landscape irrigation (parks, golf courses) | |
| Agricultural | |
| Other, please describe: | |
| **Total Volume of Reuse** | 0 |

5. For this reporting period, estimate the savings from water conservation activities and programs.

| Gallons Saved/Conserved | Gallons Recycled/Reused | Total Volume of Water Saved[1] | Dollar Value of Water Saved[2] |
|---|---|---|---|
| | 0 | 0 | |

1. Estimated Gallons Saved/Conserved + Estimated Gallons Recycled/Reused = Total Volume Saved
2. Estimate this value by taking into account water savings, the cost of treatment or purchase of water, and deferred capital costs due to conservation.

6. During this reporting period, did your rates or rate structure change? ○ Yes ○ No

Select the type of rate pricing structures used. Check all that apply.

| | | |
|---|---|---|
| ☐ Uniform Rates | ☐ Water Budget Based Rates | ☐ Surcharge - seasonal |
| ☐ Flat Rates | ☐ Excess Use Rates | ☐ Surcharge - drought |
| ☐ Inclining/Inverted Block Rates | ☐ Drought Demand Rates | Other, please describe: |
| ☐ Declining Block Rates | ☐ Tailored Rates | |
| ☐ Seasonal Rates | ☐ Surcharge - usage demand | |

7. For this reporting period, select the public awareness or educational activities used.

| | Implemented | Number/Unit |
|---|---|---|
| *Example: Brochures Distributed* | √ | *10,000/year* |
| *Example: Educational School Programs* | √ | *50 students/month* |
| Brochures Distributed | ☐ | _____ |
| Messages Provided on Utility Bills | ☐ | _____ |
| Press Releases | ☐ | _____ |
| TV Public Service Announcements | ☐ | _____ |
| Radio Public Service Announcements | ☐ | _____ |
| Educational School Programs | ☐ | _____ |
| Displays, Exhibits, and Presentations | ☐ | _____ |
| Community Events | ☐ | _____ |
| Social Media campaigns | ☐ | _____ |
| Facility Tours | ☐ | _____ |
| Other : | ☐ | _____ |

# Leak Detection and Water Loss

1. During this reporting period, how many leaks were repaired in the system or at service connections? _____

   Select the main cause(s) of water loss in your system.

   ☐ Leaks and breaks
   ☐ Un-metered utility or city uses
   ☐ Master meter problems
   ☐ Customer meter problems
   ☐ Record and data problems
   ☐ Other: _____
   ☐ Other: _____

2. For this reporting period, provide the following information regarding meter repair:

| Type of Meter | Total Number | Total Tested | Total Repaired | Total Replaced |
|---|---|---|---|---|
| Production Meters | | | | |
| Meters larger than 1 ½" | | | | |
| Meters 1 ½ or smaller | | | | |

3. Does your system have automated meter reading? ○ Yes ○ No

## Program Effectiveness and Drought

1. In your opinion, how would you rank the effectiveness of your conservation activities?

| Customer Classification | Less Than Effective | Somewhat Effective | Highly Effective | Does Not Apply |
|---|---|---|---|---|
| Residential Customers | ○ | ○ | ○ | ○ |
| Industrial Customers | ○ | ○ | ○ | ○ |
| Institutional Customers | ○ | ○ | ○ | ○ |
| Commercial Customers | ○ | ○ | ○ | ○ |
| Agricultural Customers | ○ | ○ | ○ | ○ |

2. During the reporting period, did you implement your Drought Contingency Plan?

○ Yes ○ No

If yes, how many days were water use restrictions in effect? _____

If yes, check the reason(s) for implementing your Drought Contingency Plan.

☐ Water Supply Shortage
☐ High Seasonal Demand
☐ Capacity Issues
☐ Equipment Failure
☐ Impaired Infrastructure
☐ Other:

3. Select the areas for which you would like to receive more technical assistance:

☐ Best Management Practices
☐ Drought Contingency Plans
☐ Landscape Irrigation
☐ Leak Detection and Equipment
☐ Rainwater Harvesting
☐ Rate Structures
☐ Educational Resources
☐ Water Conservation Annual Reports
☐ Water Conservation Plans
☐ Water IQ: Know Your Water
☐ Water Loss Audits
☐ Recycling and Reuse

# *Appendix F*

*City Council Resolution Adopting Plan*

*[Insert copy of City Council Resolution adopting the Water Conservation Plan.]*

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# Appendix 5C-B

# Model Water Conservation Plan for Industrial Entities

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This appendix includes a Model Water Conservation Plan for Industrial water users in the ETRWPA. The model plan addresses the latest Texas Commission on Environment Quality requirements and is intended to be modified by each user to best reflect the activities appropriate to the entity. The model plan also includes sample appendices required:

- Appendix A – List of References
- Appendix B – Texas Commission on Environmental Quality Rules on Water Conservation Plans for Industrial or Mining Use
- Appendix C – Water Conservation Implementation Report

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# Water Conservation Plan for [Industrial Entity]

## Date

### TABLE OF CONTENTS



### APPENDICES

# Water Conservation Plan for [Industrial Entity]

## 1. Objectives

The Texas Commission on Environmental Quality has developed guidelines and requirements governing the development of water conservation plans for industrial or mining use in Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.4 of the Texas Administrative Code (TAC). The minimum requirements are:

| TAC Reference | Subject | Plan Location |
|---|---|---|
| 30 TAC §288.3(a)(1) | Water Use in the Production Process | Section 2 |
| 30 TAC §288.3(a)(2) | Water Conservation Goals | Section 3 |
| 30 TAC §288.3(a)(3) | Accurate Metering | Section 4 |
| 30 TAC §288.3(a)(4) | Leak Detection, Repair, and Water Loss Accounting | Section 5 |
| 30 TAC §288.3(a)(5) | Water Use Efficiency Process and/or Equipment Upgrades | Section 6 |
| 30 TAC §288.3(a)(6) | Other Conservation Practices | Section 7 |
| 30 TAC §288.3(b) | Review and Update of Plan | Section 8 |
| 30 TAC §288.30(1) | Water Conservation Implementation Report | Section 8 |

The purpose of this water conservation plan is to:

- To reduce water consumption from the levels that would exist without conservation efforts.
- To reduce the loss and waste of water.
- To encourage improvement of processes that inefficiently consume water.
- To extend the life of current supplies by reducing the rate of growth in demand.
- To document the level of recycling and reuse in the water supply.

This water conservation plan is intended to serve as a guide to [entity]. The following plan includes all conservation measures required by TCEQ.

## 2. Description of Water Use

The TCEQ requires that each mining or industrial water user must document how water is used in the production process.

- *[Entity provides information including:*
  - *How water is diverted and transported from the source(s) of supply*
  - *How water is utilized in the production process*
  - *How much water is consumed in the production process and not available for reuse, discharge, or other means of disposal]*

## 3. Specification of Water Conservation Goals

The TCEQ regulations require that each industrial and mining user adopt quantifiable water conservation goals in their water conservation plan. *[Entity]* has specified a five-year and ten-year target for water savings. *[Include quantifiable water savings targets and the details of the basis for the development of these goals. The goals established by industrial or mining water users under this paragraph are not enforceable.]*

The goals for this water conservation plan include the following:

- *[Name goals.] Potential goals are:*
  - *Meter water use to decrease water loss through leaks*
  - *Regularly inspect systems for leaks and promptly repair in order to control unaccounted water*
  - *Improve, modify, or audit processes in order to increase efficient water use*

## 4. Metering of Industrial and Mining Water Users

[Entity]'s water use is metered at [description of location]. Submetering is a good strategy for some industrial water users. Processes or equipment that consume large quantities of water could

be usefully submetered. Submetering is an effective way to account for all water use by process, subprocess, or piece of equipment in a facility.

*[Identify processes and/or equipment that are currently submetered. This section must include a description of the device(s) and/or method(s) within an accuracy of plus or minus five percent to be used to measure and account for the amount of water diverted from the source of supply.]*

## 5. Leak Detection and Repair and Water Loss Accounting

*[Describe leak-detection, repair, and accounting for water loss in the water distribution system.]*

Careful metering of water use, detection, and repair of leaks in the distribution system and regular monitoring of water loss are important in controlling losses.

Water loss can be attributed to several things including:

- Inaccuracies in meters. Older meters tend to run slowly and therefore under-report actual use.
- Loss due to leaks and main breaks in the system.
- [Other].

In order to control water loss, personnel are asked to watch for and report water main breaks and leaks. Broken and leaking lines should be replaced or repaired in a timely manner.

[Entity] will implement and maintain a water loss program. This program will serve to reduce losses due to leakage. The measures of the water loss program include *[select applicable measure]*:

- Conducting regular inspections of aboveground piping and pump packing.
- Logging flowmeter readings on a daily basis.

- Metering individual pressure zones
- Controlling pressure just above the minimum standard-of-service level
- Limiting surges in pressure.
- [Other]

## 6. Improving, Modifying, and Auditing Processes and Equipment

[Entity] can increase water efficiency by improving, modifying, and auditing facility processes and equipment. Water can be conserved through the following measures *[select appropriate measure]*:

- Implementing a Water Waste Reduction Program
- Optimizing the water-use efficiency of cooling systems (other than cooling towers)
- Reducing water loss in cooling towers

Water Waste Reduction Programs cause [Entity] personnel to be more aware of wasteful activities. Measures resulting from a Water Waste Reduction Program include:

- Install water saving devices on equipment.
- Replace current equipment with more water-efficient equipment.
- Recycle water within a process.
- Change to waterless equipment or process.

## 7. Other Water Conservation Methods, Practices, or Techniques

*[This section must include any other water conservation practice, method, or technique which the user shows to be appropriate for achieving the stated goal(s) of the water conservation plan.*

*Other sections emphasize process water usage, equipment upgrades, and process modifications. This section should report on proposed conservation practices, methods, or techniques that address other water uses, such as domestic water use, housekeeping water use, and landscape irrigation. Potential*

*conservation methods include retrofit of water-efficient toilets, showerheads, and faucet aerators; water-wise landscaping; employee education; and other methods.]*

## 8. Implementation and Modifications to Water Conservation Plan

Upon implementation of this water conservation plan, [Entity] will update the plan at least every five years. New goals will be based on previous five-year and ten-year goals and any new information.

[Entity] has prepared a water conservation implementation report that details its water conservation efforts and achievements. The implementation report is included in Appendix C. This report includes:

- The list of dates and descriptions of conservation measures implemented
- Amount of water saved
- Data about whether or not targets in the plan are met
- If targets are not met, an explanation as to why the target was not met and a discussion of the progress to meet the target.

# *Appendix A*

*List of References*

# APPENDIX A

## List of References

Title 30 of the Texas Administrative Code, Part 1, Chapter 288, Subchapter B, Rule 288.3, downloaded from http://www.sos.state.tx.us/tac, Effective December 6, 2012.

Texas Commission on Environmental Quality, *Water Conservation Implementation Report Non Public Water Supplier*, TCEQ Form No. 20645, Revised September 18, 2013.

# *Appendix B*

*Texas Commission on Environmental Quality*
*Rules on Water Conservation Plans for*
*Industrial or Mining Use*

**SUBCHAPTER A: WATER CONSERVATION PLANS**
**§§288.1 - 288.7**
**Effective December 6, 2012**

## §288.3. Water Conservation Plans for Industrial or Mining Use.

(a) A water conservation plan for industrial or mining uses of water must provide information in response to each of the following elements. If the plan does not provide information for each requirement, the industrial or mining water user shall include in the plan an explanation of why the requirement is not applicable.

(1) a description of the use of the water in the production process, including how the water is diverted and transported from the source(s) of supply, how the water is utilized in the production process, and the estimated quantity of water consumed in the production process and therefore unavailable for reuse, discharge, or other means of disposal;

(2) specific, quantified five-year and ten-year targets for water savings and the basis for the development of such goals. The goals established by industrial or mining water users under this paragraph are not enforceable;

(3) a description of the device(s) and/or method(s) within an accuracy of plus or minus 5.0% to be used in order to measure and account for the amount of water diverted from the source of supply;

(4) leak-detection, repair, and accounting for water loss in the water distribution system;

(5) application of state-of-the-art equipment and/or process modifications to improve water use efficiency; and

(6) any other water conservation practice, method, or technique which the user shows to be appropriate for achieving the stated goal or goals of the water conservation plan.

(b) An industrial or mining water user shall review and update its water conservation plan, as appropriate, based on an assessment of previous five-year and ten-year targets and any other new or updated information. The industrial or mining water user shall review and update the next revision of its water conservation plan every five years to coincide with the regional water planning group.

Adopted November 14, 2012 Effective December 6, 2012

# *Appendix C*

*Water Conservation Implementation Report*

# Texas Commission on Environmental Quality

## Water Conservation Implementation Report

## Non Public Water Supplier

This report must be completed by entities that are required to submit a water conservation plan to the TCEQ in accordance with Title 30 Texas Administrative Code, Chapter 288. Please complete this report and submit it to the TCEQ. If you need assistance in completing this form, please contact the Resource Protection Team in the Water Availability Division at (512) 239-4691.

## CONTACT INFORMATION

Name of Entity: Click here to enter text.

Water Rights Permit numbers: Click here to enter text.

Address: Click here to enter text. City: Click here to enter text.

Zip Code: Click here to enter text.

Email: Click here to enter text. Telephone Number: Click here to enter text.

Regional Water Planning Group: _____ Map

Groundwater Conservation District: _____ Map

Form Completed By: Click here to enter text. Title: Click here to enter text.

Signature: _____ Date: Click here to enter a date.

Contact information for the person or department responsible for implementing the water conservation plan:

Name: Click here to enter text. Phone: Click here to enter text. Email: Click here to enter text.

Report Completed on Date: dd/mm/yyyy

Reporting Period (**check only one**):

☐ Fiscal Period Begin dd/mm/yyyy Period End dd/mm/yyyy

☐ Calendar Period Begin dd/mm/yyyy Period End dd/mm/yyyy

Please check all of the following that apply to your entity:

☐ An entity that has a non-irrigation surface water right greater than 1,000 acre-feet/year

☐ An entity that has an irrigation surface water right greater than 10,000 acre-feet/year

## System Data

Fields that are gray are entered by the user. Highlight the 0's that are in white and press F9 to populate these fields.

| | **Total Gallons During the Reporting Period.** |
|---|---|
| **Water Produced:** Volume produced from own sources | |
| **Wholesale Water Imported :** Purchased wholesale water imported from other sources into the distribution system | |
| **TOTAL System Input :** Total water input into the system | 0<br>[Produced + Imported = System Input] |
| **TOTAL System Output :** Water used, sold, exported or transferred out of the system | |
| **TOTAL Authorized Water Use:** All water that has been authorized for use or consumption. | 0<br>[System Output ÷ 365 = Average Gallons per day] |

In the table below please provide the **specific and quantified five and ten-year targets for water savings** as listed in your most current water conservation plan.

| **Date** | **Target for: Water Savings** | **Target for: Water Loss** |
|---|---|---|
| **Five-year target date:**<br>dd/mm/yyyy | | |
| **Ten-year target date:**<br>dd/mm/yyyy | | |

**Are targets in the water conservation plan being met?** Yes ☐ No ☐

**If these targets are not being met, provide an explanation as to why, including any progress on these targets.** Click here to enter text.

# Water Conservation Programs and Activities

Fields that are gray are entered by the user. Highlight the 0's that are in white and press F9 to populate these fields.

*As you complete this section, please review your entity's water conservation plan to see if you are making progress towards meeting your stated goals.*

## 1. Water Conservation Plan

What year did your entity adopt, or revise, their most recent water conservation plan?
Click here to enter a date.

Does the plan incorporate Best Management Practices? Yes ☐ No ☐

### 2. Water Conservation Programs

Has your entity implemented any type of water conservation activities or programs?
Yes ☐ No ☐

If yes: For this reporting period, please select the types of activities and programs that your entity actively administered and estimated volume of water conserved.

| **Agricultural Activities and Practices** | **Estimated Volume (in gallons)** |
|---|---|
| ☐ Irrigation Audit | |
| ☐ Information Gathering and Education Practices | |
| ☐ Cropping and Management Practices | |
| ☐ Scheduling Practices | |
| ☐ Land Management Systems | |
| ☐ On-Farm Water Delivery Systems | |
| ☐ Water District Delivery Systems | |
| **Industrial Activities and Practices** | |
| ☐ Industrial Water Audit | |
| ☐ Conservation Analysis and Planning | |
| ☐ Education Practices | |
| ☐ System Operations | |
| ☐ Cooling System Management | |
| ☐ Landscaping | |
| ☐ Sector Specific Practices | |
| **Estimated Volume of Water Conserved** | 0 |

Other Activities? Please list or describe: Click here to enter text.

## 3. Reuse (Water or Wastewater Effluent)

Fields that are gray are entered by the user. Highlight the 0's that are in white and press F9 to populate these fields.

For this reporting period, please provide the following data regarding the types of direct and indirect reuse activities that were administered:

| Reuse Activity | Estimated Volume (in gallons) |
|---|---|
| On-site irrigation | |
| Plant wash down | |
| Chlorination/de-chlorination | |
| Industrial | |
| Landscape irrigation (parks, golf courses) | |
| Agricultural | |
| Other, please describe: | |
| **Estimated Volume of Recycled or Reuse** | 0 |

## 4. Water Savings

For this reporting period, estimate the savings that resulted from your overall water conservation activities and programs?

| **Estimated Gallons Saved** (Total from Conservation Programs Table) | **Estimated Gallons Recycled or Reused** (Total from Reuse Table) | **Total Volume of Water Saved** [1] | **Dollar Value of Water Saved** [2] |
|---|---|---|---|
| | | 0 | |

1. [Estimated gallons saved + Estimated gallons recycled or reused = Total Volume Saved]
2. Estimate this value by taking into account water savings, the cost of treatment or purchase of your water, and any deferred capital costs due to conservation.

**5.** In your opinion, how would you rank the overall effectiveness of your conservation programs and activities, if applicable? Click here to enter text.

| Please List Activities and Practices listed in the Water Conservation Activities Tables | Less Than Effective | Somewhat Effective | Highly Effective |
|---|---|---|---|
| | ☐ | ☐ | ☐ |
| | ☐ | ☐ | ☐ |
| | ☐ | ☐ | ☐ |
| | ☐ | ☐ | ☐ |
| | ☐ | ☐ | ☐ |

**6.** What might your entity do to expand water conservation efforts? Click here to enter text.

**If you have any questions on how to fill out this form or about the Water Conservation program, please contact us at 512/239-4691.**

Individuals are entitled to request and review their personal information that the agency gathers on its forms. They may also have any errors in their information corrected. To review such information, contact us at 512-239-3282.

# Appendix 5C-C

# Model Water Conservation Plan for Irrigation Districts

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This appendix includes a Model Water Conservation Plan for Irrigation Districts in the ETRWPA. The model plan addresses the latest Texas Commission on Environment Quality requirements and is intended to be modified by each user to best reflect the activities appropriate to the entity. The model plan also includes sample appendices required:

- Appendix A – List of References
- Appendix B – Texas Commission on Environmental Quality Rules on Water Conservation Plans for Irrigation Use
- Appendix C – TCEQ Rules for Water Conservation Plans for Agricultural Users
- Appendix D – Letter to Chair of East Texas Region Water Planning Group
- Appendix E – Sample Implementation Report

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# Water Conservation Plan for [Irrigation District]

# Date

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## APPENDICES

# Water Conservation Plan for [Irrigation District]

## 1. Objectives

The Texas Commission on Environmental Quality has developed guidelines and requirements governing the development of water conservation plans for systems that provide agricultural water to more than one user in Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.4 of the Texas Administrative Code (TAC). The minimum requirements are:

| TAC Reference | Subject | Plan Location |
|---|---|---|
| 30 TAC §288.4(a)(3)(A)(i) | Inventory of Structural Facilities | Section 2 |
| 30 TAC §288.4(a)(3)(A)(ii) | Inventory of Management Practices | Section 3 |
| 30 TAC §288.4(a)(3)(A)(iii) | System Profile | Section 4 |
| 30 TAC §288.4(a)(3)(B) | Specification of Conservation Goals | Section 5 |
| 30 TAC §288.4(a)(3)(C) | Measurement of Diverted Water | Section 6 |
| 30 TAC §288.4(a)(3)(D) | Monitoring and Record Management Program | Section 7 |
| 30 TAC §288.4(a)(3)(E) | Leak Detection and Repair and Water Loss Accounting | Section 8 |
| 30 TAC §288.4(a)(3)(F) | Customer Assistance Program | Section 9 |
| 30 TAC §288.4(a)(3)(G) | Wholesale Water Customer Contract Provisions | Section 10 |
| 30 TAC §288.4(a)(3)(H) | Adoption of Water Conservation Plan an d Goals | Section 11 |
| 30 TAC §288.4(a)(3)(I) | Other Water Conservation Practices | Section 12 |
| 30 TAC §288.4(a)(3)(J) | Coordination with Regional Water Planning Group | Section 13 |
| 30 TAC §288.4(c) | Review and Update of Plan | Section 14 |
| 30 TAC §288.30(3) | Water Conservation Implementation Report | Section 15 |

The purpose of this water conservation plan is to:

- To reduce water consumption from the levels that would exist without conservation efforts.
- To reduce the loss and waste of water.
- To encourage improvement of processes that inefficiently consume water.
- To extend the life of current supplies by reducing the rate of growth in demand.

This water conservation plan is intended to serve as a guide to [irrigation district]. The following plan includes all conservation measures required by TCEQ.

*[The required elements of a water conservation plan are somewhat different for "agricultural users other than irrigation" and an "individual irrigation user." See 30 TAC §288.4 for guidance.]*

## 2. Inventory of Structural Facilities

*[Describe structural facilities, including water storage, conveyance, and delivery structures. This inventory should include the following information:*

- *Service area description*
- *Miles of main canals and pipelines*
- *Miles of lateral canals and pipelines*
- *Description of conveyance construction*
    - *Miles of unlined canals*
    - *Miles of lined canals*
    - *Miles of enclosed pipelines*
- *Description of canal conditions and recent or planned improvements*
- *Reservoir capacity*
- *Description of pumps and pumping stations*
- *Descriptions of meters and/or measuring devices*
- *Descriptions of customer gates and measuring devices*
- *Description of other structural facilities.]*

## 3. Inventory of Management Practices

*[Describe management practices, including operating rules and regulations, water pricing policy, and a description of practices and/or devices used to account for water deliveries. This inventory should include the following information:*

- *Total water available to the district*
- *Water rights*
    - *Maximum water rights allocation to district*
    - *Water rights numbers*
    - *Other water contracted to be delivered to the district.*
- *Average annual water diverted by the district*
- *Average annual water delivered to customers*
- *Delivery efficiency*
- *Historical diversions and deliveries*
- *Practices and/or devices used to account for water deliveries*
- *Water pricing policy*

## 4. System Profile

*[Describe the system profile, including square miles of the service area, the number of customers taking delivery of water by the system, the types of crops, the types of irrigation*

*systems, the types of drainage systems, and total acreage under irrigation, both historical and projected. This profile should include the following information:*

- *Number of acres or square miles in service area*
- *Average number of acres irrigated annually*
- *Projected number of acres to be irrigated in 10 years*
- *Number of active irrigation customers*
- *Total irrigation water delivered annually*
- *Types of crops grown by customers*
- *Types of irrigation systems used by customers*
- *Types of drainage systems used by customers*
- *Further description of irrigation customers*
- *List of municipal customers and number of acre-feet allocated annually*
- *List of industrial and other large customers and number of acre-feet allocated annually]*

## 5. Specification of Water Conservation Goals

*[The Irrigation District must specify a five-year and ten-year target for water savings including maximum allowable losses for the storage and distribution system. The goals established by a system providing agricultural water to more than one user under this subparagraph are not enforceable]*

The TCEQ regulations require that each irrigation user adopt quantifiable water conservation goals in their water conservation plan. The *[Irrigation District]* has adopted goals related to improving water use efficiency and water losses from its delivery system. The *[Irrigation District]* will strive to increase water efficiency per irrigated acre by *[insert amount]* percent within 5 years and *[insert amount]* percent within 10 years. In addition, the *[Irrigation District]* will strive to maintain losses from the storage and distribution system below *[insert amount]* percent annually over the next 10 years.

The goals for this water conservation plan will be achieved through the following:

*[Select applicable measures and/or include additional measures and provide descriptions:*

- *Regular inspections of District storage, conveyance, and delivery structures to identify controllable losses or leaks.*
- *Timely repair of identified losses or leaks.*
- *Installation of meters within the system to help identify areas of loss or inefficient water use.*
- *Increased metering of water deliveries.*

*Other best management practices (BMPs) can be found in the Water Conservation Best Management Practices Guide developed by the statewide Water Conservation Implementation Task Force (see list of references).]*

In addition, the District has a customer assistance program, as described in Section 9.

## 6. Measurement of Diverted Water

*[Describe the practice(s) and/or device(s) which will be utilized to measure and account for the amount of water diverted from the source(s) of supply]*

## 7. Monitoring and Record Management Program

*[Describe the monitoring and record management program for water deliveries, sales, and losses.]*

## 8. Leak Detection and Repair and Water Loss Accounting

*[Describe any methods that will be used for leak detection and repair and water loss accounting and control.]*

Canal riders and maintenance personnel watch for and report signs of leakage. Customers are also encouraged to report leaks. Drains are monitored for unusual flows. If leakage is detected, the corresponding section of the system can be isolated with shutoff gates while still allowing the rest of the system to function normally. District policy is to repair leaks within 24 hours of detection, and most leaks are repaired within 8 hours of detection.

In addition, the District will conduct an annual water audit of its system and adjust operations to minimize losses if applicable.

## 9. Customer Assistance Program

*[Describe a program to assist customers in the development of on-farm water conservation and pollution prevention plans and/or measures.]*

The District's Customer Assistance Program provides education on BMPs and encourages customers to improve volumetric measuring, improve land, and upgrade irrigation equipment to increase water efficiency of their irrigation systems.

**Volumetric Measuring**
Measuring the volume of water being used to irrigate a crop is useful because it provides [irrigation district] with information needed to evaluate the efficiency of an irrigation system. With this information, [irrigation district] and customers can better manage their crops. Irrigation water users will employ a method of measuring how much irrigation water is used in their system.

The following methods may be used to directly measure amounts of irrigation water being used:

*[Select applicable measures and/or include additional measures and provide descriptions:*

- *Propeller meters*
- *Orifice, venture or differential pressure meters*
- *Ultrasonic*
- *Stage Discharge Rating Tables*
- *Area/Point Velocity Measurements]*

Indirect methods that may be used to measure irrigation water quantities include:

- Measurement of time of irrigation and size of irrigation delivery system
- Measurement of end-pressure in a sprinkler irrigation system
- Measurement of energy used by a pump supplying water to an irrigation system
- Change in the elevation of water stored in an irrigation water supply reservoir

**Irrigation Scheduling**

Coordination of irrigation schedules of customers can reduce losses associated with conveying irrigation water. The *[irrigation district]* will implement an irrigation schedule for deliveries to customers to best meet the customers' water needs and minimize conveyance losses.

**Land Improvement**

To reduce the amount of water required for irrigation, the following land improvement practices are encouraged for customers of the *[irrigation district]*:

- Creation of furrow dikes
- Crop residue management and conservation tillage
- Land leveling
- Contour farming

**Irrigation Equipment Improvement**

The *[irrigation district]* encourages customers to utilize efficient irrigation equipment, including:

- Installation of a drip/micro-irrigation system
- Installation of gated and flexible pipe for field water distribution systems
- Replacement of on-farm irrigation ditches with pipelines
- Lining of on-farm irrigation ditches
- Installation of low pressure center pivot sprinkler irrigation systems

*[Best management practices (BMPs) can be found in the Water Conservation Best Management Practices Guide developed by the statewide Water Conservation Implementation Task Force (see list of references).]*

## 10. Wholesale Water Customer Contract Provisions

Every wholesale water supply contract entered into or renewed after official adoption of this plan (by either ordinance, resolution, or tariff), and including any contract extension, will require that each successive wholesale customer develop and implement a water conservation plan or water conservation measures using the applicable elements in this 30 TAC §288.4. If the customer intends to resell the water, the contract between the initial supplier and customer must provide that the contract for the resale of the water must have water conservation requirements so that each successive customer in the resale of the water will be required to implement water conservation measures in accordance with applicable provisions of this chapter.

## 11. Adoption of Water Conservation Plan and Goals

The *[Irrigation District]* Board adopted this water conservation plan and its goals by resolution on *[date]*. A copy of the resolution is presented in Appendix C.

## 12. Other Water Conservation Practices

*[Describe any other water conservation practice, method, or technique which the District will use to achieve conservation.]*

## 13. Coordination with Regional Water Planning Group

The *[Irrigation District]* submitted this water conservation plan to the East Texas Region Water Planning Group. A copy of the letter to the chair is presented in Appendix D.

## 14. Review and Update of Plan

As required by TCEQ rules, the *[Irrigation District]* will review and update this water conservation plan every five years, beginning in *[year]*. Goals for irrigation use will be re-evaluated based on previous five-year and ten-year goals and any new information.

## 15. Water Conservation Implementation Report

The *[Irrigation District]* has completed a water conservation implementation report that details its water conservation efforts and achievements. The implementation report is presented in Appendix E.

*[The plan must include a water conservation implementation report. At a minimum, this report must include the following information:*

- *The list of dates and descriptions of the conservation measures implemented;*
- *Data about whether or not targets in the plans are being met;*
- *The actual amount of water saved; and*
- *If the targets are not being met, an explanation as to why any of the targets are not being met, including any progress on that particular target.]*

# Appendix A
# List of References

## Appendix A List of References

Title 30 of the Texas Administrative Code, Part 1, Chapter 3, Subchapter A, Rules 3.2 and Chapter 288, Subchapter A, Rule 288.4, downloaded from http://www.sos.state.tx.us/tac/index.shtml, effective December 6, 2012.

Texas Water Development Board: *Report 362 Water Conservation Best Management Practices Guide*, prepared for the Water Conservation Implementation Task Force, Austin, November 2004.

Texas Commission on Environmental Quality, *System Inventory and Water Conservation Plan for Agricultural Water Suppliers Providing Water to More Than One User*, TCEQ Form No. 10244, Revised April 17, 2013.

Texas Commission on Environmental Quality, *Water Conservation Implementation Report Non Public Water Supplier*, TCEQ Form No. 20645, Revised September 18, 2013.

# Appendix B
# TCEQ Rules for Water Conservation Plans for Agricultural Use

**SUBCHAPTER A: WATER CONSERVATION PLANS**
**§§288.1 - 288.7**
**Effective December 6, 2012**

**§288.4. Water Conservation Plans for Agricultural Use.**

(a) A water conservation plan for agricultural use of water must provide information in response to the following subsections. If the plan does not provide information for each requirement, the agricultural water user must include in the plan an explanation of why the requirement is not applicable.

(1) For an individual agricultural user other than irrigation:

(A) a description of the use of the water in the production process, including how the water is diverted and transported from the source(s) of supply, how the water is utilized in the production process, and the estimated quantity of water consumed in the production process and therefore unavailable for reuse, discharge, or other means of disposal;

(B) specific, quantified five-year and ten-year targets for water savings and the basis for the development of such goals. The goals established by agricultural water users under this subparagraph are not enforceable;

(C) a description of the device(s) and/or method(s) within an accuracy of plus or minus 5.0% to be used in order to measure and account for the amount of water diverted from the source of supply;

(D) leak-detection, repair, and accounting for water loss in the water distribution system;

(E) application of state-of-the-art equipment and/or process modifications to improve water use efficiency; and

(F) any other water conservation practice, method, or technique which the user shows to be appropriate for achieving the stated goal or goals of the water conservation plan.

(2) For an individual irrigation user:

(A) a description of the irrigation production process which shall include, but is not limited to, the type of crops and acreage of each crop to be irrigated, monthly irrigation diversions, any seasonal or annual crop rotation, and soil types of the land to be irrigated;

(B) a description of the irrigation method, or system, and equipment including pumps, flow rates, plans, and/or sketches of the system layout;

(C) a description of the device(s) and/or methods, within an accuracy of plus or minus 5.0%, to be used in order to measure and account for the amount of water diverted from the source of supply;

(D) specific, quantified five-year and ten-year targets for water savings including, where appropriate, quantitative goals for irrigation water use efficiency and a pollution

abatement and prevention plan. The goals established by an individual irrigation water user under this subparagraph are not enforceable;

(E) water-conserving irrigation equipment and application system or method including, but not limited to, surge irrigation, low pressure sprinkler, drip irrigation, and nonleaking pipe;

(F) leak-detection, repair, and water-loss control;

(G) scheduling the timing and/or measuring the amount of water applied (for example, soil moisture monitoring);

(H) land improvements for retaining or reducing runoff, and increasing the infiltration of rain and irrigation water including, but not limited to, land leveling, furrow diking, terracing, and weed control;

(I) tailwater recovery and reuse; and

(J) any other water conservation practice, method, or technique which the user shows to be appropriate for preventing waste and achieving conservation.

(3) For a system providing agricultural water to more than one user:

(A) a system inventory for the supplier's:

(i) structural facilities including the supplier's water storage, conveyance, and delivery structures;

(ii) management practices, including the supplier's operating rules and regulations, water pricing policy, and a description of practices and/or devices used to account for water deliveries; and

(iii) a user profile including square miles of the service area, the number of customers taking delivery of water by the system, the types of crops, the types of irrigation systems, the types of drainage systems, and total acreage under irrigation, both historical and projected;

(B) specific, quantified five-year and ten-year targets for water savings including maximum allowable losses for the storage and distribution system. The goals established by a system providing agricultural water to more than one user under this subparagraph are not enforceable;

(C) a description of the practice(s) and/or device(s) which will be utilized to measure and account for the amount of water diverted from the source(s) of supply;

(D) a monitoring and record management program of water deliveries, sales, and losses;

(E) a leak-detection, repair, and water loss control program;

(F) a program to assist customers in the development of on-farm water conservation and pollution prevention plans and/or measures;

(G) a requirement in every wholesale water supply contract entered into or renewed after official adoption of the plan (by either ordinance, resolution, or tariff), and including any contract extension, that each successive wholesale customer develop and implement a water conservation plan or water conservation measures using the applicable elements in this chapter. If the customer intends to resell the water, the contract between the initial supplier and customer must provide that the contract for the resale of the water must have water conservation requirements so that each successive customer in the resale of the water will be required to implement water conservation measures in accordance with applicable provisions of this chapter;

(H) official adoption of the water conservation plan and goals, by ordinance, rule, resolution, or tariff, indicating that the plan reflects official policy of the supplier;

(I) any other water conservation practice, method, or technique which the supplier shows to be appropriate for achieving conservation; and

(J) documentation of coordination with the regional water planning groups, in order to ensure consistency with appropriate approved regional water plans.

(b) A water conservation plan prepared in accordance with the rules of the United States Department of Agriculture Natural Resource Conservation Service, the Texas State Soil and Water Conservation Board, or other federal or state agency and substantially meeting the requirements of this section and other applicable commission rules may be submitted to meet application requirements in accordance with a memorandum of understanding between the commission and that agency.

(c) An agricultural water user shall review and update its water conservation plan, as appropriate, based on an assessment of previous five-year and ten-year targets and any other new or updated information. An agricultural water user shall review and update the next revision of its water conservation plan every five years to coincide with the regional water planning group.

Adopted November 14, 2012 Effective December 6, 2012

**Appendix C**
**Board Resolution Adopting Water Conservation Plan**

*[Insert a copy of the Board resolution adopting this water conservation plan and its goals.]*

**Appendix D**
**Letter to Chair of East Texas Region Water Planning Group**

*[Insert a copy of the letter submitting this water conservation plan to the chair of the East Texas Region Water Planning Group.]*

**Appendix E**
**Water Conservation Implementation Report**

# Texas Commission on Environmental Quality

## Water Conservation Implementation Report

## Non Public Water Supplier

This report must be completed by entities that are required to submit a water conservation plan to the TCEQ in accordance with Title 30 Texas Administrative Code, Chapter 288. Please complete this report and submit it to the TCEQ. If you need assistance in completing this form, please contact the Resource Protection Team in the Water Availability Division at (512) 239-4691.

## CONTACT INFORMATION

Name of Entity: Click here to enter text.

Water Rights Permit numbers: Click here to enter text.

Address: Click here to enter text. City: Click here to enter text.

Zip Code: Click here to enter text.

Email: Click here to enter text. Telephone Number: Click here to enter text.

Regional Water Planning Group: _____ Map

Groundwater Conservation District: _____ Map

Form Completed By: Click here to enter text. Title: Click here to enter text.

Signature: _____ Date: Click here to enter a date.

Contact information for the person or department responsible for implementing the water conservation plan:

Name: Click here to enter text. Phone: Click here to enter text. Email: Click here to enter text.

Report Completed on Date: dd/mm/yyyy

Reporting Period (**check only one**):

☐ Fiscal Period Begin dd/mm/yyyy Period End dd/mm/yyyy

☐ Calendar Period Begin dd/mm/yyyy Period End dd/mm/yyyy

Please check all of the following that apply to your entity:

☐ An entity that has a non-irrigation surface water right greater than 1,000 acre-feet/year

☐ An entity that has an irrigation surface water right greater than 10,000 acre-feet/year

## System Data

Fields that are gray are entered by the user. Highlight the 0's that are in white and press F9 to populate these fields.

| | **Total Gallons During the Reporting Period.** |
|---|---|
| **Water Produced:** Volume produced from own sources | |
| **Wholesale Water Imported :** Purchased wholesale water imported from other sources into the distribution system | |
| **TOTAL System Input :** Total water input into the system | 0<br>[Produced + Imported = System Input] |
| **TOTAL System Output :** Water used, sold, exported or transferred out of the system | |
| **TOTAL Authorized Water Use:** All water that has been authorized for use or consumption. | 0<br>[System Output ÷ 365 = Average Gallons per day] |

In the table below please provide the **specific and quantified five and ten-year targets for water savings** as listed in your most current water conservation plan.

| **Date** | **Target for: Water Savings** | **Target for: Water Loss** |
|---|---|---|
| **Five-year target date:**<br>dd/mm/yyyy | | |
| **Ten-year target date:**<br>dd/mm/yyyy | | |

**Are targets in the water conservation plan being met?** Yes ☐ No ☐

**If these targets are not being met, provide an explanation as to why, including any progress on these targets.** Click here to enter text.

# Water Conservation Programs and Activities

Fields that are gray are entered by the user. Highlight the 0's that are in white and press F9 to populate these fields.

*As you complete this section, please review your entity's water conservation plan to see if you are making progress towards meeting your stated goals.*

## 1. Water Conservation Plan

What year did your entity adopt, or revise, their most recent water conservation plan?
Click here to enter a date.

Does the plan incorporate Best Management Practices? Yes ☐ No ☐

### 2. Water Conservation Programs

Has your entity implemented any type of water conservation activities or programs?
Yes ☐ No ☐

If yes: For this reporting period, please select the types of activities and programs that your entity actively administered and estimated volume of water conserved.

| **Agricultural Activities and Practices** | **Estimated Volume (in gallons)** |
|---|---|
| ☐ Irrigation Audit | |
| ☐ Information Gathering and Education Practices | |
| ☐ Cropping and Management Practices | |
| ☐ Scheduling Practices | |
| ☐ Land Management Systems | |
| ☐ On-Farm Water Delivery Systems | |
| ☐ Water District Delivery Systems | |
| **Industrial Activities and Practices** | |
| ☐ Industrial Water Audit | |
| ☐ Conservation Analysis and Planning | |
| ☐ Education Practices | |
| ☐ System Operations | |
| ☐ Cooling System Management | |
| ☐ Landscaping | |
| ☐ Sector Specific Practices | |
| **Estimated Volume of Water Conserved** | 0 |

Other Activities? Please list or describe: Click here to enter text.

## 3. Reuse (Water or Wastewater Effluent)

Fields that are gray are entered by the user. Highlight the 0's that are in white and press F9 to populate these fields.

For this reporting period, please provide the following data regarding the types of direct and indirect reuse activities that were administered:

| Reuse Activity | Estimated Volume (in gallons) |
|---|---|
| On-site irrigation | |
| Plant wash down | |
| Chlorination/de-chlorination | |
| Industrial | |
| Landscape irrigation (parks, golf courses) | |
| Agricultural | |
| Other, please describe: | |
| **Estimated Volume of Recycled or Reuse** | 0 |

## 4. Water Savings

For this reporting period, estimate the savings that resulted from your overall water conservation activities and programs?

| **Estimated Gallons Saved** (Total from Conservation Programs Table) | **Estimated Gallons Recycled or Reused** (Total from Reuse Table) | **Total Volume of Water Saved** [1] | **Dollar Value of Water Saved** [2] |
|---|---|---|---|
| | | 0 | |

1. [Estimated gallons saved + Estimated gallons recycled or reused = Total Volume Saved]
2. Estimate this value by taking into account water savings, the cost of treatment or purchase of your water, and any deferred capital costs due to conservation.

**5.** In your opinion, how would you rank the overall effectiveness of your conservation programs and activities, if applicable? Click here to enter text.

| Please List Activities and Practices listed in the Water Conservation Activities Tables | Less Than Effective | Somewhat Effective | Highly Effective |
|---|---|---|---|
| | ☐ | ☐ | ☐ |
| | ☐ | ☐ | ☐ |
| | ☐ | ☐ | ☐ |
| | ☐ | ☐ | ☐ |
| | ☐ | ☐ | ☐ |

**6.** What might your entity do to expand water conservation efforts? Click here to enter text.

**If you have any questions on how to fill out this form or about the Water Conservation program, please contact us at 512/239-4691.**

Individuals are entitled to request and review their personal information that the agency gathers on its forms. They may also have any errors in their information corrected. To review such information, contact us at 512-239-3282.

# Appendix 5C-D

# Plumbing Code Savings

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The water volume savings due to the future enhancement of plumbing fixtures and the proposed implementation of modified plumbing codes can be found in the following attachment.

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**Appendix 5C-D**
**Volumetric Savings for Municipal WUGs by County (acre feet)**

| County | Entity Name | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
|---|---|---|---|---|---|---|---|
| ANDERSON | BRUSHY CREEK WSC | 29.79 | 44.05 | 54.79 | 60.22 | 61.23 | 61.30 |
| ANDERSON | COUNTY-OTHER, ANDERSON | 272.93 | 400.36 | 496.07 | 545.21 | 554.60 | 554.91 |
| ANDERSON | ELKHART | 14.23 | 20.84 | 25.81 | 28.35 | 28.84 | 28.86 |
| ANDERSON | FOUR PINES WSC | 30.93 | 43.46 | 52.04 | 56.59 | 57.85 | 57.89 |
| ANDERSON | FRANKSTON | 13.72 | 20.33 | 25.22 | 27.69 | 28.14 | 28.18 |
| ANDERSON | PALESTINE | 205.87 | 305.49 | 381.70 | 420.79 | 427.65 | 427.65 |
| ANDERSON | THE CONSOLIDATED WSC | 16.68 | 24.31 | 30.28 | 33.42 | 34.03 | 34.05 |
| ANDERSON | WALSTON SPRINGS WSC | 40.34 | 59.13 | 73.20 | 80.46 | 81.87 | 81.91 |
| ANGELINA | ANGELINA WSC | 35.04 | 54.74 | 68.21 | 72.77 | 76.94 | 79.78 |
| ANGELINA | BURKE | 6.05 | 8.79 | 10.80 | 12.22 | 13.04 | 13.54 |
| ANGELINA | CENTRAL WCID OF ANGELINA COUNTY | 75.33 | 98.89 | 104.32 | 109.27 | 113.70 | 117.63 |
| ANGELINA | COUNTY-OTHER, ANGELINA | 197.96 | 310.85 | 392.03 | 418.23 | 442.36 | 458.90 |
| ANGELINA | DIBOLL | 59.15 | 91.98 | 118.59 | 126.53 | 133.80 | 138.71 |
| ANGELINA | FOUR WAY SUD | 43.48 | 62.00 | 75.50 | 85.09 | 90.89 | 94.42 |
| ANGELINA | HUDSON | 45.59 | 66.83 | 83.31 | 94.55 | 100.41 | 104.24 |
| ANGELINA | HUDSON WSC | 54.17 | 57.97 | 61.15 | 64.05 | 66.65 | 68.96 |
| ANGELINA | HUNTINGTON | 24.42 | 37.28 | 47.86 | 54.77 | 57.93 | 60.10 |
| ANGELINA | LUFKIN | 404.27 | 619.24 | 797.71 | 913.01 | 965.65 | 1,001.68 |
| ANGELINA | REDLAND WSC | 32.14 | 50.53 | 54.54 | 58.27 | 61.71 | 64.02 |
| ANGELINA | ZAVALLA | 8.25 | 12.68 | 16.36 | 18.73 | 19.82 | 20.54 |
| CHEROKEE | ALTO | 14.38 | 22.41 | 29.39 | 35.01 | 38.83 | 42.52 |
| CHEROKEE | ALTO RURAL WSC | 40.90 | 66.19 | 74.10 | 82.88 | 92.03 | 100.77 |
| CHEROKEE | BULLARD | 0.47 | 0.69 | 0.84 | 0.96 | 1.07 | 1.16 |
| CHEROKEE | COUNTY-OTHER, CHEROKEE | 94.58 | 147.24 | 192.49 | 229.09 | 254.75 | 279.16 |
| CHEROKEE | CRAFT-TURNEY WSC | 58.37 | 92.32 | 122.20 | 145.86 | 161.67 | 176.94 |
| CHEROKEE | JACKSONVILLE | 172.56 | 270.34 | 355.93 | 423.84 | 470.43 | 514.97 |
| CHEROKEE | NEW SUMMERFIELD | 11.17 | 16.69 | 21.26 | 25.12 | 28.00 | 30.70 |
| CHEROKEE | NORTH CHEROKEE WSC | 46.22 | 70.68 | 91.37 | 108.33 | 120.68 | 132.21 |
| CHEROKEE | RUSK | 62.80 | 97.44 | 127.34 | 151.39 | 168.13 | 184.21 |
| CHEROKEE | RUSK RURAL WSC | 37.82 | 59.02 | 77.46 | 92.19 | 102.32 | 112.10 |
| CHEROKEE | SOUTHERN UTILITIES COMPANY | 29.41 | 46.03 | 60.85 | 72.69 | 80.72 | 88.37 |
| CHEROKEE | TROUP | 0.77 | 1.21 | 1.59 | 1.91 | 2.09 | 2.29 |
| CHEROKEE | WELLS | 9.64 | 15.19 | 20.08 | 23.94 | 26.54 | 29.07 |
| CHEROKEE | WRIGHT CITY WSC | 5.98 | 9.19 | 11.87 | 14.04 | 15.59 | 17.08 |
| HARDIN | COUNTY-OTHER, HARDIN | 156.28 | 243.59 | 314.42 | 330.34 | 343.88 | 350.69 |
| HARDIN | KOUNTZE | 21.92 | 31.88 | 40.23 | 44.84 | 45.68 | 45.72 |
| HARDIN | LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY | 1.40 | 1.70 | 1.85 | 1.96 | 2.05 | 2.12 |
| HARDIN | LUMBERTON | 140.78 | 221.53 | 280.09 | 318.30 | 338.70 | 351.29 |
| HARDIN | LUMBERTON MUD | 81.19 | 118.85 | 147.40 | 164.80 | 171.66 | 174.59 |
| HARDIN | NORTH HARDIN WSC | 78.76 | 102.81 | 107.39 | 110.78 | 113.43 | 115.42 |
| HARDIN | SILSBEE | 70.47 | 104.13 | 131.80 | 147.46 | 151.23 | 152.38 |
| HARDIN | SOUR LAKE | 19.93 | 29.92 | 37.88 | 42.57 | 44.14 | 44.81 |
| HARDIN | WEST HARDIN WSC | 36.31 | 36.49 | 36.63 | 36.73 | 36.81 | 36.87 |
| HENDERSON | ATHENS | 3.03 | 4.57 | 5.77 | 6.69 | 7.30 | 7.77 |
| HENDERSON | BERRYVILLE | 11.88 | 18.41 | 23.77 | 28.13 | 30.62 | 32.68 |
| HENDERSON | BETHEL-ASH WSC | 32.30 | 49.55 | 62.77 | 74.94 | 83.07 | 90.17 |
| HENDERSON | BROWNSBORO | 13.86 | 22.44 | 29.14 | 36.15 | 41.38 | 46.14 |
| HENDERSON | BRUSHY CREEK WSC | 8.13 | 12.49 | 16.25 | 19.15 | 20.61 | 21.71 |
| HENDERSON | CHANDLER | 39.60 | 65.15 | 85.47 | 106.27 | 121.32 | 135.15 |
| HENDERSON | COUNTY-OTHER, HENDERSON | 117.09 | 175.46 | 219.88 | 218.23 | 217.63 | 212.61 |
| HENDERSON | FRANKSTON | 0.48 | 1.04 | 1.64 | 2.33 | 2.84 | 3.29 |
| HENDERSON | MURCHISON | 6.12 | 8.88 | 11.22 | 12.52 | 12.78 | 12.82 |
| HENDERSON | R-P-M WSC | 7.68 | 12.45 | 16.16 | 19.85 | 22.48 | 24.86 |
| HENDERSON | VIRGINIA HILL WSC | 20.44 | 32.69 | 42.62 | 51.74 | 57.66 | 62.97 |

**Appendix 5C-D**
**Volumetric Savings for Municipal WUGs by County (acre feet)**

| County | Entity Name | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
|---|---|---|---|---|---|---|---|
| HOUSTON | COUNTY-OTHER, HOUSTON | 11.18 | 15.74 | 18.04 | 18.46 | 18.91 | 18.91 |
| HOUSTON | CROCKETT | 74.55 | 108.08 | 135.69 | 150.02 | 152.57 | 152.57 |
| HOUSTON | GRAPELAND | 15.62 | 22.47 | 28.05 | 31.12 | 31.65 | 31.66 |
| HOUSTON | LOVELADY | 7.11 | 10.19 | 12.58 | 13.88 | 14.12 | 14.12 |
| HOUSTON | THE CONSOLIDATED WSC | 138.20 | 196.43 | 241.86 | 266.98 | 271.82 | 271.97 |
| JASPER | COUNTY-OTHER, JASPER | 233.04 | 338.41 | 418.10 | 460.87 | 469.22 | 469.22 |
| JASPER | JASPER | 83.59 | 123.04 | 153.56 | 169.87 | 172.66 | 172.66 |
| JASPER | JASPER COUNTY WCID #1 | 34.89 | 52.99 | 58.54 | 58.54 | 58.54 | 58.54 |
| JASPER | KIRBYVILLE | 22.66 | 32.99 | 40.85 | 45.05 | 45.84 | 45.87 |
| JASPER | MAURICEVILLE SUD | 3.64 | 4.92 | 4.93 | 4.93 | 4.93 | 4.93 |
| JEFFERSON | BEAUMONT | 1,349.66 | 2,076.55 | 2,720.82 | 3,190.70 | 3,479.75 | 3,756.23 |
| JEFFERSON | BEVIL OAKS | 15.09 | 23.36 | 30.73 | 34.71 | 37.82 | 40.81 |
| JEFFERSON | CHINA | 13.28 | 20.44 | 26.81 | 31.42 | 34.27 | 37.00 |
| JEFFERSON | COUNTY-OTHER, JEFFERSON | 177.29 | 345.26 | 522.65 | 698.98 | 868.44 | 1,052.89 |
| JEFFERSON | GROVES | 167.99 | 245.75 | 311.58 | 336.89 | 342.68 | 342.68 |
| JEFFERSON | JEFFERSON COUNTY WCID #10 | 52.29 | 79.30 | 102.88 | 120.38 | 131.40 | 141.90 |
| JEFFERSON | MEEKER MUD | 32.41 | 48.53 | 62.35 | 72.79 | 79.60 | 85.94 |
| JEFFERSON | NEDERLAND | 200.82 | 308.01 | 403.12 | 472.54 | 515.34 | 556.31 |
| JEFFERSON | NOME | 6.11 | 9.17 | 11.82 | 13.80 | 15.08 | 16.29 |
| JEFFERSON | PORT ARTHUR | 640.17 | 927.07 | 1,154.79 | 1,201.37 | 1,220.78 | 1,221.42 |
| JEFFERSON | PORT NECHES | 152.03 | 234.52 | 307.81 | 359.79 | 392.22 | 423.35 |
| JEFFERSON | WEST JEFFERSON COUNTY MWD | 83.46 | 125.55 | 161.97 | 189.25 | 206.81 | 223.38 |
| NACOGDOCHES | APPLEBY WSC | 38.31 | 60.38 | 79.67 | 94.95 | 106.19 | 116.86 |
| NACOGDOCHES | COUNTY-OTHER, NACOGDOCHES | 159.36 | 216.73 | 247.03 | 279.02 | 312.72 | 344.08 |
| NACOGDOCHES | CUSHING | 7.92 | 12.78 | 17.11 | 20.48 | 22.87 | 25.14 |
| NACOGDOCHES | D&M WSC | 53.04 | 82.12 | 106.33 | 126.31 | 141.97 | 156.45 |
| NACOGDOCHES | GARRISON | 11.30 | 18.27 | 24.41 | 29.21 | 32.62 | 35.86 |
| NACOGDOCHES | LILLY GROVE SUD | 29.45 | 45.77 | 59.73 | 71.01 | 79.66 | 87.66 |
| NACOGDOCHES | MELROSE WSC | 36.71 | 58.71 | 77.97 | 93.12 | 104.11 | 114.56 |
| NACOGDOCHES | NACOGDOCHES | 406.60 | 655.00 | 874.11 | 1,045.08 | 1,167.95 | 1,284.06 |
| NACOGDOCHES | SWIFT WSC | 32.47 | 52.55 | 70.40 | 83.15 | 92.81 | 102.06 |
| NACOGDOCHES | WODEN WSC | 29.75 | 47.66 | 63.46 | 75.80 | 84.73 | 93.16 |
| NEWTON | COUNTY-OTHER, NEWTON | 94.69 | 138.83 | 176.34 | 185.67 | 188.98 | 188.98 |
| NEWTON | MAURICEVILLE SUD | 3.31 | 4.37 | 4.37 | 4.37 | 4.37 | 4.37 |
| NEWTON | NEWTON | 23.59 | 33.25 | 41.11 | 45.47 | 46.38 | 46.38 |
| NEWTON | SOUTH NEWTON WSC | - | - | - | - | - | - |
| ORANGE | BRIDGE CITY | 92.46 | 140.31 | 179.51 | 190.14 | 196.09 | 198.40 |
| ORANGE | COUNTY-OTHER, ORANGE | 308.32 | 480.18 | 505.46 | 525.16 | 542.44 | 548.84 |
| ORANGE | MAURICEVILLE SUD | 77.33 | 106.64 | 109.90 | 112.10 | 113.77 | 114.99 |
| ORANGE | ORANGE | 215.77 | 325.43 | 414.64 | 457.96 | 472.18 | 477.72 |
| ORANGE | ORANGEFIELD WSC | 38.47 | 51.66 | 60.14 | 65.71 | 68.56 | 69.49 |
| ORANGE | PINEHURST | 25.41 | 38.89 | 47.78 | 49.61 | 51.18 | 51.79 |
| ORANGE | PORT ARTHUR | 0.06 | 0.08 | 0.10 | 0.10 | 0.11 | 0.11 |
| ORANGE | ROSE CITY | 5.94 | 9.01 | 11.53 | 12.16 | 12.55 | 12.69 |
| ORANGE | SOUTH NEWTON WSC | - | - | - | - | - | - |
| ORANGE | VIDOR | 124.01 | 187.63 | 239.66 | 258.20 | 266.26 | 269.38 |
| ORANGE | WEST ORANGE | 42.03 | 64.44 | 77.87 | 80.87 | 83.45 | 84.43 |
| PANOLA | BECKVILLE | 10.81 | 17.15 | 21.77 | 24.91 | 26.31 | 27.18 |
| PANOLA | CARTHAGE | 72.22 | 106.54 | 134.59 | 150.68 | 154.54 | 155.62 |
| PANOLA | COUNTY-OTHER, PANOLA | 171.32 | 259.16 | 327.43 | 369.51 | 383.72 | 390.65 |
| PANOLA | GILL WSC | 8.30 | 12.48 | 15.78 | 16.37 | 16.87 | 17.11 |
| PANOLA | TATUM | 3.64 | 6.19 | 8.12 | 9.50 | 10.20 | 10.67 |
| POLK | CORRIGAN | 21.85 | 34.85 | 45.46 | 49.72 | 52.95 | 55.11 |
| POLK | COUNTY-OTHER, POLK | 73.48 | 114.32 | 146.97 | 169.07 | 180.52 | 187.85 |

**Appendix 5C-D**
**Volumetric Savings for Municipal WUGs by County (acre feet)**

| County | Entity Name | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 |
|---|---|---|---|---|---|---|---|
| RUSK | CHALK HILL SUD | 37.95 | 59.23 | 77.59 | 92.06 | 102.34 | 111.84 |
| RUSK | COUNTY-OTHER, RUSK | 302.11 | 487.65 | 651.20 | 768.56 | 852.78 | 931.38 |
| RUSK | CROSS ROADS SUD | 29.89 | 47.67 | 63.16 | 75.20 | 83.59 | 91.32 |
| RUSK | EASTON | 0.58 | 0.66 | 0.72 | 0.79 | 0.86 | 0.94 |
| RUSK | ELDERVILLE WSC | - | - | - | - | - | - |
| RUSK | HENDERSON | 157.91 | 250.02 | 329.85 | 392.38 | 435.93 | 476.34 |
| RUSK | KILGORE | 35.30 | 56.12 | 74.65 | 89.00 | 98.95 | 108.15 |
| RUSK | NEW LONDON | 12.67 | 20.28 | 27.00 | 32.16 | 35.67 | 38.97 |
| RUSK | OVERTON | 28.68 | 45.43 | 59.94 | 71.16 | 78.99 | 86.36 |
| RUSK | TATUM | 13.60 | 21.60 | 28.37 | 33.66 | 37.33 | 40.78 |
| RUSK | WEST GREGG SUD | 1.84 | 2.92 | 3.86 | 4.59 | 5.12 | 5.59 |
| RUSK | WRIGHT CITY WSC | 4.95 | 7.73 | 10.11 | 11.98 | 13.33 | 14.57 |
| SABINE | COUNTY-OTHER, SABINE | 19.10 | 28.18 | 34.43 | 35.07 | 35.75 | 35.75 |
| SABINE | G M WSC | - | - | - | - | - | - |
| SABINE | HEMPHILL | 14.07 | 19.78 | 24.31 | 26.80 | 27.24 | 27.26 |
| SABINE | PINELAND | 9.73 | 14.06 | 17.70 | 18.25 | 18.57 | 18.57 |
| SAN AUGUSTINE | COUNTY-OTHER, SAN AUGUSTINE | 58.31 | 82.50 | 102.26 | 113.16 | 115.41 | 115.41 |
| SAN AUGUSTINE | G M WSC | - | - | - | - | - | - |
| SAN AUGUSTINE | SAN AUGUSTINE | 23.05 | 33.93 | 42.50 | 43.29 | 44.05 | 44.05 |
| SHELBY | CENTER | 61.71 | 95.19 | 123.45 | 142.23 | 151.58 | 158.60 |
| SHELBY | COUNTY-OTHER, SHELBY | 193.43 | 294.98 | 379.43 | 436.30 | 465.49 | 486.97 |
| SHELBY | JOAQUIN | 10.23 | 15.95 | 20.84 | 22.49 | 23.98 | 25.07 |
| SHELBY | TENAHA | 13.31 | 20.54 | 26.56 | 30.59 | 32.63 | 34.14 |
| SHELBY | TIMPSON | 13.24 | 20.28 | 26.18 | 30.13 | 32.13 | 33.61 |
| SMITH | ARP | 10.43 | 15.67 | 20.13 | 23.16 | 24.67 | 25.88 |
| SMITH | BULLARD | 29.93 | 51.02 | 69.67 | 87.49 | 103.72 | 119.71 |
| SMITH | COUNTY-OTHER, SMITH | 69.33 | 121.60 | 171.76 | 217.67 | 256.54 | 294.08 |
| SMITH | CRYSTAL SYSTEMS INC | 11.45 | 18.40 | 23.13 | 28.26 | 33.52 | 38.65 |
| SMITH | DEAN WSC | 46.95 | 69.18 | 87.90 | 100.22 | 106.02 | 110.21 |
| SMITH | JACKSON WSC | 23.08 | 36.22 | 47.56 | 56.20 | 62.08 | 67.50 |
| SMITH | LINDALE | 20.15 | 35.26 | 49.22 | 62.39 | 74.10 | 85.61 |
| SMITH | LINDALE RURAL WSC | 26.51 | 40.77 | 52.53 | 61.35 | 67.30 | 72.64 |
| SMITH | NEW CHAPEL HILL | 6.11 | 9.03 | 11.50 | 13.19 | 14.05 | 14.72 |
| SMITH | NOONDAY | 9.48 | 15.55 | 20.91 | 25.66 | 29.57 | 33.35 |
| SMITH | OVERTON | 1.64 | 2.95 | 4.28 | 5.49 | 6.48 | 7.43 |
| SMITH | R-P-M WSC | 3.19 | 4.91 | 6.28 | 7.42 | 8.31 | 9.15 |
| SMITH | SOUTHERN UTILITIES COMPANY | 382.21 | 576.98 | 740.58 | 853.04 | 915.09 | 967.26 |
| SMITH | TROUP | 22.95 | 36.30 | 48.20 | 57.25 | 63.15 | 68.52 |
| SMITH | TYLER | 1,078.68 | 1,665.98 | 2,176.24 | 2,558.96 | 2,802.65 | 3,020.55 |
| SMITH | WALNUT GROVE WSC | 86.15 | 142.05 | 191.73 | 234.58 | 268.75 | 301.43 |
| SMITH | WHITEHOUSE | 93.56 | 152.62 | 204.86 | 250.00 | 286.23 | 320.77 |
| SMITH | WRIGHT CITY WSC | 23.71 | 37.22 | 49.04 | 58.55 | 65.38 | 71.65 |
| TRINITY | COUNTY-OTHER, TRINITY | 36.15 | 54.42 | 54.81 | 53.27 | 55.73 | 58.32 |
| TRINITY | GROVETON | 6.35 | 9.69 | 11.74 | 12.18 | 12.97 | 13.63 |
| TYLER | COLMESNEIL | 6.54 | 9.46 | 11.88 | 12.90 | 13.12 | 13.12 |
| TYLER | COUNTY-OTHER, TYLER | 121.27 | 175.36 | 219.53 | 243.75 | 247.87 | 248.01 |
| TYLER | IVANHOE | 7.31 | 9.76 | 11.48 | 12.51 | 12.83 | 12.83 |
| TYLER | IVANHOE NORTH | 4.67 | 6.44 | 7.76 | 8.51 | 8.71 | 8.71 |
| TYLER | LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY | 0.68 | 0.73 | 0.73 | 0.73 | 0.73 | 0.73 |
| TYLER | TYLER COUNTY WSC | 59.15 | 84.76 | 105.68 | 117.13 | 119.18 | 119.18 |
| TYLER | WOODVILLE | 27.54 | 39.73 | 49.72 | 55.20 | 56.13 | 56.16 |
| **TOTAL** | | **12,052.89** | **18,375.33** | **23,459.88** | **26,785.91** | **28,833.34** | **30,588.65** |

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# Appendix 6-A

# Title 31 Texas Administrative Code Chapters 357 and 358 Regulations Pertaining to the 2016 Plan

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This appendix includes a matrix highlighting each regulation pertinent to the 2016 Plan in Chapters 357 and 358 of the Texas Administrative Code, Title 31. The matrix is used as a checklist to demonstrate compliance with these regulations.

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| Regulatory Citation | Summary of Requirement | 2016 Plan Compliance (Yes/No) | Location(s) in the Regional Plan and/or Other Commentary |
|---|---|---|---|
| **31 TAC §357.11** | | | |
| (d)(1)-(12) | RWPGs shall maintain at least one representative of the following interest categories as voting members: public, counties, municipalities, industries, agricultural interests, environmental interests, small businesses, electric generating utilities, river authorities, water districts, water utilities, and groundwater management areas. | Yes | Chapters 1 and 10 provide a list of current voting members of the RWPG. |
| (e)(1)-(5) | Non-voting members will receive the same meeting notifications and information as voting members. Non voting members are to include: staff members from the Board, from Texas Parks and Wildlife, from the Texas Department of Agriculture, and from each adjacent RWPG; persons to represent entities which are located in another RWPA but which diverts, supplies, or receives 1,000 acre-feet a year or more in , to, or from the RWPA. | Yes | Chapter 1 provides a list of current non-voting members of the RWPG. |
| **31 TAC §357.12** | | | |
| (b) | A RWPG shall hold a public meeting to determine the process for identifying potentially feasible water management strategies. Input from the public meeting will be documented. All possible water management strategies that are potentially feasible for meeting needs in the region will be listed. | Yes | The process used to identify potentially feasible WMSs was addressed in two regularly scheduled meetings of the ETRWPG on February 1, 2012 and May 22, 2013. Appendix 5A-B lists all potentially feasible WMSs identified. |
| **31 TAC §357.20** | | | |
| | Development of RWPs shall be guided by the principles stated in Title 31 §358.3 (relating to Guidance Principles). | Yes | See 31 TAC §358.3 below. |
| **31 TAC §357.21** | | | |
| (b) | Public notice requirements for regular RWPG meetings and meetings where the following were considered: amendments to the RWP scope or budget, process for identification of potentially feasible water management strategies, member addition or replacement, and adoption of water plans. | Yes | Public notice requirements met and are addressed in Chapter 10. |
| (c) | Public notice requirements for meetings where the following items were considered: population projection and water demand projection revisions, substitution of alternative water management strategies, and minor amendments to the RWPs. | Yes | Public notice requirements met and are addressed in Chapter 10. |

| Regulatory Citation | Summary of Requirement | 2016 Plan Compliance (Yes/No) | Location(s) in the Regional Plan and/or Other Commentary |
|---|---|---|---|
| (d) | Public notice requirements for holding a preplanning public meeting to obtain public input on development of the next RWP; major amendments to RWPs; holding hearings for IPPs; and requesting research and planning funds from the Board. | Yes | Public notice requirements met and are addressed in Chapter 10. |
| **31 TAC §357.22** | | | |
| (a) | RWPGs shall consider existing local, regional, and state water planning efforts, including water plans, information and relevant local, regional, state and federal programs and goals when developing the regional water plan. RWPGs must also consider: | Yes | Relevant State and federal programs and goals are addressed primarily in Chapter 1. As appropriate, water plans of specific WUGs have been considered in the evaluation of WMSs in Chapter 5B. Coordination with Regions D, C, and H (all adjacent to the ETRWPA) has occurred and planning efforts of these regions considered. |
| (a)(1) | water conservation plans; | Yes | Chapter 5C addresses water conservation efforts in the region and summarizes water conservation plans reviewed. |
| (a)(2) | drought management and drought contingency plans; | Yes | Chapter 7 addresses drought management and drought contingency within the region and summarizes drought management and drought contingency plans reviewed. |
| (a)(3) | information compiled by the Board from water loss audits performed by retail public utilities; | Yes | Chapter 1, Chapter 5C, and Appendix 1-B describe information on water loss audits. |
| (a)(4) | publicly available plans for major agricultural, municipal, manufacturing and commercial water users; | Yes | Publicly available plans for major agricultural, municipal, manufacturing, and commercial water users were not identified. However, Appendix 2-A contains a technical memorandum regarding rice production and water use in the region. |
| (a)(5) | local and regional water management plans; | Yes | Chapter 1 summarizes local and regional water management plans identified in the RWPA. |
| (a)(6) | water availability requirements; | Yes | Water availability is addressed primarily in Chapter 3. |
| (a)(7) | the Texas Clean Rivers Program; | Yes | Chapter 1 references the Texas Clean Rivers program. Where relevant, water quality data from the program were used. |

| Regulatory Citation | Summary of Requirement | 2016 Plan Compliance (Yes/No) | Location(s) in the Regional Plan and/or Other Commentary |
|---|---|---|---|
| (a)(8) | the U.S. Clean Water Act; | Yes | Chapter 1 references the CWA; the CWA is a cornerstone of the water planning process and central to the planning process for the 2016 Plan. |
| (a)(9) | water management plans; | Yes | See above. |
| (a)(10) | other planning goals including regionalization of water and wastewater services where appropriate; | Yes | Regionalization of water and wastewater services has been considered where appropriate. Chapter 5B includes WMSs that may address regionalization. |
| (a)(11) | approved groundwater conservation district management plans and other plans submitted | Yes | Groundwater Conservation Districts have been included, where appropriate, in Chapters 1, 3, and 5B. |
| (a)(12) | approved groundwater regulatory plans; and | Yes | See above. |
| (a)(13) | any other information available from existing local or regional water planning studies. | Yes | See above. |
| (b) | The following sections from Title 31 should have a separate chapter in the RWP devoted to their contents: §§357.30, 357.31, 357.32, 357.33, 357.42, 357.43, 357.44, 357.45, 357.50, 357.34, 357.35, 357.40, and 357.41 | Yes | The 2016 Plan contains chapters as required by the rules and TWDB Guidance. |
| **31 TAC §357.30** | | | |
| | The description of the RWP area must include a description of the following 12 criteria: | | |
| (1) | social and economic aspects of a region such as information on current population, economic activity and economic sectors heavily dependent on water resources; | Yes | Chapter 1 describes the social and economic aspects of the region relative to water resources. |
| (2) | current water use and major water demand centers; | Yes | Chapters 1 and 2 include current water use and major water demand centers. |
| (3) | current groundwater, surface water, and reuse supplies including major springs that are important for water supply or protection of natural resources; | Yes | Chapter 1 generally describes groundwater, surface water, reuse, and springs. Chapter 3 includes more specific information on groundwater, surface water, and reuse sources that are, or may be, used for water supply. |

| Regulatory Citation | Summary of Requirement | 2016 Plan Compliance (Yes/No) | Location(s) in the Regional Plan and/or Other Commentary |
|---|---|---|---|
| (4) | wholesale water providers; | Yes | Chapter 1 identifies the region's WWPs. Chapters 2 and 3 describe WWP demands and supply. Chapter 5B addresses WMSs for each WWP in the region. |
| (5) | agricultural and natural resources; | Yes | Chapter 1 provides a description of the agricultural and natural resources of the region; Chapter 6 describes protection of these resources. |
| (6) | identified water quality problems; | Yes | Chapter 1 provides a discussion of water quality problems that may be relevant to regional water planning. To the extent possible, water quality issues are considered in the evaluation of WMSs in Chapter 5B. |
| (7) | identified threats to agricultural and natural resources due to water quantity problems or water quality problems related to water supply; | Yes | Chapters 1 and 6 describe threats to agricultural and natural resources due to water quantity or quality issues. |
| (8) | summary of existing local and regional water plans; | Yes | Chapter 1 contains descriptions of relevant existing local and regional water plans. |
| (9) | the identified historic drought(s) of record within the planning area; | Yes | Chapters 7 contain a discussion of historic droughts of record within the RWPA. |
| (10) | current preparations for drought within the RWPA; | Yes | Chapters 1 and 7 describe current preparations for drought within the region. |
| (11) | information compiled by the Board from water loss audits performed by retail public utilities; and | Yes | Chapters 1 and 5C summarize water loss audits compiled by the TWDB; Appendix 1-B presents the data. |
| (12) | an identification of each threat to agricultural and natural resources and a discussion of how that threat will be addressed or affected by the water management strategies evaluated in the plan. | Yes | Chapters 1 and 6 describe threats to agricultural and natural resources due to water quantity or quality issues. Chapter 5B provides a discussion of how WMSs address threats. |
| **31 TAC §357.31** | | | |
| (a); (f) | RWPs shall present projected population and WUG water demands for each planning decade. | Yes | Chapter 2 provides projections of population and WUG water demands for the period 2020-2070. |

| Regulatory Citation | Summary of Requirement | 2016 Plan Compliance (Yes/No) | Location(s) in the Regional Plan and/or Other Commentary |
|---|---|---|---|
| (b) | RWPs shall present projected water demands associated with WWPs by category of water use, including municipal, manufacturing, irrigation, steam electric power generation, mining, and livestock for each county or portion of a county in the RWPA. | See Comment | Chapter 2 provides projections of WWP water demands for all categories of water use. Appendix 2-E will contain a summary of WWP demands by category, county, and basin. The TWDB will make this DB17 Report available to RWPGs after submittal of the IPP. |
| (c) | RWPs shall report the current contractual obligations of WUG and WWPs to supply water in addition to any demands projected for the WUG or WWP. | Yes | Chapter 2 reports current contractual obligations of WUGs and WWPs. |
| (d) | Municipal demands shall be adjusted to reflect water savings due to plumbing fixture requirements identified in the Texas Health and Safety Code, Chapter 372. | Yes | Municipal demands, addressed in Chapter 2, include water savings due to plumbing fixture requirements. Chapter 5C includes further discussion of required water conservation measures. |
| ( e)(1)-(2) | RWPs are to use population and water demands developed by the EA for the next water plan or use population and water demands revisions (only if requested). | Yes | Population projections and municipal water demands developed by the EA were used in development of the RWP; projections are presented in Chapter 2. |
| **31 TAC §357.32** | | | |
| (a)(1)-(2) | RWPGs shall evaluate the source water availability and existing water supplies that are legally available to WUGs and wholesale water providers during drought conditions. | Yes | Water availability, addressed in Chapter 3, includes water legally available to WUGs and WWPs during drought conditions. |
| (b); (c); (d) | RWPG evaluations shall consider surface water (firm yield unless otherwise requested) and groundwater (modeled, Board-issued) data from the state water plan, existing water rights, contracts and option agreements relating to water rights, other planning and water supply studies, and analysis of water supplies existing in and available to the RWPA during drought of record conditions. | Yes | The availability of water addressed in Chapter 3 included consideration for the requirements of this section. WMS evaluations in Chapter 5B used Chapter 3 availability. |
| (e)-(f) | RWPGs shall evaluate the existing water supplies for each WUG and WWP; existing contractual agreements should be taken into account. | Yes | Contractual agreements were taken into account as appropriate in the development of existing water supplies presented in Chapter 3. |

| Regulatory Citation | Summary of Requirement | 2016 Plan Compliance (Yes/No) | Location(s) in the Regional Plan and/or Other Commentary |
|---|---|---|---|
| **31 TAC §357.33** | | | |
| (a); (b); (d) | RWPs shall include, for each planning decade, comparisons of existing water supplies and projected water demands to determine whether WUGs will experience water surpluses or needs for additional supplies. Results will be reported for WUGs and for WWPs by use categories, county, and basin as described in §357.31 (b) | See Comment | Chapter 4 provides a comparison of water demands to supplies to determine surplus or needs for each WUG and WWP. WUG results are reported in Appendix 4-A. The TWDB will provide a detailed analysis of WWP results after submittal of the IPP. |
| (c) | Social and economic impacts of water shortages will be evaluated. | See Comment | A socio-economic impact analysis prepared by the TWDB will be provided to the RWPG after submittal of the IPP. The analysis report will be presented in Appendix 4-D and summarized in Chapter 4. |
| (e) | RWPGs shall perform a secondary water needs analysis (calculating water needs remaining after all conservation and direct reuse strategies are implemented) for all WUGs and WWPs for which conservation water management strategies or direct reuse water management strategies are recommended. | See Comment | Secondary water needs analyses will be performed for WUGs and WWPS for which conservation WMSs were recommended by the TWDB after submittal of the IPP. The data will be presented in Appendix 4-B and summarized in Chapter 4. |
| **31 TAC §357.34** | | | |
| (a) & (b) | RWPGs shall identify and evaluate potentially feasible water management strategies for all WUGs and WWPs with identified water needs. The strategies shall meet new water supply obligations necessary to implement recommended water management strategies of WWPs and WUGs. RWPGs shall plan for water supply during Drought of Record conditions. In developing RWPs, RWPGs shall provide WMSs to be used during a drought of record. | Yes | Chapters 5A and 5B identify and evaluate potentially feasible WMSs for WUGs and WWPs. |
| (c) | Potentially feasible WMSs may include expanded use of existing supplies; new supply development; conservation and drought management measures; reuse; interbasin transfers of surface water; emergency transfers of surface water. | Yes | Chapter 5A describes the types of WMSs used in the 2016 Plan. |
| (d)(1) | Evaluations of potentially feasible water management strategies shall use the Commission's most current Water Availability Model and shall include the following analyses: | Yes | Chapter 3 describes the use of the WAM in the 2016 Plan. Strategies evaluated in Chapter 5B utilize available water supplies identified in Chapter 3. |

| Regulatory Citation | Summary of Requirement | 2016 Plan Compliance (Yes/No) | Location(s) in the Regional Plan and/or Other Commentary |
|---|---|---|---|
| (d)(2) | An equitable comparison between and consistent evaluation and application of all water management strategies the RWPGs determine to be potentially feasible for each water supply need | Yes | Chapter 5B contains WMS evaluations. |
| (d)(3)(A)-(C)&(d)(5) | A quantitative reporting of: the net quantity, reliability, and cost of water delivered and treated for the end user's requirements during drought of record conditions; all applicable environmental factors; and impacts to natural and agricultural resources (including threats). | Yes | Chapter 5B contains WMS evaluations. |
| (d)(4); (d)(7) | A discussion of this RWP's impact on other water resources of the state and on local third-party social and environmental impacts. | Yes | Chapters 5B and 6 contain discussion of impacts on other water resources of the state and on local third-party social and environmental impacts. |
| (d)(8) | A description of the major impacts of recommended water management strategies on key parameters of water quality, comparing current conditions to recommended strategies. | Yes | Chapter 1 addresses issues of key parameters of water quality. Where appropriate, water quality is considered in the evaluations of WMSs in Chapter 5B. |
| (d)(9) | Consideration of water pipelines and other facilities that are currently used for water conveyance. | Yes | Chapter 5B includes consideration of conveyance for WMSs. |
| (f)(1); (f)(2)(A)-(D) | Conservation, Drought Management Measures, and Drought Contingency Plans shall be considered by RWPGs when developing the regional plans. Water conservation practices shall be included for each WUG beyond minimum requirements. Any interbasin water transfers will also include a water conservation strategy. Any water loss audits shall be addressed. | Yes | Chapters 5C and 7 contain most of the required information regarding conservation and drought management measures for each WUG. |
| (g) | RWPs shall include a subchapter consolidating the RWPG's recommendations regarding water conservation. | Yes | Summaries of the RWPG's recommendations regarding water conservation are included in Chapter 5C. |
| **31 TAC §357.35** | | | |
| (a);(b);(c);(f) | RWPGs shall recommend water management strategies to be used during a drought of record. Potentially feasible water management strategies shall be specific, cost effective, environmentally sensitive, and consistent with the long-term protection of the state's water, agricultural, and natural resources. Strategies shall protect existing water rights, water contracts, and option agreements. | Yes | Chapter 5A contains a list of potentially feasible WMSs identified. Chapter 5B evaluations were performed using a drought of record as a basis for the 2016 Plan. |

| Regulatory Citation | Summary of Requirement | 2016 Plan Compliance (Yes/No) | Location(s) in the Regional Plan and/or Other Commentary |
|---|---|---|---|
| (d) | Water management strategies shall meet all water needs for drought conditions, except when no water management strategy is feasible or when a political subdivision that provides water explicitly does not participate. | Yes | Chapter 5B WMSs were designed to meet water needs for drought conditions. |
| (g)(1) | RWPGs shall report recommended water management strategies and the associated results of all the potentially feasible water management strategy evaluations by WUG and WWP. | Yes | Chapter 5B and associated appendices report results by WUG and WWP. |
| (g)(2) | Calculated supply factors for each WUG and WWP, by entity and planning decade, shall be calculated based on the sum of the total existing water supplies, plus all water supplies from recommended water management strategies; divided by total projected water demand. | See Comment | Supply factors will be evaluated by the TWDB after submission of the IPP and presented in Appendix 5B-F. |
| (g)(3) | Fully evaluated Alternative Water Management Strategies included in the adopted RWP shall be presented together in one place in the RWP. | Yes | Chapter 5B presents a summary of Alternative WMSs evaluated. |
| **31 TAC §357.40** | | | |
| (a) | RWPs shall include a quantitative description of the socioeconomic impacts of not meeting the identified water needs. | See Comment | Appendix 4-D will contain a socio-economic impact analysis prepared by the TWDB. The report will be provided to the RWPG after submission of the IPP. |
| (b)(1)-(6) | RWPs shall include a description of the impacts of the RWP regarding agricultural resources, other water resources of the state, threats to agricultural and natural resources, third-party social and economic impacts resulting from voluntary water redistributions, water quality, and effects on navigation. | Yes | Chapter 6 contains discussion of impacts on other water resources of the state and on local third-party social and environmental impacts. |
| (c) | RWPs shall include a summary of the identified water needs that remain unmet by the RWP. | Yes | Chapter 5B includes a summary of unmet needs. |
| **31 TAC §357.41** | | | |
| | RWPGs shall describe how RWPs are consistent with the long-term protection of the state's water resources, agricultural resources, and natural resources. | Yes | Chapter 6 provides a demonstration of how the 2016 Plan is consistent with the long-term protection of the state's water resources, agricultural resources, and natural resources |
| **31 TAC §357.42** | | | |
| (a) | RWPs shall consolidate and present information on current and planned preparations for, and responses to, drought conditions in the region including drought of record conditions based on the following subsections: | | |

| Regulatory Citation | Summary of Requirement | 2016 Plan Compliance (Yes/No) | Location(s) in the Regional Plan and/or Other Commentary |
|---|---|---|---|
| (b);(c) | RWPGs shall conduct an overall assessment of current preparations for drought and develop drought response recommendations for groundwater and surface water sources. | Yes | Chapter 7 describes current preparations for drought within the region. |
| (d);(e) | RWPGs will collect (in a closed meeting) and submit (separately to the EA) information on existing major water infrastructure facilities that may be used for interconnections in event of an emergency shortage of water and will provide descriptions of local drought contingency plans that involve making emergency connections. | Yes | Chapter 7 describes emergency interconnections. Information related to existing interconnections is considered confidential and was not presented in the 2016 Plan. |
| (g) | The RWPGs shall evaluate, for all applicable municipal WUGs, potential emergency responses to local drought conditions or loss of existing water supplies, including identification of potential alternative water sources that may be considered for temporary emergency use. | Yes | Chapter 7 describes potential emergency responses to drought within the region. |
| (h) | RWPGs shall consider any relevant recommendations from the Drought Preparedness Council. | Yes | Relevant recommendations from the Drought Preparedness Council have been considered in Chapter 7. |
| (i); (i)(1)-(4) | RWPGs shall make drought preparation and response recommendations regarding local drought contingency plans; current drought management preparations, including drought response triggers and responses to drought conditions; and The Drought Preparedness Council and the State Drought Preparedness Plan. | Yes | Chapter 7 contains recommendations regarding local drought contingency plans and preparations. |
| (j) | The RWPGs shall develop region-specific model drought contingency plans. | Yes | Appendix 7-A includes model drought contingency plans. |
| **31 TAC §357.43** | | | |
| (a); (d) | The RWPs shall contain any regulatory, administrative, or legislative recommendations developed by the RWPGs, including those that the RWPG believes are needed and desirable to facilitate the orderly development, management, and conservation of water resources and prepare for and respond to drought conditions. | Yes | Chapter 8 includes relevant regulatory, administrative, and legislative recommendations of the RWPG. |
| (b); (c) | If "Ecologically Unique River and Stream Segments" and "Unique Sites for Reservoir Construction" are designated by the RWPGs, the RWP should include relevant descriptions, value, and other relevant criteria, as described in this section. | Yes | Chapter 8 includes recommendations regarding ecologically unique river and stream segments and unique sites for reservoir construction. |

| Regulatory Citation | Summary of Requirement | 2016 Plan Compliance (Yes/No) | Location(s) in the Regional Plan and/or Other Commentary |
|---|---|---|---|
| **31 TAC §357.44** | | | |
| | RWPGs shall assess and quantitatively report on how individual local governments, regional authorities, and other political subdivisions in their RWPA propose to finance recommended water management strategies. | See Comment | The TWDB will provide an infrastructure financing report to the RWPG after submittal of the IPP. Appendix 9-A will contain the report and Chapter 9 will summarize the proposed financing. |
| **31 TAC §357.45** | | | |
| (a) | RWPGs shall describe the level of implementation of previously recommended water management strategies, recommended in the previous RWP, including conservation and drought management water management strategies; and the implementation of projects that have affected progress in meeting the state's future water needs. | See Comment | The TWDB will provide an Implementation Survey to the RWPG after submittal of the IPP. Chapter 11 will summarize survey results reporting implementation of the 2011 Plan WMSs. |
| (b)(1)-(4) | RWPGs shall provide a brief summary of how the RWP differs from the previously adopted RWP with regards to: water demand projections; drought of record and hydrologic and modeling assumptions used in planning for the region; groundwater and surface water availability, existing water supplies, and identified water needs for WUGs and WWPs; and recommended and alternative water management strategies. | Yes | Chapter 11 provides a summary of how the 2016 Plan and the 2011 Plan differ. |
| **31 TAC §357.50** | | | |
| (a) | The RWPGs shall submit their adopted RWPs to the Board every five years on a date to be disseminated by the EA. | Yes | The 2016 Plan has been adopted in accordance with a schedule provided by the EA. |
| (b) | Prior to the adoption of the RWP, the RWPGs shall submit concurrently to the EA and the public an IPP. The IPP shall be distributed in accordance with Title 31 §357.21(d)(5). | Yes | The 2016 IPP was submitted to the TWDB as required. |
| (d)(1)-(3) | When adopting a RWP the RWPGs shall solicit, and consider properly submitted written comments from the EA and from any federal or Texas state agency; and properly submitted written or oral comments from the public. | See Comment | The RWPG will consider comments from the EA, federal and state agency comments, and public comments in finalization of the 2016 Plan after the IPP is available to the public and submitted to the TWDB. |
| (e)(1)(A)-(C) | When submitted, RWP shall include: a technical report, an executive summary, and summaries of and responses to all comments (written and oral). | See Comment | The 2016 Plan includes a required technical report and executive summary. Responses to comments will be incorporated after submittal of the IPP. |

| Regulatory Citation | Summary of Requirement | 2016 Plan Compliance (Yes/No) | Location(s) in the Regional Plan and/or Other Commentary |
|---|---|---|---|
| **31 TAC §358.3** | | | |
| (2) | The regional water plans and state water plan shall serve as water supply plans under drought of record conditions. | Yes | The supply availability and existing water supplies evaluated in Chapter 3 assume drought of record conditions. Chapters 3 and 7 describe this evaluation. |
| (4) | Regional water plans shall provide for the orderly development, management, and conservation of water resources and preparation for and response to drought conditions so that sufficient water will be available at a reasonable cost to satisfy a reasonable projected use of water to ensure public health, safety, and welfare; further economic development; and protect the agricultural and natural resources of the regional water planning area. | Yes | Chapter 5B presents WMS evaluations developed in response to projected demands and potential drought conditions. |
| (5) | Regional water plans shall include identification of those policies and action that may be needed to meet Texas' water supply needs and prepare for and respond to drought conditions. | Yes | The Chapter 5B WMS evaluations identify policies and action that may be required in drought conditions. |
| (6) | RWPG decision-making shall be open to and accountable to the public with decisions based on accurate, objective and reliable information with full dissemination of planning results except for those matters made confidential by law. | Yes | Chapter 10 summarizes public notice requirements and provides examples of how these requirements were met during the planning cycle. |
| (7) | The RWPG shall establish terms of participation in its water planning efforts that shall be equitable and shall not unduly hinder participation. | Yes | Chapter 10 summarizes how participation was encouraged as a part of water planning efforts in the RWPA. |
| (27) | RWPGs shall conduct their planning to achieve efficient use of existing water supplies, explore opportunities for and the benefits of developing regional water supply facilities or providing regional management of water facilities, coordinate the actions of local and regional water resource management agencies, provide substantial involvement by the public in the decision-making process, and provide full dissemination of planning results. | Yes | Chapter 3 discusses the evaluations of existing water supplies, Chapter 1 summarizes local and regional plans considered in the planning process, and Chapter 10 summarizes public involvement in the region. |
| (28) | RWPGs must consider existing regional water planning efforts when developing their plans. | Yes | Chapter 1 summarizes existing regional water plans that were considered in development of the 2016 Plan. |

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# Appendix 7-A

# Model Drought Contingency Plans

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This appendix includes a Model Drought Contingency Plan for Public Water Suppliers and for Irrigation Districts in the ETRWPA.

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# Drought Contingency Plan for [Public Water Supplier]

**Date**

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## APPENDICES

# Drought Contingency Plan for [Public Water Supplier]

## 1. Objectives

This drought contingency plan (the Plan) is intended for use by [municipal water supplier]. The plan includes all current TCEQ requirements for a drought contingency plan.

This drought contingency plan serves to:

- Conserve available water supplies during times of drought and emergency.
- Minimize adverse impacts of water supply shortages.
- Minimize the adverse impacts of emergency water supply conditions.
- Preserve public health, welfare, and safety.

## 2. Texas Commission on Environmental Quality Rules

The TCEQ rules governing development of drought contingency plans for public water suppliers are contained in Title 30, Part 1, Chapter 288, Subchapter B, Rule 288.20 of the Texas Administrative Code.

TCEQ's minimum requirements for drought contingency plans are addressed in the following subsections of this report:

- 288.20(a)(1)(A) – Provisions to Inform the Public and Provide Opportunity for Public Input – Section 3
- 288.20(a)(1)(B) – Provisions for Continuing Public Education and Information – Section 4
- 288.20(a)(1)(C) – Coordination with the Regional Water Planning Group – Section 5
- 288.20(a)(1)(D) – Criteria for Initiation and Termination of Drought Stages – Section 7
- 288.20(a)(1)(E) – Drought and Emergency Response Stages – Section 8
- 288.20(a)(1)(F) – Specific, Quantified Targets for Water Use Reductions – Section 7

- 288.20(a)(1)(G) – Water Supply and Demand Management Measures for Each Stage – Section 8
- 288.20(a)(1)(H) – Procedures for Initiation and Termination of Drought Stages – Section 6
- 288.20(a)(1)(I) - Procedures for Granting Variances – Section 9
- 288.20(a)(1)(J) - Procedures for Enforcement of Mandatory Restrictions – Section 10
- 288.20(a)(3) – Consultation with Wholesale Supplier – Not applicable
- 288.20(b) – Notification of Implementation of Mandatory Measures – Section 6
- 288.20(c) – Review and Update of Plan – Section 11

*[If you receive water from a wholesale supplier, you must include in your plan appropriate provisions for responding to reductions in the wholesale water supply.]*

## 3. Provisions to Inform the Public and Opportunity for Public Input

[Public water supplier] will give customers the opportunity to provide public input into the preparation of the plan by one of the following methods:

- Holding a public meeting.
- Providing written notice of the proposed plan and the opportunity to comment on the plan by newspaper or posted notice.

## 4. Public Education

[Public water supplier] will notify the public about the drought contingency plan, including changes in Stage and drought measures to be implemented, by one or more of the following methods:

- Prepare a description of the Plan and make it available to customers at appropriate locations.
- Include utility bill inserts that detail the Plan
- Provide radio announcements that inform customers of stages to be initiated or terminated and drought measures to be taken

- Include an ad in a newspaper of general circulation to inform customers of stages to be initiated or terminated and drought measures to be taken

## 5. Coordination with the East Texas Regional Water Planning Group

This drought contingency plan will be sent to the Chair of the East Texas Regional Water Planning Group in order to ensure consistency with the East Texas Regional Water Plan. If any changes are made to the drought contingency plan, a copy of the newly adopted plan will be sent to the Regional Water Planning Group.

## 6. Initiation and Termination of Drought Response Stages

The designated official will order the implementation of a drought response stage when one or more of the trigger conditions for that stage exist, as described in Section 7. Official designees may also order the termination of a drought response stage when the termination criteria, as described in Section 7, are met or at their own discretion.

If any mandatory provisions have been implemented or terminated, the water supplier is required to notify the Executive Director of the TCEQ within 5 business days.

## 7. Goals for Reduction in Water Use

TCEQ requires that each public water supplier develop quantifiable goals for water use reduction for each stage of the drought contingency plan. These goals are outlined below.

*[To be developed by each supplier. An example is provided.]*

- Stage 1, Mild
    - 0 to 2 percent reduction in use that would have occurred in the absence of drought contingency measures.
- Stage 2, Moderate
    - 2 to 6 percent reduction in use that would have occurred in the absence of drought contingency measures

- Stage 3, Severe
    - 6 to 10 percent reduction in use that would have occurred in the absence of drought contingency measures
- Stage 4, Emergency
    - 10 to 14 percent reduction in use that would have occurred in the absence of drought contingency measures

## 8. Drought and Emergency Response Stages

### Stage 1, Mild

*Trigger Conditions for Stage 1, Mild*

- A wholesale water supplier that provides all or part of [public water supplier]'s supply has initiated Stage 1, Mild
- [To be otherwise completed by public water supplier]
    - Potential triggers are:
        - When [public water supplier]'s available water supply is equal or less than [amount in ac-ft, percent of storage, etc.].
        - When total daily demand equals [number] million gallons for [number] consecutive days or [number] million gallons on a single day.
        - When the water level in [public water supplier]'s well(s) is equal or less than [number] feet above/below mean sea level.
        - When flows in the [name of river or stream segment] are equal to or less than [number] cubic feet per second.

Stage 1 will end when the circumstances that caused the initiation of Stage 1 no longer exist.

*Goals for Use Reduction and Actions Available Under Stage 1, Mild*

[Public water supplier] will reduce water use by [goal]. [Public water supplier] may order the implementation of any of the strategies listed below in order to decrease water use:

- Request voluntary reductions in water use.
- Review the problems that caused the initiation of Stage 1.
- Intensify leak detection and repair efforts

**Stage 2, Moderate**

*Trigger Conditions for Stage 2, Moderate*

- A wholesale water supplier that provides all or part of [public water supplier]'s supply has initiated Stage 2, Moderate
- [To be otherwise completed by public water supplier]
    - Potential triggers are:
        - When [public water supplier]'s available water supply is equal or less than [amount in ac-ft, percent of storage, etc.].
        - When total daily demand equals [number] million gallons for [number] consecutive days or [number] million gallons on a single day.
        - When the water level in [public water supplier]'s well(s) is equal or less than [number] feet above/below mean sea level.
        - When flows in the [name of river or stream segment] are equal to or less than [number] cubic feet per second.

Stage 2 will end when the circumstances that caused the initiation of Stage 2 no longer exist.

*Goals for Use Reduction and Actions Available Under Stage 2, Moderate*

[Public water supplier] will reduce water use by [goal]. [Public water supplier] may order the implementation of any of the strategies listed below in order to decrease water use:

- Request voluntary reductions in water use.
- Halt non-essential city government use
- Review the problems that caused the initiation of Stage 2.
- Intensify leak detection and repair efforts
- Implement mandatory restrictions on time of day outdoor water use in the summer.

**Stage 3, Severe**

*Trigger Conditions for Stage 3, Severe*

- A wholesale water supplier that provides all or part of [public water supplier]'s supply has initiated Stage 3, Severe
- [To be otherwise completed by public water supplier]
    - Potential triggers are:
        - When [public water supplier]'s available water supply is equal or less than [amount in ac-ft, percent of storage, etc.].
        - When total daily demand equals [number] million gallons for [number] consecutive days or [number] million gallons on a single day.
        - When the water level in [public water supplier]'s well(s) is equal or less than [number] feet above/below mean sea level.
        - When flows in the [name of river or stream segment] are equal to or less than [number] cubic feet per second.

Stage 3 will end when the circumstances that caused the initiation of Stage 3 no longer exist.

*Goals for Use Reduction and Actions Available Under Stage 3, Severe*

[Public water supplier] will reduce water use by [goal]. [Public water supplier] may order the implementation of any of the strategies listed below in order to decrease water use:

- Request voluntary reductions in water use.
- Require mandatory reductions in water use
- Halt non-essential city government use
- Review the problems that caused the initiation of Stage 3.
- Intensify leak detection and repair efforts
- Implement mandatory restrictions on time of day outdoor water use in the summer.
- Limit outdoor watering to specific weekdays.
- Create and implement a landscape ordinance.

**Stage 4, Emergency**

*Trigger Conditions for Stage 4, Emergency*

- A wholesale water supplier that provides all or part of [public water supplier]'s supply has initiated Stage 4, Emergency
- [To be otherwise completed by public water supplier]
    - Potential triggers are:
        - When [public water supplier]'s demand exceeds the amount that can be delivered to customers.
        - When [public water supplier]'s source becomes contaminated

- [Public water supplier]'s system is unable to deliver water due to the failure or damage of major water system components.

Stage 4 will end when the circumstances that caused the initiation of Stage 4 no longer exist.

*Goals for Use Reduction and Actions Available Under Stage 4, Emergency*

[Public water supplier] will reduce water use by [goal]. [Public water supplier] may order the implementation of any of the strategies listed below in order to decrease water use:

- Require mandatory reductions in water use
- Halt non-essential city government use
- Review the problems that caused the initiation of Stage 4.
- Intensify leak detection and repair efforts
- Implement mandatory restrictions on time of day outdoor water use in the summer.
- Limit outdoor watering to specific weekdays.
- Create and implement a landscape ordinance.
- Prohibit washing of vehicles except as necessary for health, sanitation, or safety reasons.
- Prohibit commercial and residential landscape watering
- Prohibit golf course watering except for greens and tee boxes
- Prohibit filling of private pools.
- Initiate a rate surcharge for all water use over [amount in gallons per month].

## 9. Procedure for Granting Variances to the Plan

The designated official may grant temporary variances for existing water uses otherwise prohibited under this drought contingency plan if one or more of the following conditions is met:

- Failure to grant such a variance would cause an emergency condition adversely affecting health, sanitation, or fire safety for the public or the person requesting the variance.
- Compliance with this plan cannot be accomplished due to technical or other limitations.
- Alternative methods that achieve the same level of reduction in water use can be implemented.

Variances shall be granted or denied at the discretion of the designated official. All petitions for variances should be in writing and should include the following information:

- Name and address of the petitioner(s)
- Purpose of water use
- Specific provisions from which relief is requested
- Detailed statement of the adverse effect of the provision from which relief is requested
- Description of the relief requested
- Period of time for which the variance is sought
- Alternative measures that will be taken to reduce water use
- Other pertinent information.

## 10. Penalty for Violation of Water Use Restriction

Mandatory restrictions are required by TCEQ regulation to have a penalty. These restrictions will be strictly enforced with the following penalties:

- Potential penalties
    - Written warning that they have violated the mandatory water use

restriction.

- Issue a citation. Minimum and maximum fines are established by ordinance.
- Discontinue water service to the user.

## 11. Review and Update of Drought Contingency Plan

This drought contingency plan will be updated at least every 5 years as required by TCEQ regulations.

# *Appendix A*

*List of References*

# APPENDIX A

## List of References

Title 30 of the Texas Administrative Code, Part 1, Chapter 288, Subchapter B, Rule 288.20, downloaded from http://www.sos.state.tx.us/tac, May 2014.

# *Appendix B*

*Texas Commission on Environmental Quality Rules on Drought Contingency Plans*

**APPENDIX B**
**Texas Commission on Environmental Quality Rules on Drought Contingency Plans**

## Texas Administrative Code

| | |
|---|---|
| **TITLE 30** | ENVIRONMENTAL QUALITY |
| **PART 1** | TEXAS COMMISSION ON ENVIRONMENTAL QUALITY |
| **CHAPTER 288** | WATER CONSERVATION PLANS, DROUGHT CONTINGENCY PLANS, GUIDELINES AND REQUIREMENTS |
| **SUBCHAPTER B** | DROUGHT CONTINGENCY PLANS |
| **RULE §288.20** | **Drought Contingency Plans for Municipal Uses by Public Water Suppliers** |

(a) A drought contingency plan for a retail public water supplier, where applicable, must include the following minimum elements.

(1) Minimum requirements. Drought contingency plans must include the following minimum elements.

(A) Preparation of the plan shall include provisions to actively inform the public and affirmatively provide opportunity for public input. Such acts may include, but are not limited to, having a public meeting at a time and location convenient to the public and providing written notice to the public concerning the proposed plan and meeting.

(B) Provisions shall be made for a program of continuing public education and information regarding the drought contingency plan.

(C) The drought contingency plan must document coordination with the regional water planning groups for the service area of the retail public water supplier to ensure consistency with the appropriate approved regional water plans.

(D) The drought contingency plan must include a description of the information to be monitored by the water supplier, and specific criteria for the initiation and termination of drought response stages, accompanied by an explanation of the rationale or basis for such triggering criteria.

(E) The drought contingency plan must include drought or emergency response stages providing for the implementation of measures in response to at least the following situations:

(i) reduction in available water supply up to a repeat of the drought of record;

(ii) water production or distribution system limitations;

(iii) supply source contamination; or

(iv) system outage due to the failure or damage of major water system components (e.g., pumps).

(F) The drought contingency plan must include specific, quantified targets for water use reductions to be achieved during periods of water shortage and drought. The entity preparing the plan shall establish the targets. The goals established by the entity under this subparagraph are not enforceable.

(G) The drought contingency plan must include the specific water supply or water demand management measures to be implemented during each stage of the plan including, but not limited to, the following:

(i) curtailment of non-essential water uses; and

(ii) utilization of alternative water sources and/or alternative delivery mechanisms with the prior approval of the executive director as appropriate (e.g., interconnection with another water system, temporary use of a non-municipal water supply, use of reclaimed water for non-potable purposes, etc.).

(H) The drought contingency plan must include the procedures to be followed for the initiation or termination of each drought response stage, including procedures for notification of the public.

(I) The drought contingency plan must include procedures for granting variances to the plan.

(J) The drought contingency plan must include procedures for the enforcement of mandatory water use restrictions, including specification of penalties (e.g., fines, water rate surcharges, discontinuation of service) for violations of such restrictions.

(2) Privately-owned water utilities. Privately-owned water utilities shall prepare a drought contingency plan in accordance with this section and incorporate such plan into their tariff.

(3) Wholesale water customers. Any water supplier that receives all or a portion of its water supply from another water supplier shall consult with that supplier and shall include in the drought contingency plan appropriate provisions for responding to reductions in that water supply.

(b) A wholesale or retail water supplier shall notify the executive director within five business days of the implementation of any mandatory provisions of the drought contingency plan.

(c) The retail public water supplier shall review and update, as appropriate, the drought contingency plan, at least every five years, based on new or updated information, such as the adoption or revision of the regional water plan.

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**Source Note:** The provisions of this §288.20 adopted to be effective February 21, 1999, 24 TexReg 949; amended to be effective April 27, 2000, 25 TexReg 3544; amended to be effective October 7, 2004, 29 TexReg 9384

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# Model Drought Contingency Plan for [Irrigation District]

**Date**

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# Drought Contingency Plan for [Irrigation District]

## 1. Introduction

*[Include basic information about the Irrigation District and its operations, for example location; service area; water rights; water sources; service accounts; types of irrigation and irrigation practices; crop types; and diversion, storage, and conveyance infrastructure.]*

## 2. Objectives

This drought contingency plan is intended for use by [irrigation district]. The plan includes all current TCEQ requirements for a drought contingency plan.

This drought contingency plan serves to:

- Conserve available water supplies during times of drought and emergency.
- Minimize adverse impacts of water supply shortages.
- Minimize the adverse impacts of emergency water supply conditions.

This model plan is a template for irrigation users to use as they develop their own drought contingency plans. This model plan includes all of the elements required by TCEQ. Each irrigation user should customize the details to match its unique situation. The final adopted version should be provided to the TCEQ.

## 3. Texas Commission on Environmental Quality Rules

The TCEQ rules governing development of drought contingency plans for irrigation districts are contained in Title 30, Part 1, Chapter 288, Subchapter B, Rule 288.21 of the Texas Administrative Code.

TCEQ's minimum requirements for drought contingency plans are addressed in the following subsections of this report:

| TAC Reference | Subject | Plan Location |
|---|---|---|
| 30 TAC §288.21(a)(1)(A) | Provisions to Inform the Public and Provide Opportunity for Public Input | Section 4 |
| 30 TAC §288.21(a)(1)(B) | Document Coordination with Regional Planning Group | Section 5 |
| 30 TAC §288.21(a)(1)(C) | Criteria for Initiation and Termination of Water Allocation | Sections 6 & 7 |
| 30 TAC §288.21(a)(1)(D) | Specific, Quantified Targets for Water Use Reduction | Section 8 |
| 30 TAC §288.21(a)(1)(E) | Procedures for Determining the Allocation of Irrigation Supplies to Individual Users | Section 8 |
| 30 TAC §288.21(a)(1)(F) | Procedures for Initiation and Termination of Water Allocation | Sections 6 & 7 |
| 30 TAC §288.21(a)(1)(G) | Procedures for Use Accounting During Water Allocation | Section 9 |
| 30 TAC §288.21(a)(1)(H) | Procedures for the Transfer of Water Allocations Among Individual Users | Section 10 |
| 30 TAC §288.21(a)(1)(I) | Procedures for Enforcement of Water Allocation Policies | Section 11 |
| 30 TAC §288.21(a)(2) | Consultation with Wholesale Supplier | Section 12 |
| 30 TAC §288.21(a)(3) | Protection of Public Water Supplies | Section 13 |
| 30 TAC §288.21(a)(3)(b) | Review and Update of Plan | Section 14 |

## 4. Provisions to Inform the Public and Opportunity for Public Input

[Irrigation district] will give customers the opportunity to provide public input into the preparation of the plan by one of the following methods:

- Holding a public meeting.
- Providing written notice of the proposed plan and the opportunity to comment on the plan by newspaper or posted notice.

## 5. Coordination with the East Texas Regional Water Planning Group

This drought contingency plan will be sent to the Chair of the East Texas Regional Water Planning Group in order to ensure consistency with the East Texas Regional Water Plan. If any changes are made to the drought contingency plan, a copy of the newly adopted plan will be sent to the Regional Water Planning Group.

## 6. Initiation of Water Allocation

The *[designated official]* shall monitor water supply conditions on a *[e.g. weekly, monthly]* basis and shall make recommendations to the Board regarding irrigation of

water allocation. Upon approval of the Board, water allocation will become effective when:

*[Below are examples of the types of triggering criteria that might be used; singly or in combination, in an irrigation district's drought contingency plan:*

- *A wholesale water supplier that provides all or part of an irrigation user's supply has initiated water allocation.*
- *When the district Board determines that there is insufficient water to complete the traditional crop year.*
- *When [irrigation district]'s available water supply is equal or less than [amount in ac-ft, amount in inches per acre, percent of storage, etc.].*
- *When total daily demand equals [number] million gallons for [number] consecutive days or [number] million gallons on a single day.*
- *When the water level in [irrigation district]'s well(s) is equal or less than [number] feet above/below mean sea level.*
- *When flows in the [name of river or stream segment] are equal to or less than [number] cubic feet per second.*

## 7. Termination of Water Allocation

The district's water allocation policies will remain in effect until the conditions defined in Section 6 no longer exist and the Board deems that the need to allocate water no longer exists.

## 8. Water Allocation

a) One allocation account will be associated with each parcel of land identified by ownership for flat rate assessment purposes as shown in the records of the District.

b) In identifying specific, quantified targets for water allocation to be achieved

during periods of water shortages and drought, each allocation account shall be allocated *[number]* irrigations or *[number]* acre-feet of water for each flat rate acre on which all taxes, fees, and charges have been paid. The water allotment in each allocation account will be expressed in acre-feet of water.

*[Include explanation of water allocation procedure. For example, in the Lower Rio Grande Valley, an "irrigation" is typically considered to be equivalent to eight (8) inches of water per irrigation acre; consisting of six (6) inches of water per acre applied plus two (2) inches of water lost in transporting the water from the river to the land. Thus, three irrigations would be equal to 24 inches of water per acre or an allocation of 2.0 acre-feet of water measured at the diversion from the river.]*

c) As additional water supplies become available to the District in an amount reasonably sufficient for allocation to the District's irrigation users, the additional water made available to the District will be equally distributed, on a pro rata basis, to those allocation accounts having _____.

*[Example 1: An account balance of less than _____ irrigations for each flat rate acre (i.e. ____ acre-feet).*

*Example 2: An account balance of less than _____ acre-feet of water for each flat rate acre.*

*Example 3: An account balance of less than _____ acre-feet of water.]*

d) The amount of water charged against an allocation account will be *[number, e.g., eight inches]* per irrigation unless water deliveries to the land are metered. Metered water deliveries will be charges based on actual measured use. In order to maintain parity in charging use against a water allocation between non-metered and metered deliveries, a loss factor of *[number]* percent of the water delivered in a metered situation will be added to the measured use and will be charged against the user's water allocation. Any metered use, with the loss factor applied, that is less than *[number]* inches per acre shall be credited back to the allocation unit and

will be available to the user. It shall be a violation of the Rules and Regulations for a water user to use water in excess of the amount of water contained in the users allocation account.

e) Acreage in an allocation account that has not been irrigated for any reason within the last two consecutive years will be considered inactive and will not be allocated water. Any landowner whose land has not been irrigated within the last two consecutive years, may, upon application to the District expressing intent to irrigate the land, receive future allocations. However, irrigation water allocated shall be applied only upon the acreage to which it was allocated and such water allotment cannot be transferred until there have been two consecutive years of use.

## 9. Procedures for Use Accounting During Water Allocation

For unmetered water use, the District will record the number of irrigations performed by each allocation account. As additional water becomes available for each allocation, additional irrigations are added to each allocation account. For metered water deliveries, actual measured use plus the conveyance loss factor is recorded and deducted from the user's allocation.

## 10. Procedures for the Transfer of Water Allocations Among Individual Users

A water allocation in an active irrigation account may be transferred within the boundaries of the District from one irrigation account to another. The transfer of water can only be made by the landowner's agent who is authorized in writing to act on behalf of the landowner in the transfer of all or part of the water allocation from the described land of the landowner covered by the irrigation account.

A water allocation may not be transferred to land owned by a landowner outside the District boundaries. *[OR: A water allocation may be transferred to land outside the District's boundaries by paying the current water charge as if the water was actually delivered by the District to the land covered by an irrigation account. The amount of water allowed to be transferred shall be stated in terms of acre-feet and deducted from*

*the landowner's current allocation balance in the irrigation account. Transfers of water outside the District shall not affect the allocation of water under Section VII of these Rules and Regulations.]*

Water from outside the District may not be transferred by a landowner for use within the District. *[OR: Water from outside the District may be transferred by a landowner for use within the District. The District will divert and deliver the water on the same basis as District water is delivered, except that a ___ percent conveyance loss will be charged against the amount of water transferred for use in the District as the water is delivered.]*

## 11. Enforcement of Water Allocation Policies

Any person who willfully opens, closes, changes or interferes with any headgate or uses water in violation of Section 11.083, Texas Water Code, may be assessed an administrative penalty up to $5,000 a day under Section 11.0842 of the Texas Water Code. Additionally, if the violator is also taking, diverting, or appropriating state water, the violator may be assessed a civil penalty in court of up to $5,000 a day. These penalties are provided by the laws of the State and may be enforced by complaints filed in the appropriate court jurisdiction in *[Name]* County, all in accordance with Section 11.083; and in addition, the District may pursue a civil remedy in the way of damages and/or injunction against the violation of any of the foregoing Policies.

## 12. Consultation with Wholesale Water Supplier

*[Provide a description of consultations with the wholesale water supplier(s), if any.*

*Any irrigation water supplier that receives all or a portion of its water supply from another water supplier shall consult with that supplier and shall include in the drought contingency plan, appropriate provisions for responding to reductions in that water supply.]*

## 13. Protection of Public Water Supplies

*[Provide a description of provisions to protect public water supplies, if applicable.*

*Any irrigation water supplier that also provides or delivers water to a public water supplier(s) shall consult with that public water supplier(s) and shall include in the plan, mutually agreeable and appropriate provisions to ensure an uninterrupted supply of water necessary for essential uses relating to public health and safety. Nothing in this provision shall be construed as requiring the irrigation water supplier to transfer irrigation water supplies to non-irrigation use on a compulsory basis or without just compensation.]*

## 14. Review and Update of Drought Contingency Plan

This drought contingency plan will be updated at least every 5 years as required by TCEQ regulations. The District will provide the updated plan to the TCEQ and the East Texas Region Water Planning Group.

## 15. References

The following references were used extensively in the development of this model plan, particularly in Sections 6 through 11:


1. Texas Commission on Environmental Quality: *Handbook for Drought Contingency Planning for Irrigation Districts*, April 2005.

2. Harlingen Irrigation District Cameron County #1: *Documents for Water Diversions and Deliveries*, Amended May 19, 2003.

3. Texas Commission on Environmental Quality: "Drought Contingency Plans for Irrigation Use," Texas Administrative Code Title 30 Part I Subchapter A §288.21, effective October 7, 2004.

# Appendix 8-A

# Proposed Reservoir Site Locations

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Chapter 8 of the 2016 Plan provides a description of proposed reservoirs in the ETRWPA. This appendix includes maps showing the locations of these proposed reservoirs.

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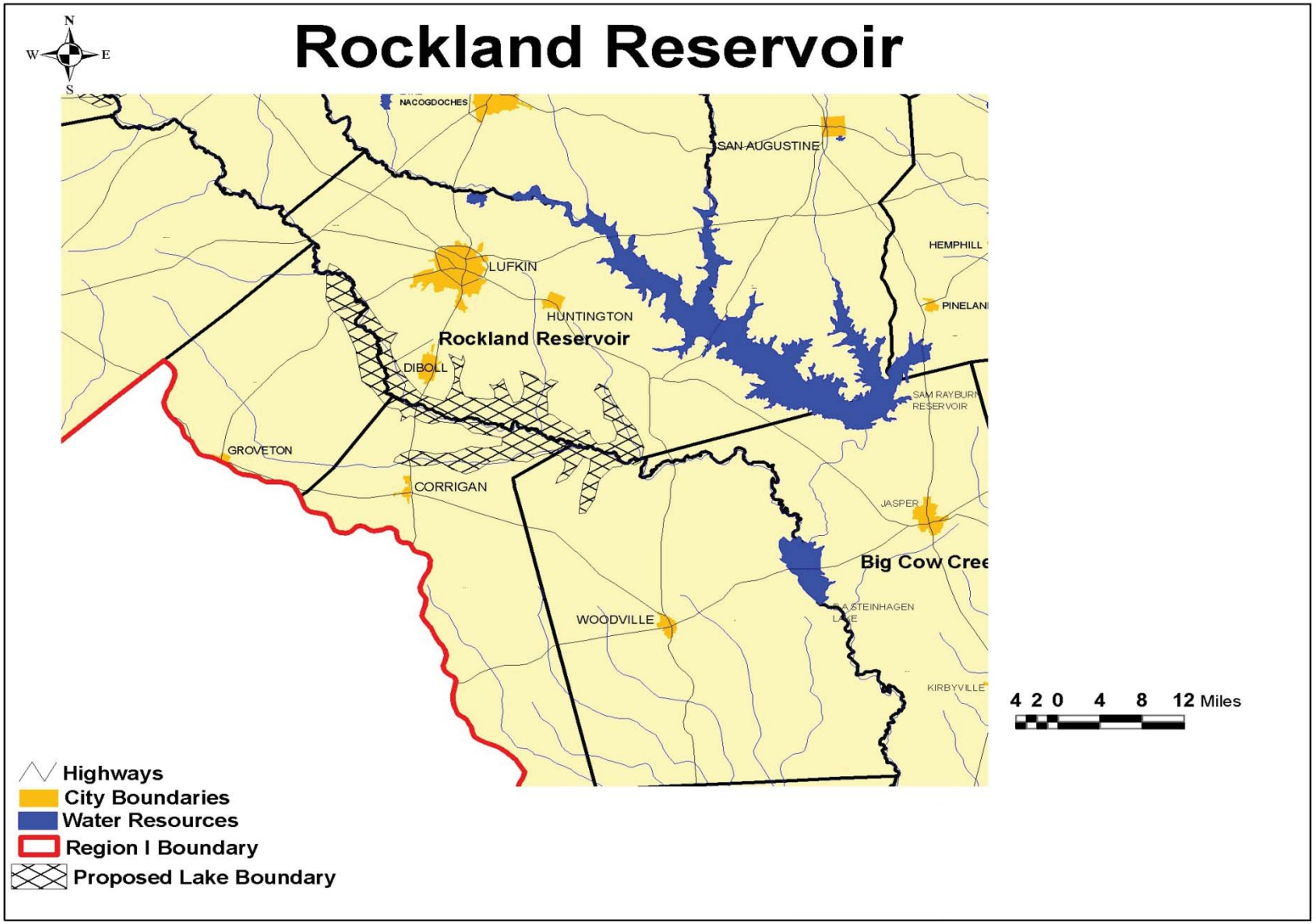
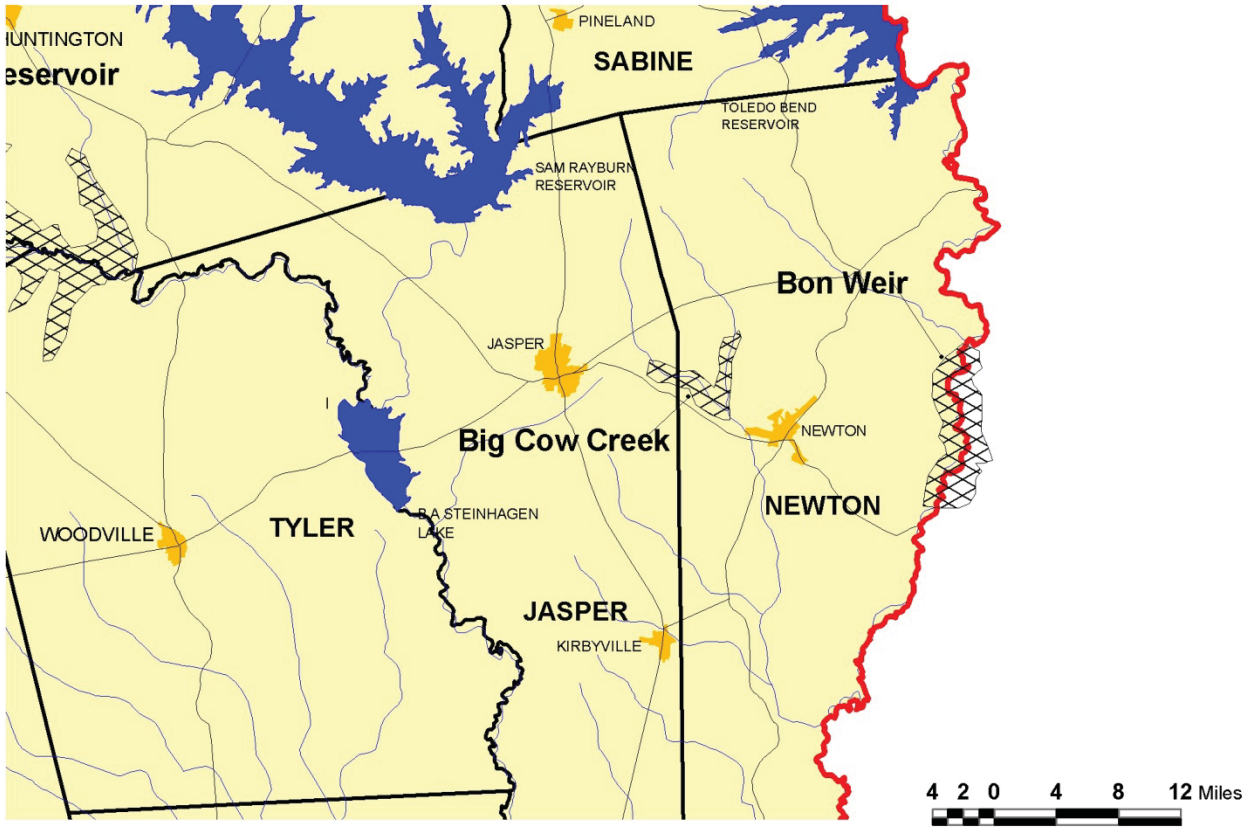
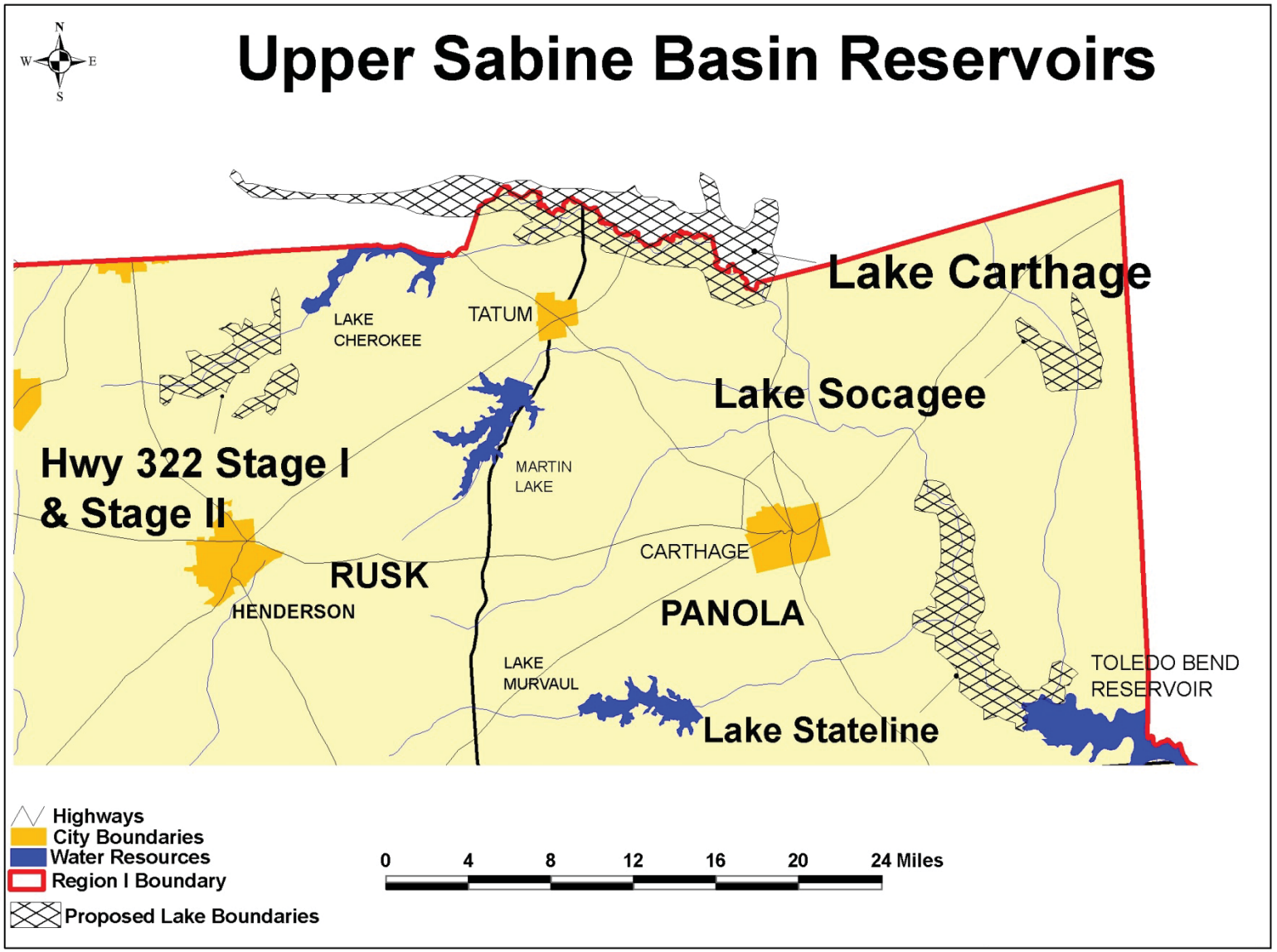
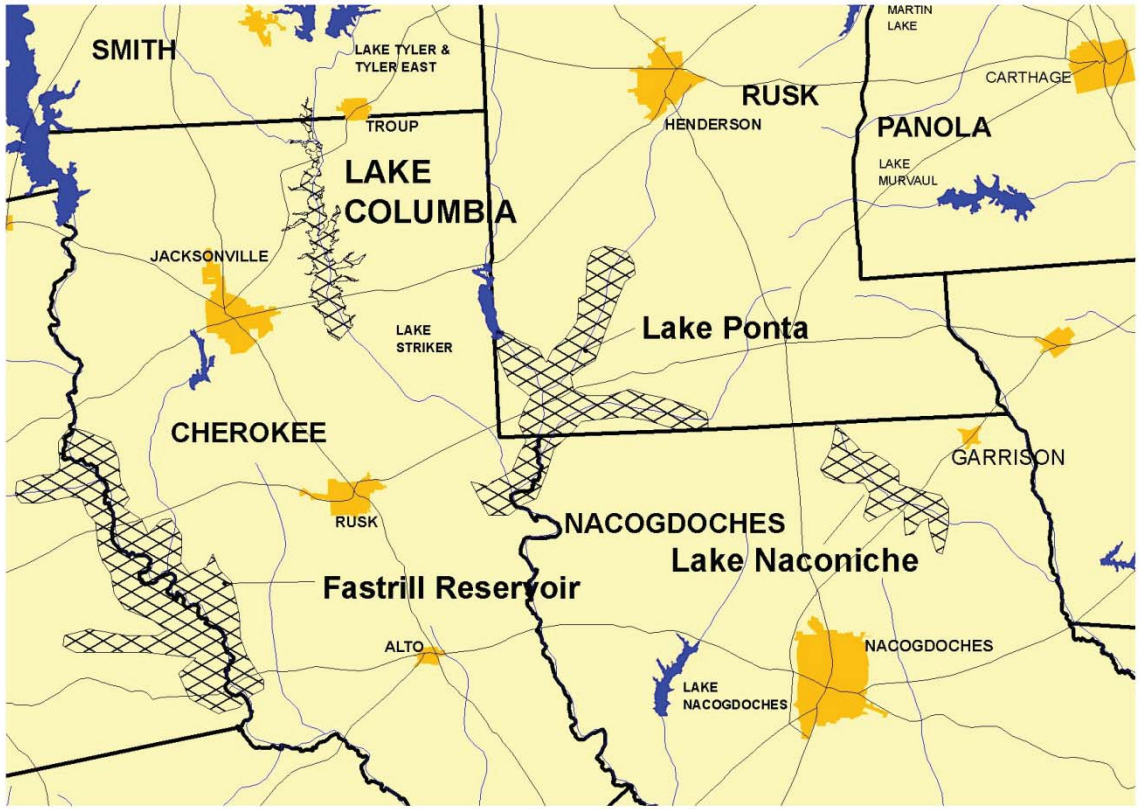

Rockland Reservoir
N
W
E
S
NACOGDOCHES
SAN AUGUSTINE
HEMPHILL
LUFKIN
HUNTINGTON
Rockland Reservoir
DIBOLL
SAM RAYBURN RESERVOIR
GROVETON
CORRIGAN
JASPER
Big Cow Cree
WOODVILLE
KIRBYVILLE
4 2 0 4 8 12 Miles
Highways
City Boundaries
Water Resources
Region I Boundary
Proposed Lake Boundary

# Lower Sabine Basin Reservoirs

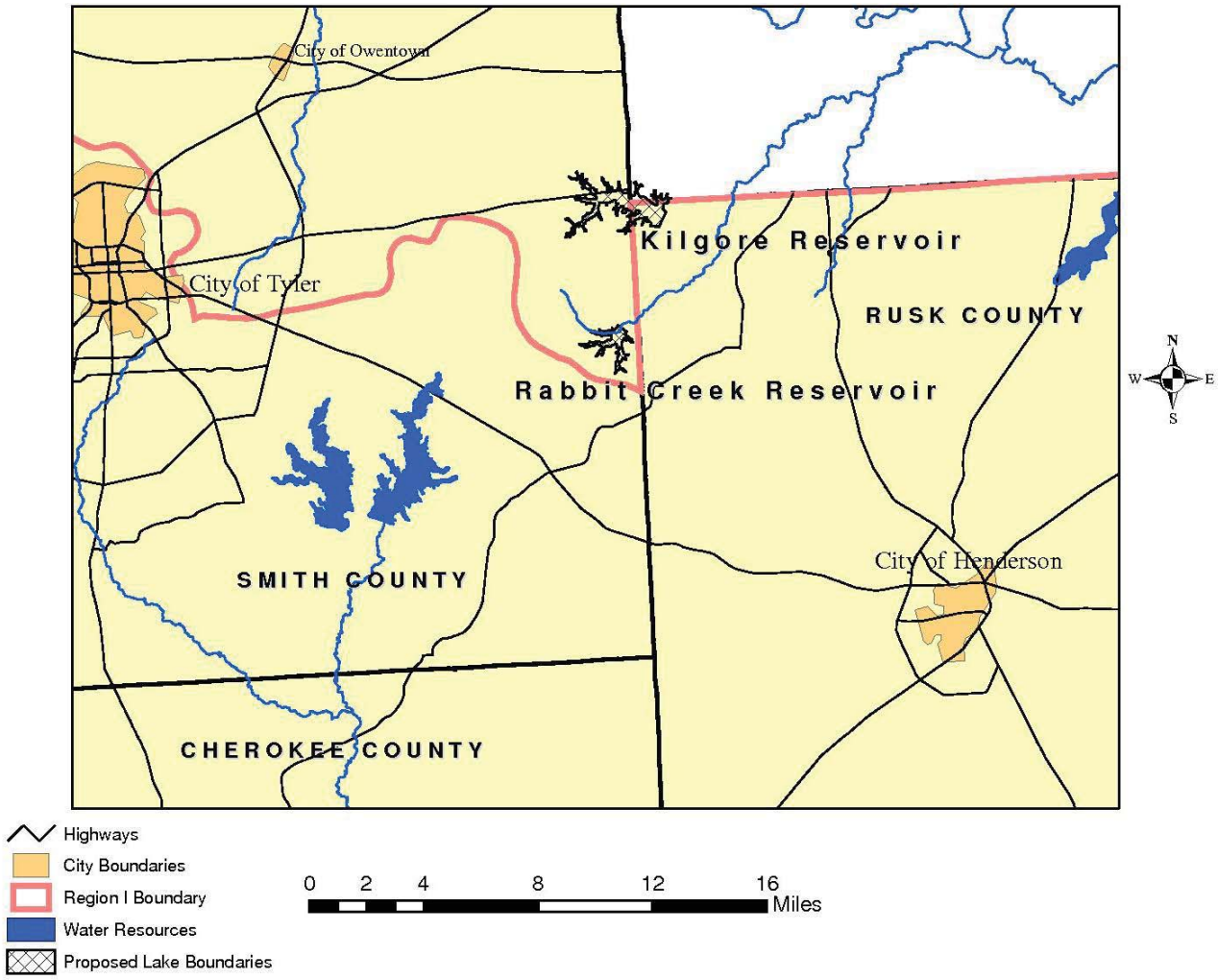



Upper Sabine Basin Reservoirs
N
W
E
S
Lake Carthage
LAKE
CHEROKEE
TATUM
Lake Socagee
Hwy 322 Stage I
& Stage II
MARTIN
LAKE
CARTHAGE
RUSK
HENDERSON
PANOLA
LAKE
MURVAUL
TOLEDO BEND
RESERVOIR
Lake Stateline
Highways
City Boundaries
Water Resources
Region I Boundary
Proposed Lake Boundaries
0
4
8
12
16
20
24 Miles

# Lakes Fastrill, Ponta, Columbia & Naconiche



# Kilgore and Rabbit Creek Reservoirs



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# Appendix 8-B

# 2011 Prioritization Comments & Concerns Memorandum

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This appendix includes a technical memorandum prepared by the Consultant Team as part of the 2011 Prioritization submittal from the ETRWPG to the TWDB. This document describes some of the primary concerns and observations of the Technical Committee for the ETRWPA regarding the 2011 Prioritization process.

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ALAN PLUMMER ASSOCIATES, INC.
ENVIRONMENTAL ENGINEERS • DESIGNERS • SCIENTISTS

MEMORANDUM

# East Texas Regional Water Planning Area
# Prioritization of Projects in the 2011 Regional Water Plan
# Regional Water Planning Group Comments & Concerns

**Project No:** 1600-002-01

**Date:** August 29, 2014

**Prepared For:** East Texas Regional Water Planning Group

**Prepared By:** Rex H. Hunt, P.E., Alan Plummer Associates, Inc.
Cynthia A. Syvarth, E.I.T., Alan Plummer Associates, Inc.
Simone Kiel, P.E., Freese and Nichols, Inc.

The 83rd Texas Legislature, through House Bill 4 (2013), requires each of the 16 Regional Water Planning Groups (RWPG) to prioritize the recommended water management strategies (WMS) in each region's 2011 Regional Water Plan (2011 Plan). Each group provided recommended WMSs to the Texas Water Development Board (TWDB) through the 2012 state water plan database (DB12). To facilitate this task, the TWDB formed a HB4 Stakeholder Committee (SHC) comprised of the 16 RWPG Chairs; the SHC developed Uniform Standards to be used by each RWPG to prioritize projects. These Uniform Standards were adopted by the SHC November 14, 2013 and approved by the governing Board of TWDB December 5, 2013.

In a transmittal dated January 6, 2014, the TWDB provided an alphabetized region-sponsor-strategy prioritization template of projects that each region is responsible for prioritizing. The template includes scoring methodologies, scales, and weighting factors for each uniform standard as developed by the SHC.

This memorandum transmits comments and concerns of the East Texas Regional Water Planning Group (ETRWPG) regarding the prioritization process and Uniform Standards provided by the TWDB. The following comments and concerns were initially developed at the ETRWPG Technical Committee meeting held March 25, 2014, and have been adjusted as a result of further discussion in the ETRWPG meeting held May 21, 2014.

### Prioritized Projects Using Information Available in 2011

*The transmittal provided from the TWDB did not specify the information to be used in applying each uniform standard.*

- Each uniform standard was applied according to information available at the time the 2011 Plan was adopted rather than considering the current status of each project.

- The information used was a compilation of data available in the 2011 Plan and the consultant's knowledge of each project at that time. Project updates were not solicited from Wholesale Water Providers (WWP) or Water User Groups (WUG) as a part of the prioritization process developed.

**Further Descriptions Needed for Projects**

*The information in the DB12 has been found to be inaccurate or unclear in some cases, but this information drives much of the scoring in prioritization.*

- Care should be taken in development of the DB17 to provide more clarity, resolve problems, and minimize risk of inappropriate scoring.
- There is concern on how the public will react to the prioritization rankings, and the ETRWPG believes adding commentary to the scoring template to provide more details for each project could help.
- All of the projects provided in the template from the TWDB were prioritized regardless of whether or not the project will seek state funding, is no longer being considered by the sponsor, or has already been completed.

**Current Uniform Standards Result in Numerous Ties**

*The scoring criteria for the uniform standards do not allow enough variability to minimize ties in final scores at the regional level.*

- Approximately 40% of the ETRWPG 2011 projects result in a prioritization final score equal to the final score of at least one other project.
- The ETRWPG is concerned with final score ties at both the regional and state level in regards to how the TWDB will allocate funds.
- One potential way of resolving ties could be to allow regions to add their own unique scoring criteria that would be used specifically for the purpose of breaking such ties. Would regions be allowed to develop and use additional criteria?

**Uniform Standard 2A**

*This uniform standard reads as follows:*
*What supporting data is available to show that the quantity of water needed is available? [Models suggest insufficient quantities of water or no modeling performed = 0 points; models suggest sufficient quantity of water = 3; Field tests and measurements confirm sufficient quantities of water = 5]*

- The scoring criteria do not allow a surface water source to receive the maximum score for this standard because field tests and measurements are not used to confirm sufficient quantities of surface water.

- The Technical Committee would like the SHC to consider revising Uniform Standard 2A to enable a new surface water source to receive a 5 for this standard if models suggest a sufficient quantity of water.

**Uniform Standard 3C**

*This uniform standard reads as follows:*
*Is this project the only economically feasible source of new supply for the WUG, other than conservation? [No = 0 points; Yes = 5]*

- An advantage is given to sponsors with only one recommended WMS, and there is a disadvantage to sponsors with several recommended WMSs, even if one of these projects is the most economically feasible source of new supply.

**Uniform Standard 3D**

*This uniform standard reads as follows:*
*Does this project serve multiple WUGs? [No = 0 points; Yes = 5]*

- The scoring criteria do not account for how many WUGs a recommended WMS serves. A more detailed scoring breakdown to distinguish between two WUGs served and numbers of WUGs greater than two would be helpful.

**Projects Shared across Regions**

*Several strategies either provide water to or receive water from a strategy in another region. These projects have a cost that is either shared with or borne by one region or the other.*

- The current prioritization instructions do not indicate if any of the Uniform Standards need to be evaluated differently for these types of projects.
- The TWDB has not disclosed to the regions how projects serving more than one region will be integrated into one list.

**Water Type and Water Use Category**

*The Uniform Standards do not differentiate between raw water and treated water strategies or water use categories (Municipal, Manufacturing, Livestock, etc.).*

- It is not appropriate to compare strategies with different water types or different water use categories against one another because certain uniform standards may benefit one water type or use over another. For example, raw water strategies tend to be less expensive than treated water strategies.

**Agriculture / Conservation Projects**

*The prioritization template has the yellow "Rural / Agricultural Conservation?" and "Conservation Reuse?" columns protected and are therefore read-only even though the "read me" sheet indicates the RWPG should input data into yellow cells.*

- The ETRWPG decided to leave these columns blank as the TWDB did not advise the group on how to mark the agriculture and conservation columns in the scoring sheet for the 2011 Prioritization.

**Project Roll-Ups**

*The TWDB has given RWPGs the option to roll up projects that are linked via a funding relationship.*

- The ETRWPG believes that the concept of scoring using rolled up projects is valid and helpful to WUGs. However, there is a concern that the definition of what constitutes a roll-up is not clear, making it difficult to identify some projects that may otherwise be eligible for scoring as a roll-up. Additional clarification should be considered.

# Appendix 9-A

# Infrastructure Financing Report – Survey Results

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This appendix includes surveys from Water User Groups with identified needs conducted by the ETRWPG. The survey determined or confirmed infrastructure costs and potential funding sources for infrastructure projects.

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| Sponsor Entity Name | Sponsor Entity Privacy Region | Project Name | WMS Project Sponsor Region | IFR Element Name | IFR Element Value | Year Of Need | IFR Project Data ID | Entity Rwp ID | WMS Project ID | IFR Project Elements ID |
|---|---|---|---|---|---|---|---|---|---|---|
| ALTO RURAL WSC | I | CHE-ALT - NEW WELLS IN CARRIZO WILCOX | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $480,000.00 | 2040 | | 167 | 2089 | 1 |
| ALTO RURAL WSC | I | CHE-ALT - NEW WELLS IN CARRIZO WILCOX | I | CONSTRUCTION FUNDING | $2,202,000.00 | 2040 | | 167 | 2089 | 2 |
| ALTO RURAL WSC | I | CHE-ALT - NEW WELLS IN CARRIZO WILCOX | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2040 | | 167 | 2089 | 3 |
| ANGELINA & NECHES RIVER AUTHORITY | I | ANRA-COL - LAKE COLUMBIA CONSTRUCTION | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $172,089,000.00 | 2020 | | 3 | 1696 | 1 |
| ANGELINA & NECHES RIVER AUTHORITY | I | ANRA-COL - LAKE COLUMBIA CONSTRUCTION | I | CONSTRUCTION FUNDING | $172,409,000.00 | 2020 | | 3 | 1696 | 2 |
| ANGELINA & NECHES RIVER AUTHORITY | I | ANRA-COL - LAKE COLUMBIA CONSTRUCTION | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 3 | 1696 | 3 |
| ANGELINA & NECHES RIVER AUTHORITY | I | ANRA-GW-NEW GROUNDWATER WELLS INFRASTRUCTURE | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $3,752,000.00 | 2020 | | 3 | 2051 | 1 |
| ANGELINA & NECHES RIVER AUTHORITY | I | ANRA-GW-NEW GROUNDWATER WELLS INFRASTRUCTURE | I | CONSTRUCTION FUNDING | $22,271,000.00 | 2020 | | 3 | 2051 | 2 |
| ANGELINA & NECHES RIVER AUTHORITY | I | ANRA-GW-NEW GROUNDWATER WELLS INFRASTRUCTURE | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 3 | 2051 | 3 |
| ANGELINA & NECHES RIVER AUTHORITY | I | ANRA-WTP-WTP CONSTRUCTION | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $19,746,157.00 | 2020 | | 3 | 2136 | 1 |
| ANGELINA & NECHES RIVER AUTHORITY | I | ANRA-WTP-WTP CONSTRUCTION | I | CONSTRUCTION FUNDING | $97,503,843.00 | 2020 | | 3 | 2136 | 2 |
| ANGELINA & NECHES RIVER AUTHORITY | I | ANRA-WTP-WTP CONSTRUCTION | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 3 | 2136 | 3 |
| ANGELINA & NECHES RIVER AUTHORITY | I | CHER-MIN-INFRASTRUCTURE | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $1,598,000.00 | 2020 | | 3 | 2052 | 1 |
| ANGELINA & NECHES RIVER AUTHORITY | I | CHER-MIN-INFRASTRUCTURE | I | CONSTRUCTION FUNDING | $2,616,000.00 | 2020 | | 3 | 2052 | 2 |
| ANGELINA & NECHES RIVER AUTHORITY | I | CHER-MIN-INFRASTRUCTURE | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 3 | 2052 | 3 |
| ANGELINA NACOGDOCHES WCID #1 | I | LAKE-STRIKER-DREDGING | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $3,557,400.00 | 2040 | | 4 | 2199 | 1 |
| ANGELINA NACOGDOCHES WCID #1 | I | LAKE-STRIKER-DREDGING | I | CONSTRUCTION FUNDING | $20,158,600.00 | 2040 | | 4 | 2199 | 2 |
| ANGELINA NACOGDOCHES WCID #1 | I | LAKE-STRIKER-DREDGING | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2040 | | 4 | 2199 | 3 |
| ANGELINA NACOGDOCHES WCID #1 | I | STRIKER-VOLUMETRIC SURVEY | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $25,000.00 | 2020 | | 4 | 2198 | 1 |
| ANGELINA NACOGDOCHES WCID #1 | I | STRIKER-VOLUMETRIC SURVEY | I | CONSTRUCTION FUNDING | $0.00 | 2020 | | 4 | 2198 | 2 |
| ANGELINA NACOGDOCHES WCID #1 | I | STRIKER-VOLUMETRIC SURVEY | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 4 | 2198 | 3 |
| ATHENS MUNICIPAL WATER AUTHORITY | I | ATHENS MWA WTP INFRASTRUCTURE IMPROVEMENTS Q-145 | C | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $380,500.00 | 2020 | | 6 | 1075 | 1 |
| ATHENS MUNICIPAL WATER AUTHORITY | I | ATHENS MWA WTP INFRASTRUCTURE IMPROVEMENTS Q-145 | C | CONSTRUCTION FUNDING | $2,519,500.00 | 2020 | | 6 | 1075 | 2 |
| ATHENS MUNICIPAL WATER AUTHORITY | I | ATHENS MWA WTP INFRASTRUCTURE IMPROVEMENTS Q-145 | C | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 6 | 1075 | 3 |
| BEAUMONT | I | BEAU ENHANCED WATER LOSS CONTROL PROGRAM | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $6,072,000.00 | 2030 | | 9 | 2042 | 1 |
| BEAUMONT | I | BEAU ENHANCED WATER LOSS CONTROL PROGRAM | I | CONSTRUCTION FUNDING | $46,551,000.00 | 2030 | | 9 | 2042 | 2 |
| BEAUMONT | I | BEAU ENHANCED WATER LOSS CONTROL PROGRAM | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2030 | | 9 | 2042 | 3 |
| BETHEL-ASH WSC | I | CONSERVATION, WATER LOSS CONTROL - BETHEL-ASH WSC | C | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $0.00 | 2020 | | 235 | 1300 | 1 |
| BETHEL-ASH WSC | I | CONSERVATION, WATER LOSS CONTROL - BETHEL-ASH WSC | C | CONSTRUCTION FUNDING | $4,744.00 | 2020 | | 235 | 1300 | 2 |
| BETHEL-ASH WSC | I | CONSERVATION, WATER LOSS CONTROL - BETHEL-ASH WSC | C | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 235 | 1300 | 3 |
| BULLARD | I | SMTH-BLD-INFRASTRUCTURE | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $1,660,500.00 | 2020 | | 288 | 2046 | 1 |
| BULLARD | I | SMTH-BLD-INFRASTRUCTURE | I | CONSTRUCTION FUNDING | $3,599,500.00 | 2020 | | 288 | 2046 | 2 |
| BULLARD | I | SMTH-BLD-INFRASTRUCTURE | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 288 | 2046 | 3 |
| CENTER | I | CENT-REU-PIPELINE FROM WWTP TO LAKE CENTER | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $5,754,000.00 | 2020 | | 25 | 2133 | 1 |
| CENTER | I | CENT-REU-PIPELINE FROM WWTP TO LAKE CENTER | I | CONSTRUCTION FUNDING | $7,825,000.00 | 2020 | | 25 | 2133 | 2 |
| CENTER | I | CENT-REU-PIPELINE FROM WWTP TO LAKE CENTER | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 25 | 2133 | 3 |
| CENTER | I | CENT-TOL-TOLEDO BEND TO CENTER | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $6,190,000.00 | 2030 | | 25 | 2134 | 1 |
| CENTER | I | CENT-TOL-TOLEDO BEND TO CENTER | I | CONSTRUCTION FUNDING | $21,585,000.00 | 2030 | | 25 | 2134 | 2 |
| CENTER | I | CENT-TOL-TOLEDO BEND TO CENTER | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2030 | | 25 | 2134 | 3 |
| CHANDLER | I | HDSN-CHN - PURCHASE FROM TYLER | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $259,500.00 | 2020 | | 313 | 2141 | 1 |
| CHANDLER | I | HDSN-CHN - PURCHASE FROM TYLER | I | CONSTRUCTION FUNDING | $1,626,500.00 | 2020 | | 313 | 2141 | 2 |
| CHANDLER | I | HDSN-CHN - PURCHASE FROM TYLER | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 313 | 2141 | 3 |
| COUNTY-OTHER, HENDERSON | I | CONSERVATION, WATER LOSS CONTROL - HENDERSON COUNTY | C | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $0.00 | 2020 | | 473 | 1556 | 1 |
| COUNTY-OTHER, HENDERSON | I | CONSERVATION, WATER LOSS CONTROL - HENDERSON COUNTY | C | CONSTRUCTION FUNDING | $5,449.00 | 2020 | | 473 | 1556 | 2 |
| COUNTY-OTHER, HENDERSON | I | CONSERVATION, WATER LOSS CONTROL - HENDERSON COUNTY | C | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 473 | 1556 | 3 |
| COUNTY-OTHER, HENDERSON | I | HENDERSON COUNTY SEP - TRANSMISSION FACILITIES FROM CEDAR CREEK LAKE Q-147 | C | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $4,893,000.00 | 2030 | | 473 | 1077 | 1 |
| COUNTY-OTHER, HENDERSON | I | HENDERSON COUNTY SEP - TRANSMISSION FACILITIES FROM CEDAR CREEK LAKE Q-147 | C | CONSTRUCTION FUNDING | $15,058,000.00 | 2030 | | 473 | 1077 | 2 |
| COUNTY-OTHER, HENDERSON | I | HENDERSON COUNTY SEP - TRANSMISSION FACILITIES FROM CEDAR CREEK LAKE Q-147 | C | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2030 | | 473 | 1077 | 3 |
| COUNTY-OTHER, JEFFERSON | I | JEFF-CTR INFRASTRUCTURE | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $3,531,000.00 | 2050 | | 489 | 1931 | 1 |
| COUNTY-OTHER, JEFFERSON | I | JEFF-CTR INFRASTRUCTURE | I | CONSTRUCTION FUNDING | $10,705,000.00 | 2050 | | 489 | 1931 | 2 |
| COUNTY-OTHER, JEFFERSON | I | JEFF-CTR INFRASTRUCTURE | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2050 | | 489 | 1931 | 3 |
| COUNTY-OTHER, NACOGDOCHES | I | NACN-LK - LAKE NACONICHE INFRASTRUCTURE | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $8,809,000.00 | 2030 | | 540 | 2125 | 1 |
| COUNTY-OTHER, NACOGDOCHES | I | NACN-LK - LAKE NACONICHE INFRASTRUCTURE | I | CONSTRUCTION FUNDING | $25,683,000.00 | 2030 | | 540 | 2125 | 2 |
| COUNTY-OTHER, NACOGDOCHES | I | NACN-LK - LAKE NACONICHE INFRASTRUCTURE | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2030 | | 540 | 2125 | 3 |
| COUNTY-OTHER, TRINITY | I | WATER LOSS REDUCTION, COUNTY-OTHER - TRINITY COUNTY | H | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $106,677.00 | 2020 | | 594 | 382 | 1 |
| COUNTY-OTHER, TRINITY | I | WATER LOSS REDUCTION, COUNTY-OTHER - TRINITY COUNTY | H | CONSTRUCTION FUNDING | $604,503.00 | 2020 | | 594 | 382 | 2 |
| COUNTY-OTHER, TRINITY | I | WATER LOSS REDUCTION, COUNTY-OTHER - TRINITY COUNTY | H | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 594 | 382 | 3 |

| Sponsor Entity Name | Sponsor Entity Privacy Region | Project Name | WMS Project Sponsor Region | IFR Element Name | IFR Element Value | Year Of Need | IFR Project Data ID | Entity Rwp ID | WMS Project ID | IFR Project Elements ID |
|---|---|---|---|---|---|---|---|---|---|---|
| CRYSTAL SYSTEMS INC | I | SMTH-CYS INFRASTRUCTURE | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $303,150.00 | 2020 | | 2505 | 2088 | 1 |
| CRYSTAL SYSTEMS INC | I | SMTH-CYS INFRASTRUCTURE | I | CONSTRUCTION FUNDING | $1,717,850.00 | 2020 | | 2505 | 2088 | 2 |
| CRYSTAL SYSTEMS INC | I | SMTH-CYS INFRASTRUCTURE | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 2505 | 2088 | 3 |
| D&M WSC | I | NACW-DMW - NEW WELLS IN CARRIZO AQUIFER | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $866,000.00 | 2020 | | 2505 | 2088 | 1 |
| D&M WSC | I | NACW-DMW - NEW WELLS IN CARRIZO AQUIFER | I | CONSTRUCTION FUNDING | $2,618,000.00 | 2020 | | 2505 | 2088 | 2 |
| D&M WSC | I | NACW-DMW - NEW WELLS IN CARRIZO AQUIFER | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 2505 | 2088 | 3 |
| G M WSC | I | GM-WSC-ELEVATED TANK | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $87,000.00 | 2020 | | 2784 | 2197 | 1 |
| G M WSC | I | GM-WSC-ELEVATED TANK | I | CONSTRUCTION FUNDING | $658,500.00 | 2020 | | 2784 | 2197 | 2 |
| G M WSC | I | GM-WSC-ELEVATED TANK | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 2784 | 2197 | 3 |
| G M WSC | I | GM-WSC-SURFACE WATER PLANT IMPROVEMENTS | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $286,500.00 | 2020 | | 2784 | 2196 | 1 |
| G M WSC | I | GM-WSC-SURFACE WATER PLANT IMPROVEMENTS | I | CONSTRUCTION FUNDING | $2,196,500.00 | 2020 | | 2784 | 2196 | 2 |
| G M WSC | I | GM-WSC-SURFACE WATER PLANT IMPROVEMENTS | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 2784 | 2196 | 3 |
| G M WSC | I | GM-WSC-WATER SYSTEM EXPANSION | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $230,500.00 | 2020 | | 2784 | 2195 | 1 |
| G M WSC | I | GM-WSC-WATER SYSTEM EXPANSION | I | CONSTRUCTION FUNDING | $1,759,990.00 | 2020 | | 2784 | 2195 | 2 |
| G M WSC | I | GM-WSC-WATER SYSTEM EXPANSION | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 2784 | 2195 | 3 |
| G M WSC | I | GM-WSC-WATERLINE IMPROVEMENTS | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $332,000.00 | 2020 | | 2784 | 2194 | 1 |
| G M WSC | I | GM-WSC-WATERLINE IMPROVEMENTS | I | CONSTRUCTION FUNDING | $2,348,400.00 | 2020 | | 2784 | 2194 | 2 |
| G M WSC | I | GM-WSC-WATERLINE IMPROVEMENTS | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 2784 | 2194 | 3 |
| IRRIGATION, HOUSTON | I | HOUS-IRR INFRASTRUCTURE | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $1,941,500.00 | 2020 | | 987 | 1916 | 1 |
| IRRIGATION, HOUSTON | I | HOUS-IRR INFRASTRUCTURE | I | CONSTRUCTION FUNDING | $10,984,500.00 | 2020 | | 987 | 1916 | 2 |
| IRRIGATION, HOUSTON | I | HOUS-IRR INFRASTRUCTURE | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 987 | 1916 | 3 |
| IRRIGATION, ORANGE | I | ORAN-IRR-INFRASTRUCTURE | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $3,588,000.00 | 2020 | | 1049 | 2057 | 1 |
| IRRIGATION, ORANGE | I | ORAN-IRR-INFRASTRUCTURE | I | CONSTRUCTION FUNDING | $9,693,000.00 | 2020 | | 1049 | 2057 | 2 |
| IRRIGATION, ORANGE | I | ORAN-IRR-INFRASTRUCTURE | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 1049 | 2057 | 3 |
| JACKSONVILLE | I | JACK-COL | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $3,120,000.00 | 2020 | | 77 | 2099 | 1 |
| JACKSONVILLE | I | JACK-COL | I | CONSTRUCTION FUNDING | $17,525,000.00 | 2020 | | 77 | 2099 | 2 |
| JACKSONVILLE | I | JACK-COL | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 77 | 2099 | 3 |
| LINDALE | I | SMTH-LDL INFRASTRUCTURE | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $870,450.00 | 2020 | | 1394 | 2084 | 1 |
| LINDALE | I | SMTH-LDL INFRASTRUCTURE | I | CONSTRUCTION FUNDING | $4,932,550.00 | 2020 | | 1394 | 2084 | 2 |
| LINDALE | I | SMTH-LDL INFRASTRUCTURE | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 1394 | 2084 | 3 |
| LIVESTOCK, NACOGDOCHES | I | NACW-LTK - NEW WELLS IN CARRIZO WILCOX | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $3,948,500.00 | 2020 | | 1394 | 2084 | 1 |
| LIVESTOCK, NACOGDOCHES | I | NACW-LTK - NEW WELLS IN CARRIZO WILCOX | I | CONSTRUCTION FUNDING | $19,821,500.00 | 2020 | | 1394 | 2084 | 2 |
| LIVESTOCK, NACOGDOCHES | I | NACW-LTK - NEW WELLS IN CARRIZO WILCOX | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 1394 | 2084 | 3 |
| LIVESTOCK, SHELBY | I | SHEL-LTK INFRASTRUCTURE | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $4,909,000.00 | 2020 | | 1430 | 2050 | 1 |
| LIVESTOCK, SHELBY | I | SHEL-LTK INFRASTRUCTURE | I | CONSTRUCTION FUNDING | $20,329,000.00 | 2020 | | 1430 | 2050 | 2 |
| LIVESTOCK, SHELBY | I | SHEL-LTK INFRASTRUCTURE | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 1430 | 2050 | 3 |
| LOWER NECHES VALLEY AUTHORITY | I | LNVA-JEFF CONSTRUCTED LEVY | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $5,248,350.00 | 2040 | | 86 | 1943 | 1 |
| LOWER NECHES VALLEY AUTHORITY | I | LNVA-JEFF CONSTRUCTED LEVY | I | CONSTRUCTION FUNDING | $29,740,650.00 | 2040 | | 86 | 1943 | 2 |
| LOWER NECHES VALLEY AUTHORITY | I | LNVA-JEFF CONSTRUCTED LEVY | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2040 | | 86 | 1943 | 3 |
| LOWER NECHES VALLEY AUTHORITY | I | LNVA-SRA INFRASTRUCTURE | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $47,060,500.00 | 2040 | | 86 | 1943 | 1 |
| LOWER NECHES VALLEY AUTHORITY | I | LNVA-SRA INFRASTRUCTURE | I | CONSTRUCTION FUNDING | $352,894,500.00 | 2040 | | 86 | 1943 | 2 |
| LOWER NECHES VALLEY AUTHORITY | I | LNVA-SRA INFRASTRUCTURE | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2040 | | 86 | 1943 | 3 |
| LUFKIN | I | LUFK-RAY PHASE 1 | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $7,695,500.00 | 2030 | | 89 | 2010 | 1 |
| LUFKIN | I | LUFK-RAY PHASE 1 | I | CONSTRUCTION FUNDING | $41,672,500.00 | 2030 | | 89 | 2010 | 2 |
| LUFKIN | I | LUFK-RAY PHASE 1 | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2030 | | 89 | 2010 | 3 |
| LUFKIN | I | LUFK-RAY PHASE 2 | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $4,900,500.00 | 2040 | | 89 | 2011 | 1 |
| LUFKIN | I | LUFK-RAY PHASE 2 | I | CONSTRUCTION FUNDING | $32,962,500.00 | 2040 | | 89 | 2011 | 2 |
| LUFKIN | I | LUFK-RAY PHASE 2 | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2040 | | 89 | 2011 | 3 |
| LUFKIN | I | LUFK-RAY PHASE 3 | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $621,500.00 | 2050 | | 89 | 2012 | 1 |
| LUFKIN | I | LUFK-RAY PHASE 3 | I | CONSTRUCTION FUNDING | $2,138,500.00 | 2050 | | 89 | 2012 | 2 |
| LUFKIN | I | LUFK-RAY PHASE 3 | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2050 | | 89 | 2012 | 3 |
| MANUFACTURING, JASPER | I | JASP-MFG INFRASTRUCTURE | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $7,275,500.00 | 2030 | | 1591 | 1926 | 1 |
| MANUFACTURING, JASPER | I | JASP-MFG INFRASTRUCTURE | I | CONSTRUCTION FUNDING | $26,221,500.00 | 2030 | | 1591 | 1926 | 2 |
| MANUFACTURING, JASPER | I | JASP-MFG INFRASTRUCTURE | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2030 | | 1591 | 1926 | 3 |
| MANUFACTURING, JEFFERSON | I | JEFF-MFG INFRASTRUCTURE | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $37,564,000.00 | 2020 | | 1592 | 1932 | 1 |
| MANUFACTURING, JEFFERSON | I | JEFF-MFG INFRASTRUCTURE | I | CONSTRUCTION FUNDING | $274,691,000.00 | 2020 | | 1592 | 1932 | 2 |
| MANUFACTURING, JEFFERSON | I | JEFF-MFG INFRASTRUCTURE | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 1592 | 1932 | 3 |

| Sponsor Entity Name | Sponsor Entity Privacy Region | Project Name | WMS Project Sponsor Region | IFR Element Name | IFR Element Value | Year Of Need | IFR Project Data ID | Entity Rwp ID | WMS Project ID | IFR Project Elements ID |
|---|---|---|---|---|---|---|---|---|---|---|
| MANUFACTURING, ORANGE | I | ORAN-MFG | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $6,960,000.00 | 2020 | | 1631 | 2058 | 1 |
| MANUFACTURING, ORANGE | I | ORAN-MFG | I | CONSTRUCTION FUNDING | $35,661,000.00 | 2020 | | 1631 | 2058 | 2 |
| MANUFACTURING, ORANGE | I | ORAN-MFG | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 1631 | 2058 | 3 |
| MANUFACTURING, SMITH | I | SMTH-MFG-INFRASTRUCTURE | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $1,687,500.00 | 2020 | | 1653 | 2048 | 1 |
| MANUFACTURING, SMITH | I | SMTH-MFG-INFRASTRUCTURE | I | CONSTRUCTION FUNDING | $5,516,500.00 | 2020 | | 1653 | 2048 | 2 |
| MANUFACTURING, SMITH | I | SMTH-MFG-INFRASTRUCTURE | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 1653 | 2048 | 3 |
| MINING, ANGELINA | I | ANGL-MIN-INFRASTRUCTURE | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $1,316,000.00 | 2020 | | 1728 | 2053 | 1 |
| MINING, ANGELINA | I | ANGL-MIN-INFRASTRUCTURE | I | CONSTRUCTION FUNDING | $2,689,000.00 | 2020 | | 1728 | 2053 | 2 |
| MINING, ANGELINA | I | ANGL-MIN-INFRASTRUCTURE | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 1728 | 2053 | 3 |
| MINING, NACOGDOCHES | I | NACW-MIN-INFRASTRUCTURE | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $2,930,000.00 | 2020 | | 1879 | 2054 | 1 |
| MINING, NACOGDOCHES | I | NACW-MIN-INFRASTRUCTURE | I | CONSTRUCTION FUNDING | $9,535,000.00 | 2020 | | 1879 | 2054 | 2 |
| MINING, NACOGDOCHES | I | NACW-MIN-INFRASTRUCTURE | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 1879 | 2054 | 3 |
| MINING, RUSK | I | RUSK-MIN | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $4,150,000.00 | 2020 | | 1903 | 2056 | 1 |
| MINING, RUSK | I | RUSK-MIN | I | CONSTRUCTION FUNDING | $10,008,000.00 | 2020 | | 1903 | 2056 | 2 |
| MINING, RUSK | I | RUSK-MIN | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 1903 | 2056 | 3 |
| MINING, SAN AUGUSTINE | I | SAUG-MIN-INFRASTRUCTURE | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $5,484,000.00 | 2020 | | 2773 | 2055 | 1 |
| MINING, SAN AUGUSTINE | I | SAUG-MIN-INFRASTRUCTURE | I | CONSTRUCTION FUNDING | $15,580,000.00 | 2020 | | 2773 | 2055 | 2 |
| MINING, SAN AUGUSTINE | I | SAUG-MIN-INFRASTRUCTURE | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 2773 | 2055 | 3 |
| MINING, SMITH | I | SMTH-MIN INFRASTRUCTURE | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $465,450.00 | 2020 | | 1926 | 590 | 1 |
| MINING, SMITH | I | SMTH-MIN INFRASTRUCTURE | I | CONSTRUCTION FUNDING | $2,637,550.00 | 2020 | | 1926 | 590 | 2 |
| MINING, SMITH | I | SMTH-MIN INFRASTRUCTURE | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 1926 | 590 | 3 |
| MINING, TRINITY | I | WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, TRINITY COUNTY (T) | H | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $162,145.00 | 2020 | | 1926 | 590 | 1 |
| MINING, TRINITY | I | WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, TRINITY COUNTY (T) | H | CONSTRUCTION FUNDING | $918,821.00 | 2020 | | 1926 | 590 | 2 |
| MINING, TRINITY | I | WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, TRINITY COUNTY (T) | H | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 1926 | 590 | 3 |
| NACOGDOCHES | I | NACP-COL | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $4,684,500.00 | 2030 | | 97 | 2101 | 1 |
| NACOGDOCHES | I | NACP-COL | I | CONSTRUCTION FUNDING | $31,144,500.00 | 2030 | | 97 | 2101 | 2 |
| NACOGDOCHES | I | NACP-COL | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2030 | | 97 | 2101 | 3 |
| OVERTON | I | OVER ENHANCED WATER LOSS CONTROL PROGRAM | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $243,000.00 | 2040 | | 2035 | 2043 | 1 |
| OVERTON | I | OVER ENHANCED WATER LOSS CONTROL PROGRAM | I | CONSTRUCTION FUNDING | $1,862,000.00 | 2040 | | 2035 | 2043 | 2 |
| OVERTON | I | OVER ENHANCED WATER LOSS CONTROL PROGRAM | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2040 | | 2035 | 2043 | 3 |
| PORT ARTHUR | I | PORT ENHANCED WATER LOSS CONTROL PROGRAM | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $5,778,000.00 | 2020 | | 111 | 2044 | 1 |
| PORT ARTHUR | I | PORT ENHANCED WATER LOSS CONTROL PROGRAM | I | CONSTRUCTION FUNDING | $44,297,000.00 | 2020 | | 111 | 2044 | 2 |
| PORT ARTHUR | I | PORT ENHANCED WATER LOSS CONTROL PROGRAM | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 111 | 2044 | 3 |
| SABINE RIVER AUTHORITY | I | SRA-INF - PUMPSTATION FOR SRA | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $10,924,901.00 | 2020 | | 115 | 2193 | 1 |
| SABINE RIVER AUTHORITY | I | SRA-INF - PUMPSTATION FOR SRA | I | CONSTRUCTION FUNDING | $61,907,774.00 | 2020 | | 115 | 2193 | 2 |
| SABINE RIVER AUTHORITY | I | SRA-INF - PUMPSTATION FOR SRA | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 115 | 2193 | 3 |
| STEAM ELECTRIC POWER, ANDERSON | I | AND-SEP1 - PIPELINE FROM LAKE PALESTINE - CONTRACT WITH CITY OF PALESTINE | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $7,467,500.00 | 2020 | | 2250 | 2121 | 1 |
| STEAM ELECTRIC POWER, ANDERSON | I | AND-SEP1 - PIPELINE FROM LAKE PALESTINE - CONTRACT WITH CITY OF PALESTINE | I | CONSTRUCTION FUNDING | $37,108,500.00 | 2020 | | 2250 | 2121 | 2 |
| STEAM ELECTRIC POWER, ANDERSON | I | AND-SEP1 - PIPELINE FROM LAKE PALESTINE - CONTRACT WITH CITY OF PALESTINE | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 2250 | 2121 | 3 |
| STEAM ELECTRIC POWER, CHEROKEE | I | CHER-SEP INFRASTRUCTURE | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $2,510,250.00 | 2020 | | 2259 | 2139 | 1 |
| STEAM ELECTRIC POWER, CHEROKEE | I | CHER-SEP INFRASTRUCTURE | I | CONSTRUCTION FUNDING | $14,224,750.00 | 2020 | | 2259 | 2139 | 2 |
| STEAM ELECTRIC POWER, CHEROKEE | I | CHER-SEP INFRASTRUCTURE | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 2259 | 2139 | 3 |
| STEAM ELECTRIC POWER, JEFFERSON | I | JEFF-SEP INFRASTRUCTURE | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $8,713,000.00 | 2020 | | 2288 | 1933 | 1 |
| STEAM ELECTRIC POWER, JEFFERSON | I | JEFF-SEP INFRASTRUCTURE | I | CONSTRUCTION FUNDING | $45,805,000.00 | 2020 | | 2288 | 1933 | 2 |
| STEAM ELECTRIC POWER, JEFFERSON | I | JEFF-SEP INFRASTRUCTURE | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 2288 | 1933 | 3 |
| STEAM ELECTRIC POWER, NACOGDOCHES | I | NACW-SEP1 - LAKE COLUMBIA INFRASTRUCTURE | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $4,411,000.00 | 2020 | | 2306 | 2085 | 1 |
| STEAM ELECTRIC POWER, NACOGDOCHES | I | NACW-SEP1 - LAKE COLUMBIA INFRASTRUCTURE | I | CONSTRUCTION FUNDING | $21,394,000.00 | 2020 | | 2306 | 2085 | 2 |
| STEAM ELECTRIC POWER, NACOGDOCHES | I | NACW-SEP1 - LAKE COLUMBIA INFRASTRUCTURE | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 2306 | 2085 | 3 |
| STEAM ELECTRIC POWER, NACOGDOCHES | I | NACW-SEP2 - NEW WELLS IN CARRIZO WILCOX | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $2,943,000.00 | 2060 | | 2306 | 2086 | 1 |
| STEAM ELECTRIC POWER, NACOGDOCHES | I | NACW-SEP2 - NEW WELLS IN CARRIZO WILCOX | I | CONSTRUCTION FUNDING | $13,078,000.00 | 2060 | | 2306 | 2086 | 2 |
| STEAM ELECTRIC POWER, NACOGDOCHES | I | NACW-SEP2 - NEW WELLS IN CARRIZO WILCOX | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2060 | | 2306 | 2086 | 3 |
| STEAM ELECTRIC POWER, NEWTON | I | NEWT-SEP INFRASTRUCTURE | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $6,744,500.00 | 2020 | | 2307 | 1935 | 1 |
| STEAM ELECTRIC POWER, NEWTON | I | NEWT-SEP INFRASTRUCTURE | I | CONSTRUCTION FUNDING | $31,425,500.00 | 2020 | | 2307 | 1935 | 2 |
| STEAM ELECTRIC POWER, NEWTON | I | NEWT-SEP INFRASTRUCTURE | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 2307 | 1935 | 3 |
| STEAM ELECTRIC POWER, ORANGE | I | ORAN-SEP | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $3,894,000.00 | 2020 | | 2310 | 2059 | 1 |
| STEAM ELECTRIC POWER, ORANGE | I | ORAN-SEP | I | CONSTRUCTION FUNDING | $11,953,000.00 | 2020 | | 2310 | 2059 | 2 |
| STEAM ELECTRIC POWER, ORANGE | I | ORAN-SEP | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 2310 | 2059 | 3 |

| Sponsor Entity Name | Sponsor Entity Privacy Region | Project Name | WMS Project Sponsor Region | IFR Element Name | IFR Element Value | Year Of Need | IFR Project Data ID | Entity Rwp ID | WMS Project ID | IFR Project Elements ID |
|---|---|---|---|---|---|---|---|---|---|---|
| STEAM ELECTRIC POWER, RUSK | I | RUSK-SEP INFRASTRUCTURE | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $10,474,000.00 | 2050 | | 2316 | 1936 | 1 |
| STEAM ELECTRIC POWER, RUSK | I | RUSK-SEP INFRASTRUCTURE | I | CONSTRUCTION FUNDING | $47,244,000.00 | 2050 | | 2316 | 1936 | 2 |
| STEAM ELECTRIC POWER, RUSK | I | RUSK-SEP INFRASTRUCTURE | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2050 | | 2316 | 1936 | 3 |
| THE CONSOLIDATED WSC | I | WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - THE CONSOLIDATED WSC | H | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $162,145.00 | 2020 | | 2968 | 589 | 1 |
| THE CONSOLIDATED WSC | I | WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - THE CONSOLIDATED WSC | H | CONSTRUCTION FUNDING | $918,821.00 | 2020 | | 2968 | 589 | 2 |
| THE CONSOLIDATED WSC | I | WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - THE CONSOLIDATED WSC | H | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 2968 | 589 | 3 |
| TYLER | I | TYL-PAL - PALESTINE INFRASTRUCTURE | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $12,721,228.00 | 2020 | | 135 | 2123 | 1 |
| TYLER | I | TYL-PAL - PALESTINE INFRASTRUCTURE | I | CONSTRUCTION FUNDING | $80,328,772.00 | 2020 | | 135 | 2123 | 2 |
| TYLER | I | TYL-PAL - PALESTINE INFRASTRUCTURE | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 135 | 2123 | 3 |
| UPPER NECHES RIVER MUNICIPAL WATER AUTHORITY | I | UNM-ROR-NECHES RUN OF RIVER INFRASTRUCTURE | I | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $99,055,000.00 | 2020 | | 140 | 2149 | 1 |
| UPPER NECHES RIVER MUNICIPAL WATER AUTHORITY | I | UNM-ROR-NECHES RUN OF RIVER INFRASTRUCTURE | I | CONSTRUCTION FUNDING | $345,030,000.00 | 2020 | | 140 | 2149 | 2 |
| UPPER NECHES RIVER MUNICIPAL WATER AUTHORITY | I | UNM-ROR-NECHES RUN OF RIVER INFRASTRUCTURE | I | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 140 | 2149 | 3 |
| WEST HARDIN WSC | I | WATER LOSS REDUCTION, WEST HARDIN WSC | H | PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING | $29,163.00 | 2020 | | 2434 | 383 | 1 |
| WEST HARDIN WSC | I | WATER LOSS REDUCTION, WEST HARDIN WSC | H | CONSTRUCTION FUNDING | $165,257.00 | 2020 | | 2434 | 383 | 2 |
| WEST HARDIN WSC | I | WATER LOSS REDUCTION, WEST HARDIN WSC | H | PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY | 0.00 | 2020 | | 2434 | 383 | 3 |

# Appendix 9-B

# Infrastructure Financing Report – Contact Information

A part of the survey presented in Appendix 9-A was obtaining and recording relevant and up-to-date contact information for each Water User Group in the East Texas Regional Water Planning Area. The following appendix contains the contact information obtaining from the survey results.

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**Appendix 9-B**
**Infrastructure Financing Report - Contact Information**

| Entity Name | Entity Planning Region | Respondent Contact Name | Area Code | Phone | Extension | Email | Comment | Entity RWP ID |
|---|---|---|---|---|---|---|---|---|
| ALTO RURAL WSC | I | TOMMY DILL | 936 | 858-4648 | | | | 167 |
| ANGELINA & NECHES RIVER AUTHORITY | I | KELLEY HOLCOMB | 936 | 632-7795 | | kholcomb@anra.org | | 3 |
| ANGELINA NACOGDOCHES WCID #1 | I | DAVID MASON | 903 | 854-4559 | | davidmasoon@lakestriker.com | | 4 |
| ATHENS MUNICIPAL WATER AUTHORITY | I | DAVID M STOVER | 903 | 677-1735 | | gherriage@athenstexas.us | | 6 |
| BEAUMONT | I | MOLLY VILLAREAL | 409 | 785-3016 | | | | 9 |
| BETHEL-ASH WSC | I | DONNIE BARFIELD | 903 | 675-8466 | | | | 235 |
| BULLARD | I | LARRY MORGAN | 903 | 894-7223 | | citymanager@bullardtexas.net | | 288 |
| CENTER | I | MICHAEL BOYD | 936 | 598-5241 | | | | 25 |
| CHANDLER | I | JON HALL | 903 | 849-6853 | | jhall@chandlertx.com | | 313 |
| COUNTY-OTHER, HENDERSON | I | HONORABLE RICHARD SANDERS | 903 | 675-6120 | | | | 473 |
| COUNTY-OTHER, JEFFERSON | I | HONORABLE JEFF BRANICK | 409 | 727-2191 | | jbranick@co.jefferson.tx.us | | 489 |
| COUNTY-OTHER, NACOGDOCHES | I | HONORABLE MIKE PERRY | 936 | 560-7755 | | cojudge@co.nacogdoches.tx.us | | 540 |
| COUNTY-OTHER, TRINITY | I | HONORABLE STEVEN PAGE | 936 | 642-1746 | | tcj@co.trinity.tx.us | | 594 |
| CRYSTAL SYSTEMS INC | I | ALLEN W FAIR | 903 | 881-8000 | | awfair@crystalsystemstx.com | | 637 |
| D&M WSC | I | ROBERT SHUMATE | 936 | 559-9900 | | dmwater.org@gmail.com | | 2505 |
| G M WSC | I | JERRY PICKARD | 409 | 787-2755 | | gmwater@valornet.com | | 2784 |
| HOUSTON COUNTY WCID #1 | I | THOMAS ACKER | 936 | 544-3985 | | hchd08@windstream.net | | 75 |
| IRRIGATION, HOUSTON | I | LEAH ADAMS | 903 | 690-0143 | | ladamspcgcd@att.net | | 987 |
| IRRIGATION, ORANGE | I | HONORABLE STEPHEN CARLTON | 409 | 882-7070 | | hwheeler@co.orange.tx.us | | 1049 |
| IRRIGATION, TRINITY | I | HONORABLE STEVEN PAGE | 936 | 642-1746 | | tcj@co.trinity.tx.us | | 1092 |
| JACKSONVILLE | I | DAVID BROCK | 903 | 589-3510 | | david.brock@jacksonvilletx.org | | 77 |
| LINDALE | I | CRAIG LINDHOM | 903 | 882-3422 | | craigl@lindaletx.gov | | 1213 |
| LIVESTOCK, NACOGDOCHES | I | LEAH ADAMS | 903 | 690-0143 | | ladamspcgcd@att.net | | 1394 |
| LIVESTOCK, SHELBY | I | HONORABLE ALLISON HARBISON | 936 | 598-3863 | | | | 1430 |
| LOWER NECHES VALLEY AUTHORITY | I | SCOTT HALL | 409 | 892-4011 | | scott.hall@lnva.dst.tx.us | | 86 |
| LUFKIN | I | KEITH WRIGHT | 936 | 633-0414 | | kwright@cityoflufkin.com | | 89 |
| MANUFACTURING, JASPER | I | HONORABLE MARK ALLEN | 409 | 384-2612 | | | | 1591 |
| MANUFACTURING, JEFFERSON | I | HONORABLE JEFF BRANICK | 409 | 727-2191 | | jbranick@co.jefferson.tx.us | | 1592 |
| MANUFACTURING, ORANGE | I | HONORABLE STEPHEN CARLTON | 409 | 882-7070 | | hwheeler@co.orange.tx.us | | 1631 |
| MANUFACTURING, SMITH | I | HONORABLE JOEL BAKER | 903 | 590-2600 | | jbaker@smith-county.com | | 1653 |
| MINING, ANGELINA | I | HONORABLE WES SUITER | 936 | 634-5413 | | wsuiter@angelinacounty.net | | 1728 |
| MINING, NACOGDOCHES | I | HONORABLE MIKE PERRY | 936 | 560-7755 | | cojudge@co.nacogdoches.tx.us | | 1879 |
| MINING, RUSK | I | HONORABLE JOEL HALE | 903 | 657-0302 | | joel.hale@co.rusk.tx.us | | 1903 |
| MINING, SAN AUGUSTINE | I | HONORABLE SAMYE JOHNSON | 936 | 275-2762 | | countyjudge@co.san-augustine.tx.us | | 2773 |
| MINING, SMITH | I | HONORABLE JOEL BAKER | 903 | 590-2600 | | jbaker@smith-county.com | | 5755 |
| MINING, TRINITY | I | LEAH ADAMS | 903 | 690-0143 | | ladamspcgcd@att.net | | 1926 |
| NACOGDOCHES | I | RUSSELL GRUBBS | 936 | 564-5046 | | grubbsr@ci.nacogdoches.tx.us | | 97 |
| OVERTON | I | CHARLES CUNNINGHAM | 903 | 834-3171 | | ccunningham@ci.overton.tx.us | | 2035 |
| PORT ARTHUR | I | JOHN TOMPLAIT | 409 | 983-8552 | | jtomplait@portarthur.net | | 111 |
| SABINE RIVER AUTHORITY | I | JIM BROWN | 409 | 746-2192 | | jbrown@sratx.org | | 115 |

**Appendix 9-B**
**Infrastructure Financing Report - Contact Information**

| Entity Name | Entity Planning Region | Respondent Contact Name | Area Code | Phone | Extension | Email | Comment | Entity RWP ID |
|---|---|---|---|---|---|---|---|---|
| STEAM ELECTRIC POWER, ANDERSON | I | HONORABLE ROBERT JOHNSTON | 903 | 723-7406 | | rjohnston@co.anderson.tx.us | | 2250 |
| STEAM ELECTRIC POWER, CHEROKEE | I | HONORABLE CHRIS DAVIS | 903 | 683-2324 | | cojudge@cocherokee.org | | 2259 |
| STEAM ELECTRIC POWER, JEFFERSON | I | HONORABLE JEFF BRANICK | 409 | 727-2191 | | jbranick@co.jefferson.tx.us | | 2288 |
| STEAM ELECTRIC POWER, NACOGDOCHES | I | HONORABLE MIKE PERRY | 936 | 560-7755 | | cojudge@co.nacogdoches.tx.us | | 2306 |
| STEAM ELECTRIC POWER, NEWTON | I | HONORABLE TRUMAN DOUGHARTY | 409 | 379-5691 | | truman.dougharty@co.newton.tx.us | | 2307 |
| STEAM ELECTRIC POWER, ORANGE | I | HONORABLE STEPHEN CARLTON | 409 | 882-7070 | | hwheeler@co.orange.tx.us | | 2310 |
| STEAM ELECTRIC POWER, RUSK | I | HONORABLE JOEL HALE | 903 | 657-0302 | | joel.hale@co.rusk.tx.us | | 2316 |
| THE CONSOLIDATED WSC | I | JOHNNY BABB | 936 | 544-2986 | | | | 2968 |
| TYLER | I | GREGORY MORGAN | 903 | 531-1234 | | gmorgan@tylertexas.com | | 135 |
| UPPER NECHES RIVER MUNICIPAL WATER A | I | MONTY SHANK | 903 | 876-2237 | | mdsunra@gmail.com | | 140 |
| WEST HARDIN WSC | I | THOMAS ANDERSON | 936 | 274-5011 | | | | 2434 |

# Appendix 10-A

# Media and Public Outreach

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The ETRWPG utilized various media outlets to keep the public informed of the Regional Water Planning Process in the ETRWPA. Included in this appendix is a public notice for the Grant Application submitted by the ETRWPG to the TWDB for the 4th Round of Regional Water Planning. Comments were received on the application during the ETRWPG's regular meeting on June 22, 2011. After submittal of the 2016 Initially Prepared Plan, this appendix will include copies of the following media and public outreach used to collect comments during the review process:

- Newspaper Articles
- Press Releases
- Newsletters

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# Classifieds 564-SALE

**Office Hours: Monday - Friday 8:00-5:00 • 4920 Colonial Drive • Place an ad or search classifieds at dailysentinel.com anytime!**

## REAL ESTATE

### HOMES 010

323 High Meadow St. 1726sq/ft, 2BR(large)/2BA. $139,500. Serious buyers only.936-414-0597

3230 Pearl St., 2BR/2.5BA, fireplace, carport patio & Ceramic Tile $66,500 936-569-0868.

4BR/3BA Newly Remodled Home in Center, Nice Neighborhood, pick carpert & finishing touches. $215,000 936-488-0246 or 936-598-7292

ALAMO REALTY
564-1818
3227 NORTH
www.alamonac.com

7

Beautiful 3/2, on 2 acres, 1600 sqft, $153,000, NE Nac 936-715-9055

**CARNEY REAL ESTATE**
**Sheila Carney, Broker**
**936-569-4097**

*10 Acres for $160,000
20 Acres for $320,000
NW Loop 224 Visability

* Woods Edge-4/2/2. All Appliances Included $173,500

*Brush Praire, 3/2/2, 2014SF, $98,900

* Tudor Dr.-3/2.5/4 2 LivingAreas/Double Sided WBFP. $198,000
**www.carneyrealty.com**

CHARLES POOL REAL ESTATE
"We Open Doors For You"
3505 NORTH ST.
564-2622
realestate@cpre.com
MLS

### HOMES 010

New House 3/2/2 1805 H/C 1 ac lot $154,900 936-675-4099

SIMPSON Real Estate
FARMS • HOMES
COMMERCIAL
www.lsimpson.com
936-564-6418

Wellington Point Subdivision off CR 215. Immaculate 4BR/2.5BA w/granite coun. tops & wood flrs. Multi-level wood deck. Beautifully landscaped on 1 acr. lot. 936-679-9015

### LOTS/ACREAGES 030

(2) 1.767 ac. tracts of land on W side of Nac. Street frontage, great location, country setting close to town. Priced to sell! Call today! 936-254-9727 or 936-332-4824.

40 Acres of land for sale on 343 in Lilbert. Two fresh water springs and a half mineral rights. For a month. 936-326-4789

**Barham Properties**
3 acres Carrizo Creek $24,000
**936-559-7304**

Wanted: Land from 10 to 100+ acres, in Nac & Angelina counties, prefer non-developed tracs, & access to water a plus. Local buyer & all cash sells. 936-560-3533 or send deeds/maps to PO Box 630811, Nac, 75963

### MOBILE HOMES 050

2001 Palm Harbor 25 x 46 doublewide for sale. To be moved. $29,900. 936-553-2675.

Mobile Homes for sale w/ owner financing. Low down payment. Affordable monthly payments, 3 & 2 BR's avail. Call now! 936-585-4183. Ask about 1st mo. special!

**SINGLE PARENT PROGRAM**
3 or 5 BR home in your county! 936-569-0375

## RENTALS

### FURNISHED HOUSES 130

2/1 Newer brick home near SFA. All appliances. $775 per month. Call Andrew @ 558-871

### UNFURNISHED HOUSES 140

1BR. Living room, dining room, & kitchen. $300/mo + $300 depsit. 936.564.5031

221 N Sanders 3/2, WD, CHA, $900mo+$900dep no HUD, no pets. 936-554-8319

2BR/2BA 3020 Lilac CHA, Nice, big yard, no HUD $725/mo + $500 dep + 1 yr. lease 936-560-2497

2BR/2BA Brick, 2 Car Garage, No HUD. Fenced Yard, @ 3835 Old Tyler Rd. $1,100mo+$600dep 936-554-8489

3/2 New home 5426E. Main. $1,100/mo+dep 936-462-3127

3BR/2BA CHA, appl. $850mo, ref req. 936-554-6715 or 936-554-3269

4021 East Starr 2 or 3Br 1/BA Covered Garage, WD, Nice Yard $750/mo & $750 Deposit Call: 936-554-7766

BARHAM PROPERTIES
LAKE CHEROKEE, TEXAS
REAL ESTATE
936-559-7304

- 205 W. California Near SFA 3/2 Newley remodeled $1,200/mo. Available May 1st
- 712 Townsend 3b/2ba $700.00/mo
- CR 8231 3/2 Mobile Home $650/mo.
- 226 Muller #8 2/1.5 $650/mo
- 460 CR 2031 3/2/2on 1 acre $900.00/mo.

### UNFURNISHED HOUSES 140

Sm. Log Cabin. All electric. W/D, Stove, Refrig., DW. 15 min from Cacul Electic Plant. Nat Area. No smoking, No pets, No HUD. $400 deposit + $400/mo. 936-569-9701

Small 2BR on FM 1275. No smoking & no pets. CHA $500/mo. + deposit. 936-552-7886

### WANT TO RENT 150

Want to rent 10-40 Acres w/house and some pasture. 580-876-3505

### CONDOS/TOWNHOMES 160

2/1.5 Condo W/D, Exc Cond. $550, Ref Req, 936-569-7276

3230 Pearl St., 2BR/2.5BA, fireplace, ceramic tile, full size W/D, water paid, carport. patio. $725 mo. + $725 dep. 936-569-0868.

Nice 2BR in University Park, Appl, WBFP, $650/dep/lease 564-9609

NICE 2BR/2BA. Appl, FP. $685-$750 mo. No HUD 903-690-9271

### UNFURNISHED APARTMENTS 180

★★★★
1 BR
$479
2 BR
$579
WALK TO SFA
2POOLS
FITNESS CTR.
PETS WELCOME
NO ELEC. DEP.
UNIVERSITY CLUB
936-569-9413
★★★★

**1-2-3 Bedroom**
***Great* Value**
**Call Now**
**936-569-9414**

1222 Raguet St. Lg. 1BR Apartments. Hardwood Floors & walking distance to SFA. CHA & Applia. 936-559-3475

### UNFURNISHED APARTMENTS 180

1BR/1BA 600sqft two story loft Duplex Apt New Construction, Dome Shaped Arch., Secluded Street in town, Energy Efficient, W/D Hook Ups, No Pets $575/Mo. $575/Deposit 1 Year Lease. 333 Mackechney Street 936-552-1197

2 BRs - Patio Style Ground Level Units
*Dogwood Village*
5109 Northway Dr.
Call 936-371-3349

2BR/1BA Four-Plex @ 120 W California. CHA, Appl, carpet & tile. $475mo + utilities + $375dep 936-569-0269

*Arbor Pines*
*Come lease with us*
2 BR/2B
For Only $509/Mo!
Ask About
Our Spring Special
*Arbor Pines Apartments*
936-564-5070

Banita Creek Properties
*Banita Creek Apartments
Walk to campus
1, 2, Bedroom
Ponderosa Pines Town Homes
2BR/2.5 BA
Covered parking
Residential area off University DR
936-560-4768

**CAMBRIDGE COURT**
Affordable, Squeaky Clean apts. Off North loop close to Wal-Mart/Medical Center.
1 & 2 BR Apartments
5222 Northway
936-569-6026

***Capri Apartments***
1 Bedroom
*Newly remodeled.
*Washeteria.
**936-564-8266**

**COUNTRY GARDEN**
APTS -No Pets.
Hwy. 59 (Appleby).
1 & 2 BR apts, $350-$450 plus elec. Call 615-1688

★★★★★★
2BR
$519

### UNFURNISHED APARTMENTS 180

**Nacogdoches Senior Village Apartments Vacancies, Taking Applications**
**936-462-8688**

**WHISPER OAKS**
Spacious Apartments
1 & 2BR Apts
Full-size W/D
4721 University Dr.
**936-560-2080**

### MOBILE HOME RENTALS 210

2BD/2BA in Southside location. Storage Bldg. CHA. Water Pd. No Pets. References Req. $500mo+dep. 936-564-2212 after 4pm

### MOBILE HOME LOTS 220

Lake Nacogdoches RV Park
Electric,Water,Septic, Wireless WiFi
$350.00/month Includes Dry Storage Area - Call Phil at 936-645-8695 or Chris at 936-371-1949

Secluded space on large tract in Douglass. $300/mo. Ref. Required 936-556-2862

**Spring Special**
**We will pay your mobile home moving cost to move into our park!**
**Call 936-585-4183**

### TIMESHARE/VACATION 223

Lake Nacogdoches Vacation Rental
400+ ft. of waterfront
3300 sq ft house
3+ Acres Week or Weekend Rentals Call (936) 569-4310

### COMMERCIAL PROPERTY 230

3200 sqft warehouse w/ office, water & alarm is pd, near downtown area, $1000 mo. 936-564-0308

### OFFICE SPACE 240

**1100 sq.ft. approx. Professional Office Space**, great location, ample parking. Available now. Rent below market . **560-2222 ext. 1110**

1800 Sq Ft Office Space 1407 North University Drive 936-564-2307

### OFFICE SPACE 240

5 Offices for Lease. Utilites included. Conference room. Internet and network available.$550 per office. Call (936) 569-4310.

**OFFICE BLDGS FOR LEASE**

1000 sq. ft.
212 South Street

1500 sq. ft.
111 W. Pilar Street

Smart-wired. Next to county courthouse.

**936-564-2333**

### STORAGE FACILITIES 260

**10:10 Storage units for rent in Douglass area. $35 mo. 936-564-9076**

Action Storage. Cardinal St., near SFA Liebrum Realty.564-8180

## ANNOUNCEMENTS

### LEGAL NOTICES 270

NOTICE OF PUBLIC MEETING
REGIONAL WATER PLANNING

Notice is hereby given that the East Texas Regional Water Planning Group (Region I) is seeking input from the public on the scope of planning activities to be considered during the Fourth Cycle of Regional Water Planning.

Input will be received at a Public Meeting, which will be conducted in conjunction with the upcoming regular Region I Planning Group Meeting, to be held at the Nacogdoches Recreation Center, 1112 North Street, Nacogdoches, TX 75961 on June 22, 2011 at 10:00 a.m. Written and oral comments (not to exceed five (5) minutes per speaker) regarding the scope of activities to be considered during the Fourth Cycle of Regional Water Planning will be accepted at this meeting. Written comments will also be accepted through June 22, 2011 and may be emailed to rhunt@apaienv.com or mailed to the address below:

Rex H. Hunt, P.E.
Alan Plummer Associates, Inc.
6300 LaCalma, Suite 400
Austin, Texas 78752

The East Texas Regional Water Planning Group (Region I) includes all or part of the following counties: Anderson, Angelina, Cherokee, Hardin, Henderson, Houston, Jasper, Jefferson, Nacogdoches, Newton, Orange, Panola, Polk, Rusk, Sabine, San Augustine, Shelby, Smith, Trinity and Tyler counties.

For additional information, please contact Lila Fuller, Region I Administrative Contact, c/o City of Nacogdoches, P.O. Box 635030, Nacogdoches, TX 75963-5030 936-559-2504 or email to lfuller@ci.nacogdoches.tx.us

Tri-County Community Action in Center, Texas is seeking a Fiscal Consultant who can provide o A comprehensive assessment of the agency's Finance Department in preparation for an annual audit

Please contact Lenola Wyatt-Tutt, CEO at 936-598-6315 ext. 17 or lenolatutt@sbcglobal.net or visit our website at www.tricountycommunity-action.com

Proposals must be received by Tri-County Community Action no later than Friday, April 15, 2011, by 4:30 p.m

NOTICE TO PUBLIC
REGIONAL WATER PLANNING

Notice is hereby given that the City of Nacogdoches will submit by April 8, 2011 a grant application for financial assistance to the Texas Water Development Board (TWDB) on behalf of Region I, to carry out planning activities to develop the 2016 Region I Regional Water Plan as part of the state's Fourth Cycle (2012 – 2016) of Regional Water Planning. It is anticipated that the application will be considered by the Texas Water Development Board at its June 22, 2011 meeting.

The East Texas Regional Water Planning Group (Region I) includes all or part of the following counties: Anderson, Angelina, Cherokee, Hardin, Henderson, Houston, Jasper, Jefferson, Nacogdoches, Newton, Orange, Panola, Polk, Rusk, Sabine, San Augustine, Shelby, Smith, Trinity and Tyler counties.

Copies of the grant application may be obtained from City of Nacogdoches when it becomes available or online at www.etexwaterplan.org. Written comments from the public regarding the grant application must be submitted to the East Texas Regional Water Planning Group and TWDB prior to TWDB Board action on this application (date stated above). Comments may be submitted to any of the following:

Rex Hunt, P.E.
Consulting Engineer for Region I
Alan Plummer Associates, Inc.
6300 La Calma, Suite 400
Austin, TX 78752
Email: rhunt@apaienv.com

Executive Administrator
Texas Water Developmetn Board
P.O. Box 13231
Austin, Texas 78711-3231

Lila Fuller
City Secretary
City of Nacogdoches
P.O. Box 635030
Nacogdoches, TX 75963

For additional information, please contact Lila Fuller, Region I Administrative Contact, c/o City of Nacogdoches, P.O. Box 635030, Nacogdoches, TX 75963-5030
936-559-2504 or email to lfuller@ci.nacogdoches.tx.us

### LOST & FOUND 290

Found male black lab. on 3/30. Call to identify. 936.556.8414

Lost Male Miniature Schnauzer. Last seen 3/17 @ CR 823. Reward-- No questions asked. 936-645-2486

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# NOTICE OF PUBLIC HEARING FOR THE EAST TEXAS REGIONAL WATER PLANNING GROUP 2016 INITIALLY PREPARED REGIONAL WATER PLAN

Notice is hereby given that the East Texas Regional Water Planning Group (ETRWPG) is taking comment on and holding a public hearing for the East Texas Regional Water Planning Area (ETRWPA) 2016 Initially Prepared Plan (IPP). The public hearing for the IPP will include a public comment period and will be held at **5:30 p.m.** as follows:

**Thursday, June 25, 2015** – Nacogdoches County Courthouse Annex,
203 W. Main, **Nacogdoches, TX**

The ETRWPG was established under provisions of Texas Senate Bill 1 (7th Texas Legislature) to develop a regional water plan for the ETRWPA which includes the following counties: Angelina, Anderson, Cherokee, Hardin, Henderson, Houston, Jasper, Jefferson, Nacogdoches, Newton, Orange, Panola, Polk, Rusk, Sabine, San Augustine, Shelby, Smith, Trinity, and Tyler.

**Copies of the IPP are available for review at the following County Clerk offices:**

Angelina County, 215 E. Lufkin Avenue, 1st Floor, Lufkin, TX 75901
Anderson County, 500 N. Church Street # 10, Palestine, TX 75801
Cherokee County Clerk, 135 S. Main Street, Rusk, TX 75785
Hardin County, 300 W. Monroe, Kountze, TX 77625
Henderson County, 125 N. Prairieville Street, # 101, Athens, TX 75751
Houston County, 401 E. Houston, 1st Floor Crockett, TX 75835
Jasper County, 121 N. Austin, # 202, Jasper, TX 75951
Jefferson County, 1001 Pearl Street, # 203, Beaumont, TX 77701
Nacogdoches County, 101 W. Main Street, Ste # 110, Nacogdoches, TX 75961
Newton County, 115 Court Street, Newton, TX 75966
Orange County, 801 W. Division Street, Orange, TX 77630
Panola County, 110 S. Sycamore Street #201, Carthage, TX 75633
Polk County, 101 W. Church Street, #100, Livingston, TX 77351
Rusk County, 115 N. Main Street, #206, Henderson, TX 75652
Sabine County, 280 W. Main Street, Hemphill, TX 75948
San Augustine County, 223 N. Harrison, San Augustine, TX 75972
Shelby County, 124 Austin Street, Center, TX 75935
Smith County, 200 E. Ferguson, Suite 300, Tyler, TX 75702
Trinity County, 223 W. First Street, Groveton, TX 75845
Tyler County, 116 S. Charlton, Woodville, TX 75979

**Copies of the IPP are also available for review at the following public libraries:**

Kurth Memorial Library, 706 S. Raguet, Lufkin, TX 75904
Palestine Public Library, 2000 S. Loop 256, Ste # 42 Palestine TX 75801
Singleton Memorial Library, 207 E. 6th Street, Rusk, TX 75785
Kountze Public Library, 800 Redwood, Kountze, TX 77625
Henderson County Library - Clint W. Murchison Memorial Library, 121 S. Prairieville St, Athens, TX 75751
J.H. Wooters Crockett Public Library, 709 E. Houston, Crockett, TX 75835
Jasper Public Library, 175 E Water Street, Jasper, TX 75951
Beaumont Public Library, 801 Pearl Street, Beaumont, TX 77701
Nacogdoches Public Library, 1112 North Street, Nacogdoches, TX 75961
Newton County Library, 212 High Street, Newton, TX 75966
Orange Public Library, 220 N. 5th St, Orange, TX 77630
Sammy Brown Public Library, 319 S. Market St, Carthage, TX 75633
Livingston Municipal Library, 707 N. Tyler Avenue, Livingston, TX 77351
Rusk County Library, 106 E. Main St, Henderson, TX 75652
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Copies of the IPP are available for review at the Texas Water Development Website at http://www.twdb.texas.gov/waterplanning/rwp/plans/2016/IPP.asp; on the East Texas Regional Water Planning Group website at www.etexwaterplan.org, and at the City of Nacogdoches, Office of the City Secretary, 202 E. Pilar Street, Room 315, Nacogdoches, TX 75961. Written and oral comments will be accepted at the public hearing. The ETRWPG will also accept written comments from the date of this notice through August 24, 2015 and may be emailed or mailed to the address below:

## QUESTIONS AND COMMENTS MAY BE SUBMITTED TO:

Rex H. Hunt, P.E. • Alan Plummer Associates, Inc. • 6300 La Calma, Suite 400 • Austin, Texas 78752
Phone: 512.452.5905 or rhunt@apaienv.com

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Lita Gonzalez
General Counsel
Comptroller of Public Accounts
Filed: February 25, 2015

♦ ♦ ♦

## Office of the Consumer Credit Commissioner

### Notice of Rate Ceilings

The Consumer Credit Commissioner of Texas has ascertained the following rate ceilings by use of the formulas and methods described in §§303.003, 303.005, 303.008, 303.009, 304.003, and 346.101, Texas Finance Code.

The weekly ceiling as prescribed by §303.003 and §303.009 for the period of 03/02/15 - 03/08/15 is 18% for Consumer[1]/Agricultural/Commercial[2] credit through $250,000.

The weekly ceiling as prescribed by §303.003 and §303.009 for the period of 03/02/15 - 03/08/15 is 18% for Commercial over $250,000.

The monthly ceiling as prescribed by §303.005 and §303.009[3] for the period of 02/01/15 - 02/28/15 is 18% for Consumer/Agricultural/Commercial credit through $250,000.

The monthly ceiling as prescribed by §303.005 and §303.009 for the period of 02/01/15 - 02/28/15 is 18% for Commercial over $250,000.

The standard quarterly rate as prescribed by §303.008 and §303.009 for the period of 04/01/15 - 06/30/15 is 18% for Consumer/Agricultural/Commercial credit through $250,000.

The standard quarterly rate as prescribed by §303.008 and §303.009 for the period of 04/01/15 - 06/30/15 is 18% for Commercial over $250,000.

The retail credit card quarterly rate as prescribed by §303.009[1] for the period of 04/01/15 - 06/30/15 is 18% for Consumer/Agricultural/Commercial credit through $250,000.

The lender credit card quarterly rate as prescribed by §346.101, Texas Finance Code[1] for the period of 04/01/15 - 06/30/15 is 18% for Consumer/Agricultural/Commercial credit through $250,000.

The standard annual rate as prescribed by §303.008 and §303.009[4] for the period of 04/01/15 - 06/30/15 is 18% for Consumer/Agricultural/Commercial credit through $250,000.

The standard annual rate as prescribed by §303.008 and §303.009 for the period of 04/01/15 - 06/30/15 is 18% for Commercial over $250,000.

The retail credit card annual rate as prescribed by §303.009[1] for the period of 04/01/15 - 06/30/15 is 18% for Consumer/Agricultural/Commercial credit through $250,000.

The judgment ceiling as prescribed by §304.003 for the period of 03/01/15 - 03/31/15 is 5.00% for Consumer/Agricultural/Commercial credit through $250,000.

The judgment ceiling as prescribed §304.003 for the period of 03/01/15 - 03/31/15 is 5.00% for Commercial over $250,000.

[1] Credit for personal, family or household use.

[2] Credit for business, commercial, investment or other similar purpose.

[3] For variable rate commercial transactions only.

[4] Only for open-end credit as defined in §301.002(14), Texas Finance Code.

TRD-201500633
Leslie L. Pettijohn
Commissioner
Office of Consumer Credit Commissioner
Filed: February 24, 2015

♦ ♦ ♦

## East Texas Regional Water Planning Group (Region I)

### City of Nacogdoches Notice of Application 5th Cycle Regional Water Planning

Notice is hereby given that the City of Nacogdoches will submit by 12:00 p.m. March 3, 2015, a grant application for financial assistance to the Texas Water Development Board (TWDB) on behalf of Region I, to carry out planning activities to develop the 2021 (Region I) East Texas Regional Water Plan as part of the state's Fifth Cycle (2017-2021) of Regional Water Planning.

The East Texas Regional Water Planning Group (Region I) includes the following counties: Anderson, Angelina, Cherokee, Hardin, Henderson, Houston, Jasper, Jefferson, Nacogdoches, Newton, Orange, Panola, Polk, Rusk, Sabine, San Augustine, Shelby, Smith, Trinity and Tyler counties.

Notice is hereby given that written comments from the public regarding the grant application must be submitted to City of Nacogdoches and TWDB by no later than April 6, 2015. Copies of the grant application may be obtained from City of Nacogdoches or online at *www.etexwaterplan.org*. Comments can be submitted to the City of Nacogdoches and the TWDB as follows:

**Lila Fuller, Administrative Agent for Region I**

City of Nacogdoches

202 E. Pilar, RM 315

Nacogdoches TX 75961

**Kevin Patteson, Executive Administrator**

Texas Water Development Board

P.O. Box 13231

Austin TX 78711-3231

For additional information, please contact Region I c/o Lila Fuller, City of Nacogdoches, 202 E Pilar, RM 315, Nacogdoches TX 75961, (936) 559-2504, lfuller@ci.nacogdoches.tx.us, *or* David Carter, Texas Water Development Board, P.O. Box 13231, Austin, Texas 78711, (512) 463-7847.

TRD-201500562
Lila Fuller
Administrative Agent
East Texas Regional Water Planning Group (Region I)
Filed: February 20, 2015

♦ ♦ ♦

## Texas Commission on Environmental Quality

### Agreed Orders

The Texas Commission on Environmental Quality (TCEQ, agency or commission) staff is providing an opportunity for written public comment on the listed Agreed Orders (AOs) in accordance with Texas Water Code (TWC), §7.075. TWC, §7.075 requires that before the commission may approve the AOs, the commission shall allow the public an opportunity to submit written comments on the proposed AOs.

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**NOTICE OF PUBLIC HEARING FOR THE EAST TEXAS REGIONAL WATER PLANNING GROUP 2016 INITIALLY PREPARED REGIONAL WATER PLAN**

Notice is hereby given that the East Texas Regional Water Planning Group (ETRWPG) is taking comment on and holding a public hearing for the East Texas Regional Water Planning Area (ETRWPA) 2016 Initially Prepared Plan (IPP). The public hearing for the IPP will include a public comment period and will be held at 5:30 p.m. as follows:

**Thursday, June 25, 2015 – Nacogdoches County Courthouse Annex, 203 W. Main, Nacogdoches, TX**

The ETRWPG was established under provisions of Texas Senate Bill 1 (7th Texas Legislature) to develop a regional water plan for the ETRWPA which includes the following counties: Angelina, Anderson, Cherokee, Hardin, Henderson, Houston, Jasper, Jefferson, Nacogdoches, Newton, Orange, Panola, Polk, Rusk, Sabine, San Augustine, Shelby, Smith, Trinity, and Tyler.

**Copies of the IPP are available for review at the following County Clerk offices:**
Angelina County, 215 E. Lufkin Avenue, 1st Floor, Lufkin, TX 75901
Anderson County, 500 N. Church Street # 10, Palestine, TX 75801
Cherokee County Clerk, 135 S. Main Street, Rusk, TX 75785
Hardin County, 300 W. Monroe, Kountze, TX 77625
Henderson County, 125 N. Prairieville Street, # 101, Athens, TX 75751
Houston County, 401 E. Houston, 1st Floor Crockett, TX 75835
Jasper County, 121 N. Austin, # 202, Jasper, TX 75951
Jefferson County, 1001 Pearl Street, # 203, Beaumont, TX 77701
Nacogdoches County, 101 W. Main Street, Ste # 110, Nacogdoches, TX 75961
Newton County, 115 Court Street, Newton, TX 75966
Orange County, 801 W. Division Street, Orange, TX 77630
Panola County, 110 S. Sycamore Street #201, Carthage, TX 75633
Polk County, 101 W. Church Street, #100, Livingston, TX 77351
Rusk County, 115 N. Main Street, #206, Henderson, TX 75652
Sabine County, 280 W. Main Street, Hemphill, TX 75948
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Alan Plummer Associates, Inc.
6300 La Calma, Suite 400
Austin, Texas 78752

Phone: 512.452.5905 or rhunt@apaienv.com

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The Daily Sentinel

# Classified

Call to Place Your AD Monday – Friday 8am – 5pm

936-564-SALE

logon to dailysentinel.com

Fax 936-560-4267

Email classifieds@dailysentinel.com

**Deadlines:**

Tuesday – Friday .....2:30 p.m. Day Prior

Saturday .....12:00 p.m. Friday

Sunday .....2:30 p.m. Friday

Monday .....3:30 p.m. Friday

call 936-558-3217 for details on display and legal advertising

**Pet Ads** Starting at $11.24 a day for 3 days

**Real Estate Ads** Starting at $33.40 for 3 lines • for 30 days

**Vehicle Ads** Starting at $27.00 for 2 months

**Merchandise Ads** Starting at $19.00 for 28 days



## REAL ESTATE

### HOMES 010

*5 Unit 2BR 1BA Apt. 1702 E. Main. $30K. *418 Hasley.Barn w/lot $16,500 936-564-9808

***DUPLEX FOR SALE***
1105 Lock St. Spacious 2BR 1BA &1BR 1BA. Residential Setting on Lg. Lot. HW Floors. **Excellent Cash Flow!** Must See to Appreciate! $68,500. 936-554-5569

**NEW!**
3-4 Bedrooms, 2 full baths. Attractive kitchen! Spacious living room. Open floor plans! Systems Built custom homes. Your choice of locations. Call for details or directions (903) 331-0981

3901 Old Lufkin Rd 3BR 1BA Frame home w/sun room. On 2ac. Recently Renovated. 1300sq ft. $77,200 936-560-3871

ALAMO REALTY
564-1818
3227 NORTH
www.alamonac.com

615 E Parker Rd.3BR 2BA, 2 car garage on quiet 3/4 acre lot. Open floor plan. 936-371-3589

Choice Realty
**936-564-3800**
**nacogdochesrealty.com**

CHARLES POOL REAL ESTATE
"We Open Doors For You"
3505 NORTH ST.
564-2622

**CHISD 4/2 on 2acs. 1mi from school. Above ground pool. Comes w/ Large upgraded portable building. A MUST SEE for families! $150K. 936-645-4181**

FSBO 3BR 2BA w/17 acres in Chireno ISD. Workshop, carport& storage $145K 936-288-0295

University Club APARTMENTS
**2BR's** STARTING AT **$599** PER MONTH
- $99 Deposit Special
- FREE Cable & HBO
- FREE Internet Service
- 1BR, 2BR, 3BR & Townhomes
- Completely Remodeled Units*

*Select units

**OPEN HOUSE**
**SUNDAY, MARCH 8TH 1-3PM**

**430 Blue Lake in Central Heights**
Newconstruction,4Bedroom2.5Bath,2800sqft.,76acre
**MLS 2140549A $309,900**
**DIRECTIONS:** From Nacogdoches - go out Hwy 259, Turn left at FM 698 West (just before school),1st left onto CR 826 which leads into subdivision. Stay right, home on right.
Tim Brookshire Realtor 675-2719 AMERICAN REAL ESTATE
www.facebook.com/TimBrookshireRealtor

### HOMES 010

FOR SALE BY OWNER 3BR 2BA HOME IN GARRISON ISD - Over 2000 s.f. home on over 2.8 acres, spring fed pond, huge metal shop, large bedrooms, open living/dining area, sunroom located off master. Home is located 1 minute from the school and right off of Highway 59. $162,500 Please call for appointment. 936-569-4751

FSBO: 3BR 2.5BA on 11ac in the Appleby area. Workshop and shed. Call for more information 936-564-8298

FSBO: 3BR 3BA Frame Home on 6.2 Fenced acs. 2 Barns & pens. WISD. 936-564-2834

FSBO: NE Nac. 4BR 2BA, 2car gar. WBFP,1900sq.ft $145K. 3520 Pebble Creek 936-564-6951 615-7250

★★★★★
**SHEILA CARNEY**
**REAL ESTATE BROKER "Best of Nacogdoches" Awards-2004 & 2006 An MLS Top Producer**
**569-0193**
**Visit our WEB PAGE www.carneyrealty.com**
★★★★★

**MIKE LIEBRUM REALTY**
**936-564-8180**
**Visit us online at:** nacogdochesrealestate.com

CIMARRON
Subdivision in CHISD 936-564-8180

TO BE MOVED: 3BR 2BA home inMartinsville Area $3,500 Call 936-552-4043 Between 5pm & 8pm

**WE BUY HOUSES, MOBILE HOMES, AND/OR LAND. We will make you an offer for your property in Nacogdoches, Shelby and Panola Counties. We are NOT brokers we are investors. Southern Timberland Advisors, LLC. 832-594-4232**

SIMPSON Real Estate
FARMS • HOMES
COMMERCIAL
**www.lsimpson.com**
**936-564-6418**

Northeast Hills APARTMENTS
**NOW LEASING**
1 Bedrooms starting at $430/month.
Quiet Location with pool on site.
Pets Ok.
Northeasthills.net
**936-564-4120**

### LOTS/ACREAGES 030

Beautiful wooded lot in Central Heights. 1.86 acres.936-615-0350

LAKE ACRES ADDITION 3 Contiguous lots with Lake View! Near boat ramp. Corner of Cash @ Cartwright San Augustine Tx 555K 281-748-3673

**One 4ac. lot in CHISD. Utilities Avail. For more info call 936-645-0360**

### MOBILE HOMES 050

1998 Patriot 24x76 DW 20x12 Front Deck. Fireplace. Remodeled inside. 5BR 2BA. 578K By Appt. only 936-552-1767

**BARGAIN PRICES**
Fairfield Affordable Homes. 100's of floor plans. Your choice of locations. (903) 331-0977

### FARMS/RANCHES 055

**Timpson, Tx**
35.5 Wooded acs +/- w/Lg. pond & Nice 3BR 2BA MH. Would make a good weekend place. $195,000
**Double TT Realty 936-254-3369**

### COMMERCIAL REAL ESTATE 070

Commercial Space For Lease
623 North Street in Nacogdoches. Approx 800 sq. Feet, $850/mo $600/dep. 936-635-0856 or 936-676-2473

## RENTALS

### UNFURNISHED HOUSES 140

*VERY NICE 2BR Fenced yard. No Smokers/HUD $725mo 936-569-6363

**1218 & 1210 Spring Valley Dr. $950mo to $1050mo. 936-558-3508**

1918 South Fredonia. 3BR 1BA. W/D, $650mo, $650dep 936-554-7766

1BR 1BA New 600sqft 2story loft Wood Floors Secluded/Energy Eff. W/D conn. No Pets 333 Mackechney $525Mo $525Dep 936-552-1197

1BR 1BA. 217 South Church. Caddo Reserve. $375MO. 1st monthrent & deposit in advance. 936-559-7304

2BR 1BA brick. Appli. included, W&D. Lawn care$520+Dep. 936-569-0777 leave msg.

2BR 1BA, Porches, Carport, 259N 6 miles out $695/mo, $600 dep. Applia. 936-569-6347

2BR 1BA. Stove & Fridge , W&D incl. Walk to SFA. NO Pets. 214 Blount St. 936-564-5508

2BR 1BA. W&D. $525mo + Dep. Yard care paid. 936-645-5434

3 bedroom unfurnished home In Appleby area References. 936-569-7618 Available 3/8/15

3/2 with carport & Shop. Newly Remodeled. CH/A. On Dead end street. 307 Pitman. NO HUD $950mo 936-556-0546 569-7328

3/2/2. 3812 Appleby Sand Very Clean $1,250mo No HUD. 512-413-2067

3723 FM 1878. 3BR 1BA. W/D, $650mo, $650dep 936-554-7766

3BR 1BA 525 E Hospital, CHA, Appl., W/D hookups, $900mo+D.936-553-1858

3BR 1BA CHA. By Central Heights School. $800mo. + Dep. 936-569-0377

3BR 1BA in Garrison $650mo + $400dep. 936-615-8582

### UNFURNISHED HOUSES 140

3BR 1BA Sm. fenced back yard. $800mo+$400dep. Plus Water & Elec. 936-564-5338 564-6099

3BR 2BA Brick Home CH/A, Appliances. Good Neighborhood. $850mo+Dep. 936-554-3269

3BR 2BA Brick, 2car garage.CHA. Fenced back yard. Good location. Call Burl at 936-560-1448

3BR 2BA Home on Lake Nac. $1,600mo, No pets 936-564-2411

3BR 2BA Lg. Fenced back yard. $900mo. NO HUD 936-615-0350 564-8180

4BR 2BA Garrison. $750mo + $500dep. 936-615-8582

821 Oakview 3BR 2BA Double garage. W&D. $1200mo. NO HUD 936-569-0742or554-1899

Available Now. Lg 4BR 3BA. CHA & Appli. 936-615-7060

**Barham Properties:** Apartments/ Homes for Rent from $450-$1,200. Call for more information. **View Rentals Barhamproperties.com (936)559-7304**

CHISD 3BR1BA. Hwy 259 CH/A. Pasture/Barn Avail.$835mo +$835dep 936-564-6973

Country Living in town. 1BR Duplex. 3118 Liles $550mo 936-560-2497

Secluded 3BR 2BA on 7ac w/gated entrance. Hardwood floors. CHA. Live in the country in town. Ref's, No HUD. $1,295mo Avail. Feb. 1st 936-564-8630

### CONDOS/TOWNHOMES 160

2/1.5 Attractive Condo w/ W/D. $565mo. NO HUD Refs. Req. 936-569-7276

2/2/2 on Post Oak. Call Craig at 936-554-4234

2BR 1.5BA 2-Story Condo. In great family neighborhood at Woodland Hills Golf Course. $600mo, $600dep. No HUD, 936-552-1101

2BR Duplex on N.side w/ 2 car Carport. Water pd. & Yard Kept. No HUD Call for details 936-569-3266

3/2/2 on Post Oak. Call Craig at 936-554-4234

**Banita Creek Mgt. Ponderosa Pines Town Homes**
2BR 2.5BA
Covered parking
In the Tangelwood Residential area off University DR
*$750mo with 1yr. lease*
**936-560-4768**

Nice Townhome in University Park, appli.wbfp. 936-564-9609 569-3576

Oak Trace Condo 2BR 2.5BA Houston St. $750mo + $750dep 936-371-1883

### UNFURNISHED APARTMENTS 180

1 & 2 Bedroom available w/WD, close to SFA 936-564-5180

1/1 Close to SFA. CHA. $390mo.Heat& Water pd. Laundry 936-569-7276

1BR 1BA Duplex near SFA New Appli. Completely remodeled. W&D hookup Garage. $450mo +$350dep 936-569-0269

**1BR 1BA,NEAR SFA.All bills pd.$575mo+Dep. No pets, 936-556-2684**

1BR Duplex. Applia, Good Area. Ref's. Req. $350mo 936-554-3269

1BR Nice quiet country setting,Water, trash & tv pd. CH/A $450mo 936-569-7402

2BR 1BA 4plex. Near Sfa 1,050sq.ft. New paint. Appli., W&D Conn. Garage $500mo+$375dep 936-569-0269

**Anna Raguet Apts. 901 Raguet**
(2 blocks South of SFA)
★★★★★★★★★
Large 1BR's
Pool & Washeteria
Newly re-modeled
All bills pd. No Pets
★★★★★★★★★
936-564-8266
936-554-6346

### UNFURNISHED APARTMENTS 180

**Austin Place Apts.**
3220 North Street
Nacogdoches,Tx 75961
**Check out our new move in specials!**
1 BR's starting @ $600
2 BR's starting @ $750
**FREE** Electric, water and cable.
**Call 936-559-9180**

★★★★★★★★★★
**Banita Creek Mgt. Banita Creek Apartments**
1BR 1BA @ $525/mo
2 BR 2BA $675/Mo with1yr lease.
2 blocks from SFA
327 W. College
**936-560-4768**
★★★★★★★★★★

***Capri Apartments***
**4401 North St**
Next to Hobby Lobby
Great Location
★★★★★★★★
Large 1 Bedroom's
On site Washeteria.
Gas & Water pd.
★★★★★★★★
936-564-8266
936-554-6346

**DOGWOOD VILLAGE APARTMENTS**
Patio Style Ground Floor
2Bed 1Bath
936-553-2044
www.dogwoodvillapts.com

Efficiency Apt. Close to Town. $295mo 936-564-1588

Historical Luxury Loft. Dtwn Nac. 2BR 1BA. $1200mo 936-371-9101

Lease Takeover! Woods of SFA Nacogdoches, Texas. 3BR 3.5BA Duplex. 2 car garage and fenced backyard. Utility room with washer and dryer. $485 per bedroom each month. Can negotiate. 936-645-0412

**MOVE-IN Special**
Look no further for your place to call Home! Exceptionally Spacious 1BR & 2BR Townhomes
**STONE FORT APTS**
Rent starting at $400
936-564-0629
133 Old Line Dr

**Northview Condos**
**1BR 1BA**
Starting@ $595mo
**2BR 2BA Remodeled Flats** Starting @ $679mo
**2BR 2BA Townhouse** Starting @$665mo
**Includes**: *Water/Trash & W/D Hookups*
On North St Between SFA & Wal-Mart
$15 application fee
**CALL NOW!!**
**936-250-2667**

**WHISPER OAKS**
Spacious Apartments
1 & 2BR Apts
Starting at $575 & $675
Full-size W/D
4721 University Dr.
**936-560-2080**

### MOBILE HOME RENTALS 210

1.5BR 1BA. W&D Douglass area Call White Fence Ind. 936-564-9076.

2BR 1BA, Off 343 $500mo+$300dep. No pets. 936-569-9339

3BR 2BA at Village RV Park 11945 N Hwy 59. All electric. Water pd. $800 mo+$400dep. Great for SFA Students! Hud Ok 936-564-5338 564-6099

3BR 2BA In Douglass Call White Fence Ind. 936-564-9076.

3BR/2BA W/D . $500mo, $500dep. 915 Ridgewood 936-552-4264

New MH Park in CHISD. 5 very nice MH's on 25 acs. New covered decks, Lg. yards. All tenants will be screened 3/2 & 2/2 avail. $650mo +$500dep. 936-585-3431

**Nice 3BR 2BA Dblwide Home in Small Community in Timpson. $650mo. $650dep NO SMOKING! Tile Floors, Stove, Frig, DW, Microwave. City Utilities. Contact: Ms. Joey 281-827-2009**

### COMMERCIAL PROPERTY 230

1302 North Street. Formerly Fish Place. Retail or Restaurant. Avail. Now 936-552-1101

### OFFICE SPACE 240

***805 SE Stalling. Loop frontage$700mo Busy Location. 936-560-2497**

2 office's for lease. 800sq.ft. ea. 4room & 3room. $0.77 per Sq. ft. 1329 N. University Dr. 936-564-2307

3600 sqft bldg for lease Office or Retail .1336 N Univ. Dr. 936-564-2307

Commercial Office Spaces. Overlook Dtwn Nac. Internet provided. 203 E. Main. Call for appt. 936-462-3679

Dtwn Hist. Office-1400 sq.ft. 104 Pecan**Newly remoldeled.** $1100mo 936-371-9101

Office Space. 403 E Hospital St. 1,200+ sq.ft. $1000MO, $1000Dep. 936-554-4922 554-6034

### STORAGE FACILITIES 260

10x10 Storage units for rent in Douglass area. $35/mo. 936-564-9076

Action Storage. Cardinal St., near SFA Liebrum Realty,564-8180

## ANNOUNCEMENTS

### LEGAL NOTICES 270

NOTICE TO CREDITORS

Notice is hereby given that original Letters Testamentary for the Estate of Jenarie J. Alexander, Deceased were issued on February 25, 2015, in Cause No. PB1S-12323, pending in the County Court of Nacogdoches County, Texas, to: Christina Sue Center, Jonathan Merritt Alexander, Jr. and Lucy Helen Kuntz.

Claims may be presented in care of the attorney for the estate, addressed as follows:

Representatives, Estate of Jenarie J. Alexander, Deceased

c/o: W. Wade Flasowski Fairchild, Price, Haley & Smith, L.L.P.
P.O. Drawer 631668
Nacogdoches, Texas 75963

All persons having claims against this Estate which is currently being administered are required to present them to the undersigned within the time and in the manner prescribed by law.

DATED the 25th day of February, 2015

W. WADE FLASOWSKI, TBA#24055482
FAIRCHILD, PRICE, HALEY & SMITH, L.L.P.
P. O. Drawer 631668
Nacogdoches, Texas 75963-1668
(936)569-2327
FAX: (936)569-7932

ATTORNEYS FOR APPLICANTS

The Nacogdoches County Hospital District dba Nacogdoches Memorial Hospital is accepting sealed bids on labor and materials to install Armstrong timberline rejuvenations sheet vinyl flooring in geri/psyche patient rooms and hallways. Measurements will need to be taken. For more information contact Andy Johnston, Director of Facilities (936) 568-8548. Sealed bids must be turned in to Andy Johnston, 1204 Mound Street, Nacogdoches, Tx. 75961 by 2:00 p.m. March 20th. Nacogdoches Memorial Hospital reserves the right to accept or reject any or all bids.

### LOST & FOUND 290

***Have you lost your pet?*** Contact the Nacogdoches Animal Shelter at 936-560-5011 to see if your pet is there.

## EMPLOYMENT

### AUTOMOTIVE SERVICES 361

Vavoline Express Care is hiring for FT Lube Tech. Apply at 2601 North St.

### HEALTHCARE 374

DENTAL ASSISTANT Family dental practice seeking full-time chair-side assistant. Applicant should be professional, self-motivated, organized. We focus on warm care and complete treatment for our family of patients. Experience is preferred. Send resume to: familydds@att.net

**Willowbrook Nursing Center** is currently accepting applications
- **House Keeping Supervisor**
- **Healthcare Marketer**

Experience Preferred. Applicant must be dependable! To join our team please apply in person at: 227 Russell Blvd Nacogdoches, TX 75965
**EEOC**

### MAINTENANCE/ INSTALLATION 383

**Maintenance Technician** needed for 180+ Unit Apartment Community in Nacogdoches. Must be HVAC Certified. Benefits include Health Insurance, 401K & Vacation. Qualified applicants fax resume to 936-569-1883 or apply in person at **Cambridge Court Apartments located at 5222 Northway Dr. Nacogdoches, TX**

**WOODLAND TRAILS APARTMENTS**
Maintenance man needed for small property in Nacodogches. Must be EPA certified. Please fax resume to 936-560-2112 or call 936-560-3119.
E-mail: manager.wt@migproperty.com

### RESTAURANT/ FOOD SERVICE 400

**Cheddar's Casual Cafe**
**now accepting applications. Apply within 3901 South Medford Drive**

### TRANSPORTATION/ LOGISTICS 410

Company Drivers Wanted $3000 Sign-On Bonus Local Fuel Delivery- Home Every Day Great Benefit package. Apply Online WWW.TTEDELIVER.COM

Elite Cab Company is seeking a Driver for Combo day & night shifts. Prefer 55+, Great Public Communication Skills & Customer Service, Must Have Good Driving Record 936-645-1185

### OTHER 412

Excel Car Wash is Hiring for PART TIME CASHIER Apply at 4101 North St.

**Experienced Delivery Driver/ Warehouse Worker wanted. Must have current, valid driver's license with clean record. Employee must regularly lift and/or move more than 100 pounds. Good customer service and teamwork skills are a must. Benefits and competitive compensation. Apply at Dixon Furniture 301 E. Laurel Avenue Lufkin, TX.**

Pit Stop Oil & Lube is hiring for PT CASHIER Apply at 1213 North University Drive

## SITUATIONS WANTED

### ELDERLY CARE PROVIDERS 435

CAREGIVER POSITION WANTED. Excellent Ref's Night preferred. 936-634-6424

### WORK WANTED 438

House Cleaning 936-564-7907 Cell 214-707-9378

I do Raking,Yard clean up, Tree trimming & Hauling . Jose 936-553-8022

## FINANCIAL

### BUSINESS OPPORTUNITY 440

**WARNING!! INVESTIGATE BEFORE YOU INVEST!!**
The Daily Sentinel does everything possible to keep these columns free of misleading, unscrupulous or fraudulent advertising. We encourage our readers to check THOROUGHLY any propositions requiring an investment, requiring that money be sent through the mail or that ask for personally identifying information to be revealed.

### LOANS 480

Loans- Bad Credit, No Credit, (936) 347-2656.

## EDUCATION

## LEGAL NOTICES 270

NOTICE OF APPLICATION ← PUBLIC NOTICE
5TH CYCLE REGIONAL WATER PLANNING

Notice is hereby given that the City of Nacogdoches will submit by 12:00 p.m. March 3, 2015, a grant application for financial assistance to the Texas Water Development Board (TWDB) on behalf of Region I, to carry out planning activities to develop the 2021(Region I) East Texas Regional Water Plan as part of the state's Fifth Cycle (2017-2021) of Regional Water Planning.

The East Texas Regional Water Planning Group (Region I) includes the following counties: Anderson, Angelina, Cherokee, Hardin, Henderson, Houston, Jasper, Jefferson, Nacogdoches, Newton, Orange, Panola, Polk, Rusk, Sabine, San Augustine, Shelby, Smith, Trinity and Tyler counties.

Notice is hereby given that written comments from the public regarding the grant application must be submitted to City of Nacogdoches and TWDB by no later than April 6, 2015. Copies of the grant application may be obtained from City of Nacogdoches or online at www.elexwaterplan.org. Comments can be submitted to the City of Nacogdoches and the TWDB as follows:

Lila Fuller, Administrative Agent for Region I
City of Nacogdoches
202 E Pilar, RM 315
Nacogdoches TX 75961

Kevin Patteson, Executive Administrator
Texas Water Development Board
PO Box 13231
Austin TX 78711-3231

For additional information, please contact *Region I c/o Lila Fuller, City of Nacogdoches, 202 E Pilar, RM 315, Nacogdoches TX 75961 936-559-2504, lfuller@ci.nacogdoches.tx.us, or David Carter, Texas Water Development Board, P.O. Box 13231, Austin, Texas 78711, (512) 463-7847.*

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|---|---|---|
| Order Number | : | 24264400 |
| PO Number | : | S.CORLEY |
| Customer | : | 23752881 CITY OF NACOGDOCHES |
| Contact | : | Stacy Corley |
| Address1 | : | PO BOX 635030 |
| Address2 | : | |
| City St Zip | : | NACOGDOCHES TX 759635030 |
| Phone | : | (936) 559-2567 |
| Fax | : | (936) 559-2915 |
| Credit Card | : | |
| Printed By | : | Cynthia Torrence |
| Entered By | : | Cynthia Torrence |
| Keywords | : | |
| Notes | : | |
| Zones | : | |

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|---|---|---|
| Ad Number | : | 24349000 |
| Ad Key | : | |
| Salesperson | : | 0630 - Cynthia Torrence |
| Publication | : | Beaumont Enterprise |
| Section | : | Classifieds Section |
| Sub Section | : | Classifieds Section |
| Category | : | 4 Legal Notices |
| Dates Run | : | 05/22/2015-05/22/2015 |
| Days | : | 1 |
| Size | : | 1 x 17.95, 162 lines |
| Words | : | 680 |
| Ad Rate | : | LE |
| Ad Price | : | 405.21 |
| Amount Paid | : | 0.00 |
| Amount Due | : | 405.21 |

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**NOTICE OF PUBLIC HEARING FOR THE EAST TEXAS REGIONAL WATER PLANNING GROUP 2016 INITIALLY PREPARED REGIONAL WATER PLAN**

Notice is hereby given that the East Texas Regional Water Planning Group (ETRWPG) is taking comment on and holding a public hearing for the East Texas Regional Water Planning Area (ETRWPA) 2016 Initially Prepared Plan (IPP). The public hearing for the IPP will include a public comment period and will be held at 5:30 p.m. as follows:

**Thursday, June 25, 2015** - Nacogdoches County Courthouse Annex, 203 W. Main, **Nacogdoches, TX**

The ETRWPG was established under provisions of Texas Senate Bill 1 (7th Texas Legislature) to develop a regional water plan for the ETRWPA which includes the following counties: Angelina, Anderson, Cherokee, Hardin, Henderson, Houston, Jasper, Jefferson, Nacogdoches, Newton, Orange, Panola, Polk, Rusk, Sabine, San Augustine, Shelby, Smith, Trinity, and Tyler.

**Copies of the IPP are available for review at the following County Clerk offices:**
Angelina County,
215 E. Lufkin Avenue,
1st Floor, Lufkin, TX 75901
Anderson County,
500 N. Church Street # 10
Palestine, TX 75801
Cherokee County Clerk, 135 S Main Street, Rusk, TX 75785
Hardin County, 300 W. Monroe, Kountze, TX 77625
Henderson County,
125 N. Prairieville Street,
# 101, Athens, TX 75751
Houston County,
401 E. Houston, 1st Floor
Crockett, TX 75835
Jasper County, 121 N. Austin

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|---|---|---|---|---|---|
| **Order Number** | : | 24264400 | **Ad Number** | : | 24349000 |
| **PO Number** | : | S.CORLEY | **Ad Key** | : | |
| **Customer** | : | 23752881 CITY OF NACOGDOCHES | **Salesperson** | : | 0630 - Cynthia Torrence |
| **Contact** | : | Stacy Corley | **Publication** | : | Beaumont Enterprise |
| **Address1** | : | PO BOX 635030 | **Section** | : | Classifieds Section |
| **Address2** | : | | **Sub Section** | : | Classifieds Section |
| **City St Zip** | : | NACOGDOCHES TX 759635030 | **Category** | : | 4 Legal Notices |
| **Phone** | : | (936) 559-2567 | **Dates Run** | : | 05/22/2015-05/22/2015 |
| **Fax** | : | (936) 559-2915 | **Days** | : | 1 |
| **Credit Card** | : | | **Size** | : | 1 x 17.95, 162 lines |
| **Printed By** | : | Cynthia Torrence | **Words** | : | 680 |
| **Entered By** | : | Cynthia Torrence | **Ad Rate** | : | LE |
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| **Keywords** | : | | | | |
| **Notes** | : | | | | |
| **Zones** | : | | | | |

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# 202, Jasper, TX 75951
Jefferson County,
1001 Pearl Street, # 203,
Beaumont, TX 77701
Nacogdoches County,
101 W. Main Street, Ste # 110,
Nacogdoches, TX 75961
Newton County, 115 Court
Street, Newton, TX 75966
Orange County,
801 W. Division Street,
Orange, TX 77630
Panola County,
110 S. Sycamore Street #201
Carthage, TX 75633
Polk County,
101 W. Church Street, #100
Livingston, TX 77351
Rusk County,
115 N. Main Street, #206
Henderson, TX 75652
Sabine County, 280 W. Main
Street, Hemphill, TX 75948
San Augustine County
223 N. Harrison,
San Augustine, TX 75972
Shelby County, 124 Austin
Street, Center, TX 75935
Smith County
200 E. Ferguson, Suite 300
Tyler, TX 75702
Trinity County, 223 W. First
Street, Groveton, TX 75845
Tyler County, 116 S. Charlton,
Woodville, TX 75979

**Copies of the IPP are also available for review at the following public libraries:**
Kurth Memorial Library, 706 S.
Raguet, Lufkin, TX 75904
Palestine Public Library
2000 S. Loop 256, Ste # 42
Palestine TX 75801
Singleton Memorial Library
207 E. 6th Street
Rusk, TX 75785
Kountze Public Library, 800
Redwood, Kountze, TX 77625
Henderson County Library -
Clint W. Murchison Memorial
Library, 121 S. Prairieville St,
Athens, TX 75751
J.H. Wooters Crockett Public
Library, 709 E. Houston,
Crockett, TX 75835
Jasper Public Library
175 E Water Street
Jasper, TX 75951
Beaumont Public Library
801 Pearl Street

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| Section | : | Classifieds Section |
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| Dates Run | : | 05/22/2015-05/22/2015 |
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Beaumont, TX 77701
Nacogdoches Public Library 1112 North Street, Nacogdoches, TX 75961
Newton County Library, 212 High Street, Newton, TX 75966
Orange Public Library, 220 N. 5th St, Orange, TX 77630
Sammy Brown Public Library, 319 S. Market St, Carthage, TX 75633
Livingston Municipal Library, 707 N. Tyler Avenue Livingston, TX 77351
Rusk County Library, 106 E. Main St, Henderson, TX 75652
J.R. Huffman Public Library 375 Sabine Street, Hemphill, TX 75948
San Augustine Public Library 413 E. Columbia San Augustine, TX 75972
Fannie Brown Booth Memorial Library, 619 Tenaha St, Center, TX 75935
Tyler Public Library, 201 S. College Ave, Tyler, TX 75702
Groveton Public Library 126 W. First Street Groveton, TX 75845
Allan Shivers Library, 302 N. Charlton, Woodville, TX 75979

Copies of the IPP are available for review at the Texas Water Development Website at http://www.twdb.texas.gov/waterplanning/rwp/plans/2016/IPP.asp; on the East Texas Regional Water Planning Group website at www.etexwaterplan.org, and at the City of Nacogdoches, Office of the City Secretary, 202 E. Pilar Street, Room 315, Nacogdoches, TX 75961. Written and oral comments will be accepted at the public hearing. The ETRWPG will also accept written comments from the date of this notice through August 24, 2015 and may be emailed or mailed to the address below:

**QUESTIONS AND COMMENTS MAY BE SUBMITTED TO:**
Rex H. Hunt, P.E.
Alan Plummer Associates, Inc.
6300 La Calma, Suite 400
Austin, Texas 78752

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| **Keywords** | : | | | | |
| **Notes** | : | | | | |
| **Zones** | : | | | | |

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Phone: 512.452.5905
or rhunt@apaienv.com

# Appendix 10-B

# Transcripts, Presentations, and Minutes from Public Hearings

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A fundamental element of the planning process is input from the public. One public hearing was scheduled in June 25, 2015 to provide the public with forums to comment on the 2016 Initially Prepared Plan. The public hearing was held at the public library in Nacogdoches Texas. Provided in this appendix are the transcripts, presentations, and minutes from the public hearing.

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# NOTICE OF PUBLIC HEARING FOR THE EAST TEXAS REGIONAL WATER PLANNING GROUP 2016 INITIALLY PREPARED REGIONAL WATER PLAN

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Hardin County, 300 W. Monroe, Kountze, TX 77625
Henderson County, 125 N. Prairieville Street, # 101, Athens, TX 75751
Houston County, 401 E. Houston, 1st Floor Crockett, TX 75835
Jasper County, 121 N. Austin, # 202, Jasper, TX 75951
Jefferson County, 1001 Pearl Street, # 203, Beaumont, TX 77701
Nacogdoches County, 101 W. Main Street, Ste # 110, Nacogdoches, TX 75961
Newton County, 115 Court Street, Newton, TX 75966
Orange County, 801 W. Division Street, Orange, TX 77630
Panola County, 110 S. Sycamore Street #201, Carthage, TX 75633
Polk County, 101 W. Church Street, #100, Livingston, TX 77351
Rusk County, 115 N. Main Street, #206, Henderson, TX 75652
Sabine County, 280 W. Main Street, Hemphill, TX 75948
San Augustine County, 223 N. Harrison, San Augustine, TX 75972
Shelby County, 124 Austin Street, Center, TX 75935
Smith County, 200 E. Ferguson, Suite 300, Tyler, TX 75702
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Singleton Memorial Library, 207 E. 6th Street, Rusk, TX 75785
Kountze Public Library, 800 Redwood, Kountze, TX 77625
Henderson County Library - Clint W. Murchison Memorial Library, 121 S. Prairieville St, Athens, TX 75751
J.H. Wooters Crockett Public Library, 709 E. Houston, Crockett, TX 75835
Jasper Public Library, 175 E Water Street, Jasper, TX 75951
Beaumont Public Library, 801 Pearl Street, Beaumont, TX 77701
Nacogdoches Public Library, 1112 North Street, Nacogdoches, TX 75961
Newton County Library, 212 High Street, Newton, TX 75966
Orange Public Library, 220 N. 5th St, Orange, TX 77630
Sammy Brown Public Library, 319 S. Market St, Carthage, TX 75633
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Rex H. Hunt, P.E.
Alan Plummer Associates, Inc.
6300 La Calma, Suite 400
Austin, Texas 78752

Phone: 512.452.5905 or rhunt@apaienv.com

MINUTES OF THE PUBLIC MEETING
to receive comments on the
Initially Prepared Plan (IPP)
of the
REGIONAL WATER PLANNING GROUP "I"
**Thursday – June 25, 2015– 5:30 p.m.**
Nacogdoches County Courthouse Annex
208 W. Main Street, Nacogdoches, Texas

Kelley Holcomb, Chair, called the meeting to order at 5:31 p.m. Chair Holcomb made introductions for consultants, administrative staff and ETRWPG board members in attendance.

Those that signed the sign-in sheet were: Lila Fuller, Lann Bookout, Stacy Corley, John W. Stine, Alvin V. Newton, Ben A. Stephenson, John Martin, Bill Adams, Terry D. Stelly, Kelley Holcomb, Cynthia Syvarth, David Coburn, Mark Stephenson, Mary Vann, Greg Morgan, Manuel Martinez and Spandana Tummuri.

Cynthia Syvarth with Alan Plummer Associates, Inc. (APAI) gave a brief review of each chapter contained in the IPP and how the information was gathered.

Kelley Holcomb opened the floor for public comments.

John W. Stine appeared and gave the following comment:

"As a resident of San Augustine County and spokesperson for signatories below [John W. Stine and Alvin V. Newton] we do not support any future water impoundment projects for Groundwater Management Area 11 as proposed in the East Texas Regional Water Planning Group 2016 Initially Prepared Regional Water Plan.

Proposed water impoundments as incorporated in the above Regional Water Plan will continue to erode our East Texas land base used for Agriculture and Recreational Hunting—cattle production, forestry production and wildlife habitat. In addition it erodes the private property tax base and therefore will escalate private property taxes.

In November of 2013, the voters of Sabine, San Augustine and Shelby Counties soundly defeated the formation of a proposed Groundwater District by 5,720 Against and 489 For the proposal. This voter response further validated the inviolability of private property rights from government overreach and infringement. The grass roots electorate is resolute in its opposition to further water impoundment by the State of Texas that infringes on private property rights of Texans.

Enclosed is a letter from the Sabine River Authority in October 16, 2013 in which 'the Sabine River Authority of Texas has a Texas water right for over 244 billion gallons per year, of which 96% is available to be sold under contract'. Toledo Bend Reservoir is nearly 50 years old since impoundment in the late 1960's. This untapped source of surface water from Toledo Bend Reservoir is just one of many existing water impoundments in East Texas that precludes future water impoundment projects in East Texas and specifically in Groundwater Management Area 11."

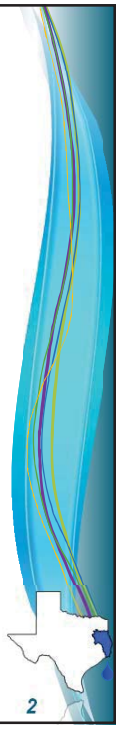
No one else appeared to speak.

Chair Holcomb opened the floor for questions.

Chair Holcomb adjourned the meeting at 6:01 p.m.


## Consultant Team Report Agenda

1. General overview of the ETRWPA 2016 Initially Prepared Plan
2. Questions and Answers



## Your 2016 ETRWPA Water Plan

**1 Executive Summary**

**11 chapters**

**35 appendices (including 16 DB17 Reports)**

**146 tables and figures**

**~1,200 pages**

**Final Regional Water Plan due December 2015**

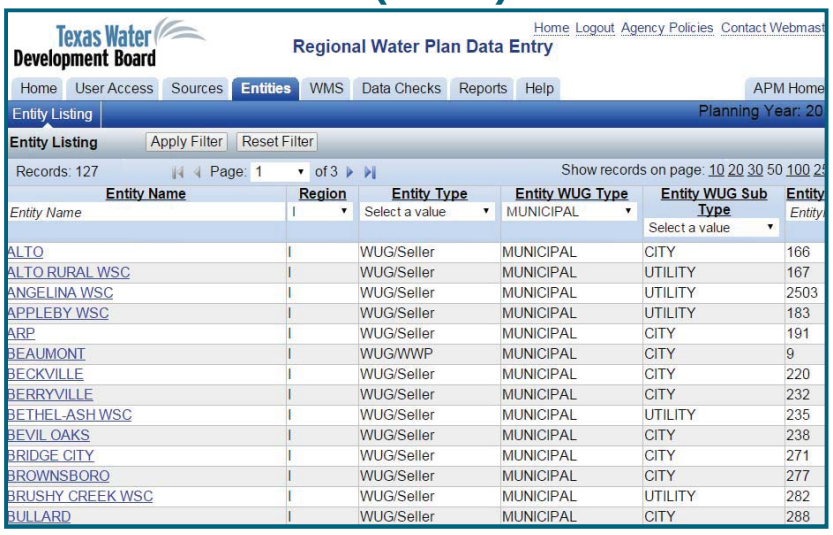
3

## Executive Summary: Regional Description

**East Texas Regional Water Planning Area**


4

# Executive Summary: Regional Water Planning Application (DB17)



Texas Water Development Board

Regional Water Plan Data Entry

Home Logout Agency Policies Contact Webmast

Home | User Access | Sources | Entities | WMS | Data Checks | Reports | Help | APM Home

Entity Listing — Planning Year: 20

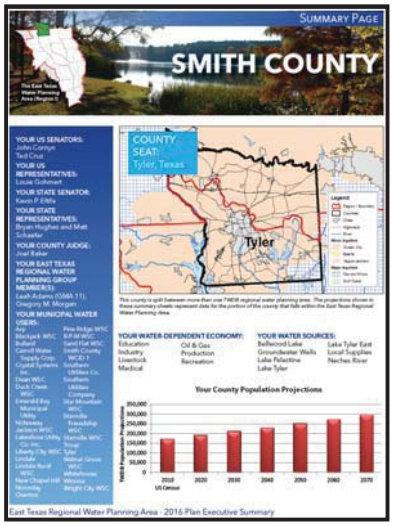
**Entity Listing** Apply Filter Reset Filter

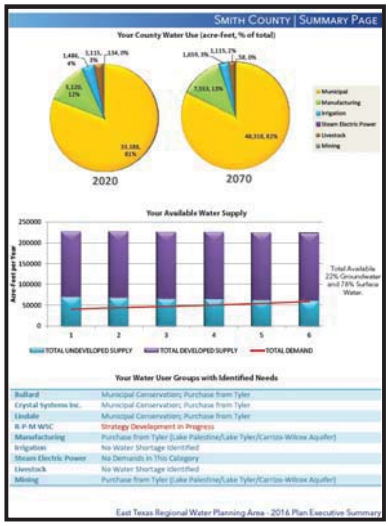
Records: 127 Page: 1 of 3 Show records on page: 10 20 30 50 100 2

| Entity Name | Region | Entity Type | Entity WUG Type | Entity WUG Sub Type | Entity |
|---|---|---|---|---|---|
| *Entity Name* | I | Select a value | MUNICIPAL | Select a value | *Entity* |
| ALTO | I | WUG/Seller | MUNICIPAL | CITY | 166 |
| ALTO RURAL WSC | I | WUG/Seller | MUNICIPAL | UTILITY | 167 |
| ANGELINA WSC | I | WUG/Seller | MUNICIPAL | UTILITY | 2503 |
| APPLEBY WSC | I | WUG/Seller | MUNICIPAL | UTILITY | 183 |
| ARP | I | WUG/Seller | MUNICIPAL | CITY | 191 |
| BEAUMONT | I | WUG/WWP | MUNICIPAL | CITY | 9 |
| BECKVILLE | I | WUG/Seller | MUNICIPAL | CITY | 220 |
| BERRYVILLE | I | WUG/Seller | MUNICIPAL | CITY | 232 |
| BETHEL-ASH WSC | I | WUG/Seller | MUNICIPAL | UTILITY | 235 |
| BEVIL OAKS | I | WUG/Seller | MUNICIPAL | CITY | 238 |
| BRIDGE CITY | I | WUG/Seller | MUNICIPAL | CITY | 271 |
| BROWNSBORO | I | WUG/Seller | MUNICIPAL | CITY | 277 |
| BRUSHY CREEK WSC | I | WUG/Seller | MUNICIPAL | UTILITY | 282 |
| BULLARD | I | WUG/Seller | MUNICIPAL | CITY | 288 |

5

# Executive Summary: County Summary Sheets




6

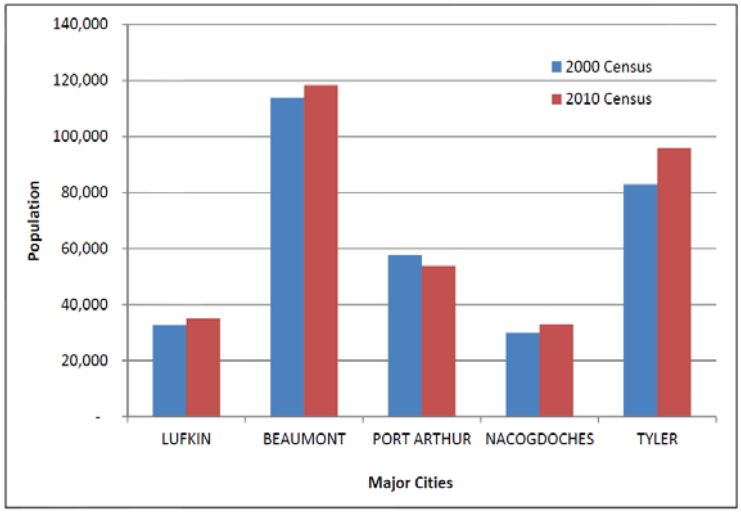
## Chapter 1: Description of the Region

- **General discussion of the ETRWPA, e.g.:**
  - Climate, population, economic drivers
  - Water sources, Water User Groups, Wholesale Water Providers
  - Regional resources and threats to resources

7

## Chapter 1: Population

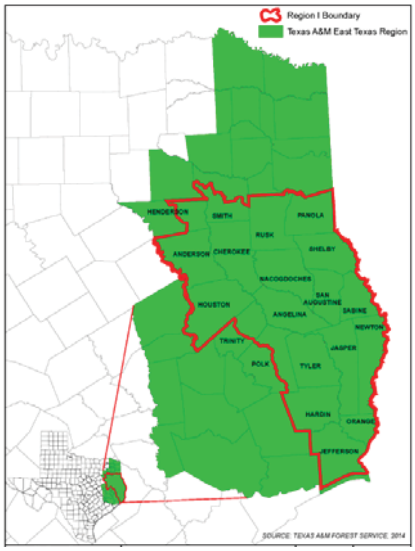
Figure 1.6 Historical Populations of Major Cities




8

## Chapter 1: Regional Resources
Timber, Pulpwood, and Forest Fiber

**Texas A&M Forest Service East Texas Region**




9

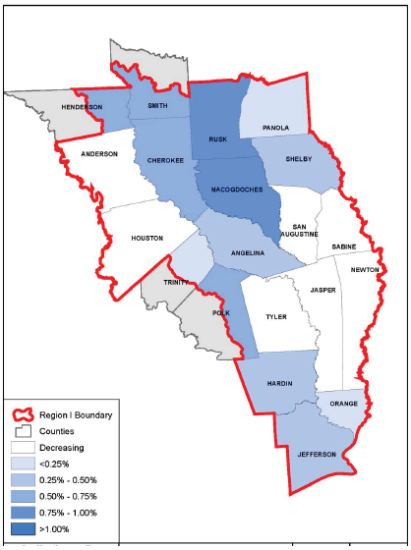
## Chapter 2: Current and Projected Population and Water Demands

- **2020 to 2070 projections of population and water demands**
- **Six categories of water use**
  - Municipal
  - Irrigation
  - Manufacturing
  - Steam Electric Power
  - Mining
  - Livestock

10

## Chapter 2: Current and Projected Population and Water Demands

### Annual Growth Rate of Municipal Demand 2020-2070




11

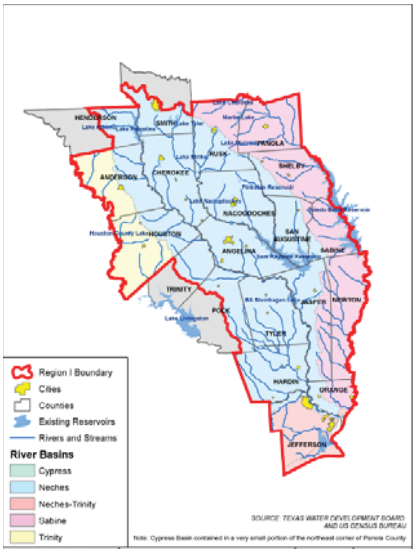
## Chapter 3: Evaluation of Current Water Supplies in the Region

- **Current surface water supplies: rivers, lakes, brackish (near coast)**
- **Current groundwater supplies (freshwater and brackish aquifers)**

12

## Chapter 3: Evaluation of Current Water Supplies in the Region

### Surface Water Sources




13

## Chapter 4: Comparison of Water Supplies with Water Demands to Determine Need

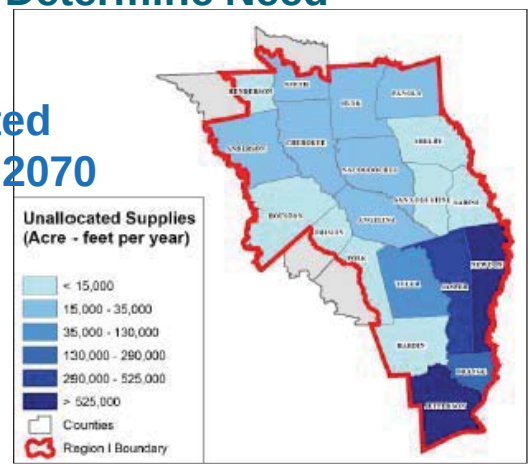
- **Brings together Chapters 2 and 3 to establish regional needs:**

***Supply – Demand = Surplus/Shortage***

14

## Chapter 4: Comparison of Water Supplies with Water Demands to Determine Need

### Unallocated Supplies in 2070




15

## Chapter 5A: Identification of Potentially Feasible Water Management Strategies

- **Explains the process for evaluating WMSs and identifies strategies that may be feasible**
- **Strategy Types**
  - Water Conservation
  - Water Reuse
  - Expanded Use of Existing Supplies
  - New Supply Development
  - Interbasin Transfer
  - Drought Management

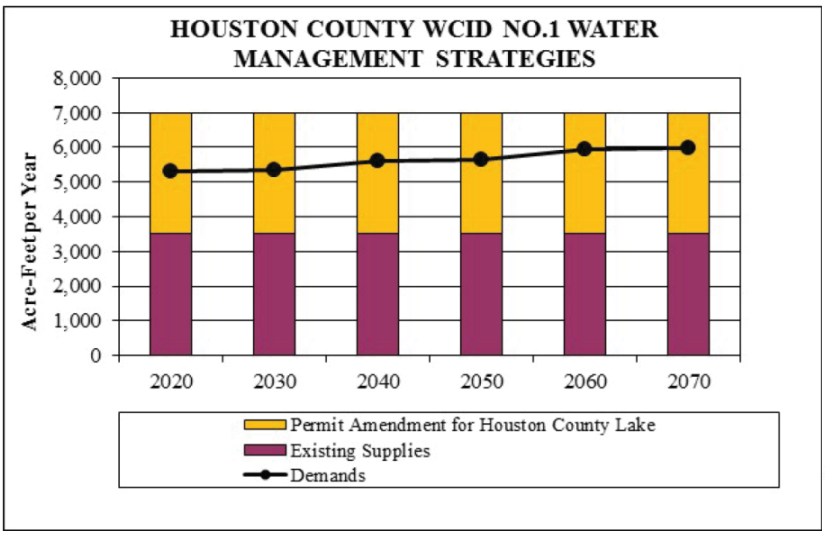
16

## Chapter 5B: Evaluation of Potentially Feasible, Recommended, and Alternative Water Management Strategies

- **The central objective of the regional water plan**
- **Approximately 80 WMSs Evaluated**
- **Identify WMSs to be Prioritized**
  - SWIFT Funding

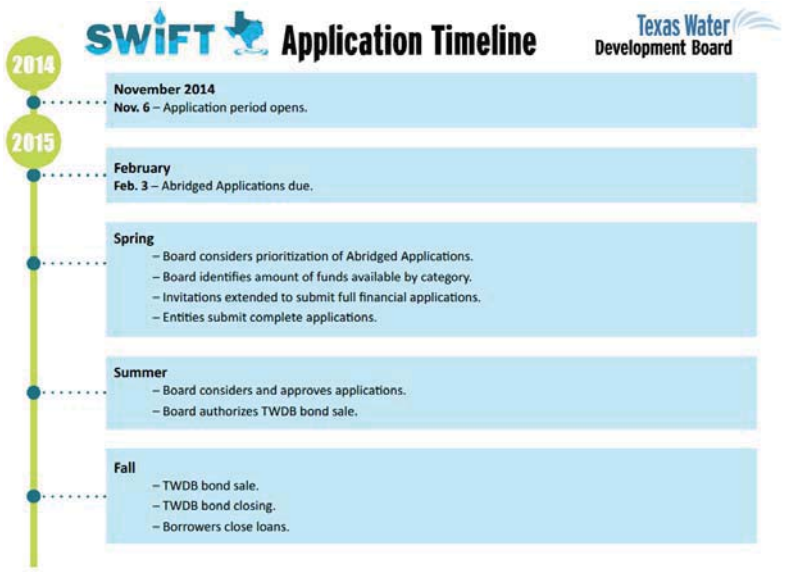
17

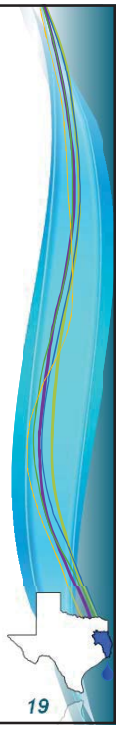
## Chapter 5B: Permit Amendment for Houston County Lake (Recommended)




18

## Chapter 5B: WMS Prioritization (SWIFT Funding)

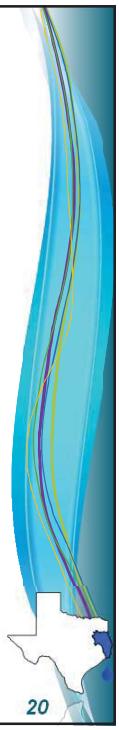


19

## Chapter 5C: Water Conservation Recommendations

- **Addresses current water conservation in the region**
- **Discusses water conservation as a WMS in the 2016 Plan**
- **Presents water loss data in the region**



20

## Chapter 5C: Reported 2010 Water Loss Accounting in the ETRWPA

Table 5C.2 Reported 2010 Water Loss Accounting in the ETRWPA

| | | | |
|---|---|---|---|
| System Input Volume 49.3 Billion Gallons 100.0% | Authorized Consumption 40.8 Billion Gallons 82.7% | Billed Consumption 39.7 Billion Gallons 80.6% | Revenue Water 39.7 Billion Gallons 80.6% |
| | | Unbilled Consumption 1.0 Billion Gallons 2.1% | Non-Revenue Water 9.6 Billion Gallons 19.4% |
| | Water Loss 8.5 Billion Gallons 17.3% | Apparent Loss 1.3 Billion Gallons 2.6% | |
| | | Real Loss 7.2 Billion Gallons 14.6% | |

21

## Chapter 6: Impacts of Plan and Consistency with Protection of Resources

- **Describes potential impacts of the plan and threats to the region's resources**
- **Addresses consistency of the plan with protection of resources**
- **Addresses consistency of the plan with water planning requirements**
  - TAC Chapters 357 and 358

22

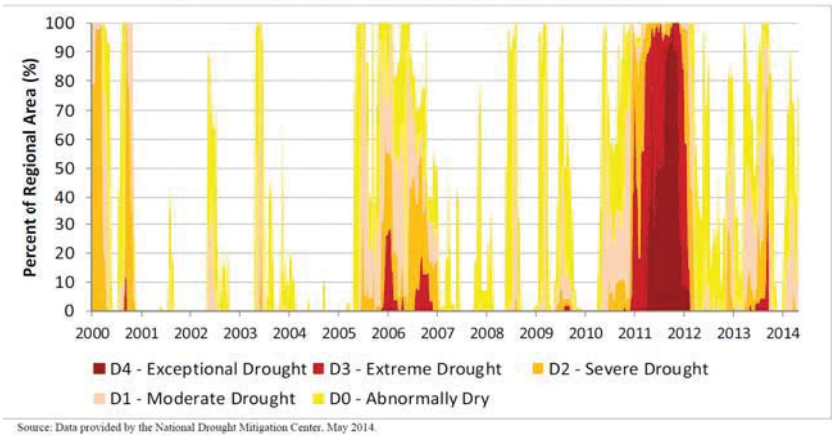
## Chapter 7: Drought Response Information, Activities, and Recommendations

- **Describes the current status of drought response in the region**
- **Discusses the drought of record for the region**

23

## Chapter 7: Drought Response Information, Activities, and Recommendations

Figure 7.1 Composite Drought Monitor Index for Counties in the ETRWPA




Source: Data provided by the National Drought Mitigation Center, May 2014.

24

## Chapter 8: Unique Stream Segments, Unique Reservoir Sites, and Legislative Recommendations

- Addresses the ETRWPG's desires with respect to unique stream segments and unique reservoir sites
- Addresses legislative and regulatory recommendations of the ETRWPG relative to water planning.

25

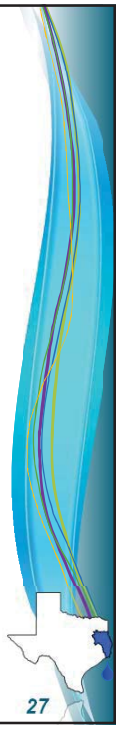
## Chapter 8: Unique Stream Segments, Unique Reservoir Sites, and Legislative Recommendations

### TPWD Ecologically Significant Stream Segments


26

## Chapter 9: Infrastructure Financing Report

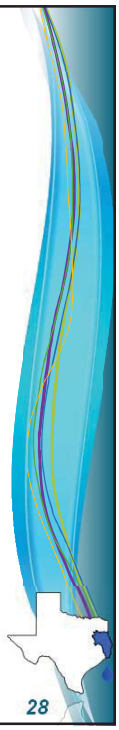
- Report on how WUGs intend to finance recommended WMSs
- The ETRWPG will send out and collect this information and forward it to the TWDB.
- TWDB will provide the report to be included in the plan



27

## Chapter 10: Public Participation and Adoption of Plan

- Chapter describing the 4th round planning process culminating in the 2016 Plan
- Supported by three appendices that will include outreach information, public hearing proceedings, and public comments



28

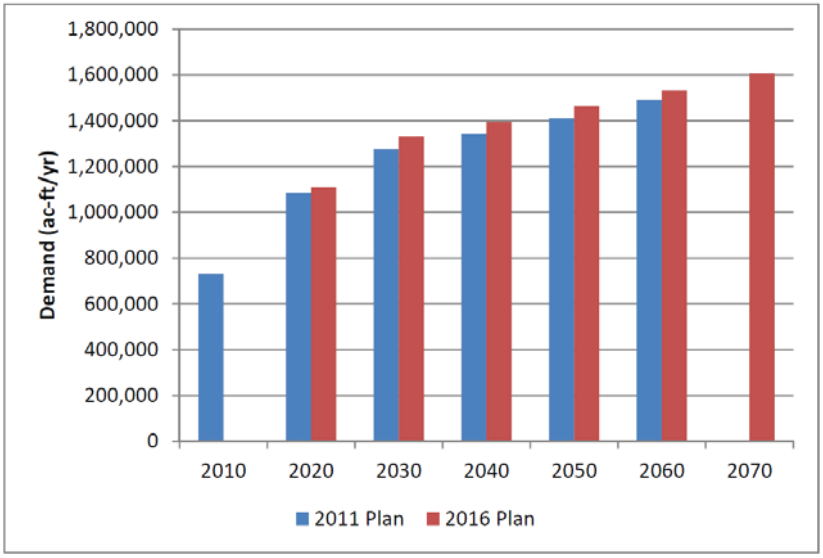
## Chapter 11: Implementation and Comparison to the Previous Regional Water Plan

- New chapter in this plan
- Review implementation success since the previous plan
- Compares the 2011 and 2016 Plans

29

## Chapter 11

Figure 11.1 Total Projected Demand for the ETRWPA from the 2011 and 2016 Plans

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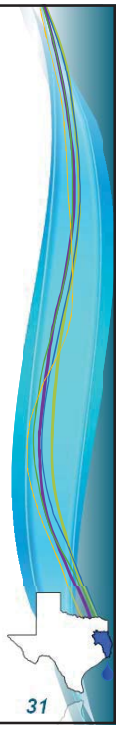
## Next Steps in the Regional Water Planning Process

- **August 2015**
  - Accept public comments
  - Incorporate TWDB comments received
- **September 2015**
  - Update Chapter 10 – Public Participation
  - Prioritize 2016 WMSs
- **October 2015**
  - Adopt Final 2016 Prioritization
  - Adopt Final Regional Water Plan
- **December 2015**
  - Submit Final Regional Water Plan to TWDB




## ETRWPA 2016 Initially Prepared Plan Comments

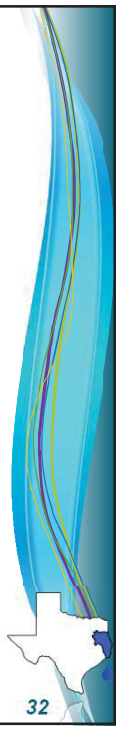
- **Comments accepted today**
- **PDF of 2016 IPP available to download:**

  www.twdb.texas.gov

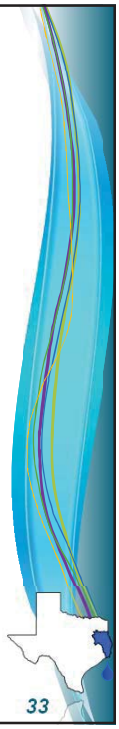
  www.etexwaterplan.org
- **Written comments accepted until August 24, 2015**

Rex H. Hunt, P.E.
Alan Plummer Associates, Inc.
6300 La Calma, Suite 400
Austin, Texas 78752

512.452-5905 rhunt@apaienv.com



## QUESTIONS?



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# Appendix 10-C

# Initially Prepared Plan Public Comments

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Opportunities for public comment are provided through the regional water planning process. The public are invited to provide comments at regularly scheduled meetings of the ETRWPG. Comments may be received in person, as well as in the form of letters, emails, or by telephone. During an official comment period to occur during the summer of 2015, comments regarding the 2016 Initially Prepared Plan were received from entities and/or individuals. This appendix includes copies of all written comments and a transcript of oral comments. Chapter 10 of the 2016 Plan includes responses to all comments received during the 2016 Initially Prepared Plan comment period.

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Texas Water Development Board
P.O. Box 13231, 1700 N. Congress Ave.
Austin, TX 78711-3231, www.twdb.texas.gov
Phone (512) 463-7847, Fax (512) 475-2053

August 10, 2015

Mr. Kelley Holcomb, Chair
c/o Angelina & Neches River Authority
P.O. Box 387
Lufkin, Texas 75902

Ms. Lila Fuller
City of Nacogdoches
P.O. Box 635030
Nacogdoches, Texas 75963

Re: Texas Water Development Board Comments on the East Texas Regional Water Planning Group (Region I) Initially Prepared Plan, Contract No. 1148301320

Dear Mr. Holcomb and Ms. Fuller:

Texas Water Development Board (TWDB) staff completed a review of the Initially Prepared Plan (IPP) submitted by May 1, 2015 on behalf of the Region I Regional Water Planning Group. The attached comments follow this format:

- **Level 1:** Comments, questions, and online regional water planning database revisions that must be satisfactorily addressed in order to meet statutory, agency rule, and/or contract requirements; and,

- **Level 2:** Comments and suggestions for consideration that may improve the readability and overall understanding of the regional water plan.

The TWDB's statutory requirement for review of potential interregional conflicts under Title 31 Texas Administrative Code (TAC) §357.62 will not be completed until submittal and review of adopted regional water plans. However, as previously requested by our Executive Administrator, please inform TWDB in advance of your final plan if your planning group believes that an interregional conflict exists. Additionally, subsequent review will be performed as the planning group completes its data entry into the regional water planning database (DB17). If issues arise during our ongoing data review, they will be communicated promptly to the planning group to resolve.

Title 31 TAC§357.50(d) requires the regional water planning group to consider timely agency and public comment. Section 357.50(e) requires the final adopted plan include summaries of all timely written and oral comments received, along with a response explaining any resulting revisions or why changes are not warranted. Copies of TWDB's Level 1 and 2 written comments and the region's responses must be included in the final, adopted regional water plan. While the comments included in this letter represent TWDB's review to date, please anticipate the need to respond to additional comments regarding data integrity, including any water source overallocations, in the regional water planning database (DB17) once data entry is completed by the region.

Standard to all planning groups is the need to include certain content in the final regional water plans that was not yet available at the time that IPPs were prepared and submitted. In your final regional water plan, however please be sure to also incorporate the following:

a) Completed results from the regional planning group's infrastructure financing survey (IFR) for sponsors of recommended projects with capital costs *[31 TAC §357.44]*;
b) Completed results from the implementation survey *[31 TAC §357.45(a)]*;
c) The socioeconomic impact evaluation provided by TWDB at the request of the planning group *[31 TAC §357.33(c)]*;
d) Documentation that comments received on the IPP were considered in the development of the final plan *[31 TAC §357.50(d)]*;
e) Evidence, such as a certification, that the final, adopted regional water plan is complete and adopted by the planning group *[31 TAC §357.50(j)(1)]*; and,
f) The required DB17 reports, as made available by TWDB, in the executive summary or elsewhere in the plan as specified in the Contract *[31 TAC §357.50(e)(2)(B), Contract Scope of Work Task 4D(p), Contract Exhibit 'C', Table 2]*. Please ensure that the numerical values presented in the tables throughout the final, adopted regional water plan are consistent with the data provided in DB17. For the purpose of development of the 2017 State Water Plan, water management strategy and other data entered by the regional water group in DB17 (and as presented in the regional plan) shall take precedence over any conflicting data presented in the final regional water plan *[Contract Exhibit 'C', Sections 12.1.3. and 12.2.2]*.

The following items must accompany, separately, the submission of the final, adopted regional water plan:

- The prioritized list of all recommended projects in the regional water plan *[Texas Water Code 15.436(a), Contract Scope of Work Task 13];* and,
- Any remaining hydrologic modeling files or GIS files that may not have been provided at the time of the submission of the IPP but that were used in developing the final plan. *[31 TAC §357.50(e)(2)(C), Contract Exhibit 'C', Section 12.2.1; Contract Scope of Work Task 3-III-13]*

Note that provision of certain content in an electronic-only form is permissible as follows: Internet links are permissible as a method for including model conservation and drought contingency plans within the final regional water plan; hydrologic modeling files may be submitted as electronic appendices, however

all other regional water plan appendices should be incorporated in hard copy format within each plan *[31 TAC §357.50(e)(2)(C), Contract Scope of Work Task 5e, Contract Exhibit 'C', Section 12.2.1]*.

The following general requirements that apply to recommended water management strategies must be adhered to in all final regional water plans including:

- Regional water plans must not include any strategies or costs that are associated with simply maintaining existing water supplies or replacing existing infrastructure. Plans may include only infrastructure costs that are associated with volumetric increases of treated water supplies delivered to water user groups or that result in more efficient use of existing supplies *[31 TAC §357.10(28), §357.34(d)(3)(A), Contract Exhibit 'C", Section 5.1.2.2, Section 5.1.2.3]*; and,
- Regional water plans must not include any retail distribution-level infrastructure costs (other than those costs related to conservation strategies such as water loss reduction) *[31 TAC §357.10(28), §357.34(d)(3)(A), Contract Exhibit 'C", Section 5.1.2.3]*.

To facilitate efficient and timely completion, and Board approval, of your final regional water plan, please provide your TWDB project manager with early drafts of your responses to these IPP comments for preliminary review and feedback.

If you have any questions regarding these comments or would like to discuss your approach to addressing any of these comments, please do not hesitate to contact Lann Bookout at (512) 936-9439. TWDB staff will be available to assist you in any way possible to ensure successful completion of your final regional water plan.

Sincerely,

Jeff Walker
Deputy Executive Administrator
Water Supply and Infrastructure

Attachments

cc w/att: Mr. Rex Hunt, Alan Plummer Associates, Inc.

# TWDB Comments to the Initially Prepared 2016 East Texas (Region I) Regional Water Plan

| **Level 1:** | **Comments and questions must be satisfactorily addressed in order to meet statutory, agency rule, and/or contract requirements.** |
|---|---|

1. Please describe how publicly available plans of major agricultural, municipal, manufacturing and commercial water users were considered in the final, adopted regional water plan. *[31 Texas Administrative Code (TAC) §357.22(a)(4)]*

2. The plan does not appear to include a listing of the water rights that are the basis for the surface water availability in the plan. Please include such a listing in the final, adopted regional water plan. *[Contract Exhibit 'C', Section 3.1]*

3. Please clarify how the run-of-river availabilities were calculated for municipal water users to ensure that all monthly demands are fully met for the entire simulation of the unmodified Texas Commission on Environmental Quality WAM Run 3 in the final, adopted regional water plan. *[Contract Exhibit 'C', Section 3.4]*

4. Pages 3-23 and 3-24, Tables 3.5 and 3.6; Vol. II, Appendix 3A: The availability volumes shown in Table 3.5 for the Carrizo-Wicox in Smith County, Neches Basin do not match the availability from DB17 in all decades. For example, 2020 availability is 12,245 AFY, compared to the 2020 value in the source availability report of 21,004 AFY. Additionally, the aquifer totals presented in Table 3.6 should reflect this correction. Please revise in the final, adopted regional water plan.

5. The plan does not appear to consider conservation or drought management as a potentially feasible strategy for all identified water supply needs. Please include documentation whether conservation and drought management were considered to meet identified needs and, if not recommended, please document the reason in the final, adopted regional water plan. *[Texas Water Code (TWC) §16.053(e)(5), 31 TAC §357.34(c)(3), §357.34(f)(2)]*

6. Page 5B-121: The plan does not appear to include a recommended water management strategy summary table including strategy names, total yield for all decades, total capital costs, and estimated unit costs. The table starting on page 5B-121 appears to present strategies but the header of the table is unclear as to exactly what information is being presented (e.g., recommended or alternative strategies) and costs are not included. Please include recommended and alternative strategy summary tables in the final, adopted regional water plan. *[Contract Exhibit 'C', Section 12.1.2]*

7. Page 6-2: The description of protection of water resources does not appear to include information on potential impacts to groundwater and surface water interrelationships. Please include this information in the final, adopted regional water plan. *[31 TAC §357.40(b)(2)]*

8. Chapter 7: The plan does not appear to include recommended drought triggers and actions for each water source. Please include this information in the final, adopted regional water plan. *[TWC §16.053(e)(3)(A-C); 31 TAC §357.42(c)(1-3)]*

9. Please indicate how the planning group considered relevant recommendations from the Drought Preparedness Council (a letter was provided to planning groups with relevant recommendations in November 2014) in the final, adopted regional water plan. *[31 TAC §357.42(h)]*

10. The technical evaluations of the water management strategies do not appear to estimate water losses from the associated strategies. Please include an estimate of water losses in the final, adopted regional water plan, for example in a format of an estimated percent loss. *[31 TAC §357.34(d)(3)(A); Contract Exhibit 'C', Section 5.1.1]*

11. Vol. II, Pages Appendix 5B-129, 5B-132, 5B-136, 5B-146, 5B-156, 5B-181: The plan appears to include water management strategies, including retail distribution system infrastructure, that appear to not increase the volume of supply to water user groups. For example, the Athens MWA Water Treatment Plant Improvements, the Volumetric Surveys of Lake Striker, Lake Center, and Lake Pinkston, the Normal Pool Elevation Adjustment of Lake Striker, Sabine River Authority Infrastructure Improvements, and the City of Jacksonville Distribution System Improvements. Regional water plans must not include any strategies or costs that are associated with simply maintaining existing supplies, improving retail distribution systems, improving water treatment processes, or replacing infrastructure. Plans may include only infrastructure costs that are associated with volumetric increases of treated water supplies delivered to water user groups or that result in more efficient use of existing supplies (e.g., conservation). Please revise as appropriate throughout the final, adopted regional water plan. *[31 TAC §357.34(d)(3)(A); Contract Exhibit 'C', Sections 5.1.2.2 and 5.1.2.3]*

12. Vol. II, Appendix 5A-B: The plan does not appear to identify potentially feasible water management strategies for all wholesale water provider (WWPs) with identified needs. Please include documentation that potentially feasible water management strategy types, as required by statute and rule, were considered for identified needs in the final, adopted regional water plan. *[TWC §16.053(e)(5), 31 TAC §357.34(a)]*

13. Vol. II, Pages Appendix 5B-15, 5B-24, 5B-42, 5B-45, 5B-150, and 5B-158: The plan in some instances, does not appear to include a quantitative reporting of environmental factors. For example, strategy evaluations for Alto Rural WSC New Wells, Houston Irrigation New Wells, D&M WSC New Wells, Nacogdoches Livestock New Wells, Houston County WCID #1 New Wells, and LNVA Purchase from Sabine River Authority provide qualitative descriptions such as "low" or "moderate" impacts, but the plan does not appear to include quantification of the impacts. Please include quantitative reporting in the final, adopted regional water plan. *[31 TAC §357.34 (d)(3)(B)]*

14. Vol. II, Pages Appendix 5B-108, 5B-114, and 5B-124: The plan in some instances, does not appear to include a quantitative reporting of impacts to agricultural resources. For example, strategy evaluations for Lake Columbia, ANRA Treatment Plant and Distribution System, and Athens MWA Indirect Reuse do not appear to include quantified impacts to agricultural resources, even in instances where there may be no impact. Please include quantitative reporting of impacts to agricultural resources in the final, adopted regional water plan. *[31 TAC §357.34 (d)(3)(C)]*

**Level 2: Comments and suggestions for consideration that may improve the readability and overall understanding of the regional water plan.**

1. Please consider numbering, titling, and referencing all tables in the final, adopted regional water plan. For example, all tables in Section 5B of Volume I.

2. Page 3-13, Table 3.3: Please consider specifying the stream or river source names for the run-of-river supplies listed in this table in the final, adopted regional water plan.

3. Page 3-24, Table 3.6: Please consider revising the citation for the source information to "GAM Run 10-038 MAG" and "GAM Run 10-016 MAG (ver. 2)" in the final, adopted regional water plan.

4. Page 5B-2: Reference is made to Appendix 5B-B, but there appears to be no associated Appendix or a listing for the appendix in the plan. Please reconcile in the final, adopted regional water plan.

5. Page 5C-12: The plan lists "appropriate conservation activities" for Irrigation, but does not appear to evaluate the BMPs for recommended strategies in chapter 5B. Please consider including additional documentation of potentially feasible irrigation conservation strategies in the final, adopted regional water plan.

6. Page 11-12: Although the plan contains a volumetric summary of the differences in recommended and alternative strategies between the 2011 and 2016 plans, please consider specifically identifying the individual recommended and alternative strategies in the plan.

EAST TEXAS
Regional Water Planning Group
Region I WPG

**PUBLIC COMMENT REQUEST FORM**

6-25-15 - 5:30 p.m.

**Name:** John W. Stine

**Title:** Self

**Entity/Organization Represented:**

**Mailing Address:** Route 2 Box 1012
San Augustine, TX 75972

**Phone:** 936-596-7308 **Email:** jj66stine at gmail.com

**I would like to comment on Item(s) No.** IPP public comment

June 15, 2015

Mr. John W. Stine

2673 FM 2785

San Augustine, Texas 75972

Gentlemen:

As a resident of San Augustine County and spokesperson for signatories below we do not support any future water impoundment projects for Groundwater Management Area 11 as proposed in The East Texas Regional Water Planning Group 2016 Initially Prepared Regional Water Plan.

Proposed water impoundments as incorporated in the above Regional Water Plan will continue to erode our East Texas land base used for Agriculture and Recreational Hunting--- cattle production, forestry production, and wildlife habitat. In addition it erodes the private property tax base and therefore will escalate private property taxes.

In November of 2013, the voters of Sabine, San Augustine and Shelby Counties soundly defeated the formation of a proposed Groundwater District by 5,720 Against and 489 For the proposal. This voter response further validated the inviolability of private property rights from government overreach and infringement. The grass roots electorate is resolute in its opposition to further water impoundment by the State of Texas that infringes on private property rights of Texans.

Enclosed is a letter from the Sabine River Authority in October 16, 2013 in which "The Sabine River Authority of Texas has a Texas water right for over 244 billion gallons per year, of which 96% is available to be sold under contract." Toledo Bend Reservoir is nearly 50 years old since impoundment in the late 1960's. This untapped source of surface water from Toledo Bend Reservoir is just one of many existing water impoundments in East Texas that precludes future water impoundment projects in East Texas and specifically in Groundwater Management Area 11.

Sincerely,

John W. Stine

San Augustine County

Alvin V. Newton

San Augustine County

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Boerne

S. Reed Morian
Houston

Dick Scott
Wimberley

Lee M. Bass
Chairman-Emeritus
Fort Worth

Carter P. Smith
Executive Director

August 14, 2015

Mr. Rex Hunt, P.E.
Alan Plummer and Associates, Inc.
6300 La Calma Suite 400
Austin, Texas 78752

Re: 2016 Region I Initially Prepared Regional Water Plan

Dear Mr.Hunt:

Thank you for seeking review and comment from the Texas Parks and Wildlife Department ("TPWD") on the 2016 Initially Prepared Regional Water Plan for the East Texas Regional Planning Area (ETRWPA) Region I (IPP). As you know, water impacts every aspect of TPWD's mission to manage and conserve the natural and cultural resources of Texas. As the agency charged with primary responsibility for protecting the state's fish and wildlife resources, TPWD is positioned to provide technical assistance during the water planning process. Although TPWD has limited regulatory authority over the use of state waters, TPWD is committed to working with stakeholders and others to provide science-based information during the water planning process intended to avoid or minimize impacts to state fish and wildlife resources.

TPWD understands that regional water planning groups are guided by 31 TAC §357 when preparing regional water plans. These water planning rules spell out requirements related to natural resource and environmental protection. Accordingly, TPWD staff reviewed the IPP with a focus on the following questions:

- Does the IPP include a quantitative reporting of environmental factors including the effects on environmental water needs and habitat?
- Does the IPP include a description of natural resources and threats to natural resources due to water quantity or quality problems?
- Does the IPP discuss how these threats will be addressed?
- Does the IPP describe how it is consistent with long-term protection of natural resources?
- Does the IPP include water conservation as a water management strategy?
- Does the IPP include Drought Contingency Plans?
- Does the IPP recommend any stream segments be nominated as ecologically unique?
- If the IPP includes strategies identified in the 2010 regional water plan, does it address concerns raised by TPWD in connection with the 2010 Water Plan.

4200 SMITH SCHOOL ROAD
AUSTIN, TEXAS 78744-3291
512.389.4800
www.tpwd.texas.gov

The ETRWPA consists of all or portions of 20 counties located in the Neches, Sabine, and Trinity River Basins, and the Neches-Trinity Coastal Basin. The population of the ETRWPA was 1.07 million in 2010 and is expected to increase to 1.55 million by 2070. Regional water use, which is projected to be about 1.1 million acre-feet in 2020, is expected to increase to more than 1.6 million acre-feet by 2070. Approximately 55 percent of the current water use in ETRWPA is for manufacturing, primarily in the petrochemical industry in Jefferson County. Municipal water use accounts for about 17 percent of water use in ETRWPA. Most of the available water in the ETRWPA is surface water. Approximately 15 percent of the total freshwater supply is groundwater.

The ETRWPA IPP adequately describes the natural resources of the region. Aquatic resources including major rivers, estuaries, springs, and wetlands are discussed as well as terrestrial habitats and state and federal parks. Appendix 1-A lists Species of Special Concern in the ETRWPA.
Threats to natural resources due to water quantity or quality problems are also discussed. Aquifer depletion, saltwater intrusion, insufficient environmental flows and inundation due to reservoir construction are described. According to the IPP, between 1955 and 1992 overpumping of aquifers resulted in approximately 19,900 acres of estuarine intertidal emergent wetlands being lost in Texas as a result of submergence (drowning) and erosion.

Two major aquifers that underlie the region are the Carrizo-Wilcox and the Gulf Coast aquifers. Over 250 springs of various sizes have been documented in the ETRWPA. TPWD concurs with the statement that springs are an important source of water for local supplies and provide crucial water for wildlife. TWDB planning rules now require that groundwater supplies not exceed the Modeled Available Groundwater (MAG) values that were determined to meet the desired future conditions (DFCs) of the groundwater source. However, adopted DFCs for the primary aquifers in ETRWPA do not address protection of springs or groundwater surface water interaction. Ultimately TPWD would like to see DFCs adopted to protect these features.

Currently, over 25 percent of the municipal water users in the ETRWPA use less than 100 gallons per capita per day (gpcd) and 62 percent use less than the Water Conservation Implementation Task Force recommended 140 gpcd. According to the IPP, the projected total water savings are projected to be just over 5,000 acre-feet in 2020 increasing to over 20,000 acre-feet by 2070. TPWD commends Region I for progress made toward implementing municipal water conservation strategies and encourages further progress towards implementing manufacturing and irrigation water conservation strategies. Chapter 7 of the IPP includes existing drought contingency plans (DCPs). Drought management measures are not recommended as a water management strategy to provide additional supplies for the ETRWPA.

Other proposed water management strategies (WMS) include water reuse, expanded use of existing supplies and groundwater, and development of new reservoirs. Lake Columbia and the Fastrill Reservoir replacement project (also called the Neches Off-Channel Reservoir Project) are recommended as strategies for meeting future water needs. TPWD agrees that environmental impacts associated with the development of a new reservoir can be significant. Construction of off-channel reservoirs can also help to minimize wildlife impacts if reservoirs are located to minimize inundation of habitats and diversions are modified to avoid impacts to environmental flows. TPWD has worked closely with the Angelina Neches River Authority to minimize impacts to fish and wildlife resources associated with the construction of the proposed Lake Columbia.

Water management strategies were evaluated for impacts as addressed in Chapter 5B of this Plan. The evaluation was based on a numeric evaluation from most desirable (1) to least desirable (5). According to the IPP, both Lake Columbia and the Neches River Off-Channel Reservoir Project scored "3" medium environmental impacts. Table 1.9 lists potential impacts to fish and wildlife associated with the proposed Lake Columbia as well as Rockland Reservoir, Bon Weir Reservoir, and Tennessee Colony Reservoir. Protection of environmental flows, including recently adopted environmental flow standards, is briefly discussed in Chapter 3 of the IPP. TPWD agrees that the implementation of environmental flow recommendations will result in a need to more carefully consider environmental flow needs during the development of surface water management strategies.

As in the previous planning cycles TPWD staff appreciates the consideration the planning group gave to evaluating whether to recommend stream segments as ecologically unique. Ultimately the ETRWPA voted not to recommend any stream segments in the region for unique status, concluding that sufficient programs are already in place to protect the region's streams from inappropriate reservoir construction. TPWD continues to see the importance of recommending and designating significant stream segments and will support ETRWPA in this regard if requested in the next planning cycle.

We appreciate the opportunity to provide these comments. While TPWD values and appreciates the need to meet future water supply demands, we must do so in a thoughtful and sound manner that ensures the ecological health of our state's aquatic and natural resources. If you have any questions, or if we can be of any assistance, please feel to contact Cindy Loeffler at 512-389-8715. Thank you.

Sincerely,

Ross Melinchuk
Deputy Executive Director, Natural Resources

RM:CL:ms

cc: Robin Riechers, Division Director, Coastal Fisheries Division, TPWD
Clayton Wolf, Division Director, Wildlife Division, TPWD
Terry Stelly, Coastal Fisheries Division, TPWD

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# UPPER NECHES RIVER MUNICIPAL WATER AUTHORITY

RECEIVED
AUG 21 2015
APAI - AUSTIN

August 18, 2015

Region I ETRWPG
% City of Nacogdoches
P.O. Box 635030
Nacogdoches, TX 75963-5030
Attn: Lila Fuller

Via: Email: fullm@ci-nacogdoches.tx.us
U.S. Post

Re: Comments on the 2016 Initially Prepared Region I Water Plan

Dear Sir:

The Upper Neches River Municipal Water Authority respectfully submits the attached comments regarding the 2016 Initially Prepared Region I Water Plan.

We appreciate this opportunity.

If there are any questions, or if any additional information is necessary or required, please contact us at your convenience.

Sincerely,

Monty D. Shank
General Manager
Upper Neches River Municipal Water Authority
P.O. Box 1965
Palestine, TX 75802
Phone: 903-876-2237
Fax: 903-876-5200
mdsunra@dctexas.net

Enclosure

XC: Rex Hunt, Principal
Alan Plummer and Associates, Inc.
6300 La Calma, Suite 400
Austin, TX 78752

Sam Vaugh, PE, Vice President/Professional Associate
HDR Engineering, Inc.
4401 West Gate Blvd., Suite 400
Austin, Texas 78745

*Upper Neches River Municipal Water Authority*

## Comments on the East Texas Regional Water Planning Area 2016 Initially Prepared Plan

**August 18, 2015**

1) Page 1-36 – Replace "Upper Neches River Authority" with "Upper Neches River Municipal Water Authority."
2) Page 5A-16 – The last two sentences of the first paragraph are duplicative of the previous two sentences and should be deleted.
3) Page 5A-18 – Replace the partial sentence at the top of the page with: "construction of an off-channel storage reservoir, which would be located on a tributary of the Neches River in Anderson County downstream of Lake Palestine and upstream of the Weches Dam Site."
4) Page 5B-3 – Please revise the last sentence. The UNRMWA does not presently intend to meet future steam-electric water needs in Anderson County with supplies from the recommended Neches Run-of-River water management strategy.
5) Page 5B-4 – Please revise text in the first paragraph. The UNRMWA does not presently intend to meet future steam-electric water needs in Anderson County with supplies from the recommended Neches Run-of-River water management strategy.
6) Page 5B-117 – In the first sentence, replace "2014" with "2015."
7) Page 5B-117 – Revise text of second paragraph to reflect UNRMWA intent to develop the recommended Neches Run-of-River water management strategy in the same configuration as included in the 2014 draft *Dallas Long Range Water Supply Plan to 2070 and Beyond* (i.e. with a firm yield of 47,250 acft/yr (42 MGD) and projected to meet Dallas needs starting in 2060). See Comments #4 and #5.
8) Page 5B-118 - After the first sentence in the paragraph regarding Neches Run-of-River Diversions with Tributary Storage (Alternate), insert the following sentence: "This alternate strategy includes system operations with Lake Palestine." System operations of this alternate strategy with Lake Palestine could result in a firm yield of 75,000 acft/yr (67 MGD) at a unit cost of $434/acft/yr during the debt service period. Revise the last sentence in this paragraph accordingly.
9) Page 5B-118 - After the second sentence in the paragraph regarding Neches Run-of-River Diversions with Groundwater (Alternate), insert the following sentence: "This alternate strategy includes system operations with Lake Palestine." System operations of this alternate strategy with Lake Palestine could result in a firm yield of 84,875 acft/yr (76 MGD) at a unit cost of $414/acft/yr during the debt service period. Revise the last sentence in this paragraph accordingly.
10) Page 5B-119 – Revise table pursuant to Comments #4, #5, and #7.
11) Page 5B-120 – Revise table and figure pursuant to Comments #4, #5, #7, #8, and #9.
12) Page 5B-121 – Revise table pursuant to Comment #4, #5, and #7.

13) Page 5B-128 – Revise table pursuant to Comments #4, #5, #7, #8, and #9.
14) Page 8-8 – Revise the footnote for Table 8.3 to reflect that the size of the Neches River National Wildlife Refuge was 3,729 acres as of September 2013.
15) Page 8-17 – In the second to last sentence, replace "275 ft msl" with "274 ft-msl."
16) Pages Appendix 5B-3 through 5B-5 – In this Technical Memorandum regarding purchase of water from the City of Palestine for Anderson County steam-electric power needs, delete the fourth and fifth sentences under the heading Supply Development pursuant to Comments #4, #5, and #7. Additional revisions may be needed throughout the Technical Memorandum.
17) Pages Appendix 5B-6 through 5B-8 – Delete or substantially revise this Technical Memorandum regarding purchase of water from UNRMWA for Anderson County steam-electric power needs pursuant to Comments #4, #5, and #7.
18) Pages Appendix 5B-21 through 5B-23 – Revise this Technical Memorandum regarding purchase of water from UNRMWA for City of Chandler needs to reflect that the UNRMWA does not presently intend to meet future municipal water needs in Henderson County with supplies from the recommended Neches Run-of-River water management strategy.
19) Pages Appendix 5B-187 through 5B-189 – Revise this Technical Memorandum regarding the recommended Neches Run-of-River water management strategy as follows:
    a. Page Appendix 5B-187 – In the title, replace "Region C" with "ETRWPA."
    b. Page Appendix 5B-187 – Revise Potential Supply Quantity to "47,250 acft/yr (42 MGD)."
    c. Page Appendix 5B-187 – Revise Implementation Decade to "2020 (2020)."
    d. Page Appendix 5B-187 – Revise Strategy Capital Cost to "$226,790,000 (Sept. 2013)."
    e. Page Appendix 5B-187 – Revise Unit Water Cost to "$1.44 per1,000 gallons (during loan period)."
    f. Page Appendix 5B-187 – Revise the last sentence in the second paragraph under Strategy Description to read: "Hence, the run-of-the-river project would be operated as a system with Lake Palestine using available storage capacity therein during drought."
    g. Page Appendix 5B-187 – In the last sentence, replace "62 MGD (68,625 acre-feet/year)" with "42 MGD (47,250 acre-feet/year)."
    h. Page Appendix 5B-188 – Delete the second paragraph and replace with: "It should be noted that the project configuration for the recommended Neches Run-of-River WMS for UNRMWA in the ETRWPA Regional Plan is identical to the configuration discussed in the *2014 Dallas Long Range Water Supply Plan to 2070 and Beyond* (Draft LRWSP). The project configuration discussed in the City of Dallas Draft LRWSP resulted in a firm yield of 47,250 acft/yr (42 MGD) that is projected to meet Dallas needs starting in 2060."
    i. Page Appendix 5B-188 – After the first sentence in the paragraph regarding Neches Run-of-River Diversions with Tributary Storage (Alternate), insert the

following sentence: "This alternate strategy includes system operations with Lake Palestine." System operations of this alternate strategy with Lake Palestine could result in a firm yield of 75,000 acft/yr at a unit cost of $434/acft/yr during the debt service period.

j. Page Appendix 5B-188 – After the second sentence in the paragraph regarding Neches Run-of-River Diversions with Groundwater (Alternate), insert the following sentence: "This alternate strategy includes system operations with Lake Palestine." System operations of this alternate strategy with Lake Palestine could result in a firm yield of 84,875 acft/yr at a unit cost of $414/acft/yr during the debt service period.

k. Page Appendix 5B-189 – Under the heading of Environmental Considerations, delete the table which is for the Nueces Off-Channel Reservoir. The recommended Neches Run-of-River water management strategy does not include an off-channel reservoir.

l. Page Appendix 5B-189 – Under the heading of Water Management Strategy Evaluation, revise the Rating and Explanation information to appropriately reflect the recommended Neches Run-of-River water management strategy focusing on the following Criteria: Quantity, Environmental Factors, Threat to Agricultural Resources/Rural Areas, Other Natural Resources, and Major Impacts on Key Water Quality Parameters. The recommended Neches Run-of-River water management strategy does not include an off-channel reservoir.

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# Appendix 10-D

# Initially Prepared Plan Submittal Letter

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Attached as Appendix 10-D is the letter the East Texas Regional Water Planning Group chair, Kelley Holcomb, informing the Texas Water Development Board (TWDB) of the approval and adoption of the 2016 Initially Prepared Plan. This submittal letter accompanied the submittal documents when delivered to the TWDB.

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Region I
East Texas Regional
Water Planning Group

Kelley Holcomb, Chair
P.O. Box 387
Lufkin TX 75902
936-633-7543

May 1, 2015

Mr. Kevin Patteson
Executive Administrator
Texas Water Development Board
1700 North Congress Avenue
Austin, TX 78711-3231

Re: Submission of the Region I, East Texas Regional Water Planning Group 2016 Initially Prepared Plan

Dear Mr. Patteson:

The Region I, East Texas Regional Water Planning Group (ETRWPG) met on April 8, 2015 and formally adopted the 2016 Initially Prepared Plan (IPP) and approved its submission to the Texas Water Development Board (TWDB) commensurate with the May 1, 2015 deadline. The submittal was mailed to your office via overnight delivery.

The submission of the IPP includes twelve (12) double-sided copies and two (2) electronic copies of the 2016 East Texas IPP. The electronic submittal includes the following documents:

- The 2016 East Texas IPP in searchable Portable Document Format
- The 2016 East Texas IPP in Microsoft Word Format

If you have any questions regarding this matter, please contact me at 936-633-7543. I appreciate the opportunity to work with the TWDB and your staff on this matter.

Respectfully,

Kelley Holcomb, Chair
East Texas Regional Water Planning Group

Lila Fuller, Administrative Contact ▪ P.O. Box 635030 ▪ Nacogdoches, Texas 75963-5030
Phone: 936-559-2504 ▪ Fax: 936-559-2912

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# Appendix 11-A

# TWDB Implementation Survey

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The results of the Implementation Survey can be seen in the attachment included on page Appendix 11-A-3 through Appendix 11-A-6. The survey was used to analyze the 2011 projects and the 2016 projects in order to determine the progression and current status of proposed projects from the previous planning cycle.

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| Sponsor and Recommended Water Mangement Strategy | Sponsor | Recommended Water Management Strategy | Sponsor Region | WMS Sponsor Entity Id | DBProjectId | CapitalCost | SS2010 | SS2020 | SS2030 | SS2040 | SS2050 | SS2060 | Y denotes strategies with supply volumes included in other strategies | Project Description | Infrastructure Type* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ANGELINA & NECHES RIVER AUTHORITY : Angelina-Neches River Authority Treatment and Distribution System | ANGELINA & NECHES RIVER AUTHORITY | Angelina-Neches River Authority Treatment and Distribution System | I | 3 | 830 | $35,127,250 | 0 | 0 | 0 | 0 | 0 | 0 | Y | Water Treatment Plant and Distribution System | Water Treatment Plant |
| ANGELINA & NECHES RIVER AUTHORITY : New source - Lake Columbia | ANGELINA & NECHES RIVER AUTHORITY | New source - Lake Columbia | I | 3 | 458 | $231,865,000 | 0 | 75,700 | 75,700 | 75,700 | 75,700 | 75,700 | N | New Reservoir | Impoundment |
| APPLEBY WSC : Lake Noconiche Regional Supply System | APPLEBY WSC | Lake Noconiche Regional Supply System | I | 193 | 835 | $4,392,350 | 0 | 300 | 300 | 300 | 300 | 300 | N | Assumes Nacogdoches County will seek water right amendment for municipal water use designation and develop regional distribution system | Water Treatment Plant |
| APPLEBY WSC : Municipal conservation | APPLEBY WSC | Municipal conservation | I | 193 | 439 | $0 | 0 | 0 | 0 | 22 | 39 | 62 | N | Municipal conservation | No Infrastructure |
| ATHENS : Indirect reuse | ATHENS | Indirect reuse | I | 205 | 449 | $0 | 0 | 19 | 29 | 42 | 65 | 94 | Y | Contract to require Fish Hatury to return unused water to Lake Athens (current operations) | No Infrastructure |
| ATHENS : Municipal conservation | ATHENS | Municipal conservation | I | 205 | 439 | $0 | 1 | 6 | 12 | 17 | 22 | 30 | N | Municipal conservation | No Infrastructure |
| ATHENS MUNICIPAL WATER AUTHORITY : Forest Grove Reservoir project | ATHENS MUNICIPAL WATER AUTHORITY | Forest Grove Reservoir project | I | 6 | 451 | $26,619,000 | 0 | 0 | 0 | 2,240 | 2,240 | 2,240 | N | Amend water right for municipal water use. | Other |
| ATHENS MUNICIPAL WATER AUTHORITY : Indirect reuse | ATHENS MUNICIPAL WATER AUTHORITY | Indirect reuse | I | 6 | 449 | $0 | 0 | 2,872 | 2,872 | 2,872 | 2,872 | 2,872 | N | Contract to require Fish Hatury to return unused water to Lake Athens (current operations) | No Infrastructure |
| ATHENS MUNICIPAL WATER AUTHORITY : New water treatment plant | ATHENS MUNICIPAL WATER AUTHORITY | New water treatment plant | I | 6 | 463 | $12,387,000 | 0 | 0 | 0 | 0 | 0 | 2,240 | Y | Expand treatment capacity | Water Treatment Plant |
| ATHENS MUNICIPAL WATER AUTHORITY : Overdraft Carrizo Wilcox Aquifer | ATHENS MUNICIPAL WATER AUTHORITY | Overdraft Carrizo Wilcox Aquifer | I | 6 | 444 | $3,799,000 | 0 | 1,400 | 1,400 | 1,400 | 1,400 | 1,400 | N | New groundwater wells. These wells have been permitted. | Other |
| BROWNSBORO : Overdraft Carrizo Wilcox Aquifer | BROWNSBORO | Overdraft Carrizo Wilcox Aquifer | I | 299 | 444 | $148,600 | 0 | 0 | 0 | 0 | 0 | 40 | N | Assumed met by existing wellfield | Other |
| BULLARD : Municipal conservation | BULLARD | Municipal conservation | I | 310 | 439 | $0 | 0 | 3 | 4 | 5 | 6 | 8 | N | Municipal conservation | No Infrastructure |
| BULLARD : New wells - Carrizo Wilcox Aquifer | BULLARD | New wells - Carrizo Wilcox Aquifer | I | 310 | 443 | $305,674 | 0 | 100 | 100 | 100 | 200 | 200 | N | Expand existing well field | Wells |
| CENTER : Municipal conservation | CENTER | Municipal conservation | I | 26 | 439 | $0 | 15 | 34 | 47 | 60 | 67 | 75 | N | Municipal conservation | No Infrastructure |
| COMMUNITY WATER COMPANY : New wells - Carrizo Wilcox Aquifer | COMMUNITY WATER COMPANY | New wells - Carrizo Wilcox Aquifer | I | 393 | 443 | $1,640,776 | 100 | 121 | 121 | 227 | 227 | 227 | N | Plan states the recommended strategy is to purchase water from provider | Wells |
| CONSOLIDATED WSC : Purchase water from provider (1) | CONSOLIDATED WSC | Purchase water from provider (1) | I | 398 | 440 | $0 | 1,050 | 1,050 | 1,050 | 1,050 | 1,050 | 1,050 | Y | Purchase from Houston County | No Infrastructure |
| COUNTY-OTHER, ANDERSON : New wells - Queen City Aquifer | COUNTY-OTHER, ANDERSON | New wells - Queen City Aquifer | I | 412 | 445 | $212,732 | 0 | 0 | 0 | 0 | 0 | 100 | N | New wells - Queen City Aquifer | Wells |
| COUNTY-OTHER, ANDERSON : Overdraft Carrizo Wilcox Aquifer | COUNTY-OTHER, ANDERSON | Overdraft Carrizo Wilcox Aquifer | I | 412 | 444 | $262,189 | 0 | 0 | 0 | 100 | 100 | 100 | N | Overdraft Carrizo Wilcox Aquifer | Other |
| COUNTY-OTHER, ANGELINA : New wells - Yegua Jackson Aquifer | COUNTY-OTHER, ANGELINA | New wells - Yegua Jackson Aquifer | I | 414 | 448 | $419,717 | 0 | 0 | 150 | 150 | 300 | 300 | N | New wells - Yegua Jackson Aquifer | Wells |
| COUNTY-OTHER, ANGELINA : Purchase water from provider (2) | COUNTY-OTHER, ANGELINA | Purchase water from provider (2) | I | 414 | 441 | $0 | 0 | 0 | 0 | 0 | 500 | 500 | N | This is a distribution system for Lufkin to supply smaller entities in Angelina County. Strategies #120 and 121 are the same strategy. | No Infrastructure |
| COUNTY-OTHER, ANGELINA : Purchase water from provider (2) | COUNTY-OTHER, ANGELINA | Purchase water from provider (2) | I | 414 | 441 | $10,604,000 | 0 | 0 | 1,100 | 1,100 | 600 | 600 | Y | This is a distribution system for Lufkin to supply smaller entities in Angelina County. Strategies #120 and 121 are the same strategy. | Pipeline |
| COUNTY-OTHER, HARDIN : New wells - Gulf Coast Aquifer | COUNTY-OTHER, HARDIN | New wells - Gulf Coast Aquifer | I | 511 | 446 | $0 | 0 | 0 | 0 | 1 | 1 | 2 | N | New wells - Gulf Coast Aquifer | Wells |
| COUNTY-OTHER, HARDIN : Overdraft Gulf Coast Aquifer | COUNTY-OTHER, HARDIN | Overdraft Gulf Coast Aquifer | I | 511 | 643 | $556,888 | 154 | 306 | 306 | 306 | 459 | 459 | N | Overdraft Gulf Coast Aquifer | Other |
| COUNTY-OTHER, HENDERSON : Municipal conservation | COUNTY-OTHER, HENDERSON | Municipal conservation | I | 518 | 439 | $0 | 31 | 57 | 74 | 92 | 108 | 129 | N | Municipal conservation | No Infrastructure |
| COUNTY-OTHER, HENDERSON : New wells - Carrizo Wilcox Aquifer | COUNTY-OTHER, HENDERSON | New wells - Carrizo Wilcox Aquifer | I | 518 | 443 | $609,900 | 50 | 50 | 50 | 50 | 50 | 50 | N | New wells - Carrizo Wilcox Aquifer | Wells |
| COUNTY-OTHER, HENDERSON : New wells - Queen City Aquifer | COUNTY-OTHER, HENDERSON | New wells - Queen City Aquifer | I | 518 | 445 | $4,420,100 | 50 | 50 | 50 | 100 | 200 | 500 | N | New wells - Queen City Aquifer | Wells |
| COUNTY-OTHER, HENDERSON : Overdraft Carrizo Wilcox Aquifer | COUNTY-OTHER, HENDERSON | Overdraft Carrizo Wilcox Aquifer | I | 518 | 444 | $0 | 100 | 0 | 0 | 0 | 0 | 0 | N | Overdraft Carrizo Wilcox Aquifer | No Infrastructure |
| COUNTY-OTHER, HENDERSON : Purchase water from provider (2) | COUNTY-OTHER, HENDERSON | Purchase water from provider (2) | I | 518 | 441 | $8,937,350 | 0 | 150 | 200 | 300 | 400 | 500 | N | UNRMWA, Palestine | No Infrastructure |
| COUNTY-OTHER, JASPER : New wells - Gulf Coast Aquifer | COUNTY-OTHER, JASPER | New wells - Gulf Coast Aquifer | I | 532 | 446 | $393,088 | 82 | 82 | 82 | 82 | 82 | 82 | N | New wells - Gulf Coast Aquifer | Wells |
| COUNTY-OTHER, JASPER : Overdraft Gulf Coast Aquifer | COUNTY-OTHER, JASPER | Overdraft Gulf Coast Aquifer | I | 532 | 643 | $1,369,957 | 550 | 550 | 550 | 550 | 550 | 550 | N | Overdraft Gulf Coast Aquifer | Other |
| COUNTY-OTHER, NACOGDOCHES : Lake Noconiche Regional Supply System | COUNTY-OTHER, NACOGDOCHES | Lake Noconiche Regional Supply System | I | 585 | 835 | $7,320,600 | 0 | 500 | 500 | 500 | 500 | 500 | N | Assumes sponsor (Nacogdoches County) will seek water right amendment for municipal purposes and develop regional distribution system. | Other |
| COUNTY-OTHER, NACOGDOCHES : Purchase water from provider (1) | COUNTY-OTHER, NACOGDOCHES | Purchase water from provider (1) | I | 585 | 440 | $0 | 0 | 428 | 428 | 428 | 428 | 428 | Y | ANRA, Lake Columbia | No Infrastructure |

| Sponsor and Recommended Water Mangement Strategy | Sponsor | Recommended Water Management Strategy | Sponsor Region | WMS Sponsor Entity Id | DBProjectId | CapitalCost | SS2010 | SS2020 | SS2030 | SS2040 | SS2050 | SS2060 | Y denotes strategies with supply volumes included in other strategies | Project Description | Infrastructure Type* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| COUNTY-OTHER, ORANGE : Overdraft Gulf Coast Aquifer | COUNTY-OTHER, ORANGE | Overdraft Gulf Coast Aquifer | I | 592 | 643 | $432,222 | 140 | 140 | 140 | 140 | 140 | 140 | N | Overdraft Gulf Coast Aquifer | Other |
| COUNTY-OTHER, POLK : New wells - Gulf Coast Aquifer | COUNTY-OTHER, POLK | New wells - Gulf Coast Aquifer | I | 598 | 446 | $2,991,138 | 208 | 417 | 624 | 832 | 832 | 832 | N | New wells - Gulf Coast Aquifer | Wells |
| COUNTY-OTHER, SABINE : New wells - Carrizo Wilcox Aquifer | COUNTY-OTHER, SABINE | New wells - Carrizo Wilcox Aquifer | I | 613 | 443 | $328,840 | 32 | 32 | 32 | 64 | 64 | 64 | N | New wells - Carrizo Wilcox Aquifer | Wells |
| COUNTY-OTHER, SHELBY : New wells - Carrizo Wilcox Aquifer | COUNTY-OTHER, SHELBY | New wells - Carrizo Wilcox Aquifer | I | 621 | 443 | $2,278,400 | 100 | 200 | 300 | 300 | 350 | 350 | N | New wells - Carrizo Wilcox Aquifer | Wells |
| COUNTY-OTHER, SHELBY : Purchase water from provider (1) | COUNTY-OTHER, SHELBY | Purchase water from provider (1) | I | 621 | 440 | $0 | 50 | 50 | 50 | 50 | 50 | 50 | N | SRA, Toledo Bend | No Infrastructure |
| COUNTY-OTHER, SHELBY : Purchase water from provider (2) | COUNTY-OTHER, SHELBY | Purchase water from provider (2) | I | 621 | 441 | $3,024,150 | 150 | 150 | 150 | 150 | 150 | 150 | N | Center, Center Lake | Other |
| COUNTY-OTHER, TRINITY : New wells - Yegua Jackson Aquifer | COUNTY-OTHER, TRINITY | New wells - Yegua Jackson Aquifer | I | 639 | 448 | $249,851 | 0 | 0 | 0 | 60 | 60 | 60 | N | New wells - Yegua Jackson Aquifer | Wells |
| COUNTY-OTHER, TYLER : New wells - Gulf Coast Aquifer | COUNTY-OTHER, TYLER | New wells - Gulf Coast Aquifer | I | 640 | 446 | $366,241 | 0 | 251 | 251 | 251 | 251 | 251 | N | New wells - Gulf Coast Aquifer | Wells |
| D&M WSC : New wells - Carrizo Wilcox Aquifer | D&M WSC | New wells - Carrizo Wilcox Aquifer | I | 2688 | 443 | $492,348 | 0 | 0 | 310 | 310 | 310 | 310 | N | New wells - Carrizo Wilcox Aquifer | Wells |
| DIBOLL : Municipal conservation | DIBOLL | Municipal conservation | I | 713 | 439 | $0 | 11 | 20 | 26 | 34 | 53 | 72 | N | Municipal conservation | No Infrastructure |
| DIBOLL : New wells - Yegua Jackson Aquifer | DIBOLL | New wells - Yegua Jackson Aquifer | I | 713 | 448 | $576,576 | 600 | 600 | 600 | 600 | 600 | 600 | N | Expand City's current wellfield | Wells |
| DIBOLL : Purchase water from provider (2) | DIBOLL | Purchase water from provider (2) | I | 713 | 441 | $6,195,000 | 800 | 800 | 800 | 800 | 1,600 | 1,600 | Y | Purchase water from Lufkin, Abitibi wellfield in Carizzo-Wilcox | Other |
| FOUR WAY WSC : Purchase water from provider (2) | FOUR WAY WSC | Purchase water from provider (2) | I | 811 | 441 | $669,192 | 0 | 0 | 0 | 0 | 0 | 225 | N | Particpant in the Lufkin Agenlina Regional Project | Other |
| FRANKSTON : Municipal conservation | FRANKSTON | Municipal conservation | I | 813 | 439 | $0 | 0 | 0 | 6 | 7 | 8 | 9 | N | Municipal conservation | No Infrastructure |
| FRANKSTON : New wells - Carrizo Wilcox Aquifer | FRANKSTON | New wells - Carrizo Wilcox Aquifer | I | 813 | 443 | $255,951 | 0 | 0 | 121 | 121 | 121 | 121 | N | New wells - Carrizo Wilcox Aquifer | Wells |
| HOUSTON COUNTY WCID #1 : Permit amendment - Houston County Lake | HOUSTON COUNTY WCID #1 | Permit amendment - Houston County Lake | I | 77 | 831 | $0 | 3,500 | 3,500 | 3,500 | 3,500 | 3,500 | 3,500 | N | Houston County | No Infrastructure |
| HUDSON : Purchase water from provider (1) | HUDSON | Purchase water from provider (1) | I | 962 | 440 | $0 | 0 | 0 | 125 | 400 | 800 | 1,200 | Y | Hudson WSC, Carizzo-Wilcox | No Infrastructure |
| HUDSON WSC : New wells - Carrizo Wilcox Aquifer | HUDSON WSC | New wells - Carrizo Wilcox Aquifer | I | 964 | 443 | $3,274,192 | 0 | 0 | 600 | 600 | 2,000 | 2,000 | N | New well field | Wells |
| IRRIGATION, HARDIN : Purchase water from provider (2) | IRRIGATION, HARDIN | Purchase water from provider (2) | I | 1074 | 441 | $2,405,001 | 1,002 | 1,002 | 1,002 | 1,002 | 1,002 | 1,002 | N | LNVA, Rayburn | Other |
| IRRIGATION, HENDERSON : Indirect reuse | IRRIGATION, HENDERSON | Indirect reuse | I | 1081 | 449 | $0 | 0 | 70 | 83 | 95 | 108 | 121 | Y | AMWA, recycled water from Hatchery | No Infrastructure |
| IRRIGATION, HOUSTON : New wells - Carrizo Wilcox Aquifer | IRRIGATION, HOUSTON | New wells - Carrizo Wilcox Aquifer | I | 1087 | 443 | $3,205,560 | 766 | 1,149 | 1,149 | 1,639 | 1,915 | 2,298 | N | New wells - Carrizo Wilcox Aquifer | Wells |
| IRRIGATION, SAN AUGUSTINE : New wells - Carrizo Wilcox Aquifer | IRRIGATION, SAN AUGUSTINE | New wells - Carrizo Wilcox Aquifer | I | 1168 | 443 | $224,690 | 100 | 100 | 100 | 100 | 100 | 100 | N | New wells - Carrizo Wilcox Aquifer | Wells |
| IRRIGATION, SMITH : New wells - Queen City Aquifer | IRRIGATION, SMITH | New wells - Queen City Aquifer | I | 1177 | 445 | $357,794 | 40 | 40 | 80 | 120 | 168 | 168 | N | New wells - Queen City Aquifer | Wells |
| JACKSON WSC : Purchase water from provider (2) | JACKSON WSC | Purchase water from provider (2) | I | 1224 | 441 | $0 | 0 | 600 | 600 | 600 | 600 | 600 | Y | ANRA, Lake Columbia; Participant in ANRA Regional Project (I1) | No Infrastructure |
| JACKSONVILLE : Infrastructure improvements | JACKSONVILLE | Infrastructure improvements | I | 79 | 833 | $1,000,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | N | Improvements at City's WTP to allow greater amount of water to be treated. | Water Treatment Plant |
| JACKSONVILLE : Purchase water from provider (3) | JACKSONVILLE | Purchase water from provider (3) | I | 79 | 442 | $19,133,700 | 0 | 1,700 | 1,700 | 1,700 | 1,700 | 1,700 | Y | Contract with ANRA; construct own intake and pipeline | Pipeline |
| KIRBYVILLE : Municipal conservation | KIRBYVILLE | Municipal conservation | I | 1270 | 439 | $0 | 3 | 4 | 5 | 6 | 7 | 7 | N | Municipal conservation | No Infrastructure |
| LILLY GROVE SUD : Lake Noconiche Regional Supply System | LILLY GROVE SUD | Lake Noconiche Regional Supply System | I | 1322 | 835 | $7,320,600 | 0 | 0 | 0 | 0 | 500 | 500 | N | Assumes sponsor (Nacogdoches County) will seek water right amendment for municipal purposes and develop regional distribution system. | Pipeline |
| LILLY GROVE SUD : New wells - Carrizo Wilcox Aquifer | LILLY GROVE SUD | New wells - Carrizo Wilcox Aquifer | I | 1322 | 443 | $580,504 | 0 | 0 | 0 | 0 | 500 | 500 | N | New wells - Carrizo Wilcox Aquifer | Wells |
| LINDALE RURAL WSC : Municipal conservation | LINDALE RURAL WSC | Municipal conservation | I | 1325 | 439 | $0 | 0 | 0 | 5 | 7 | 9 | 12 | N | Municipal conservation | No Infrastructure |
| LINDALE RURAL WSC : New wells - Carrizo Wilcox Aquifer | LINDALE RURAL WSC | New wells - Carrizo Wilcox Aquifer | I | 1325 | 443 | $347,259 | 0 | 0 | 0 | 0 | 0 | 80 | N | New wells - Carrizo Wilcox Aquifer | Wells |
| LIVESTOCK, ANGELINA : Expand local surface water supplies | LIVESTOCK, ANGELINA | Expand local surface water supplies | I | 1334 | 453 | $168,800 | 0 | 0 | 0 | 90 | 90 | 90 | N | Build new stock tanks | Other |
| LIVESTOCK, HENDERSON : Indirect reuse | LIVESTOCK, HENDERSON | Indirect reuse | I | 1438 | 449 | $0 | 0 | 1,288 | 1,477 | 1,647 | 1,820 | 1,983 | Y | Contract to require Fish Hatchery to return unused water to Lake Athens (which is current operations) | No Infrastructure |

| Sponsor and Recommended Water Mangement Strategy | Sponsor | Recommended Water Management Strategy | Sponsor Region | WMS Sponsor Entity Id | DBProjectId | CapitalCost | SS2010 | SS2020 | SS2030 | SS2040 | SS2050 | SS2060 | Y denotes strategies with supply volumes included in other strategies | Project Description | Infrastructure Type* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LIVESTOCK, HOUSTON : New wells - Carrizo Wilcox Aquifer | LIVESTOCK, HOUSTON | New wells - Carrizo Wilcox Aquifer | I | 1444 | 443 | $1,335,649 | 111 | 111 | 221 | 363 | 542 | 665 | N | New wells - Carrizo Wilcox Aquifer | Wells |
| LIVESTOCK, HOUSTON : New wells - Yegua Jackson Aquifer | LIVESTOCK, HOUSTON | New wells - Yegua Jackson Aquifer | I | 1444 | 448 | $1,335,649 | 110 | 130 | 221 | 300 | 342 | 416 | N | New wells - Yegua Jackson Aquifer | Wells |
| LIVESTOCK, NACOGDOCHES : New wells - Carrizo Wilcox Aquifer | LIVESTOCK, NACOGDOCHES | New wells - Carrizo Wilcox Aquifer | I | 1505 | 443 | $1,969,392 | 0 | 0 | 322 | 644 | 966 | 1,350 | N | New wells - Carrizo Wilcox Aquifer | Wells |
| LIVESTOCK, SABINE : Expand local surface water supplies | LIVESTOCK, SABINE | Expand local surface water supplies | I | 1533 | 453 | $562,700 | 50 | 100 | 107 | 200 | 210 | 300 | N | Build new stock tanks | Other |
| LIVESTOCK, SABINE : New wells - Carrizo Wilcox Aquifer | LIVESTOCK, SABINE | New wells - Carrizo Wilcox Aquifer | I | 1533 | 443 | $226,430 | 50 | 50 | 50 | 100 | 100 | 100 | N | New wells - Carrizo Wilcox Aquifer | Wells |
| LIVESTOCK, SAN AUGUSTINE : Expand local surface water supplies | LIVESTOCK, SAN AUGUSTINE | Expand local surface water supplies | I | 1534 | 453 | $562,700 | 0 | 50 | 100 | 200 | 200 | 300 | N | Build new stock tanks | Other |
| LIVESTOCK, SAN AUGUSTINE : New wells - Carrizo Wilcox Aquifer | LIVESTOCK, SAN AUGUSTINE | New wells - Carrizo Wilcox Aquifer | I | 1534 | 443 | $568,710 | 150 | 150 | 250 | 300 | 400 | 400 | N | New wells - Carrizo Wilcox Aquifer | Wells |
| LIVESTOCK, SHELBY : Expand local surface water supplies | LIVESTOCK, SHELBY | Expand local surface water supplies | I | 1541 | 453 | $689,600 | 0 | 0 | 500 | 500 | 500 | 500 | N | Build new stock tanks | Other |
| LIVESTOCK, SHELBY : New wells - Carrizo Wilcox Aquifer | LIVESTOCK, SHELBY | New wells - Carrizo Wilcox Aquifer | I | 1541 | 443 | $2,428,400 | 1,500 | 2,500 | 3,000 | 3,000 | 3,500 | 3,500 | N | New wells - Carrizo Wilcox Aquifer | Wells |
| LIVESTOCK, SHELBY : Purchase water from provider (2) | LIVESTOCK, SHELBY | Purchase water from provider (2) | I | 1541 | 441 | $4,763,200 | 0 | 0 | 0 | 4,000 | 4,000 | 4,000 | N | SRA, Toledo Bend | Other |
| LOWER NECHES VALLEY AUTHORITY : Permit amendment for Sam Rayburn Reservoir | LOWER NECHES VALLEY AUTHORITY | Permit amendment for Sam Rayburn Reservoir | I | 88 | 827 | $0 | 0 | 28,000 | 28,000 | 28,000 | 28,000 | 28,000 | N | Permit amendment for Sam Rayburn Reservoir | No Infrastructure |
| LOWER NECHES VALLEY AUTHORITY : Purchase water from provider (2) | LOWER NECHES VALLEY AUTHORITY | Purchase water from provider (2) | I | 88 | 441 | $39,168,200 | 0 | 0 | 0 | 0 | 36,000 | 36,000 | N | Purchase water from SRA, Toledo Bend. | Other |
| LOWER NECHES VALLEY AUTHORITY : Reallocation of flood storage (Rayburn) | LOWER NECHES VALLEY AUTHORITY | Reallocation of flood storage (Rayburn) | I | 88 | 828 | $0 | 0 | 0 | 0 | 0 | 122,000 | 122,000 | N | Reallocation of flood storage (Rayburn) | No Infrastructure |
| LOWER NECHES VALLEY AUTHORITY : Saltwater barrier conjunctive operation with Rayburn/Steinhagen | LOWER NECHES VALLEY AUTHORITY | Saltwater barrier conjunctive operation with Rayburn/Steinhagen | I | 88 | 826 | $2,000,000 | 0 | 111,000 | 111,000 | 111,000 | 111,000 | 111,000 | N | Saltwater barrier conjunctive operation with Rayburn/Steinhagen | Other |
| LOWER NECHES VALLEY AUTHORITY : Wholesale customer conservation | LOWER NECHES VALLEY AUTHORITY | Wholesale customer conservation | I | 88 | 889 | $1,400,000 | 20,000 | 30,000 | 33,000 | 35,000 | 40,000 | 40,000 | N | Water conservation associated with irrigation deliveries | Other |
| LUFKIN : Angelina County Regional Project | LUFKIN | Angelina County Regional Project | I | 91 | 460 | $53,164,000 | 0 | 0 | 0 | 11,210 | 11,210 | 11,210 | N | Regional distribution system to serve Angelina County-Other, Diboll, Four-Way WSC | Pipeline |
| LUFKIN : Lake Kurth Regional System | LUFKIN | Lake Kurth Regional System | I | 91 | 832 | $56,488,600 | 6,800 | 18,400 | 18,400 | 18,400 | 18,400 | 18,400 | N | Connect Lake Kurth to Lufkin | Pipeline |
| LUFKIN : Municipal conservation | LUFKIN | Municipal conservation | I | 91 | 439 | $0 | 50 | 117 | 189 | 249 | 319 | 408 | N | Municipal conservation | No Infrastructure |
| LUFKIN : New wells - Carrizo Wilcox Aquifer | LUFKIN | New wells - Carrizo Wilcox Aquifer | I | 91 | 443 | $14,097,000 | 4,650 | 4,650 | 4,650 | 4,650 | 4,650 | 4,650 | N | Develop well field purchased from Abitibi | Wells |
| MANUFACTURING, ANGELINA : Purchase water from provider (2) | MANUFACTURING, ANGELINA | Purchase water from provider (2) | I | 1622 | 441 | $26,176,750 | 6,800 | 21,351 | 21,351 | 22,651 | 25,351 | 27,351 | Y | Purchase water from different providers: ANRA, Lufkin | Other |
| MANUFACTURING, HARDIN : New wells - Gulf Coast Aquifer | MANUFACTURING, HARDIN | New wells - Gulf Coast Aquifer | I | 1686 | 446 | $429,542 | 114 | 114 | 114 | 114 | 114 | 114 | N | New wells - Gulf Coast Aquifer | Wells |
| MANUFACTURING, HOUSTON : Purchase water from provider (1) | MANUFACTURING, HOUSTON | Purchase water from provider (1) | I | 1698 | 440 | $0 | 30 | 30 | 30 | 30 | 30 | 30 | Y | Purchase water from Houston County | No Infrastructure |
| MANUFACTURING, NEWTON : New wells - Gulf Coast Aquifer | MANUFACTURING, NEWTON | New wells - Gulf Coast Aquifer | I | 1742 | 446 | $891,529 | 400 | 400 | 400 | 800 | 800 | 800 | N | New wells - Gulf Coast Aquifer | Wells |
| MANUFACTURING, ORANGE : Purchase water from provider (1) | MANUFACTURING, ORANGE | Purchase water from provider (1) | I | 1745 | 440 | $0 | 5,000 | 15,000 | 20,000 | 25,000 | 25,000 | 28,000 | N | Purchase water from SRA Canal System. | No Infrastructure |
| MANUFACTURING, ORANGE : Purchase water from provider (2) | MANUFACTURING, ORANGE | Purchase water from provider (2) | I | 1745 | 441 | $0 | 0 | 0 | 0 | 0 | 5,000 | 8,000 | N | Purchase water from SRA Toledo Bend Reservoir. Same strategy as #189 | No Infrastructure |
| MANUFACTURING, PANOLA : Purchase water from provider (1) | MANUFACTURING, PANOLA | Purchase water from provider (1) | I | 1747 | 440 | $0 | 96 | 116 | 132 | 147 | 161 | 187 | N | Carthage, Murvaul | No Infrastructure |
| MANUFACTURING, POLK : New wells - Gulf Coast Aquifer | MANUFACTURING, POLK | New wells - Gulf Coast Aquifer | I | 1751 | 446 | $581,344 | 0 | 225 | 225 | 450 | 450 | 450 | N | New wells - Gulf Coast Aquifer | Wells |
| MANUFACTURING, SAN AUGUSTINE : New wells - Carrizo Wilcox Aquifer | MANUFACTURING, SAN AUGUSTINE | New wells - Carrizo Wilcox Aquifer | I | 1762 | 443 | $33,300 | 10 | 10 | 10 | 10 | 10 | 10 | N | New wells - Carrizo Wilcox Aquifer | Wells |
| MANUFACTURING, SHELBY : Purchase water from provider (1) | MANUFACTURING, SHELBY | Purchase water from provider (1) | I | 1766 | 440 | $0 | 0 | 0 | 0 | 0 | 5 | 12 | N | Center, Carizzo-Wilcox | No Infrastructure |
| MANUFACTURING, SMITH : Purchase water from provider (2) | MANUFACTURING, SMITH | Purchase water from provider (2) | I | 1767 | 441 | $1,476,152 | 0 | 0 | 294 | 294 | 294 | 295 | N | Tyler, Palestine | Other |
| MAURICEVILLE SUD : New wells - Gulf Coast Aquifer | MAURICEVILLE SUD | New wells - Gulf Coast Aquifer | I | 1811 | 446 | $550,848 | 0 | 203 | 203 | 203 | 203 | 203 | N | New wells in Jasper County | Wells |
| MINING , SAN AUGUSTINE : Purchase water from provider (2) | MINING , SAN AUGUSTINE | Purchase water from provider (2) | I | 2692 | 441 | $8,212,450 | 1,000 | 6,500 | 0 | 0 | 0 | 0 | N | LNVA, Rayburn | Other |
| MINING , SAN AUGUSTINE : Purchase water from provider (2) | MINING , SAN AUGUSTINE | Purchase water from provider (2) | I | 2692 | 441 | $2,627,850 | 500 | 500 | 0 | 0 | 0 | 0 | Y | ANRA, Lake Columbia (river diversion) | Other |

| Sponsor and Recommended Water Mangement Strategy | Sponsor | Recommended Water Management Strategy | Sponsor Region | WMS Sponsor Entity Id | DBProjectId | CapitalCost | SS2010 | SS2020 | SS2030 | SS2040 | SS2050 | SS2060 | Y denotes strategies with supply volumes included in other strategies | Project Description | Infrastructure Type* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MINING , SHELBY : Purchase water from provider (1) | MINING , SHELBY | Purchase water from provider (1) | I | 2691 | 440 | $3,847,950 | 250 | 1,250 | 0 | 0 | 0 | 0 | N | SRA, Toledo Bend | Other |
| MINING , SHELBY : Purchase water from provider (2) | MINING , SHELBY | Purchase water from provider (2) | I | 2691 | 441 | $1,543,400 | 250 | 250 | 0 | 0 | 0 | 0 | Y | ANRA, Lake Columbia (river diversion) | Other |
| MINING, ANDERSON : New wells - Carrizo Wilcox Aquifer | MINING, ANDERSON | New wells - Carrizo Wilcox Aquifer | I | 1844 | 443 | $228,730 | 18 | 120 | 120 | 120 | 120 | 120 | N | New wells - Carrizo Wilcox Aquifer | Wells |
| MINING, ANGELINA : Purchase water from provider (2) | MINING, ANGELINA | Purchase water from provider (2) | I | 1846 | 441 | $5,793,150 | 2,000 | 4,000 | 0 | 0 | 0 | 0 | Y | ANRA (Lake Columbia or Angelina River); Lufkin (Lake Kurth) | Other |
| MINING, CHEROKEE : Purchase water from provider (2) | MINING, CHEROKEE | Purchase water from provider (2) | I | 1876 | 441 | $3,619,300 | 500 | 1,500 | 0 | 0 | 0 | 0 | Y | ANRA, Lake Columbia | Other |
| MINING, JEFFERSON : New wells - Gulf Coast Aquifer | MINING, JEFFERSON | New wells - Gulf Coast Aquifer | I | 1951 | 446 | $103,083 | 0 | 0 | 0 | 0 | 5 | 9 | N | New wells - Gulf Coast Aquifer | Wells |
| MINING, NACOGDOCHES : Purchase water from provider (2) | MINING, NACOGDOCHES | Purchase water from provider (2) | I | 1997 | 441 | $9,593,450 | 2,500 | 7,000 | 0 | 0 | 0 | 0 | Y | ANRA (Lake Columbia or Angelina River); LNVA | Other |
| MINING, RUSK : New wells - Carrizo Wilcox Aquifer | MINING, RUSK | New wells - Carrizo Wilcox Aquifer | I | 2021 | 443 | $241,600 | 0 | 0 | 0 | 158 | 158 | 158 | N | New wells - Carrizo Wilcox Aquifer | Wells |
| MINING, SMITH : New wells - Queen City Aquifer | MINING, SMITH | New wells - Queen City Aquifer | I | 2029 | 445 | $655,416 | 47 | 141 | 188 | 235 | 282 | 329 | N | New wells - Queen City Aquifer | Wells |
| NACOGDOCHES : Municipal conservation | NACOGDOCHES | Municipal conservation | I | 102 | 439 | $0 | 0 | 229 | 425 | 514 | 654 | 787 | N | Municipal conservation | No Infrastructure |
| NACOGDOCHES : New wells - Carrizo Wilcox Aquifer | NACOGDOCHES | New wells - Carrizo Wilcox Aquifer | I | 102 | 443 | $2,727,000 | 2,800 | 2,800 | 2,800 | 2,800 | 2,800 | 2,800 | N | Expand exisitng well field | Wells |
| NACOGDOCHES : Purchase water from provider (3) | NACOGDOCHES | Purchase water from provider (3) | I | 102 | 442 | $0 | 0 | 0 | 0 | 0 | 5,175 | 5,175 | N | Purchase water from SRA, Toledo Bend. Alternate strategy. Suggest delete. | No Infrastructure |
| NACOGDOCHES : Purchase water from provider (3) | NACOGDOCHES | Purchase water from provider (3) | I | 102 | 442 | $37,282,050 | 0 | 8,551 | 8,551 | 8,551 | 8,551 | 8,551 | Y | ANRA, Lake Columbia. Assumes downstream diversion to Lake Nacogdoches. | Other |
| NEW SUMMERFIELD : Municipal conservation | NEW SUMMERFIELD | Municipal conservation | I | 2116 | 439 | $0 | 0 | 10 | 18 | 21 | 23 | 26 | N | Municipal conservation | No Infrastructure |
| NEW SUMMERFIELD : Purchase water from provider (1) | NEW SUMMERFIELD | Purchase water from provider (1) | I | 2116 | 440 | $0 | 0 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | Y | ANRA, Lake Columbia; Participant in ANRA Regional Project (I1) | No Infrastructure |
| RUSK : Municipal conservation | RUSK | Municipal conservation | I | 2308 | 439 | $0 | 0 | 0 | 0 | 51 | 66 | 76 | N | Municipal conservation | No Infrastructure |
| RUSK : Purchase water from provider (2) | RUSK | Purchase water from provider (2) | I | 2308 | 441 | $28,435,800 | 0 | 3,000 | 3,000 | 3,000 | 3,000 | 3,000 | Y | ANRA, Lake Columbia. New river intake with downstream diversions | Other |
| STEAM ELECTRIC POWER, ANDERSON : Purchase water from provider (2) | STEAM ELECTRIC POWER, ANDERSON | Purchase water from provider (2) | I | 2401 | 441 | $24,917,413 | 0 | 21,853 | 21,853 | 21,853 | 21,853 | 21,853 | N | UNRMWA, Palestine | Other |
| STEAM ELECTRIC POWER, ANGELINA : New wells - Carrizo Wilcox Aquifer | STEAM ELECTRIC POWER, ANGELINA | New wells - Carrizo Wilcox Aquifer | I | 2673 | 443 | $1,724,909 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | N | New wells - Carrizo Wilcox Aquifer | Wells |
| STEAM ELECTRIC POWER, JEFFERSON : Purchase water from provider (1) | STEAM ELECTRIC POWER, JEFFERSON | Purchase water from provider (1) | I | 2440 | 440 | $13,647,296 | 0 | 25,951 | 25,951 | 25,951 | 25,951 | 25,951 | N | LNVA, Rayburn | Other |
| STEAM ELECTRIC POWER, NACOGDOCHES : Purchase water from provider (2) | STEAM ELECTRIC POWER, NACOGDOCHES | Purchase water from provider (2) | I | 2458 | 441 | $2,012,400 | 0 | 340 | 340 | 340 | 340 | 340 | N | Houston County | Other |
| STEAM ELECTRIC POWER, NACOGDOCHES : Purchase water from provider (2) | STEAM ELECTRIC POWER, NACOGDOCHES | Purchase water from provider (2) | I | 2458 | 441 | $10,718,000 | 0 | 5,000 | 5,000 | 5,000 | 13,400 | 13,400 | Y | ANRA, Lake Columbia | Other |
| STEAM ELECTRIC POWER, NEWTON : Purchase water from provider (2) | STEAM ELECTRIC POWER, NEWTON | Purchase water from provider (2) | I | 2459 | 441 | $12,515,350 | 0 | 0 | 15,000 | 15,000 | 15,000 | 15,000 | N | SRA, Toledo Bend | Other |
| STEAM ELECTRIC POWER, RUSK : Purchase water from provider (2) | STEAM ELECTRIC POWER, RUSK | Purchase water from provider (2) | I | 2468 | 441 | $1,318,500 | 0 | 0 | 0 | 0 | 1,501 | 1,500 | N | SRA, Toledo Bend | Other |
| STEAM ELECTRIC POWER, RUSK : Purchase water from provider (2) | STEAM ELECTRIC POWER, RUSK | Purchase water from provider (2) | I | 2468 | 441 | $8,640,450 | 0 | 0 | 0 | 0 | 0 | 8,500 | Y | ANRA, Lake Columbia | Other |
| SWIFT WSC : Lake Noconiche Regional Supply System | SWIFT WSC | Lake Noconiche Regional Supply System | I | 2503 | 835 | $5,856,500 | 0 | 0 | 400 | 400 | 400 | 400 | N | Assumes sponsor (Nacogdoches County) will seek water right amendment for municipal purposes and develop regional distribution system. | Other |
| SWIFT WSC : New wells - Carrizo Wilcox Aquifer | SWIFT WSC | New wells - Carrizo Wilcox Aquifer | I | 2503 | 443 | $498,171 | 350 | 350 | 350 | 350 | 350 | 350 | N | New wells - Carrizo Wilcox Aquifer | Wells |
| TYLER : Lake Palestine infrastructure | TYLER | Lake Palestine infrastructure | I | 144 | 834 | $79,389,250 | 0 | 0 | 16,815 | 16,815 | 16,815 | 16,815 | N | Expand treatment and pumping capacity from Lake Palestine. | Water Treatment Plant |
| UPPER NECHES MWD: Fastrill replacement (Region I component) | UPPER NECHES MWD | Fastrill replacement (Region I component) | I | 149 | 936 | $0 | 0 | 0 | 0 | 0 | 0 | 22,400 | N | New reservoir. Project is water in place. | No Infrastructure |
| WHITEHOUSE : Purchase water from provider (2) | WHITEHOUSE | Purchase water from provider (2) | I | 2616 | 441 | $0 | 0 | 1,200 | 1,200 | 1,200 | 1,200 | 1,200 | Y | ANRA, Lake Columbia; Participant in ANRA Regional Project (I1) | No Infrastructure |
| WHITEHOUSE : Purchase water from provider (3) | WHITEHOUSE | Purchase water from provider (3) | I | 2616 | 442 | $0 | 27 | 0 | 0 | 0 | 0 | 0 | N | Purchases water from Tyler | No Infrastructure |
| WOODVILLE : New wells - Gulf Coast Aquifer | WOODVILLE | New wells - Gulf Coast Aquifer | I | 2647 | 446 | $511,400 | 0 | 300 | 300 | 300 | 300 | 300 | N | New well near exisitng well field | Wells |

# East Texas Regional Water Planningn Area
## TWDB Implementation Survey Results

| Sponsor | Recommended Water Management Strategy | At what level of Implementation is the project?* | If not implemented, why?* | Initial Volume of Water Provided (acft/yr) | Funds Expended to Date ($) | Project Cost ($) (should include development and construction costs) | Year the Project is Online?* | Is this a phased project?* | (Phased) Ultimate Volume (acft/yr) | (Phased) Ultimate Project Cost ($) | Year project reaches maximum capacity?* | What is the project funding source(s)?* | Included in the 2016 Plan?* | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ANGELINA & NECHES RIVER AUTHORITY | Angelina-Neches River Authority Treatment and Distribution System | Not Implemented | Too soon | | | | | | | | | | Yes | |
| ANGELINA & NECHES RIVER AUTHORITY | New source - Lake Columbia | Permit Application Submitted/Pending | Permit contraints | | | | | | | | | | Yes | |
| APPLEBY WSC | Lake Noconiche Regional Supply System | All Phases Fully Implemented | | 3239 | | | | | | | | | No | |
| APPLEBY WSC | Municipal conservation | Not Implemented | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor did not request for project to be included in RWP. |
| ATHENS | Indirect reuse | Not Implemented | Too soon | | 0 | 0 | | | | 0 | | Other | Yes | |
| ATHENS | Municipal conservation | Sponsor Has Taken Official Action to Initiate Project | Other | | 0 | 0 | | | | 0 | | | No | |
| ATHENS MUNICIPAL WATER AUTHORITY | Forest Grove Reservoir project | Not Implemented | Too soon | | | | | | | | | | No | |
| ATHENS MUNICIPAL WATER AUTHORITY | Indirect reuse | Not Implemented | Too soon | | | | | | | | | | Yes | |
| ATHENS MUNICIPAL WATER AUTHORITY | New water treatment plant | Not Implemented | Too soon | | | | | | | | | | Yes | |
| ATHENS MUNICIPAL WATER AUTHORITY | Overdraft Carrizo Wilcox Aquifer | Permit Application Submitted/Pending | Permit contraints | | | | | | | | | | Yes | |
| BROWNSBORO | Overdraft Carrizo Wilcox Aquifer | Not Implemented | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor did not request for project to be included in RWP. |
| BULLARD | Municipal conservation | Sponsor Has Taken Official Action to Initiate Project | Other | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor did not request for project to be included in RWP. |
| BULLARD | New wells - Carrizo Wilcox Aquifer | Not Implemented | Environmental obstacles | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor did not request for project to be included in RWP. |
| CENTER | Municipal conservation | Sponsor Has Taken Official Action to Initiate Project | Other | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor did not request for project to be included in RWP. |
| COMMUNITY WATER COMPANY | New wells - Carrizo Wilcox Aquifer | Not Implemented | Other | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor did not request for project to be included in RWP. |
| CONSOLIDATED WSC | Purchase water from provider (1) | Permit Application Submitted/Pending | Permit contraints | | 0 | 0 | | | | 0 | | | No | |
| COUNTY-OTHER, ANDERSON | New wells - Queen City Aquifer | Not Implemented | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| COUNTY-OTHER, ANDERSON | Overdraft Carrizo Wilcox Aquifer | Not Implemented | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| COUNTY-OTHER, ANGELINA | New wells - Yegua Jackson Aquifer | Not Implemented | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| COUNTY-OTHER, ANGELINA | Purchase water from provider (2) | Not Implemented | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| COUNTY-OTHER, ANGELINA | Purchase water from provider (2) | Not Implemented | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| COUNTY-OTHER, HARDIN | New wells - Gulf Coast Aquifer | Not Implemented | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| COUNTY-OTHER, HARDIN | Overdraft Gulf Coast Aquifer | Not Implemented | Environmental obstacles | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| COUNTY-OTHER, HENDERSON | Municipal conservation | Sponsor Has Taken Official Action to Initiate Project | Other | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| COUNTY-OTHER, HENDERSON | New wells - Carrizo Wilcox Aquifer | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| COUNTY-OTHER, HENDERSON | New wells - Queen City Aquifer | Not Implemented | Other | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| COUNTY-OTHER, HENDERSON | Overdraft Carrizo Wilcox Aquifer | Not Implemented | Environmental obstacles | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| COUNTY-OTHER, HENDERSON | Purchase water from provider (2) | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| COUNTY-OTHER, JASPER | New wells - Gulf Coast Aquifer | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| COUNTY-OTHER, JASPER | Overdraft Gulf Coast Aquifer | Not Implemented | Environmental obstacles | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| COUNTY-OTHER, NACOGDOCHES | Lake Noconiche Regional Supply System | Not Implemented | Other | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| COUNTY-OTHER, NACOGDOCHES | Purchase water from provider (1) | Sponsor Has Taken Official Action to Initiate Project | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |

# East Texas Regional Water Planningn Area
## TWDB Implementation Survey Results

| Sponsor | Recommended Water Management Strategy | At what level of Implementation is the project?* | If not implemented, why?* | Initial Volume of Water Provided (acft/yr) | Funds Expended to Date ($) | Project Cost ($) (should include development and construction costs) | Year the Project is Online?* | Is this a phased project?* | (Phased) Ultimate Volume (acft/yr) | (Phased) Ultimate Project Cost ($) | Year project reaches maximum capacity?* | What is the project funding source(s)?* | Included in the 2016 Plan?* | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| COUNTY-OTHER, ORANGE | Overdraft Gulf Coast Aquifer | Not Implemented | Environmental obstacles | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| COUNTY-OTHER, POLK | New wells - Gulf Coast Aquifer | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| COUNTY-OTHER, SABINE | New wells - Carrizo Wilcox Aquifer | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| COUNTY-OTHER, SHELBY | New wells - Carrizo Wilcox Aquifer | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| COUNTY-OTHER, SHELBY | Purchase water from provider (1) | Currently Operating | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| COUNTY-OTHER, SHELBY | Purchase water from provider (2) | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| COUNTY-OTHER, TRINITY | New wells - Yegua Jackson Aquifer | Not Implemented | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| COUNTY-OTHER, TYLER | New wells - Gulf Coast Aquifer | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| D&M WSC | New wells - Carrizo Wilcox Aquifer | Not Implemented | Too soon | | | | | | | | | | No | |
| DIBOLL | Municipal conservation | Sponsor Has Taken Official Action to Initiate Project | Other | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor did not request for project to be included in RWP. |
| DIBOLL | New wells - Yegua Jackson Aquifer | | | | | | | | | | | | No | |
| DIBOLL | Purchase water from provider (2) | | | | | | | | | | | | No | |
| FOUR WAY WSC | Purchase water from provider (2) | Not Implemented | Too soon | | | | | | | | | | No | |
| FRANKSTON | Municipal conservation | Not Implemented | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor did not request for project to be included in RWP. |
| FRANKSTON | New wells - Carrizo Wilcox Aquifer | Not Implemented | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor did not request for project to be included in RWP. |
| HOUSTON COUNTY WCID #1 | Permit amendment - Houston County Lake | Permit Application Submitted/Pending | Permit contraints | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor did not request for project to be included in RWP. |
| HUDSON | Purchase water from provider (1) | Not Implemented | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor did not request for project to be included in RWP. |
| HUDSON WSC | New wells - Carrizo Wilcox Aquifer | Not Implemented | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor did not request for project to be included in RWP. |
| IRRIGATION, HARDIN | Purchase water from provider (2) | Not Implemented | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| IRRIGATION, HENDERSON | Indirect reuse | Not Implemented | Environmental obstacles | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| IRRIGATION, HOUSTON | New wells - Carrizo Wilcox Aquifer | Not Implemented | Environmental obstacles | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| IRRIGATION, SAN AUGUSTINE | New wells - Carrizo Wilcox Aquifer | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| IRRIGATION, SMITH | New wells - Queen City Aquifer | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| JACKSON WSC | Purchase water from provider (2) | Sponsor Has Taken Official Action to Initiate Project | Too soon | | 0 | 0 | | | | 0 | | | No | |
| JACKSONVILLE | Infrastructure improvements | Not Implemented | Other | | | | | | | | | | No | |
| JACKSONVILLE | Purchase water from provider (3) | Not Implemented | Other | | | | | | | | | | No | |
| KIRBYVILLE | Municipal conservation | Sponsor Has Taken Official Action to Initiate Project | Other | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor did not request for project to be included in RWP. |
| LILLY GROVE SUD | Lake Noconiche Regional Supply System | Not Implemented | Too soon | | | | | | | | | | No | |
| LILLY GROVE SUD | New wells - Carrizo Wilcox Aquifer | Not Implemented | Too soon | | | | | | | | | | No | |
| LINDALE RURAL WSC | Municipal conservation | Not Implemented | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor did not request for project to be included in RWP. |
| LINDALE RURAL WSC | New wells - Carrizo Wilcox Aquifer | Not Implemented | Too soon | | | | | | | | | | No | |
| LIVESTOCK, ANGELINA | Expand local surface water supplies | Not Implemented | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| LIVESTOCK, HENDERSON | Indirect reuse | Not Implemented | Environmental obstacles | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |

# East Texas Regional Water Planningn Area
## TWDB Implementation Survey Results

| Sponsor | Recommended Water Management Strategy | At what level of Implementation is the project?* | If not implemented, why?* | Initial Volume of Water Provided (acft/yr) | Funds Expended to Date ($) | Project Cost ($) (should include development and construction costs) | Year the Project is Online?* | Is this a phased project?* | (Phased) Ultimate Volume (acft/yr) | (Phased) Ultimate Project Cost ($) | Year project reaches maximum capacity?* | What is the project funding source(s)?* | Included in the 2016 Plan?* | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LIVESTOCK, HOUSTON | New wells - Carrizo Wilcox Aquifer | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| LIVESTOCK, HOUSTON | New wells - Yegua Jackson Aquifer | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| LIVESTOCK, NACOGDOCHES | New wells - Carrizo Wilcox Aquifer | Not Implemented | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | Yes | Project sponsor for aggregated entity unknown. |
| LIVESTOCK, SABINE | Expand local surface water supplies | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| LIVESTOCK, SABINE | New wells - Carrizo Wilcox Aquifer | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| LIVESTOCK, SAN AUGUSTINE | Expand local surface water supplies | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| LIVESTOCK, SAN AUGUSTINE | New wells - Carrizo Wilcox Aquifer | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| LIVESTOCK, SHELBY | Expand local surface water supplies | Not Implemented | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| LIVESTOCK, SHELBY | New wells - Carrizo Wilcox Aquifer | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| LIVESTOCK, SHELBY | Purchase water from provider (2) | Not Implemented | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| LOWER NECHES VALLEY AUTHORITY | Permit amendment for Sam Rayburn Reservoir | Permit Application Submitted/Pending | Permit contraints | | 0 | 0 | | | | 0 | | | Yes | |
| LOWER NECHES VALLEY AUTHORITY | Purchase water from provider (2) | Not Implemented | Too soon | | | | | | | | | | Yes | |
| LOWER NECHES VALLEY AUTHORITY | Reallocation of flood storage (Rayburn) | Not Implemented | Too soon | | 0 | 0 | | | | 0 | | | No | |
| LOWER NECHES VALLEY AUTHORITY | Saltwater barrier conjunctive operation with Rayburn/Steinhagen | Not Implemented | Financing | | | | | | | | | | No | |
| LOWER NECHES VALLEY AUTHORITY | Wholesale customer conservation | | | | | | | | | | | | No | |
| LUFKIN | Angelina County Regional Project | Not Implemented | Too soon | | | | | | | | | | Yes | |
| LUFKIN | Lake Kurth Regional System | All Phases Fully Implemented | | | | | | | | | | | Yes | |
| LUFKIN | Municipal conservation | Sponsor Has Taken Official Action to Initiate Project | Other | | 0 | 0 | | | | 0 | | | No | |
| LUFKIN | New wells - Carrizo Wilcox Aquifer | All Phases Fully Implemented | | | | | | | | | | | No | |
| MANUFACTURING, ANGELINA | Purchase water from provider (2) | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | Yes | Project sponsor for aggregated entity unknown. |
| MANUFACTURING, HARDIN | New wells - Gulf Coast Aquifer | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| MANUFACTURING, HOUSTON | Purchase water from provider (1) | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| MANUFACTURING, NEWTON | New wells - Gulf Coast Aquifer | Not Implemented | Other | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| MANUFACTURING, ORANGE | Purchase water from provider (1) | Currently Operating | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | Yes | Project sponsor for aggregated entity unknown. |
| MANUFACTURING, ORANGE | Purchase water from provider (2) | Not Implemented | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| MANUFACTURING, PANOLA | Purchase water from provider (1) | Currently Operating | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | Yes | Project sponsor for aggregated entity unknown. |
| MANUFACTURING, POLK | New wells - Gulf Coast Aquifer | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| MANUFACTURING, SAN AUGUSTINE | New wells - Carrizo Wilcox Aquifer | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| MANUFACTURING, SHELBY | Purchase water from provider (1) | Not Implemented | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| MANUFACTURING, SMITH | Purchase water from provider (2) | Not Implemented | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | Yes | Project sponsor for aggregated entity unknown. |
| MAURICEVILLE SUD | New wells - Gulf Coast Aquifer | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor did not request for project to be included in RWP. |
| MINING , SAN AUGUSTINE | Purchase water from provider (2) | Not Implemented | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| MINING , SAN AUGUSTINE | Purchase water from provider (2) | Sponsor Has Taken Official Action to Initiate Project | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | Yes | Project sponsor for aggregated entity unknown. |

# East Texas Regional Water Planningn Area
## TWDB Implementation Survey Results

| Sponsor | Recommended Water Management Strategy | At what level of Implementation is the project?* | If not implemented, why?* | Initial Volume of Water Provided (acft/yr) | Funds Expended to Date ($) | Project Cost ($) (should include development and construction costs) | Year the Project is Online?* | Is this a phased project?* | (Phased) Ultimate Volume (acft/yr) | (Phased) Ultimate Project Cost ($) | Year project reaches maximum capacity?* | What is the project funding source(s)?* | Included in the 2016 Plan?* | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MINING , SHELBY | Purchase water from provider (1) | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| MINING , SHELBY | Purchase water from provider (2) | Sponsor Has Taken Official Action to Initiate Project | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| MINING, ANDERSON | New wells - Carrizo Wilcox Aquifer | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| MINING, ANGELINA | Purchase water from provider (2) | Sponsor Has Taken Official Action to Initiate Project | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | Yes | Project sponsor for aggregated entity unknown. |
| MINING, CHEROKEE | Purchase water from provider (2) | Sponsor Has Taken Official Action to Initiate Project | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | Yes | Project sponsor for aggregated entity unknown. |
| MINING, JEFFERSON | New wells - Gulf Coast Aquifer | Not Implemented | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| MINING, NACOGDOCHES | Purchase water from provider (2) | Sponsor Has Taken Official Action to Initiate Project | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | Yes | Project sponsor for aggregated entity unknown. |
| MINING, RUSK | New wells - Carrizo Wilcox Aquifer | Not Implemented | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| MINING, SMITH | New wells - Queen City Aquifer | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| NACOGDOCHES | Municipal conservation | Sponsor Has Taken Official Action to Initiate Project | Other | | 0 | 0 | | | | 0 | | | No | |
| NACOGDOCHES | New wells - Carrizo Wilcox Aquifer | | | | | | | | | | | | No | |
| NACOGDOCHES | Purchase water from provider (3) | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor did not request for project to be included in RWP. |
| NACOGDOCHES | Purchase water from provider (3) | Sponsor Has Taken Official Action to Initiate Project | Too soon | | | | | | | | | | No | |
| NEW SUMMERFIELD | Municipal conservation | Sponsor Has Taken Official Action to Initiate Project | Other | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor did not request for project to be included in RWP. |
| NEW SUMMERFIELD | Purchase water from provider (1) | Sponsor Has Taken Official Action to Initiate Project | Too soon | | 0 | 0 | | | | 0 | | | No | |
| RUSK | Municipal conservation | Not Implemented | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor did not request for project to be included in RWP. |
| RUSK | Purchase water from provider (2) | Sponsor Has Taken Official Action to Initiate Project | Too soon | | | | | | | | | | No | |
| STEAM ELECTRIC POWER, ANDERSON | Purchase water from provider (2) | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| STEAM ELECTRIC POWER, ANGELINA | New wells - Carrizo Wilcox Aquifer | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| STEAM ELECTRIC POWER, JEFFERSON | Purchase water from provider (1) | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| STEAM ELECTRIC POWER, NACOGDOCHES | Purchase water from provider (2) | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| STEAM ELECTRIC POWER, NACOGDOCHES | Purchase water from provider (2) | Sponsor Has Taken Official Action to Initiate Project | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | Yes | Project sponsor for aggregated entity unknown. |
| STEAM ELECTRIC POWER, NEWTON | Purchase water from provider (2) | Not Implemented | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | Yes | Project sponsor for aggregated entity unknown. |
| STEAM ELECTRIC POWER, RUSK | Purchase water from provider (2) | Not Implemented | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | Yes | Project sponsor for aggregated entity unknown. |
| STEAM ELECTRIC POWER, RUSK | Purchase water from provider (2) | Not Implemented | Too soon | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor for aggregated entity unknown. |
| SWIFT WSC | Lake Nacogdoches Regional Supply System | Not Implemented | Too soon | | | | | | | | | | No | |
| SWIFT WSC | New wells - Carrizo Wilcox Aquifer | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor did not request for project to be included in RWP. |
| TYLER | Lake Palestine infrastructure | Not Implemented | Too soon | | | | | | | | | | Yes | |
| UPPER NECHES MWD | Fastrill replacement (Region I component) | Not Implemented | Too soon | | 0 | 0 | | | | 0 | | | Yes | |
| WHITEHOUSE | Purchase water from provider (2) | Sponsor Has Taken Official Action to Initiate Project | Too soon | | 0 | 0 | | | | 0 | | | No | |
| WHITEHOUSE | Purchase water from provider (3) | | | Unknown | Unknown | Unknown | | | Unknown | Unknown | | Unknown | No | Project sponsor did not request for project to be included in RWP. |
| WOODVILLE | New wells - Gulf Coast Aquifer | | | | | | | | | | | | No | |