2026 INITIALLY PREPARED REGION C WATER PLAN

Volume II. Appendices

Freese and Nichols, Inc.

Plummer Associates, Inc.

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2026 INITIALLY PREPARED REGION C WATER PLAN

March 2025

Prepared for the Region C Water Planning Group

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List of Acronyms

ACRONYM	DESCRIPTION
AMI	Advanced Metering Infrastructure
ASR	Aquifer Storage and Recovery
AWWA	American Water Works Association
BEG	Bureau of Economic Geology
BMP	Best Management Practices
CFS	Cubic Feet per Second
CGMA	Collin-Grayson Municipal Alliance
CRU	Collective Reporting Units
DB22	TWDB's Regional Water Planning Database
DBP	Disinfection Byproduct
DCP	Drought Contingency Plan
DFC	Desired Future Conditions
DOR	Drought of Record
DPR	Direct Potable Reuse
EA	Executive Administrator of the TWDB
EPA	Environmental Protection Agency
GAM	Groundwater Availability Model
GCD	Groundwater Conservation District
GMA	Groundwater Management Area
GPCD	Gallons per Capita per Day
GPF	Gallons per Flush

ACRONYM	DESCRIPTION
GPM	Gallons per minute
HOA	Homeowners Association
IBT	Interbasin Transfer
ICI	Industrial, Commercial, Institutional
IPP	Initially Prepared Plan
IWA	International Water Association
LLC	Limited Liability Company
MAG	Modeled Available Groundwater
MGD	Million Gallons per Day
MSL	Mean Sea Level
MWP	Major Water Provider
NRCS	Natural Resources Conservation Service (formerly the Soil Conservation Service)
NRNWR	Neches River National Wildlife Refuge
OCR	Off Channel Reservoir
PDSI	Palmer Drought Severity Index
RO	Reverse Osmosis
RWP	Regional Water Plan
RWPA	Regional Water Planning Area
RWPG	Regional Water Planning Group
SB1	Senate Bill One
SB2	Senate Bill Two
SB3	Senate Bill Three
SDWA	Safe Drinking Water Act
SEP	Steam Electric Power
SUD	Special Utility District
SWCQP	Statewide Water Conservation Quantification Project
SWIFT	State Water Implementation Fund
SWIRFT	State Water Implementation Revenue Fund
SWP	State Water Plan
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TDS	Total Dissolved Solids
TNRIS	Texas Natural Resources Information System
TPWD	Texas Parks and Wildlife Department
TWDB	Texas Water Development Board
UCM	Uniform Costing Model
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
WAM	Water Availability Model
WCAC	Water Conservation Advisory Council
WCCAP	Water Conservation and Condition Assessment Program
WCP	Water Conservation Plan
WIF	Water Infrastructure Fund
WMS	Water Management Strategy
WMSP	Water Management Strategy Project

ACRONYM	DESCRIPTION
WSC	Water Supply Corporation
WSD	Water Supply District
WTP	Water Treatment Plant
WUG	Water User Group
WWP	Wholesale Water Provider
WWTP	Wastewater Treatment Plant
Water Providers	
ANRA	Angelina and Neches River Authority
BRA	Brazos River Authority
DWU	Dallas Water Utilities
GTUA	Greater Texoma Utility Authority
NTMWD	North Texas Municipal Water District
RRA	Red River Authority
SRA	Sabine River Authority
SRBA	Sulphur River Basin Authority
SRMWD	Sulphur River Municipal Water District
TRWD	Tarrant Regional Water District
TRA	Trinity River Authority
UNRMWA	Upper Neches River Municipal Water Authority
UTRWD	Upper Trinity Regional Water District

Glossary of Terms

TERM	MEANING
Aquifer Storage and Recovery	Aquifer storage and recovery (ASR) is the storage of water in a suitable aquifer through a well during times when water is available, and the recovery of water from the same aquifer during times when it is needed.
Best Management Practice	Best Management Practices (BMPs) are a menu of options for which entities within a water use sector can choose to implement in order to achieve benchmarks and goals through water conservation. Best management practices are voluntary efficiency measures that are intended to save a quantifiable amount of water, either directly or indirectly, and can be implemented within a specified timeframe.
Desired Future Condition	Criteria which is used to define the amount of available groundwater from an aquifer.
Drought of Record	A drought of record is the worst recorded drought since the comiplation of meterologic and hydraulic began.
Groundwater Availability Model	Numerical groundwater flow model. GAMs are used to determine the aquifer response to pumping scenarios. These are the preferred models to assess groundwater availability.
Groundwater Conservation District	Generic term for all or individual state recognized Districts that oversee the groundwater resources within a specified political boundary.

TERM	MEANING
Groundwater Management Area	Sixteen GMAs in Texas. Tasked by the Legislature to define the desired future conditions for major and minor aquifers within the GMA.
Gallons per capita per day	Unit of measure that accounts for water use in the number of gallons a person uses each day.
Interbasin Transfer	In an interbasin water transfer, surface water is taken from one river basin and conveyed into another river basin for use there.
Modeled Available Groundwater	The MAG is the amount of groundwater that can be permitted by a GCD on an annual basis. It is determined by the TWDB based on the DFC approved by the GMA. Once the MAG is established, this value must be used as the available groundwater in regional water planning.
Major Water Provider	A water user group or a wholesale water provider of particular significance to the region's water supply as determined by the regional water planning group.
Palmer Drought Severity Index	A measure of dryness based on precipitation, temperature, soil moisture and other factors.
Regional Water Planning Group	The generic term for the planning groups that oversee the regional water plan development in each respective region in the State of Texas
Senate Bill One	Legislation passed by the 75th Texas Legislature that is the basis for the current regional water planning process.
Texas Commission on Environmental Quality	Agency charged with oversight of Texas surface water rights and WAM program.
Total Dissolved Solids	A measure of the combined total organic and ingorganic substances contained in the water.
Total Maximum Daily Load	A Total Maximum Daily Load (TMDL) is a regulatory term in the U.S. Clean Water Act, describing a plan for restoring impaired waters that identifies the maximum amount of a pollutant that a body of water can receive while still meeting water quality standards.
Texas Water Development Board	Texas Agency charged with oversight of regional water plan development and oversight of GCDs
Water Availability Model	Computer model of a river watershed that evaluates surface water availability based on Texas water rights.
Water Management Strategy	Strategies available to RWPG to meet water needs identified in the regional water plan.
Water User Group	A group that uses water. Six major types of WUGs: municipal, manufacturing, mining, steam electric power, irrigation and livestock.
Wholesale Water Provider	Entity that has or is expected to have contracts to sell 1,000 ac-ft./yr. or more of wholesale water.

Appendix A

Consistency with TWDB Rules

Appendix A
Consistency with TWDB Rules

Regulatory Citation or Contract Exhibit	Summary of Requirement	Location(s) in Regional Plan and/or Commentary
(Col 1)	(Col 2)	(Col 4)
Guidance Principles		
31 TAC §358.3		
358.3 (1)	The state water plan shall provide for the preparation for and response to drought conditions.	Chapters 2, 3, 5, 7
(2)	The RWP and SWP shall serve as water supply plans under drought of record conditions. RWPGs may, at their discretion, plan for drought conditions worse than the drought of record.	Chapters 2, 3, 5, 7
(3)	Consideration shall be given to the construction and improvement of surface water resources and the application of principles that result in voluntary redistribution of water resources.	Chapter 5
(4)	RWP 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 affected regional water planning areas and the state.	Chapters 5, 6, and 7
(5)	RWP 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.	Chapters 5 and 7
(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.	Chapter 10
(7)	The RWPG shall establish terms of participation in water planning efforts that shall be equitable and shall not unduly hinder participation.	Chapter 10
(8)	Consideration of the effect of policies or water management strategies on the public interest of the state, water supply, and those entities involved in providing this supply throughout the entire state.	Chapter 8
(9)	Consideration of all water management strategies the regional water plan determines to be potentially feasible when developing plans to meet future water needs and to respond to drought so that cost effective water management strategies which are consistent with long-term protection of the state's water resources, agricultural resources, and natural resources are considered and approved.	Chapters 5 and 6
(10)	Consideration of opportunities that encourage and result in voluntary transfers of water resources, including but not limited to regional water banks, sales, leases, options, subordination agreements, and financing agreements.	Chapter 5
(11)	Consideration of a balance of economic, social, aesthetic, and ecological viability.	Appendix F (Potentially Feasible WMSs); Appendix G (WMS Strategy Evaulation), and Appendix J
(12)	For regional water planning areas without approved regional water plans or water providers for which revised plans are not developed through the regional water planning process, the use of information from the adopted state water plan and other completed studies that are sufficient for water planning shall represent the water supply plan for that area or water provider.	N/A
(13)	All surface waters are held in trust by the state, their use is subject to rights granted and administered by the Commission, and the use of surface water is governed by the prior appropriation doctrine, unless adjudicated otherwise.	Chapter 3 and Appendix E
(14)	Existing water rights, water contracts, and option agreements shall be protected. However, potential amendments of water rights, contracts and agreements may be considered and evaluated. Any amendments will require the eventual consent of the owner.	Chapters 3 and 5
(15)	The production and use of groundwater in Texas is governed by the rule of capture doctrine unless and to the extent that such production and use is regulated by a groundwater conservation district as codified by the legislature at Texas Water Code §36.002 (relating to Ownership of Groundwater).	Chapter 3
(16)	Consideration of recommendations of river and stream segments of unique ecological value to the legislature for potential protection.	Chapter 8
(17)	Consideration of recommendation of sites of unique value for the construction of reservoirs to the legislature for potential protection.	Chapter 8
(18)	Consideration of water planning and management activities of local, regional, state, and federal agencies, along with existing local, regional, and state water plans and information and existing state and federal programs and goals.	Chapters 1 and 5
(19)	Designated water quality and related water uses as shown in the state water quality management plan shall be improved or maintained.	Chapter 6
(20)	RWPGs shall actively coordinate water planning and management activities to identify common needs, issues, and opportunities for interregional water management strategies and water management strategy projects to achieve efficient use of water supplies. The Board will support RWPGs coordination to identify common needs, issues, and opportunities while working with RWPGs to resolve conflicts in a fair, equitable, and efficient manner.	Chapter 10
(21)	The water management strategies identified in approved RWPs to meet needs shall be described in sufficient detail to allow a state agency making a financial or regulatory decision to determine if a proposed action before the state agency is consistent with an approved RWP.	Chapter 5; Appendix F (Potentially Feasible WMSs); Appendix G (WMS Strategy Evaulation); Appendix I (Water Conservation Savings); Appendix J (Updated Quantification of Impacts of Marvin Nichols)
(22)	The evaluation of water management strategies shall use environmental information in accordance with the Commission's adopted environmental flow standards under 30 TAC Chapter 298 (relating to Environmental Flow Standards for Surface Water) where applicable or, in basins where standards are not available or have not been adopted, information from existing site-specific studies or state consensus environmental planning criteria.	Chapter 5; Evaluation of strategies involving new reservoir include environmental flow standards as appropriate; Appendix G
(23)	Consideration of environmental water needs including instream flows and bay and estuary inflows, including adjustments by the RWPGs to water management strategies to provide for environmental water needs including instream flows and bay and estuary needs. Consideration shall be consistent with the Commission's adopted environmental flow standards under 30 TAC Chapter 298 in basins where standards have been adopted.	Chapter 5; Appendix G
(24)	Planning shall be consistent with all laws applicable to water use for the state and regional water planning area.	Entire RWP

Appendix A
Consistency with TWDB Rules

Regulatory Citation or Contract Exhibit	Summary of Requirement	Location(s) in Regional Plan and/or Commentary
(25)	The inclusion of ongoing water development projects that have been permitted by the Commission or a predecessor agency.	Chapter 5
(26)	Specific recommendations of water management strategies shall be based upon identification, analysis, and comparison of all water management strategies the RWPG determines to be potentially feasible so that the cost effective water management strategies which are environmentally sensitive are considered and adopted unless the RWPG demonstrates that adoption of such strategies is not appropriate. To determine cost-effectiveness, the RWPGs will use the process describedin §357.34(d)(3)(A) of this title (relating to Identificationand Evaluation of Potentially Feasible Water Management Strategies)and, to determine environmental sensitivity, the RWPGs shall use theprocess described in §357.34(d)(3)(B) of this title.	Chapter 5, Appendix G
(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.	Chapters 5 and 10
(28)	RWPGs must consider existing regional water planning efforts when developing their plans.	Chapters 1, 5, and 10
	Chapter One Description of the Regional Water Planning Area	
	31 TAC §357.30	
	RWPGs shall describe their regional water planning area including the following:	
357.3 (1)	Social and economic aspects of a region such as information on current population, economic activity and economic sectors heavily dependent on water resources	Section 1.1
(2)	Current water use and major water demand centers	Section 1.3
(3)	Current groundwater, surface water, and reuse supplies including major springs that are important for water supply or protection of natural resources	Section 1.4
(4)	Wholesale water providers	Section 1.5
(5)	Agricultural and natural resources	Section 1.10
(6)	Identified water quality problems	Section 1.12.2
(7)	Identified threats to agricultural and natural resources due to water quantity problems or water quality problems related to water supply	Section 1.12
(8)	Summary of existing local and regional water plans	Section 1.6
(9)	The identified historic drought(s) of record within the planning area	Section 1.7, Chapter 7, and Appendix E
(10)	Current preparations for drought within the RWPA	Section 1.7 and Chapter 7
(11)	Information compiled by the Board from water loss audits (see also Texas Administrative Code §358.6)	Section 1.9; Appendix B (Water Audit 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.	Section 1.10, Chapter 6, Appendix G, Appendix J
	Chapter Two Projected Non-Municipal, Municipal and Population Water Demands	
	31 TAC §357.31	
357.31 (a)	RWPs shall present projected population and Water Demands by WUG as defined in §357.10 of this title (relating to Definitions and Acronyms). If a WUG lies in one or more countiesor RWPA or river basins, data shall be reported for each river basin, RWPA, and county split.	Sections 2.2 and 2.3, Chapter 2 Attachments 1-4, Appendix D (DB27 Reports)
(b)	RWPs shall present projected Water Demands associated with MWPs by category of water use, including municipal, manufacturing, irrigation, steam electric power generation, mining, and livestock for the RWPA.	Chapter 2 Attachment 5
(c)	RWPs shall evaluate the current contractual obligations of WUGs and WWPs to supply water in addition to any demands projected for the WUG or WWP. Information regarding obligations to supply water to other users must also be incorporated into the water supply analysis in §357.32 of this title (relating to Water Supply Analysis) in order to determine net existing water supplies available for each WUG's own use. The evaluation of contractual obligations under this subsection is limited to determining the amount of water secured by the contract and the duration of the contract.	Chapter 3 - Where a seller/buyer relationships existed, calculations of existing supplies for each buyer considered and evaulated the contractual obligations of the seller.
(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. RWPGs shall report how changes in plumbing fixtures would affect projected municipal Water Demands using projections with plumbing code savings provided by the Board or by methods approved by the EA.	Section 2.3.1
(e)	Source of population and Water Demands. In developing RWPs, RWPGs shall use:	
(e) (1)	Population and water demand projections developed by the EA that will be contained in the next state water plan and adopted by the Board after consultation with the RWPGs, Commission, Texas Department of Agriculture, and the Texas Parks and Wildlife Department.	Sections 2.2 and 2.3
(e) (2)	RWPGs may request revisions of Board adopted population or Water Demand projections if the request demonstrates that population or Water Demand projections no longer represents a reasonable estimate of anticipated conditions based on changed conditions and or new information. Before requesting a revision to population and Water Demand projections, the RWPG shall discuss the proposed revisions at a public meeting for which notice has been posted in accordance with §357.21(c) of this title (relating to Notice and Public Participation). The RWPG shall summarize public comments received on the proposed request for projection revisions. The EA shall consult with the requesting RWPG and respond to their request within 45 days after receipt of a request from an RWPG for revision of population or Water Demand projections.	Sections 2.2.1 and 2.3.1; Appendix C (Adjustments to Projections)
(f)	Population and Water Demand projections shall be presented for each Planning Decade for WUGs and MWPs.	Sections 2.2 and 2.3; Chapter 2 Attachments 1-5
	Chapter Three Water Supply Analysis	
	31 TAC §357.32	
357.32 (a)	RWPGs shall evaluate:	
(a) (1)	Source water availability during drought of record conditions.	Chapter 3, Appendix E

Appendix A
Consistency with TWDB Rules

Regulatory Citation or Contract Exhibit	Summary of Requirement	Location(s) in Regional Plan and/or Commentary
(a) (2)	Existing water supplies that are legally and physically available to WUGs and wholesale water suppliers within the RWPA for use during the drought of record.	Chapter 3; Appendix D (DB27 Reports); Appendix E (Existing Supply Available)
(b)	Consider surface water and groundwater 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.	Chapter 3; Appendix E (Existing Supply Available)
(c)	For surface water supply analyses, RWPGs shall use most current Water Availability Models from the Commission to evaluate the adequacy of surface water supplies. As the default approach for evaluating existing supplies, RWPGs shall assume full utilization of existing water rights and no return flows when using Water Availability Models. RWPGs may use better, more representative, water availability modeling assumptions or better site-specific information with written approval from the EA. Information available from the Commission shall be incorporated by RWPGs unless better site-specific information is available and approved in writing by the EA.	Section 3.2; Appendix E (Existing Supply Available)
(c) (1)	Evaluation of existing stored surface water available during Drought of Record conditions shall be based on Firm Yield as defined in §357.10. The analysis may be based on justified operational procedures other than Firm Yield. The EA shall consider a written request from an RWPG to use procedures other than Firm Yield.	Chapter 3 and Appendix E
(c) (2)	Evaluation of existing run of river surface water available for municipal WUGs during Drought of Record conditions shall be based on the minimum monthly diversion amounts that are available 100 percent of the time, if those run of river supplies are the only supply for the municipal WUG.	Chapter 3 and Appendix E
(d)	Use modeled available groundwater volumes for groundwater Availability, as issued by the EA, and incorporate such information in its RWP unless no modeled available groundwater volumes are provided. Groundwater Availability used in the RWP must be consistent with the desired future conditions as of the most recent deadline for the Board to adopt the State Water Plan or, at the discretion of the RWPG, established subsequent to the adoption of the most recent State Water Plan.	Section 3.3
(d) (1)	Consistent with a desired future condition if the groundwater Availability amount in the RWP and on which an Existing Water Supply or recommended WMS relies does not exceed the modeled available groundwater amount associated with the desired future condition for the relevant aquifers.	Chapter 3 and Chapter 5
(d) (2)	If no groundwater conservation district exists within the RWPA, then the RWPG shall determine the Availability of groundwater for regional planning purposes.	N/A
(d) (3)	In RWPAs that have at least one groundwater conservation district, the EA shall consider a written request from an RWPG to apply a MAG Peak Factor in the form of a percentage (e.g., greater than 100 percent) applied to the modeled available groundwater value of any particular aquifer-region-county-basin split within the jurisdiction of a groundwater conservation district, or groundwater management area if no groundwater conservation district exists, to allow temporary increases in annual availability for planning purposes. The request must:	N/A
(d) (3) (A)	Include written approval from the groundwater conservation district, if a groundwater conservation district exists in the particular aquifer-region-county-basin split, and from representatives of the groundwater management area;	N/A
(d) (3) (B)	Provide the technical basis for the request in sufficient detail to support groundwater conservation district, groundwater management area, and EA evaluation; and	N/A
(d) (3) (C)	Document the basis for how the temporary availability increase will not prevent the groundwater conservation district from managing groundwater resources to achieve the desired future condition.	N/A
(e)	Evaluate the existing water supplies for each WUG and WWP	Sections 3.5 and 3.6, Appendix D (DB27 reports)
(f)	Water supplies based on contracted agreements will be based on the terms of the contract, which may be assumed to renew upon contract termination if the contract contemplates renewal or extensions.	3.5, 3.6, Where a seller/buyer relationships existed, calculations of existing supplies for each buyer considered and evaulated the contractual obligations of the seller.
(g)	Evaluation results shall be reported by WUG in accordance with §357.31(a) of this title (relating to Projected Population and Water Demands) and WWPs in accordance with §357.31(b) of this title	Chapters 3, 5D, 5E, Appendix D (DB27 Reports); Appendix E (Existing Supply Available)
Contract Exhibit C, Section 2.3.1	The methodology used for calculating anticipated sedimentation rate and revising the area-capacity rating curve must be described in the IPP and final adopted RWP.	Appendix E, Section E.1
Contract Exhibit C, Section 2.3.4.2	For groundwater sources where no DFC exists, RWPGs may determine the groundwater availability for planning purposes. These RWPG-estimated groundwater availabilities may be determined by using availability values presented in the local GCD management plan, TWDB GAMs, if available, or other means. RWPGs must include a table documenting the method(s) used for estimating RWPG-estimated groundwater availability in the Technical Memorandum, IPP, and final adopted RWP. This table should include the aquifer, county, and methodology description(s).	Section 3.3.3
Contract Exhibit C, Section 2.3.3	Reuse availability should be presented as a separate subsection within Chapter 3 of the IPP and final RWP. The subsection must describe the data sources and methodology used to calculate reuse availability.	Section 3.2.3
Contract Exhibit C, Section 2.3.3	RWPGs must classify reuse availability as either direct or indirect.	Appendix D (DB27 Reports), Appendix E, Chapter 5B
Contract Exhibit C, Section 2.3.6	For indirect reuse [existing supplies], RWPGs must base their drought of record existing indirect reuse analyses on currently installed wastewater treatment infrastructure; currently permitted wastewater discharge amounts; and the amount of wastewater anticipated to be treated at the WWTP, based on associated decade populations/demands. These amounts may not exceed the amounts of water available to utilities generating the wastewater.	Section 3.2.3
Contract Exhibit C, Section 2.3.6	[The following items must also be presented in the IPP and final adopted RWP:] Water rights which are the basis for surface water existing supply volumes. RWPGs must also submit water rights data to the TWDB electronically using a TWDB provided spreadsheet.	Appendix E, Electronic Workbook submittal
Contract Exhibit C, Section 2.3.6	[The following items must also be presented in the IPP and final adopted RWP:] For local supplies, the plan must acknowledge whether the RWPG can confirm if the local supplies are firm. For any local supplies that cannot be confirmed as 'firm' under DOR, the RWP must include a summary of the number of WUGs for which this is true and the total associated volume of water associated with this uncertainty.	Section 3.2.2

Appendix A
Consistency with TWDB Rules

Regulatory Citation or Contract Exhibit	Summary of Requirement	Location(s) in Regional Plan and/or Commentary
	Chapter Four Identification of Water Needs	
	31 TAC §357.33	
357.33 (a)	RWPs shall include comparisons of existing water supplies and projected Water Demands to identify Water Needs.	Chapter 4
(b)	RWPGs shall compare projected Water Demands, developed in accordance with §357.31 of this title (relating to Projected Population and Water Demands), with existing water supplies available to WUGs and WWPs in a planning area, as developed in accordance with §357.32 of this title (relating to Water Supply Analysis), to determine whether WUGs will experience water surpluses or needs for additional supplies.	Chapter 4, Appendix D
(c)	Results of evaluations will be reported by WUG in accordance with §357.31(a) of this title and MWPs in accordance with §357.31(b) of this title.	Section 4.2, Section 5D, Section 5E, Appendix D (DB27 Reports)
(d)	RWPGs shall perform a secondary water needs analysis for all WUGs and WWPs for which conservation WMSs or direct Reuse WMSs are recommended. This secondary water needs analysis shall calculate the Water Needs that would remain after assuming all recommended conservation and direct Reuse WMSs are fully implemented. The resulting secondarywater needs volumes shall be presented in the RWP by WUG and MWP and decade.	Section 4.5, Appendix D (DB27 Reports)
	Chapter Five Identification and Evaluation of Potentially Feasible Water Management Strategies	
	31 TAC §357.34	
357.34 (a)	RWPGs shall identify and evaluate potentially feasible WMSs and the WMSPs required to implement those strategies for all WUGs and WWPs with identified Water Needs.	All of Chapter 5; Appendix F (Potentially Feasible WMSs); Appendix G (WMS Strategy Evaulation)
(b)	RWPGs shall identify potentially feasible WMSs to meet water supply needs identified in §357.33 of this title (relating to Needs Analysis: Comparison of Water Supplies and Demands) in accordance with the process in §357.12(b) of this title (relating to General Regional Water Planning Group Responsibilities and Procedures). Strategies shall be developed for WUGs and WWPs. WMS and WMSPs shall be developed for WUGs and WWPs that would provide water to meet water supply needs during Drought of Record conditions.	All of Chapter 5; Appendix F (Potentially Feasible WMSs); Appendix G (WMS Strategy Evaulation)
(c)	Potential Feasible Water Management Strategies should include, but are not limited to:	
(c) (1)	Expanded use of existing supplies including system optimization and conjunctive use of water resources, reallocation of reservoir storage to new uses, voluntary redistribution of water resources including contracts, water marketing, regional water banks, sales, leases, options, subordination agreements, and financing agreements, subordination of existing water rights through voluntary agreements, enhancements of yields of existing sources, and improvement of water quality including control of naturally occurring chlorides.	Chapter 5, Appendix G
(c) (2)	New supply development including construction and improvement of surface water and groundwater resources, brush control, precipitation enhancement, seawater desalination, brackish groundwater desalination, water supply that could be made available by cancellation of water rights based on data provided by the Commission, rainwater harvesting, and aquifer storage and recovery.	Chapter 5, Appendix G
(c) (3)	Conservation and drought management measures including demand management.	Section 5B
(c) (4)	Reuse of wastewater.	Section 5B
(c) (5)	Interbasin transfers of surface water.	Chapter 5
(c) (6)	Emergency transfers of surface water including a determination of the part of each water right for non-municipal use in the RWPA that may be transferred without causing unreasonable damage to the property of the non-municipal water rights holder in accordance with Texas Water Code §11.139 (relating to Emergency Authorizations).	Section 5A, Chapter 7
(d)	All recommended WMSs and WMSPs that are entered into the State Water Planning Database and prioritized by RWPGs shall be designed to reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water, or develop, deliver or treat additional water supply volumes to WUGs or WWPs in at least one planning decade such that additional water is available during Drought of Record conditions. Any other RWPG recommendations regarding permit modifications, operational changes, and/or other infrastructure that are not designed to reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water, or develop, deliver or treat additional water supply volumes to WUGs or WWPs in at least one Planning Decade such that additional water is available during Drought of Record conditions shall be indicated as such and presented separately in the RWP and shall not be eligible for funding from the State Water Implementation Fund for Texas.	Chapter 5; Appendix F (Potentially Feasible WMSs); Appendix G (Water Management Strategy Evaulation)
(e)	Evaluations of potentially feasible WMSs and associated WMSPs shall include the following analyses:	
(e) (1)	For the purpose of evaluating potentially feasible WMSs, the Commission's most current Water Availability Model with assumptions of no return flows and full utilization of senior water rights, is to be used. Alternative assumptions may be used with written approval from the EA who shall consider a written request from an RWPG to use assumptions other than no return flows and full utilization of senior water rights.	Appendix E (Water Supply Available)
(e) (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.	Chapter 5, Appendix G (Water Management Strategy Evaulation)
(e) (3) (A)	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, taking into account and reporting anticipated strategy water losses, incorporating factors used calculating infrastructure debt payments and may include present costs and discounted present value costs. Costs do not include distribution of water within a WUG after treatment.	Chapter 5, Appendix G (Water Management Strategy Evaulation); Appendix H (Cost Estimates)
(e) (3) (B)	A quantitative reporting of the environmental factors including effects on environmental water needs, wildlife habitat, cultural resources, and effect of upstream development on bays, estuaries, and arms of the Gulf of Mexico. Evaluations of effects on environmental flows shall include consideration of the Commission's adopted environmental flow standards under 30 Texas Administrative Code Chapter 298 (relating to Environmental Flow Standards for Surface Water). If environmental flow standards have not been established, then environmental information from existing site-specific studies, or in the absence of such information, state environmental planning criteria adopted by the Board for inclusion in the State Water Plan after coordinating with staff of the Commission and the Texas Parks and Wildlife Department to ensure that WMSs are adjusted to provide for environmental water needs including instream flows and bays and estuaries inflows.	Appendix G (Water Management Strategy Evaulation); Appendix H (Cost Estimates); Appendix J (2020 Quantitative Analysis of the Impact of Marvin Nichols Reservoir)

Appendix A
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Regulatory Citation or Contract Exhibit	Summary of Requirement	Location(s) in Regional Plan and/or Commentary
(e) (3) (C)	A quantitative reporting of the impacts to agricultural resources.	Appendix G (Water Management Strategy Evaulation); Appendix J (2020 Quantitative Analysis of the Impact of Marvin Nichols Reservoir); Chapter 6
(e) (4)	Discussion of the plan's impact on other water resources of the state including other water management strategies and groundwater and surface water interrelationships.	Appendix G, Section 6.2
(e) (5)	Discussion of each threat to agricultural or natural resources identified pursuant to §357.30(7) of this title (relating to Description of the Regional Water Planning Area) including how that threat will be addressed or affected by the water management strategies evaluated	Appendix G, Section 6.2
(e) (6)	If applicable, consideration and discussion of the provisions in Texas Water Code §11.085(k)(1) for interbasin transfers of surface water. At minimum, this consideration will include a summation of water needs in the basin of origin and in the receiving basin.	Section 6.2.5; Table 6.2
(e) (7)	Consideration of third-party social and economic impacts resulting from voluntary redistributions of water including analysis of third-party impacts of moving water from rural and agricultural areas.	Section 6.2
(e) (8)	A description of the major impacts of recommended water management strategies on key parameters of water quality identified by RWPGs as important to the use of a water resource and comparing conditions with the recommended water management strategies to current conditions using best available data.	Section 6.1; Appendix K (Key Water Quality Parameters)
(e) (9)	Other factors as deemed relevant by the RWPG including recreational impacts.	Section 6.2.4
(f)	RWPGs shall evaluate and present potentially feasible WMSs and WMSPs with sufficient specificity to allow state agenciesto make financial or regulatory decisions to determine consistency of the proposed action before the state agency with an approved RWP.	Chapter 5; Appendix G (Water Management Strategy Evaulation); Appendix H (Cost Estimates)
(g)	Implementation of large recommended WMSs and associated WMSPs.	Chapter 5, Appendix G, Appendix N
(g) (1)	For large recommended WMSs and associated WMSPs, RWPGs must include the following information:	
(g) (1) (A)	Expenditures of sponsor money	Appendix N
(g) (1) (B)	Permit applications, including the status of a permit application	Chapter 5F, Appendix N
(g) (1) (C)	Status updates on the phase of construction of a project	Chapter 5F, Appendix N
(g) (2)	The implementation status must be provided for the following types of recommended WMSs with any online decade:	
(g) (2) (A)	All reservoir strategies (including major and minor reservoirs)	Chapter 5F, Appendix N
(g) (2) (B)	All seawater desalination strategies	N/A
(g) (2) (C)	Direct potable reuse strategies that provide greater than 5,000 acre-feet per year (AFY) of supply in any planning decade	N/A
(g) (2) (D)	Brackish groundwater strategies that provide greater than 10,000 AFY of supply in any planning decade	N/A
(g) (2) (E)	Aquifer storage and recovery strategies that provide greater than 10,000 AFY in any decade	N/A
(g) (2) (F)	All water transfers from out of state	N/A
(g) (2) (G)	Any other innovative technology projects the RWPG considers appropriate.	Chapter 5F, Appendix N
(h)	If an RWPG does not recommend aquifer storage and recovery strategies, seawater desalination strategies, or brackish groundwater desalination strategies it must document the reason(s) in the RWP.	Chapter 5
(i)	In instances where an RWPG has determined there are significant identified Water Needs in the RWPA, the RWP shall include an assessment of the potential for aquifer storage and recovery to meet those Water Needs. Each RWPG shall define the threshold to determine whether it has significant identified Water Needs. Each RWP shall include, at a minimum, a description of the methodology used to determine the threshold of significant needs. If a specific assessment is conducted, the assessment may be based on information from existing studies and shall include minimum parameters as defined in contract guidance.	Chapter 5, Appendix G
(j)	Conservation, Drought Management Measures, and Drought Contingency Plans shall be considered by RWPGs when developing the regional plans, particularly during the process of identifying, evaluating, and recommending WMSs. RWPs shall incorporate water conservation planning and drought contingency planning in the RWPA.	Chapter 5B, Appendix I (Water Conservation Savings)
(j) (1)	Drought Management Measures including water demand management. RWPGs shall consider Drought Management Measures for each need identified in §357.33 of this title and shall include such measures for each user group to which Texas Water Code §11.1272 (relating to Drought Contingency Plans for Certain Applicants and Water Right Holders) applies. Impacts of the Drought Management Measures on Water Needs must be consistent with guidance provided by the Commission in its administrative rules implementing Texas Water Code §11.1272. If an RWPG does not adopt a drought management strategy for a need it must document the reason in the RWP. Nothing in this paragraph shall be construed as limiting the use of voluntary arrangements by water users to forgo water usage during drought periods.	Section 5A.1.2, Section 6.2
(j) (2)	Water conservation practices. RWPGs must consider water conservation practices, including potentially applicable best management practices, for each identified Water Need.	Section 5A.1.1, Chapter 5B
(j) (2) (A)	RWPGs shall include water conservation practices for each user group to which Texas Water Code §11.1271 and §13.146 (relating to Water Conservation Plans) apply. The impact of these water conservation practices on Water Needs must be consistent with requirements in appropriate Commission administrative rules related to Texas Water Code §11.1271 and §13.146.	Section 5A.1.1, Chapter 5B
(j) (2) (B)	RWPGs shall consider water conservation practices for each WUG beyond the minimum requirements of subparagraph (A) of this paragraph, whether or not the WUG is subject to Texas Water Code §11.1271 and §13.146. If RWPGs do not adopt a Water Conservation Strategy to meet an identified need, they shall document the reason in the RWP.	Chapter 5B

Regulatory Citation or Contract Exhibit	Summary of Requirement	Location(s) in Regional Plan and/or Commentary
(j) (2) (C)	For each WUG or WWP that is to obtain water from a proposed interbasin transfer to which Texas Water Code §11.085 (relating to Interbasin Transfers) applies, RWPGs shall include a Water Conservation Strategy, pursuant to Texas Water Code §11.085(l), that will result in the highest practicable level of water conservation and efficiency achievable. For these strategies, RWPGs shall determine, and report projected water use savings in gallons per capita per day based on its determination of the highest practicable level of water conservation and efficiency achievable. RWPGs shall develop conservation strategies based on this determination. In preparing this evaluation, RWPGs shall seek the input of WUGs and WWPs as to what is the highest practicable level of conservation and efficiency achievable, in their opinion, and take that input into consideration. RWPGs shall develop water conservation strategies consistent with guidance provided by the Commission in its administrative rules that implement Texas Water Code §11.085. When developing water conservation strategies, the RWPGs must consider potentially applicable best management practices. Strategy evaluation in accordance with this section shall include a quantitative description of the quantity, cost, and reliability of the water estimated to be conserved under the highest practicable level of water conservation and efficiency achievable.	Chapter 5B
(j) (2) (D)	RWPGs shall consider strategies to address any issues identified in the information compiled by the Board from the water loss audits performed by Retail Public Utilities pursuant to §358.6 of this title (relating to Water Loss Audits).	Chapter 5B, Appendix B
(j) (3)	RWPGs shall recommend Gallons Per Capita Per Day goal(s) for each municipal WUG or specified groupings of municipal WUGs. Goals must be recommended for each planning decade and may be a specific goal or a range of values. At a minimum, the RWPs shall include Gallons Per Capita Per Day goals based on drought conditions to align with guidance principles in §358.3 of this title (relating to Guidance Principles).	Appendix I
(k)	RWPs shall include a subchapter consolidating the RWPG's recommendations regarding water conservation. RWPGs shall include in the RWPs model Water Conservation Plans pursuant to Texas Water Code §11.1271.	Chapter 5B
Exhibit C, Section 2.5.1	The IPP and final adopted RWP must include a list or table of all identified WMSs that were considered potentially feasible, to date, for meeting a need in the region per 31 TAC § 357.12(b). RWPGs must consider the potentially feasible WMSs listed in Exhibit C, Section 2.5.1.	Chapter 5A, Appendix F
Exhibit C, Section 2.5.1	Identify those potentially feasible WMSs, if any, that, in addition to providing water supply, could potentially provide non-trivial flood mitigation benefits or that might be the best potential candidates for exploring ways that they might be combined with flood mitigation features to leverage planning efforts to achieve potential cost savings or other combined water supply and flood mitigation benefits. The work required to identify these WMSs will be based entirely on a high-level, qualitative assessment and should not require modeling or other additional technical analyses.	Section 5F.1.2
Exhibit C, Section 2.5.2.7	Documentation of the implementation status addressing rule 357.34(g), must be included in a separate Chapter 5 subsection. The subsection must include 1) the implementation status in table format, using the TWDB provided table template, and 2) a simple, graphic, showing the full planning horizon, and displaying separate timeline/schedules for each project in accordance with Exhibit C, Section 2.5.2.7. Planning groups are required to use the TWDB table template in the 2026 RWP Exhibit C Tables Excel file for this subsection.	Section 5F.2
Exhibit C, Section 2.5.2.5-6	Aquifer storage and recovery WMS evaluations must report the expected percent of recovery for the ASR projects and must present that expected, lesser volume as the net water supply yield for the project.	Appendix G
Exhibit C, Section 2.5.2.14	If the distribution line replacement for the water conservation strategy is subject to adopted utility standard minimum size requirements that exceed two standard pipe diameters, the water management strategy evaluation must note the specific utility standard and include 1) a map of the proposed line replacement; and 2) detailed water loss calculations before and after the proposed line replacement.	Appendix I
Exhibit C, Section 2.5.2.12	At a minimum, annual costs should be presented by debt service, operation and maintenance cost as a percentage of total construction cost, power costs, and cost of purchasing water (if applicable). If precise information on the cost of purchasing water is not available, the plan should include a best estimate (e.g., as a percent markup) or an estimated range of the raw or treated water cost and the water management strategy evaluation can state the average cost is an estimate.	Appendix H
Exhibit C, Section 2.5.2	[Related to technical evaluations:] WMS and WMSP documentation must include a strategy description, discussion of associated facilities, project map, and technical evaluation addressing all considerations and factors required under 31 TAC §357.34(e)-(i) and §357.35. If an identified potentially feasible WMS is, at any point, determined to be not potentially feasible by the planning group and therefore not evaluated, the plan must provide documentation of why the WMS was not evaluated.	Chapter 5, Appendix G, Appendix H
Exhibit C, Section 2.5.4	[If applicable] Alternative water management strategies must be fully evaluated in accordance with 31 TAC §357.34(e)-(i). Technical evaluations of alternative WMSs must be included in the plans and the data associated with alternative WMS must be entered into DB27. Technical evaluations of each alternative WMS must have a generally defined delivery point for the water.	Chapter 5, Appendix G, Appendix H
Exhibit C, Section 2.5.4.1	RWPGs must provide an explanation for any predetermined management supply factors and may present these factors based, for example, on sizes of water users, types of water use, water availability conditions, types of WMSs, or any other factors the RWPG considers relevant at the project or water user level.	Chapter 5D
Exhibit C, Section 2.5.3	For any recommended water management strategies where the strategy supply volume remains 100 percent unallocated to water user groups, the RWPG must explain in the RWP why the strategy is recommended but not assigned to any beneficiaries.	N/A
	31 TAC §357.35	
357.35 (a)	RWPGs shall recommend WMSs and the WMSPs required to implement those WMSs to be used during a Drought of Record based on the potentially feasible WMSs evaluated under §357.34 of this title (relating to Identification and Evaluation of Potentially Feasible Water Management Strategies and Water Management Strategy Projects).	All of Chapter 5; Appendix F (Potentially Feasible WMSs); Appendix G (WMS Strategy Evaulation)
(b)	RWPGs shall recommend specific WMSs and WMSPs based upon the identification, analysis, and comparison of WMSs by the RWPG that the RWPG determines are potentially feasible so that the cost effective WMSs that are environmentally sensitive are considered and adopted unless an RWPG demonstrates that adoption of such WMSs is inappropriate. To determine cost-effectiveness and environmental sensitivity,RWPGs shall follow processes described in §357.34 of this title. The RWP may include Alternative WMSs evaluated by the processes described in §357.34 of this title.	All of Chapter 5; Appendix F (Potentially Feasible WMSs); Appendix G (WMS Strategy Evaluation); Appendix H (Cost Estimates)

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(c)	Strategies will be selected by the RWPGs so that cost effective water management strategies, which are consistent with long-term protection of the state's water resources, agricultural resources, and natural resources are adopted.	All of Chapter 5; Chapter 6; Appendix F (Potentially Feasible WMSs); Appendix G (WMS Strategy Evaulation); Appendix H (Cost Estimates)
(d)	RWPGs shall identify and recommend WMSs for all WUGs and WWPs with identified Water Needs and that meet all Water Needs during the Drought of Record except in cases where:	
(d) (1)	No WMS is feasible. In such cases, RWPGs must explain why no WMSs are feasible; or	Section 6.5.1
(d) (2)	A Political Subdivision that provides water supply other than water supply corporations, counties, or river authorities explicitly does not participate in the regional water planning process for needs located within its boundaries or extraterritorial jurisdiction.	N/A
(e)	Specific recommendations of water management strategies to meet an identified need will not be shown as meeting a need for a political subdivision if the political subdivision in question objects to inclusion of the strategy for the political subdivision and specifies its reasons for such objection. This does not prevent the inclusion of the strategy to meet other needs.	This was considered for all water purchases. If a seller did not agree to the sale, it was not included as a WMS.
(f)	Recommended strategies shall protect existing water rights, water contracts, and option agreements, but may consider potential amendments of water rights, contracts and agreements, which would require the eventual consent of the owner.	Chapter 3; Appendix E (Water Supply Available), Chapter 5, Appendix G
(g)	RWPGs shall report the following:	
(g) (1)	Recommended WMSs, recommended WMSPs, and the associated results of all the potentially feasible WMS evaluations by WUG and MWP. If a WUG lies in one or more counties or RWPAs or river basins, data shall be reported for each river basin, RWPA, and county.	Chapter 5; Appendices D, F, G, H
(g) (2)	Calculated planning management supply factors for each WUG and MWP included in the RWP assuming all recommended WMSs are implemented. This calculation shall be based on the sum of: the total existing water supplies, plus all water supplies from recommended WMSs for each entity; divided by that entity's total projected Water Demand, within the Planning Decade. The resulting calculated management supply factor shall be presented in the plan by entity and decade for every WUG and MWP. Calculating planning management supply factors is for reporting purposes only.	Chapter 5D, Appendix D (DB27 Reports)
(g) (3)	Fully evaluated Alternative WMSs and associated WMSPs included in the adopted RWP shall be presented together in one place in the RWP.	Chapter 5C, 5D, 5E; Appendices F, G, H
HB807, TWC 16.053 (e)(11)	Set one or more specific goals for gallons of water use per capita per day in each decade of the period covered by the plan for the municipal water user groups in the RWPA.	Chapter 5B, Appendix I (Water Conservation Savings)
HB807, TWC 16.053 (e)(10)	Specific assessment of Aquifer Storage and Recovery (ASR) potential if significant identified needs.	Chapter 5A, Chapter 5C
Chapter Six Impacts of Regional Water Plan and Consistency with Protection of Water Resources, Agricultural Resources, and Natural Resources		
31 TAC §357.40		
357.40(a)	RWPs shall include a quantitative description of the socioeconomic impacts of not meeting the identified Water Needs pursuant to §357.33(c) of this title (relating to Needs Analysis: Comparison of Water Supplies and Demands).	Section 6.5.2, Appendix L (Socio-Economic Impacts)
(b)	RWPs shall include a description of the impacts of the RWP regarding:	
(b) (1)	Agricultural resources pursuant to §357.34(e)(3)(C) of this title (relating to Identification and Evaluation of Potentially Feasible Water Management Strategies);	Section 6.2, 6.4, Appendix G, Appendix J
(b) (2)	Other water resources of the state including other WMSs and groundwater and surface water interrelationships pursuant to §357.34(e)(4) of this title;	Section 6.2, 6.4, Appendix G
(b) (3)	Threats to agricultural and natural resources identified pursuant to §357.34(e)(5) of this title;	Chapter 6
(b) (4)	Third-party social and economic impacts resulting from voluntary redistributions of water including analysis of third-party impacts of moving water from rural and agricultural areas pursuant to §357.34(e)(7) of this title;	Section 6.2
(b) (5)	Major impacts of recommended WMSs on key parameters of water quality pursuant to §357.34(e)(8) of this title; and	Section 6.1; Appendix K (Key Water Quality Parameters)
(b) (6)	Effects on navigation	Section 6.4.4
(c)	RWPs shall include a summary of the identified Water Needs that remain unmet by the RWP.	Section 6.5.1
31 TAC §357.41		
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 as embodied in the guidance principles in §358.3(4) and (8) of this title (relating to Guidance Principles).	Section 6.4
Chapter Seven Drought Response Information, Activities, and Recommendations		
31 TAC §357.42		
357.42 (a)	RWPs shall consolidate and present information on current and planned preparations for, and responses to, drought conditions in the region including, but not limited to, drought of record conditions based on the following subsections.	Section 7.1; Section 7.2; Appendix M (Summary of Drought Reponses)
(b)	RWPGs shall conduct an assessment of current preparations for drought within the RWPA. This may include information from local Drought Contingency Plans. The assessment shall include	Section 7.1; Section 7.2; Appendix M (Summary of Drought Reponses)
(b) (1)	A description of how water suppliers in the RWPA identify and respond to the onset of drought.	Chapter 7
(b) (2)	Identification of unnecessary or counterproductive variations in drought response strategies among water suppliers that may confuse the public or impede drought response efforts. At a minimum, RWPGs shall review and summarize drought response efforts for neighboring communities including the differences in the implementation of outdoor watering restrictions.	Section 7.3.7
(c)	RWPGs shall develop drought response recommendations regarding the management of existing groundwater and surface water sources in the RWPA designated in accordance with §357.32 of this title (relating to Water Supply Analysis), including:	

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Regulatory Citation or Contract Exhibit	Summary of Requirement	Location(s) in Regional Plan and/or Commentary
(c) (1)	Factors specific to each source of water supply to be considered in determining whether to initiate a drought response for each water source including specific recommended drought response triggers (See also §357.32 of Regional Planning Guidelines)	Section 7.1; Section 7.2; Appendix M (Summary of Drought Reponses)
(c) (2)	Actions to be taken as part of the drought response by the manager of each water source and the entities relying on each source, including the number of drought stages; and	Section 7.1; Section 7.2; Appendix M (Summary of Drought Reponses)
(c) (3)	Triggers and actions developed in paragraphs (1) and (2) of this subsection may consider existing triggers and actions associated with existing drought contingency plans.	Section 7.5
(d)	RWPGs shall collect information on existing major water infrastructure facilities that may be used for interconnections in event of an emergency shortage of water. In accordance with Texas Water Code §16.053(r), this information is CONFIDENTIAL INFORMATION and cannot be disseminated to the public. The associated information is to be collected by a subgroup of RWPG members in a closed meeting and submitted separately to the EA in accordance with guidance to be provided by EA.	Section 7.3; Section 7.4
(e)	RWPGs shall provide general descriptions of local drought contingency plans that involve making emergency connections between water systems or WWP systems that do not include locations or descriptions of facilities that are disallowed under subsection (d) of this section.	Section 7.3; Section 7.4
(f)	RWPGs may designate recommended and alternative drought management water management strategies and other recommended drought measures in the RWP including:	
(f) (1)	List and description of the recommended drought management water management strategies and associated WUGs and WWPs, if any, that are recommended by the RWPG. Information to include associated triggers to initiate each of the recommended drought management water management strategies	N/A
(f) (2)	List and description of alternative drought management water management strategies and associated WUGs and WWPs, if any, that are included in the plan. Information to include associated triggers to initiate each of the alternative drought management water management strategies	N/A
(f) (3)	List of all potentially feasible drought management water management strategies that were considered or evaluated by the RWPG but not recommended; and	N/A
(f) (4)	List and summary of any other recommended drought management measures, if any, that are included in the RWP, including associated triggers if applicable	N/A
(g)	The RWPGs shall evaluate potential emergency responsesto local drought conditions or loss of existing water supplies; theevaluation shall include identification of potential alternative watersources that may be considered for temporary emergency use by WUGsand WWPs in the event that the Existing Water Supply sources becometemporarily unavailable to the WUGs and WWPs due to unforeseeablehydrologic conditions such as emergency water right curtailment, unanticipatedloss of reservoir conservation storage, or other localized droughtimpacts. RWPGs shall evaluate, at a minimum, municipal WUGs that:	
(g) (1)	Have existing populations less than 7,500;	Section 7.3; Appendix M (Summary of Drought Reponses)
(g) (2)	Rely on a sole source for its water supply regardless of whether the water is provided by a WWP; and	
(g) (3)	All County-Other WUGs.	
(h)	RWPGs shall consider any relevant recommendations from the Drought Preparedness Council.	Section 7.7.1
(i)	RWPGs shall make drought preparation and response recommendations regarding:	
(i) (1)	Development of, content contained within, and implementation of local drought contingency plans required by the Commission	Section 7.5; Section 7.7.2
(i) (2)	Current drought management preparations in the RWPA including:	
(i) (2) (A)	Drought response triggers; and	Section 7.5
(i) (2) (B)	Responses to drought conditions;	Section 7.5
(i) (3)	The Drought Preparedness Council and the State Drought Preparedness Plan; and	Section 7.5
(i) (4)	Any other general recommendations regarding drought management in the region or state	Section 7.5
(j)	The RWPGs shall develop region-specific model Drought Contingency Plans.	Section 7.5.4
HB807, TWC 16.053 (e)(3)(E)	Identify unnecessary or counterproductive variations in specific drought response strategies, including outdoor watering restrictions, among user groups in the regional water planning area that may confuse the public or otherwise impede drought response efforts	Section 7.7.3
Exhibit C, Section 2.7.2	Include a separate Chapter 7 subsection that provides documentation of how the planning group addressed uncertainties in the RWP (if applicable), how the planning group addressed a drought worse than the DOR in the RWP (if applicable), and potential measures and responses that would likely be available to users in the region, in the event of a drought worse than the DOR.	Section 7.2
Exhibit C, Section 2.7.2	Summarize, in general, how the region incorporated planning for uncertainty in its RWP and the region's basis, or policy, for inclusion. This could include general discussion on planning factors, any drivers of uncertainty associated with those factors, and how the RWPG made planning decisions to acknowledge or address that uncertainty. If the RWP does not include any measures to address uncertainty, this subsection must include a statement to that effect.	Section 7.2.1
Exhibit C, Section 2.7.2	Summarize, in general, the key assumptions, analyses, strategies, and projects that are already included in the 2026 RWP calculations and recommendations (if applicable) that go beyond just meeting identified water needs anticipated under a DOR (i.e., those things that will provide some additional measure of protection to withstand a DWDOR such as use of safe-yield or inclusion of strategies that provide water volumes in excess of the identified water need, such as management supply factor, etc.). The summary should include describing which water users in the region, in general, are associated with those additional measures of protection (e.g., list of WUGs and WWPs and their associated water supplies to which these assumptions apply). If the RWP does not include any planning measures to address a DWDOR, this subsection must include a statement to that effect.	Section 7.5

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Exhibit C, Section 2.7.2	Summarize, in general, the potential additional types of measures and responses, that are not part of the recommendations in the 2026 RWP, but that would likely be available to certain water providers/users in the event of the near-term onset of a DWDOR and that would be capable of providing additional, potential capacity for those water providers and users to withstand a DWDOR (i.e., additional or deeper drought management measures - if not a recommended WMS - that could be employed). The summary should include describing which water providers/users in the region, in general, the additional measures and responses would be associated with (e.g., list of WUGs and WWPs and their associated water supplies to which these assumptions apply). This information may be presented at a high-level as provided in the examples in the 2026 RWP Exhibit C Tables Excel file.	Section 7.5
Chapter Eight Policy Recommendations and Unique Sites		
31 TAC §357.43		
357.43 (a)	The RWPs shall contain any regulatory, administrative, or legislative recommendations developed by the RWPGs	Section 8.4
(b)	Ecologically Unique River and Stream Segments. RWPGs may include in adopted RWPs recommendations for all or parts of river and stream segments of unique ecological value located within the RWPA by preparing a recommendation package consisting of a physical description giving the location of the stream segment, maps, and photographs of the stream segment and a site characterization of the stream segment documented by supporting literature and data. The recommendation package shall address each of the criteria for designation of river and stream segments of ecological value found in this subsection. The RWPG shall forward the recommendation package to the Texas Parks and Wildlife Department and allow the Texas Parks and Wildlife Department 30 days for its written evaluation of the recommendation. The adopted RWP shall include, if available, Texas Parks and Wildlife Department's written evaluation of each river and stream segment recommended as a river or stream segment of unique ecological value.	Section 8.2
(b) (1)	An RWPG may recommend a river or stream segment as being of unique ecological value based upon the criteria set forth in §358.2 of this title (relating to Definitions)	Section 8.2
(b) (2)	For every river and stream segment that has been designated as a unique river or stream segment by the legislature, during a session that ends not less than one year before the required date of submittal of an adopted RWP to the Board, or recommended as a unique river or stream segment in the RWP, the RWPG shall assess the impact of the RWP on these segments. The assessment shall be a quantitative analysis of the impact of the plan on the flows important to the river or stream segment, as determined by the RWPG, comparing current conditions to conditions with implementation of all recommended water management strategies. The assessment shall also describe the impact of the plan on the unique features cited in the region's recommendation of that segment	Chapter 6, Section 8.2
(c)	Unique Sites for Reservoir Construction. An RWPG may recommend sites of unique value for construction of reservoirs by including descriptions of the sites, reasons for the unique designation and expected beneficiaries of the water supply to be developed at the site. The criteria at §358.2 of this title shall be used to determine if a site is unique for reservoir construction.	Section 8.3
(d)	Any other recommendations that the RWPG believes are needed and desirable to achieve the stated goals of state and regional water planning including to facilitate the orderly development, management, and conservation of water resources and prepare for and respond to drought conditions.	Section 8.4
(e)	RWPGs may develop information as to the potential impacts of any proposed changes in law prior to or after changes are enacted.	Section 8.4
(f)	RWPGs should consider making legislative recommendations to facilitate more voluntary water transfers in the region.	Section 8.4
HB807, TWC 16.053(i)	RWPG should make legislative recommendations "for any other changes that the members of the planning group believe would improve the water planning process	Included in Existing Scope; Chapter 8, Section 8.4
Exhibit C, Section 2.8.1	An updated Texas Parks and Wildlife Department evaluation must be included in each RWP, even for those stream segments that have been recommended in previous plans but not designated by the Legislature.	Section 8.2
Exhibit C, Section 2.8.1	If a river or stream segment has been recommended in a previous plan, the planning group may incorporate references of supporting materials developed for the previous plan into the current plan. References must be precise and include a summary of the information presented in the previous plan.	Section 8.2
Exhibit C, Section 2.8.1	Recommendations regarding unique river or stream segments presented in the RWPs must be specific as to a) which unique river or stream segments have been previously designated by the legislature and b) which are being recommended for designation by the planning group.	Section 8.2
Exhibit C, Section 2.8.2	For recommendations regarding unique reservoir sites, the RWP must be specific as to a) which unique reservoir sites have been previously designated by the legislature; b) which are being recommended for designation by the RWPG; and c) whether the RWPG is recommending that the legislature re-designate a previously designated unique reservoir site.	Section 8.3
Chapter Nine Implementation and Comparison to the Previous Regional Water Plan		
31 TAC §357.45		
357.45 (a)	RWPGs shall describe the level of implementation of previously recommended WMSs and associated impediments to implementation in accordance with guidance provided by the board. Information on the progress of implementation of all WMSs that were recommended in the previous RWP, including conservation and Drought Management WMSs; and the implementation of WMSPs that have affected progress in meeting the state's future water needs.	Chapter 9, Appendix N
(b)	RWPGs shall assess the progress of the RWPA in encouraging cooperation between WUGs for the purpose of achieving economies of scale and otherwise incentivizing WMSs that benefit the entire RWPA. This assessment of regionalization shall include:	
(b) (1)	The number of recommended WMSs in the previously adopted and current RWPs that serve more than one WUG;	Section 9.3
(b) (2)	The number of recommended WMSs in the previously adopted RWP that serve more than one WUG and have been implemented since the previously adopted RWP; and	Section 9.3
(b) (3)	A description of efforts the RWPG has made to encourage WMSs and WMSPs that serve more than one WUG, and that benefit the entire region.	Section 9.3
(b) (4)	Recommended and Alternative WMSs and WMSPs.	Chapter 5, Section 9.3, Appendix G
HB807, TWC 16.053 (e)(12)	Assess progress of "regionalization"	Section 9.3
Chapter Ten Public Participation and Plan Adoption		

Appendix A
Consistency with TWDB Rules

Regulatory Citation or Contract Exhibit	Summary of Requirement	Location(s) in Regional Plan and/or Commentary
	31 TAC §357.21	
357.21 (a)	Each RWPG and any committee or subcommittee of an RWPG are subject to Chapters 551 and 552, Government Code. A copy of all materials presented or discussed at an open meeting shall be made available for public inspection prior to and following the meetings and shall meet the additional notice requirements when specifically referenced as required under other subsections. In addition to the notice requirements of Chapter 551, Government Code, the following requirements apply to RWPGs.	Section 10.4
(b-h)	All public notices required by the TWDB by the RWPG shall comply with 31 TAC §357.21 and shall meet the requirements specified therein.	Section 10.4
Exhibit C, Section 2.8.3	Receive and consider recommendations from the Interregional Planning Council to the RWPGs.	Section 8.4.6, Section 10.5
Exhibit C, Section 2.13.2	In the 2026 RWPs, the required DB27 data reports must be included in the IPP and final RWP via reference to the TWDB Database Reports application in lieu of including electronic versions of the reports as an appendix to the plan. Each Executive Summary of the IPP and RWP must include a section that lists the DB27 reports that will be available through the TWDB Database Reports application and instructions on how the public can access the reports, including a direct hyperlink to the TWDB Database Reports application. The DB27 reports that will be accessible in the application are listed in Contract Exhibit C, Table 3. Section 2.13.2 of Exhibit C lists the required instructions to include in the IPP and final plans.	Executive Summary, Throughout Plan (Attachments, Section 5F.3, etc.)
Exhibit C, Section 2.10	Conduct and/or enhance existing outreach specifically to rural entities in the planning area to collect and evaluate information to support plan development, including keeping track of which rural entities were contacted by the RWPG/Consultant, which entities were not responsive to RWPG contact efforts, and including a summary of the region's rural outreach efforts in Chapter 10 of the IPP and final RWP.	Chapter 10, Appendix O
	31 TAC §357.50	
357.5 (a)	Submit their adopted RWPs to the Board every five years on a date to be disseminated by the EA, as modified by subsection (e)(2) of this section, for approval and inclusion in the state water plan.	N/A for IPP. Applies to the Final Plan.
(b)	Prior to the adoption of the RWP, the RWPGs shall submit concurrently to the EA and the public an IPP. The IPP submitted to the EA must be in the electronic and paper format specified by the EA. Each RWPG must certify that the IPP is complete and adopted by the RWPG. In the instance of a recommended WMS proposed to be supplied from a different RWPA, the RWPG recommending such strategy shall submit, concurrently with the submission of the IPP to the EA, a copy of the IPP, or a letter identifying the WMS in the other region along with an internet link to the IPP, to the RWPG associated with the location of such strategy.	Entire IPP Document; cover/transmittal letter; Interregional letters
(c)	The RWPGs shall distribute the IPP in accordance with §357.21(d)(4) of this title (relating to Notice and Public Participation).	Section 10.4
(d)	Within 60 days of the submission of IPPs to the EA, the RWPGs shall submit to the EA, and the other affected RWPG, in writing, the identification of potential Interregional Conflicts by:	
(d) (1)	identifying the specific recommended WMS from another RWPG's IPP;	To be considered after submission of IPP.
(d) (2)	providing a statement of why the RWPG considers there to be an Interregional Conflict; and	
(d) (3)	providing any other information available to the RWPG that is relevant to the Board's decision.	
(e)	The RWPGs shall seek to resolve conflicts with other RWPGs and shall promptly and actively participate in any Board sponsored efforts to resolve Interregional Conflicts.	Section 10.5
(f)	The RWPGs shall solicit, and consider the following comments when adopting an RWP:	
(f) (1)	the EA's written comments, which shall be provided to the RWPG within 120 days of receipt of the IPP;	Comments will be solicited after the Public Hearing and addressed in the Final Plan.
(f) (2)	Any written or oral comments received from any federal agency, Texas state agency, or the public after the first public hearing notice is published until at least 60 days after the public hearing is held pursuant to §357.21(h) of this title.	
(f) (3)	The RWPGs shall revise their IPPs to incorporate negotiated resolutions or Board resolutions of any Interregional Conflicts into their final adopted RWPs.	
(f) (4)	In the event that the Board has not resolved an Interregional Conflict sufficiently early to allow an involved RWPG to modify and adopt its final RWP by the statutory deadline, all RWPGs involved in the conflict shall proceed with adoption of their RWP by excluding the relevant recommended WMS and all language relevant to the conflict and include language in the RWP explaining the unresolved Interregional Conflict and acknowledging that the RWPG may be required to revise or amend its RWP in accordance with a negotiated or Board resolution of an Interregional Conflict.	The IPP will be revised to reflect any negotiated resolutions, if reached.
(g)	Submittal of RWPs. RWPGs shall submit the IPP and the adopted RWPs and amendments to approved RWPs to the EA in conformance with this section.	
(g) (1)	RWPs shall include:	
(g) (1) (A)	The technical report and data prepared in accordance with this chapter and the EA's specifications;	All IPP chapters and appendices
(g) (1) (B)	An executive summary that documents key RWP findings and recommendations;	Executive Summary
(g) (1) (C)	Documentation of the RWPG's interregional coordination efforts; and	Chapter 10
(g) (1) (D)	A copy of the EA's comments on the IPP and summaries of all written and oral comments received pursuant to subsection (f) of this section, with a response by the RWPG explaining how the plan was revised or why changes were not warranted in response to written comments received under subsection (f) of this section.	To be included in Final Plan
(g) (2)	RWPGs shall submit RWPs to the EA according to the following schedule:	
(g) (2) (A)	IPPs are due every five years on a date disseminated by the EA unless an extension is approved, in writing, by the EA.	IPP will be submitted by March 3, 2025 IPP deadline
(g) (2) (B)	Prior to submission of the IPP, the RWPGs shall upload ~~the~~ all required data, metadata and all other relevant digital information supporting the plan to the Board's State Water Planning Database. All changes and corrections to this information must be entered into the Board's State Water Planning Database prior to submittal of a final adopted plan.	All metadata and digital information will be uploaded prior to the March 3, 2025 IPP deadline.
(g) (2) (C)	The RWPG shall transfer copies of all data, models, and reports generated by the planning process and used in developing the RWP to the EA. To the maximum extent possible, data shall be transferred in digital form according to specifications provided by the EA. One copy of all reports prepared by the RWPG shall be provided in digital format according to specifications provided by the EA. All digital mapping shall use a geographic information system according to specifications provided by the EA. The EA shall seek the input from the State Geographic Information Officer regarding specifications mentioned in this section.	All data, models, and reports will be submitted with the IPP submittal.

Appendix A
Consistency with TWDB Rules

Regulatory Citation or Contract Exhibit	Summary of Requirement	Location(s) in Regional Plan and/or Commentary
(g) (2) (D)	Adopted RWPs are due to the EA every five years on a date disseminated by the EA unless, at the discretion of the EA, a time extension is granted consistent with the timelines in Texas Water Code §16.053(i).	N/A for IPP.
(g) (2) (E)	Once approved by the Board, RWPs shall be made available on the Board website.	N/A for IPP.
(h)	Upon receipt of an RWP adopted by the RWPG, the Board shall consider approval of such plan based on the following criteria:	
(h) (1)	verified adoption of the RWP by the RWPG; and	N/A for IPP.
(h) (2)	verified incorporation of any negotiated resolution or Board resolution of any Interregional Conflicts, or in the event that an Interregional Conflict is not yet resolved, verified exclusion of the relevant recommended WMS and all language relevant to the conflict.	N/A for IPP.
(i)	Approval of RWPs by the Board. The Board may approve an RWP only after it has determined that the RWP complies with statute and rules.	N/A for IPP.
(j)	The Board shall consider approval of an RWP that includes unmet municipal Water Needs provided that the RWPG includes adequate justification, including that the RWP:	
(j) (1)	documents that the RWPG considered all potentially feasible WMSs, including Drought Management WMSs and contains an explanation why additional conservation and/or Drought Management WMSs were not recommended to address the need;	Section 5A and Section 6.5.1
(j) (2)	describes how, in the event of a repeat of the Drought of Record, the municipal WUGs associated with the unmet need shall ensure the public health, safety, and welfare in each Planning Decade that has an unmet need; and	Section 6.5.1
(j) (3)	explains whether there may be occasion, prior to development of the next IPP, to amend the RWP to address all or a portion of the unmet need.	Section 6.5.1
(k)	Board Adoption of State Water Plan. RWPs approved by the Board pursuant to this chapter shall be incorporated into the State Water Plan as outlined in §358.4 of this title (relating to Guidelines).	N/A

Appendix B

Water Loss Audit Data

Appendix B

Total Water Loss by WUGs in Gallons per Connection per Day

YEAR	2018	2019	2020	2021	2022	AVERAGE
Ables Springs SUD	N/A	N/A	14	17	24	18
Addison	52	59	89	41	64	61
Aledo	8	10	16	67	60	32
Allen	37	41	N/A	36	54	42
Alvord	N/A	N/A	N/A	53	N/A	53
Anna	93	70	45	56	53	63
Annetta	N/A	N/A	6	N/A	N/A	6
Arledge Ridge WSC	N/A	N/A	87	N/A	N/A	87
Arlington	32	35	42	57	61	46
Athens	N/A	N/A	20	N/A	71	45
Avalon Water Supply & Sewer Service	N/A	N/A	100	N/A	N/A	100
Azle	N/A	N/A	N/A	30	N/A	30
Balch Springs	N/A	16	16	20	31	21
Bear Creek SUD	9	14	18	30	N/A	18
Bedford	N/A	N/A	18	N/A	25	21
Bells	N/A	53	42	45	33	43
Benbrook Water Authority	39	44	43	46	42	43
Bethel Ash WSC	N/A	N/A	22	N/A	N/A	22
Black Rock WSC	N/A	N/A	39	N/A	N/A	39
Blackland WSC	N/A	N/A	N/A	71	N/A	71
Blue Mound	N/A	N/A	N/A	20	N/A	20
Blue Ridge	N/A	69	N/A	N/A	N/A	69
Bois D Arc MUD	41	119	45	46	29	56
Bolivar WSC	86	96	120	132	82	103
Bonham	62	66	N/A	104	65	74
Boyd	N/A	45	59	15	N/A	40
Bridgeport	N/A	N/A	N/A	20	N/A	20
Buena Vista-Bethel SUD	N/A	N/A	154	N/A	N/A	154
Butler WSC	87	N/A	N/A	N/A	N/A	87
Carrollton	26	22	N/A	36	46	32
Cedar Hill	70	59	53	44	97	65
Celina	81	54	33	89	N/A	64
Chatfield WSC	N/A	N/A	26	N/A	N/A	26
Chico	N/A	N/A	43	N/A	N/A	43
Cockrell Hill	147	244	87	N/A	N/A	160
Colleyville	27	38	53	48	64	46
Collinsville	N/A	N/A	11	N/A	N/A	11
Community WSC	N/A	N/A	107	N/A	N/A	107
Coppell	N/A	N/A	43	51	43	45
Corbet WSC	15	N/A	19	N/A	35	23
Corinth	N/A	N/A	N/A	38	N/A	38
Corsicana	54	43	53	45	37	47
Crandall	N/A	N/A	22	N/A	N/A	22
Crescent Heights WSC	N/A	20	22	N/A	31	24
Cross Timbers WSC	N/A	N/A	17	N/A	30	24
Crowley	51	N/A	27	19	N/A	32

Appendix B
Total Water Loss by WUGs in Gallons per Connection per Day

YEAR	2018	2019	2020	2021	2022	AVERAGE
Dallas	133	N/A	72	78	N/A	94
Dalworthington Gardens	N/A	N/A	23	22	36	27
Dawson	N/A	6	9	N/A	46	20
Denison	76	34	56	67	17	50
Denton	43	54	47	46	61	50
Denton County FWSD 10	N/A	12	75	41	16	36
Desert WSC	131	N/A	171	167	102	143
Desoto	60	55	N/A	N/A	N/A	57
Dorchester	N/A	N/A	155	N/A	155	155
Duncanville	N/A	N/A	28	33	69	43
East Cedar Creek FWSD	N/A	14	31	62	40	37
East Fork SUD	N/A	N/A	N/A	17	N/A	17
East Garrett WSC	N/A	N/A	142	N/A	N/A	142
Elmo WSC	N/A	N/A	83	N/A	20	51
Ennis	38	65	53	79	N/A	59
Everman	29	33	22	40	21	29
Fairview	85	62	N/A	N/A	91	80
Farmers Branch	N/A	N/A	76	73	57	69
Farmersville	114	N/A	N/A	N/A	40	77
Fate	31	N/A	29	N/A	20	27
Ferris	N/A	N/A	69	242	N/A	156
Flower Mound	N/A	N/A	44	59	47	50
Forest Hill	N/A	N/A	22	N/A	N/A	22
Forney	45	26	46	N/A	N/A	39
Forney Lake WSC	N/A	N/A	31	N/A	N/A	31
Fort Worth	86	91	94	78	56	81
Frisco	44	32	43	49	N/A	42
Frognot WSC	N/A	53	40	38	N/A	43
Gainesville	19	17	36	38	N/A	27
Garland	58	68	70	41	N/A	59
Glenn Heights	N/A	92	82	83	78	84
Grand Prairie	61	51	51	N/A	N/A	55
Grapevine	N/A	15	31	26	71	36
Gunter	14	36	6	28	N/A	21
Haslet	N/A	N/A	55	N/A	N/A	55
Heath	N/A	51	88	89	72	75
High Point WSC	N/A	N/A	N/A	21	N/A	21
Highland Park	17	23	N/A	N/A	N/A	20
Highland Village	N/A	30	N/A	43	47	40
Hilco United Services	N/A	N/A	90	N/A	N/A	90
Honey Grove	32	43	52	102	151	76
Howe	N/A	N/A	84	103	N/A	93
Hurst	18	N/A	17	18	19	18
Hutchins	N/A	69	N/A	N/A	N/A	69
Irving	26	32	35	34	32	32
Jacksboro	N/A	N/A	N/A	136	183	160

Appendix B
Total Water Loss by WUGs in Gallons per Connection per Day

YEAR	2018	2019	2020	2021	2022	AVERAGE
Josephine	N/A	13	N/A	N/A	N/A	13
Justin	102	87	51	50	56	69
Kaufman	19	N/A	N/A	19	N/A	19
Kaufman County Development District 1	N/A	N/A	92	N/A	N/A	92
Keller	22	40	55	61	52	46
Kemp	N/A	24	43	N/A	31	33
Kennedale	54	38	36	25	38	38
Krum	N/A	6	35	53	71	41
Ladonia	308	74	136	N/A	N/A	172
Lake Cities Municipal Utility Authority	N/A	18	N/A	22	24	21
Lake Kiowa SUD	N/A	N/A	N/A	N/A	12	12
Lake Worth	17	21	40	29	9	23
Lancaster	19	24	20	58	N/A	30
Lancaster MUD 1	N/A	N/A	8	N/A	N/A	8
Leonard	N/A	205	98	140	96	135
Lewisville	34	N/A	77	91	117	80
Lindsay	N/A	N/A	N/A	N/A	37	37
Little Elm	N/A	N/A	N/A	42	N/A	42
Lucas	N/A	N/A	N/A	41	N/A	41
Luella SUD	N/A	N/A	25	N/A	N/A	25
Mabank	N/A	39	56	82	N/A	59
Malakoff	14	13	13	55	54	30
Mansfield	27	61	59	49	N/A	49
McKinney	90	73	61	43	46	63
Melissa	N/A	N/A	N/A	N/A	31	31
Mesquite	N/A	41	N/A	34	81	52
Midlothian	33	67	63	106	60	66
Mountain Peak SUD	146	125	102	130	105	122
Muenster	N/A	N/A	N/A	56	N/A	56
Mustang SUD	75	35	39	37	34	44
NA	87	102	N/A	N/A	N/A	95
Navarro Mills WSC	N/A	N/A	58	N/A	N/A	58
Nevada SUD	10	10	6	8	17	10
Newark	N/A	43	65	N/A	25	44
North Collin SUD	N/A	71	N/A	N/A	N/A	71
North Kaufman WSC	N/A	3	N/A	N/A	78	41
North Richland Hills	N/A	23	38	35	48	36
Northlake	N/A	N/A	N/A	39	N/A	39
Oak Ridge South Gale WSC	36	30	18	18	N/A	25
Ovilla	N/A	N/A	60	N/A	N/A	60
Paloma Creek North	N/A	16	32	N/A	N/A	24
Paloma Creek South	N/A	N/A	74	N/A	N/A	74
Pantego	9	12	9	19	23	14
Parker County SUD	15	11	13	17	50	21
Pelican Bay	N/A	N/A	7	N/A	N/A	7
Pilot Point	N/A	N/A	22	N/A	N/A	22

Appendix B
Total Water Loss by WUGs in Gallons per Connection per Day

YEAR	2018	2019	2020	2021	2022	AVERAGE
Pink Hill WSC	25	36	29	N/A	N/A	30
Plano	110	106	98	114	107	107
Poetry WSC	31	24	24	28	45	30
Pottsboro	10	N/A	N/A	5	N/A	8
Prosper	40	50	N/A	25	36	38
Providence Village WCID	N/A	N/A	10	N/A	N/A	10
R C H WSC	N/A	N/A	N/A	24	N/A	24
Red Oak	N/A	35	N/A	26	17	26
Red River Authority of Texas	N/A	N/A	84	N/A	N/A	84
Reno (Parker)	N/A	10	N/A	N/A	N/A	10
Richardson	108	102	N/A	110	N/A	107
Richland Hills	14	19	20	22	28	21
River Oaks	8	19	13	26	14	16
Rockett SUD	50	63	50	60	80	61
Rockwall	93	58	58	74	54	67
Rose Hill SUD	N/A	N/A	14	N/A	N/A	14
Rowlett	26	32	22	27	31	28
Royse City	35	23	N/A	N/A	N/A	29
Runaway Bay	N/A	N/A	27	N/A	N/A	27
Sachse	14	19	18	22	25	20
Saginaw	26	N/A	N/A	N/A	N/A	26
Sardis Lone Elm WSC	106	75	47	46	29	60
Seagoville	N/A	37	N/A	N/A	N/A	37
Seis Lagos UD	20	14	N/A	N/A	39	25
Sherman	99	48	94	93	116	90
South Freestone County WSC	59	66	69	51	40	57
Southlake	N/A	31	34	48	80	48
Southmayd	N/A	N/A	N/A	N/A	80	80
Southwest Fannin County SUD	N/A	N/A	43	N/A	N/A	43
Springtown	84	14	60	40	69	53
Starr WSC	N/A	31	31	N/A	N/A	31
Talty SUD	N/A	N/A	29	25	26	27
Teague	24	51	18	120	N/A	53
Terrell	26	N/A	112	N/A	N/A	69
The Colony	29	39	57	33	N/A	40
Tioga	21	23	8	31	39	24
Tom Bean	66	47	52	28	52	49
Trinidad	68	26	N/A	149	N/A	81
Trophy Club MUD 1	206	63	N/A	100	101	117
University Park	19	25	N/A	61	20	31
Van Alstyne	64	28	N/A	N/A	N/A	46
Verona SUD	N/A	N/A	N/A	37	32	34
Watauga	N/A	75	48	N/A	N/A	61
Waxahachie	31	56	64	36	51	47
Weatherford	18	25	29	29	29	26
West Leonard WSC	N/A	N/A	16	N/A	N/A	16

Appendix B
Total Water Loss by WUGs in Gallons per Connection per Day

YEAR	2018	2019	2020	2021	2022	AVERAGE
West Wise SUD	73	76	50	45	56	60
Westlake	137	35	N/A	25	N/A	66
Westminster SUD	N/A	N/A	113	N/A	N/A	113
Westover Hills	N/A	N/A	72	N/A	N/A	72
Westworth Village	N/A	25	12	N/A	N/A	19
White Settlement	63	N/A	53	52	65	58
White Shed WSC	N/A	N/A	36	N/A	N/A	36
Whitesboro	14	17	18	6	N/A	14
Whitewright	57	52	51	22	26	42
Willow Park	N/A	N/A	93	70	25	63
Wilmer	N/A	N/A	N/A	190	80	135
Woodbine WSC	N/A	N/A	42	N/A	N/A	42
Wortham	14	11	19	49	43	27
Wylie	19	N/A	N/A	N/A	N/A	19
Wylie Northeast SUD	N/A	N/A	39	N/A	N/A	39

Source: TWDB Water Loss Audit data downloaded in October 2024.

Appendix C

Adjustments to Projections

Attachment C-1

WUGs Removed, Added, and Renamed Since the 2021 Region C Water Plan

WUGs Removed Since the 2021 Region C Water Plan

Removed WUGs	
Marilee SUD	

WUGs Added Since the 2021 Region C Water Plan

Added WUGs	
AMC Creekside	Kaufman County MUD 14
City of Blue Mound	Lancaster MUD 1
City of Log Cabin	Nash Forreston WSC
City of Savoy	Southern Oaks Water Supply
Denton County FWSD 11-C	Terrra Southwest

WUGs Renamed Since the 2021 Region C Water Plan

Renamed WUGs	
2021 Region C Plan Name	2026 Region C Plan Name
Ables Springs WSC	Ables Springs SUD
College Mound WSC	College Mound SUD
Copeville SUD	Copeville WSC
Westminster WSC	Westminster SUD

Attachment C-2

Example of Population and Demand Survey Email to WUGs

Dear «WUG_Primarily_Region_C»,

The Texas Water Development Board (TWDB), which is responsible for developing the State Water Plan, has begun a new cycle of regional/state water planning. I am part of the consultant team developing the *2026 Region C Water Plan*. Region C includes a 16 county-area in and around the DFW Metroplex.

We are seeking your input on data necessary to prepare the plan and comply with Legislative requirements. The first step in developing a regional water plan is confirming the **population and demand projections** reflect your growth**.** TWDB has released their draft population and demand projections for the 2026 regional plans. These projections are based on the 2020 Census data and historical water use data. We are now asking you to provide input on your population and demand projections. The projections are shown in the tables below. After reviewing the draft GPCDs, the consultants are recommending changes to the projections which are also shown below. If you do not agree with the projections, we have provided a blank table for you to enter your own projections.

As you review the population and demand projections, please keep in mind the following:

- **Population** is for your RETAIL service area only, which may differ from your city limits (for cities) or other political boundaries.
- **Demands** are for drought year (dry year) conditions and are in acre-feet per year. *Note: 1 million gallons/day (MGD) is equivalent to 1,120 acre-feet per year.*
- The projections do not include your wholesale customers' population or demand.
- The projections do not include the demand for any major industrial/manufacturing customers. Those are included in a separate demand category by county.
- The TWDB has placed restrictions on changes to the regional population. We may not be able to satisfy all the revision requests submitted by water suppliers, but we will do our best to incorporate your requested changes.

If you agree with the information below, please simply reply to this email stating your agreement.

If you do not agree, please reply to this email by explaining what data needs revisions and filling in your suggested projections or corrected data below. If available, please include any supporting information for your changes. Supporting information can include evidence regarding population growth rates over the last 5 years, maps of changed service areas, historical residential connections from 2000 to present, or other data.

TWDB DRAFT PROJECTIONS

	Historical	TWDB DRAFT Projections for *2026 Region C Plan*					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population	«Historic_Pop_2020»	«Draft_Pop_2030»	«Draft_Pop_2040»	«Draft_Pop_2050»	«Draft_Pop_2060»	«Draft_Pop_2070»	«Draft_Pop_2080»
GPCD	«Historic_GPCD_2020»	«Draft_GPCD_2030»	«Draft_GPCD_2040»	«Draft_GPCD_2050»	«Draft_GPCD_2060»	«Draft_GPCD_2070»	«Draft_GPCD_2080»
Demand (ac-ft/yr)	«Historic_Demand_2020»	«Draft_Demand_2030»	«Draft_Demand_2040»	«Draft_Demand_2050»	«Draft_Demand_2060»	«Draft_Demand_2070»	«Draft_Demand_2080»

CONSULTANT REVISED PROJECTIONS

	Historical	Consultant's Revised projections for *2026 Region C Plan*					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population	«Historic_Pop_2020»	«Revised_Pop_2030»	«Revised_Pop_2040»	«Revised_Pop_2050»	«Revised_Pop_2060»	«Revised_Pop_2070»	«Revised_Pop_2080»
GPCD	«Historic_GPCD_2020»	«Revised_GPCD_2030»	«Revised_GPCD_2040»	«Revised_GPCD_2050»	«Revised_GPCD_2060»	«Revised_GPCD_2070»	«Revised_GPCD_2080»
Demand (ac-ft/yr)	«Historic_Demand_2020»	«Revised_Demand_2030»	«Revised_Demand_2040»	«Revised_Demand_2050»	«Revised_Demand_2060»	«Revised_Demand_2070»	«Revised_Demand_2080»

YOUR REVISED PROJECTIONS

	YOUR REVISED Projections** for *2026 Region C Plan*					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population						
GPCD						
Demand (ac-ft/yr)						

**Please provide alternate projections if you do not agree with the projections above.

In addition to the population and demand projections, please comment in the text box below if there have been any changes to your existing water supply sources or the status of your planned water management strategies. If you had a strategy recommended in the 2021 Plan that was projected to be online in 2020 and included capital costs, we will follow up to see if that strategy has been implemented. The 2021 Region C Regional Water Plan is available online here.

Thank you for your time and participation. If you have any questions, please don't hesitate to contact me.

Thank you,

Christina Gildea, EIT

Water Resources Planning

Freese and Nichols, Inc.

682-386-1626

Christina.Gildea@Freese.com

www.freese.com

FREESE AND NICHOLS

Dear «WUG_Primarily_Region_C»,

The Texas Water Development Board (TWDB), which is responsible for developing the State Water Plan, has begun a new cycle of regional/state water planning. I am part of the consultant team developing the *2026 Region C Water Plan*. Region C includes a 16 county-area in and around the DFW Metroplex.

We are seeking your input on data necessary to prepare the plan and comply with Legislative requirements. The first step in developing a regional water plan is confirming the **population and demand projections** reflect your growth**.** TWDB has released their draft population and demand projections for the 2026 regional plans. These projections are based on the 2020 Census data and historical water use data. We are now asking you to provide input on your population and demand projections. The projections are shown in the tables below. After reviewing the draft GPCDs, the consultants are recommending changes to the projections which are also shown below. If you do not agree with the projections, we have provided a blank table for you to enter your own projections.

As you review the population and demand projections, please keep in mind the following:

- **Population** is for your RETAIL service area only, which may differ from your city limits (for cities) or other political boundaries.
- **Demands** are for drought year (dry year) conditions and are in acre-feet per year. *Note: 1 million gallons/day (MGD) is equivalent to 1,120 acre-feet per year.*
- The projections do not include your wholesale customers' population or demand.
- The projections do not include the demand for any major industrial/manufacturing customers. Those are included in a separate demand category by county.
- The TWDB has placed restrictions on changes to the regional population. We may not be able to satisfy all the revision requests submitted by water suppliers, but we will do our best to incorporate your requested changes.

If you agree with the information below, please simply reply to this email stating your agreement.

If you do not agree, please reply to this email by explaining what data needs revisions and filling in your suggested projections or corrected data below. If available, please include any supporting information for your changes. Supporting information can include evidence regarding population growth rates over the last 5 years, maps of changed service areas, historical residential connections from 2000 to present, or other data.

TWDB DRAFT PROJECTIONS

	Historical	TWDB DRAFT Projections for *2026 Region C Plan*					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population	«Historic_Pop_2020»	«Draft_Pop_2030»	«Draft_Pop_2040»	«Draft_Pop_2050»	«Draft_Pop_2060»	«Draft_Pop_2070»	«Draft_Pop_2080»
GPCD	«Historic_GPCD_2020»	«Draft_GPCD_2030»	«Draft_GPCD_2040»	«Draft_GPCD_2050»	«Draft_GPCD_2060»	«Draft_GPCD_2070»	«Draft_GPCD_2080»

Attachment C-3

Memorandum on Draft 2026 Region C Population Projections

801 Cherry Street, Suite 2800 + Fort Worth, Texas 76102 + 817-735-7300 + FAX 817-735-7491

Innovative approaches
Practical results
Outstanding service

www.freese.com

TO: Region C Regional Water Planning Group

CC: File

FROM: Freese and Nichols, Inc.

SUBJECT: Memorandum on Draft 2026 Region C Population Projections

DATE: 8/11/2023

PROJECT: TRA21862

1.0 BACKGROUND

The Texas Water Development Board (TWDB) provided the planning groups with draft population projections in January 2023. The review process of these projections includes review by the individual planning groups, with recommended changes provided to the TWDB by August 11, 2023. The TWDB will consider the recommended changes from the planning groups, and the final projections will ultimately be adopted by the TWDB and incorporated into the 2027 State Water Plan (SWP). The purpose of this technical memorandum is to document information related to historical population and provide information supporting recommended modifications, if needed, to the draft population projections. Population projections include permanent residential population, including 'group quarter' population residing in institutional facilities (military, prisons, schools, or nursing homes) who are served by municipal WUGs or rely on their own water sources. Seasonal population, including tourists or seasonal workers, are not included in the draft projections although the associated seasonal water use is necessarily reflected in the per capita water use rates.

Some key points regarding the draft population projections include:

- Draft population projections are based on county-level projections from the Texas Demographic Center (TDC), which used migration rates between the 2010 and 2020 decennial Census to project future growth.
- The Texas Water Development Board (TWDB) drafted WUG-level population and water demand projections using the TDC's full-migration scenario (1.0) projections and provided the half-migration scenario (0.5) projections by Region-County for the planning groups' consideration. The region can choose to use either the full migration or half migration scenario by county. Region C chose to use the full migration rate for all counties in the region.
- Previous TWDB population projections for the regional and state water plans have relied, initially, on county-level population projections from the TDC using the half migration rate. In the past, the TWDB had altered the resulting regional plan population projections in counties with declining population– by holding them flat into future periods – which obscured projected population decline, a trend for some areas that continued in the 2020 Census. For the 2026

Regional Water Plans (RWPs), these draft county population projections being provided to the RWPGs followed the trends, without adjustment, as projected by the TDC, including population declines.

- The 2026 population projections differ from the 2021 projections due to changes in migration rates, use of the full migration rate rather than half migration rate, and associated updates in the TDC cohort model to reflect updated birth and mortality rates. While the migration rates commonly drive long-term population trends, declines in the birth rates for the 2026 assessment also affected the draft projections.

1.1 Regional-level Population Projections

In accordance with the TWDB Guidance, adjustment to net regional-total population projections may be considered based on the criteria below. The net cumulative sub-regional requested changes may not exceed the maximum region-wide population that is provided by the TWDB.

Criteria for adjustment:
One or more of the following criteria must be verified by the RWPG and the Executive Administrator for consideration of revising the regional-level population projections:

1. A possible Census undercount took place in a county located within the region and action is currently being pursued to request a U.S. Census Bureau correction.
2. The most recent population growth rate (2015 – 2020) for the whole region is significantly different than the draft regional projections.

Data requirements:
The RWPG must provide the following data to the Executive Administrator associated with the identified criteria for justifying any adjustments to the regional-level population projections.

1. Documentation of an action requesting the U.S. Census Bureau correct an undercount of population within a county located in the region.
2. Historical regional-total population estimates from the Texas Demographic Center or the U.S. Census Bureau.
3. Other data and evidence that the RWPG believes provides a reasonable basis for justifying changes to the net total regional-level population projection.

Recommendation:
Region C consists of the Metroplex and surrounding counties. Most of the population is centered in the Metroplex, but current trends show fast growing areas in the surrounding counties. Collin, Rockwall and Kaufman counties in the eastern part of the region are some of the fastest growing areas in the state. Parker and Wise counties are also showing high growth rates in the western part of the region. As the Metroplex grows, the population could settle nearly anywhere within the region and not be contained in specific counties. This trend has become pronounced considering changing work requirements that support remote work. As such, we have focused our initial assessment at the regional level.

A review of the adopted population projections from the 2021 Region C Plan to the draft 2026 projections (with full migration) shows Region C has a higher population in 2020 than projected in the

2021 Plan. By 2040, the draft 2026 projections are less than estimated for the 2021 Plan. By 2070, the draft 2026 projections are nearly one million people less than shown in the 2021 plan (7%). This is difficult to explain since the full migration rate is used for the 2026 projections and the half migration rate was used for the 2021 plan. The most likely reasons for this change are 1) the lower birth rates that can affect long-term growth patterns and 2) lower growth projected for some of the more rural counties. Both Jack and Freestone counties are the only counties that show population declines.

Table 1 summarizes the difference between the 2026 TWDB Draft projections and the final 2021 Region C Regional Plan projections.

Table 1: 2026 TWDB Draft Projections Compared to 2021 Region C Regional Water Plan Projections

	2020	2030	2040	2050	2060	2070	2080
2026 TWDB Draft	7,709,193[1]	8,866,884	10,093,722	11,297,108	12,440,777	13,700,226	15,087,176
2021 Region C Plan	7,621,230	8,840,050	10,130,718	11,512,888	13,029,984	14,661,858	-
Difference	***87,963***	***26,834***	***(36,996)***	***(215,780)***	***(589,207)***	***(961,632)***	**-**

[1]*2020 Census population for Region C*

The first criterion for adjustment is a possible Census undercount. The 2020 Census had several unique challenges to overcome. The nation was not only in the midst of a pandemic, but there was limited funding made available to allow for canvassing and outreach efforts. It was reported that towards the end, the self-response rate for Texas households was barely at 60%. The U.S. Census Bureau released the 2020 Census estimated undercount and overcount rates by state from the Post-Enumeration Survey (PES). It is estimated that Texas had an undercount of ~1.92%. ***It is recommended that the Region C 2020 Census total be adjusted to capture the ramifications of this undercount***. **Table 2** summarizes the population projections for Region C if the 2020 Census is increased by 1.92% and the trendline for growth between 2010 and 2020 is extended to 2080.

Table 2: 2010 – 2010 Census Adjusted with Undercount Trendline

	2010	2020	2030	2040	2050	2060	2070	2080
2026 TWDB Draft	6,456,749	7,709,193	8,866,884	10,093,722	11,297,108	12,440,777	13,700,226	15,087,176
Adjusted Undercount Trendline	6,456,749	7,857,210[1]	9,257,670	10,658,131	12,058,591	13,459,052	14,859,512	16,259,973
Difference	-	*(148,017)*	*(390,786)*	*(564,409)*	*(761,483)*	*(1,018,275)*	*(1,159,286)*	*(1,172,797)*

[1]*2020 Census population for Region C adjusted by 1.92% undercount*

The second criterion for adjustment is that the most recent growth rate (2015 – 2020) for the whole region is significantly different than the draft regional projections. **Table 3** shows the compound annual growth rate (CAGR) based on the historical census estimates for Region C in each year from 2010 to 2022. The average growth rate for this time period is 1.77%. This includes the lowest growth rate of 1.15% from 2019 to 2020 that is heavily influenced by the undercounted census. The average growth rate for the 2015 – 2020 timeframe is 1.66%.

Table 3: Historical Census Estimates for Region C and CAGR

	Historical Census Estimate[1]	Annual Growth Rate	5 Year Average	10 Year Average
2010	6,503,203	-	-	-
2011	6,621,057	1.81%	-	-
2012	6,753,968	2.01%	-	-
2013	6,861,506	1.59%	-	-
2014	6,996,147	1.96%	-	-
2015	7,148,153	2.17%	1.91%	-
2016	7,298,592	2.10%	1.97%	-
2017	7,439,843	1.94%	1.95%	-
2018	7,557,758	1.58%	1.95%	-
2019	7,673,210	1.53%	1.86%	-
2020	7,761,468	1.15%	1.66%	1.78%
2021	7,866,782	1.36%	1.51%	1.74%
2022	8,031,222	2.09%	1.54%	1.75%

[1]The historical census estimate includes the total population of Henderson County. This is the only county that is split with another region (Region I) and represents a relatively small portion of the total Region C population.

This supports the request to increase the Region C regional total to better reflect what has been historically observed. Additionally, the growth rate from 2021 to 2022 is one of the higher growth rates observed indicating that growth within Region C is actually increasing post the 2020 timeframe.

Table 4 summarizes the regional annual growth rates as well as the recommendation for a regional total increase. The cumulative requested revisions received through the planning group's own targeted canvassing efforts were lower than the 2070 – 2080 trendline predictions.

Table 4: Regional Annual Growth Rates and Population Projections

	2030[1]	2040	2050	2060	2070	2080
2026 TWDB Draft	**8,866,884**	**10,093,722**	**11,297,108**	**12,440,777**	**13,700,226**	**15,087,176**
CAGR	*1.22%*	*1.30%*	*1.13%*	*0.97%*	*0.97%*	*0.97%*
Cumulative Requested Revisions	**9,437,646**	**11,223,475**	**12,520,592**	**13,795,145**	**14,800,793**	**15,801,688**
Increase from TWDB Draft	*570,762*	*1,129,753*	*1,223,484*	*1,354,368*	*1,100,567*	*714,512*
CAGR	*1.85%*	*1.75%*	*1.10%*	*0.97%*	*0.71%*	*0.66%*
Adjusted Undercount Trendline	**9,257,670**	**10,658,131**	**12,058,591**	**13,459,052**	**14,859,512**	**16,259,973**
Increase from TWDB Draft	*390,786*	*564,409*	*761,483*	*1,018,275*	*1,159,286*	*1,172,797*
CAGR	*1.65%*	*1.42%*	*1.24%*	*1.10%*	*0.99%*	*0.90%*
Recommended	***9,257,670***	***10,658,131***	***12,058,591***	***13,459,052***	***14,800,793***	***15,801,688***
CAGR	***1.65%***	***1.42%***	***1.24%***	***1.10%***	***0.95%***	***0.66%***

[1]Compound Annual Growth Rate (CAGR) from 2020 – 2030 is based on the adjusted 2020 Region C Census total population of 7,857,210.

It is recommended that the trendline projections be used from 2030 – 2060 and the cumulative requested revisions be used from 2070 – 2080. This growth rate better reflects the recent population trends observed within Region C. The growth rates proposed for the 2026 Region C Regional Water Plan projections are both lower than the 5-Year average from 2015 – 2020 (1.66%) as well as the 10-Year average from 2010 – 2020 (1.78%). It is also lower than the growth rate observed in the most recent census estimate from 2021 to 2022 (2.09%).

As a region that is heavily influenced by municipal use, it is imperative that Region C's population projections reflect the best available data to date. Implementation of this recommendation will not be able to accommodate all of the requested revisions that were received from individual WUGs and WWPs. Therefore, for 2030 – 2060, the increase above the 2026 TWDB draft projections requested by the WUGs were adjusted by the same percentages to match the adjusted undercount trendline. **To meet this regional total, requested increases had to be decreased from 13 - 34% between 2030 – 2060.** All requested revisions were incorporated into the 2070 – 2080 projections with no reductions.

1.2 County-Level Population Projections

County-level projections were developed considering requested changes at the sub-county WUG level, historical county growth rates, known new developments and industries. Any net adjustments to a county-level population projection requires a redistribution of the projected counties populations within the same region so that the net, summed regional total, as recommended in ***Section 1.1***, remains unchanged.

Recommendation:
It is recommended that the increase to the Region C regional total be distributed among the 16 counties based upon historical data, requested revisions as well as other data and evidence, such as more detailed studies. **Table 5** shows the historical census estimates for each of the 16 individual counties located within Region C. **Table 6** and **Table 7** summarize the 2026 TWDB draft projections and the recommended county total revisions.

- **Collin –** Collin County is one of the more densely populated counties within Region C. While the population is still increasing, the historical annual growth rate has stayed consistently around 3% in recent years. From 2021 – 2022 the growth rate increased to almost 4%. ***It is recommended to increase the county total in 2030 – 2060 and decrease the county total in 2070 – 2080*** as some WUGs begin to reach buildout. Both the 5 (3.28%) and 10-year (3.17%) average annual historical growth rate is higher than the highest annual growth rate that was used in the draft projections (2.15%).
- **Cooke –** Region C only received two revision requests from WUGs within Cooke County. ***It is recommended to increase the county total***. Both the 5 (1.28%) and 10-year (0.82%) average annual historical growth rate is higher than the highest annual growth rate that was used in the draft projections (0.38%).
- **Dallas –** Dallas is currently the most populous county in Region C with an estimate of approximately 2.6 million people in 2022. Because Dallas County is so densely populated several WUGs are projected to be at or near buildout within the planning horizon. Of the 16 counties in Region C, Dallas is the only county that had a negative growth rate from 2020 – 2021. ***It is recommended to decrease the county total in 2030 – 2040 and increase the county total in 2050 – 2080.*** The 5-year average annual historic growth rate (0.40%) and most recent year

(0.50%) growth rate is lower than the highest annual growth rate used in the projections (0.54%).

- **Denton –** Currently Denton has over 1 million people living within the county. ***It is recommended to increase the county total in 2030 - 2060 and decrease the county total in 2070 - 2080.*** Both the 5 (3.24%) and 10-year (3.21%) average annual historical growth rate is higher than the highest annual growth rate that was used in the draft projections (2.27%).
- **Ellis –** ***It is recommended to increase the county total in all decades***. Both the 5 (3.54%) and 10-year (2.60%) average annual historical growth rate is higher than the highest annual growth rate that was used in the draft projections (1.78%).
- **Fannin –** ***It is recommended to increase the county total in all decades***. The 5-year average annual historical growth rate (1.33%) is higher than the highest annual growth rate that was used in the draft projections (0.41%). The two most recent years 2020 – 2021 (2.56%) and 2021 – 2022 (1.11%) are higher as well. Also, with the completion of Bois d'Arc Lake and the construction of Lake Ralph Hall, it is expected that this county will experience future growth at higher rates than shown in the past. This is based on economic studies conducted for these reservoirs and active development.
- **Freestone** - ***The only county that it is not recommended to make any changes to the county total***. Of the ten WUGs within the county, Region C only received one response to the survey and that response agreed with the draft projections.
- **Grayson** – ***It is recommended to increase the county total in all decades***. Both the 5 (1.61%) and 10-year (1.18%) average annual historical growth rate is higher than the highest annual growth rate that was used in the draft projections (0.81%).
- **Henderson –** Henderson County is the only county in Region C that is split with another region. Although we use the river basin as a divide in regional planning, we looked at the growth within the entire county as a means for comparison. ***It is recommended to increase the county total in all decades***. The 5-year average annual historical growth rate (0.72%) is higher than the highest annual growth rate that was used in the draft projections (0.46%). The two most recent years 2020 – 2021 (1.45%) and 2021 – 2022 (1.10%) are higher as well.
- **Jack –** Jack is the least populated county in Region C and one of the only two counties that are projected to decrease over the planning horizon. ***It is recommended to increase the county total in all decades, however the decreasing total trend will remain the same for the majority of the planning horizon.*** Both the 5 (-0.91%) and 10-year (-0.59%) average annual historical growth rate show a decreasing trend, however the two most recent years 2020 -2021 (2.73%) and 2021 – 2022 (2.34%) show an increase in growth. The largest reported decrease in growth is shown between 2019 – 2020 (-5.03%) which is not surprising considering the obstacles the census encountered particularly in the less urban counties.
- **Kaufman -** Kaufman is the county with the largest historical growth rate in recent years within Region C. The two largest WUGs in this county are currently Forney and Terrell. ***It is recommended to increase the county total in all decades***. Both the 5 (5.22%) and 10-year (3.54%) average annual historical growth rate is higher than the highest annual growth rate that was used in the draft projections (2.69%). The most recent years 2020 – 2021 (7.54%) and 2021 – 2022 (8.94%) continue this trend.

- **Navarro –** Only one WUG requested an increase in projections within Navarro County. ***It is recommended to accommodate this request by increasing the county total in all decades.*** This is a minimal change, and an increase is supported by historical growth. Both the 5 (0.87%) and 10-year (1.17%) average annual historical growth rate is higher than the highest annual growth rate that was used in the draft projections (0.57%).
- **Parker –** Parker county has had consistently high growth throughout recent years. ***It is recommended to increase the county total in all decades***. The 5-year average annual historical growth rate (3.55%) is higher than the highest annual growth rate that was used in the draft projections (1.85%). The two most recent years 2020 – 2021 (4.96%) and 2021 – 2022 (5.65%) are higher as well. The majority of the increase is attributed to county-other as this county becomes more urbanized. This is supported by a recent study that considered the new planned developments and significant increase in groundwater permits for domestic use.
- **Rockwall –** ***It is recommended to increase the county total in all decades***. The 5-year average annual historical growth rate (3.89%) is higher than the highest annual growth rate that was used in the draft projections (2.29%). The two most recent years 2020 – 2021 (6.79%) and 2021 – 2022 (5.71%) are higher as well.
- **Tarrant –** Tarrant is the second largest county in Region C with over 2.1 million people in 2022. ***It is recommended to increase the county total in all decades***. The 5-year average annual historical growth rate (1.28%) is higher than the highest annual growth rate that was used in the draft projections (0.92%). The most recent year 2021 – 2022 (1.18%) is higher as well.
- **Wise -** ***It is recommended to increase the county total in all decades***. The 5-year average annual historical growth rate (1.87%) is higher than the highest annual growth rate that was used in the draft projections (0.92%). The two most recent years 2020 – 2021 (4.27%) and 2021 – 2022 (4.18%) are significantly higher as well. Most of the increase is attributed to county-other as this county becomes more urbanized.

Table 5: Historical Census Estimates and Annual Growth Rates for Region C Counties

County	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Population													
Collin	787,614	812,540	835,230	856,398	884,688	915,243	943,742	971,864	1,004,307	1,034,730	1,075,654	1,114,450	1,158,696
Cooke	38,472	38,443	38,717	38,456	38,764	39,170	39,343	39,932	40,504	41,257	41,744	42,408	43,050
Dallas	2,372,993	2,408,697	2,455,930	2,484,486	2,519,410	2,557,830	2,591,488	2,620,154	2,629,350	2,635,516	2,609,966	2,587,954	2,600,840
Denton	666,760	685,740	707,892	728,624	753,188	779,584	808,212	835,364	858,741	887,207	914,324	943,857	977,281
Ellis	150,367	152,373	153,739	155,928	159,204	163,292	168,332	173,405	179,006	184,826	194,295	203,107	212,182
Fannin	33,920	33,878	33,601	33,510	33,593	33,502	33,933	34,550	35,185	35,514	35,798	36,716	37,125
Freestone	19,803	19,602	19,484	19,597	19,677	19,746	19,669	19,649	19,789	19,717	19,445	19,784	19,950
Grayson	121,034	121,430	121,854	122,362	123,599	125,628	128,291	131,152	133,787	136,212	136,100	139,561	143,131
Henderson	78,665	78,837	78,992	78,669	79,324	79,492	80,062	80,954	82,103	82,737	82,394	83,590	84,511
Jack	9,004	9,030	8,992	8,951	8,880	8,883	8,789	8,828	8,825	8,935	8,486	8,718	8,922
Kaufman	103,872	105,199	106,553	108,248	110,872	114,055	117,904	122,628	128,279	136,154	147,126	158,216	172,366
Navarro	47,869	48,074	48,163	48,036	47,913	48,181	48,405	48,739	49,536	50,113	52,828	53,616	54,636
Parker	117,316	118,320	119,482	119,785	122,147	125,640	128,967	133,501	138,070	142,878	149,547	156,966	165,834
Rockwall	78,919	81,045	82,710	84,670	87,064	90,170	93,421	96,824	100,546	104,915	109,136	116,549	123,208
Tarrant	1,817,480	1,847,882	1,882,205	1,912,767	1,946,122	1,984,880	2,023,556	2,056,451	2,081,446	2,102,515	2,115,682	2,129,402	2,154,595
Wise	59,115	59,967	60,424	61,019	61,702	62,857	64,478	65,848	68,284	69,984	68,943	71,888	74,895
Annual Growth Rate													
Collin	-	3.16%	2.79%	2.53%	3.30%	3.45%	3.11%	2.98%	3.34%	3.03%	3.96%	3.61%	3.97%
Cooke	-	-0.08%	0.71%	-0.67%	0.80%	1.05%	0.44%	1.50%	1.43%	1.86%	1.18%	1.59%	1.51%
Dallas	-	1.50%	1.96%	1.16%	1.41%	1.52%	1.32%	1.11%	0.35%	0.23%	-0.97%	-0.84%	0.50%
Denton	-	2.85%	3.23%	2.93%	3.37%	3.50%	3.67%	3.36%	2.80%	3.31%	3.06%	3.23%	3.54%
Ellis	-	1.33%	0.90%	1.42%	2.10%	2.57%	3.09%	3.01%	3.23%	3.25%	5.12%	4.54%	4.47%
Fannin	-	-0.12%	-0.82%	-0.27%	0.25%	-0.27%	1.29%	1.82%	1.84%	0.94%	0.80%	2.56%	1.11%
Freestone	-	-1.01%	-0.60%	0.58%	0.41%	0.35%	-0.39%	-0.10%	0.71%	-0.36%	-1.38%	1.74%	0.84%
Grayson	-	0.33%	0.35%	0.42%	1.01%	1.64%	2.12%	2.23%	2.01%	1.81%	-0.08%	2.54%	2.56%
Henderson	-	0.22%	0.20%	-0.41%	0.83%	0.21%	0.72%	1.11%	1.42%	0.77%	-0.41%	1.45%	1.10%
Jack	-	0.29%	-0.42%	-0.46%	-0.79%	0.03%	-1.06%	0.44%	-0.03%	1.25%	-5.03%	2.73%	2.34%
Kaufman	-	1.28%	1.29%	1.59%	2.42%	2.87%	3.37%	4.01%	4.61%	6.14%	8.06%	7.54%	8.94%
Navarro	-	0.43%	0.19%	-0.26%	-0.26%	0.56%	0.46%	0.69%	1.64%	1.16%	5.42%	1.49%	1.90%
Parker	-	0.86%	0.98%	0.25%	1.97%	2.86%	2.65%	3.52%	3.42%	3.48%	4.67%	4.96%	5.65%
Rockwall	-	2.69%	2.05%	2.37%	2.83%	3.57%	3.61%	3.64%	3.84%	4.35%	4.02%	6.79%	5.71%
Tarrant	-	1.67%	1.86%	1.62%	1.74%	1.99%	1.95%	1.63%	1.22%	1.01%	0.63%	0.65%	1.18%
Wise	-	1.44%	0.76%	0.98%	1.12%	1.87%	2.58%	2.12%	3.70%	2.49%	-1.49%	4.27%	4.18%

Table 6: 2026 Draft Projections for 2026 Region C Regional Plan Compared to Historical Census Estimate Annual Growth Rates

County Name	Draft Projections for 2026 RWP (ac ft/yr)							CAGR for Draft Projections						Historical Census Estimate Annual Growth Rates			
	2020[1]	2030	2040	2050	2060	2070	2080	2020 2030	2030 2040	2040 2050	2050 2060	2060 2070	2070 2080	5 Year Average (2015 2020)	10 Year Average (2010 2020)	2020 2021	2021 2022
Collin	1,084,903	1,341,877	1,676,287	2,056,270	2,438,008	2,858,391	3,321,332	2.15%	2.25%	2.06%	1.72%	1.60%	1.51%	3.28%	3.17%	3.61%	3.97%
Cooke	42,468	44,096	45,641	46,337	46,490	46,658	46,843	0.38%	0.34%	0.15%	0.03%	0.04%	0.04%	1.28%	0.82%	1.59%	1.51%
Dallas	2,663,719	2,811,320	2,954,449	3,029,940	3,072,924	3,120,260	3,172,388	0.54%	0.50%	0.25%	0.14%	0.15%	0.17%	0.40%	0.96%	-0.84%	0.50%
Denton	923,825	1,156,452	1,449,394	1,757,793	2,071,337	2,416,623	2,796,864	2.27%	2.28%	1.95%	1.65%	1.55%	1.47%	3.24%	3.21%	3.23%	3.54%
Ellis	196,150	234,017	280,510	331,033	381,817	437,742	499,329	1.78%	1.83%	1.67%	1.44%	1.38%	1.33%	3.54%	2.60%	4.54%	4.47%
Fannin	36,347	37,851	39,584	40,629	41,251	41,936	42,690	0.41%	0.45%	0.26%	0.15%	0.16%	0.18%	1.33%	0.54%	2.56%	1.11%
Freestone	19,808	19,057	18,648	18,067	17,514	16,905	16,234	-0.39%	-0.22%	-0.32%	-0.31%	-0.35%	-0.40%	-0.31%	-0.18%	1.74%	0.84%
Grayson	138,145	149,694	163,010	174,122	183,924	194,718	206,605	0.81%	0.86%	0.66%	0.55%	0.57%	0.59%	1.61%	1.18%	2.54%	2.56%
Henderson	59,404	62,219	64,490	65,745	67,173	68,746	70,478	0.46%	0.36%	0.19%	0.22%	0.23%	0.25%	0.72%	0.46%	1.45%	1.10%
Jack	8,635	8,002	7,522	7,004	6,525	5,998	5,418	-0.76%	-0.62%	-0.71%	-0.71%	-0.84%	-1.01%	-0.91%	-0.59%	2.73%	2.34%
Kaufman	148,100	193,144	253,897	331,393	419,515	516,558	623,425	2.69%	2.77%	2.70%	2.39%	2.10%	1.90%	5.22%	3.54%	7.54%	8.94%
Navarro	53,634	56,773	60,865	64,251	67,193	70,433	74,001	0.57%	0.70%	0.54%	0.45%	0.47%	0.50%	1.86%	0.99%	1.49%	1.90%
Parker	151,068	181,391	217,135	257,508	299,924	346,634	398,073	1.85%	1.81%	1.72%	1.54%	1.46%	1.39%	3.55%	2.46%	4.96%	5.65%
Rockwall	109,889	137,756	173,604	216,829	262,120	311,996	366,921	2.29%	2.34%	2.25%	1.92%	1.76%	1.63%	3.89%	3.29%	6.79%	5.71%
Tarrant	2,151,164	2,356,541	2,604,655	2,809,558	2,969,443	3,145,514	3,339,410	0.92%	1.01%	0.76%	0.56%	0.58%	0.60%	1.28%	1.53%	0.65%	1.18%
Wise	69,950	76,694	84,031	90,629	95,619	101,114	107,165	0.92%	0.92%	0.76%	0.54%	0.56%	0.58%	1.87%	1.55%	4.27%	4.18%
Total	***7,857,210***	***8,866,884***	***10,093,722***	***11,297,108***	***12,440,777***	***13,700,226***	***15,087,176***	***1.22%***	***1.30%***	***1.13%***	***0.97%***	***0.97%***	***0.97%***	***1.66%***	***1.78%***	***1.36%***	***2.09%***

[1]2020 Census adjusted with 1.92% Undercount.

Table 7: Summary of Requested County Revisions for 2026 Regional Water Plan

County Name	Recommended Revisions for 2026 RWP (ac ft/yr)						Recommended Revisions for 2026 RWP (ac ft/yr)						Difference between TWDB Draft and Recommended Revisions					
	2030	2040	2050	2060	2070	2080	2020 2030	2030 2040	2040 2050	2050 2060	2060 2070	2070 2080	2030	2040	2050	2060	2070	2080
Collin	1,468,213	1,837,437	2,238,263	2,549,561	2,745,531	2,819,635	3.07%	2.27%	1.99%	1.31%	0.74%	0.27%	126,336	161,150	181,993	111,553	-112,860	-501,697
Cooke	44,200	45,693	46,466	47,694	49,742	51,732	0.40%	0.33%	0.17%	0.26%	0.42%	0.39%	104	52	129	1,204	3,084	4,889
Dallas	2,755,692	2,912,542	3,084,325	3,280,733	3,471,445	3,609,214	0.34%	0.56%	0.57%	0.62%	0.57%	0.39%	-55,628	-41,907	54,385	207,809	351,185	436,826
Denton	1,281,602	1,549,219	1,843,067	2,088,668	2,352,849	2,574,400	3.33%	1.91%	1.75%	1.26%	1.20%	0.90%	125,150	99,825	85,274	17,331	-63,774	-222,464
Ellis	241,748	290,487	346,553	399,928	459,484	521,412	2.11%	1.85%	1.78%	1.44%	1.40%	1.27%	7,731	9,977	15,520	18,111	21,742	22,083
Fannin	40,070	44,955	53,396	62,520	74,244	84,502	0.98%	1.16%	1.74%	1.59%	1.73%	1.30%	2,219	5,371	12,767	21,269	32,308	41,812
Freestone	19,057	18,648	18,067	17,514	16,905	16,234	-0.39%	-0.22%	-0.32%	-0.31%	-0.35%	-0.40%	0	0	0	0	0	0
Grayson	173,423	207,085	242,522	271,463	310,612	338,984	2.30%	1.79%	1.59%	1.13%	1.36%	0.88%	23,729	44,075	68,400	87,539	115,894	132,379
Henderson	69,434	76,356	91,680	103,715	120,956	132,472	1.57%	0.95%	1.85%	1.24%	1.55%	0.91%	7,215	11,866	25,935	36,542	52,210	61,994
Jack	8,214	7,957	7,770	7,740	7,859	7,787	-0.50%	-0.32%	-0.24%	-0.04%	0.15%	-0.09%	212	435	766	1,215	1,861	2,369
Kaufman	209,309	257,499	335,063	431,671	542,246	627,644	3.52%	2.09%	2.67%	2.57%	2.31%	1.47%	16,165	3,602	3,670	12,156	25,688	4,219
Navarro	57,263	61,718	65,956	70,147	75,206	80,385	0.66%	0.75%	0.67%	0.62%	0.70%	0.67%	490	853	1,705	2,954	4,773	6,384
Parker	193,243	256,164	342,606	444,891	569,928	679,642	2.49%	2.86%	2.95%	2.65%	2.51%	1.78%	11,852	39,029	85,098	144,967	223,294	281,569
Rockwall	155,987	214,364	282,069	346,714	392,548	422,765	3.57%	3.23%	2.78%	2.08%	1.25%	0.74%	18,231	40,760	65,240	84,594	80,552	55,844
Tarrant	2,446,040	2,749,017	2,878,997	3,093,387	3,287,331	3,449,671	1.29%	1.17%	0.46%	0.72%	0.61%	0.48%	89,499	144,362	69,439	123,944	141,817	110,261
Wise	94,175	128,991	181,789	242,706	323,907	385,209	3.02%	3.20%	3.49%	2.93%	2.93%	1.75%	17,481	44,960	91,160	147,087	222,793	278,044
Total	***9,257,670***	***10,658,131***	***12,058,591***	***13,459,052***	***14,800,793***	***15,801,688***	***1.65%***	***1.42%***	***1.24%***	***1.10%***	***0.95%***	***0.66%***	***390,786***	***564,409***	***761,483***	***1,018,275***	***1,100,567***	***714,512***

1.3 WUG (entity) Population Projections

The projected population growth throughout the planning period for the utilities and rural area (county-other) within a county is a function of a number of factors, including the WUG's estimated share of the county's population or growth between 2010 and 2020, as well as local information provided by RWPGs.

Recommendation:
Individual WUG projection adjustments were made as needed based on currently available information. Where possible, adjustments between WUG population projections were made within the same county. A summary of the total WUG revised population is attached in ***Attachment A***, including the portion of WUG population in other regions.

There are several WUGs in Region C that are shared with adjoining regions. The TWDB designates a primary region to plan for these split entities. The focus of the recommended changes in this section is on WUGs that Region C is designated as the primary region. For WUGs that are planned for by other regions, we have adopted those recommended revisions, if available. If not available, Region C will defer to the primary planning region for changes to other shared WUGs. For split WUGs where Region C is the designated primary region, the split of the recommended population across counties is shown in ***Attachment B***.

Sources for Projection Adjustments:
In the case of Region C, new data sources since the 2021 Region C Water Plan (RCRWP) have been considered and changes to both the regional and county totals are warranted.

The consultant's population revisions are based on a review of the following data:

- **Water User Group Survey** – In March, FNI sent a survey to each municipal water user group with their draft projections and asked for input on the projections. To date, we have had a 32% response rate, half of which have requested changes.
- **Input from Wholesale Water Providers (WWPs)** – In March, an email survey was sent out to all WWPS. In May, FNI met with five major water providers and two regional water providers to get input on their customer's population and demand projections.
- **Texas Demographic Center Estimates –** The TDC releases annual population estimates by place. FNI reviewed these estimates of observed historical growth and compared it to the projected growth from 2030-2080. This was done for individual entities and for county totals. If an entity has grown much faster or slower than originally projected, adjustments were made.
- **North Central Texas Council of Government (NCTCOG) Estimated –** NCTCOG population estimates were reviewed and compared to the 2020 Census and TWDB projected growth.
- **Individual Plans and/or Reports** – If population projections were available from a recently updated plan and/or report that was available to FNI, the projections were compared to the other available data and projections were updated for the time period in which they overlapped. Specifically, these included long-range water supply plans, water and wastewater master plans, impact fee reports, and comprehensive plans. If projections from a plan and/or report was used to revise projections for a WUG it is noted in ***Attachment A.***

ATTACHMENT A

WUG Revision Recommendations for Population Projections

WUG	Draft 2026 TWDB Projections (ac-ft/yr)						Recommended Population Projection Revisions (ac-ft/yr)						Changes from Draft and Proposed Revised Projections (ac-ft/yr)						Comment
	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	
ABLES SPRINGS SUD	3,675	4,329	5,141	6,039	7,029	8,118	8,650	9,045	10,458	11,875	13,253	13,915	4,975	4,716	5,317	5,836	6,224	5,797	Survey Revision Request and Region D Request
ADDISON	20,465	23,069	24,456	25,276	26,179	27,173	20,465	23,069	24,456	25,276	26,179	27,173	0	0	0	0	0	0	
ALEDO	4,538	5,449	6,480	7,563	8,755	10,069	7,834	8,462	10,358	11,933	13,500	14,500	3,296	3,013	3,878	4,370	4,745	4,431	UTGCD Regional Water Supply Planning Study
ALLEN	133,789	167,216	205,200	243,358	285,379	331,654	125,000	140,000	140,000	140,000	140,000	140,000	(8,789)	(27,216)	(65,200)	(103,358)	(145,379)	(191,654)	Survey Revision Request
ALVORD	3,020	3,736	4,375	4,888	5,453	6,073	3,020	3,736	4,375	4,888	5,453	6,073	0	0	0	0	0	0	
AMC CREEKSIDE	2,684	3,359	4,003	4,628	5,318	6,078	2,684	3,359	4,003	4,628	5,318	6,078	0	0	0	0	0	0	
ANNA	24,021	33,433	44,157	54,891	66,728	79,774	42,849	69,571	87,859	105,879	121,250	130,000	18,828	36,138	43,702	50,988	54,522	50,226	NTMWD Long Range Water Supply Plan
ANNETTA	5,531	7,356	9,417	11,622	14,041	16,697	3,180	3,810	4,439	5,068	5,698	6,327	(2,351)	(3,546)	(4,978)	(6,554)	(8,343)	(10,370)	Survey Revision Request; Comprehensive Plan Projections
ARGYLE WSC	9,608	13,402	18,694	22,005	22,005	22,005	13,719	17,803	23,565	29,302	33,250	36,250	4,111	4,401	4,871	7,297	11,245	14,245	Ongoing UTRWD Study
ARLEDGE RIDGE WSC	1,364	1,474	1,531	1,578	1,629	1,684	1,364	1,474	1,531	1,578	1,629	1,684	0	0	0	0	0	0	
ARLINGTON	416,797	423,084	423,084	423,084	423,084	423,084	443,202	482,455	513,479	541,755	574,231	591,297	26,405	59,371	90,395	118,671	151,147	168,213	TRWD Demand Study
ATHENS	12,949	13,322	13,645	13,918	14,218	14,547	18,315	22,108	28,955	31,217	33,463	33,463	5,366	8,786	15,310	17,299	19,245	18,916	Survey Revision Request; Land Use Data
AUBREY	4,303	5,402	6,559	7,735	9,030	10,457	8,260	14,448	24,708	34,267	40,586	40,586	3,957	9,046	18,149	26,532	31,556	30,129	Ongoing UTRWD Study
AVALON WATER SUPPLY & SEWER SERVICE	992	1,109	1,236	1,360	1,498	1,650	992	1,109	1,236	1,360	1,498	1,650	0	0	0	0	0	0	
AZLE	16,328	18,775	21,074	23,169	25,472	28,005	16,328	18,775	21,074	23,169	25,472	28,005	0	0	0	0	0	0	Agreed with Draft Projections
B AND B WSC	1,871	2,060	2,217	2,364	2,525	2,701	1,871	2,060	2,217	2,364	2,525	2,701	0	0	0	0	0	0	
B B S WSC	1,081	1,078	1,065	1,052	1,038	1,025	1,081	1,078	1,065	1,052	1,038	1,025	0	0	0	0	0	0	
BALCH SPRINGS	26,209	28,020	28,979	29,535	30,146	30,819	28,403	30,394	33,210	36,348	40,018	42,000	2,194	2,374	4,231	6,813	9,872	11,181	DWU Survey Revision Request
BEAR CREEK SUD	10,185	13,887	18,118	22,368	27,052	32,214	27,711	48,717	55,494	61,429	66,501	66,501	17,526	34,830	37,376	39,061	39,449	34,287	Survey Revision Request
BECKER JIBA WSC	3,608	4,259	5,085	6,007	7,030	8,160	4,422	6,986	9,434	10,508	14,800	17,113	814	2,727	4,349	4,501	7,770	8,953	Survey Revision Request; Growth Analysis
BEDFORD	53,705	59,337	60,166	60,166	60,166	60,166	52,345	56,345	57,255	60,166	60,166	60,166	(1,360)	(2,992)	(2,911)	0	0	0	Survey Revision Request
BELLS	1,743	1,900	2,031	2,147	2,275	2,416	1,743	1,900	2,031	2,147	2,275	2,416	0	0	0	0	0	0	
BENBROOK WATER AUTHORITY	27,061	29,909	32,288	34,213	34,213	34,213	27,155	29,353	31,526	33,698	35,871	38,044	94	(556)	(762)	(515)	1,658	3,831	Survey Revision Request; 2021 Master Plan Update
BETHEL ASH WSC	7,511	7,855	8,164	8,454	8,754	9,064	7,511	7,855	8,164	8,454	8,754	9,064	0	0	0	0	0	0	
BETHESDA WSC	35,167	40,663	46,170	51,154	56,749	63,032	35,167	40,663	46,170	51,154	56,749	63,032	0	0	0	0	0	0	
BLACK ROCK WSC	1,560	1,959	2,377	2,804	3,274	3,791	1,560	1,959	2,377	2,804	3,274	3,791	0	0	0	0	0	0	
BLACKLAND WSC	6,440	8,044	9,977	12,000	14,228	16,683	4,634	4,824	5,199	6,029	6,491	6,988	(1,806)	(3,220)	(4,778)	(5,971)	(7,737)	(9,695)	NTMWD Long Range Water Supply Plan
BLOOMING GROVE	828	890	940	985	1,033	1,087	1,037	1,078	1,166	1,257	1,355	1,465	209	188	226	272	322	378	Survey Revision Request
BLUE MOUND	2,690	2,976	3,213	3,398	3,602	3,826	2,690	2,976	3,213	3,398	3,602	3,826	0	0	0	0	0	0	
BLUE RIDGE	1,653	2,162	2,740	3,320	3,959	4,664	2,581	7,240	12,752	26,934	35,000	43,000	928	5,078	10,012	23,614	31,041	38,336	Survey Revision Request
BOIS D ARC MUD	3,047	3,196	3,285	3,341	3,402	3,469	3,047	3,196	3,285	3,341	3,402	3,469	0	0	0	0	0	0	
BOLIVAR WSC	12,220	14,878	17,544	20,208	23,992	28,800	12,220	14,878	17,544	20,208	23,992	28,800	0	0	0	0	0	0	Agreed with Draft Projections
BONHAM	11,132	11,547	11,815	11,949	12,098	12,263	12,460	15,204	21,531	28,798	37,686	45,834	1,328	3,657	9,716	16,849	25,588	33,571	NTMWD Long Range Water Supply Plan
BOYD	1,477	1,641	1,788	1,901	2,026	2,162	1,477	1,879	2,570	3,228	3,800	4,200	0	238	782	1,327	1,774	2,038	UTGCD Regional Water Supply Planning Study
BRANDON IRENE WSC	1,999	2,069	2,118	2,168	2,222	2,286	1,999	2,069	2,118	2,168	2,222	2,286	0	0	0	0	0	0	
BRIDGEPORT	5,814	5,958	6,093	6,165	6,246	6,337	5,814	5,958	6,093	6,165	6,246	6,337	0	0	0	0	0	0	Agreed with Draft Projections
BRUSHY CREEK WSC	3,493	3,510	3,490	3,469	3,451	3,434	3,493	3,510	3,490	3,469	3,451	3,434	0	0	0	0	0	0	
BUENA VISTA-BETHEL SUD	7,152	8,701	10,384	12,081	13,948	16,004	7,152	8,701	10,384	12,081	13,948	16,004	0	0	0	0	0	0	
BURLESON	51,966	60,546	68,952	76,495	84,944	94,407	51,966	60,546	68,952	76,495	84,944	94,407	0	0	0	0	0	0	
BUTLER WSC	838	830	818	794	767	737	838	830	818	794	767	737	0	0	0	0	0	0	Agreed with Draft Projections
CADDO BASIN SUD	15,886	19,589	23,280	26,882	30,699	34,750	18,175	26,075	35,538	38,969	41,334	43,698	2,289	6,486	12,258	12,087	10,635	8,948	NTMWD Long Range Water Supply Plan/Region D Request
CALLISBURG WSC	1,614	1,686	1,717	1,728	1,740	1,752	1,614	1,686	1,717	1,728	1,740	1,752	0	0	0	0	0	0	Agreed with Draft Projections
CARROLLTON	133,138	133,138	133,138	133,138	133,138	133,138	144,906	154,693	171,966	193,378	219,000	236,700	11,768	21,555	38,828	60,240	85,862	103,562	DWU Survey Revision Request
CASH SUD	22,234	25,203	27,991	30,651	33,412	36,283	23,510	27,288	34,167	42,044	50,195	59,926	1,276	2,085	6,176	11,393	16,783	23,643	NTMWD Long Range Water Supply Plan/Region D Request
CEDAR HILL	44,678	46,970	48,179	48,868	49,627	50,462	65,148	78,887	101,576	129,526	162,800	185,500	20,470	31,917	53,397	80,658	113,173	135,038	DWU Survey Revision Request
CELINA	34,358	50,886	69,716	88,545	109,316	132,216	66,540	116,498	193,537	266,847	330,000	350,000	32,182	65,612	123,821	178,302	220,684	217,784	Survey Revision Request; Ongoing Study
CHATFIELD WSC	3,318	3,572	3,782	3,967	4,172	4,396	3,318	3,572	3,782	3,967	4,172	4,396	0	0	0	0	0	0	
CHICO	2,054	2,054	2,054	2,054	2,054	2,054	2,645	3,210	4,407	5,901	8,000	9,600	591	1,156	2,353	3,847	5,946	7,546	UTGCD Regional Water Supply Planning Study
COCKRELL HILL	3,610	3,380	3,255	3,176	3,089	2,993	4,807	4,948	5,664	6,561	14,000	15,000	1,197	1,568	2,409	3,385	10,911	12,007	DWU Survey Revision Request
COLLEGE MOUND SUD	8,873	10,427	12,398	14,597	17,035	19,730	12,649	14,078	19,008	29,749	40,174	50,886	3,776	3,651	6,610	15,152	23,139	31,156	NTMWD Long Range Water Supply Plan
COLLEYVILLE	28,000	28,000	28,000	28,000	28,000	28,000	28,000	28,000	28,000	28,000	28,000	28,000	0	0	0	0	0	0	
COLLINSVILLE	2,641	2,907	3,129	3,331	3,552	3,794	2,641	2,907	3,129	3,331	3,552	3,794	0	0	0	0	0	0	Agreed with Draft Projections
COMBINE WSC	3,604	4,094	4,678	5,309	6,009	6,784	3,604	4,094	4,678	5,309	6,009	6,784	0	0	0	0	0	0	
COMMUNITY WSC	4,123	4,630	5,054	5,396	5,773	6,186	4,123	4,630	5,054	5,396	5,773	6,186	0	0	0	0	0	0	
COPEVILLE SUD	4,697	5,939	7,350	8,766	10,327	12,046	14,701	23,307	34,109	38,171	41,989	41,989	10,004	17,368	26,759	29,405	31,662	29,943	Survey Revision Request; Comprehensive Plan Projections
COPPELL	42,913	42,913	42,913	42,913	42,913	42,913	43,774	43,633	43,753	43,875	44,000	44,000	861	720	840	962	1,087	1,087	DWU Survey Revision Request
CORBET WSC	2,465	2,647	2,797	2,928	3,072	3,232	2,465	2,647	2,797	2,928	3,072	3,232	0	0	0	0	0	0	
CORINTH	29,073	29,520	29,520	29,520	29,520	29,520	29,174	31,493	39,161	40,566	42,000	42,000	101	1,973	9,641	11,046	12,480	12,480	Ongoing UTRWD Study
CORSICANA	27,916	29,886	31,517	32,925	34,477	36,187	27,916	29,886	31,517	32,925	34,477	36,187	0	0	0	0	0	0	Agreed with Draft Projections
COUNTY-OTHER, COLLIN	3,794	7,605	9,769	10,346	9,123	5,415	3,794	5,035	6,276	7,518	8,759	10,000	0	(2,570)	(3,493)	(2,828)	(364)	4,585	
COUNTY-OTHER, COOKE	5,882	6,135	6,253	6,272	6,296	6,319	5,975	6,178	6,367	6,562	6,800	7,000	93	43	114	290	504	681	

WUG	Draft 2026 TWDB Projections (ac-ft/yr)						Recommended Population Projection Revisions (ac-ft/yr)						Changes from Draft and Proposed Revised Projections (ac-ft/yr)						Comment
	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	
COUNTY-OTHER, DALLAS	43,170	46,746	56,051	58,742	56,780	54,021	1,000	1,400	1,800	2,200	2,600	3,000	(42,170)	(45,346)	(54,251)	(56,542)	(54,180)	(51,021)	
COUNTY-OTHER, DENTON	51,205	104,950	179,574	262,889	352,402	427,254	51,205	80,964	110,723	140,482	185,121	214,880	0	(23,986)	(68,851)	(122,407)	(167,281)	(212,374)	Ongoing UTRWD Study
COUNTY-OTHER, ELLIS	8,881	8,302	7,671	7,960	7,379	6,796	6,500	6,960	7,420	7,880	8,340	8,800	(2,381)	(1,342)	(251)	(80)	961	2,004	
COUNTY-OTHER, FANNIN	3,862	3,441	3,335	3,108	2,856	2,577	3,800	3,838	4,065	4,358	4,760	5,000	(62)	397	730	1,250	1,904	2,423	
COUNTY-OTHER, FREESTONE	3,337	3,063	2,622	2,661	2,675	2,657	3,337	3,063	2,622	2,661	2,675	2,657	0	0	0	0	0	0	
COUNTY-OTHER, GRAYSON	7,888	7,139	6,509	5,649	4,745	3,784	11,144	10,489	11,060	11,801	12,800	13,000	3,256	3,350	4,551	6,152	8,055	9,216	
COUNTY-OTHER, HENDERSON	14,502	15,266	15,390	15,772	16,193	16,662	5,000	6,000	7,000	8,000	9,000	10,000	(9,502)	(9,266)	(8,390)	(7,772)	(7,193)	(6,662)	
COUNTY-OTHER, JACK	4,565	4,337	4,088	3,867	3,625	3,362	4,500	4,300	4,000	3,800	3,600	3,400	(65)	(37)	(88)	(67)	(25)	38	
COUNTY-OTHER, KAUFMAN	17,341	22,239	28,466	36,164	45,550	55,894	17,341	22,239	30,424	36,164	45,000	55,894	0	0	1,958	0	(550)	0	
COUNTY-OTHER, NAVARRO	6,648	6,596	6,298	5,703	4,949	3,994	6,927	7,261	7,767	8,444	9,400	10,000	279	665	1,469	2,741	4,451	6,006	
COUNTY-OTHER, PARKER	67,251	79,740	93,855	109,450	126,692	145,699	69,428	111,025	163,493	225,881	298,000	355,000	2,177	31,285	69,638	116,431	171,308	209,301	UTGCD Regional Water Supply Planning Study
COUNTY-OTHER, ROCKWALL	3,015	3,675	4,390	4,879	5,145	5,080	3,241	3,337	3,269	3,768	5,843	7,294	226	(338)	(1,121)	(1,111)	698	2,214	NTMWD Long Range Water Supply Plan
COUNTY-OTHER, TARRANT	65,604	122,842	179,060	218,141	262,363	309,421	30,000	44,000	58,000	72,000	86,000	100,000	(35,604)	(78,842)	(121,060)	(146,141)	(176,363)	(209,421)	
COUNTY-OTHER, WISE	41,986	45,709	48,781	50,632	52,558	54,544	52,291	80,325	120,021	168,672	227,000	270,000	10,305	34,616	71,240	118,040	174,442	215,456	UTGCD Regional Water Supply Planning Study
CRANDALL	4,813	5,816	7,106	7,920	7,920	7,920	10,761	23,128	38,517	57,170	79,364	95,162	5,948	17,312	31,411	49,250	71,444	87,242	Survey Revision Request
CRESCENT HEIGHTS WSC	1,622	1,640	1,702	1,731	1,762	1,796	1,931	1,992	2,211	2,826	3,770	4,000	309	352	509	1,095	2,008	2,204	Survey Revision Request
CROSS TIMBERS WSC	9,808	12,310	14,944	17,622	20,802	25,403	9,808	12,310	14,944	17,622	20,802	25,403	0	0	0	0	0	0	Agreed with Draft Projections
CROWLEY	22,370	26,626	30,175	33,053	36,216	39,691	22,372	26,629	30,180	33,059	36,223	39,700	2	3	5	6	7	9	Region G Request
CULLEOKA WSC	6,985	8,735	10,723	12,719	14,919	17,341	45,493	52,348	62,838	72,737	80,531	80,531	38,508	43,613	52,115	60,018	65,612	63,190	NTMWD Long Range Water Supply Plan
DALLAS	1,372,734	1,447,053	1,494,277	1,529,969	1,573,879	1,622,202	1,342,289	1,391,906	1,472,336	1,543,850	1,620,364	1,692,302	(30,445)	(55,147)	(21,941)	13,881	46,485	70,100	Ongoing DWU LRWSP
DALWORTHINGTON GARDENS	2,303	2,326	2,343	2,344	2,348	2,352	2,303	2,326	2,343	2,344	2,348	2,352	0	0	0	0	0	0	Agreed with Draft Projections
DAWSON	825	834	842	839	837	835	825	834	842	839	837	835	0	0	0	0	0	0	
DECATUR	7,291	7,976	8,591	9,057	9,568	10,132	10,782	12,824	17,250	21,575	27,000	31,300	3,491	4,848	8,659	12,518	17,432	21,168	UTGCD Regional Water Supply Planning Study
DELTA COUNTY MUD	1,973	2,011	2,043	2,075	2,108	2,142	1,973	2,011	2,043	2,075	2,108	2,142	0	0	0	0	0	0	
DENISON	30,631	33,349	35,617	37,617	39,819	42,245	45,559	58,130	69,091	81,424	95,278	103,443	14,928	24,781	33,474	43,807	55,459	61,198	Survey Revision Request
DENTON	183,086	227,946	275,173	323,187	379,613	460,476	227,278	275,540	340,823	407,082	485,078	562,953	44,192	47,594	65,650	83,895	105,465	102,477	Survey Revision Request; Ongoing Study
DENTON COUNTY FWSD 10	18,887	19,770	19,770	19,770	19,770	19,770	6,246	6,246	6,246	6,246	6,246	6,246	(12,641)	(13,524)	(13,524)	(13,524)	(13,524)	(13,524)	Ongoing UTRWD Study
DENTON COUNTY FWSD 11-C	5,406	8,467	11,690	14,965	18,573	22,547	5,406	8,467	11,690	14,965	18,573	22,547	0	0	0	0	0	0	
DENTON COUNTY FWSD 1-A	22,382	30,000	30,000	30,000	30,000	30,000	23,528	31,738	33,907	34,476	35,057	35,057	1,146	1,738	3,907	4,476	5,057	5,057	Survey Revision Request; Annexed by Lewisville
DENTON COUNTY FWSD 7	9,981	13,500	13,500	13,500	13,500	13,500	12,767	13,500	13,500	13,500	13,500	13,500	2,786	0	0	0	0	0	Ongoing UTRWD Study
DESERT WSC	1,864	2,071	2,215	2,350	2,498	2,663	1,864	2,071	2,215	2,350	2,498	2,663	0	0	0	0	0	0	
DESOTO	59,901	63,934	66,069	67,304	68,664	70,162	59,901	63,934	66,069	67,304	68,664	70,162	0	0	0	0	0	0	
DOGWOOD ESTATES WATER	1,179	1,154	1,226	1,239	1,253	1,267	1,179	1,154	1,226	1,239	1,253	1,267	0	0	0	0	0	0	
DORCHESTER	1,287	1,322	1,350	1,361	1,376	1,394	1,287	1,322	1,350	1,361	1,376	1,394	0	0	0	0	0	0	
DUNCANVILLE	43,672	45,939	47,157	47,307	47,307	47,307	43,672	45,939	47,157	47,307	47,307	47,307	0	0	0	0	0	0	Agreed with Draft Projections
EAST CEDAR CREEK FWSD	11,866	12,479	12,591	12,900	13,243	13,622	21,877	23,331	29,410	37,841	49,109	58,704	10,011	10,852	16,819	24,941	35,866	45,082	Survey Revision Request; Master Plan
EAST FORK SUD	21,352	28,061	36,878	48,466	63,694	83,708	24,724	29,515	35,021	39,846	44,015	48,621	3,372	1,454	(1,857)	(8,620)	(19,679)	(35,087)	NTMWD Long Range Water Supply Plan
EAST GARRETT WSC	1,806	2,295	2,825	3,363	3,954	4,605	1,806	2,295	2,825	3,363	3,954	4,605	0	0	0	0	0	0	
EDGECLIFF	3,761	3,761	3,761	3,761	3,761	3,761	3,761	3,761	3,761	3,761	3,761	3,761	0	0	0	0	0	0	Agreed with Draft Projections
ELMO WSC	2,332	2,733	3,243	3,810	4,440	5,137	2,332	2,733	3,243	3,810	4,440	5,137	0	0	0	0	0	0	Agreed with Draft Projections
ENNIS	20,220	21,227	22,316	23,303	24,413	25,655	20,220	21,227	22,316	23,303	24,413	25,655	0	0	0	0	0	0	
EULESS	60,820	60,820	60,820	60,820	60,820	60,820	60,820	60,820	60,820	60,820	60,820	60,820	0	0	0	0	0	0	
EUSTACE	3,105	3,399	3,333	3,441	3,562	3,696	3,105	3,399	3,333	3,441	3,562	3,696	0	0	0	0	0	0	
EVERMAN	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	0	0	0	0	0	0	Agreed with Draft Projections
FAIRFIELD	4,932	4,782	4,639	4,338	4,039	3,742	4,932	4,782	4,639	4,338	4,039	3,742	0	0	0	0	0	0	
FAIRVIEW	13,152	16,629	20,418	20,418	20,418	20,418	13,152	16,629	20,418	20,418	20,418	20,418	0	0	0	0	0	0	Agreed with Draft Projections
FARMERS BRANCH	36,454	39,795	41,570	42,609	43,754	45,014	36,454	39,795	41,570	42,609	43,754	45,014	0	0	0	0	0	0	Agreed with Draft Projections
FARMERSVILLE	5,700	7,115	8,723	10,338	12,118	14,077	13,932	34,480	67,985	79,074	88,000	88,000	8,232	27,365	59,262	68,736	75,882	73,923	NTMWD Long Range Water Supply Plan
FATE	25,597	36,969	50,748	65,318	81,326	98,927	25,597	36,969	50,748	65,318	81,326	98,927	0	0	0	0	0	0	Agreed with Draft Projections
FERRIS	2,455	2,602	2,761	2,907	3,072	3,256	2,455	2,602	2,761	2,907	3,072	3,256	0	0	0	0	0	0	
FILES VALLEY WSC	3,342	3,592	3,830	4,071	4,338	4,634	3,342	3,592	3,830	4,071	4,338	4,634	0	0	0	0	0	0	
FLO COMMUNITY WSC	3,159	2,951	2,745	2,555	2,344	2,106	3,159	2,951	2,745	2,555	2,344	2,106	0	0	0	0	0	0	
FLOWER MOUND	95,740	120,016	145,555	171,507	200,084	231,556	95,689	119,876	145,417	145,491	145,555	145,555	(51)	(140)	(138)	(26,016)	(54,529)	(86,001)	Ongoing UTRWD Study
FOREST HILL	15,535	17,189	18,556	19,624	20,798	22,093	15,535	17,189	18,556	19,624	20,798	22,093	0	0	0	0	0	0	
FORNEY	27,431	36,654	48,424	61,829	76,582	92,825	32,879	42,290	52,344	61,829	61,829	61,829	5,448	5,636	3,920	0	(14,753)	(30,996)	Survey Revision Request
FORNEY LAKE WSC	14,953	22,347	31,804	42,648	54,555	67,646	19,190	22,100	23,000	25,000	25,500	26,000	4,237	(247)	(8,804)	(17,648)	(29,055)	(41,646)	Survey Revision Request
FORT WORTH	1,088,987	1,239,211	1,371,239	1,477,653	1,593,371	1,718,478	1,124,375	1,333,700	1,371,311	1,477,768	1,593,514	1,718,619	35,388	94,489	72	115	143	141	Survey Revision Request (2022 Impact Fee Study) and Region G Request
FRISCO	284,501	383,861	493,210	603,456	724,940	858,774	319,883	387,697	389,656	389,656	389,656	389,656	35,382	3,836	(103,554)	(213,800)	(335,284)	(469,118)	Survey Revision Request; Ongoing Study
FROGNOT WSC	2,130	2,664	3,263	3,865	4,527	5,256	2,130	2,664	3,263	3,865	4,527	5,257	0	0	0	0	0	1	Region D Request
GAINESVILLE	19,705	20,309	20,590	20,630	20,676	20,727	19,705	20,309	20,590	21,551	23,237	24,916	0	0	0	921	2,561	4,189	Survey Revision Request; New MUD Annexation
GARLAND	264,943	278,533	285,702	289,787	294,284	299,237	259,490	280,255	292,558	301,850	303,416	303,416	(5,453)	1,722	6,856	12,063	9,132	4,179	NTMWD Long Range Water Supply Plan
GASTONIA SCURRY SUD	12,814	16,869	22,040	27,922	34,398	41,530	12,512	14,583	19,563	33,039	52,565	65,808	(302)	(2,286)	(2,477)	5,117	18,167	24,278	NTMWD Long Range Water Supply Plan
GLENN HEIGHTS	22,178	25,909	29,228	32,297	35,668	39,377	22,178	25,909	29,228	32,297	35,668	39,377	0	0	0	0	0	0	
GRAND PRAIRIE	204,821	211,690	215,314	217,378	219,651	222,154	223,477	250,447	281,044	290,859	300,401	300,401	18,656	38,757	65,730	73,481	80,750	78,247	Survey Revision Request; Ongoing Study

WUG	Draft 2026 TWDB Projections (ac-ft/yr)						Recommended Population Projection Revisions (ac-ft/yr)						Changes from Draft and Proposed Revised Projections (ac-ft/yr)						Comment
	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	
GRAPEVINE	54,037	54,037	54,037	54,037	54,037	54,037	54,037	54,037	54,037	54,037	54,037	54,037	0	0	0	0	0	0	
GUNTER	1,940	2,258	2,523	2,782	3,064	3,371	1,940	2,258	2,523	2,782	3,064	3,371	0	0	0	0	0	0	
HACKBERRY	5,999	8,480	11,092	13,748	16,673	19,894	2,309	2,840	3,682	4,642	5,612	6,173	(3,690)	(5,640)	(7,410)	(9,106)	(11,061)	(13,721)	NTMWD Long Range Water Supply Plan
HALTOM CITY	50,298	55,645	60,061	63,509	67,306	71,487	50,000	50,000	50,000	50,000	50,000	50,000	(298)	(5,645)	(10,061)	(13,509)	(17,306)	(21,487)	Survey Revision Request
HASLET	2,584	3,277	4,156	5,271	6,686	8,480	6,524	8,959	11,761	12,997	14,000	14,000	3,940	5,682	7,605	7,726	7,314	5,520	Fort Worth Impact Fee
HEATH	12,307	15,369	19,062	22,935	27,201	31,899	11,828	15,718	20,840	21,363	21,363	21,363	(479)	349	1,778	(1,572)	(5,838)	(10,536)	Survey Revision Request; 2018 Comprehensive Plan
HICKORY CREEK SUD	3,827	4,340	4,946	5,631	6,415	7,315	3,827	4,340	4,946	5,631	6,415	7,315	0	0	0	0	0	0	
HIGH POINT WSC	21,311	32,764	47,362	64,034	82,333	102,444	5,798	6,796	8,849	13,759	17,816	20,290	(15,513)	(25,968)	(38,513)	(50,275)	(64,517)	(82,154)	NTMWD Long Range Water Supply Plan
HIGHLAND PARK	9,311	9,311	9,311	9,311	9,311	9,311	9,311	9,311	9,311	9,311	9,311	9,311	0	0	0	0	0	0	
HIGHLAND VILLAGE	16,656	17,822	18,020	18,020	18,020	18,020	16,656	17,822	18,020	18,020	18,020	18,020	0	0	0	0	0	0	Agreed with Draft Projections
HILCO UNITED SERVICES	6,489	6,767	7,005	7,253	7,526	7,826	6,489	6,767	7,005	7,253	7,526	7,826	0	0	0	0	0	0	
HONEY GROVE	1,782	1,828	1,828	1,828	1,828	1,828	1,782	1,828	1,828	1,828	1,828	1,828	0	0	0	0	0	0	
HORSESHOE BEND WATER SYSTEM	1,118	1,340	1,591	1,854	2,144	2,464	1,303	1,474	1,862	2,464	3,334	4,367	185	134	271	610	1,190	1,903	UTGCD Regional Water Supply Planning Study
HOWE	4,785	5,735	6,531	7,320	8,178	9,111	4,785	5,735	6,531	7,320	8,178	9,111	0	0	0	0	0	0	Agreed with Draft Projections
HUDSON OAKS	5,679	5,679	5,679	5,679	5,679	5,679	5,500	5,693	5,850	6,052	6,300	6,500	(179)	14	171	373	621	821	UTGCD Regional Water Supply Planning Study
HURST	40,367	40,367	40,367	40,367	40,367	40,367	40,910	40,821	40,897	40,974	41,053	41,053	543	454	530	607	686	686	Fort Worth Impact Fee
HUTCHINS	8,346	9,300	9,808	10,107	10,436	10,799	8,346	9,300	9,808	10,107	10,436	10,799	0	0	0	0	0	0	
IRVING	286,398	301,541	301,541	301,541	301,541	301,541	285,073	302,931	303,163	303,400	303,641	303,641	(1,325)	1,390	1,622	1,859	2,100	2,100	DWU Survey Revision Request
ITALY	1,939	1,942	1,944	1,933	1,923	1,915	1,939	1,942	1,944	1,933	1,923	1,915	0	0	0	0	0	0	
JACKSBORO	3,437	3,185	2,916	2,658	2,373	2,056	3,713	3,657	3,765	3,965	4,259	4,387	276	472	849	1,307	1,886	2,331	Survey Revision Request
JOHNSON COUNTY SUD	51,219	57,510	63,810	69,436	75,756	82,856	72,538	91,442	101,701	110,847	121,131	132,694	21,319	33,932	37,891	41,411	45,375	49,838	Region G Request
JOSEPHINE	4,505	4,530	4,553	4,574	4,594	4,615	5,540	12,169	17,555	20,020	22,045	22,067	1,035	7,639	13,002	15,446	17,451	17,452	NTMWD Long Range Water Supply Plan and Reigon D Request
JUSTIN	5,812	7,705	10,214	13,540	17,950	23,796	11,900	16,903	25,267	34,842	37,608	37,608	6,088	9,198	15,053	21,302	19,658	13,812	Ongoing UTRWD Study
KAUFMAN	8,074	9,443	11,178	13,112	15,256	17,628	7,626	8,606	12,361	15,682	18,682	21,791	(448)	(837)	1,183	2,570	3,426	4,163	NTMWD Long Range Water Supply Plan
KAUFMAN COUNTY DEVELOPMENT DISTRICT 1	1,052	1,467	1,997	2,603	3,270	4,003	3,831	4,083	6,294	9,935	14,527	16,798	2,779	2,616	4,297	7,332	11,257	12,795	NTMWD Long Range Water Supply Plan
KAUFMAN COUNTY MUD 11	5,635	7,900	10,792	14,097	17,731	21,729	4,340	5,159	6,629	8,374	10,269	11,378	(1,295)	(2,741)	(4,163)	(5,723)	(7,462)	(10,351)	NTMWD Long Range Water Supply Plan
KAUFMAN COUNTY MUD 14	7,221	11,836	17,743	24,540	31,995	40,186	6,300	6,300	6,300	6,300	6,300	6,300	(921)	(5,536)	(11,443)	(18,240)	(25,695)	(33,886)	Survey Revision Request
KELLER	51,130	51,974	51,974	51,974	51,974	51,974	51,130	51,974	51,974	51,974	51,974	51,974	0	0	0	0	0	0	Agreed with Draft Projections
KEMP	1,611	1,671	1,745	1,813	1,894	1,987	1,611	1,671	1,745	1,813	1,894	1,987	0	0	0	0	0	0	
KENNEDALE	10,296	13,100	16,667	21,206	26,981	34,329	10,711	14,532	19,015	23,811	28,592	33,035	415	1,432	2,348	2,605	1,611	(1,294)	Survey Revision Request; 2021 Impact Fee
KENTUCKYTOWN WSC	2,863	3,139	3,368	3,574	3,801	4,050	2,863	3,139	3,368	3,574	3,801	4,050	0	0	0	0	0	0	
KERENS	1,469	1,359	1,257	1,163	1,076	995	1,469	1,359	1,257	1,163	1,076	995	0	0	0	0	0	0	
KRUM	7,146	9,532	12,715	16,961	22,625	30,180	7,146	9,532	12,715	16,961	22,625	30,180	0	0	0	0	0	0	Agreed with Draft Projections
LADONIA	606	578	573	554	535	514	774	953	1,369	2,055	2,500	2,500	168	375	796	1,501	1,965	1,986	Ongoing UTRWD Study
LAKE CITIES MUNICIPAL UTILITY AUTHORITY	16,486	18,770	21,178	21,810	21,810	21,810	17,717	21,502	22,506	22,772	22,897	22,897	1,231	2,732	1,328	962	1,087	1,087	Ongoing UTRWD Study
LAKE KIOWA SUD	2,346	2,477	2,532	2,555	2,581	2,609	2,346	2,477	2,532	2,555	2,581	2,609	0	0	0	0	0	0	Agreed with Draft Projections
LAKE WORTH	5,483	6,060	6,536	6,907	7,316	7,767	5,859	6,414	6,808	7,150	7,474	7,767	376	354	272	243	158	0	Fort Worth Impact Fee
LAKESIDE	2,144	2,144	2,144	2,144	2,144	2,144	2,144	2,144	2,144	2,144	2,144	2,144	0	0	0	0	0	0	
LANCASTER	44,667	47,419	48,875	49,713	50,637	51,653	44,667	47,419	48,875	49,713	50,637	51,653	0	0	0	0	0	0	
LANCASTER MUD 1	2,286	2,844	3,142	3,321	3,517	3,734	2,286	2,844	3,142	3,321	3,517	3,734	0	0	0	0	0	0	
LEONARD	2,020	2,077	2,117	2,132	2,149	2,168	2,796	3,019	3,572	4,228	5,000	6,000	776	942	1,455	2,096	2,851	3,832	Survey Revision Request
LEWISVILLE	109,624	109,624	109,624	109,624	109,624	109,624	115,233	115,977	123,901	125,981	128,105	128,105	5,609	6,353	14,277	16,357	18,481	18,481	Survey Revision Request; Annexed DCFWSD 1-A
LINDSAY	1,718	1,758	1,777	1,777	1,776	1,776	1,718	1,758	1,777	1,777	1,776	1,776	0	0	0	0	0	0	
LITTLE ELM	38,253	38,253	38,253	38,253	38,253	38,253	44,298	42,372	44,703	46,880	48,000	48,000	6,045	4,119	6,450	8,627	9,747	9,747	NTMWD Long Range Water Supply Plan
LOG CABIN	671	671	702	712	723	735	671	671	702	712	723	735	0	0	0	0	0	0	
LUCAS	9,825	12,494	15,330	15,330	15,330	15,330	11,469	13,122	13,442	13,442	13,442	13,442	1,644	628	(1,888)	(1,888)	(1,888)	(1,888)	Survey Revision Request
LUELLA SUD	2,717	2,717	2,717	2,717	2,717	2,717	2,717	2,717	2,717	2,717	2,717	2,717	0	0	0	0	0	0	
M E N WSC	3,732	4,307	4,782	5,255	5,771	6,334	3,732	4,307	4,782	5,255	5,771	6,334	0	0	0	0	0	0	
MABANK	10,137	10,592	10,605	10,778	10,992	11,241	10,137	10,592	10,605	10,778	10,992	11,241	0	0	0	0	0	0	
MACBEE SUD	8,904	10,951	13,480	16,595	20,435	25,172	8,904	10,951	13,480	16,595	20,435	25,172	0	0	0	0	0	0	
MALAKOFF	1,782	1,775	1,863	1,889	1,916	1,946	2,746	2,917	3,359	3,757	4,200	4,400	964	1,142	1,496	1,868	2,284	2,454	Survey Revision Request
MANSFIELD	61,722	70,344	77,997	84,447	91,597	99,523	109,524	118,153	143,719	203,222	218,645	218,645	47,802	47,809	65,722	118,775	127,048	119,122	Ongoing 2040 Mansfield Comprehensive Report
MARKOUT WSC	3,921	5,648	7,856	10,384	13,161	16,214	2,958	3,514	4,903	7,062	9,422	12,571	(963)	(2,134)	(2,953)	(3,322)	(3,739)	(3,643)	NTMWD Long Range Water Supply Plan
MCKINNEY	258,054	340,062	434,174	531,763	639,339	760,430	227,593	269,464	344,909	433,869	433,869	433,869	(30,461)	(70,598)	(89,265)	(97,894)	(205,470)	(326,561)	NTMWD Long Range Water Supply Plan
MELISSA	26,317	39,105	53,689	68,267	84,350	102,082	43,771	65,280	87,489	109,693	119,072	119,072	17,454	26,175	33,800	41,426	34,722	16,990	NTMWD Long Range Water Supply Plan
MESQUITE	161,746	170,046	174,424	176,918	179,664	182,689	166,062	173,044	191,910	217,026	243,324	266,415	4,316	2,998	17,486	40,108	63,660	83,726	NTMWD Long Range Water Supply Plan
MIDLOTHIAN	23,665	29,642	36,138	42,714	49,945	57,900	33,629	38,530	45,932	53,202	60,311	66,058	9,964	8,888	9,794	10,488	10,366	8,158	Survey Revision Request; 2021 Water Supply Plan Update
MILLIGAN WSC	2,894	3,091	3,310	3,536	3,783	4,053	3,350	3,525	4,133	4,849	5,593	6,231	456	434	823	1,313	1,810	2,178	NTMWD Long Range Water Supply Plan
MINERAL WELLS	14,993	15,021	14,887	14,825	14,755	14,674	18,727	19,763	20,794	21,836	21,836	21,836	3,734	4,742	5,907	7,011	7,081	7,162	UTGCD Regional Water Supply Planning Study and Region G Request
MOUNT ZION WSC	2,079	2,148	2,226	2,294	2,373	2,462	2,833	3,099	4,001	5,211	6,542	6,542	754	951	1,775	2,917	4,169	4,080	NTMWD Long Range Water Supply Plan
MOUNTAIN PEAK SUD	25,731	33,919	42,997	52,557	63,308	75,434	25,798	34,002	43,100	52,686	63,468	75,633	67	83	103	129	160	199	Region G Request
MOUNTAIN SPRINGS WSC	2,001	2,028	2,055	2,062	2,069	2,077	2,001	2,028	2,055	2,062	2,069	2,077	0	0	0	0	0	0	

WUG	Draft 2026 TWDB Projections (ac-ft/yr)						Recommended Population Projection Revisions (ac-ft/yr)						Changes from Draft and Proposed Revised Projections (ac-ft/yr)						Comment
	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	
MUENSTER	2,139	2,139	2,139	2,139	2,139	2,139	2,139	2,139	2,139	2,139	2,139	2,139	0	0	0	0	0	0	
MURPHY	20,850	20,850	20,850	20,850	20,850	20,850	21,371	21,822	24,086	26,836	29,564	31,653	521	972	3,236	5,986	8,714	10,803	NTMWD Long Range Water Supply Plan
MUSTANG SUD	88,989	132,593	178,432	224,995	276,279	332,757	110,810	157,621	210,129	263,337	304,419	340,419	21,821	25,028	31,697	38,342	28,140	7,662	Ongoing UTRWD Study
NASH FORRESTON WSC	2,095	2,514	2,970	3,428	3,933	4,489	2,095	2,514	2,970	3,428	3,933	4,489	0	0	0	0	0	0	Agreed with Draft Projections
NAVARRO MILLS WSC	2,831	3,040	3,211	3,362	3,526	3,709	2,831	3,040	3,211	3,362	3,526	3,709	0	0	0	0	0	0	Agreed with Draft Projections
NEVADA SUD	4,223	5,453	6,856	8,268	9,822	11,534	5,800	7,363	10,935	23,426	41,290	55,490	1,577	1,910	4,079	15,158	31,468	43,956	NTMWD Long Range Water Supply Plan
NEWARK	1,227	1,346	1,453	1,533	1,622	1,721	2,077	2,640	3,807	5,664	8,300	10,600	850	1,294	2,354	4,131	6,678	8,879	UTGCD Regional Water Supply Planning Study
NORTH COLLIN SUD	18,047	25,235	33,426	41,622	50,661	60,624	7,544	8,523	10,409	12,496	14,565	16,977	(10,503)	(16,712)	(23,017)	(29,126)	(36,096)	(43,647)	NTMWD Long Range Water Supply Plan
NORTH FARMERSVILLE WSC	585	629	680	731	787	849	465	550	715	836	942	992	(120)	(79)	35	105	155	143	NTMWD Long Range Water Supply Plan
NORTH HUNT SUD	2,630	2,591	2,560	2,496	2,431	2,369	2,630	2,591	2,560	2,496	2,431	2,369	0	0	0	0	0	0	
NORTH KAUFMAN WSC	3,448	4,535	5,920	7,495	9,231	11,141	3,448	4,535	5,920	7,495	9,231	11,141	0	0	0	0	0	0	Agreed with Draft Projections
NORTH RICHLAND HILLS	77,480	77,480	77,480	77,480	77,480	77,480	80,109	85,636	86,997	88,384	89,800	89,800	2,629	8,156	9,517	10,904	12,320	12,320	Fort Worth Impact Fee
NORTH RURAL WSC	3,027	3,322	3,636	3,976	4,349	4,761	3,027	3,322	3,636	3,976	4,349	4,761	0	0	0	0	0	0	
NORTHLAKE	12,164	18,423	25,012	31,711	39,091	47,219	26,208	29,172	36,142	42,747	48,940	53,700	14,044	10,749	11,130	11,036	9,849	6,481	Survey Revision Request; Impact Fee
NORTHWEST GRAYSON COUNTY WCID 1	2,032	2,265	2,459	2,640	2,838	3,054	2,032	2,265	2,459	2,640	2,838	3,054	0	0	0	0	0	0	
OAK RIDGE SOUTH GALE WSC	2,811	2,875	2,927	2,942	2,962	2,988	2,811	2,875	2,927	2,942	2,962	2,988	0	0	0	0	0	0	Agreed with Draft Projections
OVILLA	5,438	6,827	8,337	9,871	11,556	13,411	5,438	6,827	8,337	9,871	11,556	13,411	0	0	0	0	0	0	Agreed with Draft Projections
PALMER	2,543	3,053	3,606	4,162	4,775	5,449	2,543	3,053	3,606	4,162	4,775	5,449	0	0	0	0	0	0	
PALOMA CREEK NORTH	12,101	12,101	12,101	12,101	12,101	12,101	5,853	5,853	5,853	5,853	5,853	5,853	(6,248)	(6,248)	(6,248)	(6,248)	(6,248)	(6,248)	Ongoing UTRWD Study
PALOMA CREEK SOUTH	9,088	9,088	9,088	9,088	9,088	9,088	9,088	9,088	9,088	9,088	9,088	9,088	0	0	0	0	0	0	
PANTEGO	2,653	2,653	2,653	2,653	2,653	2,653	2,653	2,653	2,653	2,653	2,653	2,653	0	0	0	0	0	0	Agreed with Draft Projections
PARKER	8,096	10,382	12,982	15,590	18,465	21,631	6,878	8,782	12,121	14,089	14,089	14,089	(1,218)	(1,600)	(861)	(1,501)	(4,376)	(7,542)	NTMWD Long Range Water Supply Plan
PARKER COUNTY SUD	10,512	13,725	17,355	21,229	25,480	30,150	9,100	12,400	16,800	22,619	30,900	41,800	(1,412)	(1,325)	(555)	1,390	5,420	11,650	UTGCD Regional Water Supply Planning Study
PELICAN BAY	2,958	3,967	5,320	7,134	9,567	12,830	2,958	3,967	5,320	7,134	9,567	12,830	0	0	0	0	0	0	
PILOT POINT	5,501	6,854	8,279	9,727	11,321	13,076	6,351	8,200	14,104	20,494	21,892	21,892	850	1,346	5,825	10,767	10,571	8,816	Ongoing UTRWD Study
PINK HILL WSC	2,210	2,449	2,648	2,832	3,033	3,253	2,210	2,449	2,648	2,832	3,033	3,253	0	0	0	0	0	0	Agreed with Draft Projections
PLANO	314,299	354,971	401,499	451,952	507,362	570,820	286,220	288,115	317,280	326,800	326,800	326,800	(28,079)	(66,856)	(84,219)	(125,152)	(180,562)	(244,020)	NTMWD Long Range Water Supply Plan
PLEASANT GROVE WSC	1,445	1,560	1,711	1,674	1,633	1,588	1,445	1,560	1,711	1,674	1,633	1,588	0	0	0	0	0	0	Agreed with Draft Projections
POETRY WSC	3,166	3,723	4,392	5,120	5,914	6,782	3,867	4,698	6,403	8,868	11,937	13,865	701	975	2,011	3,748	6,023	7,083	NTMWD Long Range Water Supply Plan/Region D Request
POINT ENTERPRISE WSC	1,295	1,262	1,219	1,188	1,152	1,113	1,311	1,289	1,258	1,241	1,223	1,203	16	27	39	53	71	90	Region G Request
PONDER	4,798	6,403	8,093	9,811	11,703	13,786	4,798	6,403	8,093	9,811	11,703	13,786	0	0	0	0	0	0	Agreed with Draft Projections
POST OAK SUD	1,495	1,481	1,462	1,433	1,401	1,371	1,495	1,481	1,462	1,433	1,401	1,371	0	0	0	0	0	0	
POTTSBORO	3,613	3,938	4,210	4,450	4,715	5,007	3,613	3,938	4,210	4,450	4,715	5,007	0	0	0	0	0	0	
PRINCETON	27,577	39,276	52,611	65,952	80,665	91,789	48,638	103,793	140,240	158,951	171,027	171,027	21,061	64,517	87,629	92,999	90,362	79,238	NTMWD Long Range Water Supply Plan
PROSPER	47,211	51,000	51,000	51,000	51,000	51,000	55,243	65,097	77,599	81,475	85,432	85,432	8,032	14,097	26,599	30,475	34,432	34,432	Survey Revision Request; Ongoing Study
PROVIDENCE VILLAGE WCID	7,235	7,235	7,235	7,235	7,235	7,235	7,235	7,235	7,235	7,235	7,235	7,235	0	0	0	0	0	0	
R C H WSC	11,581	16,495	22,447	28,737	35,649	43,250	5,684	6,457	8,240	10,994	13,407	16,350	(5,897)	(10,038)	(14,207)	(17,743)	(22,242)	(26,900)	NTMWD Long Range Water Supply Plan
RED OAK	12,039	15,009	18,237	21,502	25,093	29,044	12,039	15,009	18,237	21,502	25,093	29,044	0	0	0	0	0	0	Agreed with Draft Projections
RED RIVER AUTHORITY OF TEXAS	7,908	7,707	7,574	7,496	7,439	7,403	7,908	7,707	7,574	7,496	7,439	7,403	0	0	0	0	0	0	
RENO (PARKER)	4,273	5,195	6,233	7,327	8,530	9,854	4,273	5,195	6,233	7,327	8,530	9,854	0	0	0	0	0	0	
RHOME	1,567	1,852	2,189	2,587	3,057	3,613	2,939	3,804	5,597	8,263	12,000	16,000	1,372	1,952	3,408	5,676	8,943	12,387	UTGCD Regional Water Supply Planning Study
RICE WATER SUPPLY AND SEWER SERVICE	9,518	11,375	13,469	15,738	18,327	21,287	9,518	11,375	13,469	15,738	18,327	21,287	0	0	0	0	0	0	
RICHARDSON	135,150	151,181	166,848	181,636	197,918	215,845	117,464	122,836	131,067	135,000	135,000	135,000	(17,686)	(28,345)	(35,781)	(46,636)	(62,918)	(80,845)	NTMWD Long Range Water Supply Plan
RICHLAND HILLS	9,616	10,622	11,452	12,911	14,217	15,655	9,616	10,622	11,452	12,911	14,217	15,655	0	0	0	0	0	0	Agreed with Draft Projections
RIVER OAKS	7,746	7,746	7,746	7,746	7,746	7,746	8,075	8,053	8,104	8,157	8,210	8,210	329	307	358	411	464	464	Fort Worth Impact Fee
ROANOKE	11,961	11,961	11,961	11,961	11,961	11,961	13,990	13,658	13,941	14,229	14,524	14,524	2,029	1,697	1,980	2,268	2,563	2,563	Fort Worth Impact Fee
ROCKETT SUD	38,261	43,299	48,748	57,135	68,836	81,687	38,370	45,774	54,737	65,320	78,881	93,733	109	2,475	5,989	8,185	10,045	12,046	Survey Revision Request; Comprehensive Plan
ROCKWALL	53,377	63,929	76,604	89,790	104,338	120,377	55,068	67,561	89,917	120,684	124,696	124,696	1,691	3,632	13,313	30,894	20,358	4,319	NTMWD Long Range Water Supply Plan
ROSE HILL SUD	4,699	5,634	6,822	8,154	9,628	11,255	4,967	6,001	7,085	8,151	9,005	9,948	268	367	263	(3)	(623)	(1,307)	NTMWD Long Range Water Supply Plan
ROWLETT	64,753	68,743	71,325	73,173	75,220	77,480	77,823	81,935	95,048	101,426	105,095	105,095	13,070	13,192	23,723	28,253	29,875	27,615	NTMWD Long Range Water Supply Plan
ROYSE CITY	14,632	17,715	20,758	23,755	26,928	30,293	39,374	74,453	97,939	109,518	120,640	120,640	24,742	56,738	77,181	85,763	93,712	90,347	NTMWD Long Range Water Supply Plan and Region D Request
RUNAWAY BAY	1,878	2,304	2,826	3,467	4,253	5,217	1,878	2,304	2,826	3,467	4,253	5,217	0	0	0	0	0	0	
SACHSE	29,635	30,558	30,558	30,558	30,558	30,558	29,507	31,598	35,799	37,554	38,462	38,462	(128)	1,040	5,241	6,996	7,904	7,904	NTMWD Long Range Water Supply Plan
SAGINAW	29,238	31,218	31,218	31,218	31,218	31,218	29,913	32,879	33,156	33,439	33,727	33,727	675	1,661	1,938	2,221	2,509	2,509	Fort Worth Impact Fee
SANGER	11,153	14,002	17,000	22,119	27,933	35,269	11,153	14,002	17,000	22,119	27,933	35,269	0	0	0	0	0	0	Agreed with Draft Projections
SANSOM PARK	6,087	6,736	7,272	7,690	8,152	8,659	6,087	6,736	7,272	7,690	8,152	8,659	0	0	0	0	0	0	
SANTO SUD	2,137	2,166	2,178	2,203	2,231	2,259	2,137	2,166	2,178	2,203	2,231	2,259	0	0	0	0	0	0	
SARDIS LONE ELM WSC	20,865	25,783	31,135	32,524	32,524	32,524	20,865	25,783	31,135	32,524	32,524	32,524	0	0	0	0	0	0	
SAVOY	711	704	706	698	689	678	711	704	706	698	689	678	0	0	0	0	0	0	
SEAGOVILLE	20,875	22,892	23,964	24,593	25,285	26,047	20,875	22,892	23,964	24,593	25,285	26,047	0	0	0	0	0	0	
SEIS LAGOS UD	2,148	2,148	2,148	2,148	2,148	2,148	2,348	2,270	2,381	2,485	2,535	2,541	200	122	233	337	387	393	NTMWD Long Range Water Supply Plan
SHERMAN	46,811	50,903	54,318	57,317	60,622	64,264	46,811	50,903	54,318	57,317	60,622	64,264	0	0	0	0	0	0	
SOUTH ELLIS COUNTY WSC	1,526	1,833	2,161	2,492	2,855	3,256	1,526	1,833	2,161	2,492	2,855	3,256	0	0	0	0	0	0	

WUG	Draft 2026 TWDB Projections (ac-ft/yr)						Recommended Population Projection Revisions (ac-ft/yr)						Changes from Draft and Proposed Revised Projections (ac-ft/yr)						Comment
	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	
SOUTH FREESTONE COUNTY WSC	2,598	2,720	2,880	2,799	2,708	2,608	2,598	2,720	2,880	2,799	2,708	2,608	0	0	0	0	0	0	
SOUTH GRAYSON SUD	5,303	6,167	7,010	7,826	8,723	9,710	5,303	6,167	7,010	7,826	8,723	9,710	0	0	0	0	0	0	
SOUTHERN OAKS WATER SUPPLY	838	1,077	1,368	1,393	1,418	1,444	838	1,077	1,368	1,393	1,418	1,444	0	0	0	0	0	0	
SOUTHLAKE	34,941	38,688	41,773	44,175	46,820	49,732	35,812	40,119	42,776	45,164	47,511	49,732	871	1,431	1,003	989	691	0	Fort Worth Impact Fee
SOUTHMAYD	964	992	1,015	1,026	1,039	1,055	964	992	1,015	1,026	1,039	1,055	0	0	0	0	0	0	
SOUTHWEST FANNIN COUNTY SUD	8,413	9,279	9,755	10,180	10,646	11,157	8,413	9,279	9,755	10,180	10,646	11,157	0	0	0	0	0	0	Agreed with Draft Projections
SPRINGTOWN	3,832	4,590	5,445	5,484	5,484	5,484	5,430	7,245	10,007	13,110	16,850	19,600	1,598	2,655	4,562	7,626	11,366	14,116	Survey Revision Request
STARR WSC	2,325	2,533	2,708	2,862	3,032	3,219	2,325	2,533	2,708	2,862	3,032	3,219	0	0	0	0	0	0	Agreed with Draft Projections
STURDIVANT PROGRESS WSC	2,282	2,283	2,257	2,242	2,225	2,207	2,282	2,283	2,257	2,242	2,225	2,207	0	0	0	0	0	0	
SUNNYVALE	9,834	11,408	12,247	12,746	13,295	13,900	9,064	11,417	13,541	14,157	14,340	14,340	(770)	9	1,294	1,411	1,045	440	NTMWD Long Range Water Supply Plan
TALTY SUD	13,312	18,056	24,112	31,018	38,615	46,977	12,151	13,567	20,000	28,710	39,600	46,568	(1,161)	(4,489)	(4,112)	(2,308)	985	(409)	NTMWD Long Range Water Supply Plan
TEAGUE	3,437	3,142	2,738	2,646	2,545	2,435	3,437	3,142	2,738	2,646	2,545	2,435	0	0	0	0	0	0	
TERRA SOUTHWEST	3,143	3,996	4,895	5,808	6,814	7,922	3,143	3,996	4,895	5,808	6,814	7,922	0	0	0	0	0	0	
TERRELL	18,329	20,344	22,881	25,638	28,724	32,152	24,840	28,404	34,761	40,777	47,940	53,769	6,511	8,060	11,880	15,139	19,216	21,617	NTMWD Long Range Water Supply Plan
THE COLONY	51,496	60,502	67,600	67,600	67,600	67,600	51,496	60,502	67,600	67,600	67,600	67,600	0	0	0	0	0	0	Agreed with Draft Projections
TIOGA	1,773	2,106	2,386	2,662	2,961	3,288	1,773	2,106	2,386	2,662	2,961	3,288	0	0	0	0	0	0	
TOM BEAN	1,113	1,113	1,113	1,113	1,113	1,113	1,113	1,113	1,113	1,113	1,113	1,113	0	0	0	0	0	0	
TRENTON	798	857	889	913	940	970	798	857	889	913	940	970	0	0	0	0	0	0	
TRINIDAD	1,134	1,152	1,191	1,213	1,236	1,261	1,134	1,152	1,191	1,213	1,236	1,261	0	0	0	0	0	0	
TROPHY CLUB MUD 1	14,247	14,534	14,773	14,969	15,185	15,421	14,247	14,534	14,773	14,969	15,185	15,421	0	0	0	0	0	0	Agreed with Draft Projections
TWO WAY SUD	4,636	5,053	5,400	5,707	6,044	6,417	6,042	6,400	7,606	8,379	9,241	9,811	1,406	1,347	2,206	2,672	3,197	3,394	Survey Revision Request
UNIVERSITY PARK	25,656	25,656	25,656	25,656	25,656	25,656	25,656	25,656	25,656	25,656	25,656	25,656	0	0	0	0	0	0	
VAN ALSTYNE	5,999	7,189	8,186	9,175	10,250	11,420	12,018	23,349	37,011	46,370	59,800	70,300	6,019	16,160	28,825	37,195	49,550	58,880	Survey Revision Request
VERONA SUD	3,345	4,217	5,210	6,206	7,303	8,512	3,345	4,217	5,210	6,206	7,303	8,512	0	0	0	0	0	0	
VIRGINIA HILL WSC	3,240	3,346	3,421	3,494	3,569	3,647	3,240	3,346	3,421	3,494	3,569	3,647	0	0	0	0	0	0	
WALNUT CREEK SUD	19,469	23,145	27,222	31,425	36,053	41,147	24,614	26,796	37,161	56,256	77,781	99,566	5,145	3,651	9,939	24,831	41,728	58,419	UTGCD Regional Water Supply Planning Study
WATAUGA	24,525	24,525	24,525	24,525	24,525	24,525	24,525	24,525	24,525	24,525	24,525	24,525	0	0	0	0	0	0	
WAXAHACHIE	48,394	59,800	72,197	84,724	98,504	113,667	48,394	59,800	72,197	84,724	98,504	113,667	0	0	0	0	0	0	
WEATHERFORD	45,410	54,197	64,123	74,543	86,019	98,660	45,410	54,197	64,123	74,543	86,019	98,660	0	0	0	0	0	0	Agreed with Draft Projections
WEST CEDAR CREEK MUD	5,074	4,777	5,308	5,383	5,461	5,543	5,074	4,777	5,308	5,383	5,461	5,543	0	0	0	0	0	0	
WEST LEONARD WSC	2,287	2,764	3,042	3,326	3,637	3,978	2,287	2,764	3,042	3,327	3,638	3,979	0	0	0	1	1	1	Region D Request
WEST WISE SUD	4,047	4,438	4,789	5,056	5,349	5,672	4,047	4,438	4,789	5,056	5,349	5,672	0	0	0	0	0	0	Agreed with Draft Projections
WESTLAKE	3,052	4,001	4,791	5,441	6,152	6,933	3,052	4,001	4,791	5,441	6,152	6,933	0	0	0	0	0	0	
WESTMINSTER SUD	2,168	2,710	3,324	3,940	4,620	5,367	2,168	2,710	3,324	3,940	4,620	5,367	0	0	0	0	0	0	
WESTOVER HILLS	655	657	659	661	663	665	676	674	677	680	682	682	21	17	18	19	19	17	Fort Worth Impact Fee
WESTWORTH VILLAGE	2,751	3,043	3,285	3,474	3,682	3,912	3,127	3,203	3,406	3,584	3,755	3,912	376	160	121	110	73	0	Fort Worth Impact Fee
WHITE SETTLEMENT	20,351	22,469	24,218	25,582	27,083	28,738	20,351	22,469	24,218	25,582	27,083	28,738	0	0	0	0	0	0	
WHITE SHED WSC	2,344	2,460	2,528	2,571	2,618	2,670	2,344	2,460	2,528	2,571	2,618	2,670	0	0	0	0	0	0	
WHITESBORO	4,847	5,280	5,642	5,960	6,311	6,699	4,847	5,280	5,642	5,960	6,311	6,699	0	0	0	0	0	0	Agreed with Draft Projections
WHITEWRIGHT	2,298	2,519	2,695	2,854	3,026	3,218	2,298	2,519	2,695	2,854	3,026	3,218	0	0	0	0	0	0	
WILLOW PARK	8,080	9,714	11,560	13,501	15,638	17,991	10,392	11,491	13,287	15,000	16,593	17,991	2,312	1,777	1,727	1,499	955	0	Fort Worth Impact Fee
WILMER	5,902	6,672	7,081	7,324	7,591	7,885	5,902	6,672	7,081	7,324	7,591	7,885	0	0	0	0	0	0	
WOLFE CITY	1,638	1,657	1,677	1,681	1,685	1,692	1,638	1,657	1,677	1,681	1,685	1,692	0	0	0	0	0	0	
WOODBINE WSC	6,944	7,212	7,333	7,370	7,409	7,453	6,944	7,212	7,333	7,370	7,409	7,453	0	0	0	0	0	0	
WORTHAM	925	841	724	700	673	644	925	841	724	700	673	644	0	0	0	0	0	0	
WYLIE	53,618	66,995	82,196	97,466	114,282	132,801	47,379	46,874	49,115	50,589	50,589	50,589	(6,239)	(20,121)	(33,081)	(46,877)	(63,693)	(82,212)	NTMWD Long Range Water Supply Plan
WYLIE NORTHEAST SUD	9,693	13,264	17,332	21,405	25,896	30,844	15,866	19,669	24,202	26,045	26,648	26,648	6,173	6,405	6,870	4,640	752	(4,196)	Survey Revision Request

ATTACHMENT B

Split WUG Revision Recommendations

Split Region	County	Region C Primary WUG	Draft 2026 TWDB Projections (ac-ft/yr)						Recommended Population Projection Revisions (ac-ft/yr)						Changes from Draft and Proposed Revised Projections (ac-ft/yr)					
			2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080
C	KAUFMAN	ABLES SPRINGS SUD	3,029	3,631	4,396	5,254	6,203	7,252	8,016	8,338	9,734	10,965	12,417	13,039	4,987	4,707	5,338	5,711	6,214	5,787
D	HUNT	ABLES SPRINGS SUD	611	661	706	743	782	820	619	670	715	753	792	830	8	9	9	10	10	10
D	VAN ZANDT	ABLES SPRINGS SUD	35	37	39	42	44	46	35	37	39	42	44	46	0	0	0	0	0	0
		ABLES SPRINGS SUD TOTAL	3,675	4,329	5,141	6,039	7,029	8,118	8,670	9,045	10,488	11,760	13,253	13,915	4,995	4,716	5,347	5,721	6,224	5,797
C	HENDERSON	ATHENS	12,739	13,109	13,434	13,707	14,007	14,336	18,127	21,895	28,829	30,665	33,252	33,252	5,388	8,786	15,395	16,958	19,245	18,916
I	HENDERSON	ATHENS	210	213	211	211	211	211	210	213	211	211	211	211	0	0	0	0	0	0
		ATHENS TOTAL	12,949	13,322	13,645	13,918	14,218	14,547	18,337	22,108	29,040	30,876	33,463	33,463	5,388	8,786	15,395	16,958	19,245	18,916
C	FANNIN	BOIS D ARC MUD	3,031	3,180	3,269	3,325	3,386	3,453	3,031	3,180	3,269	3,325	3,386	3,453	0	0	0	0	0	0
D	LAMAR	BOIS D ARC MUD	16	16	16	16	16	16	16	16	16	16	16	16	0	0	0	0	0	0
		BOIS D ARC MUD TOTAL	3,047	3,196	3,285	3,341	3,402	3,469	3,047	3,196	3,285	3,341	3,402	3,469	0	0	0	0	0	0
C	TARRANT	CROWLEY	22,194	26,367	29,831	32,630	35,703	39,078	22,194	26,367	29,831	32,630	35,703	39,078	0	0	0	0	0	0
G	JOHNSON	CROWLEY	176	259	344	423	513	613	178	262	349	429	520	622	2	3	5	6	7	9
		CROWLEY TOTAL	22,370	26,626	30,175	33,053	36,216	39,691	22,372	26,629	30,180	33,059	36,223	39,700	2	3	5	6	7	9
C	DENTON	FORT WORTH	25,471	36,605	48,326	60,243	73,369	87,826	26,302	39,396	48,326	60,243	73,369	87,826	831	2,791	0	0	0	0
G	JOHNSON	FORT WORTH	-	-	5,009	7,951	9,858	9,776	-	-	5,081	8,066	10,001	9,917	0	0	72	115	143	141
C	PARKER	FORT WORTH	3,633	4,015	4,438	4,856	5,321	5,835	3,751	4,321	4,438	4,856	5,321	5,835	118	306	0	0	0	0
C	TARRANT	FORT WORTH	1,057,482	1,195,932	1,310,518	1,401,360	1,501,256	1,611,117	1,091,983	1,287,121	1,310,518	1,401,360	1,501,256	1,611,117	34,501	91,189	0	0	0	0
C	WISE	FORT WORTH	2,401	2,659	2,948	3,243	3,567	3,924	2,480	2,862	2,948	3,243	3,567	3,924	79	203	0	0	0	0
		FORT WORTH TOTAL	1,088,987	1,239,211	1,371,239	1,477,653	1,593,371	1,718,478	1,124,516	1,333,700	1,371,311	1,477,768	1,593,514	1,718,619	35,529	94,489	72	115	143	141
C	COLLIN	FROGNOT WSC	2,077	2,593	3,181	3,772	4,422	5,138	2,077	2,593	3,181	3,772	4,422	5,138	0	0	0	0	0	0
C	FANNIN	FROGNOT WSC	30	42	48	53	60	67	30	42	48	53	60	67	0	0	0	0	0	0
D	HUNT	FROGNOT WSC	23	29	34	40	45	51	23	29	34	40	45	52	0	0	0	0	0	1
		FROGNOT WSC TOTAL	2,130	2,664	3,263	3,865	4,527	5,256	2,130	2,664	3,263	3,865	4,527	5,257	0	0	0	0	0	1
C	COLLIN	JOSEPHINE	4,352	4,352	4,352	4,352	4,352	4,352	5,389	11,989	17,424	19,491	21,800	21,800	1,037	7,637	13,072	15,139	17,448	17,448
D	HUNT	JOSEPHINE	153	178	201	222	242	263	155	180	204	225	245	267	2	2	3	3	3	4
		JOSEPHINE TOTAL	4,505	4,530	4,553	4,574	4,594	4,615	5,544	12,169	17,628	19,716	22,045	22,067	1,039	7,639	13,075	15,142	17,451	17,452
C	HENDERSON	MABANK	3,474	3,826	3,737	3,863	4,004	4,161	3,474	3,826	3,737	3,863	4,004	4,161	0	0	0	0	0	0
C	KAUFMAN	MABANK	6,335	6,398	6,461	6,467	6,498	6,549	6,335	6,398	6,461	6,467	6,498	6,549	0	0	0	0	0	0
D	VAN ZANDT	MABANK	328	368	407	448	490	531	328	368	407	448	490	531	0	0	0	0	0	0
		MABANK TOTAL	10,137	10,592	10,605	10,778	10,992	11,241	10,137	10,592	10,605	10,778	10,992	11,241	0	0	0	0	0	0
C	ELLIS	MANSFIELD	581	698	824	951	1,091	1,245	581	698	824	951	1,091	1,245	0	0	0	0	0	0
C	TARRANT	MANSFIELD	54,629	60,388	65,144	68,856	72,943	77,443	102,621	108,197	131,234	185,294	199,991	196,565	47,992	47,809	66,090	116,438	127,048	119,122
G	JOHNSON	MANSFIELD	6,512	9,258	12,029	14,640	17,563	20,835	6,512	9,258	12,029	14,640	17,563	20,835	0	0	0	0	0	0
		MANSFIELD TOTAL	61,722	70,344	77,997	84,447	91,597	99,523	109,714	118,153	144,087	200,885	218,645	218,645	47,992	47,809	66,090	116,438	127,048	119,122
C	ELLIS	MOUNTAIN PEAK SUD	21,088	28,150	35,829	43,651	52,242	61,684	21,088	28,150	35,829	43,651	52,242	61,684	0	0	0	0	0	0
G	JOHNSON	MOUNTAIN PEAK SUD	4,643	5,769	7,168	8,906	11,066	13,750	4,710	5,852	7,271	9,035	11,226	13,949	67	83	103	129	160	199
		MOUNTAIN PEAK SUD TOTAL	25,731	33,919	42,997	52,557	63,308	75,434	25,798	34,002	43,100	52,686	63,468	75,633	67	83	103	129	160	199
C	NAVARRO	NAVARRO MILLS WSC	2,814	3,021	3,193	3,343	3,507	3,689	2,814	3,021	3,193	3,343	3,507	3,689	0	0	0	0	0	0
G	Hill	NAVARRO MILLS WSC	17	19	18	19	19	20	17	19	18	19	19	20	0	0	0	0	0	0
		NAVARRO MILLS WSC TOTAL	2,831	3,040	3,211	3,362	3,526	3,709	2,831	3,040	3,211	3,362	3,526	3,709	0	0	0	0	0	0
C	FREESTONE	POINT ENTERPRISE WSC	842	834	823	823	823	823	842	834	823	823	823	823	0	0	0	0	0	0
G	LIMESTONE	POINT ENTERPRISE WSC	453	428	396	365	329	290	469	455	435	418	400	380	16	27	39	53	71	90
		POINT ENTERPRISE WSC TOTAL	1,295	1,262	1,219	1,188	1,152	1,113	1,311	1,289	1,258	1,241	1,223	1,203	16	27	39	53	71	90
C	COLLIN	ROYSE CITY	1,835	2,697	3,679	4,661	5,744	6,938	8,394	15,496	22,376	24,692	27,747	27,747	6,559	12,799	18,697	20,031	22,003	20,809
C	ROCKWALL	ROYSE CITY	8,714	9,184	9,724	10,241	10,823	11,475	26,943	53,046	68,545	74,175	82,398	80,859	18,229	43,862	58,821	63,934	71,575	69,384
D	HUNT	ROYSE CITY	4,083	5,834	7,355	8,853	10,361	11,880	4,136	5,910	7,450	8,967	10,495	12,034	53	76	95	114	134	154
		ROYSE CITY TOTAL	14,632	17,715	20,758	23,755	26,928	30,293	39,473	74,453	98,371	107,833	120,640	120,640	24,841	56,738	77,613	84,078	93,712	90,347
C	HENDERSON	VIRGINIA HILL WSC	1,547	1,594	1,633	1,667	1,704	1,744	1,547	1,594	1,633	1,667	1,704	1,744	0	0	0	0	0	0
I	HENDERSON	VIRGINIA HILL WSC	1,693	1,752	1,788	1,827	1,865	1,903	1,693	1,752	1,788	1,827	1,865	1,903	0	0	0	0	0	0
		VIRGINIA HILL WSC TOTAL	3,240	3,346	3,421	3,494	3,569	3,647	3,240	3,346	3,421	3,494	3,569	3,647	0	0	0	0	0	0
C	COLLIN	WEST LEONARD WSC	337	422	518	614	720	837	337	422	518	614	720	837	0	0	0	0	0	0
C	FANNIN	WEST LEONARD WSC	1,914	2,301	2,478	2,661	2,862	3,082	1,914	2,301	2,478	2,661	2,862	3,082	0	0	0	0	0	0
D	HUNT	WEST LEONARD WSC	36	41	46	51	55	59	36	41	46	52	56	60	0	0	0	1	1	1
		WEST LEONARD WSC TOTAL	2,287	2,764	3,042	3,326	3,637	3,978	2,287	2,764	3,042	3,327	3,638	3,979	0	0	0	1	1	1

Attachment C-4

Memorandum on Comparison of Historical GPCDs for Region C; Requested GPCD Changes

801 Cherry Street, Suite 2800 + Fort Worth, Texas 76102 + 817-735-7300 + FAX 817-735-7491 www.freese.com

TO: Region C Regional Water Planning Group

CC: File

FROM: Freese and Nichols, Inc.

SUBJECT: Comparison of Historical GPCDs for Region C; Requested GPCD Changes

DATE: 8/11/2023

PROJECT: TRA21862

1.0 BACKGROUND

The purpose of this memorandum is to summarize the conclusions from a quantitative assessment of the draft base dry year Gallons Per Capita Day (GPCD) estimates to be used in the ***2026 Region C Water Plan***. The TWDB provided updated estimates of 2010-2020 GPCDs in March 2022.

According to the General Guidelines for the Sixth Cycle of Regional Water Plan Development, one or more of the following criteria must be met to qualify for an adjustment.

1) Evidence that per capita water use from a more recent year (2015-2019) would be more appropriate because that year was more representative of dry-year conditions.
2) Evidence of errors identified in the historical water use for a utility or public water system, including evidence that volumes of reuse (treated effluent) water or brackish groundwater used for municipal purposes should be included in the draft projections.
3) Evidence that the dry year water use was abnormal due to temporary infrastructure constraints.
4) Trends indicating that per capita water use for a utility or rural area of a county have changed substantially since 2011 and evidence that these trends will continue to rise in the short-term future.
5) Evidence that the water efficiency and conservation savings that have been implemented are not reflected in the baseline GPCD.
6) Evidence that the number of installations of water-efficient fixtures and appliances between 2010 and 2020 is substantially different than the TWDB estimate.
7) Evidence that future water efficiency savings are projected much higher than the draft projections.

2.0 Methodology

To review this data, we compared the draft baseline dry year GPCDs against the maximum historical GPCD from 2015 – 2019.

1. Any WUGs that had a recent year of at least 20 GPCD higher than the proposed draft baseline GPCD were identified.

2. If the max GPCD was over 100 GPCD higher than the draft baseline, the other years were also analyzed.
3. If the max GPCD was significantly higher than all other the other annual historical data, then it was marked as an outlier.
4. If that max GPCD was consistent with the other historical data, the WUG was marked as requiring further analysis to determine if a revision to the base GPCD was needed.

Based on our review, we believe that several of the Region C WUGs meet one or more of the required criteria for a GPCD adjustment and are recommended to be revised. ***Attachment A*** summarizes the requested GPCD revisions as well as the required TWDB criteria code(s) that they fulfill. The maximum GPCDs from 2015 – 2019 are highlighted in green. The revised GPCD utilizes the maximum historical GPCD with the 2010 -2020 plumbing code per year savings applied. If the historical maximum GPCD was in 2020, the plumbing code per year savings was not applied. For new WUGs that do not have 2010 - 2020 plumbing code savings, an annual savings of 0.9 gallons was used. Additionally, several WUGs responded to the survey requesting revisions to their GPCDs based on more recent use. These revisions are recommended as well and are included in the request for revisions included in ***Attachment A***.

Due to the nature of county-other, there is less historical data available for the 16 county-other WUGs included in Region C. It is recommended to keep the TWDB baseline GPCDs for these WUGs. ***Table 1*** summarizes the baseline GPCDs for the 16 county-other WUGs.

Table 1: Region C County Other GPCDs

WUG	Baseline GPCD	Plumbing Code Savings					
		2030	2040	2050	2060	2070	2080
County-Other, Collin	**141**	6.53	7.39	7.39	7.39	7.39	7.39
County-Other, Cooke	**119**	4.99	5.63	5.63	5.63	5.63	5.63
County-Other, Dallas	**1,822**[1]	3.40	4.29	4.29	4.29	4.29	4.29
County-Other, Denton	**112**	5.32	5.70	5.70	5.70	5.70	5.70
County-Other, Ellis	**110**	3.91	4.48	4.48	4.48	4.48	4.48
County-Other, Fannin	**100**	5.13	5.61	5.61	5.61	5.61	5.61
County-Other, Freestone	**93**	5.76	6.53	6.53	6.53	6.53	6.53
County-Other, Grayson	**114**	4.25	4.87	4.87	4.87	4.87	4.87
County-Other, Henderson	**83**	4.98	5.44	5.44	5.44	5.44	5.44
County-Other, Jack	**101**	4.67	5.26	5.26	5.26	5.26	5.26
County-Other, Kaufman	**99**	4.16	4.57	4.57	4.57	4.57	4.57
County-Other, Navarro	**102**	4.63	5.22	5.22	5.22	5.22	5.22
County-Other, Parker	**117**	4.26	4.77	4.77	4.77	4.77	4.77
County-Other, Rockwall	**144**	4.07	4.64	4.64	4.64	4.64	4.64
County-Other, Tarrant	**206**	4.85	5.38	5.38	5.38	5.38	5.38
County-Other, Wise	**108**	4.37	4.93	4.93	4.93	4.93	4.93

[1]Water use for Dallas County-Other includes DFW Airport and surrounding commercial areas that have no permanent population.

ATTACHMENT A

WUG Revision Recommendations for Demand Projections

Region C Requested GPCD Changes				2011	2015	2016	2017	2018	2019	2020		
Entity Name	Draft Baseline GPCD	2010-2020 PC Per Year Savings	Revised GPCD	GPCD Estimates (provided by TWDB)							TWDB Criteria Code (1-7)*	Additional Comments
ABLES SPRINGS SUD	60	0.3		90	70	70	69	69	69	74		
ADDISON	369	1.0		371	329	320	308	292	273	262		
ALEDO	139	1.0	**165**	118	170	153	140	136	122	155	1	Max historical GPCD minus PC per year savings
ALLEN	187	0.7		191	143	152	151	150	143	151		
ALVORD	126	0.5		102	70	55	53	50	47	62		
AMC CREEKSIDE	60	0.0		54	48	47	46	56	53	52		
ANNA	142	0.6		148	126	117	134	137	135	136		
ANNETTA	104	1.0	**129**	113	121	119	125	123	74	82	4	Updated based on WUG Survey Revision Request
ARGYLE WSC	178	1.3		200	163	177	168	197	184	193		
ARLEDGE RIDGE WSC	105	1.0	**155**	115	138	135	126	136	156	145	1	Max historical GPCD minus PC per year savings
ARLINGTON	155	0.9		167	142	141	133	135	128	124		
ATHENS	183	1.0		203	172	156	157	152	132	133		
AUBREY	107	1.0		109	96	94	83	90	90	88		
AVALON WATER SUPPLY & SEWER SERVICE	114	0.9		149	113	126	118	113	113	110		
AZLE	141	0.9		140	109	118	124	124	119	123		
B AND B WSC	124	1.0	**151**	151	104	105	118	93	152	137	1	Max historical GPCD minus PC per year savings
BALCH SPRINGS	94	0.9		89	87	100	101	98	90	84		
BEAR CREEK SUD	107	1.3		136	108	111	101	117	107	105		
BECKER JIBA WSC	83	1.0		88	69	63	61	62	65	64		
BEDFORD	171	0.9		186	148	149	153	148	143	137		
BELLS	96	0.9		62	91	85	91	108	101	95		
BENBROOK WATER AUTHORITY	207	0.9		222	164	151	153	157	158	152		
BLACK ROCK WSC	169	0.7	**219**	176	222	182	216	191	140	148	1	Max historical GPCD minus PC per year savings
BLACKLAND WSC	181	0.9		169	107	102	107	98	101	109		
BLOOMING GROVE	151	1.0		151	108	122	115	115	115	103		
BLUE MOUND	69	0.0		68	63	64	65	69	63	59		
BLUE RIDGE	154	0.9		87	93	83	78	79	84	77		
BOIS D ARC MUD	105	1.0		88	75	103	94	87	109	98		
BOLIVAR WSC	81	0.9	**127**	116	121	84	120	117	113	127	1	Max historical GPCD
BONHAM	144	1.0		146	126	129	123	124	124	145		
BOYD	150	0.9		176	143	115	164	157	127	120		
BRIDGEPORT	156	0.9		136	129	119	102	121	126	143		
BUENA VISTA-BETHEL SUD	249	0.7		175	169	165	159	166	157	156		
BUTLER WSC	138	1.0	**196**	246	143	173	199	163	162	156	1	Max historical GPCD minus PC per year savings
CALLISBURG WSC	82	0.9		102	77	76	75	74	74	96		
CARROLLTON	167	0.9		176	152	151	144	146	141	145		
CEDAR HILL	180	0.8		221	152	151	145	158	147	138		
CELINA	187	0.9	**211**	125	128	114	123	133	130	140	4	Updated based on WUG Survey Revision Request
CHATFIELD WSC	97	1.0		136	112	100	107	110	112	105		
CHICO	177	0.9		91	55	60	65	67	64	63		
COCKRELL HILL	79	1.0	**134**	90	103	119	137	102	94	89	1	Max historical GPCD minus PC per year savings
COLLEGE MOUND SUD	61	1.1	**92**	94	97	86	89	87	86	86	1	Max historical GPCD minus PC per year savings
COLLEYVILLE	348	0.8		343	262	251	264	260	257	282		
COLLINSVILLE	99	1.0		94	87	107	96	96	79	49		
COMBINE WSC	86	0.9		108	80	78	86	89	83	88		
COMMUNITY WSC	89	1.1	**136**	106	97	96	94	90	116	136	1	Max historical GPCD
COPEVILLE SUD	75	1.0	**112**	92	76	79	80	89	97	112	1	Max historical GPCD
COPPELL	237	0.8		258	233	224	213	226	209	200		
CORBET WSC	81	0.9		95	99	84	82	100	91	84		
CORINTH	154	0.7		166	134	133	138	142	127	130		
CORSICANA	205	1.0		212	175	164	200	215	165	169		
CRANDALL	163	1.1		164	150	127	121	114	118	122		
CRESCENT HEIGHTS WSC	79	0.9		88	61	69	66	70	68	66		
CROSS TIMBERS WSC	196	0.7		203	158	147	168	162	160	174		
CROWLEY	133	0.9		136	107	111	125	121	96	100		
CULLEOKA WSC	98	1.0		107	90	94	94	94	99	104		
DALLAS	202	0.9		205	212	191	182	168	176	149		
DALWORTHINGTON GARDENS	354	0.9		369	358	358	274	265	267	253		
DAWSON	150	1.0		151	113	118	137	121	124	123		
DECATUR	244	1.1		238	189	195	221	204	189	204		
DENISON	237	1.0		265	159	154	139	145	131	134		

Region C Requested GPCD Changes				2011	2015	2016	2017	2018	2019	2020	TWDB Criteria Code (1-7)*	Additional Comments
Entity Name	Draft Baseline GPCD	2010-2020 PC Per Year Savings	Revised GPCD	GPCD Estimates (provided by TWDB)								
DENTON	162	1.0		165	130	121	111	152	164	125		
DENTON COUNTY FWSD 10	169	0.6		12	129	181	147	179	162	144		
DENTON COUNTY FWSD 11-C	60	0.0		0	47	75	58	45	60	63		
DENTON COUNTY FWSD 1-A	234	0.7	**155**	213	207	211	216	230	235	236	4	Updated based on WUG Survey Revision Request
DENTON COUNTY FWSD 7	227	0.6		445	325	303	334	300	286	299		
DESERT WSC	113	0.8	**148**	121	126	114	116	137	149	139	1	Max historical GPCD minus PC per year savings
DESOTO	155	0.9		165	139	132	144	135	135	163		
DOGWOOD ESTATES WATER	137	0.9		130	131	107	96	101	105	102		
DORCHESTER	68	0.9	**159**	97	142	136	139	161	159	160	1	Max historical GPCD minus PC per year savings
DUNCANVILLE	128	1.0		138	133	94	96	102	96	99		
EAST CEDAR CREEK FWSD	61	0.5	**136**	123	119	120	110	120	115	135	4	Updated based on WUG Survey Revision Request
EAST FORK SUD	110	1.2		115	83	87	89	98	94	102		
EAST GARRETT WSC	148	0.9		193	131	98	95	91	159	129		
EDGECLIFF	155	0.9		162	106	117	124	108	93	111		
ELMO WSC	77	1.0		106	82	86	70	77	70	84		
ENNIS	169	1.0		186	138	115	136	96	90	110		
EULESS	149	0.9		159	93	96	95	98	99	102		
EUSTACE	97	0.9		64	66	64	50	61	49	44		
EVERMAN	78	0.9		94	81	94	79	75	73	74		
FAIRFIELD	187	1.0		180	152	132	134	143	152	151		
FAIRVIEW	320	0.8		336	233	231	232	247	235	225		
FARMERS BRANCH	265	0.9		268	272	259	236	257	250	229		
FARMERSVILLE	108	1.4		102	80	77	70	94	98	105		
FATE	158	0.6		153	100	99	106	107	94	108		
FERRIS	141	1.0	**177**	157	136	90	96	95	120	177	1	Max historical GPCD
FLOWER MOUND	226	0.8		235	167	192	186	182	183	192		
FOREST HILL	96	0.9		105	83	80	83	88	84	81		
FORNEY	130	0.8	**134**	127	124	106	99	116	107	114	4	Updated based on WUG Survey Revision Request
FORNEY LAKE WSC	146	0.7		159	108	103	112	110	85	128		
FORT WORTH	177	0.9		173	143	139	136	140	120	134		
FRISCO	217	0.6		223	1	159	155	160	154	163		
FROGNOT WSC	94	0.8		102	93	86	87	105	108	107		
GAINESVILLE	129	1.0		130	114	115	112	113	113	141		
GARLAND	145	0.9		153	0	115	111	114	119	125		
GASTONIA SCURRY SUD	61	1.0	**103**	75	91	88	102	104	104	96	1	Max historical GPCD minus PC per year savings
GLENN HEIGHTS	100	0.9		106	90	87	85	83	108	120		
GRAND PRAIRIE	145	0.9		141	120	123	124	122	120	120		
GRAPEVINE	315	0.9		343	280	267	245	251	226	231		
GUNTER	145	1.0		161	109	118	137	132	126	136		
HACKBERRY	217	0.7		0	0	196	207	207	174	181		
HALTOM CITY	108	0.9	**100**	120	96	90	87	90	83	85	4	Updated based on WUG Survey Revision Request
HASLET	292	0.8	**357**	277	275	258	286	295	357	357	1	Max historical GPCD minus PC per year savings
HEATH	292	0.9		224	173	171	171	193	242	250		
HIGH POINT WSC	82	1.2		71	55	77	78	79	71	76		
HIGHLAND PARK	402	1.0		411	336	336	321	317	307	300		
HIGHLAND VILLAGE	201	0.9		216	181	171	168	162	163	175		
HONEY GROVE	144	1.0		157	105	91	88	95	121	108		
HORSESHOE BEND WATER SYSTEM	86	0.9	**127**	135	131	113	83	95	94	98	1	Max historical GPCD minus PC per year savings
HOWE	86	1.0		88	54	69	69	56	92	82		
HUDSON OAKS	308	1.1		151	132	159	153	138	140	123		
HURST	153	1.0		155	134	128	133	129	127	126		
HUTCHINS	202	1.0		110	142	137	148	147	157	140		
IRVING	193	1.0		163	153	151	151	149	142	138		
ITALY	119	1.2		131	112	111	103	113	112	106		
JACKSBORO	127	0.9	**195**	152	134	143	163	197	190	192	1	Max historical GPCD minus PC per year savings
JOSEPHINE	192	1.2		119	71	80	68	77	92	127		
JUSTIN	134	0.9	**158**	130	162	85	118	120	128	154	1	Max historical GPCD minus PC per year savings
KAUFMAN	151	1.1		123	131	135	123	123	114	124		
KAUFMAN COUNTY DEVELOPMENT DISTRICT 1	214	1.0		1,064	882	907	1,023	945	1,045	1,292		
KAUFMAN COUNTY MUD 11	152	1.0		0	92	101	96	87	77	84		
KAUFMAN COUNTY MUD 14	148	0.9	**246**	0	0	0	0	148	136	0	4	Updated based on WUG Survey Revision Request

Region C Requested GPCD Changes				2011	2015	2016	2017	2018	2019	2020		
Entity Name	Draft Baseline GPCD	2010-2020 PC Per Year Savings	Revised GPCD	GPCD Estimates (provided by TWDB)							TWDB Criteria Code (1-7)*	Additional Comments
KELLER	229	0.8		242	179	177	185	178	174	191		
KEMP	160	1.3		174	149	163	151	170	159	150		
KENNEDALE	159	0.9		173	146	136	136	135	123	135		
KENTUCKYTOWN WSC	112	1.0		142	122	130	91	131	129	128		
KERENS	107	1.0		109	89	95	75	85	79	82		
KRUM	199	0.8		109	87	86	89	93	87	97		
LADONIA	140	1.5		154	336	317	340	372	112	169		
LAKE CITIES MUNICIPAL UTILITY AUTHORITY	126	0.7		133	101	101	104	107	100	107		
LAKE KIOWA SUD	363	1.2		465	294	262	291	302	271	284		
LAKE WORTH	197	1.0		206	169	163	153	154	149	154		
LAKESIDE	247	0.8		130	133	106	109	129	111	106		
LANCASTER	153	0.9		163	114	119	135	138	149	137		
LANCASTER MUD 1	75	0.9	**111**	0	70	114	81	75	90	95	1	Max historical GPCD minus PC per year savings
LEONARD	134	1.0	**127**	139	139	137	119	140	150	127	4	Updated based on WUG Survey Revision Request
LEWISVILLE	168	0.8	**155**	184	130	139	149	138	128	134	4	Updated based on WUG Survey Revision Request
LINDSAY	117	0.9		90	70	60	67	70	61	72		
LITTLE ELM	123	0.5		129	0	103	103	105	97	104		
LOG CABIN	121	0.0	**157**	99	99	100	108	121	157	133	1	Max historical GPCD minus PC per year savings
LUCAS	265	0.9	**255**	295	222	214	211	221	212	203	4	Updated based on WUG Survey Revision Request
LUELLA SUD	95	0.9		128	99	93	93	98	98	105		
M E N WSC	127	0.8		167	111	117	120	126	119	108		
MABANK	178	0.9		107	89	96	98	109	102	98		
MALAKOFF	102	0.9	**105**	134	108	114	109	117	113	119	4	Updated based on WUG Survey Revision Request
MANSFIELD	245	0.7		255	207	183	198	196	207	207		
MARKOUT WSC	156	1.0		165	97	97	112	129	118	124		
MCKINNEY	196	0.7		201	165	164	160	153	151	155		
MELISSA	197	0.7		169	118	174	185	178	142	109		
MESQUITE	134	0.9		128	0	103	97	94	103	105		
MIDLOTHIAN	208	0.6		168	171	147	155	152	163	163		
MILLIGAN WSC	108	0.8		142	95	100	79	106	113	98		
MOUNT ZION WSC	178	1.1		208	136	132	118	127	133	143		
MOUNTAIN PEAK SUD	281	1.0		144	123	131	142	150	145	148		
MOUNTAIN SPRINGS WSC	151	0.8		204	166	148	142	159	148	163		
MUENSTER	154	0.9		118	102	98	102	107	101	116		
MURPHY	206	0.6		208	170	177	177	200	198	187		
MUSTANG SUD	135	0.8		138	100	95	126	151	119	120		
NASH FORRESTON WSC	70	0.0	**102**	0	51	70	68	70	68	102	1	Max historical GPCD
NAVARRO MILLS WSC	96	0.9		111	81	54	87	83	76	98		
NEVADA SUD	90	0.8		84	96	91	94	95	89	85		
NEWARK	99	1.2		110	84	84	86	94	88	73		
NORTH COLLIN SUD	132	0.9		137	109	101	91	99	87	86		
NORTH FARMERSVILLE WSC	195	0.8		186	108	122	140	163	168	161		
NORTH KAUFMAN WSC	62	1.0		71	64	69	57	63	62	63		
NORTH RICHLAND HILLS	160	0.9		179	133	133	127	124	116	129		
NORTHLAKE	182	0.8		160	235	266	296	324	249	266		
NORTHWEST GRAYSON COUNTY WCID 1	92	0.9		111	76	88	90	103	92	100		
OAK RIDGE SOUTH GALE WSC	79	0.9		77	60	66	69	70	65	60		
OVILLA	214	1.0		200	166	153	132	138	140	129		
PALMER	101	1.1		107	91	87	86	90	81	80		
PALOMA CREEK NORTH	186	0.6		79	95	103	112	127	108	96		
PALOMA CREEK SOUTH	184	0.7		118	114	105	91	100	81	100		
PANTEGO	232	0.9		244	207	193	195	199	191	188		
PARKER	382	0.8		283	254	245	236	223	255	237		
PARKER COUNTY SUD	96	0.8		81	54	76	70	89	71	77		
PELICAN BAY	60	0.2		62	47	45	47	46	58	64		
PILOT POINT	123	1.2		147	118	109	111	125	116	117		
PINK HILL WSC	104	0.9		117	103	90	98	82	81	81		
PLANO	231	0.8		248	207	220	206	207	194	196		
PLEASANT GROVE WSC	90	1.0		99	90	80	86	96	98	86		
POINT ENTERPRISE WSC	98	1.0	**128**	123	110	104	106	130	128	127	1	Max historical GPCD minus PC per year savings
PONDER	111	0.8	**133**	129	112	104	118	135	132	102	1	Max historical GPCD minus PC per year savings

Region C Requested GPCD Changes				2011	2015	2016	2017	2018	2019	2020		
Entity Name	Draft Baseline GPCD	2010-2020 PC Per Year Savings	Revised GPCD	GPCD Estimates (provided by TWDB)							TWDB Criteria Code (1-7)*	Additional Comments
POTTSBORO	152	1.0		99	77	81	77	82	83	83		
PRINCETON	97	0.8		86	59	61	58	62	64	77		
PROSPER	230	0.7	**235**	213	0	208	207	212	203	218	4	Updated based on WUG Survey Revision Request
PROVIDENCE VILLAGE WCID	116	0.5		121	108	112	100	124	103	112		
R C H WSC	189	0.9		197	148	145	148	153	141	120		
RED OAK	134	0.7		115	114	123	115	126	114	126		
RENO (PARKER)	60	0.0		58	44	52	55	62	64	55		
RHOME	155	0.8		179	101	149	104	76	108	118		
RICE WATER SUPPLY AND SEWER SERVICE	108	0.9		116	101	105	102	108	111	97		
RICHARDSON	225	0.9		226	191	179	169	170	172	164		
RICHLAND HILLS	123	1.0		126	116	114	109	110	105	103		
RIVER OAKS	102	0.9		112	76	82	84	73	80	80		
ROANOKE	254	0.8		261	220	220	238	230	204	199		
ROCKETT SUD	103	1.0	**106**	126	108	93	105	110	114	114	4	Updated based on WUG Survey Revision Request
ROCKWALL	168	0.7		161	128	125	135	169	164	172		
ROSE HILL SUD	78	1.1		105	80	72	77	87	84	79		
ROWLETT	137	0.8		154	118	116	106	106	108	121		
ROYSE CITY	104	0.7	**138**	126	0	105	103	110	113	138	1	Max historical GPCD
RUNAWAY BAY	326	0.9		266	192	170	138	150	147	166		
SACHSE	163	0.8		177	129	117	105	106	106	111		
SAGINAW	123	0.8		132	110	103	100	100	104	111		
SANGER	125	0.9		130	90	92	97	99	89	90		
SANSOM PARK	99	0.9		107	93	102	93	85	85	94		
SARDIS LONE ELM WSC	241	1.1		253	184	177	168	194	179	181		
SAVOY	123	0.9		97	111	110	112	123	125	126		
SEAGOVILLE	99	0.9		71	101	99	97	87	90	85		
SEIS LAGOS UD	253	1.0		259	223	201	182	217	211	185		
SHERMAN	220	1.0		233	179	155	108	175	160	166		
SOUTH ELLIS COUNTY WSC	232	0.9	**336**	167	237	216	304	338	299	297	1	Max historical GPCD minus PC per year savings
SOUTH FREESTONE COUNTY WSC	90	1.0		100	85	81	84	94	92	97		
SOUTH GRAYSON SUD	110	0.7		123	75	80	74	107	130	129		
SOUTHERN OAKS WATER SUPPLY	131	0.9	**165**	175	169	145	135	131	127	124	1	Max historical GPCD minus PC per year savings
SOUTHLAKE	370	0.7		378	298	291	316	286	277	265		
SOUTHMAYD	101	0.9		144	94	70	70	64	98	97		
SOUTHWEST FANNIN COUNTY SUD	91	0.9		86	78	71	72	87	88	82		
SPRINGTOWN	199	1.1		141	110	105	99	99	125	114		
STARR WSC	93	0.9		117	87	81	78	84	83	85		
SUNNYVALE	301	0.8		306	246	212	199	226	242	228		
TALTY SUD	147	0.7		162	129	109	110	131	125	140		
TEAGUE	154	1.0		99	100	97	88	99	98	100		
TERRA SOUTHWEST	71	0.9		99	68	66	74	71	79	76		
TERRELL	153	1.1		152	124	121	140	131	125	124		
THE COLONY	137	1.0		136	123	122	123	130	124	133		
TIOGA	123	0.9		88	93	105	112	117	75	82		
TOM BEAN	169	1.0		148	106	101	101	93	83	100		
TRENTON	166	1.0		201	145	132	130	123	125	124		
TRINIDAD	92	1.0	**130**	93	130	134	109	99	90	131	1	Max historical GPCD minus PC per year savings
TROPHY CLUB MUD 1	341	0.7		310	196	192	204	233	191	187		
TWO WAY SUD	100	0.9	**121**	135	107	107	107	111	108	121	1	Max historical GPCD
UNIVERSITY PARK	266	1.0		278	221	209	212	221	207	206		
VAN ALSTYNE	124	1.0	**105**	130	176	79	98	101	100	97	4	Updated based on WUG Survey Revision Request
VERONA SUD	90	0.8	**122**	98	106	103	105	114	108	122	1	Max historical GPCD
VIRGINIA HILL WSC	87	1.0	**111**	119	116	94	90	102	102	98	1	Max historical GPCD minus PC per year savings
WALNUT CREEK SUD	68	0.8	**142**	107	114	113	108	122	131	142	1	Max historical GPCD
WATAUGA	104	0.9		111	94	86	78	79	99	92		
WAXAHACHIE	164	0.9		171	138	148	158	165	166	161		
WEATHERFORD	158	0.9	**166**	144	126	120	118	122	110	116	4	Updated based on WUG Survey Revision Request
WEST CEDAR CREEK MUD	60	0.3	**191**	179	193	185	188	182	184	187	1	Max historical GPCD minus PC per year savings
WEST LEONARD WSC	120	1.0		128	84	97	87	79	90	123		
WEST WISE SUD	111	1.0		118	89	90	89	91	85	78		
WESTLAKE	1,033	0.6		1,010	768	798	780	783	512	639		
WESTMINSTER SUD	121	0.8	**173**	129	128	143	154	164	174	144	1	Max historical GPCD minus PC per year savings

Region C Requested GPCD Changes				2011	2015	2016	2017	2018	2019	2020
Entity Name	Draft Baseline GPCD	2010-2020 PC Per Year Savings	Revised GPCD	GPCD Estimates (provided by TWDB)						
WESTOVER HILLS	1,218	0.9		1,316	729	754	824	836	753	845
WESTWORTH VILLAGE	131	1.0		128	119	121	111	114	115	145
WHITE SETTLEMENT	110	0.9		114	108	108	100	103	93	95
WHITE SHED WSC	98	1.0		112	90	84	82	96	92	87
WHITESBORO	110	0.9		116	102	92	94	98	95	90
WHITEWRIGHT	124	0.9	**165**	133	146	164	133	154	166	146
WILLOW PARK	140	0.9		127	109	108	104	112	113	117
WILMER	93	0.9	**128**	89	99	120	121	100	113	128
WOODBINE WSC	96	0.9		98	81	79	83	93	85	95
WORTHAM	128	1.0		124	99	100	93	82	77	88
WYLIE	135	0.6		127	118	127	118	119	116	119
WYLIE NORTHEAST SUD	122	0.8	**108**	132	106	116	120	109	106	130

TWDB Criteria Code (1-7)*	Additional Comments
1	Max historical GPCD minus PC per year savings
1	Max historical GPCD
4	Updated based on WUG Survey Revision Request

***TWDB Criteria for Adjustment**

1) Evidence that per capita water use from a more recent year (2015-2019) would be more appropriate because that year was more representative of dry-year conditions.
2) Evidence of errors identified in the historical water use for a utility or public water system, including evidence that volumes of reuse (treated effluent) water or brackish groundwater used for municipal purposes should be included in the draft projections.
3) Evidence that the dry year water use was abnormal due to temporary infrastructure constraints.
4) Trends indicating that per capita water use for a utility or rural area of a county have changed substantially since 2011 and evidence that these trends will continue to rise in the short-term future.
5) Evidence that the water efficiency and conservation savings that have been implemented are not reflected in the baseline GPCD.
6) Evidence that the number of installations of water-efficient fixtures and appliances between 2010 and 2020 is substantially different than the TWDB estimate.
7) Evidence that future water efficiency savings are projected much higher than the draft projections.

Attachment C-5

Memorandums on Non-Municipal Demand Projection: Irrigation, Manufacturing, Steam Electric Power, Livestock, and Mining

MEMORANDUM

Innovative approaches
Practical results
Outstanding service

801 Cherry Street, Suite 2800 + Fort Worth, Texas 76102 + 817-735-7300 + FAX 817-735-7491 www.freese.com

TO: Region C Regional Water Planning Group

CC: File

FROM: Freese and Nichols, Inc.

SUBJECT: Memorandum on Draft Irrigation Water Use Projections

DATE: 11/2/2022

PROJECT: TRA21862

1.0 BACKGROUND

The Texas Water Development Board (TWDB) provided the planning groups with draft irrigation demand projections in August of 2022. The draft projections will be reviewed by the individual planning groups and recommendations will be provided to the TWDB to be considered. The final projections will ultimately be adopted by the planning groups and the TWDB and incorporated into the 2027 State Water Plan (SWP). The purpose of this technical memorandum is to document information related to historical irrigation usage and provide information supporting recommended modifications to the draft irrigation demands.

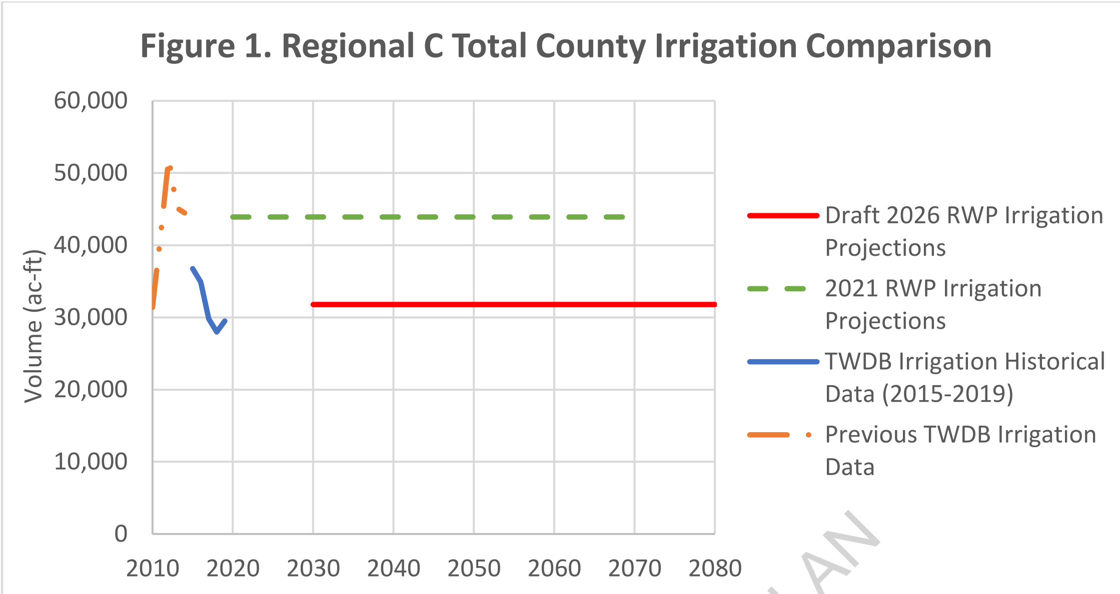
Irrigation water use is defined by the TWDB as irrigation of agricultural crops and golf courses. Historically, irrigation has accounted for approximately 27 percent of all non-municipal water use in Region C[1]. According to the *Region C Regional Water Plan*, the irrigation water use in Region C primarily represents the use of raw water for golf courses[2].

1.1 Historical Irrigation Water Use Estimates

As of August 2022, historical data estimates are available through the year 2019. The historical 2015-2019 use estimates are based on crops, acreage, climatic conditions, observations by local agricultural representatives, historical irrigation water right diversions, and data provided by irrigation and groundwater districts. Irrigation water use for golf courses that are not supplied by municipalities are also considered in the irrigation water estimates. If a golf course is supplied by municipal water, this use is incorporated into the municipality's gpcd and included as municipal water use. Since 2015, the region-wide irrigation water use estimates have ranged from 27,983 to 36,753 acre-feet per year (Figure 1).

[1] Based on historical water use estimates from the TWDB.

[2] https://www.twdb.texas.gov/waterplanning/rwp/plans/2021/index.asp#region-c



1.2 TWDB Draft Irrigation Water Demand Projections

TWDB's draft non-municipal irrigation demand projections for the 2027 State Water Plan utilize an average of the 2015-2019 irrigation water use estimates and are either:

- held constant between 2030 and 2080 or
- in counties where the total groundwater availability over the planning period is projected to be less than the groundwater-portion of the baseline water demand projections, the irrigation water demand projections are held constant for 10 years beyond the point that the groundwater availability falls below the baseline demand after projected demands will begin to decline, depending on and corresponding with the groundwater availability.

1.3 Criteria for Revising the Draft Irrigation Water Demand Projections

One or more of the following criteria must be verified by the Planning Group and the Executive Administrator for consideration of revising the irrigation water demand projections:

- Evidence that irrigation water use estimates for a county from another information source or more recent modeled available groundwater volumes are more accurate than those used in the draft projections.
- Evidence that recent (10 years or less) irrigation trends are more indicative of future trends than the draft groundwater resource-constrained water demand projections.
- Evidence that the baseline projection is more likely as a future demand than the draft groundwater resource-constrained water demand projections.
- Region or county-specific studies that have developed water demand projections or trends for the planning period, or part of the planning period, and are deemed more accurate than the draft projections.
- Evidence of errors identified in historical water use, including volumes of reuse (treated effluent) or brackish groundwater that were not included in the draft projections.

During the review process, the TWDB also imposed one other restriction on revisions of the draft irrigation water demand projections: Projections for all counties must have the same basis. For example, if the Planning Group recommends using the average of the 2010-2019 irrigation water use estimates to project future water demand, then it must recommend this basis for all counties.
The Planning Group must provide the following data associated with the identified criteria to the Executive Administrator for justifying any adjustments to the irrigation water demand projections: Historical water use, diversion, or pumpage volumes for irrigation by county.

Acreage and water use data for irrigated crops grown in a region as published by the Texas Agricultural Statistics Service, the Texas Agricultural Extension Service, the Farm Service Agency or other sources. Available economic, technical, and/or water supply-related evidence that may provide a basis for adjustments in the default baseline projection and/or the future rate of change in irrigation water demand.

Alternative projected water availability volumes that may constrain water demand projections.
Other data that the RWPG considers adequate to justify an adjustment to the irrigation water demand projections.

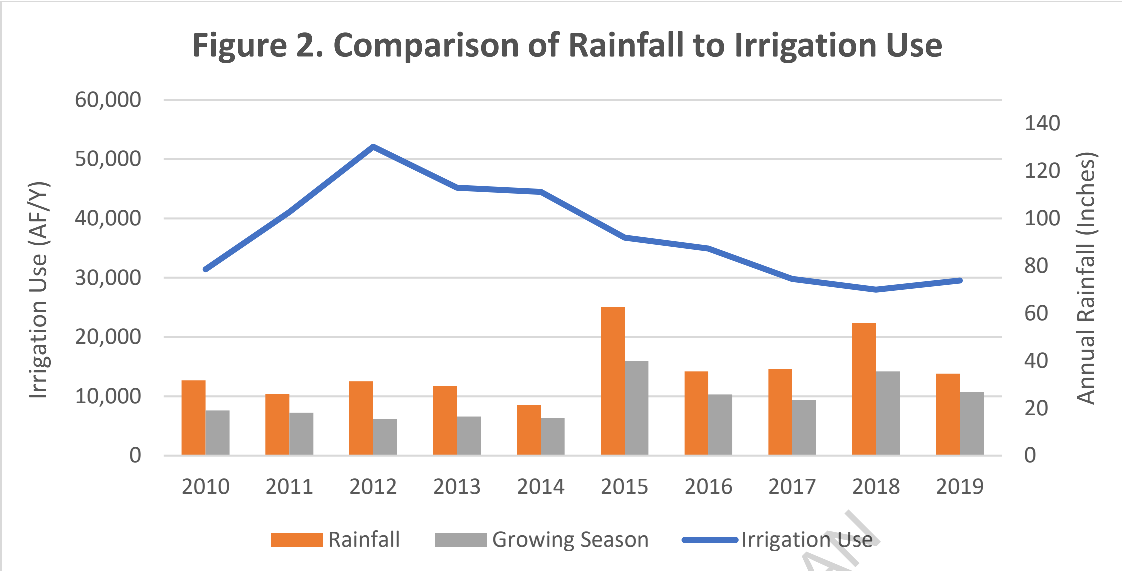
1.4 Data Used in the Evaluation of Draft Irrigation Demands

Data used to evaluate the draft irrigation demands were obtained from the following sources:

- NOAH historical rainfall at DFW airport (surrogate for regional precipitation)
- TWDB historical irrigation water use, 2010-2019
- 2021 Regional Water Plan Water Demand Projections by County for 2020-2070
- Projected total groundwater availability volumes based on the available MAG and non-MAG values as of July 2022.

2.0 RCWPG RECOMMENDED REVISIONS TO DRAFT WATER DEMAND PROJECTIONS

As noted above, the TWDB irrigation water use methodology utilizes estimates of crop acreages, crop types and climatic conditions. Irrigation use does vary considerably with climatic conditions. The TWDB uses the average of the historical water use over the period of 2015 through 2019. These years represent an above average rainfall period. Figure 2 shows the historical irrigation water use and the annual precipitation at DFW airport from 2010 through 2019. To confirm this pattern as it pertains to irrigation, the total precipitation during the growing season (defined as from April to October) is also shown as a gray line. Based on this graphic, it is clear there was higher irrigation water use from 2010 through 2014 then the latter five-year interval for the region as a whole.



A comparison of the draft projections for the 2026 RWP (provided by TWDB) with the final 2021 RWP projections shows a 27 percent decrease in projected irrigation use for the region. This is most likely due to using the average historical water use during a wet period as the basis for future demands. Since the regional water plans are to consider water use during drought of record conditions, this approach is not appropriate. Another concern is the use of the average water use rather than the highest water use. There can be justification for using the average water use, but this should be considered during a dry period. It is uncertain whether the future irrigation use will remain constant over the next 50 years. As the region continues to grow it is likely that current irrigated acreage will transition to other uses. However, the demand for additional golf courses will increase, but it is uncertain whether these golf courses will be self-supplied or provided water from municipalities. Due to this uncertainty, having the irrigation demand remain constant may be a conservative estimate.

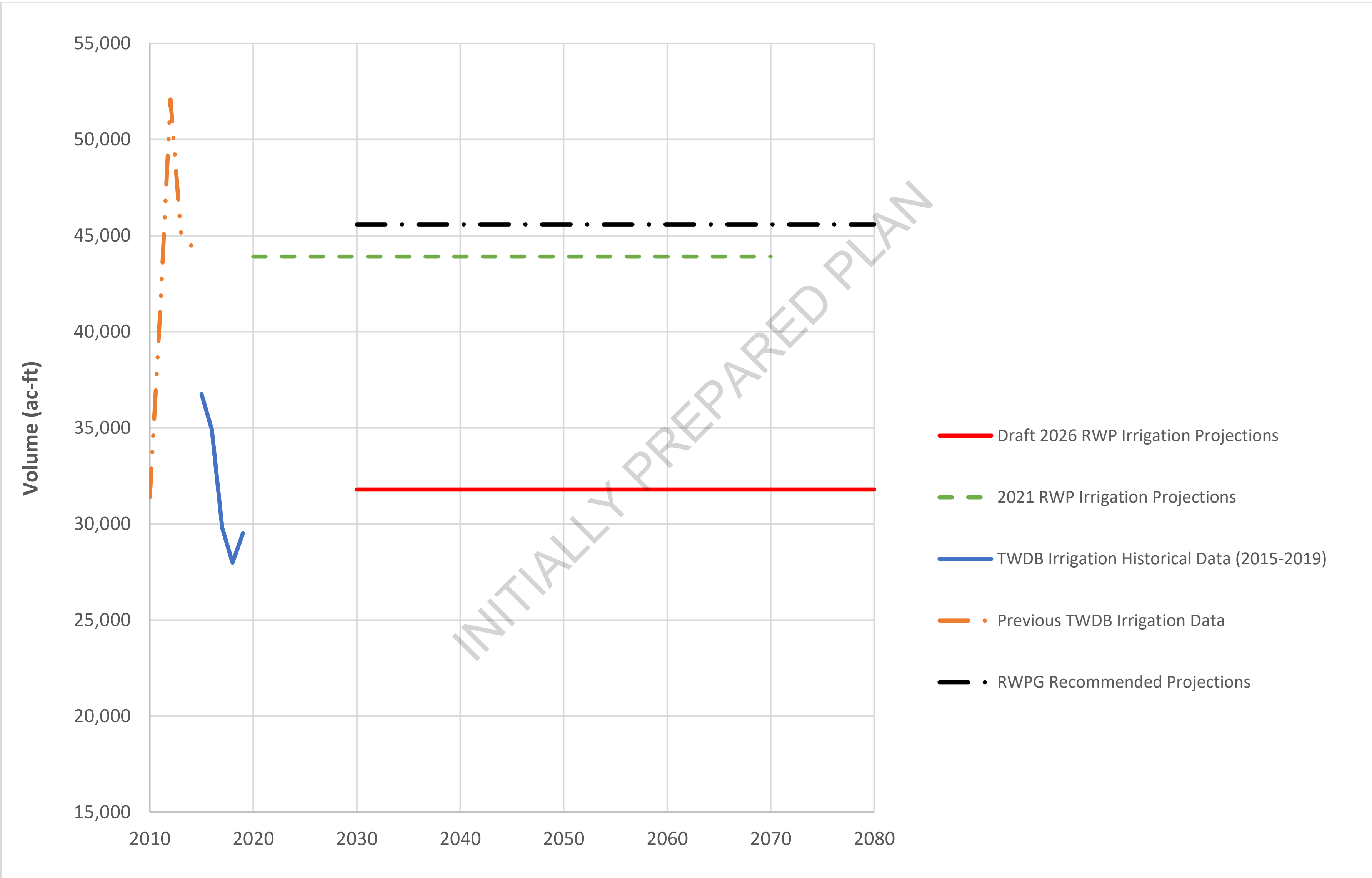
Considering the TWDB methodology for irrigation demands and the unique aspects for Region C, it is recommended that the 2026 projected irrigation demands be based on the maximum amount between the TWDB draft irrigation projections and the average historical water use during the dry period from 2010 through 2014. Taking the maximum amount accounts for any additional acreage that was added since the last plan. A comparison of the draft projections for the 2026 RWP (provided by TWDB), the final 2021 RWP projections, and the proposed RCWPG revisions to the 2026 SWP projections is presented in Table 1 and Figure 3.

Table 1. Comparison of Region C Irrigation Demand Projections

County Name	2021 RWP Projections (ac-ft/yr)						Draft Projections for 2026 RWP (ac-ft/yr)						Recommended RWPG Revisions (ac-ft/yr)					
	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080
Collin	3,340	3,340	3,340	3,340	3,340	3,340	2,445	2,445	2,445	2,445	2,445	2,445	2,811	2,811	2,811	2,811	2,811	2,811
Cooke	1,100	1,100	1,100	1,100	1,100	1,100	635	635	635	635	635	635	1,038	1,038	1,038	1,038	1,038	1,038
Dallas	10,122	10,122	10,122	10,122	10,122	10,122	7,428	7,428	7,428	7,428	7,428	7,428	10,468	10,468	10,468	10,468	10,468	10,468
Denton	3,003	3,003	3,003	3,003	3,003	3,003	2,593	2,593	2,593	2,593	2,593	2,593	2,973	2,973	2,973	2,973	2,973	2,973
Ellis	1,367	1,367	1,367	1,367	1,367	1,367	2,725	2,725	2,725	2,725	2,725	2,725	2,725	2,725	2,725	2,725	2,725	2,725
Fannin	11,553	11,553	11,553	11,553	11,553	11,553	5,598	5,598	5,598	5,598	5,598	5,598	11,186	11,186	11,186	11,186	11,186	11,186
Freestone	569	569	569	569	569	569	448	448	448	448	448	448	565	565	565	565	565	565
Grayson	4,477	4,477	4,477	4,477	4,477	4,477	1,998	1,998	1,998	1,998	1,998	1,998	4,450	4,450	4,450	4,450	4,450	4,450
Henderson	582	582	582	582	582	582	743	743	743	743	743	743	743	743	743	743	743	743
Jack	98	98	98	98	98	98	67	67	67	67	67	67	84	84	84	84	84	84
Kaufman	285	285	285	285	285	285	353	353	353	353	353	353	353	353	353	353	353	353
Navarro	75	75	75	75	75	75	447	447	447	447	447	447	447	447	447	447	447	447
Parker	773	773	773	773	773	773	1,136	1,136	1,136	1,136	1,136	1,136	1,136	1,136	1,136	1,136	1,136	1,136
Rockwall	234	234	234	234	234	234	36	36	36	36	36	36	201	201	201	201	201	201
Tarrant	4,926	4,926	4,926	4,926	4,926	4,926	3,735	3,735	3,735	3,735	3,735	3,735	4,964	4,964	4,964	4,964	4,964	4,964
Wise	1,406	1,406	1,406	1,406	1,406	1,406	1,402	1,402	1,402	1,402	1,402	1,402	1,440	1,440	1,440	1,440	1,440	1,440
Total	**43,910**	**43,910**	**43,910**	**43,910**	**43,910**	**43,910**	**31,789**	**31,789**	**31,789**	**31,789**	**31,789**	**31,789**	**45,583**	**45,583**	**45,583**	**45,583**	**45,583**	**45,583**

Grey text indicates that the was no change from the TWDB Draft projections.

Figure 3. Region C Irrigation – Comparison of Water Use Estimates, 2021 Region C Water Plan Projection, Proposed Projections, and Revised Projections



Attachment A
Irrigation Demand by County
Historical Usage and Projections

Figure 1A. Collin County Irrigation Comparison

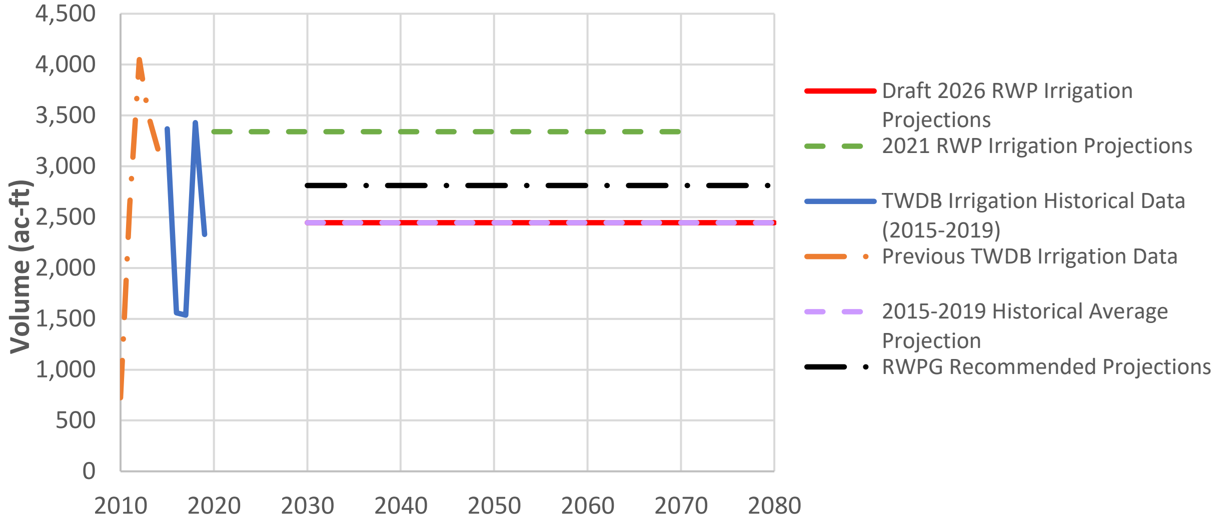


Figure 2A. Cooke County Irrigation Comparison

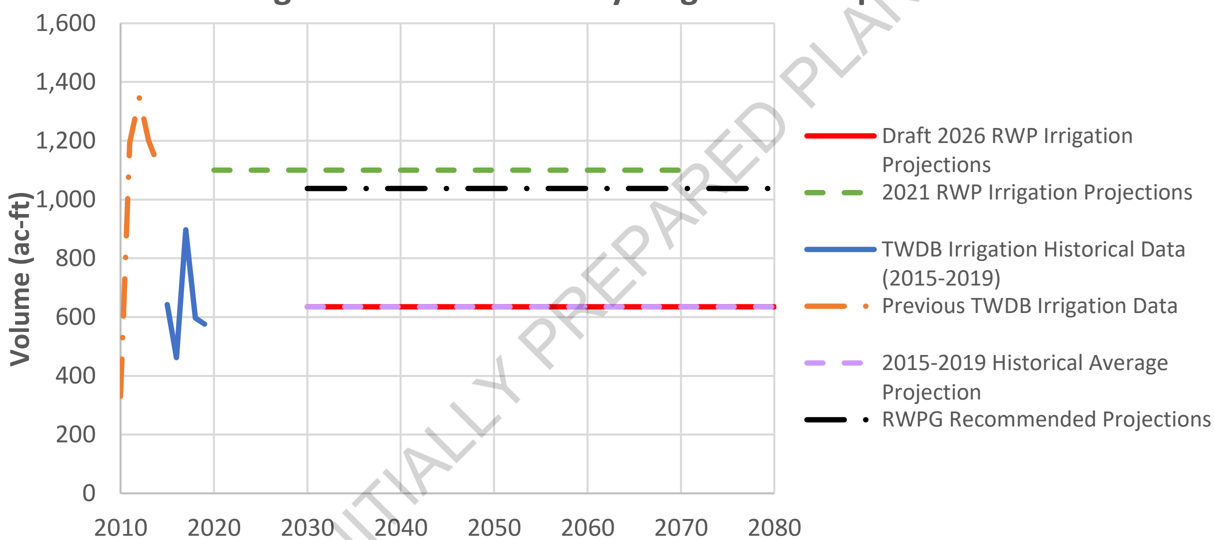
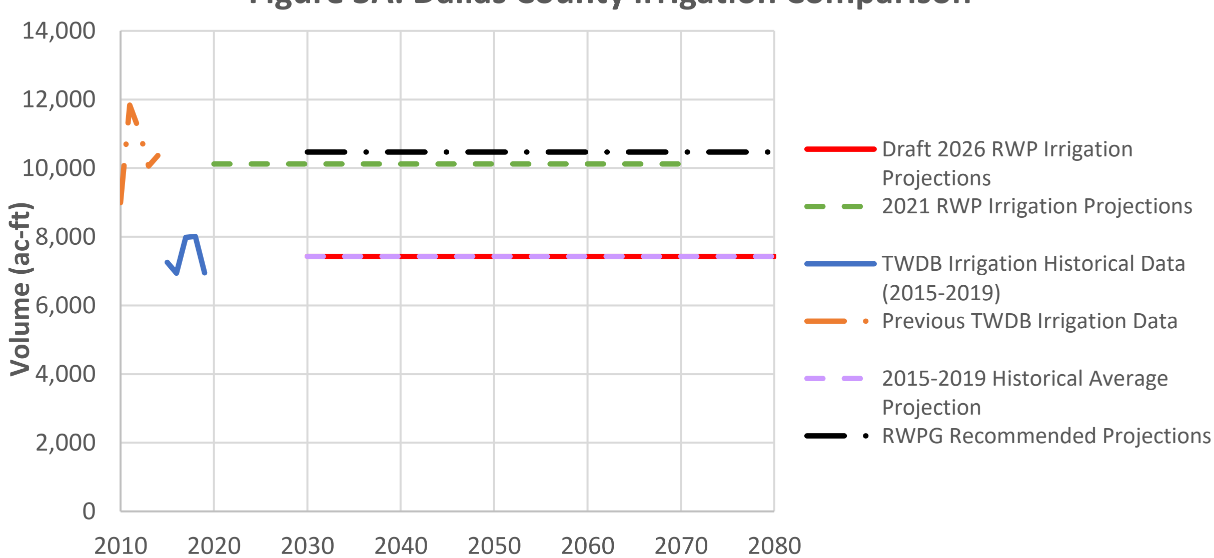


Figure 3A. Dallas County Irrigation Comparison



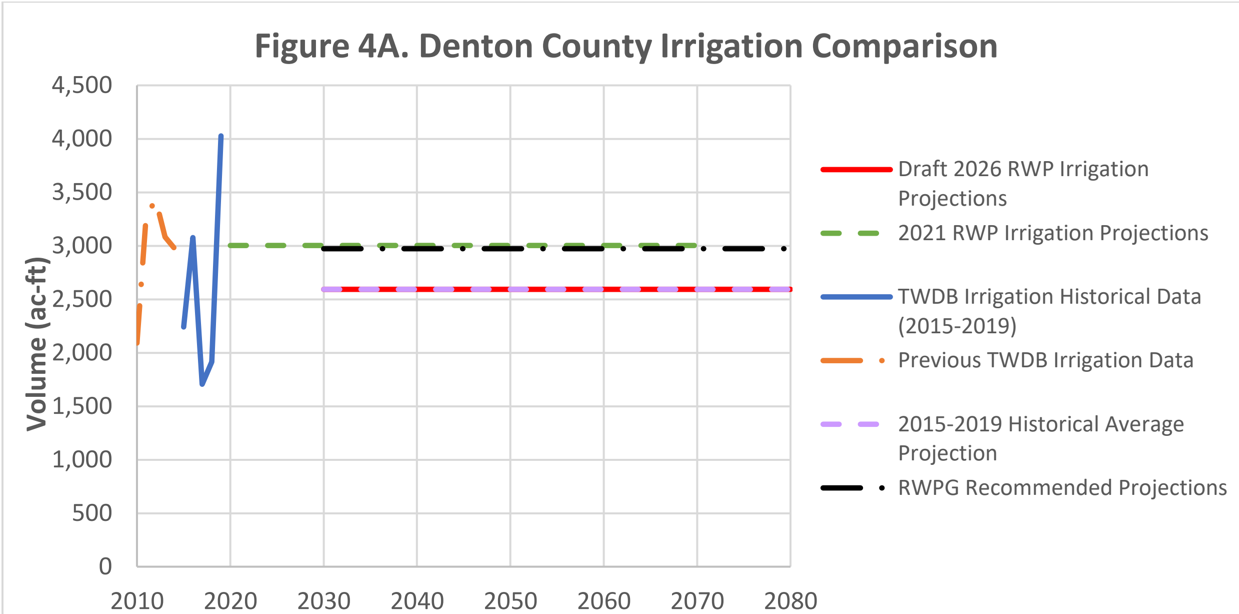


Figure 4A. Denton County Irrigation Comparison
Volume (ac-ft)
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
2010
2020
2030
2040
2050
2060
2070
2080
Draft 2026 RWP Irrigation Projections
2021 RWP Irrigation Projections
TWDB Irrigation Historical Data (2015-2019)
Previous TWDB Irrigation Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

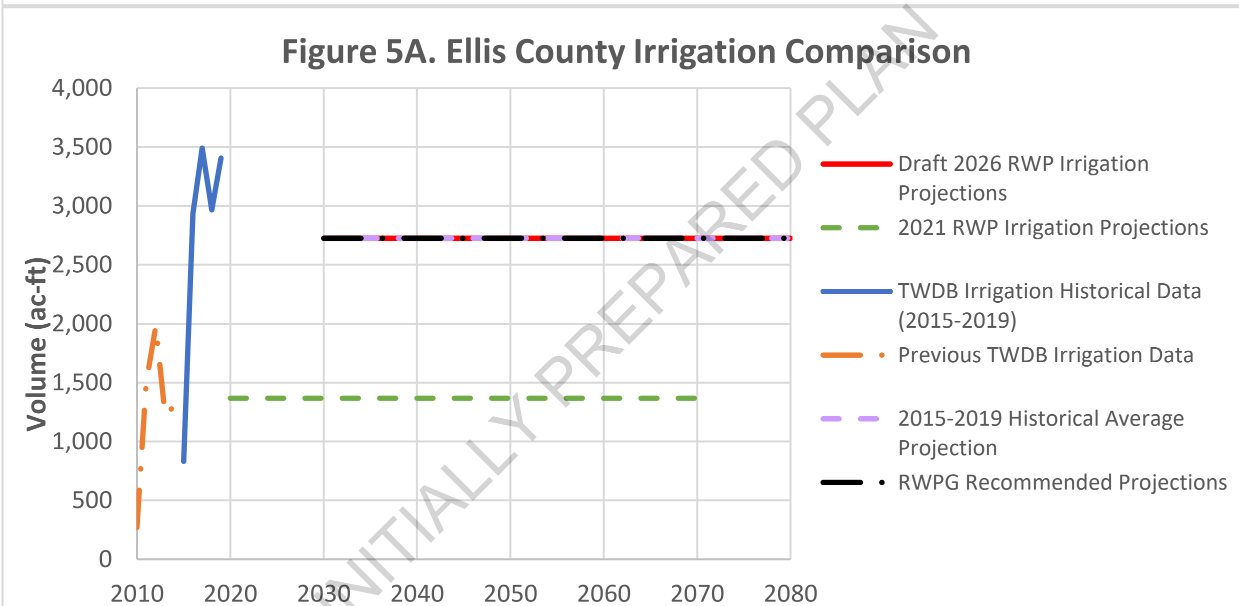


Figure 5A. Ellis County Irrigation Comparison
Volume (ac-ft)
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
2010
2020
2030
2040
2050
2060
2070
2080
Draft 2026 RWP Irrigation Projections
2021 RWP Irrigation Projections
TWDB Irrigation Historical Data (2015-2019)
Previous TWDB Irrigation Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

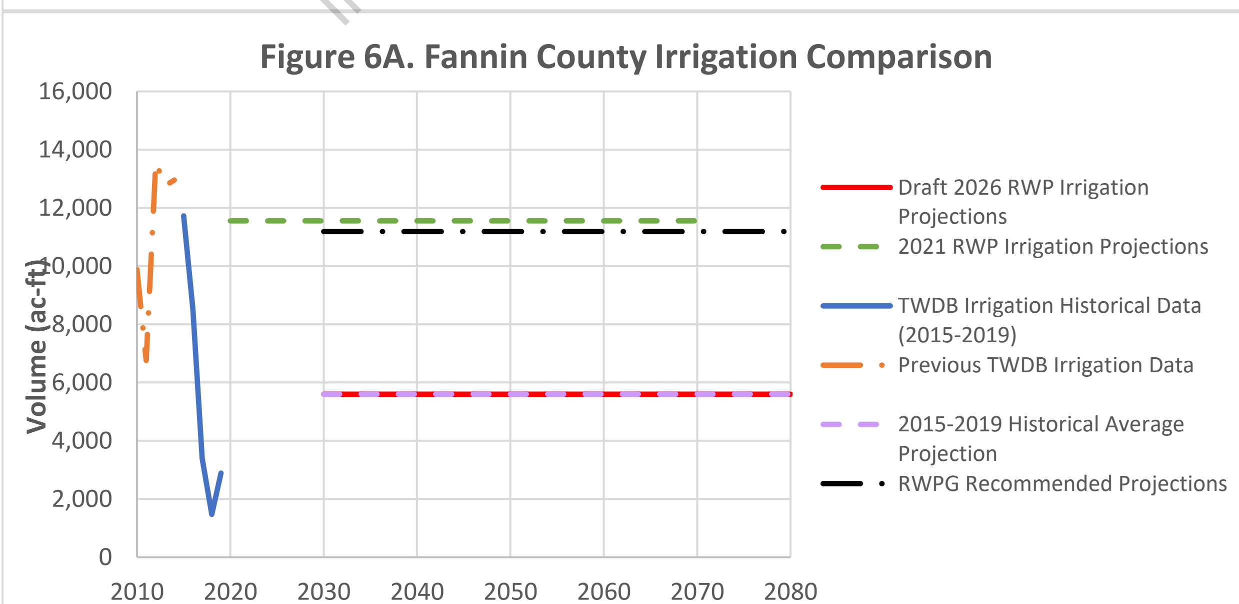


Figure 6A. Fannin County Irrigation Comparison
Volume (ac-ft)
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
2010
2020
2030
2040
2050
2060
2070
2080
Draft 2026 RWP Irrigation Projections
2021 RWP Irrigation Projections
TWDB Irrigation Historical Data (2015-2019)
Previous TWDB Irrigation Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

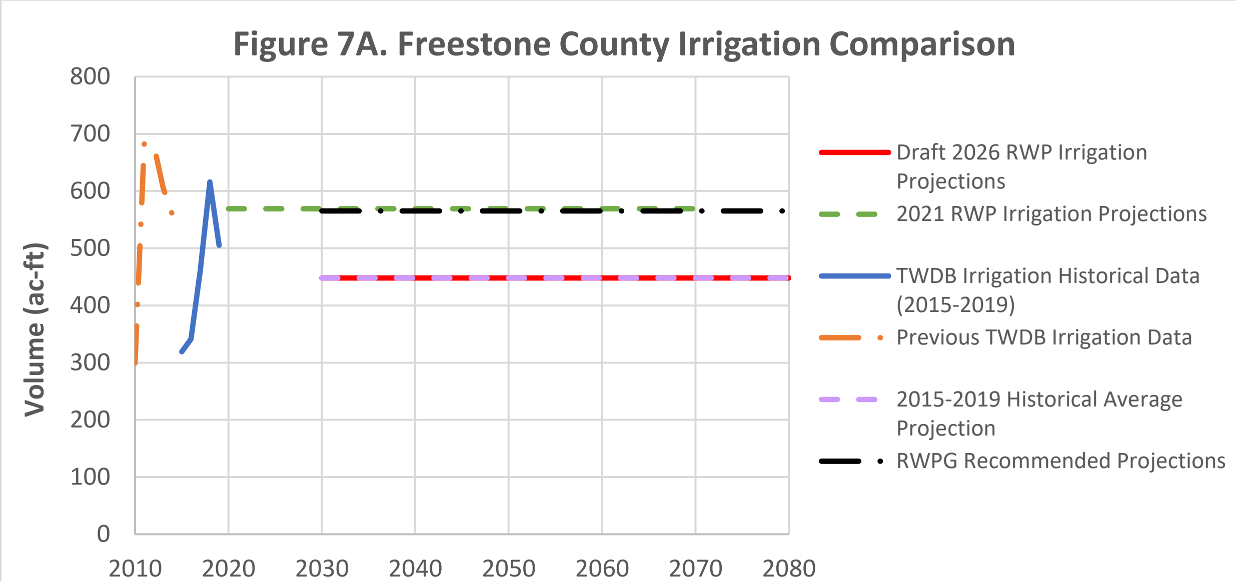


Figure 7A. Freestone County Irrigation Comparison
Volume (ac-ft)
800
700
600
500
400
300
200
100
0
2010
2020
2030
2040
2050
2060
2070
2080
Draft 2026 RWP Irrigation Projections
2021 RWP Irrigation Projections
TWDB Irrigation Historical Data (2015-2019)
Previous TWDB Irrigation Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

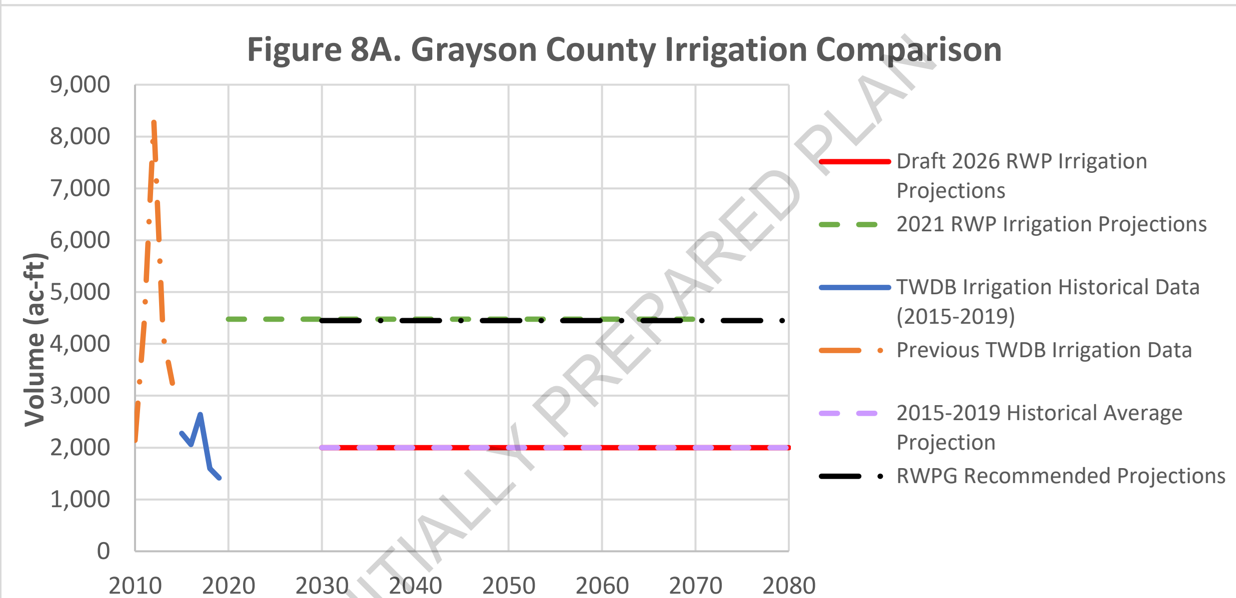


Figure 8A. Grayson County Irrigation Comparison
Volume (ac-ft)
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
2010
2020
2030
2040
2050
2060
2070
2080
Draft 2026 RWP Irrigation Projections
2021 RWP Irrigation Projections
TWDB Irrigation Historical Data (2015-2019)
Previous TWDB Irrigation Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

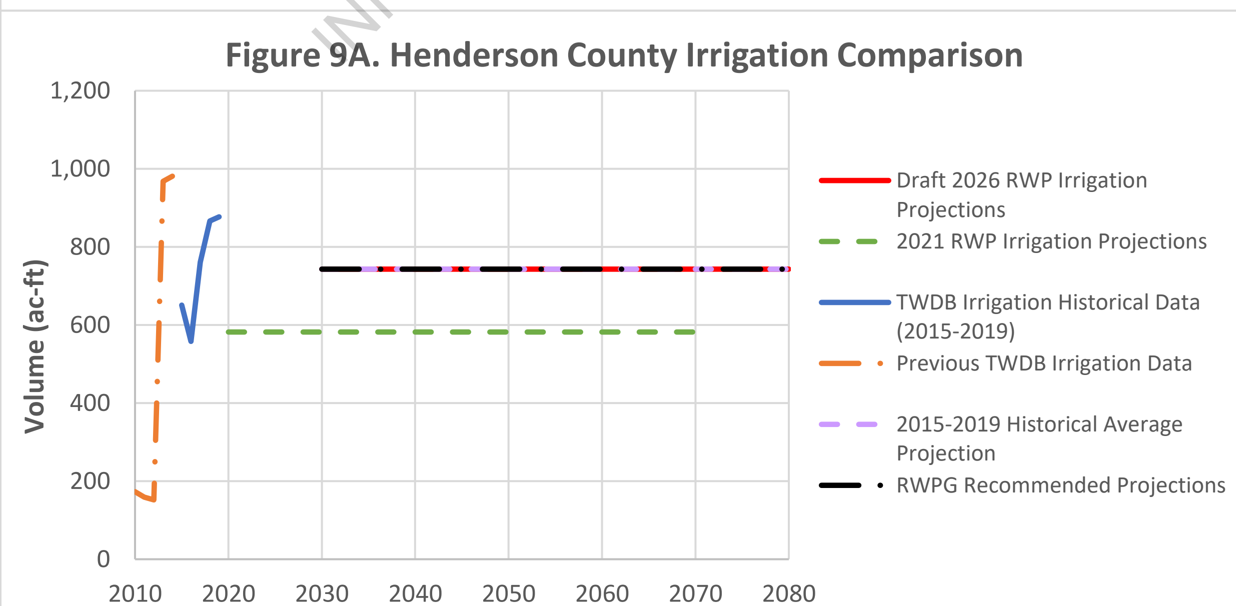


Figure 9A. Henderson County Irrigation Comparison
Volume (ac-ft)
1,200
1,000
800
600
400
200
0
2010
2020
2030
2040
2050
2060
2070
2080
Draft 2026 RWP Irrigation Projections
2021 RWP Irrigation Projections
TWDB Irrigation Historical Data (2015-2019)
Previous TWDB Irrigation Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

Figure 10A. Jack County Irrigation Comparison

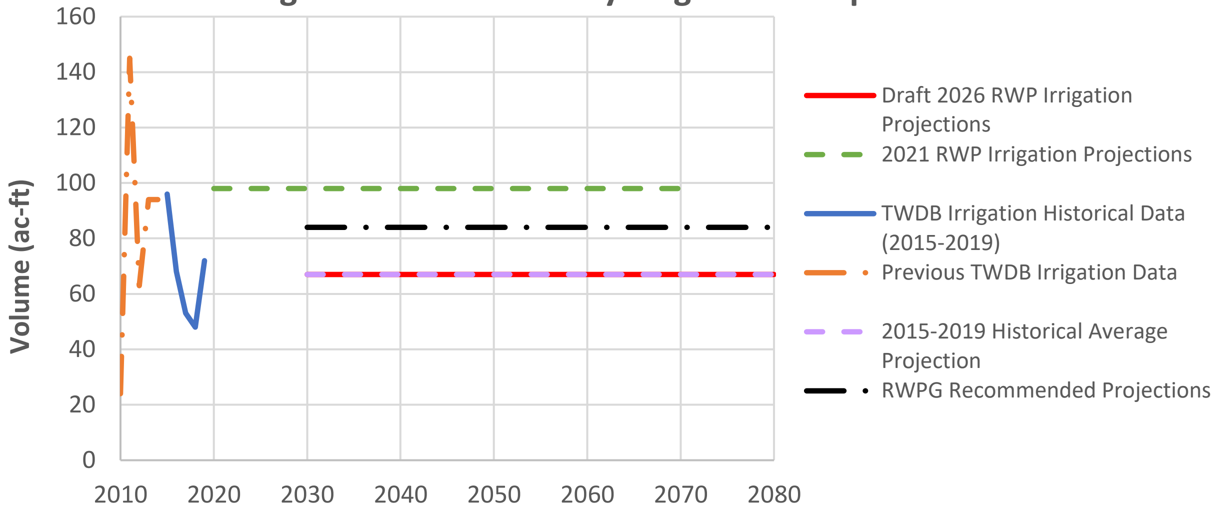


Figure 11A. Kaufman County Irrigation Comparison

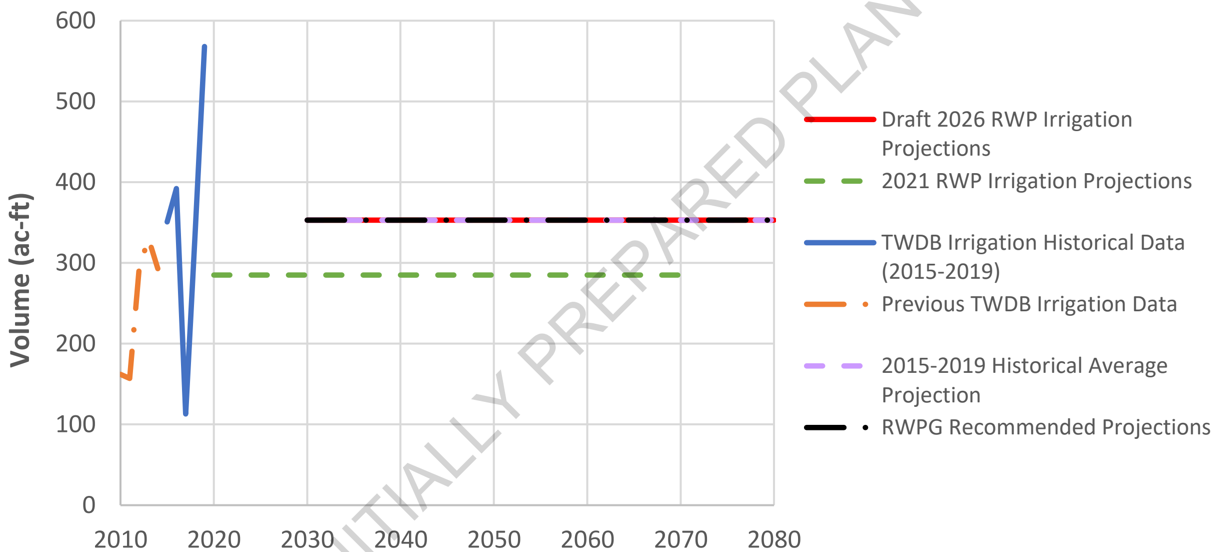
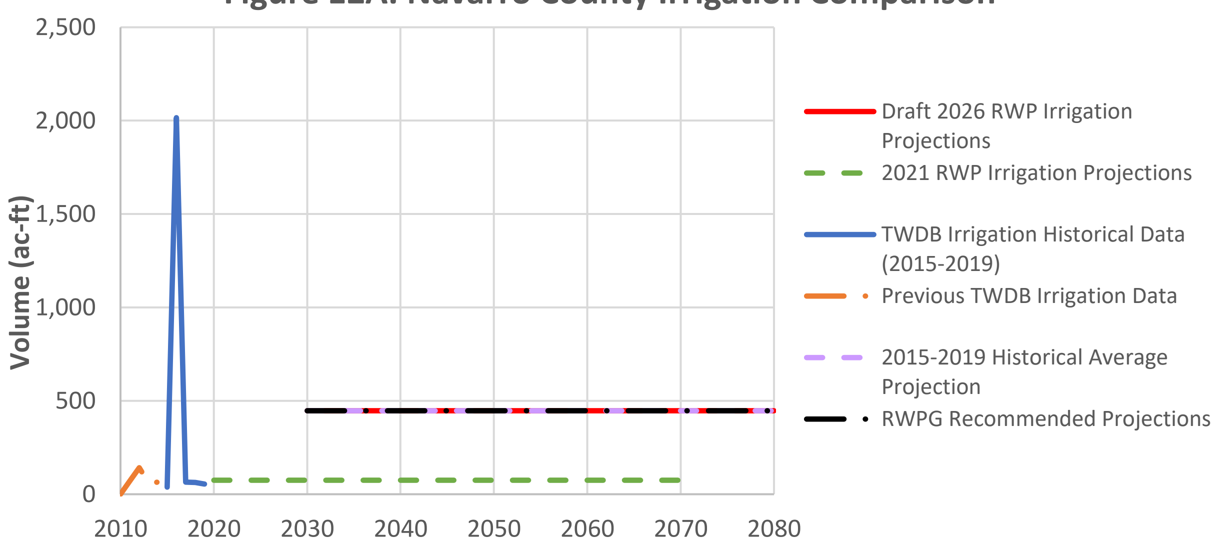


Figure 12A. Navarro County Irrigation Comparison



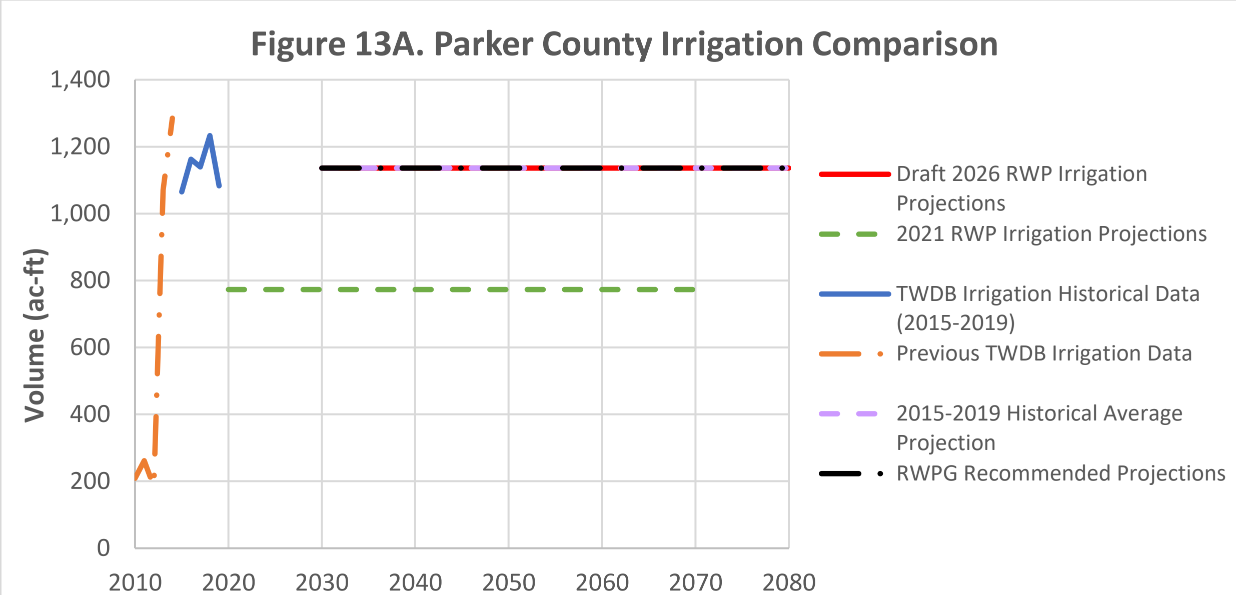


Figure 13A. Parker County Irrigation Comparison
Volume (ac-ft)
1,400
1,200
1,000
800
600
400
200
0
2010
2020
2030
2040
2050
2060
2070
2080
Draft 2026 RWP Irrigation Projections
2021 RWP Irrigation Projections
TWDB Irrigation Historical Data (2015-2019)
Previous TWDB Irrigation Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

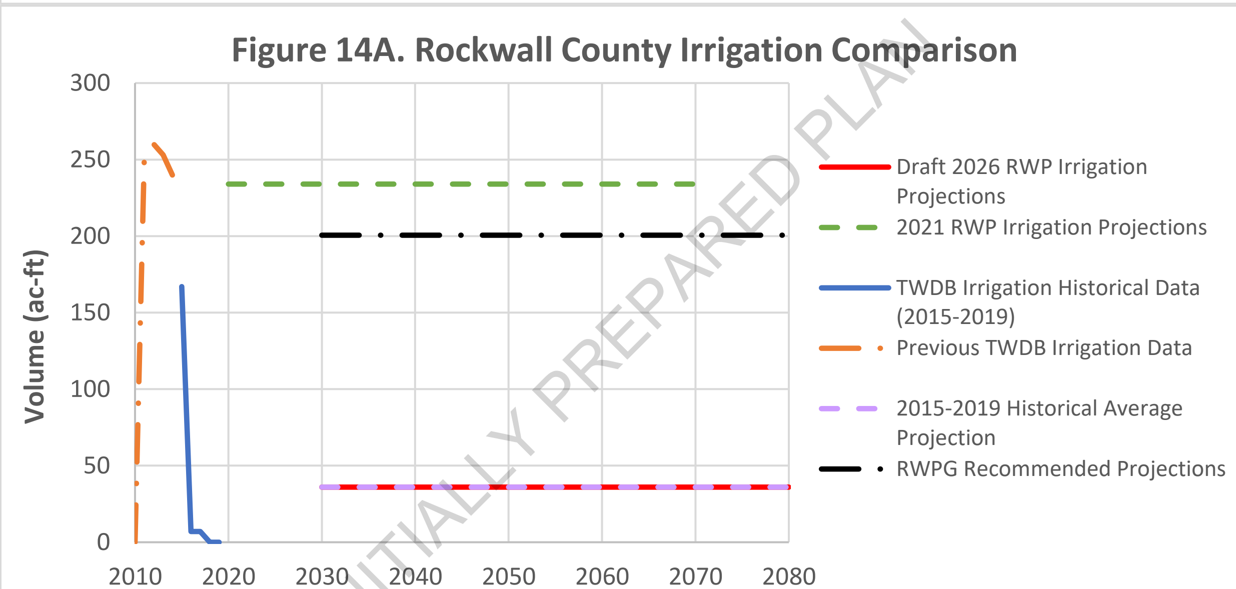


Figure 14A. Rockwall County Irrigation Comparison
Volume (ac-ft)
300
250
200
150
100
50
0
2010
2020
2030
2040
2050
2060
2070
2080
Draft 2026 RWP Irrigation Projections
2021 RWP Irrigation Projections
TWDB Irrigation Historical Data (2015-2019)
Previous TWDB Irrigation Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

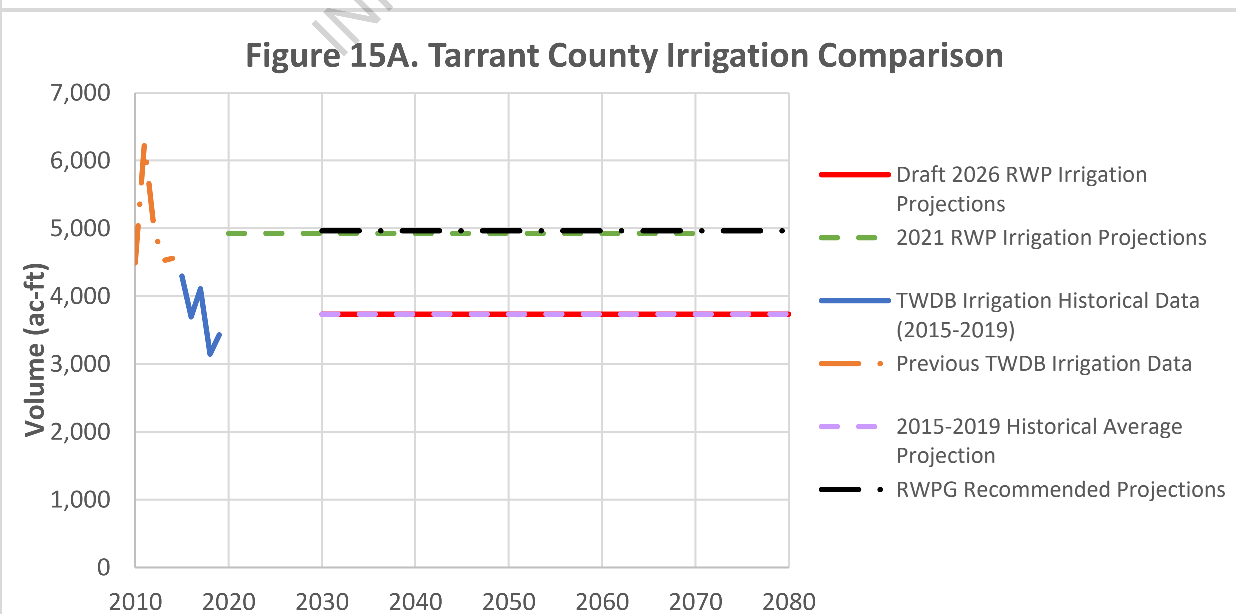


Figure 15A. Tarrant County Irrigation Comparison
Volume (ac-ft)
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
2010
2020
2030
2040
2050
2060
2070
2080
Draft 2026 RWP Irrigation Projections
2021 RWP Irrigation Projections
TWDB Irrigation Historical Data (2015-2019)
Previous TWDB Irrigation Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

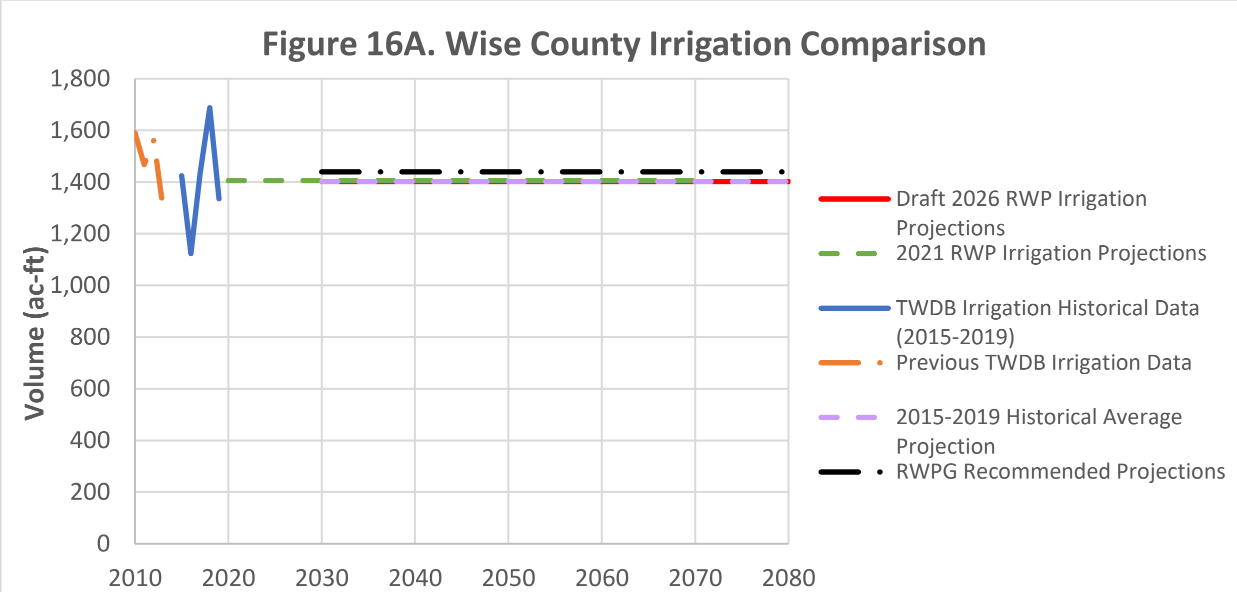


Figure 16A. Wise County Irrigation Comparison
Volume (ac-ft)
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
2010
2020
2030
2040
2050
2060
2070
2080
Draft 2026 RWP Irrigation Projections
2021 RWP Irrigation Projections
TWDB Irrigation Historical Data (2015-2019)
Previous TWDB Irrigation Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

801 Cherry Street, Suite 2800 + Fort Worth, Texas 76102 + 817-735-7300 + FAX 817-735-7491 www.freese.com

TO: Region C Regional Water Planning Group

CC: File

FROM: Freese and Nichols, Inc.

SUBJECT: Memorandum on Draft Manufacturing Water Use Projections

DATE: 7/5/2023

PROJECT: TRA21862

1.0 BACKGROUND

The Texas Water Development Board (TWDB) provided the planning groups with draft manufacturing demand projections in January of 2022. The draft projections will be reviewed by the individual planning groups and recommendations will be provided to the TWDB to be considered. The final projections will ultimately be adopted by the planning groups and the TWDB and incorporated into the 2027 State Water Plan (SWP). The purpose of this technical memorandum is to document information related to historical manufacturing usage and provide information supporting recommended modifications to the draft manufacturing demands.

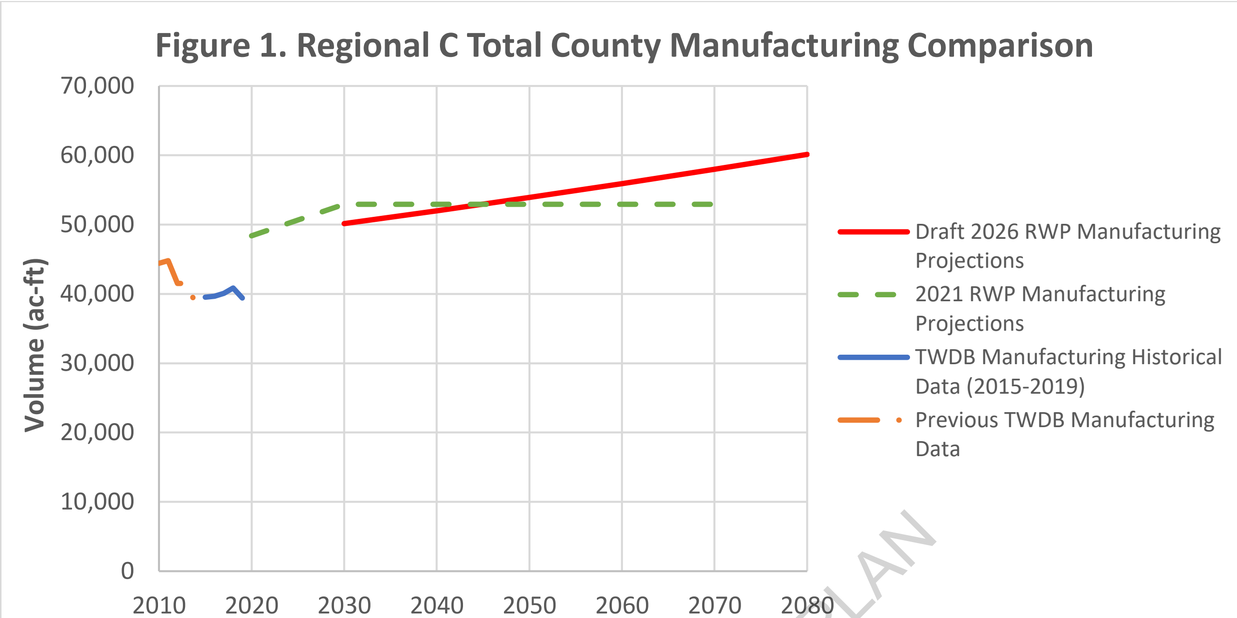
Manufacturing water use is defined by the TWDB as water used in the production process of manufactured products, including water used by employees for drinking and sanitation purposes. The manufacturing water use category does not include water use by all manufacturers, as described in the following section. Manufacturing demands in Region C include larger manufacturing facilities, food processing operations, defense industry operations, and others. Historically, manufacturing has accounted for approximately 30 percent of all non-municipal water use in Region C[1].

1.1 Historical Manufacturing Water Use Estimates

The TWDB's manufacturing water use estimates are obtained from manufacturing facilities that complete TWDB Water Use Surveys and from manufacturing use volumes reported by surveyed municipal water sellers. The TWDB historical manufacturing water use estimates focus on facilities that use large amounts of water and/or are self-supplied by groundwater or surface water. Facilities with smaller uses that are supplied by public utilities and cannot easily be tracked separately are included in municipal water demands.

As of January 2022, historical data estimates are available through the year 2019. Since 2015, the region-wide manufacturing water use estimates have ranged from 39,519 to 40,850 acre-feet per year (Figure 1). This represents approximately 3.6% of the total state manufacturing water use.

[1] Based on historical water use estimates from the TWDB.



1.2 TWDB Draft Manufacturing Water Demand Projections

TWDB's draft 2026 manufacturing demand projections are based on the maximum annual manufacturing water use that occurred in each county during 2015-2019 plus an estimate of the non-surveyed water use. Non-surveyed water use was determined using the U.S. Census Bureau's Business Patterns (CBP)[2] and an inventory of the industries from the Water Use Survey.

To obtain the 2030 demand projections, the 2020 demand projections were multiplied by the statewide annual historic water use rate of change from 2010-2019, which was determined to be 0.96%. This was to account for potential changes in production and water use that may occur between the baseline water use values and the first projected decade. For each planning decade after 2030, a statewide manufacturing growth proxy of 0.37% was applied annually to project increases in manufacturing water demands. This growth proxy was based on the CBP historical number of establishments in the manufacturing sector from 2010-2019. Both of these growth factors (0.96% and 0.37%) were applied equally by county across the state.

The draft projected manufacturing water demands for the 2026 Region C Plan by county and the decadal increases are shown in Table 1.

[2] U.S. Census Bureau, *CBP Datasets*. URL: https://www.census.gov/programs-surveys/cbp/data/datasets.html, accessed January 2022.

Table 1. TWDB Draft Manufacturing Water Demands

County Name	Draft Manufacturing Demands (ac-ft/yr)							Increase from Baseline (ac-ft/yr)				
	Baseline	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070
Collin	4,518	4,952	5,135	5,325	5,522	5,726	5,938	434	617	807	1,004	1,208
Cooke	127	139	144	149	155	161	167	12	17	22	28	34
Dallas	18,436	20,206	20,954	21,729	22,533	23,367	24,232	1,770	2,518	3,293	4,097	4,931
Denton	552	605	627	650	674	699	725	53	75	98	122	147
Ellis	5,164	5,660	5,869	6,086	6,311	6,545	6,787	496	705	922	1,147	1,381
Fannin	5	5	5	5	5	5	5	0	0	0	0	0
Freestone	50	55	57	59	61	63	65	5	7	9	11	13
Grayson	2,501	2,741	2,842	2,947	3,056	3,169	3,286	240	341	446	555	668
Henderson	1,158	1,269	1,316	1,365	1,416	1,468	1,522	111	158	207	258	310
Jack	0	0	0	0	0	0	0	0	0	0	0	0
Kaufman	1,074	1,177	1,221	1,266	1,313	1,362	1,412	103	147	192	239	288
Navarro	991	1,086	1,126	1,168	1,211	1,256	1,302	95	135	177	220	265
Parker	78	85	88	91	94	97	101	7	10	13	16	19
Rockwall	6	7	7	7	7	7	7	1	1	1	1	1
Tarrant	10,858	11,900	12,340	12,797	13,270	13,761	14,270	1,042	1,482	1,939	2,412	2,903
Wise	232	254	263	273	283	293	304	22	31	41	51	61
TOTAL	**45,750**	**50,141**	**51,994**	**53,917**	**55,911**	**57,979**	**60,123**	**4,391**	**6,244**	**8,167**	**10,161**	**12,229**

1.3 Criteria for Revising the Draft Manufacturing Water Demand Projections

One or more of the following criteria must be verified by the Planning Group and the Executive Administrator for consideration of revising the manufacturing water demand projections:

- A new or existing facility that has not been included in the TWDB water use survey.
- An industrial facility has recently closed its operation in a county.
- Plans for new construction or expansion of an existing industrial facility in a county at some future date.
- Evidence of a long-term projected water demand of a facility or industry within a county that is substantially different than the draft projections.
- Evidence of errors identified in historical water use, including volumes of reuse (treated effluent) or brackish groundwater that were not included in the draft projections.

The Planning Group must provide the following data associated with the identified criteria to the Executive Administrator for justifying any adjustments to the manufacturing water demand projections:

- Historical water use data and the 6-digit North American Industrial Classification System (NAICS) code of a manufacturing facility. The NAICS code classifies establishments by type of activity in which they are engaged as defined by the U.S. Office of Management and Budget and is a successor of the Standard Industrial Classification (SIC).
- Documentation and analysis that justify that the new manufacturing facility not included in the Water Use Survey database will increase the future manufacturing water demand for the county above the draft projections.
- The 6-digit NAICS code of the industrial facility that has recently located in a county and annual water use volume.

- Documentation of plans for a manufacturing facility to locate in a county at some future date will include the following data:
  - The quantity of water required by the planned facility on an annual basis.
  - The proposed construction schedule for the facility including the date the facility will become operational.
  - The 6-digit NAICS code for the planned facility.
- Other data that the RWPG considers adequate to justify an adjustment to the manufacturing water demand projections.

2.0 RCWPG RECOMMENDED REVISIONS TO DRAFT MANUFACTURING WATER DEMAND PROJECTIONS

Manufacturing water use is a small fraction of Region C's total water use, but it is an important component especially in the more rural counties. The North Texas area is a prime area to attract new businesses, including manufacturing in the electronic and high-tech sectors. There have been at least 12 new manufacturing facilities announced within the last one to two years within the region. Many are in the computer and electronics field. A facility currently under design is the Texas Instruments Semiconductor facility in Sherman (Grayson County). This is just one of several water manufacturing facilities locating to Grayson County. Another facility, Global Wafer, is expected to be online by 2026. Its production is planned to double by 2031 with the potential to double again during the planning period. This increase in water use is not reflected in the draft projections provided by the TWDB.

A list of new facilities in Region C announced by the Office of the Texas Governor[3] and those included in local publications is included in Table 2. This list does not necessarily represent all the expected new facilities in Region C in the next few years.

Table 2. List of Newly Announced Manufacturing Facilities in Region C

Facility	County	Process Type	NAICS	Expected Water Use[1] (ac-ft/yr)
TI Semiconductor Plant (new)	Grayson	Electronics	334	8,968
TI Semiconductor Plant (expansion)	Collin	Electronics	334	3,000
Global Wafer	Grayson	Electronics	334	6,722
Finisar	Grayson	Electronics	334	560
GAF Roofing Materials	Navarro	Recycling	327	500
Delta Electronics	Collin	Electronics	334	200
Mouser Electronics	Tarrant	Electronics	334	200
Chewters Chocolates	Rockwall	Food	311	400
Clevon (automotives)	Tarrant	Automotives	336	200
Niagara Bottling Plant	Dallas	Beverage	312	1,128
Raytheon	Collin	Electronics	334	150
Pratt Industries	Dallas	Packaging	322	50

1. Expected water use is based on data provided by the water provider or estimated based on similar facilities.

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[3] Recent Project Announcements | Texas Economic Development | Office of the Texas Governor | Greg Abbott

The assumption of a state-wide average growth applied uniformly across the state does not accurately capture the manufacturing growth in North Texas. It also does not accurately capture the projected water use. This is demonstrated through the projected manufacturing water use in Grayson County. Water use by facility can vary significantly and projecting which industries may locate in specific counties is difficult at best. Without more specific data, an estimated growth approach seems reasonable. However, this growth should reflect current trends within the region.

To better capture current and future manufacturing growth Region C requests to increase the water demands for counties with known new facilities expected to be operating within the next two to five years. This includes known projected expansions of these facilities. The state-wide growth rate (0.96%) for 2030 would be applied to the new baseline. For subsequent decades, the state-wide manufacturing growth proxy (0.37%) would be applied. For Grayson County, the growth factors are applied to the TWDB baseline, and the demands are adjusted to incorporate the projected demand for the new facilities in Sherman, Texas, because the state-wide growth rates do not accurately reflect the planned expansions for these facilities.

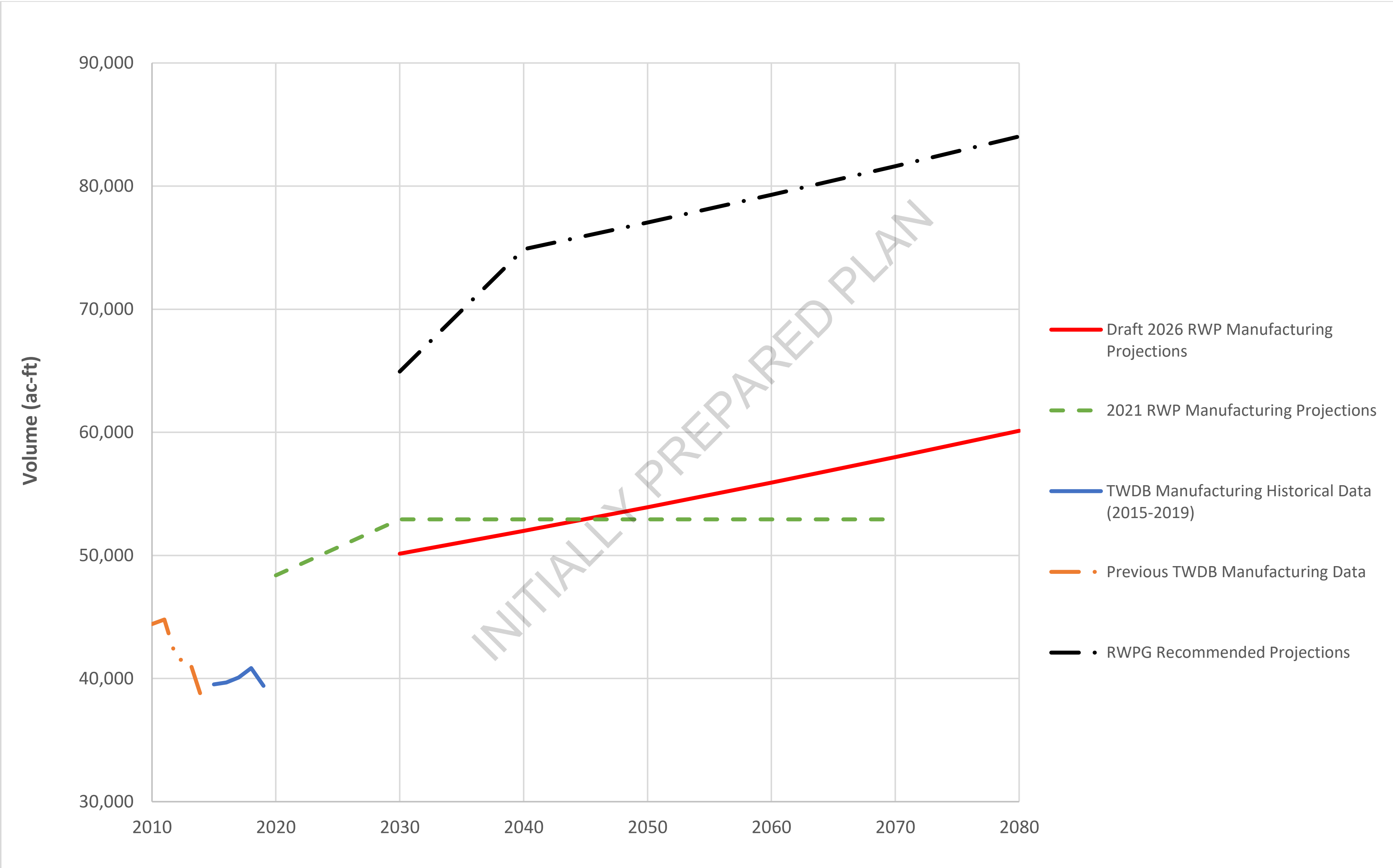
A comparison of the draft projections for the 2026 RWP (provided by TWDB), the final 2021 RWP projections, and the proposed RCWPG revisions to the 2026 RWP projections is presented in Table 3 and Figure 2.

Table 3. Comparison of Region C Manufacturing Demand Projections

County Name	2021 RWP Projections (ac-ft/yr)						Draft Projections for 2026 RWP (ac-ft/yr)						Recommended RWPG Revisions (ac-ft/yr)					
	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080
Collin	2,246	2,602	2,602	2,602	2,602	2,602	4,952	5,135	5,325	5,522	5,726	5,938	8,623	8,942	9,273	9,616	9,972	10,341
Cooke	116	128	128	128	128	128	139	144	149	155	161	167	139	144	149	155	161	167
Dallas	21,834	23,073	23,073	23,073	23,073	23,073	20,206	20,954	21,729	22,533	23,367	24,232	21,497	22,292	23,117	23,972	24,859	25,779
Denton	374	440	440	440	440	440	605	627	650	674	699	725	605	627	650	674	699	725
Ellis	5,414	6,549	6,549	6,549	6,549	6,549	5,660	5,869	6,086	6,311	6,545	6,787	5,660	5,869	6,086	6,311	6,545	6,787
Fannin	12	12	12	12	12	12	5	5	5	5	5	5	5	5	5	5	5	5
Freestone	19	19	19	19	19	19	55	57	59	61	63	65	55	57	59	61	63	65
Grayson	2,951	3,009	3,009	3,009	3,009	3,009	2,741	2,842	2,947	3,056	3,169	3,286	11,148	19,092	19,197	19,306	19,419	19,536
Henderson	806	985	985	985	985	985	1,269	1,316	1,365	1,416	1,468	1,522	1,269	1,316	1,365	1,416	1,468	1,522
Jack	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Kaufman	946	1,109	1,109	1,109	1,109	1,109	1,177	1,221	1,266	1,313	1,362	1,412	1,177	1,221	1,266	1,313	1,362	1,412
Navarro	894	1,062	1,062	1,062	1,062	1,062	1,086	1,126	1,168	1,211	1,256	1,302	1,634	1,694	1,757	1,822	1,889	1,959
Parker	87	103	103	103	103	103	85	88	91	94	97	101	85	88	91	94	97	101
Rockwall	31	36	36	36	36	36	7	7	7	7	7	7	445	461	478	496	514	533
Tarrant	12,197	13,301	13,301	13,301	13,301	13,301	11,900	12,340	12,797	13,270	13,761	14,270	12,339	12,796	13,269	13,760	14,269	14,797
Wise	454	501	501	501	501	501	254	263	273	283	293	304	254	263	273	283	293	304
Total	**48,382**	**52,930**	**52,930**	**52,930**	**52,930**	**52,930**	**50,141**	**51,994**	**53,917**	**55,911**	**57,979**	**60,123**	**64,935**	**74,867**	**77,035**	**79,284**	**81,615**	**84,033**

Grey text indicates that the was no change from the TWDB Draft projections.

Figure 2. Region C Manufacturing – Comparison of Water Use Estimates, 2021 Region C Water Plan Projection, Proposed Projections, and Revised Projections



Attachment A
Manufacturing Demand by County Historical Usage and Projections

Figure 1A. Collin County Manufacturing Comparison

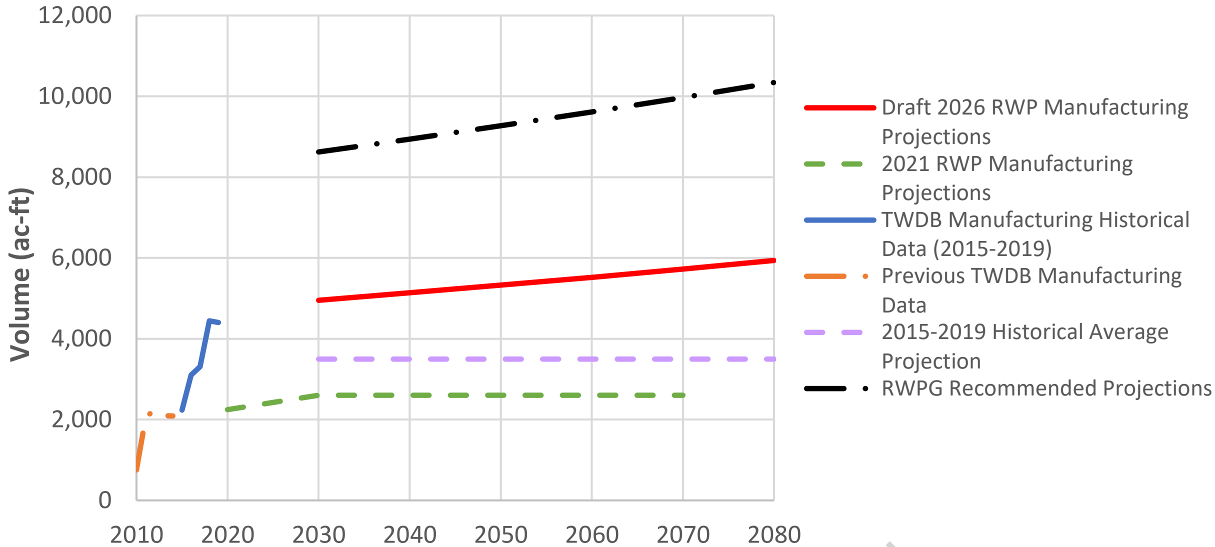


Figure 2A. Cooke County Manufacturing Comparison

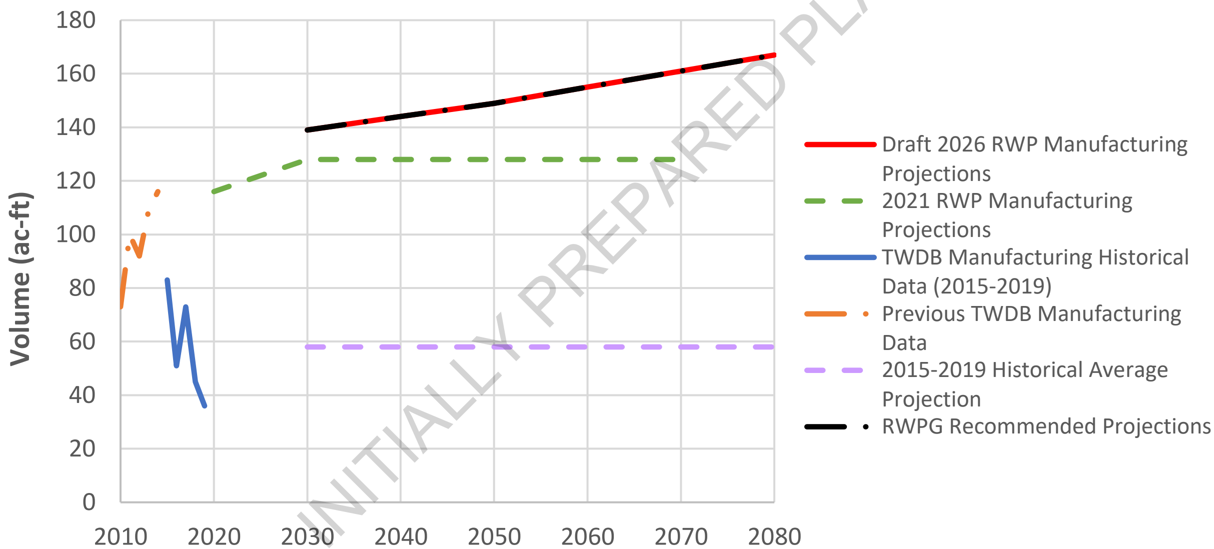


Figure 3A. Dallas County Manufacturing Comparison

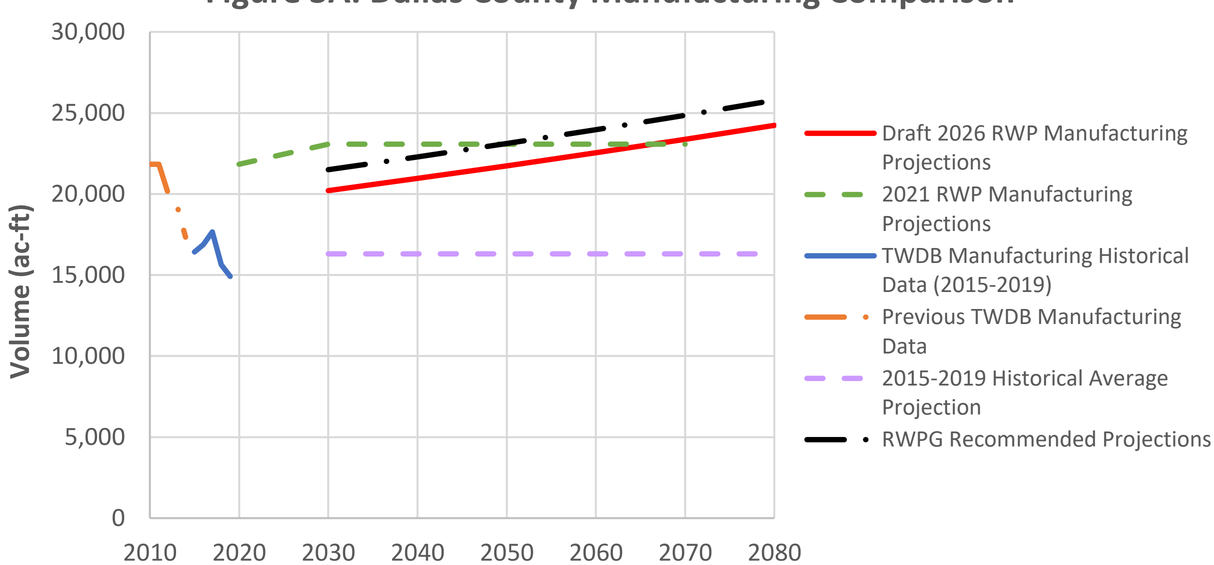


Figure 4A. Denton County Manufacturing Comparison

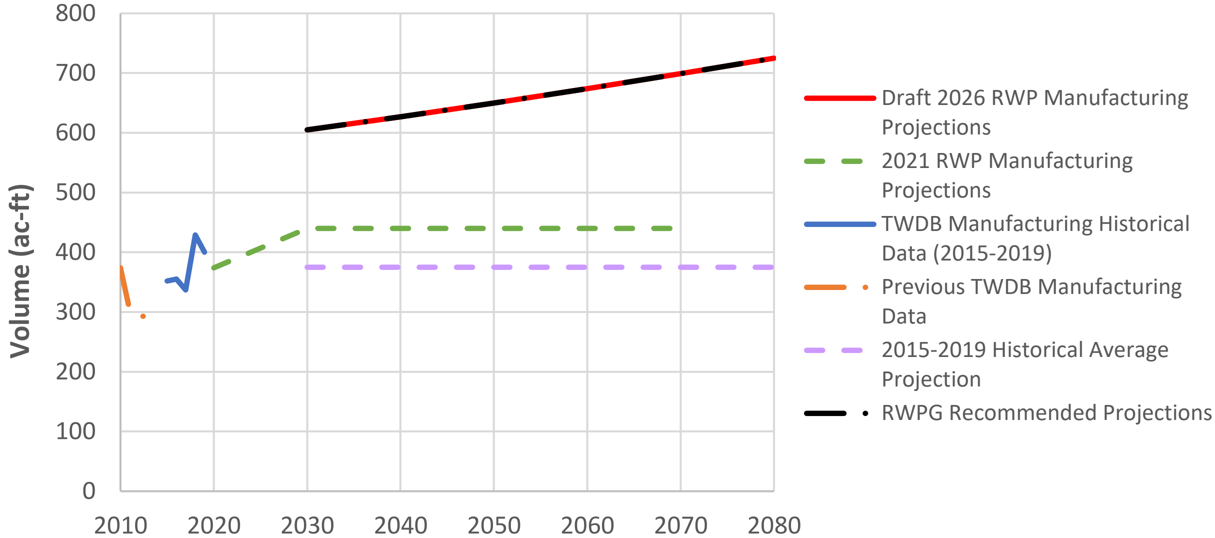


Figure 5A. Ellis County Manufacturing Comparison

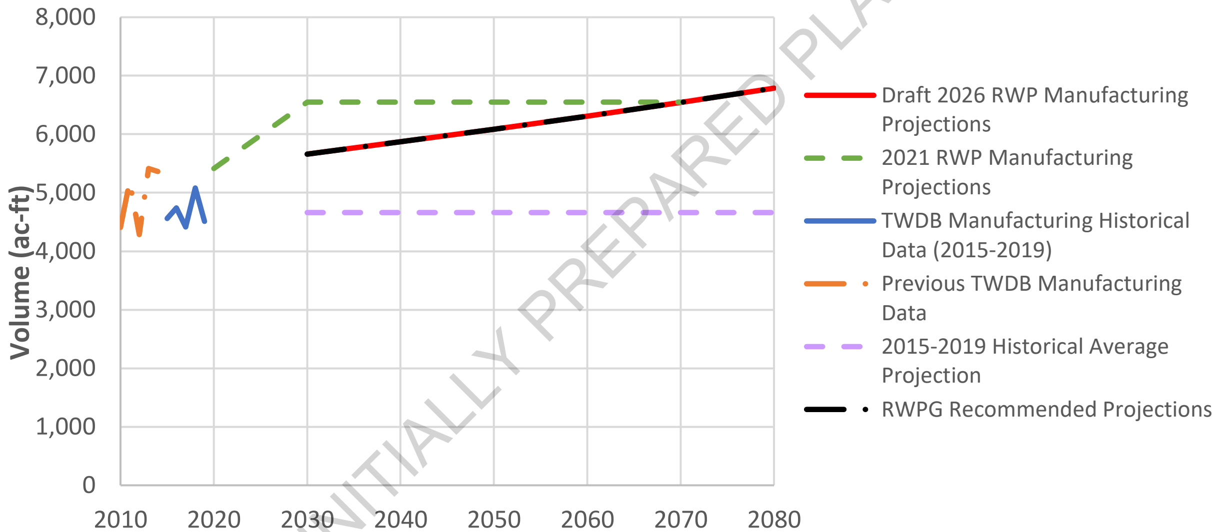


Figure 6A. Fannin County Manufacturing Comparison

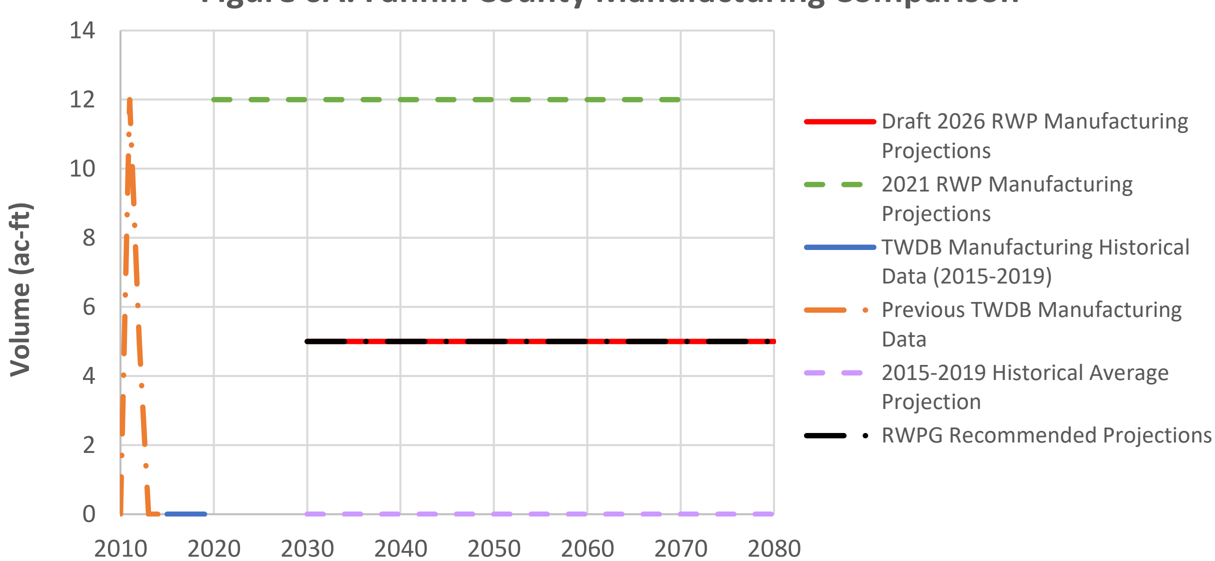


Figure 7A. Freestone County Manufacturing Comparison

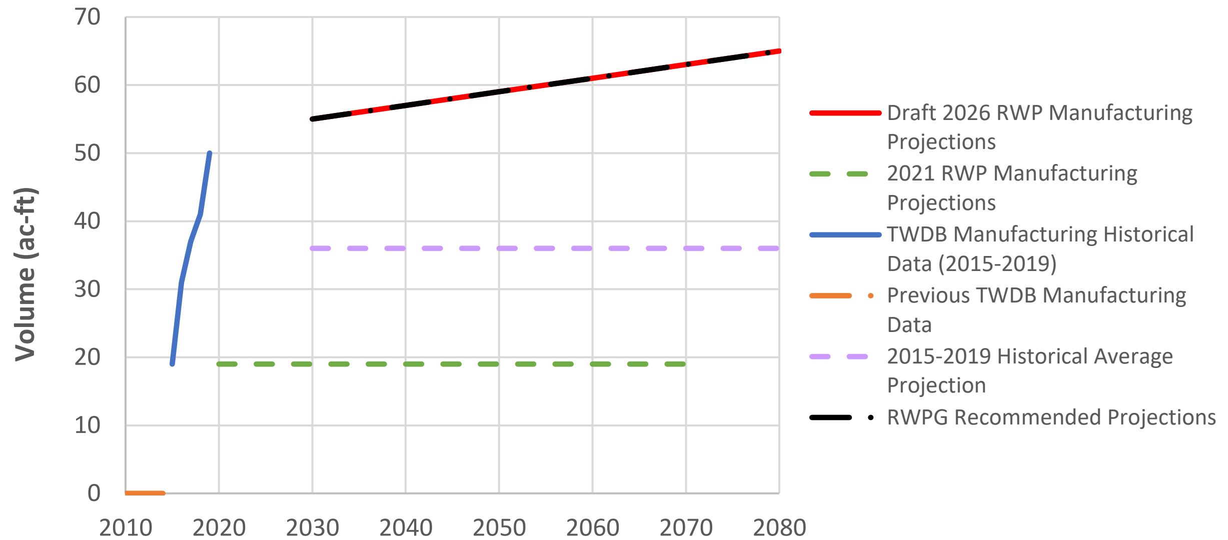


Figure 8A. Grayson County Manufacturing Comparison

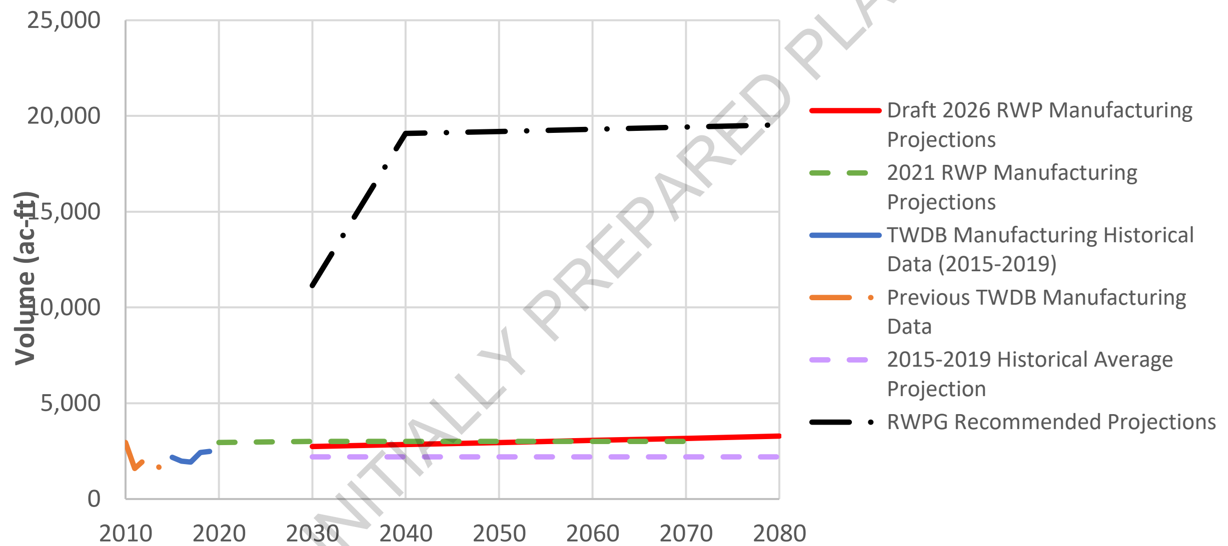
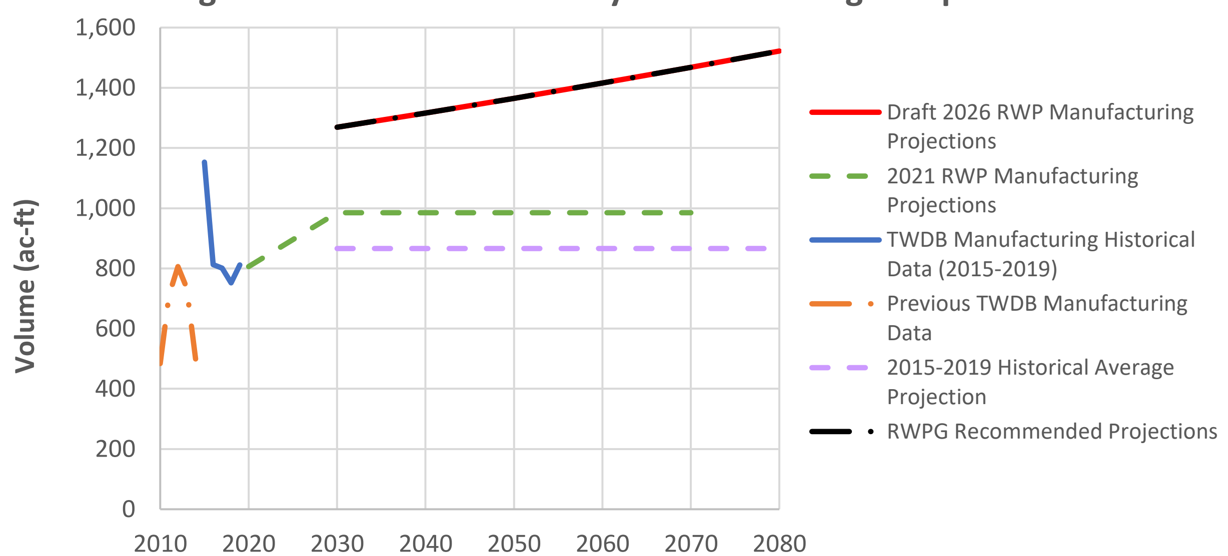


Figure 9A. Henderson County Manufacturing Comparison



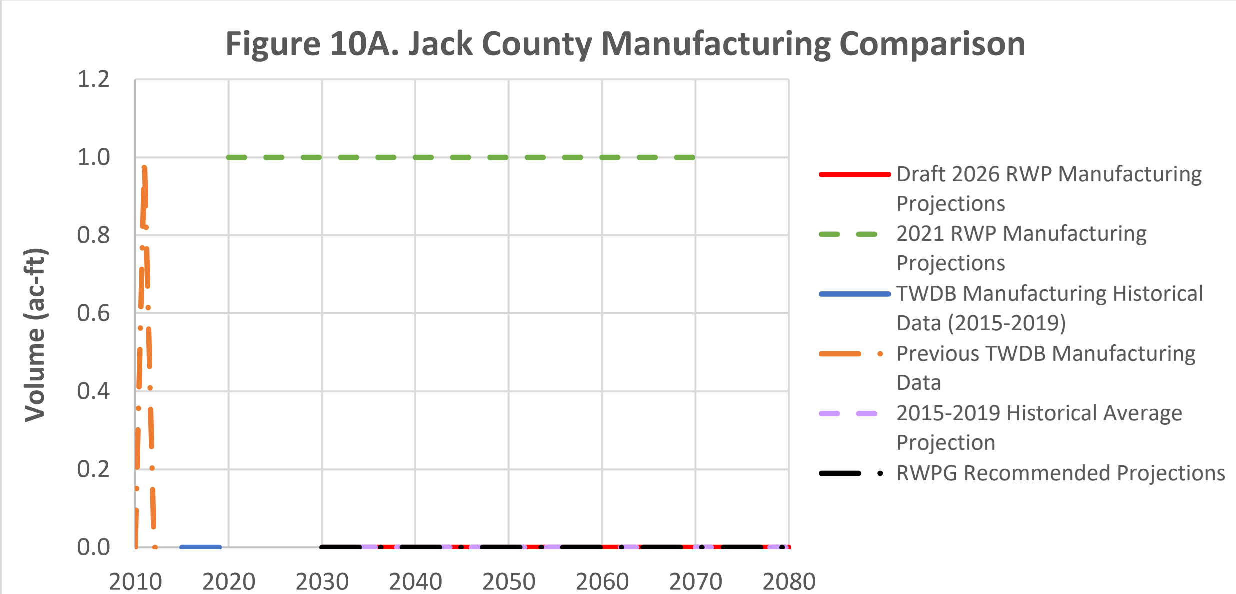


Figure 10A. Jack County Manufacturing Comparison
Volume (ac-ft)
1.2
1.0
0.8
0.6
0.4
0.2
0.0
2010
2020
2030
2040
2050
2060
2070
2080
Draft 2026 RWP Manufacturing Projections
2021 RWP Manufacturing Projections
TWDB Manufacturing Historical Data (2015-2019)
Previous TWDB Manufacturing Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

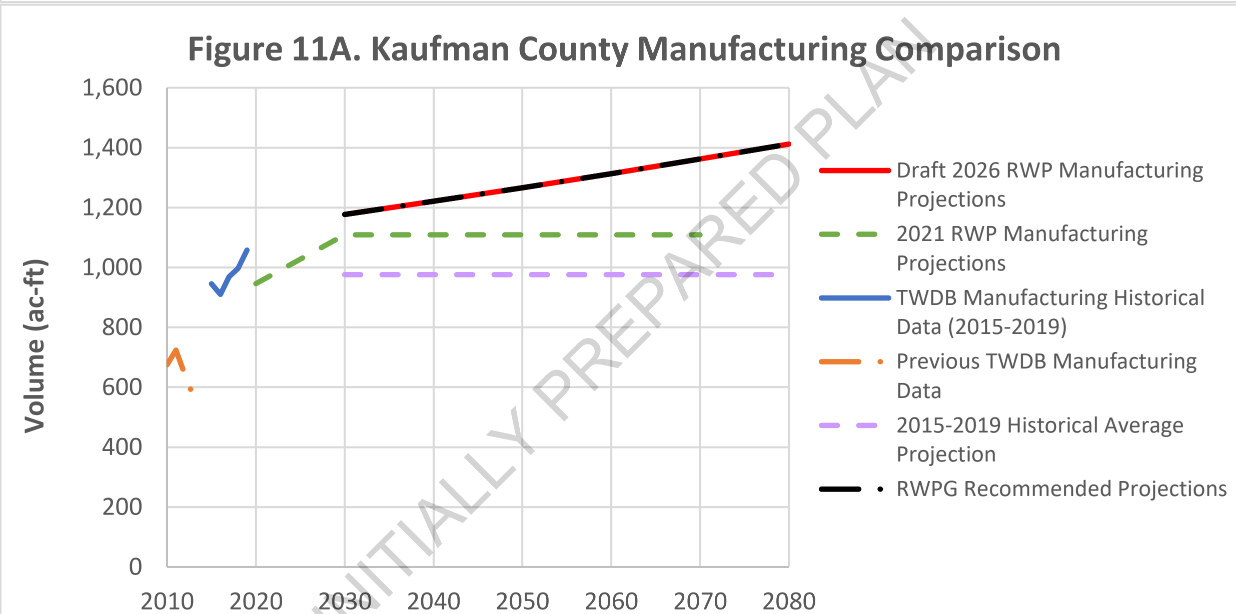


Figure 11A. Kaufman County Manufacturing Comparison
Volume (ac-ft)
1,600
1,400
1,200
1,000
800
600
400
200
0
2010
2020
2030
2040
2050
2060
2070
2080
Draft 2026 RWP Manufacturing Projections
2021 RWP Manufacturing Projections
TWDB Manufacturing Historical Data (2015-2019)
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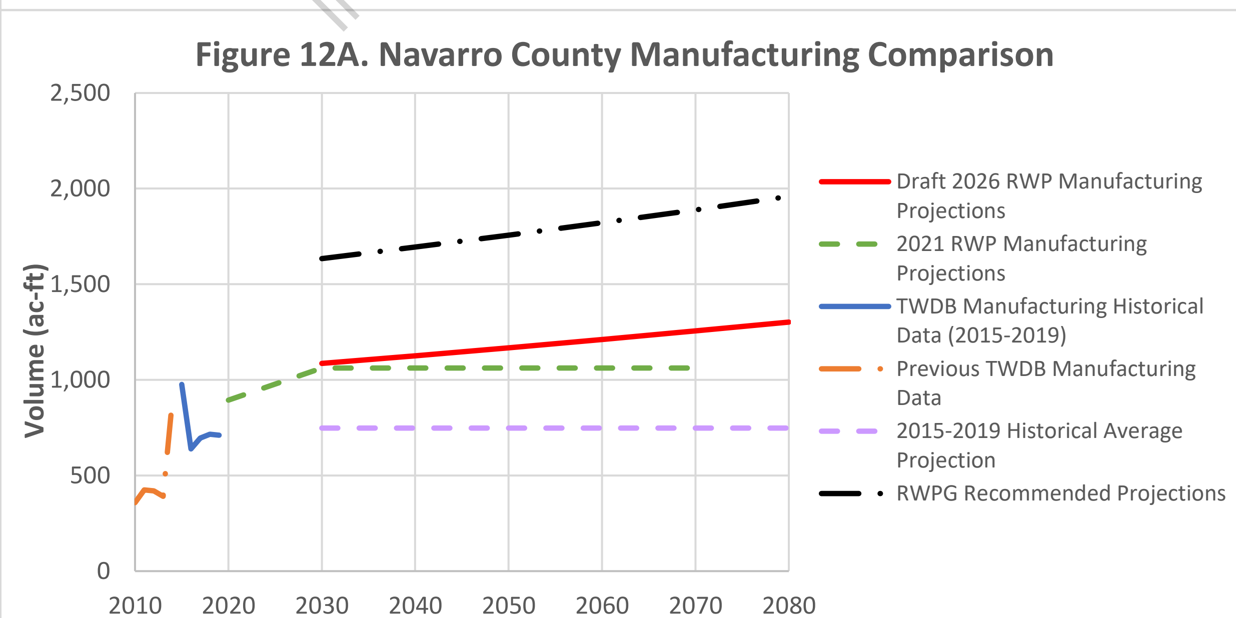


Figure 12A. Navarro County Manufacturing Comparison
Volume (ac-ft)
2,500
2,000
1,500
1,000
500
0
2010
2020
2030
2040
2050
2060
2070
2080
Draft 2026 RWP Manufacturing Projections
2021 RWP Manufacturing Projections
TWDB Manufacturing Historical Data (2015-2019)
Previous TWDB Manufacturing Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

Figure 13A. Parker County Manufacturing Comparison

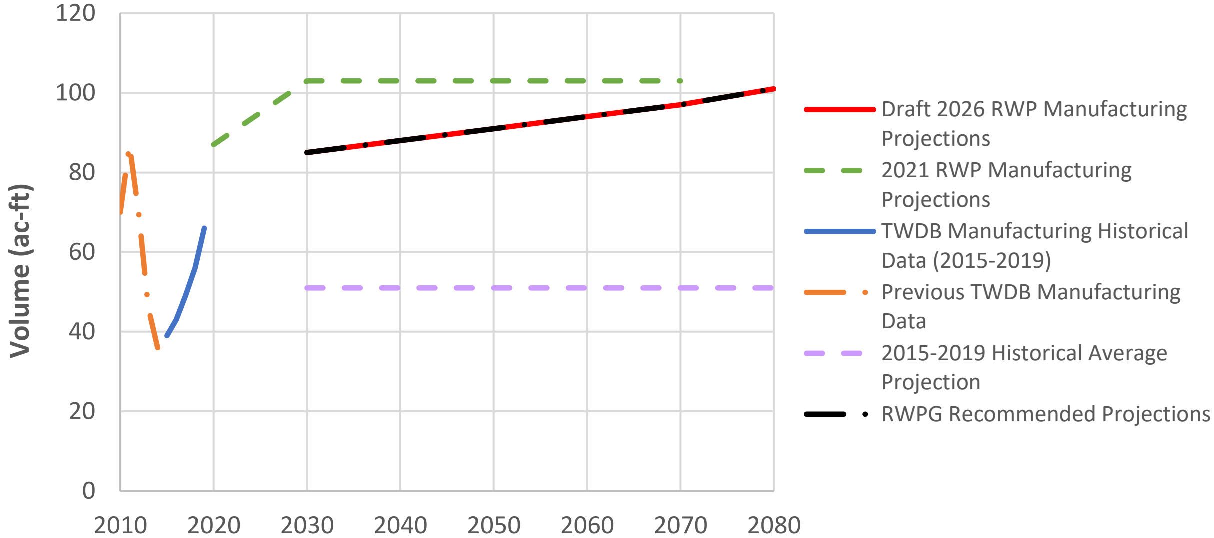


Figure 14A. Rockwall County Manufacturing Comparison

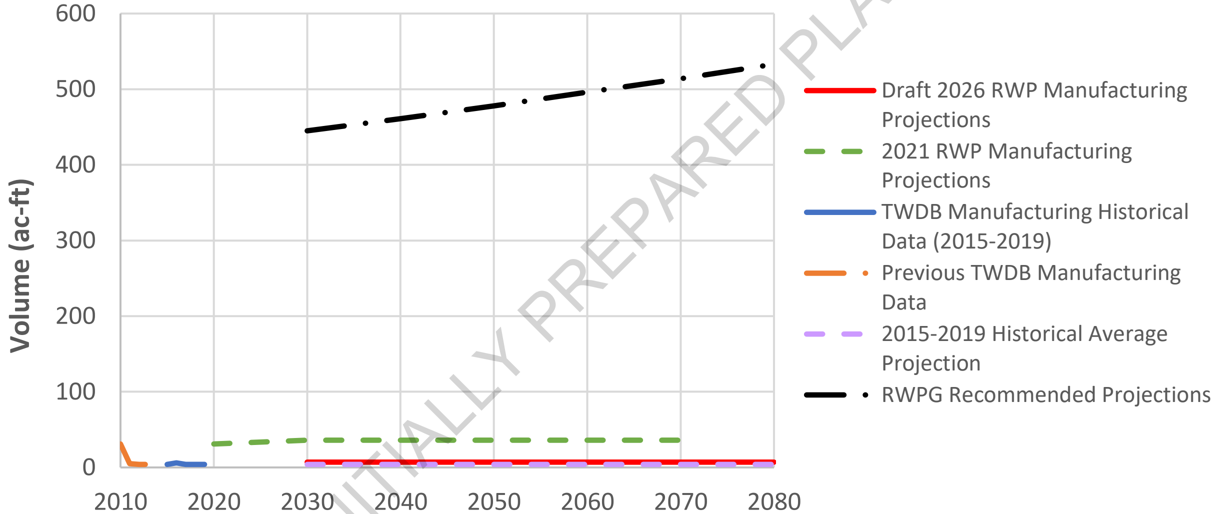
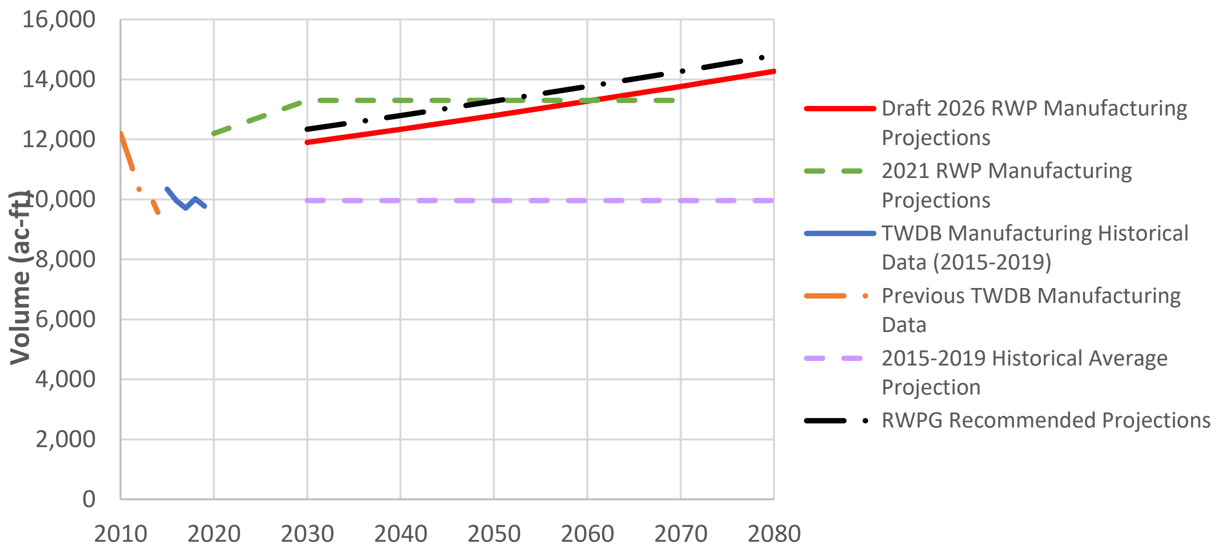


Figure 15A. Tarrant County Manufacturing Comparison



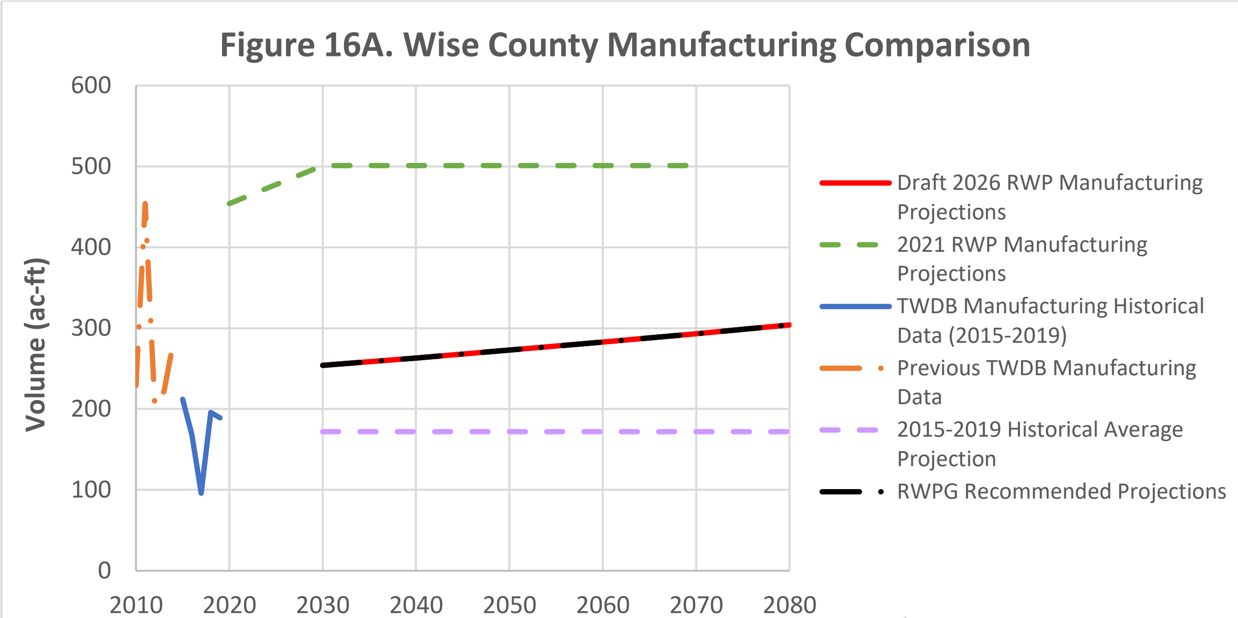


Figure 16A. Wise County Manufacturing Comparison
Volume (ac-ft)
600
500
400
300
200
100
0
2010
2020
2030
2040
2050
2060
2070
2080
Draft 2026 RWP Manufacturing Projections
2021 RWP Manufacturing Projections
TWDB Manufacturing Historical Data (2015-2019)
Previous TWDB Manufacturing Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

MEMORANDUM

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TO: Region C Regional Water Planning Group

CC: File

FROM: Freese and Nichols, Inc.

SUBJECT: Memorandum on Draft Steam Electric Power Water Use Projections

DATE: 11/9/2022

PROJECT: TRA21862

1.0 BACKGROUND

The Texas Water Development Board (TWDB) provided the planning groups with draft non-municipal demand projections in January and August 2022. The review process of these projections includes review by the individual planning groups, with recommended changes provided to the TWDB by July 2023. The TWDB will consider the recommended changes from the planning groups, and the final projections will ultimately be adopted by the TWDB and incorporated into the 2027 State Water Plan (SWP). The purpose of this technical memorandum is to document information related to historical steam electric power (SEP) usage and provide information supporting recommended modifications, if needed, to the draft SEP demands.

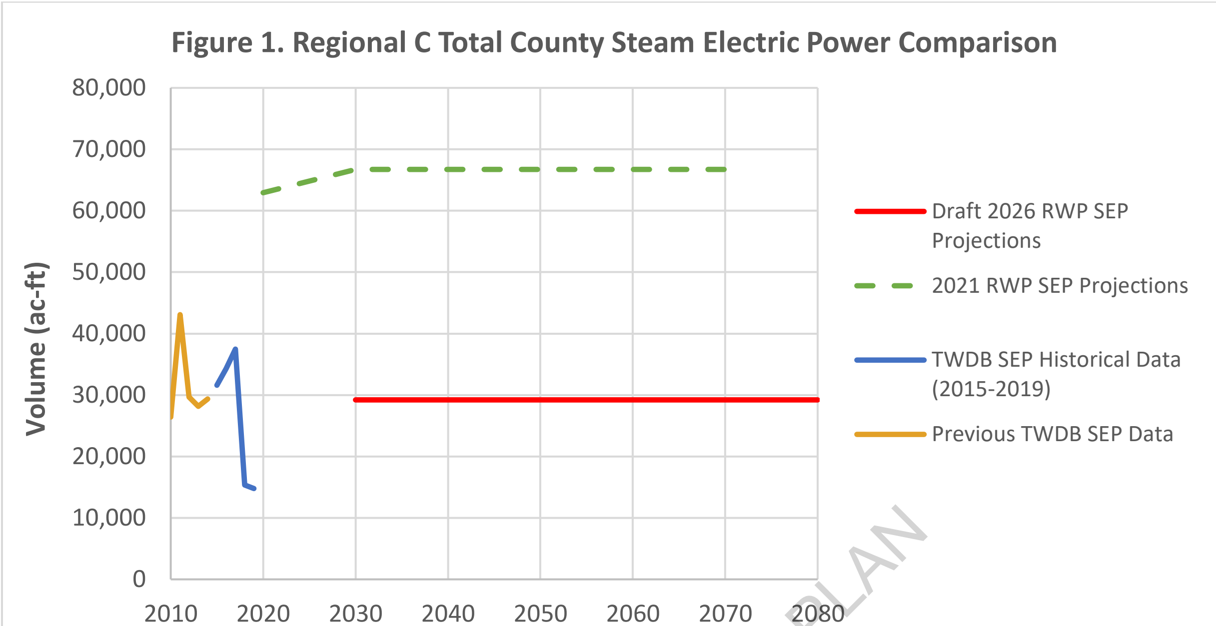
SEP water use is defined by the TWDB as consumed water used in the production process of SEP, including water used by employees for drinking and sanitation purposes. It does not include cooling water that is returned to a lake or stream. Historically, SEP has accounted for approximately 21 percent of all non-municipal water use in Region C[1].

1.1 Historical Steam Electric Power Water Use Estimates

The TWDB's SEP water use estimates are obtained from SEP facilities that complete TWDB Water Use Surveys. These typically include large power generation plants that sell power on the open market and do not include cogeneration plants for manufacturing or mining processes. SEP water uses reported by municipal users in their Water Use Surveys are also included in the SEP water use estimates.

As of January 2022, historical data estimates are available through the year 2019. Since the year 2015, the region-wide SEP water use estimates have ranged from 14,783 to 37,475 acre-feet (Figure 1). The TWDB historical SEP water use estimates include water provided by reuse programs.

[1] Based on historical water use estimates from the TWDB.



1.2 TWDB Draft Steam Electric Power Water Demand Projections

TWDB's draft 2030 SEP demand projections for the 2026 Regional Water Plan are based on the maximum annual SEP water use that occurred in each county during 2015-2019. After 2030, the draft SEP water demand projections are held constant through 2080 with one exception: estimated water use from new SEP facilities listed in state and federal reports is added to the projections from the anticipated operation date to 2080. For new facilities, TWDB staff estimated water demand from fuel type, generation capacity, average water use information, and average operational time.
Based on this information, new facilities have occurred in the following counties since the last 2021 Region C Water plan:

- Dallas (online by 2016): WM Renewable Energy LLC – Skyline Gas Recovery
- Denton (online by 2018): Denton Energy Center
- Ellis (online by 2019): Ennis Power Company LLC
- Wise (Online by 2012): Wise County Power Company LLC

Water use from some of these facilities are captured in the historical SEP water use. Overall, there has been a reduction in SEP water use in Region C over the past decade. This is primarily due to the number of facilities that are no longer operating. Retired facilities since the 2021 RWP in the following counties include:

- Dallas (retired prior to 2015): Luminant Generation Company LLC – North Lake Plant
- Fannin (retired prior to 2015): Valley NG Power Company LLC – Valley Steam Electric Station
- Freestone (retired after 2017): Luminant Generation Company LLC – Big Brown Steam Electric Station
- Parker (retired prior to 2015): Brazos Electric Power CO OP INC – North Texas Plant
- Tarrant (retired prior to 2015): Luminant Generation Company LLC – Eagle Mountain Steam Electric Station

For SEP plants that have not returned a Water Use Survey, water use was either obtained from the operator or water demand was estimated from kilowatt-hour output and fuel type. Power plants driven by landfill gas, wood waste biomass, battery, or renewable energy sources are not included in the draft water demand projections.

TWDB staff members have determined that holding 2030-2080 steam electric power water demands constant is "efficient, effective, and reasonable" for the following reasons:[2]

1. Basing projections on the highest county water use in recent years ensures sufficient supply for current water uses.
2. Developing modeled projections would be complicated and expensive. Modeling would have to include a number of potential water use drivers, including facility replacement schedules, anticipation of generation efficiency and cooling systems, carbon capture activities, cost of various fuels, and federal environmental/regulatory policies. Each of these drivers has its own probability of occurrence and level of impact.
3. Projected increases in solar and wind generation capacity will offset the need to operate some water-consuming facilities.
4. New steam electric power plants will be more efficient than existing plants.
5. It would be difficult to allocate increased demands by county, because locations of new facilities listed in government reports cannot be identified. This could also lead to double counting of demands from any new facilities brought forward by the RWPG.
6. There will be opportunities to update the projections during each planning cycle.

Although the Region C population has increased substantially since the 1980s, the reported SEP water use has declined (Figure 1). The decline is due in part to the retiring of coal facilities that used once through cooling and the construction of more water efficient energy facilities. This declining trend also supports holding 2030-2080 SEP water demands constant.

1.3 Criteria for Revising the Draft Steam Electric Power Water Demand Projections

One or more of the following criteria must be verified by the Planning Group and the Executive Administrator for consideration of revising the SEP water demand projections:

- Documentation that the TWDB draft projections have not included a facility that warrants inclusion.
- Any local information related to new facilities or facility closures that may not have been included in Electrical Reliability Council of Texas's Capacity, Demand, and Reserves report.
- Evidence of a long-term projected water demand of a facility or in a county that is substantially different than the draft projections.
- Evidence of errors identified in historical water use, including volumes of reuse (treated effluent) water or brackish groundwater that were not included in the draft projections.
- Evidence that a currently-operating power generation facility has experienced a higher dry-year water use beyond the most recent five years, within the most recent 10 years.

[2] Texas Water Development Board, Methodologies for Developing Draft Irrigation, Manufacturing, and Steam-Electric Water Demand Projections, August 2022.

The Planning Group must provide the following data associated with the identified criteria to the Executive Administrator for justifying any adjustments to the SEP water demand projections:

- Historical (2015-2019) water use data and description of a surveyed or future facility, including the fuel type, cooling process, capacity, average percent of time operating, and any other information necessary to estimate water use.
- Reports describing alternative trends or anticipated water use for steam-electric power generation.
- Specific information of an anticipated facility not listed in state or federal reports necessary to estimate the volume of water reasonably expected to be consumed. Such information would include generation method, cooling method, generation capacity and any additional information necessary to estimate the future water use.
- Other data that the RWPG considers adequate to justify an adjustment to the steam electric power water demand projections.

2.0 Proposed SEP Water Use

FNI consulted with the RWPG's electric power representative on the draft demands and approach adopted by the TWDB. Based on this input and our review of the draft projections, the following procedural changes are recommended:

- For existing facilities, use the highest use over the past ten years for each facility. This will provide representative demand during extreme hot weather, as experienced in the early 2010s.
- For facilities that have reached the end of their useful life and have recently been closed or decommissioned, the existing water supplies may be used by new facilities. Texas is growing and the need for greater electrical generation is high.
    - If a power provider retains the water right or contracted water for power generation, then include a demand equivalent to two-thirds (2/3) of the consumptive water right. The lower amount reflects a more water efficient replacement unit. However, the new power generation facility may be larger than the retired facility for less water demand.
    - If the water right is no longer retained, do not include future power demand at that location.

These changes will affect the following locations (Table 1). Table 1 shows the locations, water source and authorized consumption for power generation.

Table 1 Existing Water Supplies for Retired Facilities

County	Power Company	Water Source	Water right	Consumptive amount (ac-ft/yr)
Freestone	Big Brown	Fairfield Lake	CA-5040	14,150
Tarrant	Luminant	Eagle Mountain Lake	Contract 451, expires 2052	4,636

For the other facilities noted retired by the TWDB, the water right for the North Lake Power Station was sold to the City of Coppell. It has retained its industrial purpose, but it will likely not be used for future power generation. The Brazos Electric Co-op facility in Parker County was on Lake Weatherford and received water from the City of Weatherford. It is no longer operating and is not expected to reinitiate operations. The Valley Steam Electric Station in Fannin County was determined by ERCOT not to be needed for reliability. Luminant does not intend to construct a new facility at this location.

Luminant holds the water rights for Forest Grove Reservoir and a contract for water from Cedar Creek Lake. However, Forest Grove Reservoir has never filled, and it is uncertain if it will be used for power generation in the future. The TWDB has no reported use for this facility over the past ten years and therefore did not consider future use in the projected demands. Since there is no active lake or power facility, the potential demands associated with the water right and contract are not included in the Region C projections.

In addition to the inclusion of the above facilities, we reviewed the steam electric power demand memorandum developed for the 2021 Region C Water Plan and correspondence with wholesale water providers. We identified several new or potential facilities that are not included in the TWDB draft demands. These include:

- Grayson (additional 2,439 ac-ft/yr): Navasota Energy Generation Holdings Van Alstyne Energy Center.
- Henderson (additional 2,060 ac-ft/yr): Halyard Energy Henderson, LLC Halyard Henderson Energy Center.

The Van Alstyne Energy Center is still in permitting and is expected to be constructed in 2022 – 2024[3]. The Halyard Energy Center appears to have been delayed for now.

Since the Region C area will continue to need power generation, it is recommended to include the Val Alstyne Energy Center to be online by 2030 and the Halyard Henderson Energy Center to be online by 2040.

A comparison of the draft projections for the 2026 RWP (provided by TWDB), the final 2021 RWP projections, and the proposed RCWPG revisions to the 2026 SWP projections is presented in Table 2 and Figure 2.

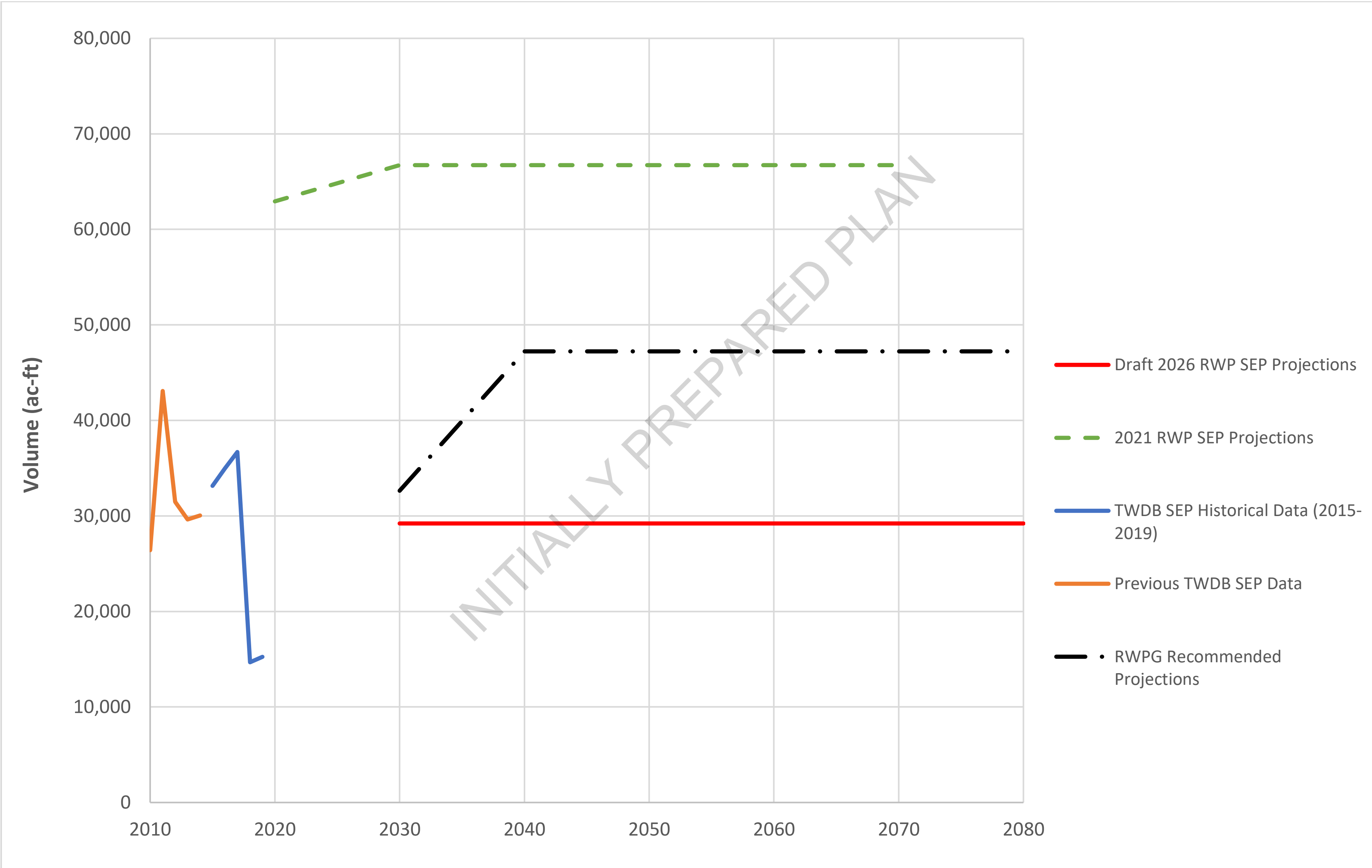
[3] . Van Alstyne Energy Center Power Plant, US (power-technology.com)

Table 2. Comparison of Region C Steam Electric Power Demand Projections

County Name	2021 RWP Projections (ac-ft/yr)						Draft Projections for 2026 RWP (ac-ft/yr)						Recommended RWPG Revisions (ac-ft/yr)					
	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080
Collin	40	40	40	40	40	40	20	20	20	20	20	20	40	40	40	40	40	40
Cooke	5	5	5	5	5	5	6	6	6	6	6	6	6	6	6	6	6	6
Dallas	1065	1065	1065	1065	1065	1065	1,840	1,840	1,840	1,840	1,840	1,840	2,412	2,412	2,412	2,412	2,412	2,412
Denton	173	173	173	173	173	173	1,103	1,103	1,103	1,103	1,103	1,103	1,175	1,175	1,175	1,175	1,175	1,175
Ellis	901	901	901	901	901	901	1,854	1,854	1,854	1,854	1,854	1,854	1,854	1,854	1,854	1,854	1,854	1,854
Fannin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Freestone	34,432	34,432	34,432	34,432	34,432	34,432	4,831	4,831	4,831	4,831	4,831	4,831	4,831	14,269	14,269	14,269	14,269	14,269
Grayson	4,387	4,387	4,387	4,387	4,387	4,387	2,134	2,134	2,134	2,134	2,134	2,134	4,573	4,573	4,573	4,573	4,573	4,573
Henderson	3,709	3,709	3,709	3,709	3,709	3,709	70	70	70	70	70	70	132	2,192	2,192	2,192	2,192	2,192
Jack	3772	3772	3772	3772	3772	3772	3,772	3,772	3,772	3,772	3,772	3,772	3,772	3,772	3,772	3,772	3,772	3,772
Kaufman	9,793	9,793	9,793	9,793	9,793	9,793	9,793	9,793	9,793	9,793	9,793	9,793	9,793	9,793	9,793	9,793	9,793	9,793
Navarro	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parker	604	604	604	604	604	604	0	0	0	0	0	0	0	0	0	0	0	0
Rockwall	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tarrant	1157	4948	4948	4948	4948	4948	945	945	945	945	945	945	1,157	4,249	4,249	4,249	4,249	4,249
Wise	2,894	2,894	2,894	2,894	2,894	2,894	2,844	2,844	2,844	2,844	2,844	2,844	2,894	2,894	2,894	2,894	2,894	2,894
Total	**62,932**	**66,723**	**66,723**	**66,723**	**66,723**	**66,723**	**29,212**	**29,212**	**29,212**	**29,212**	**29,212**	**29,212**	**32,639**	**47,229**	**47,229**	**47,229**	**47,229**	**47,229**

Grey text indicates that the was no change from the TWDB Draft projections.

Figure 2. Region C Steam Electric Power – Comparison of Water Use Estimates, 2021 Region C Water Plan Projection, Proposed Projections, and Revised Projections



Attachment A
Steam Electric Power Demand by County
Historical Usage and Projections

Figure 1A. Collin County Steam Electric Power Comparison

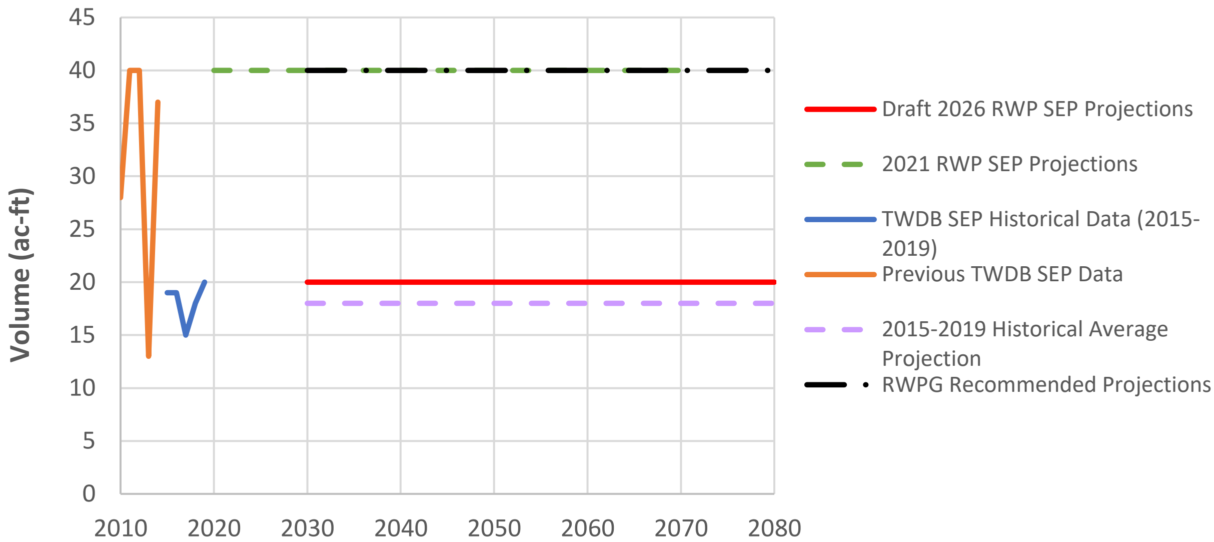


Figure 2A. Cooke County Steam Electric Power Comparison

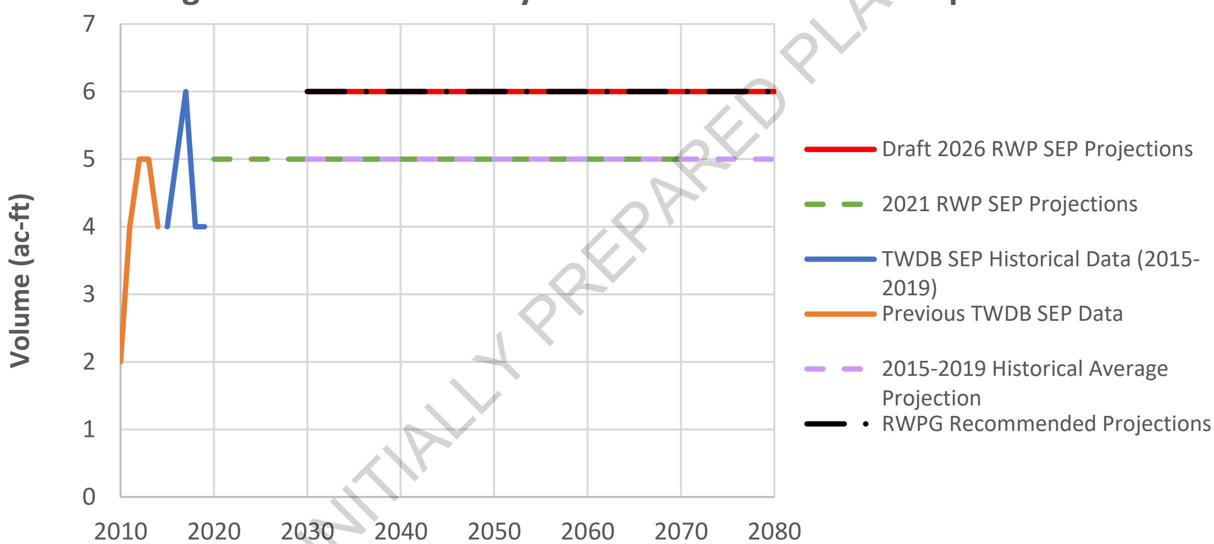


Figure 3A. Dallas County Steam Electric Power Comparison

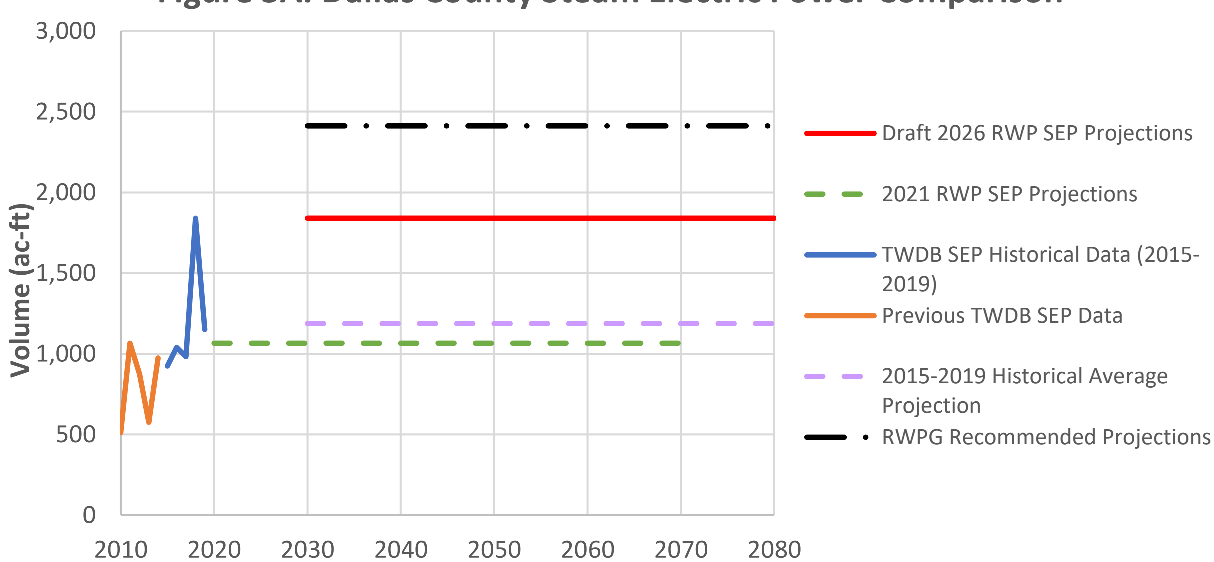


Figure 4A. Denton County Steam Electric Power Comparison

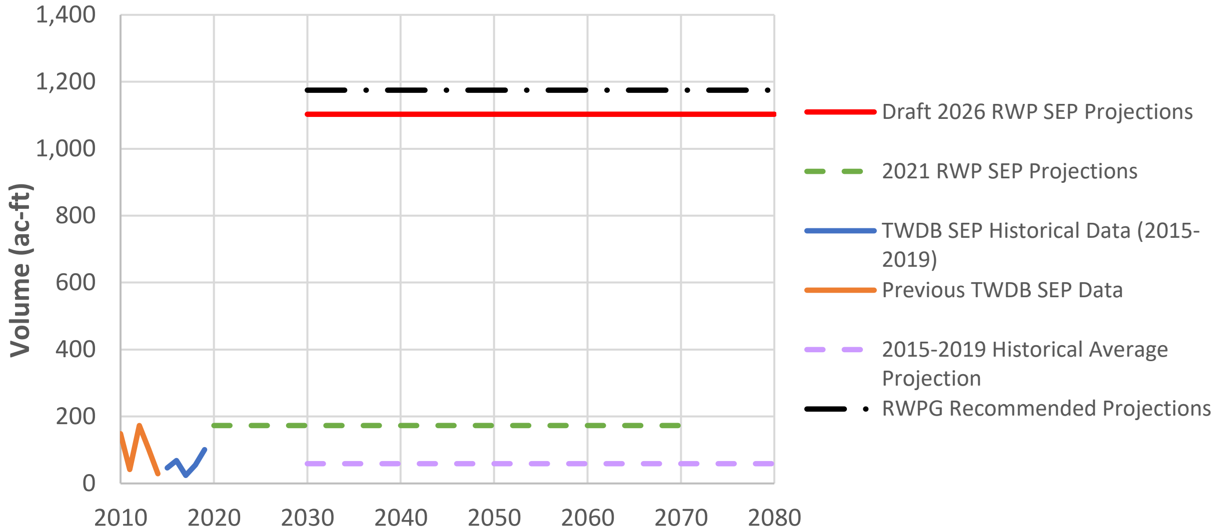


Figure 5A. Ellis County Steam Electric Power Comparison

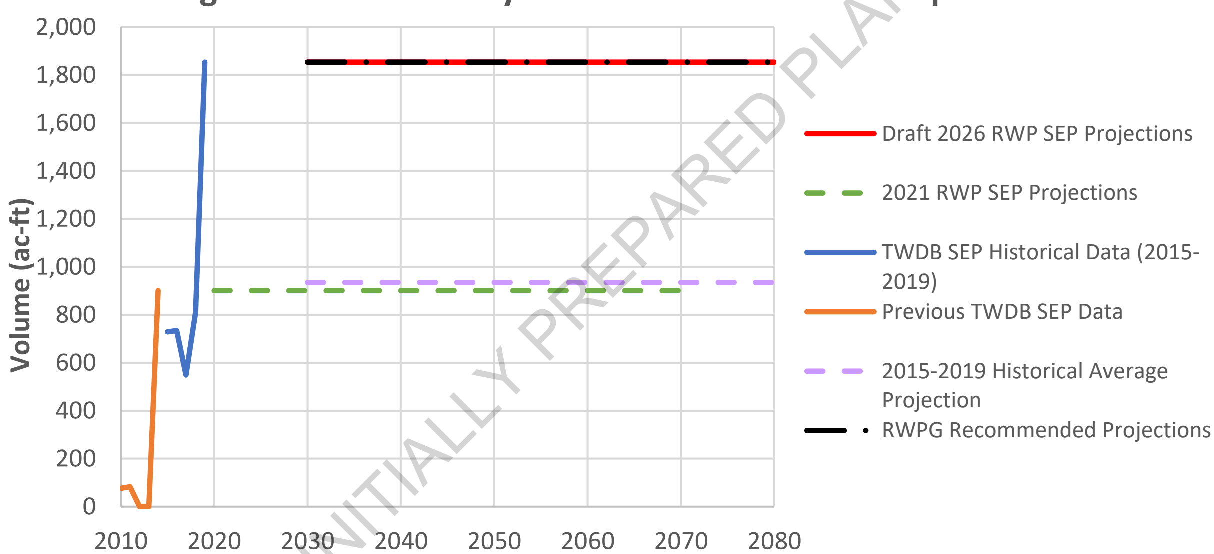


Figure 6A. Fannin County Steam Electric Power Comparison

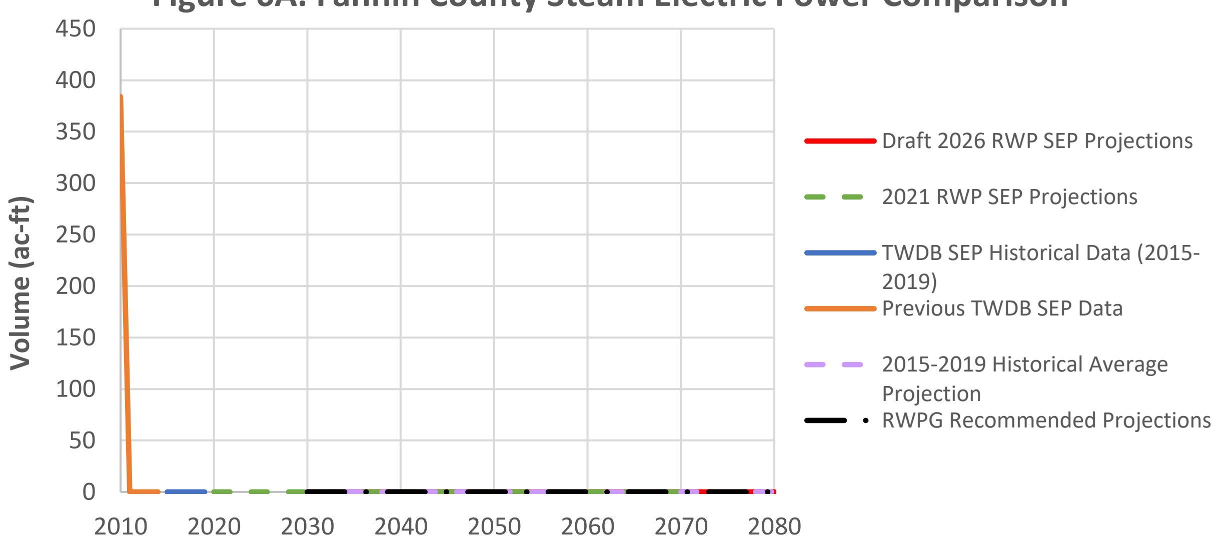


Figure 7A. Freestone County Steam Electric Power Comparison

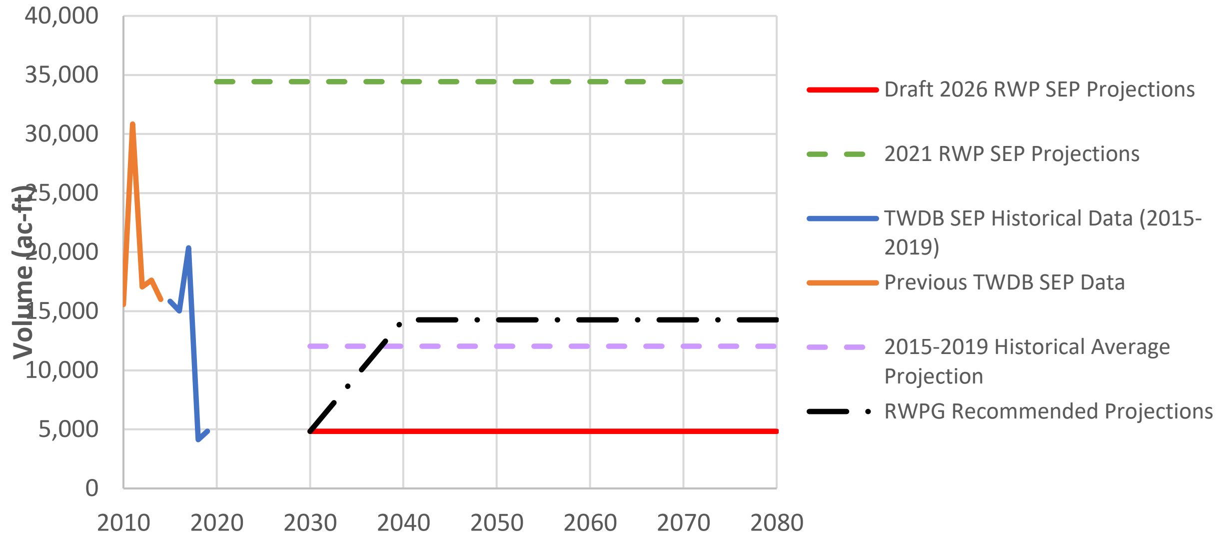


Figure 8A. Grayson County Steam Electric Power Comparison

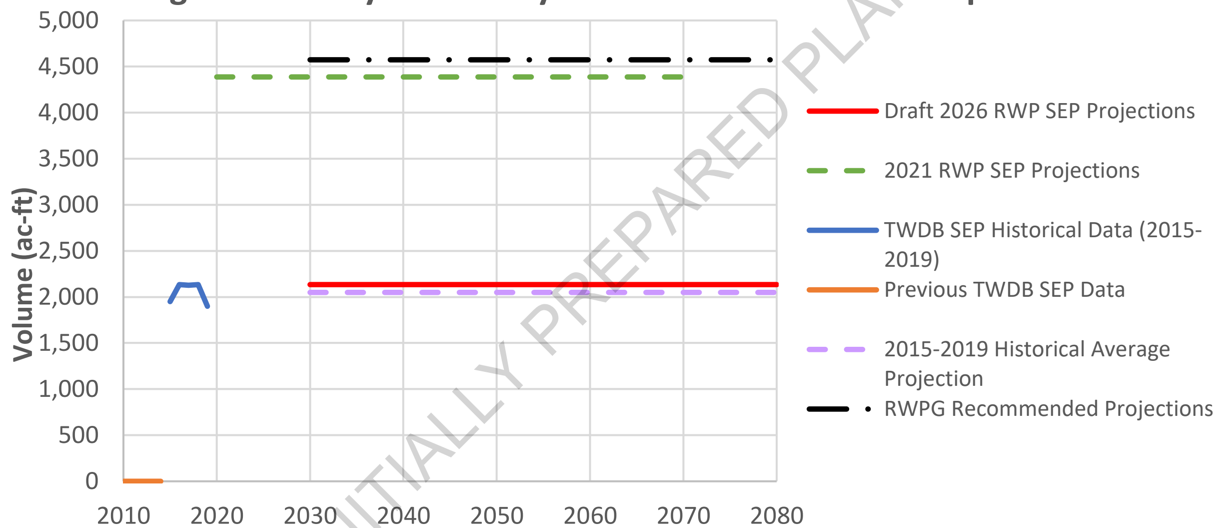
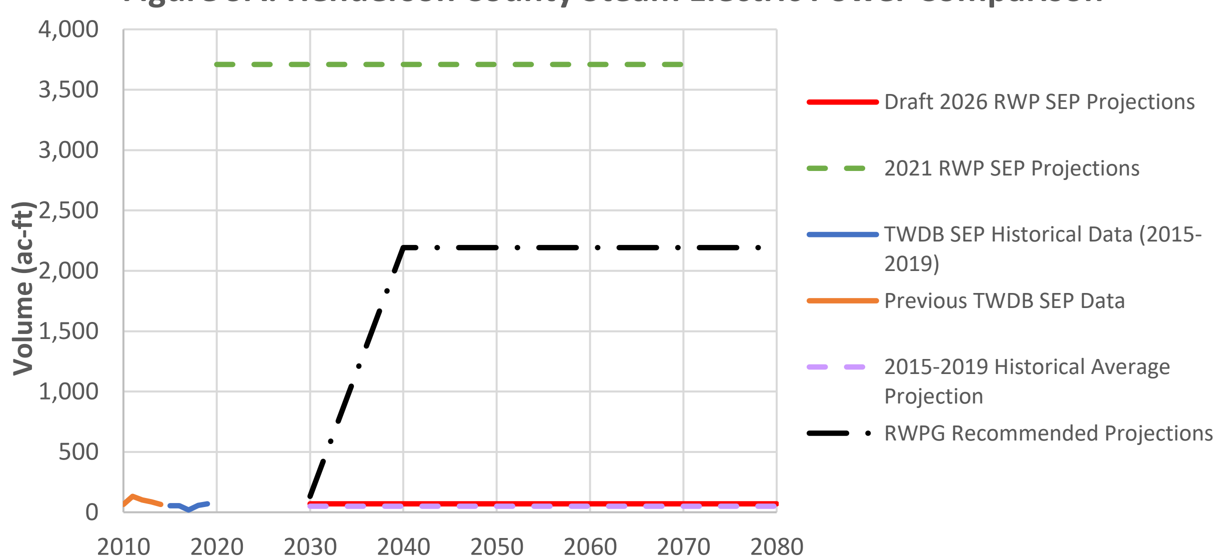


Figure 9A. Henderson County Steam Electric Power Comparison



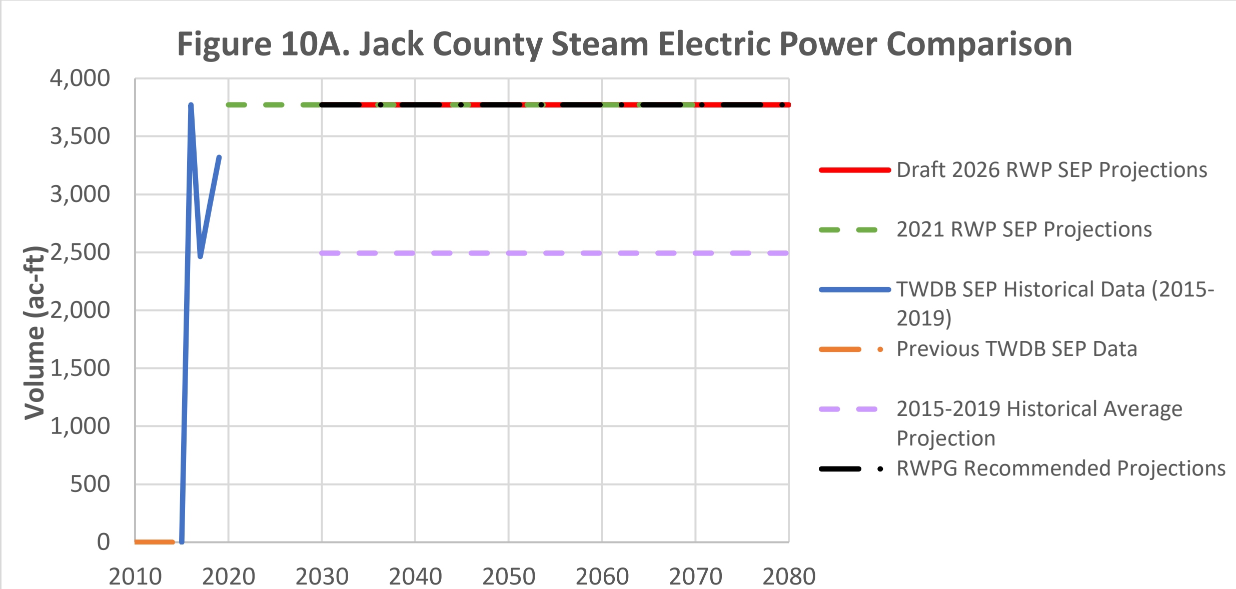


Figure 10A. Jack County Steam Electric Power Comparison
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
Volume (ac-ft)
2010
2020
2030
2040
2050
2060
2070
2080
Draft 2026 RWP SEP Projections
2021 RWP SEP Projections
TWDB SEP Historical Data (2015-2019)
Previous TWDB SEP Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

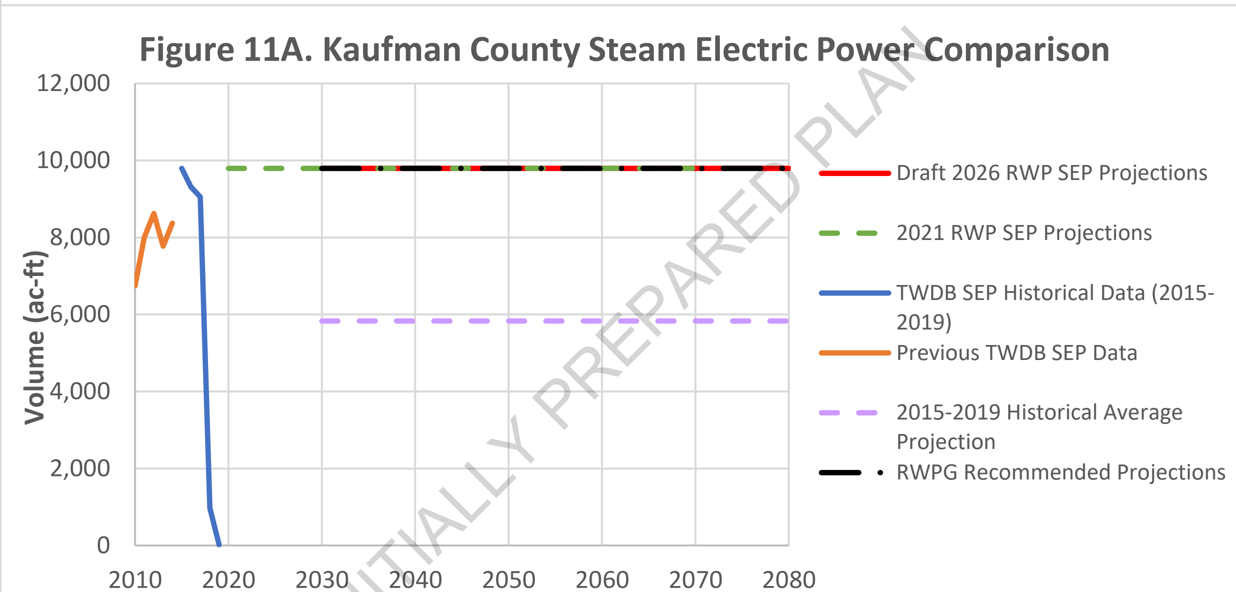


Figure 11A. Kaufman County Steam Electric Power Comparison
12,000
10,000
8,000
6,000
4,000
2,000
0
Volume (ac-ft)
2010
2020
2030
2040
2050
2060
2070
2080
Draft 2026 RWP SEP Projections
2021 RWP SEP Projections
TWDB SEP Historical Data (2015-2019)
Previous TWDB SEP Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

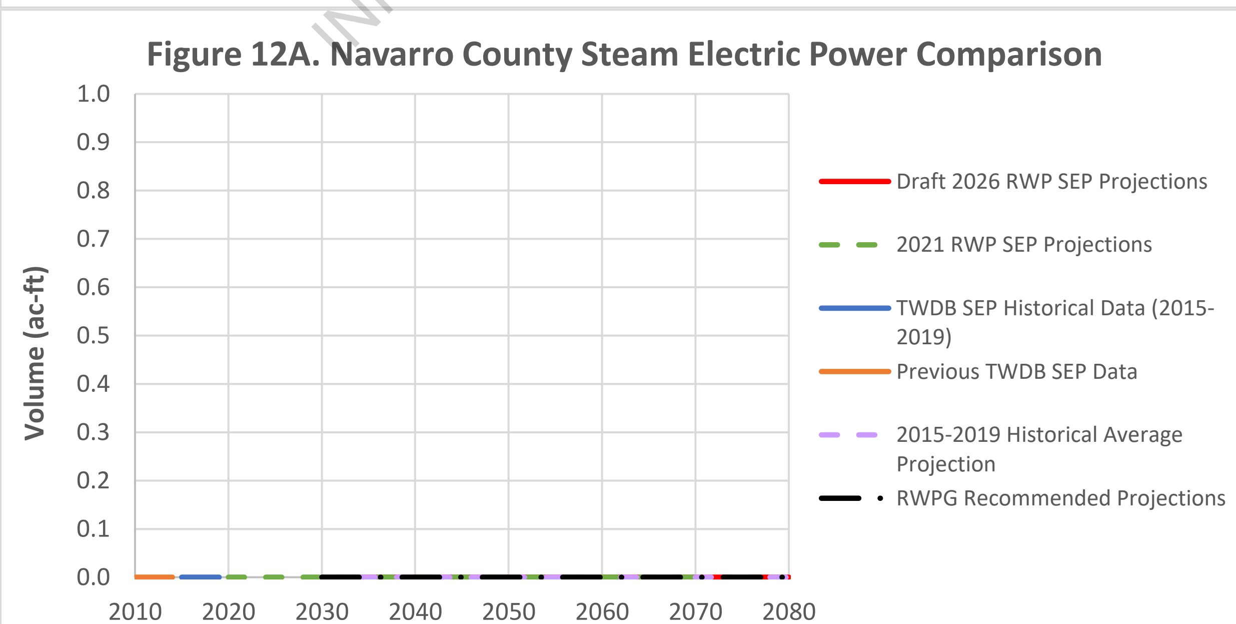


Figure 12A. Navarro County Steam Electric Power Comparison
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Volume (ac-ft)
2010
2020
2030
2040
2050
2060
2070
2080
Draft 2026 RWP SEP Projections
2021 RWP SEP Projections
TWDB SEP Historical Data (2015-2019)
Previous TWDB SEP Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

Figure 13A. Parker CountySteam Electric Power Comparison

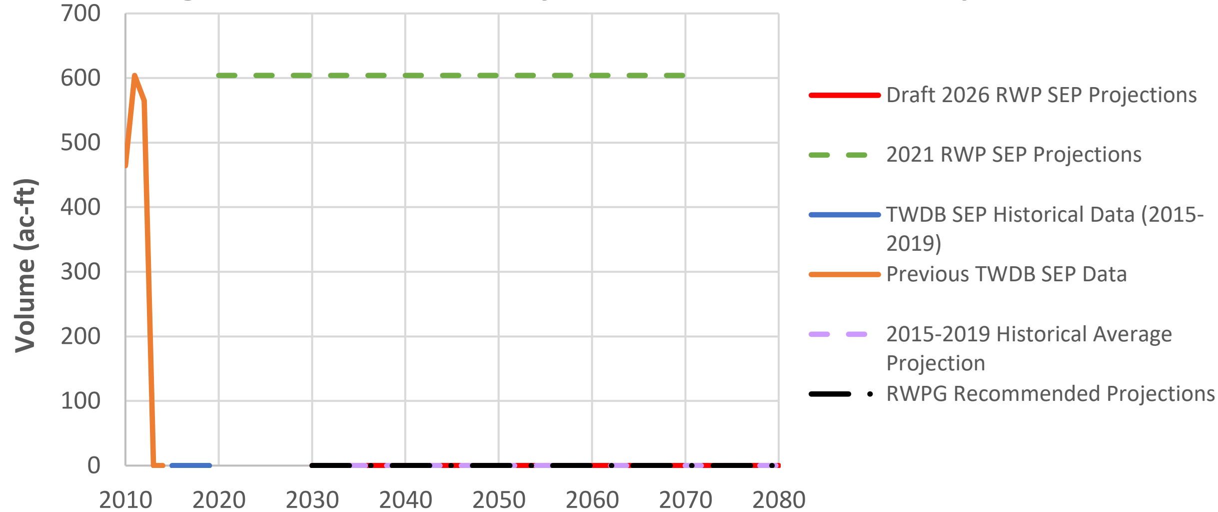


Figure 14A. Rockwall County Steam Electric Power Comparison

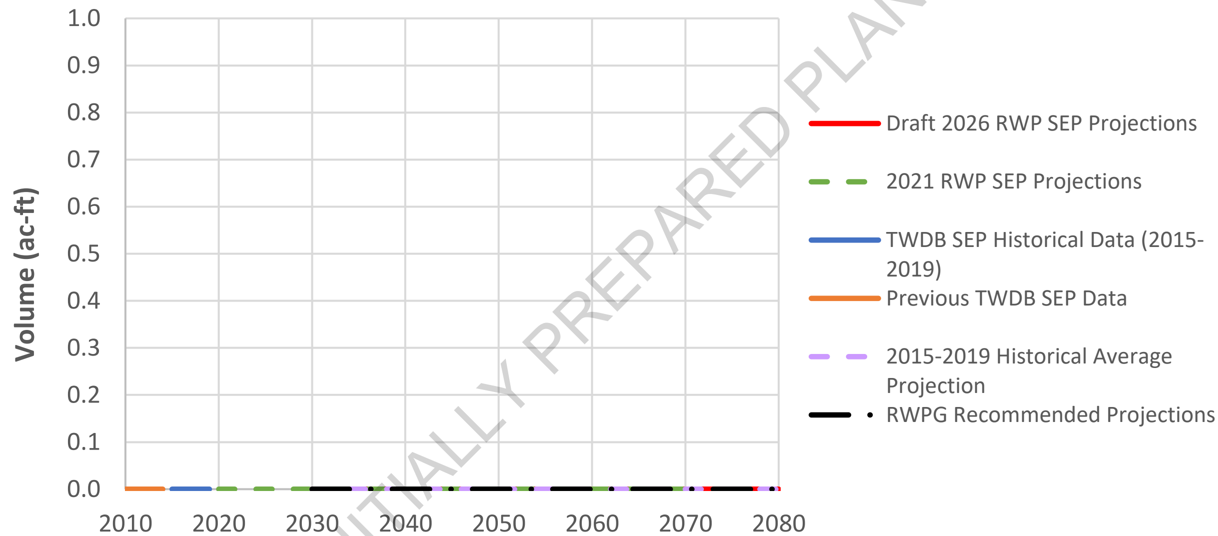
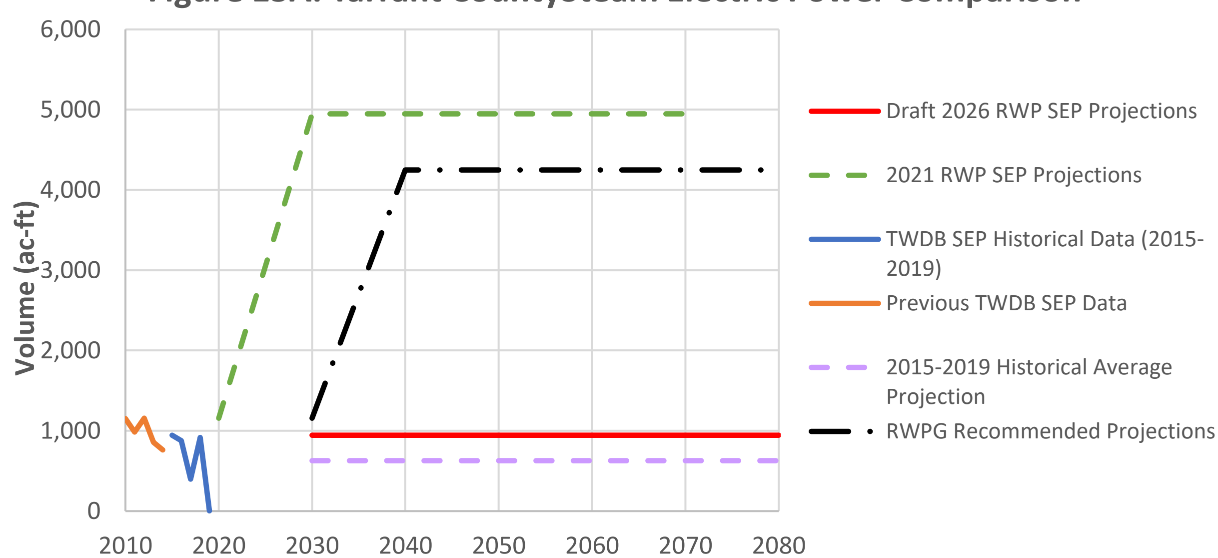


Figure 15A. Tarrant CountySteam Electric Power Comparison



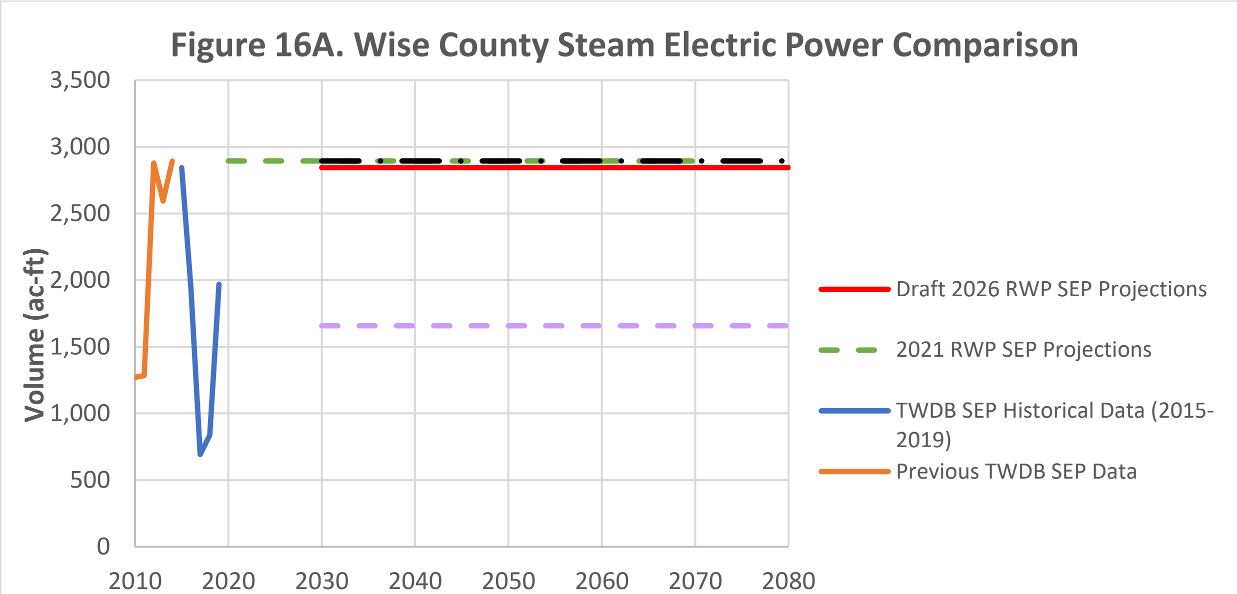


Figure 16A. Wise County Steam Electric Power Comparison
Volume (ac-ft)
3,500
3,000
2,500
2,000
1,500
1,000
500
0
2010
2020
2030
2040
2050
2060
2070
2080
Draft 2026 RWP SEP Projections
2021 RWP SEP Projections
TWDB SEP Historical Data (2015-2019)
Previous TWDB SEP Data

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TO: Region C Regional Water Planning Group

CC: File

FROM: Freese and Nichols, Inc.

SUBJECT: Memorandum on Draft Livestock Water Use Projections

DATE: 11/2/2022

PROJECT: TRA21862

1.0 BACKGROUND

The Texas Water Development Board (TWDB) provided the planning groups with draft livestock demand projections in January of 2022. The draft projections will be reviewed by the individual planning groups and recommendations will be provided to the TWDB to be considered. The final projections will ultimately be adopted by the planning groups and the TWDB and incorporated into the 2027 State Water Plan (SWP). The purpose of this technical memorandum is to document information related to historical livestock usage and provide information supporting recommended modifications to the draft livestock demands.

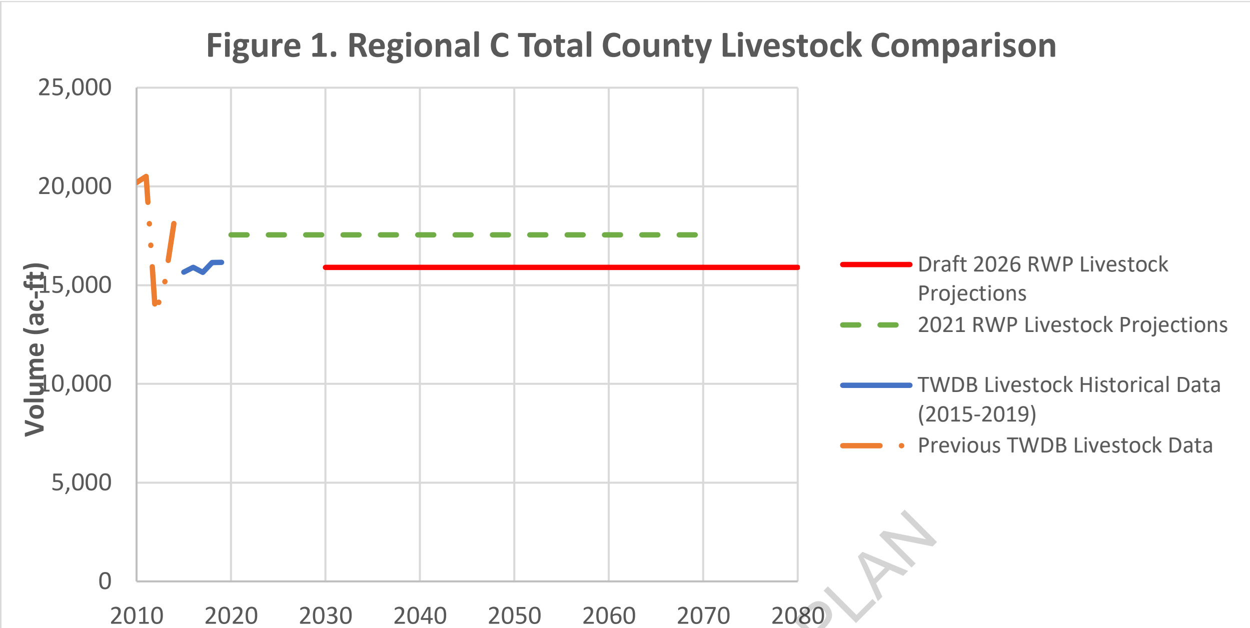
Livestock water use is defined by the TWDB as water used in the production of livestock, both for drinking and for cleaning or environmental purposes. It does not include the processing of livestock for food. Livestock processing water use is considered as part of the manufacturing water use. Historically, livestock has accounted for approximately 12 percent of all non-municipal water use in Region C[1]. Generally, most livestock water use in Region C is associated with ranching.

1.1 Historical Livestock Water Use Estimates

The historical 2015-2019 livestock water use estimates are based on a combination of TWDB Water Use Surveys and estimates derived from applying a water use coefficient for each livestock category to county-level inventory estimates from the National Agricultural Statistical Service and the Texas Department of Agriculture.

As of January 2022, historical data estimates are available through the year 2019. Since the year 2015, the region-wide livestock water use estimates have ranged from 15,648 to 16,155 acre-feet per year (Figure 1).

[1] Based on historical water use estimates from the TWDB.



1.2 TWDB Draft Livestock Water Demand Projections

TWDB's draft non-municipal livestock demand projections for the 2027 State Water Plan utilize an average of the 2015-2019 livestock water use estimates as a base (2030 projection), and the rate of change for projections from the *2021 Region C Water Plan* is applied to the base for the years 2030-2080.[2]

1.3 Criteria for Revising the Draft Livestock Water Demand Projections

One or more of the following criteria must be verified by the Planning Group and the Executive Administrator for consideration of revising the livestock water demand projections:

- Evidence that livestock water use estimates for a county from another source are more accurate than those used in the draft projections.
- Plans for the construction of a confined livestock feeding operation in a county at some future date.
- Documentation of an existing confined livestock feeding operation not captured in the draft projections.
- Other evidence of change in livestock inventory or water requirements that would justify an adjustment in the projected future rate of change in livestock water demand.
- Evidence of errors identified in historical water use, including volumes of reuse (treated effluent) or brackish groundwater that were not included in the draft projections.

[2] In 2019, the TWDB updated water use estimates for 2015-2019 using updated geographic splits (region/county/basin), assumed water use parameters for five types of livestock, and broiler chicken inventory estimates.

During the review process, the TWDB also imposes one other restriction on revisions of the draft livestock water demand projections: Projections for all counties must have the same basis. For example, if the Planning Group recommends using the average of the 2015-2019 livestock water use estimates to project future water demand, then it must recommend this basis for all counties.

The Planning Group must provide the following data associated with the identified criteria to the Executive Administrator for justifying any adjustments to the livestock water demand projections:

- Documentation of plans for the construction of a confined livestock feeding facility in a county at some future date will include the following:
    - Confirmation of land purchase or lease arrangements for the facility.
    - The construction schedule including the date the livestock feeding facility will become operational.
    - The daily water requirements of the planned livestock feeding facility.
- Other evidence that would document an expected increase or decrease in the livestock inventory in the county.
- Other data that the RWPG considers adequate to justify an adjustment to the livestock water demand projections.

2.0 RCWPG-RECOMMENDED REVISIONS TO DRAFT Livestock Water DEMAND PROJECTIONS

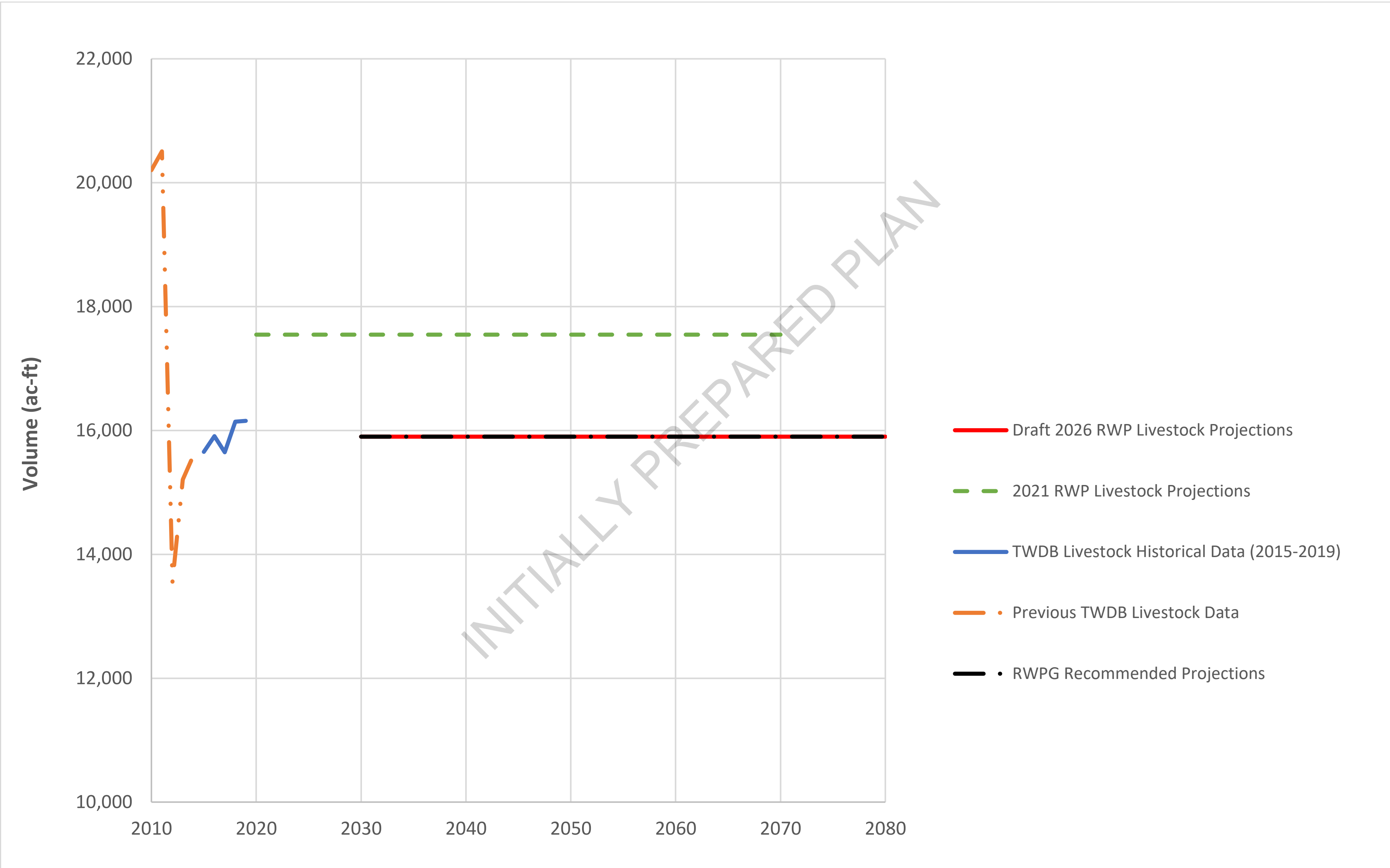
A comparison of the draft projections for the 2026 RWP (provided by TWDB) and the final 2021 RWP projections is presented in Table 1 and Figure 2. After reviewing the available data, the Planning Group recommends no changes to the draft projections for the 2026 RWP.

Table 1. Comparison of Region C Livestock Demand Projections

County Name	2021 RWP Projections (ac-ft/yr)						Draft Projections for 2026 RWP (ac-ft/yr)						Recommended RWPG Revisions (ac-ft/yr)					
	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080
Collin	912	912	912	912	912	912	801	801	801	801	801	801	801	801	801	801	801	801
Cooke	1,330	1,330	1,330	1,330	1,330	1,330	1,508	1,508	1,508	1,508	1,508	1,508	1,508	1,508	1,508	1,508	1,508	1,508
Dallas	758	758	758	758	758	758	248	248	248	248	248	248	248	248	248	248	248	248
Denton	769	769	769	769	769	769	840	840	840	840	840	840	840	840	840	840	840	840
Ellis	1,140	1,140	1,140	1,140	1,140	1,140	923	923	923	923	923	923	923	923	923	923	923	923
Fannin	1,411	1,411	1,411	1,411	1,411	1,411	1,375	1,375	1,375	1,375	1,375	1,375	1,375	1,375	1,375	1,375	1,375	1,375
Freestone	1,207	1,207	1,207	1,207	1,207	1,207	1,430	1,430	1,430	1,430	1,430	1,430	1,430	1,430	1,430	1,430	1,430	1,430
Grayson	1,143	1,143	1,143	1,143	1,143	1,143	1,106	1,106	1,106	1,106	1,106	1,106	1,106	1,106	1,106	1,106	1,106	1,106
Henderson	1,261	1,261	1,261	1,261	1,261	1,261	694	694	694	694	694	694	694	694	694	694	694	694
Jack	785	785	785	785	785	785	685	685	685	685	685	685	685	685	685	685	685	685
Kaufman	1,570	1,570	1,570	1,570	1,570	1,570	1,413	1,413	1,413	1,413	1,413	1,413	1,413	1,413	1,413	1,413	1,413	1,413
Navarro	1,691	1,691	1,691	1,691	1,691	1,691	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512
Parker	1,634	1,634	1,634	1,634	1,634	1,634	1,503	1,503	1,503	1,503	1,503	1,503	1,503	1,503	1,503	1,503	1,503	1,503
Rockwall	111	111	111	111	111	111	106	106	106	106	106	106	106	106	106	106	106	106
Tarrant	627	627	627	627	627	627	341	341	341	341	341	341	341	341	341	341	341	341
Wise	1,198	1,198	1,198	1,198	1,198	1,198	1,415	1,415	1,415	1,415	1,415	1,415	1,415	1,415	1,415	1,415	1,415	1,415
Total	**17,547**	**17,547**	**17,547**	**17,547**	**17,547**	**17,547**	**15,900**	**15,900**	**15,900**	**15,900**	**15,900**	**15,900**	**15,900**	**15,900**	**15,900**	**15,900**	**15,900**	**15,900**

Grey text indicates that the was no change from the TWDB Draft projections.

Figure 2. Region C Livestock – Comparison of Water Use Estimates, 2021 Region C Water Plan Projection, Proposed Projections, and Revised Projections



Attachment A
Livestock Demand by County
Historical Usage and Projections

Figure 1A. Collin County Livestock Comparison

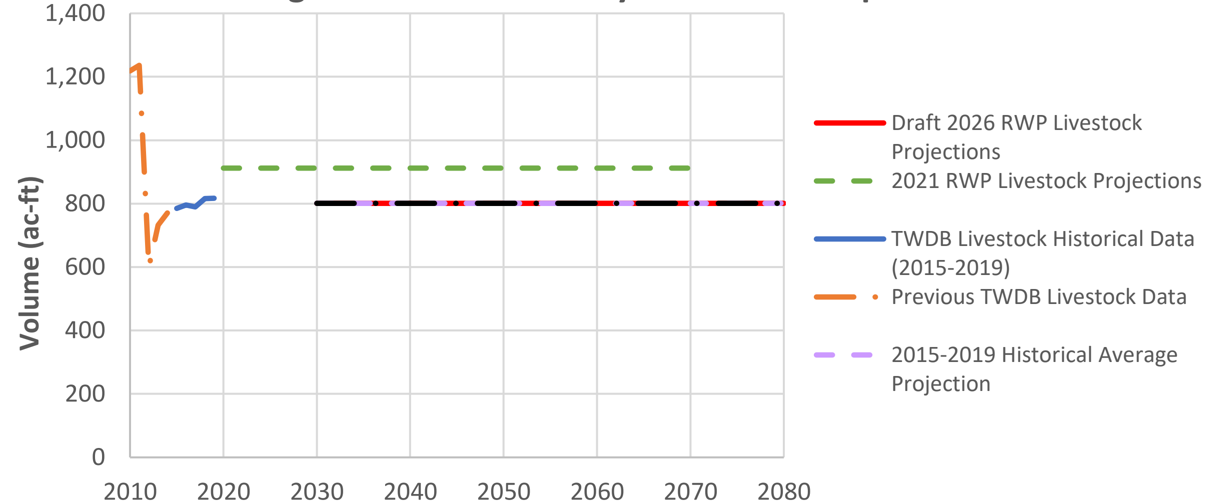


Figure 2A. Cooke County Livestock Comparison

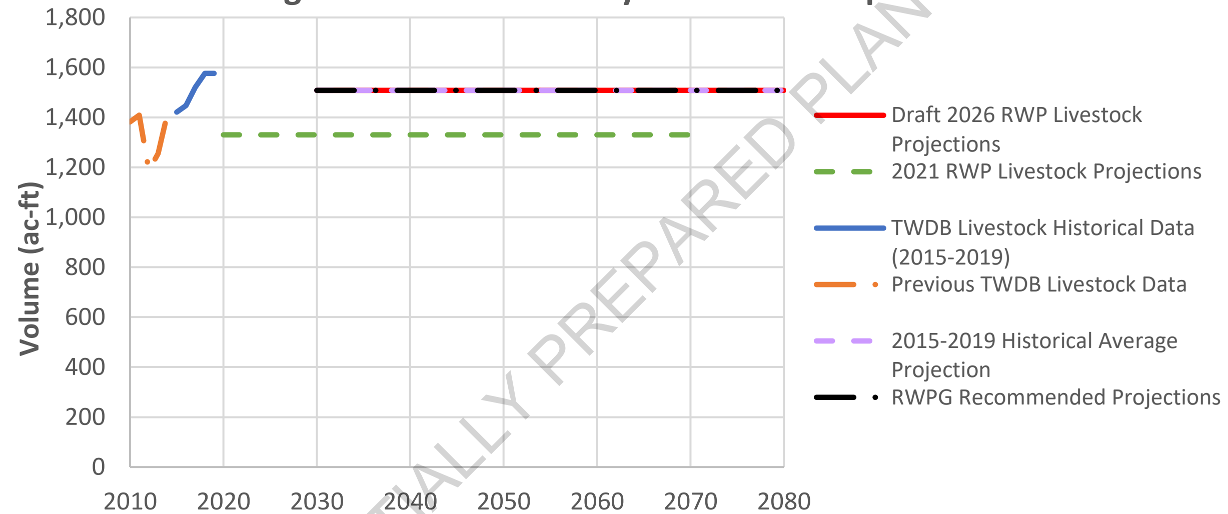
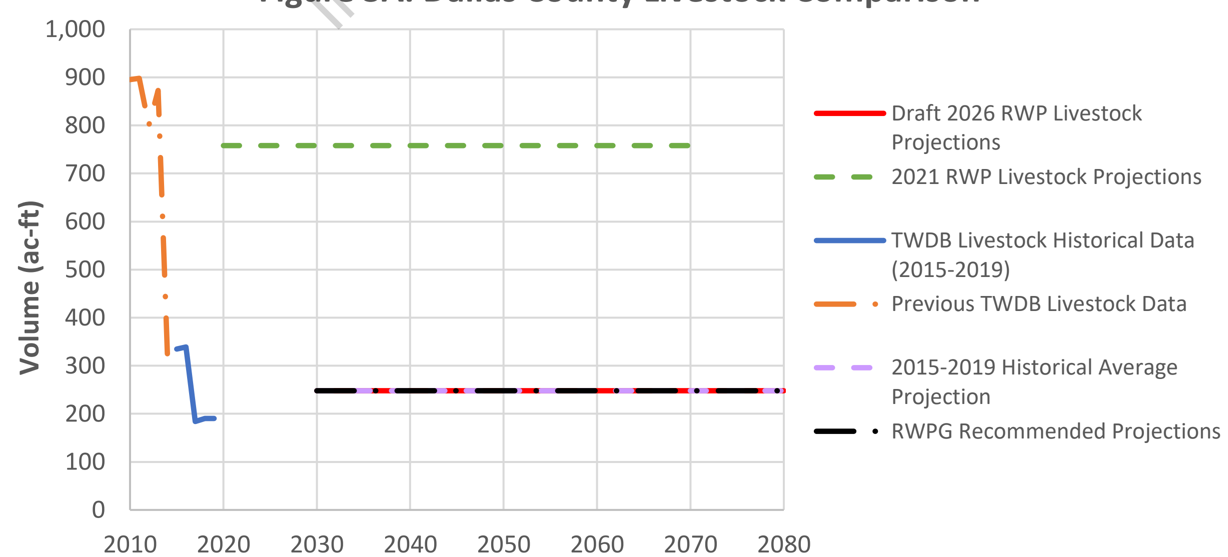


Figure 3A. Dallas County Livestock Comparison



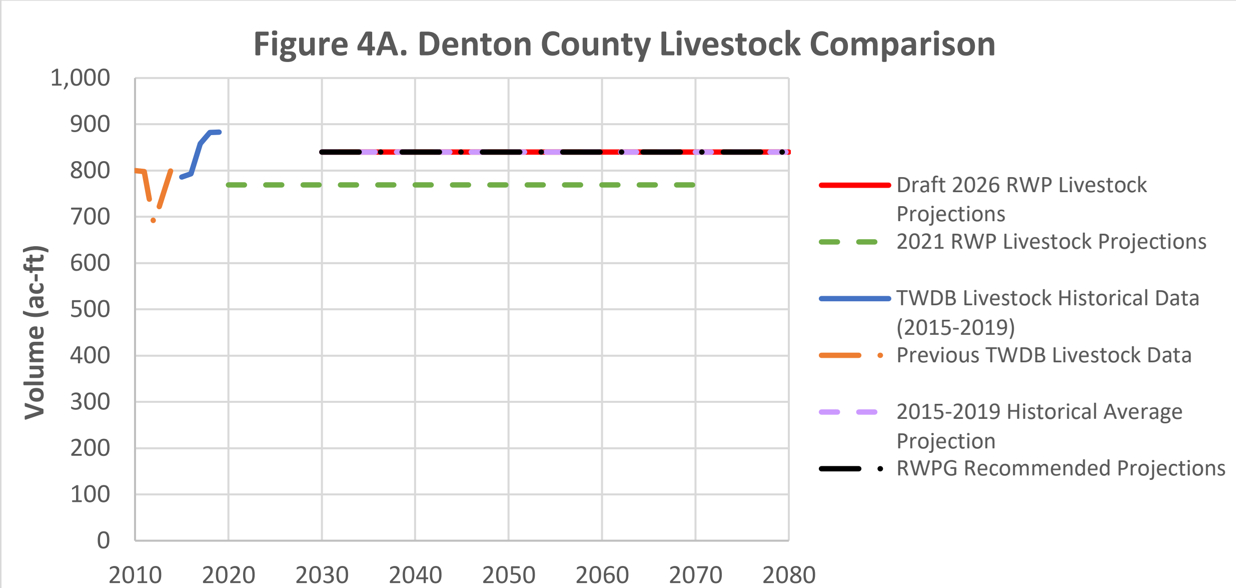


Figure 4A. Denton County Livestock Comparison
Volume (ac-ft)
1,000
900
800
700
600
500
400
300
200
100
0
2010
2020
2030
2040
2050
2060
2070
2080
Draft 2026 RWP Livestock Projections
2021 RWP Livestock Projections
TWDB Livestock Historical Data (2015-2019)
Previous TWDB Livestock Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

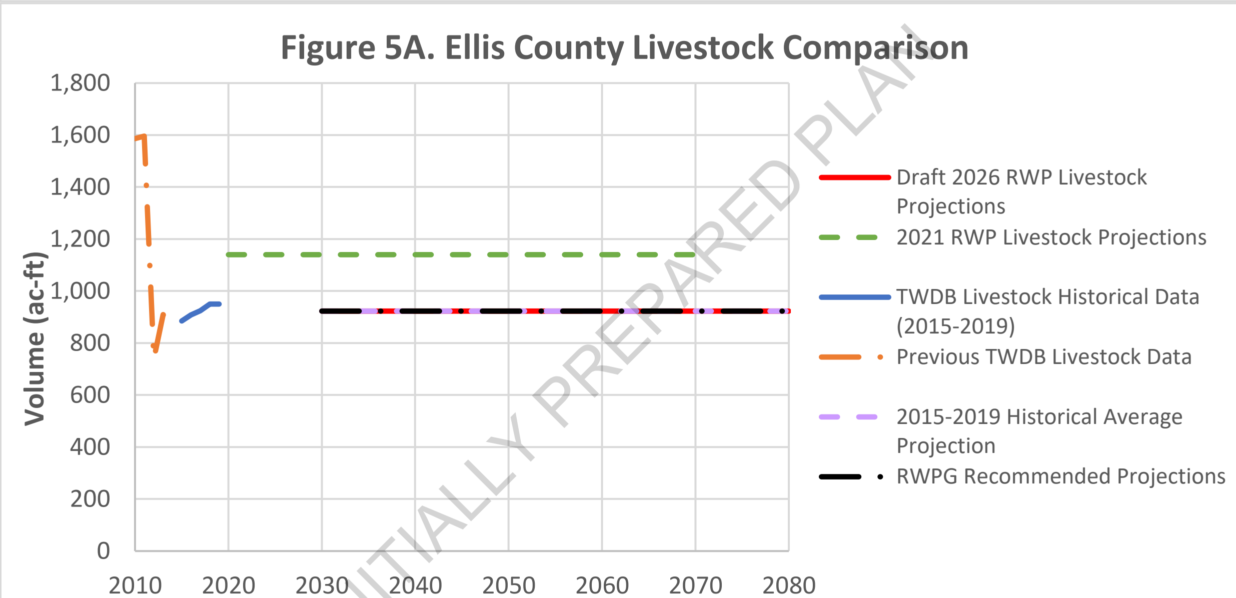


Figure 5A. Ellis County Livestock Comparison
Volume (ac-ft)
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
2010
2020
2030
2040
2050
2060
2070
2080
Draft 2026 RWP Livestock Projections
2021 RWP Livestock Projections
TWDB Livestock Historical Data (2015-2019)
Previous TWDB Livestock Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

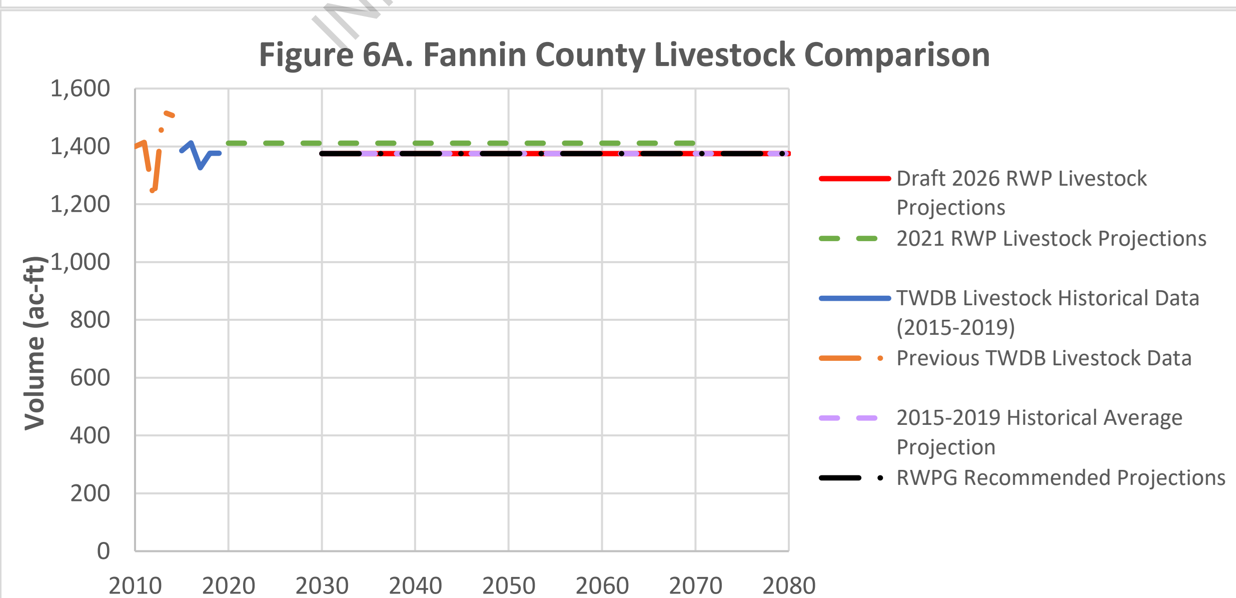


Figure 6A. Fannin County Livestock Comparison
Volume (ac-ft)
1,600
1,400
1,200
1,000
800
600
400
200
0
2010
2020
2030
2040
2050
2060
2070
2080
Draft 2026 RWP Livestock Projections
2021 RWP Livestock Projections
TWDB Livestock Historical Data (2015-2019)
Previous TWDB Livestock Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

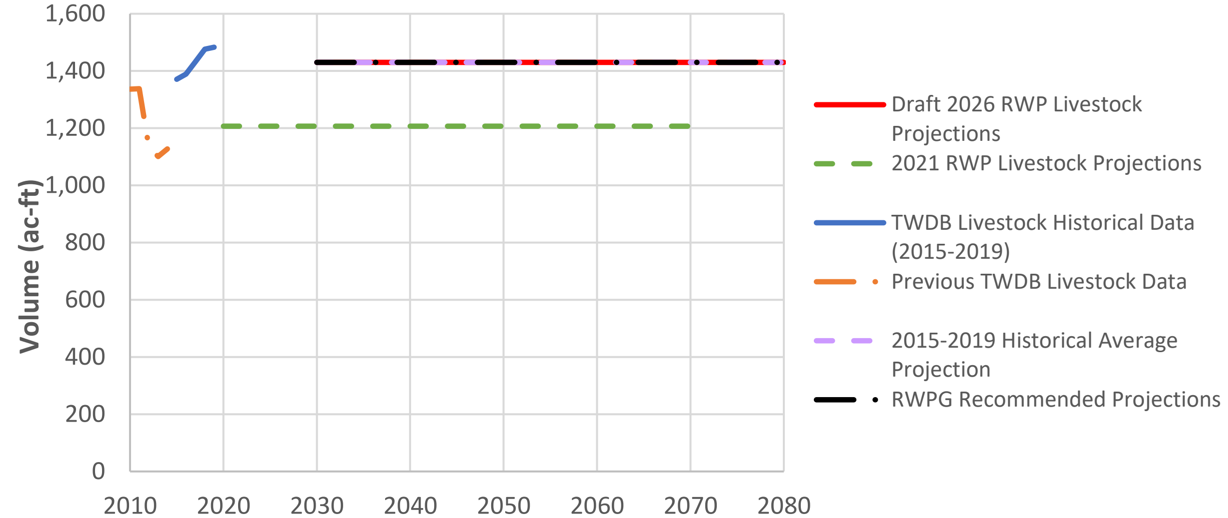


Figure 7A. Freestone County Livestock Comparison

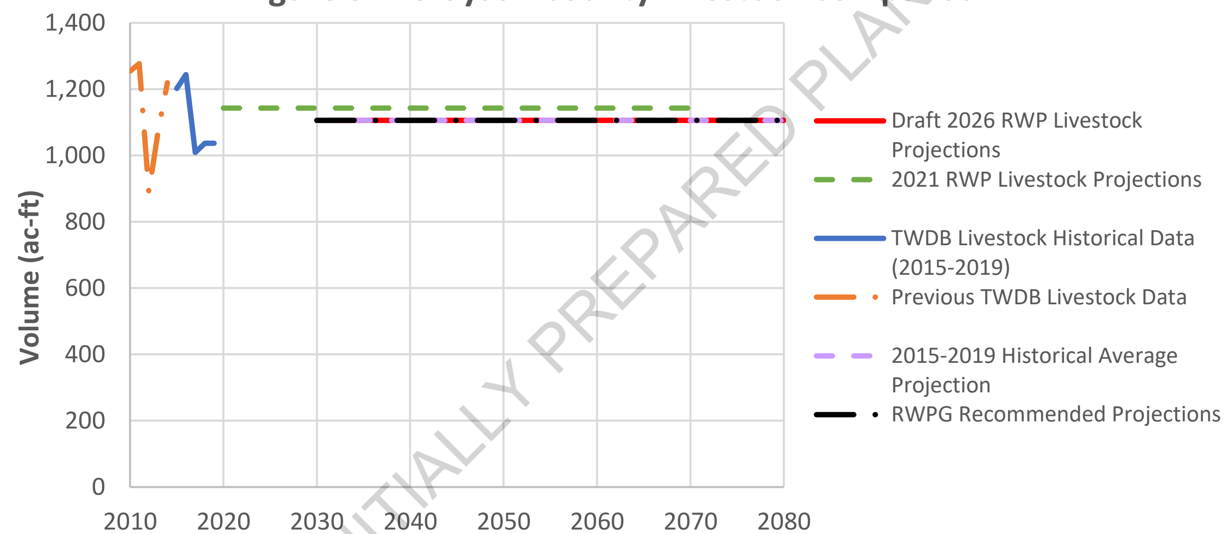


Figure 8A. Grayson County Livestock Comparison

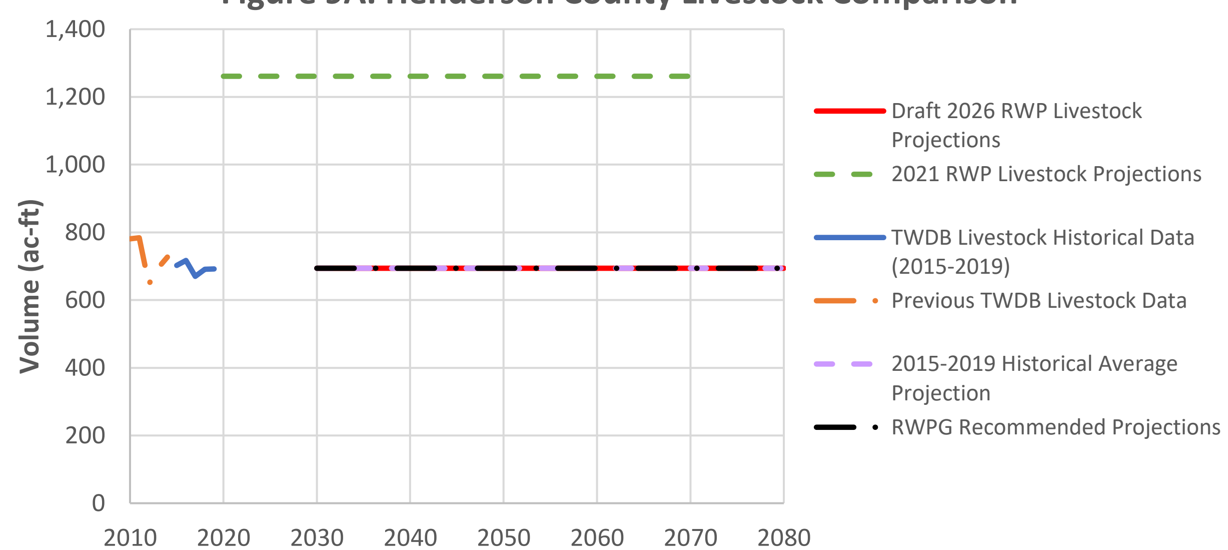


Figure 9A. Henderson County Livestock Comparison

Figure 10A. Jack County Livestock Comparison

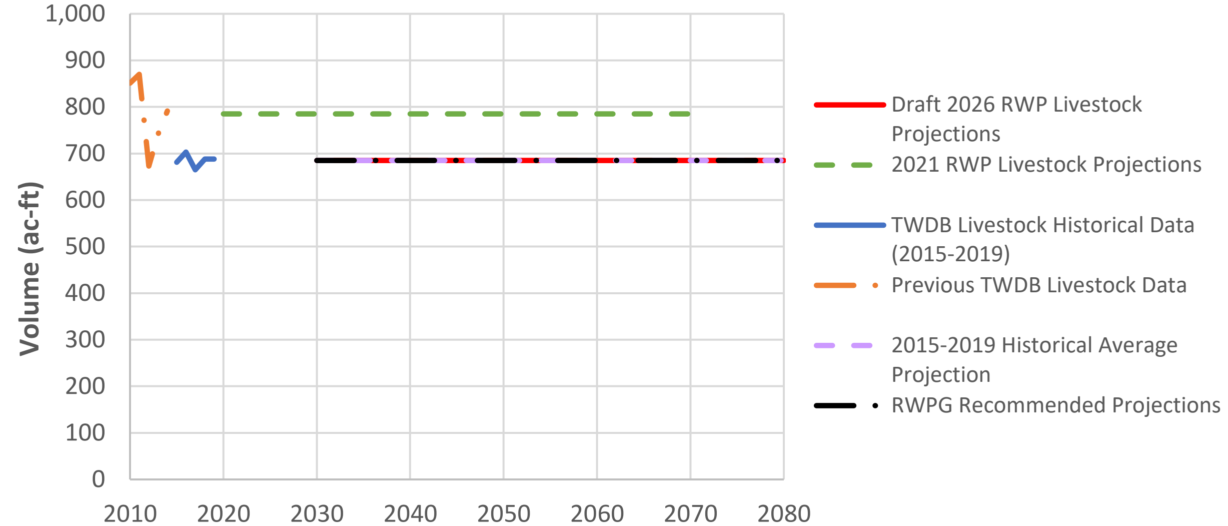


Figure 11A. Kaufman County Livestock Comparison

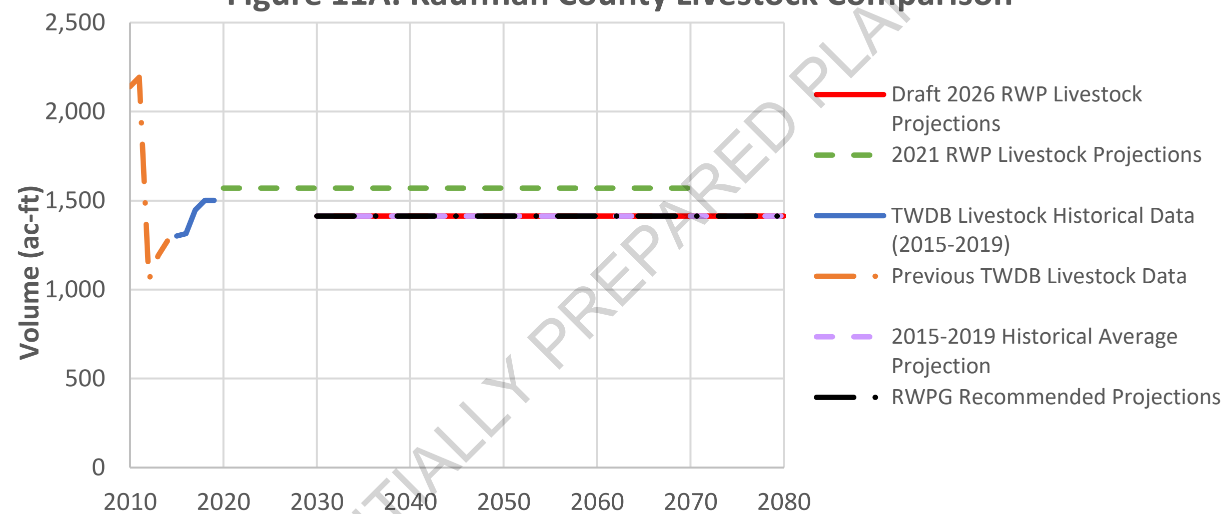
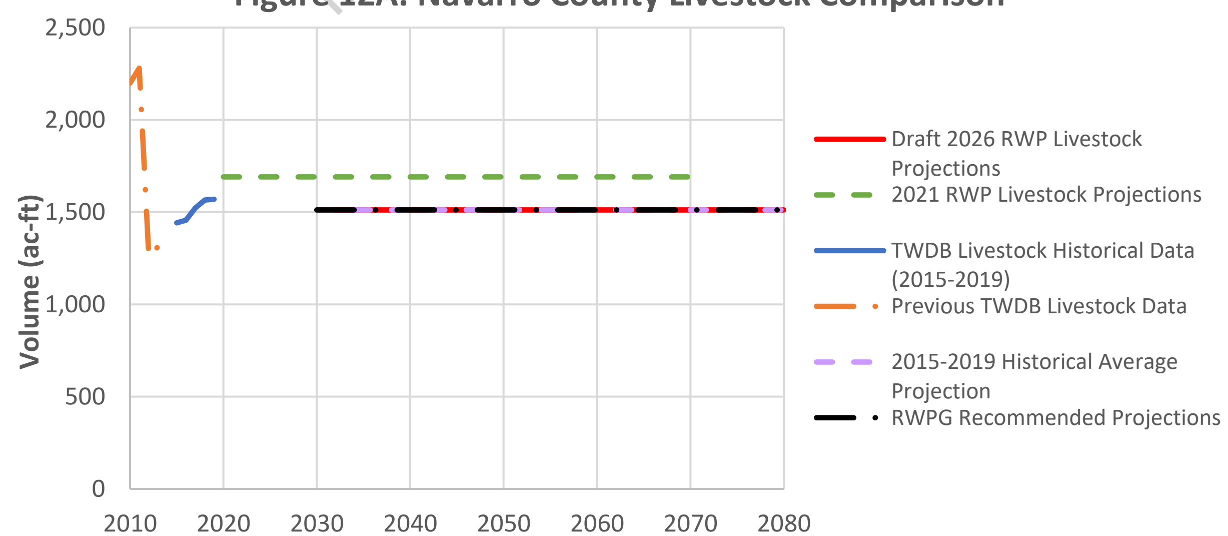


Figure 12A. Navarro County Livestock Comparison



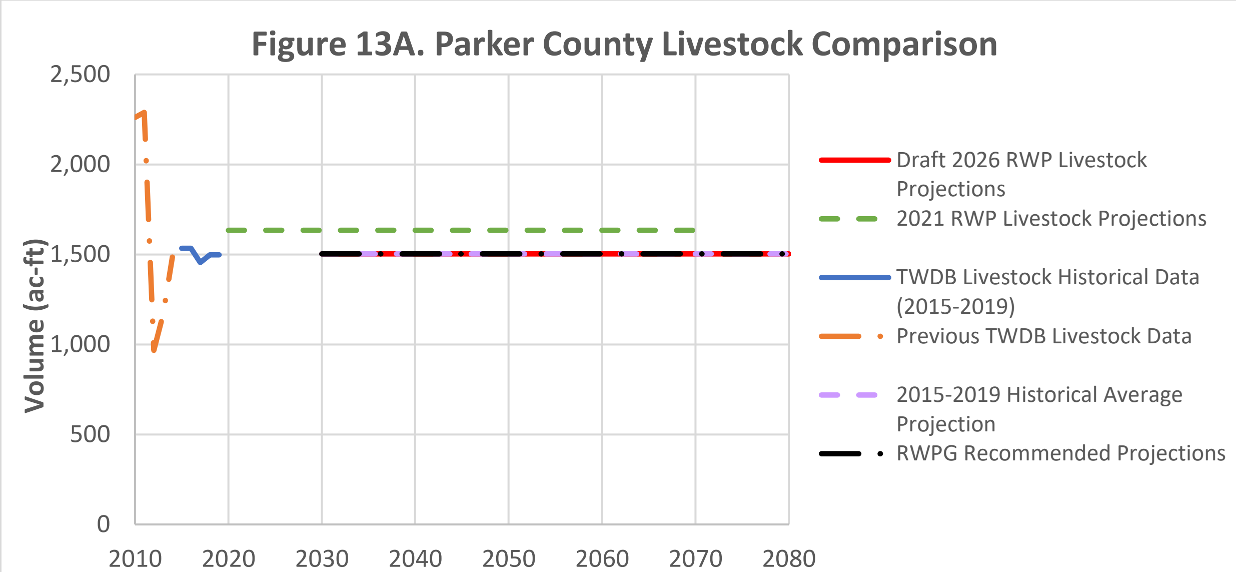


Figure 13A. Parker County Livestock Comparison
Volume (ac-ft)
2,500
2,000
1,500
1,000
500
0
2010
2020
2030
2040
2050
2060
2070
2080
Draft 2026 RWP Livestock Projections
2021 RWP Livestock Projections
TWDB Livestock Historical Data (2015-2019)
Previous TWDB Livestock Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

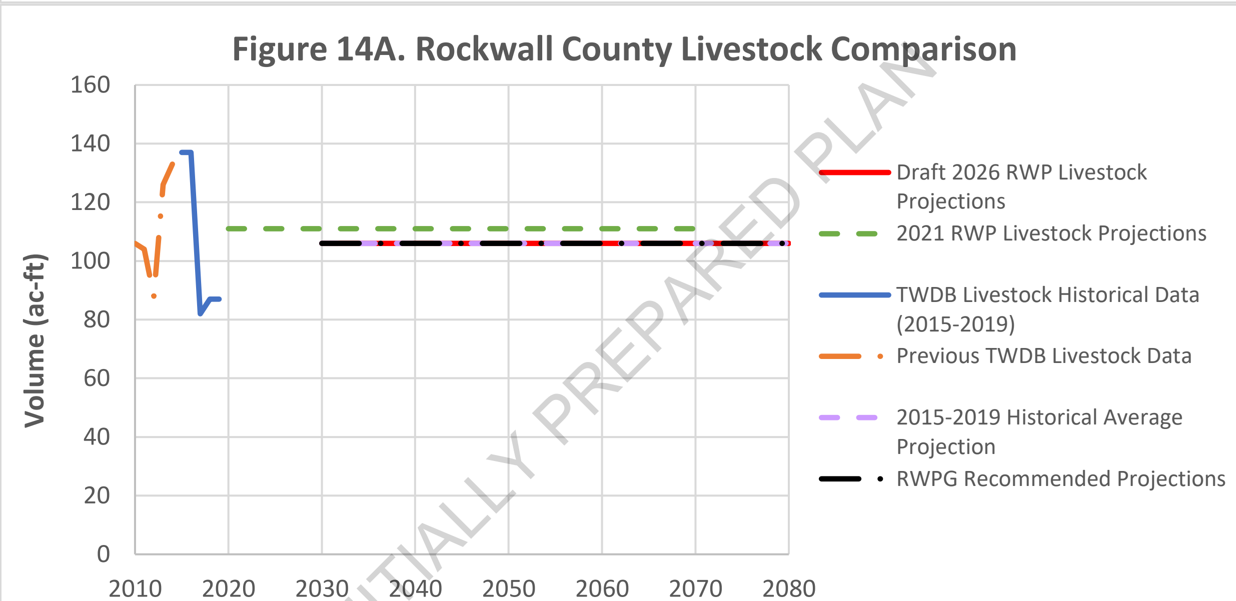


Figure 14A. Rockwall County Livestock Comparison
Volume (ac-ft)
160
140
120
100
80
60
40
20
0
2010
2020
2030
2040
2050
2060
2070
2080
Draft 2026 RWP Livestock Projections
2021 RWP Livestock Projections
TWDB Livestock Historical Data (2015-2019)
Previous TWDB Livestock Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

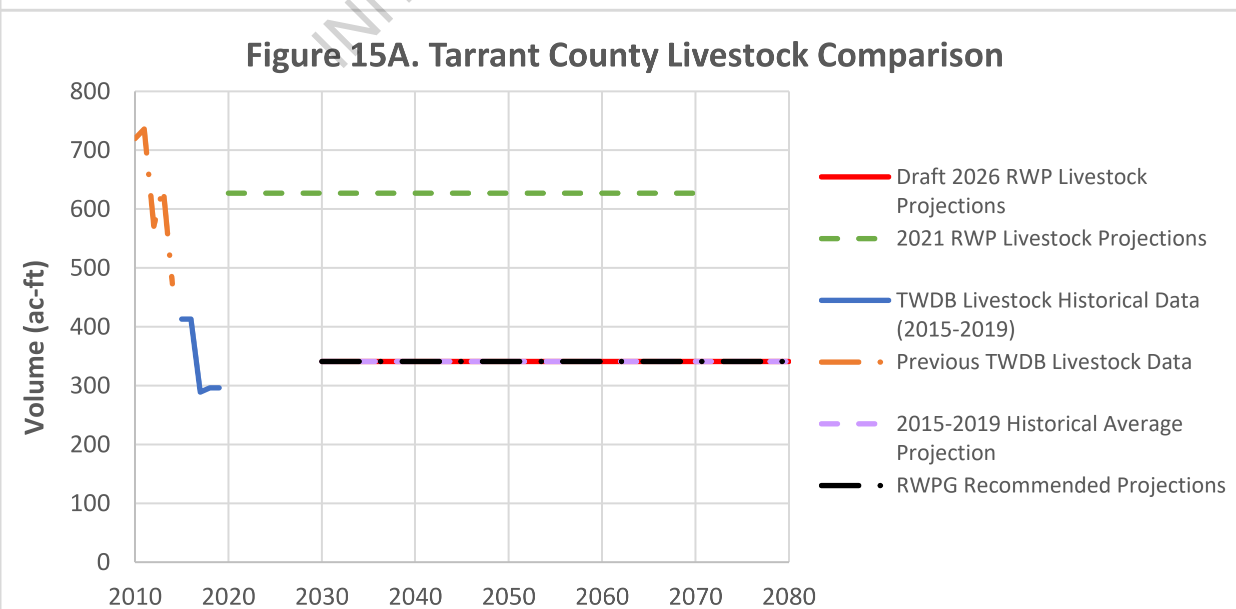


Figure 15A. Tarrant County Livestock Comparison
Volume (ac-ft)
800
700
600
500
400
300
200
100
0
2010
2020
2030
2040
2050
2060
2070
2080
Draft 2026 RWP Livestock Projections
2021 RWP Livestock Projections
TWDB Livestock Historical Data (2015-2019)
Previous TWDB Livestock Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

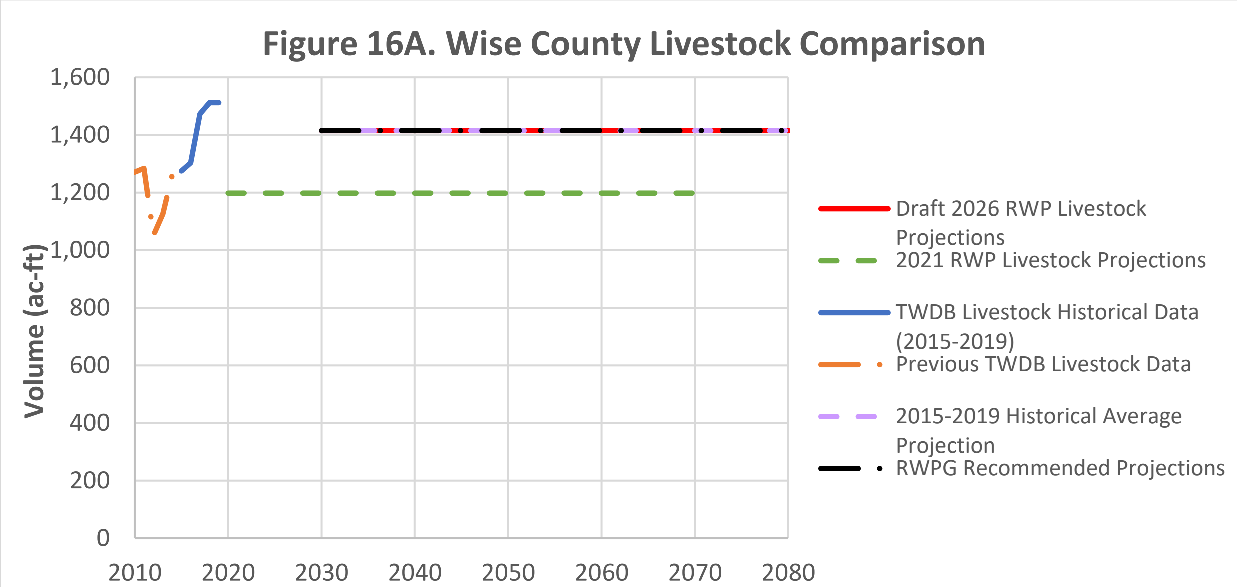


Figure 16A. Wise County Livestock Comparison
Volume (ac-ft)
1,600
1,400
1,200
1,000
800
600
400
200
0
2010
2020
2030
2040
2050
2060
2070
2080
Draft 2026 RWP Livestock Projections
2021 RWP Livestock Projections
TWDB Livestock Historical Data (2015-2019)
Previous TWDB Livestock Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

MEMORANDUM

FREESE AND NICHOLS

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801 Cherry Street, Suite 2800 + Fort Worth, Texas 76102 + 817-735-7300 + FAX 817-735-7491 www.freese.com

TO: Region C Regional Water Planning Group

CC: File

FROM: Freese and Nichols, Inc.

SUBJECT: Memorandum on Draft Mining Water Use Projections

DATE: 11/2/2022

PROJECT: TRA21862

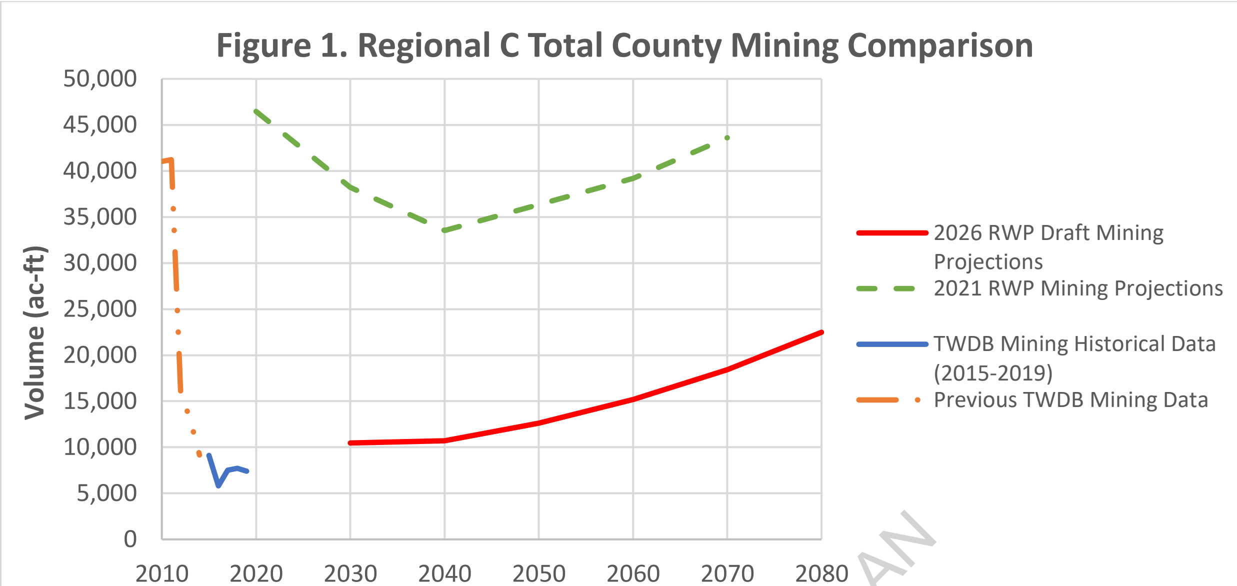
1.0 BACKGROUND

The Texas Water Development Board (TWDB) provided the planning groups with draft mining demand projections in August of 2022. These projections were developed in conjunction with a special study on mining water use authorized by the TWDB. This study evaluated water use for the oil and gas industry, coal mining, and aggregate mining within Texas. The draft mining demand projections are presented by county and will be reviewed by the individual planning groups. Any recommended changes to these projections will be provided to the TWDB for consideration, and the final projections will ultimately be adopted by the planning groups and the TWDB. Historically, mining has accounted for approximately 10 percent of all non-municipal water use in Region C[1].

1.1 Historical Mining Water Use Estimates

The TWDB publishes historical annual mining water use estimates for each county. Mining water use is water used for oil and gas development, as well as coal and lignite, sand aggregate, and other resource extraction. Since the year 2015, the region-wide mining water use estimates have ranged from 5,812 to 9,116 acre-feet per year (Figure 1). As of August 2022, historical data estimates were available through the year 2019.

[1] Based on historical water use estimates from the TWDB.



1.2 TWDB Draft Mining Water Demand Projections

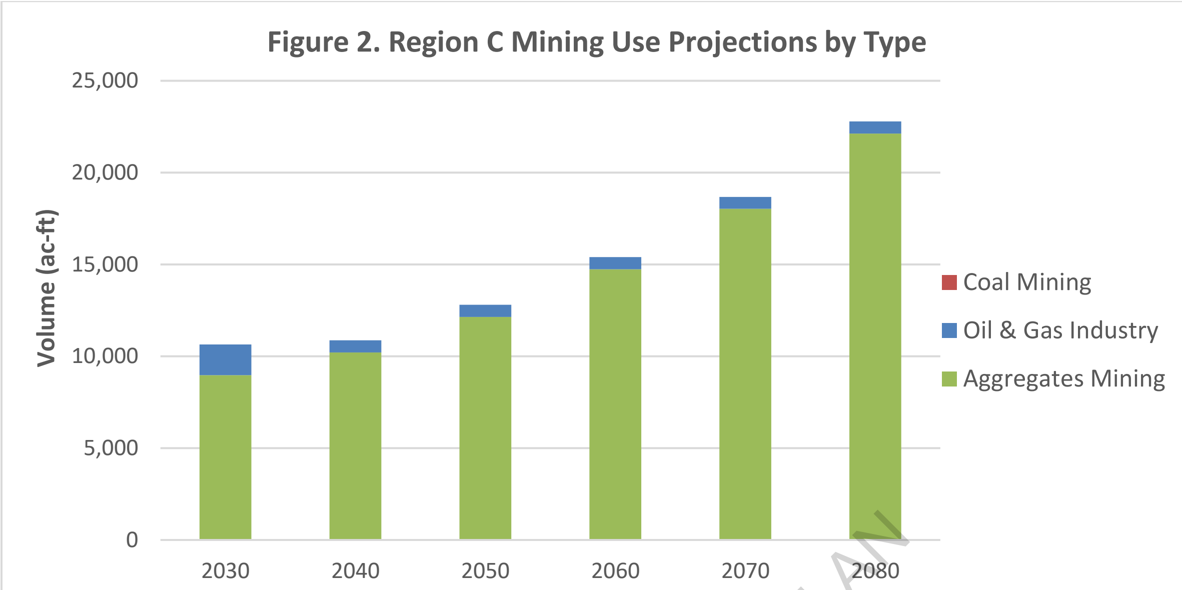
TWDB's draft mining water demand projections for the 2026 Regional Water Plan (RWP) were developed from a 2022 TWDB-contracted mining use study with the Bureau of Economic Geology (BEG) and U.S. Geological Survey (USGS).[2]

The mining use study estimated current mining water use and projected use across the planning horizon using data collected from trade organizations, government agencies, and other industry representatives. The projections include information from three mining categories: oil and gas industry, coal mining, and aggregates mining. Figure 2 shows Region C mining use projections by type. The mining use study projects Region C mining use to gradually increase through 2080 due to increased demand for aggregate industry products. Oil and gas mining use is projected to decrease in 2040 as major oil and gas development matures. Currently, there are no active coal mines in Region C. In the past there were two lignite coal mines located in Freestone County, Turlington Strip Mine and Big Brown Strip, which closed in 2011 and 2017 respectively.

Data used to evaluate the draft mining demands in the mining use study were obtained from the following sources:

- Texas Water Development Board (TWDB)
- Texas Commission on Environmental Quality (TCEQ)
- Railroad Commission of Texas (RRC)
    - Information Handling Services (IHS)[3]
    - B3 Insight[4]
- United States Geological Survey (USGS)
- FracFocus (referenced above)

[2] Bureau of Economic Geology and U.S. Geological Survey, *Water Use by the Mining Industry in Texas*, prepared for Texas Water Development Board, August 2022.
[3] https://ihsmarkit.com/
[4] https://www.b3insight.com/



1.3 Criteria for Revising the Draft Mining Water Demand Projections

One or more of the following criteria must be verified by the Planning Group and the Executive Administrator for consideration of revising the mining water demand projections:

- Evidence that mining water use in a county is substantially different than the draft projections. This could include trends in water use data from FracFocus national online registry,[5] the Texas Railroad Commission, or other sources.
- Evidence of new facilities coming online, reported closures in surveyed facilities that may impact county projections
- Evidence of errors identified in historical water use, including volumes of reuse (treated effluent) water or brackish groundwater that were not included in the draft projections.

The Planning Group must provide the following data associated with the identified criteria to the Executive Administrator for justifying any adjustments to the mining water demand projections:

- Historical (2015-2019) water use data and description of a surveyed or future facility, and any other information necessary to estimate water use.
- Reports describing alternative trends or anticipated water use for mining.
- Other data that the RWPG considers adequate to justify an adjustment to the mining water demand projections will be considered.

[5] https://fracfocus.org/

2.0 RCWPG REVIEW OF DRAFT MINING WATER DEMAND PROJECTIONS

A comparison of the draft projections for the 2026 RWP (provided by TWDB) and the final 2021 RWP projections is presented in Table 1 and Figure 3. The 2021 RWP projections were originally developed from a 2011 TWDB-contracted study with the BEG[6] and a September 2012 update to the BEG study[7]. The 2021 SWP projections for Ellis, Fannin, Grayson, Henderson, Jack, Navarro, and Tarrant Counties were then revised based on input from the Region C Water Planning Group (RCWPG).

Overall, Region C's 2026 RWP mining use projections have declined compared to the 2021 RWP projections due to a historic decline in overall mining use from 2012 through 2019 (Figure 3). Additionally, two lignite mines, Turlington Strip Mine and Big Brown Strip, closed in 2011 and 2017 respectively. Fannin and Kaufman Counties 2026 RWP mining projections have increased compared to the 2021 RWP projections due to an increase in aggregate mining. On the other hand, the 2026 RWP projections have decreased since the last RWP in Cooke, Dallas, Denton, Freestone, Parker, Tarrant, and Wise Counties due to reduced oil and gas fracking. Henderson and Jack Counties saw a decrease in water use projections due to a decrease in aggregate mining.

After reviewing the data described in the previous section, the RCWPG recommends no change to the draft county-level mining water demand projections.

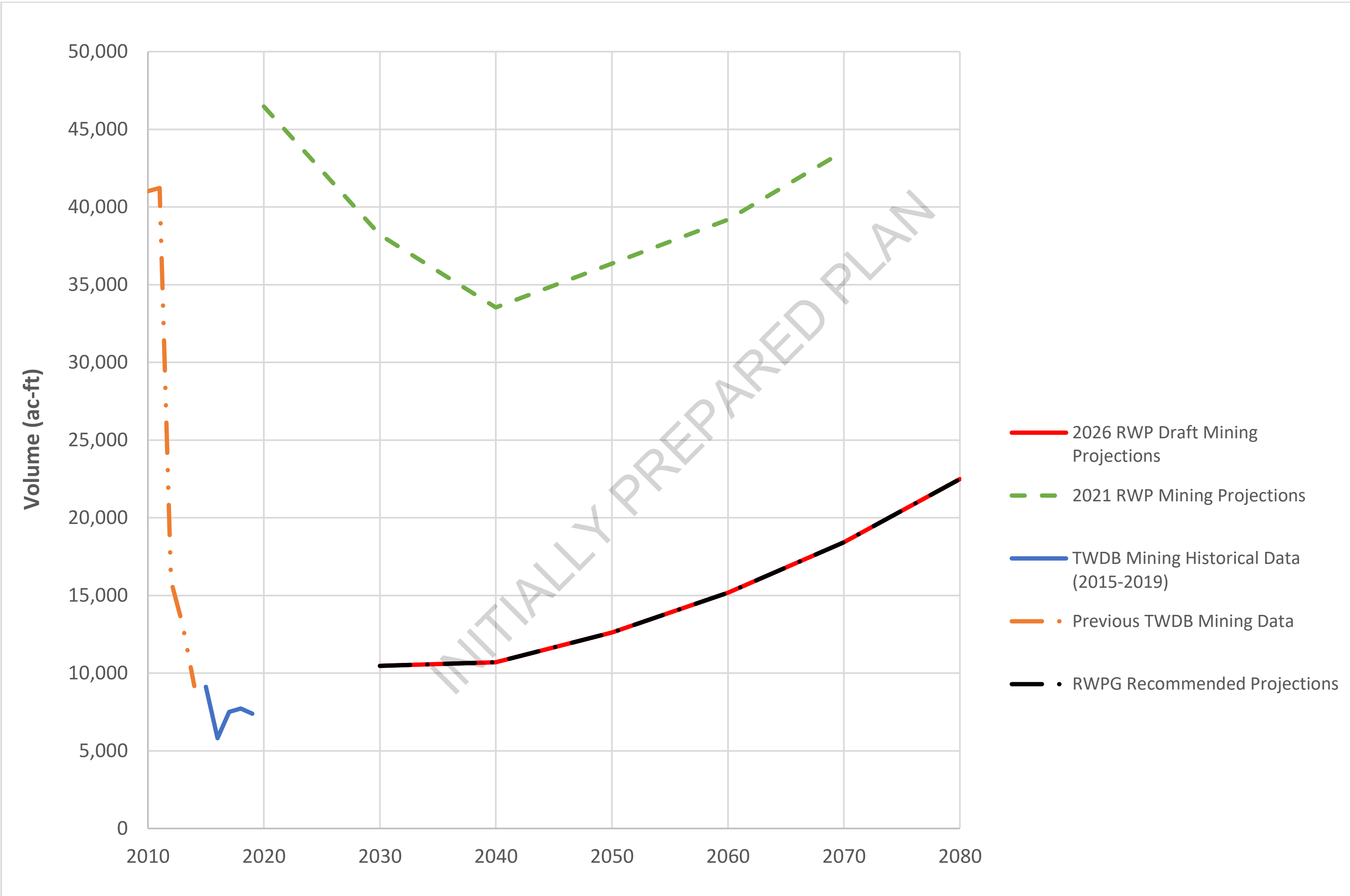
[6] Bureau of Economic Geology, *Current and Projected Water Use in the Texas Mining and Oil and Gas Industry*, prepared for Texas Water Development Board, June 2011.
[7] Bureau of Economic Geology, *Oil and Gas Water Use in Texas: Update to the 2011 Mining Water Use Report*, prepared for Texas Water Development Board, September 2012.

Table 1. Comparison of Region C Mining Demand Projections

County Name	2021 RWP Projections (ac-ft/yr)						Draft Projections for 2026 RWP (ac-ft/yr)						Recommended RWPG Revisions (ac-ft/yr)					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Collin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cooke	1,583	900	378	446	511	586	12	12	12	13	13	13	12	12	12	13	13	13
Dallas	3,038	2,656	2,279	1,930	1,922	1,916	32	32	32	32	32	32	32	32	32	32	32	32
Denton	4,326	2,729	3,345	4,306	5,204	6,291	259	75	87	99	111	120	259	75	87	99	111	120
Ellis	931	547	164	123	82	55	0	0	0	0	0	0	0	0	0	0	0	0
Fannin	574	351	128	128	128	128	1,747	2,070	2,561	3,376	4,258	5,130	1,747	2,070	2,561	3,376	4,258	5,130
Freestone	5,347	5,115	5,251	5,286	5,356	5,582	200	200	200	200	200	200	200	200	200	200	200	200
Grayson	312	210	107	123	142	163	295	295	295	295	295	295	295	295	295	295	295	295
Henderson	434	506	481	484	479	469	15	16	17	19	22	26	15	16	17	19	22	26
Jack	3,396	1,821	1,698	1,731	1,768	1,862	35	35	35	35	35	35	35	35	35	35	35	35
Kaufman	296	386	491	646	783	951	1,453	1,736	2,101	2,679	3,357	4,134	1,453	1,736	2,101	2,679	3,357	4,134
Navarro	1,193	1,238	1,282	1,572	1,806	2,076	1,748	1,915	2,125	2,352	2,723	3,293	1,748	1,915	2,125	2,352	2,723	3,293
Parker	3,182	4,029	4,006	4,073	4,124	4,364	1,062	1,126	1,385	1,712	2,060	2,411	1,062	1,126	1,385	1,712	2,060	2,411
Rockwall	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tarrant	11,535	6,562	1,589	1,537	1,497	1,464	525	106	115	121	129	136	525	106	115	121	129	136
Wise	10,320	11,159	12,337	13,975	15,378	17,694	3,084	3,074	3,650	4,246	5,193	6,663	3,084	3,074	3,650	4,246	5,193	6,663
Total	**46,467**	**38,209**	**33,536**	**36,360**	**39,180**	**43,601**	**10,467**	**10,692**	**12,615**	**15,179**	**18,428**	**22,488**	**10,467**	**10,692**	**12,615**	**15,179**	**18,428**	**22,488**

Grey text indicates that the was no change from the TWDB Draft projections.

Figure 3. Region C Mining – Comparison of Water Use Estimates, 2021 Region C Water Plan Projection, Proposed Projections, and Revised Projections



Attachment A
Mining Demand by County
Historical Usage and Projections

Figure 1A. Collin County Mining Comparison

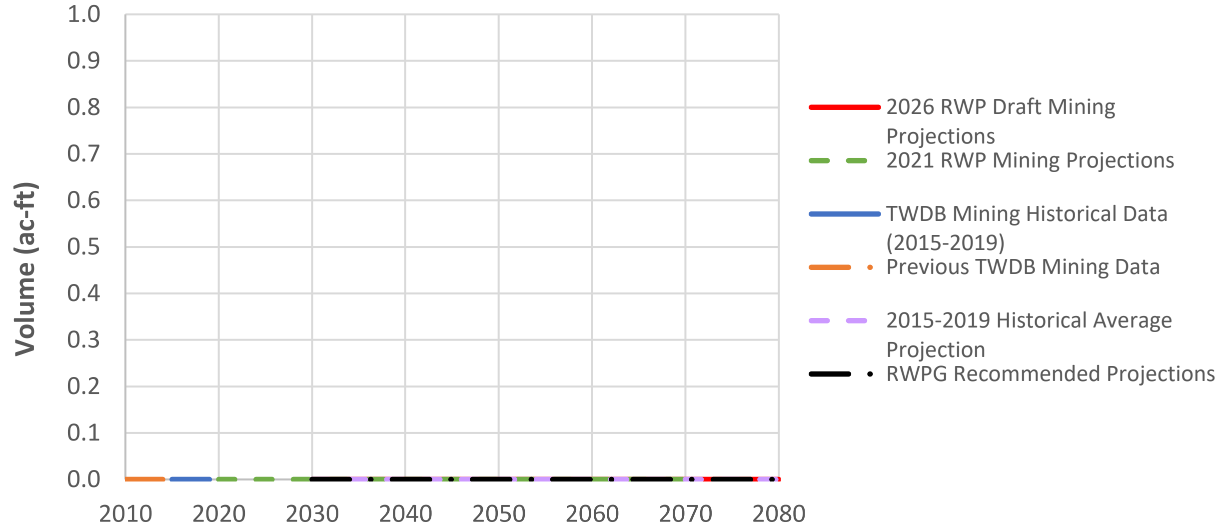


Figure 2A. Cooke County Mining Comparison

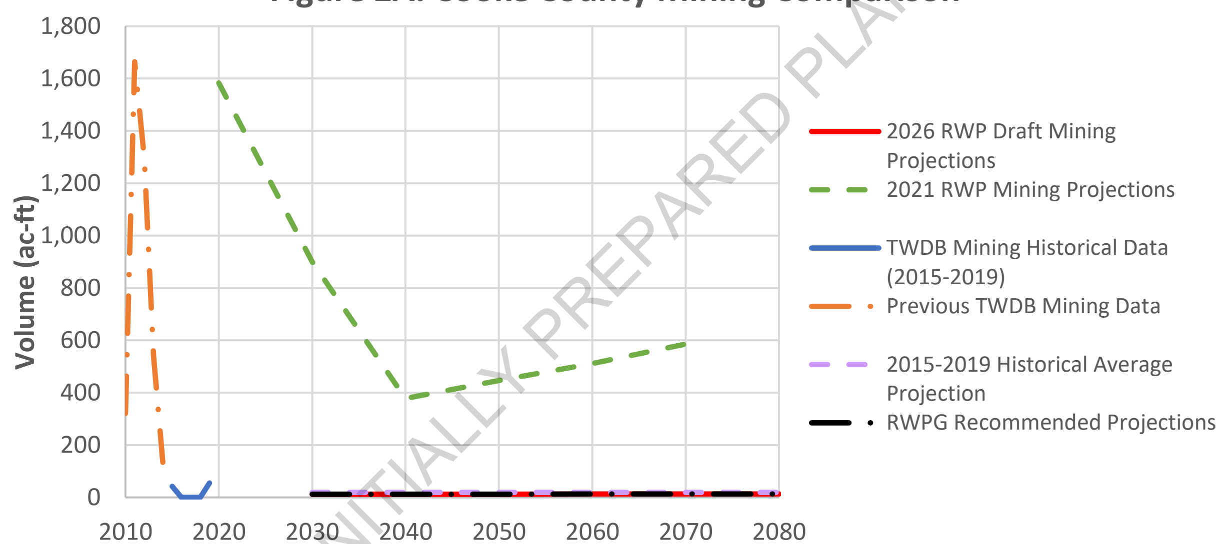


Figure 3A. Dallas County Mining Comparison

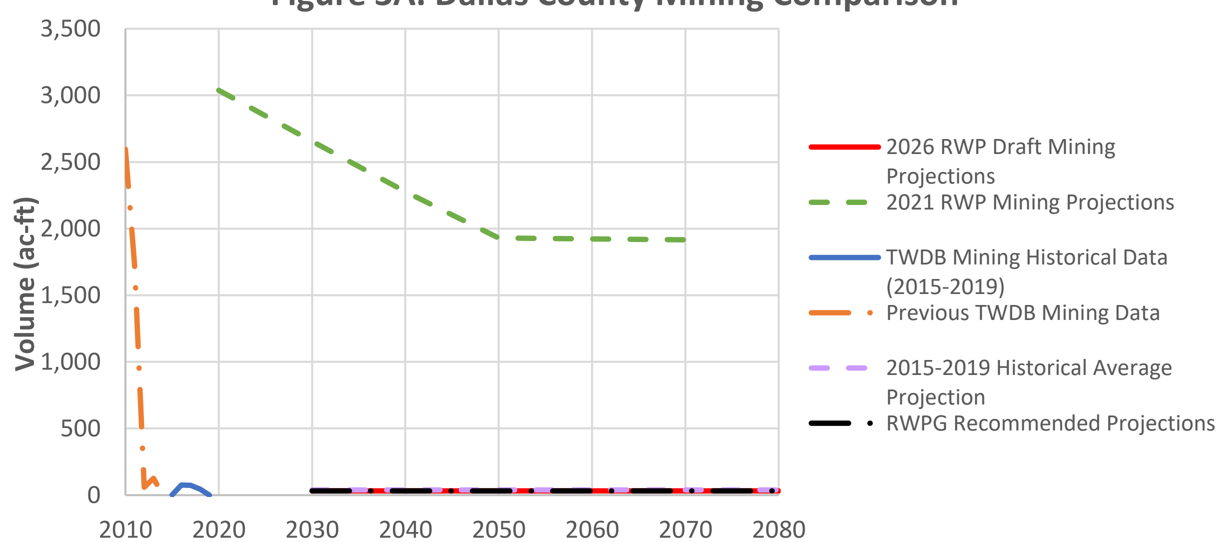


Figure 4A. Denton County Mining Comparison

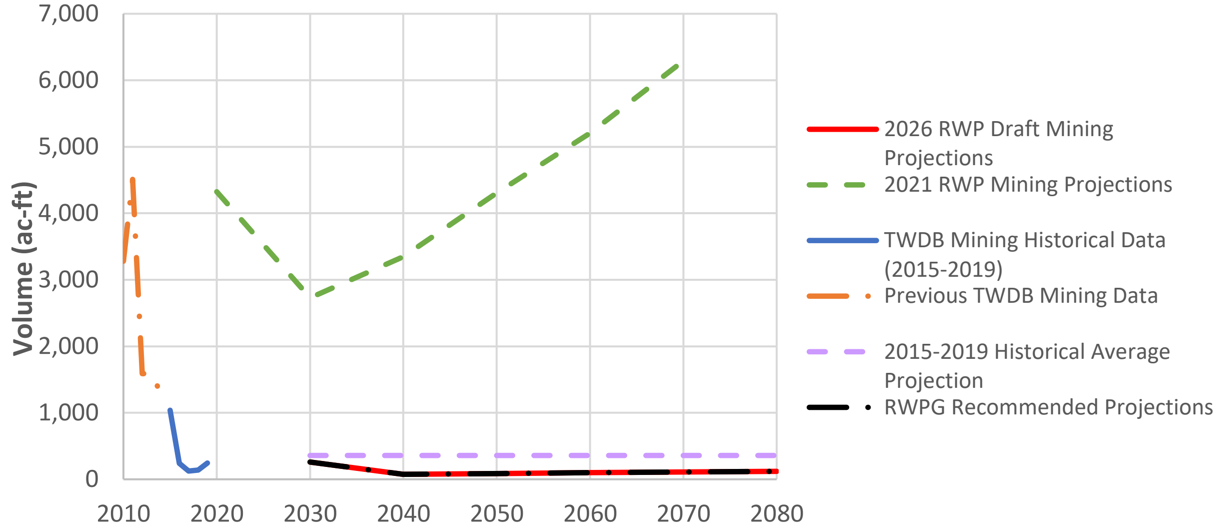


Figure 5A. Ellis County Mining Comparison

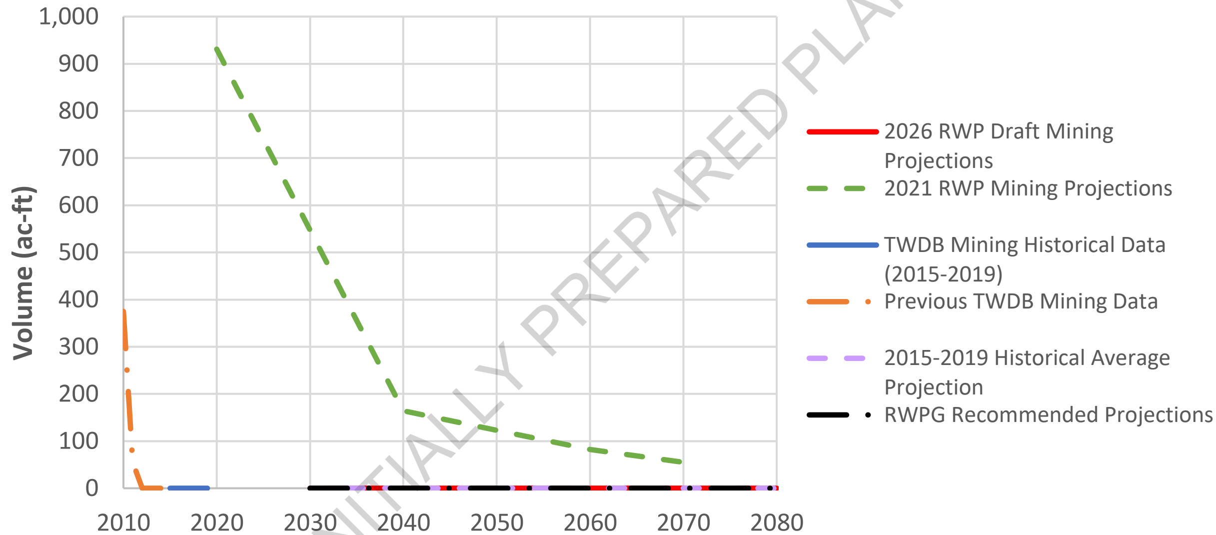
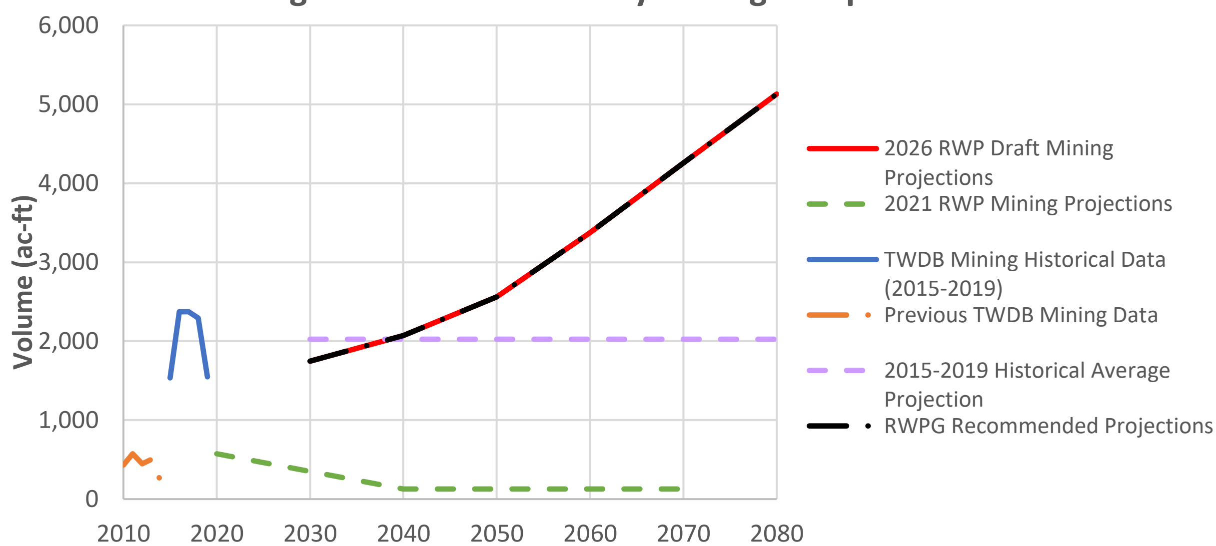


Figure 6A. Fannin County Mining Comparison



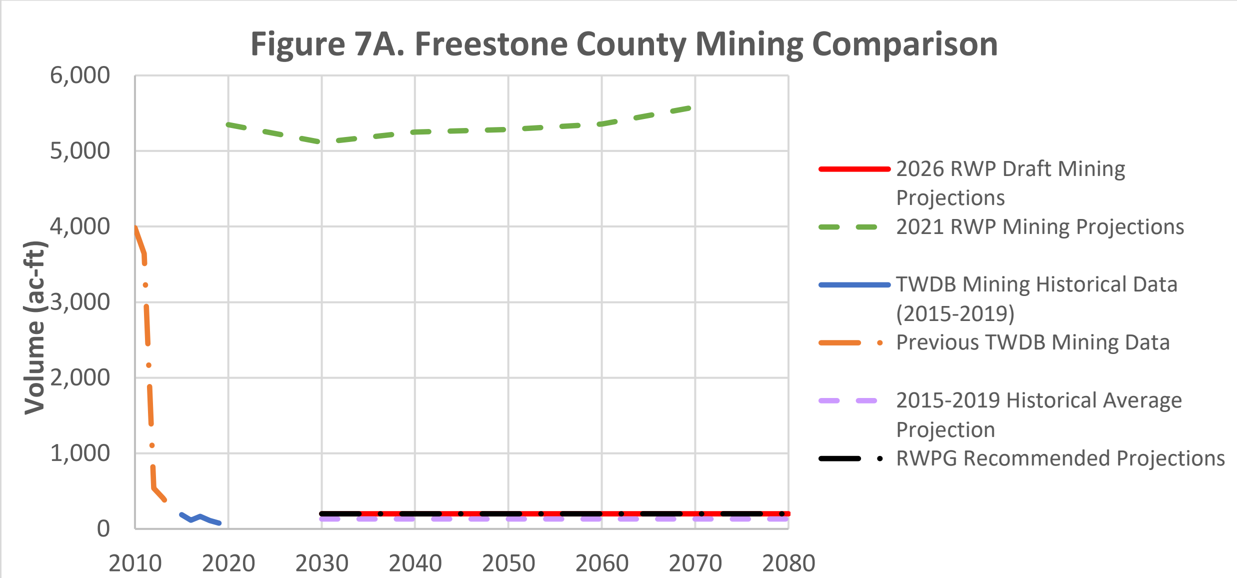


Figure 7A. Freestone County Mining Comparison
Volume (ac-ft)
6,000
5,000
4,000
3,000
2,000
1,000
0
2010
2020
2030
2040
2050
2060
2070
2080
2026 RWP Draft Mining Projections
2021 RWP Mining Projections
TWDB Mining Historical Data (2015-2019)
Previous TWDB Mining Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

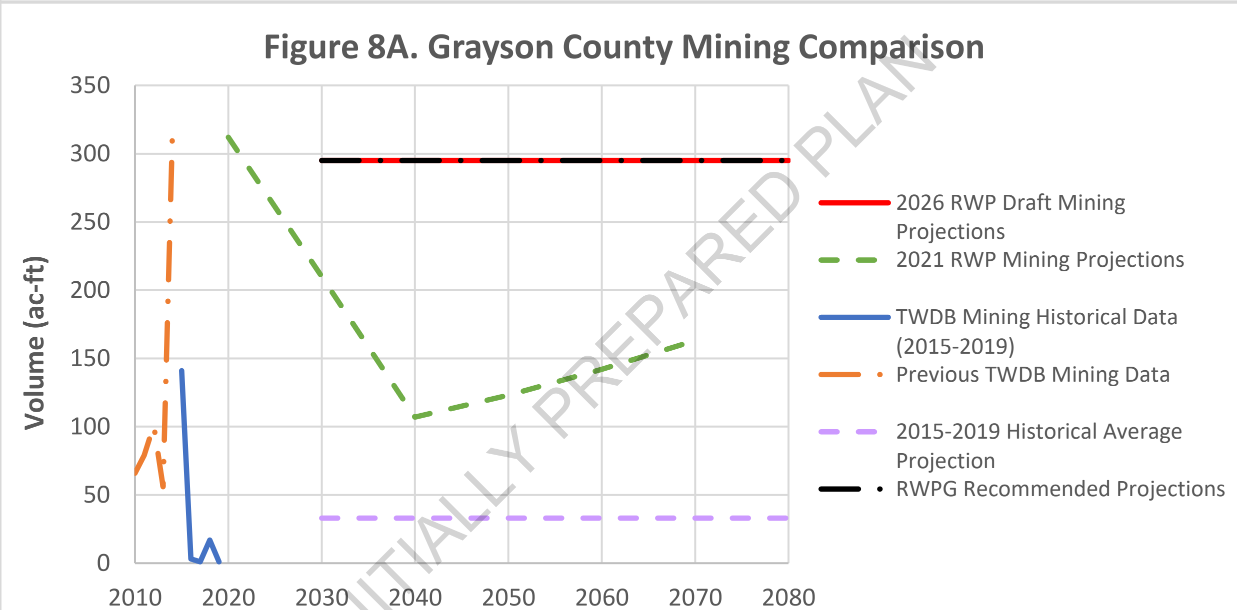


Figure 8A. Grayson County Mining Comparison
Volume (ac-ft)
350
300
250
200
150
100
50
0
2010
2020
2030
2040
2050
2060
2070
2080
2026 RWP Draft Mining Projections
2021 RWP Mining Projections
TWDB Mining Historical Data (2015-2019)
Previous TWDB Mining Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

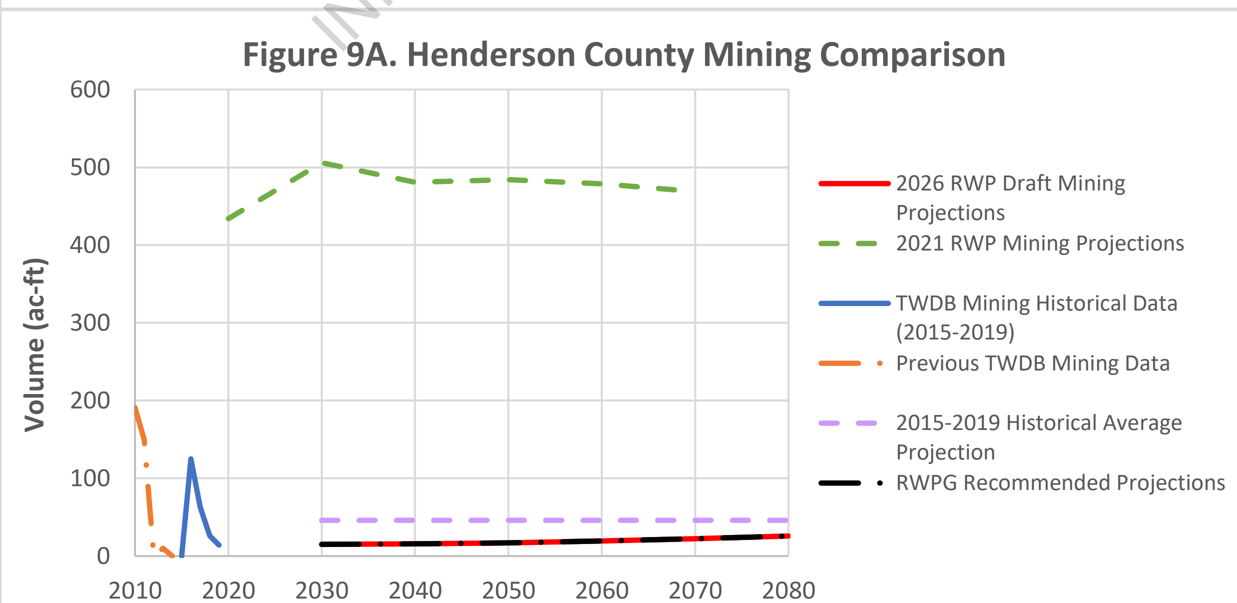


Figure 9A. Henderson County Mining Comparison
Volume (ac-ft)
600
500
400
300
200
100
0
2010
2020
2030
2040
2050
2060
2070
2080
2026 RWP Draft Mining Projections
2021 RWP Mining Projections
TWDB Mining Historical Data (2015-2019)
Previous TWDB Mining Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

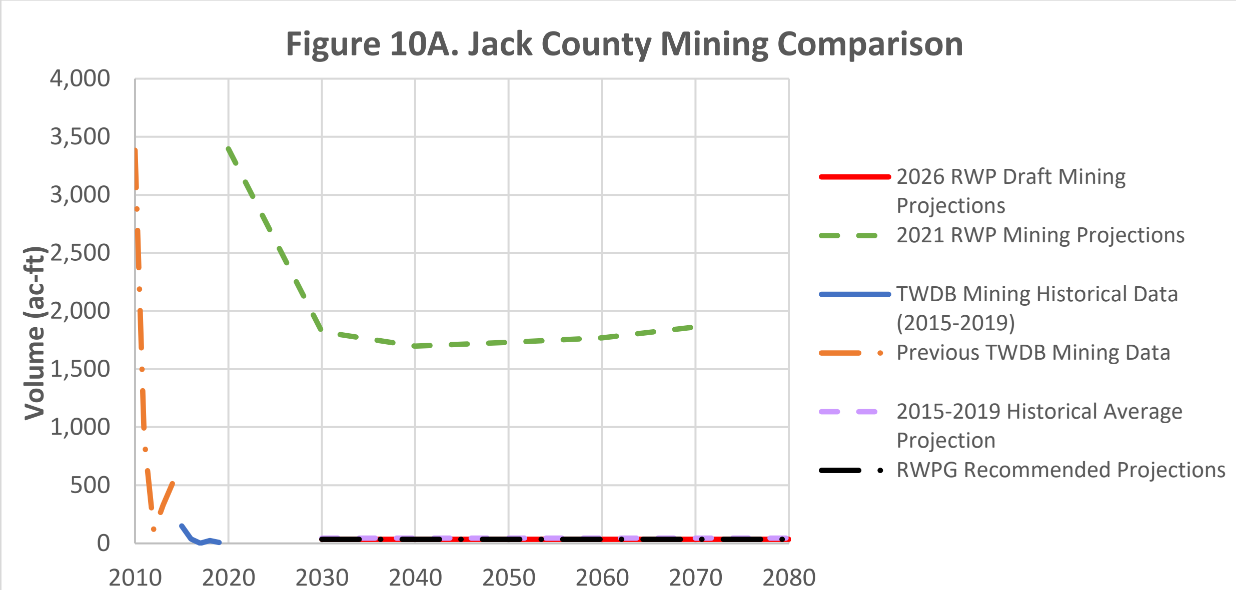


Figure 10A. Jack County Mining Comparison
Volume (ac-ft)
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
2010
2020
2030
2040
2050
2060
2070
2080
2026 RWP Draft Mining Projections
2021 RWP Mining Projections
TWDB Mining Historical Data (2015-2019)
Previous TWDB Mining Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

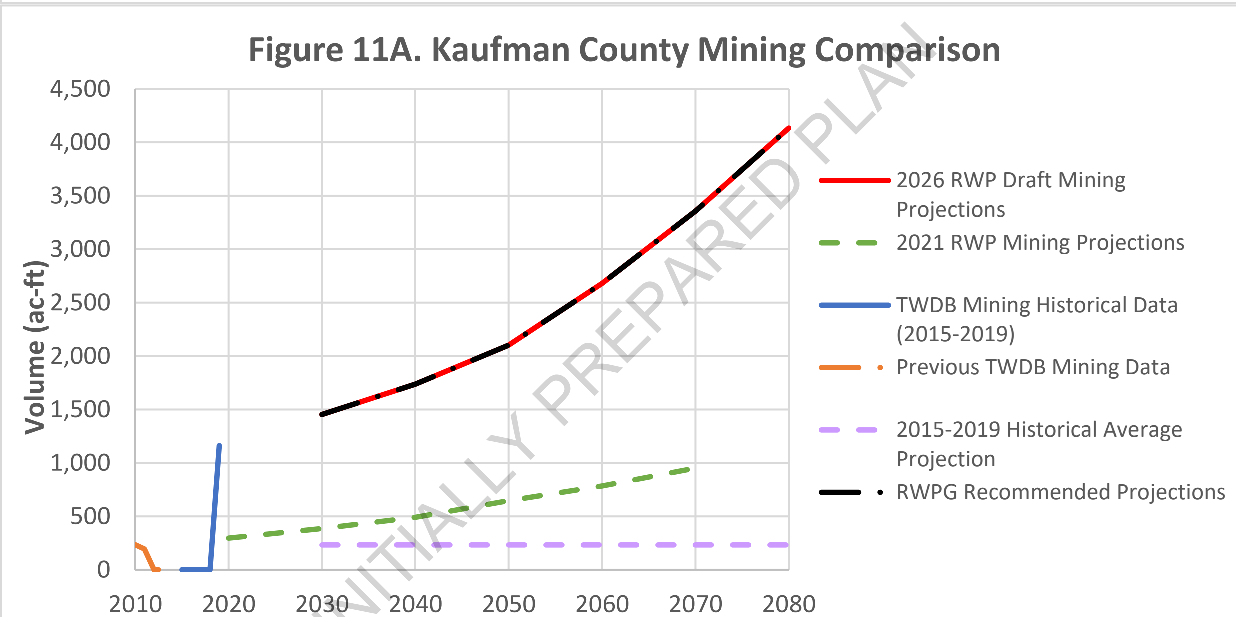


Figure 11A. Kaufman County Mining Comparison
Volume (ac-ft)
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
2010
2020
2030
2040
2050
2060
2070
2080
2026 RWP Draft Mining Projections
2021 RWP Mining Projections
TWDB Mining Historical Data (2015-2019)
Previous TWDB Mining Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

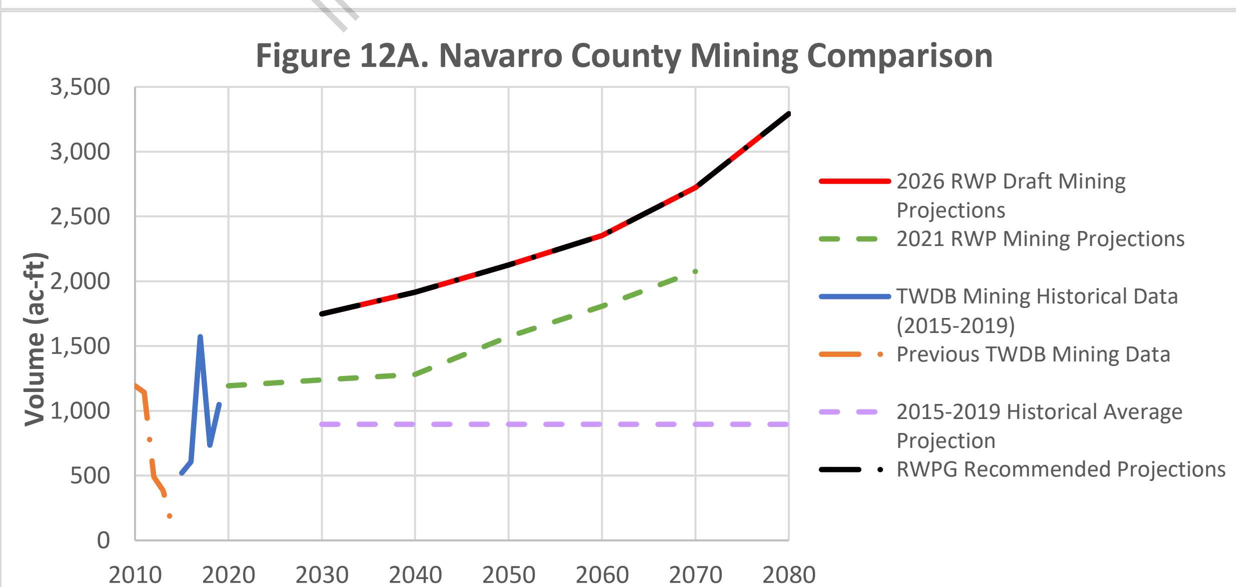


Figure 12A. Navarro County Mining Comparison
Volume (ac-ft)
3,500
3,000
2,500
2,000
1,500
1,000
500
0
2010
2020
2030
2040
2050
2060
2070
2080
2026 RWP Draft Mining Projections
2021 RWP Mining Projections
TWDB Mining Historical Data (2015-2019)
Previous TWDB Mining Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

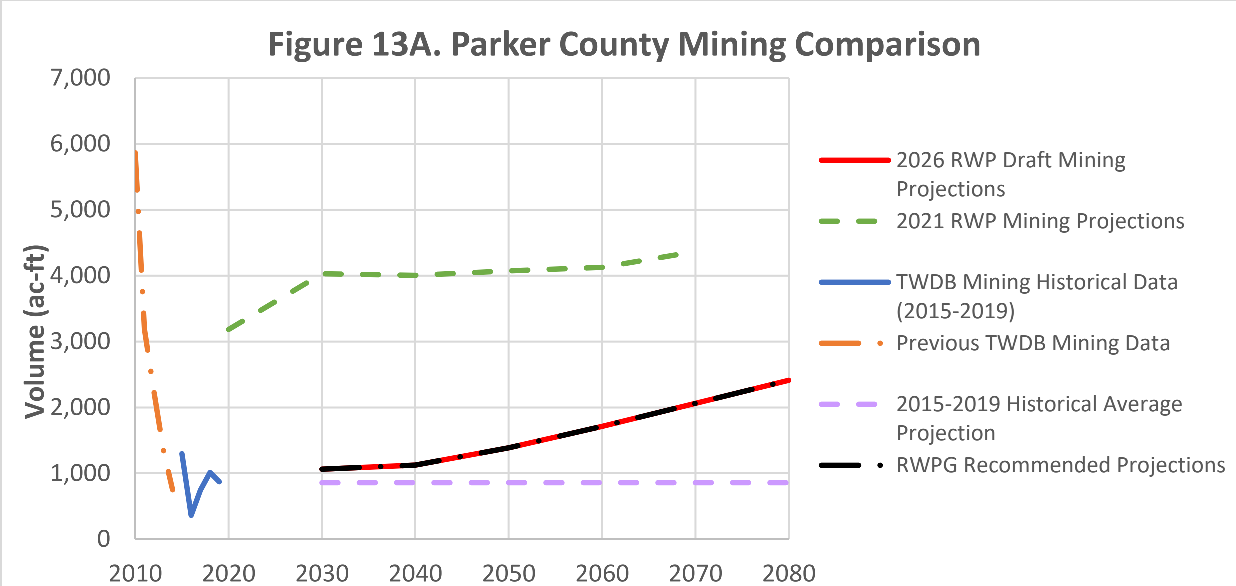


Figure 13A. Parker County Mining Comparison
Volume (ac-ft)
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
2010
2020
2030
2040
2050
2060
2070
2080
2026 RWP Draft Mining Projections
2021 RWP Mining Projections
TWDB Mining Historical Data (2015-2019)
Previous TWDB Mining Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

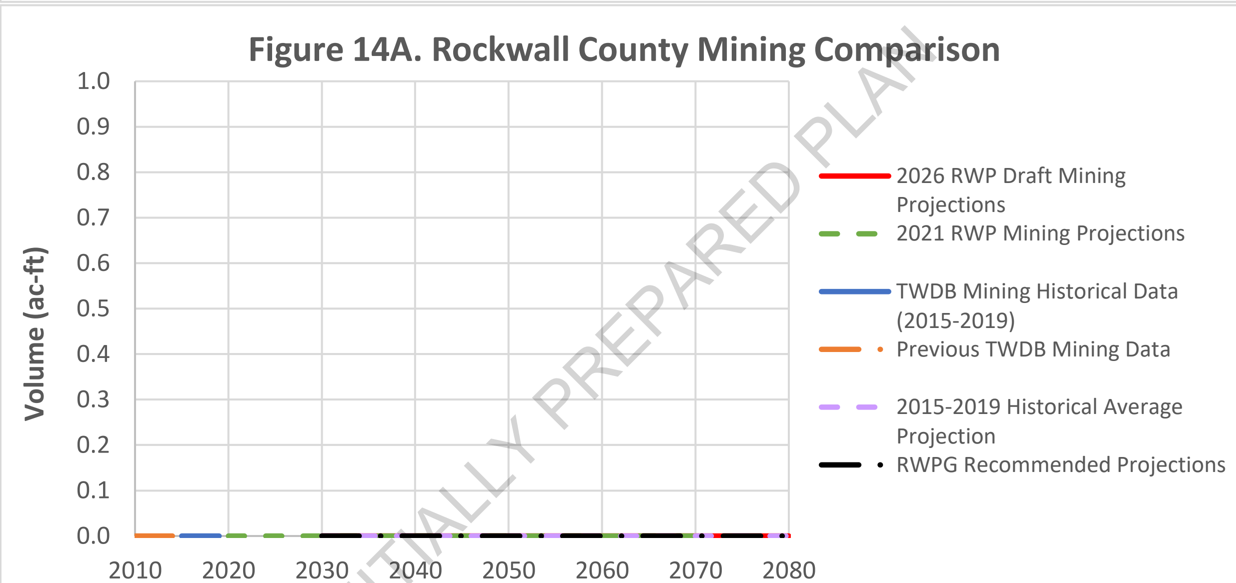


Figure 14A. Rockwall County Mining Comparison
Volume (ac-ft)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
2010
2020
2030
2040
2050
2060
2070
2080
2026 RWP Draft Mining Projections
2021 RWP Mining Projections
TWDB Mining Historical Data (2015-2019)
Previous TWDB Mining Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

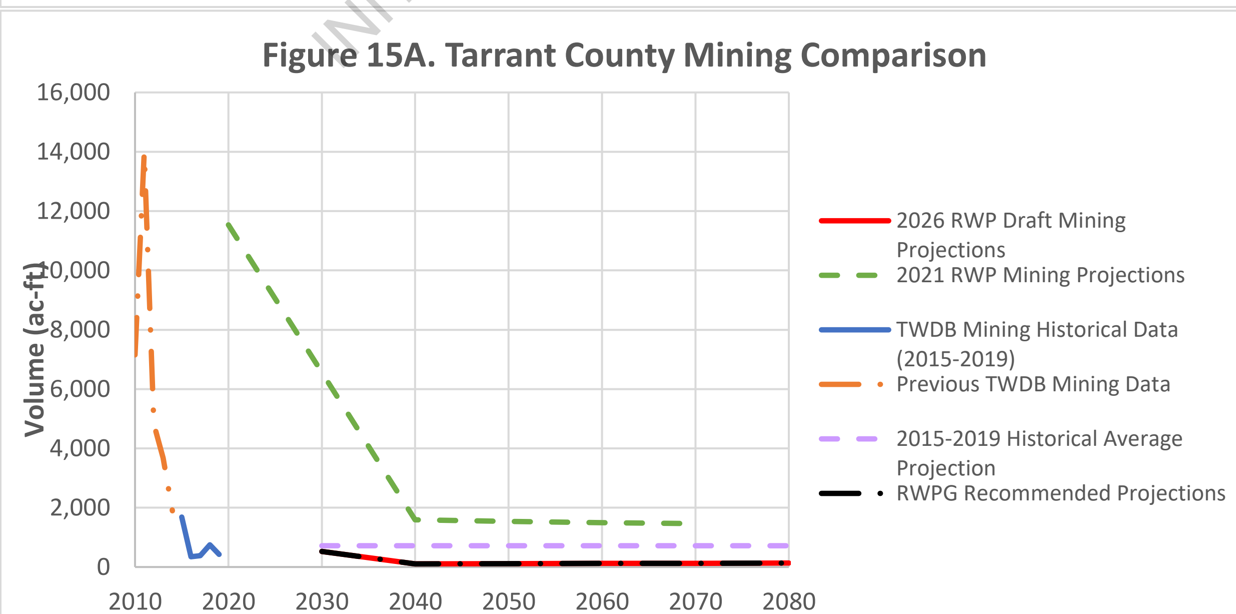


Figure 15A. Tarrant County Mining Comparison
Volume (ac-ft)
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
2010
2020
2030
2040
2050
2060
2070
2080
2026 RWP Draft Mining Projections
2021 RWP Mining Projections
TWDB Mining Historical Data (2015-2019)
Previous TWDB Mining Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

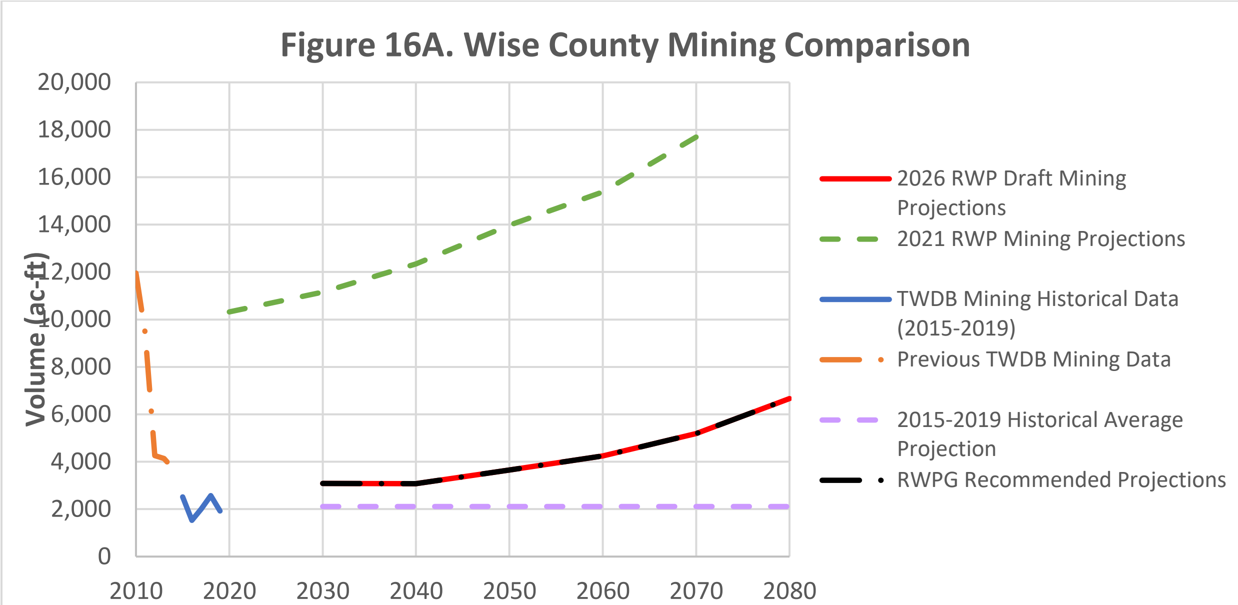


Figure 16A. Wise County Mining Comparison
Volume (ac-ft)
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
2010
2020
2030
2040
2050
2060
2070
2080
2026 RWP Draft Mining Projections
2021 RWP Mining Projections
TWDB Mining Historical Data (2015-2019)
Previous TWDB Mining Data
2015-2019 Historical Average Projection
RWPG Recommended Projections

Attachment C-6

Projected Savings Due to Plumbing Code for Municipal WUGs

Plumbing Code Savings
(GPCD)

Entity Name	County	Basin	PC2030	PC2040	PC2050	PC2060	PC2070	PC2080
ABLES SPRINGS SUD	KAUFMAN	TRINITY	0.00	0.00	0.00	0.00	0.00	0.00
ABLES SPRINGS SUD	KAUFMAN	SABINE	0.00	0.00	0.00	0.00	0.00	0.00
ADDISON	DALLAS	TRINITY	5.90	6.79	6.79	6.79	6.79	6.79
ALEDO	PARKER	TRINITY	4.64	5.19	5.19	5.19	5.19	5.19
ALLEN	COLLIN	TRINITY	4.48	5.05	5.05	5.05	5.05	5.05
ALVORD	WISE	TRINITY	4.07	4.45	4.45	4.45	4.45	4.45
AMC CREEKSIDE	DENTON	TRINITY	0.00	0.00	0.00	0.00	0.00	0.00
AMC CREEKSIDE	DALLAS	TRINITY	0.00	0.00	0.00	0.00	0.00	0.00
ANNA	COLLIN	TRINITY	3.93	4.42	4.42	4.42	4.42	4.42
ANNETTA	PARKER	TRINITY	4.13	4.47	4.47	4.47	4.47	4.47
ARGYLE WSC	DENTON	TRINITY	4.20	4.60	4.60	4.60	4.60	4.60
ARLEDGE RIDGE WSC	FANNIN	SULPHUR	1.17	1.30	1.30	1.30	1.30	1.30
ARLEDGE RIDGE WSC	FANNIN	RED	3.23	3.61	3.61	3.61	3.61	3.61
ARLINGTON	TARRANT	TRINITY	4.67	5.24	5.24	5.24	5.24	5.24
ATHENS	HENDERSON	TRINITY	5.03	5.62	5.62	5.62	5.62	5.62
AUBREY	DENTON	TRINITY	4.59	5.07	5.07	5.07	5.07	5.07
AVALON WATER SUPPLY & SEWER SERVICE	ELLIS	TRINITY	4.30	4.75	4.75	4.75	4.75	4.75
AZLE	PARKER	TRINITY	4.51	5.02	5.02	5.02	5.02	5.02
AZLE	TARRANT	TRINITY	4.51	5.02	5.02	5.02	5.02	5.02
B AND B WSC	NAVARRO	TRINITY	4.42	4.96	4.96	4.96	4.96	4.96
BALCH SPRINGS	DALLAS	TRINITY	4.33	4.92	4.92	4.92	4.92	4.92
BEAR CREEK SUD	COLLIN	TRINITY	3.93	4.41	4.41	4.41	4.41	4.41
BEAR CREEK SUD	ROCKWALL	SABINE	1.80	2.02	2.02	2.02	2.02	2.02
BEAR CREEK SUD	ROCKWALL	TRINITY	2.13	2.39	2.39	2.39	2.39	2.39
BECKER JIBA WSC	KAUFMAN	TRINITY	4.39	4.86	4.86	4.86	4.86	4.86
BEDFORD	TARRANT	TRINITY	5.01	5.51	5.51	5.51	5.51	5.51
BELLS	GRAYSON	RED	4.55	5.07	5.07	5.07	5.07	5.07
BENBROOK WATER AUTHORITY	TARRANT	TRINITY	4.76	5.27	5.27	5.27	5.27	5.27
BETHESDA WSC	TARRANT	TRINITY	4.20	4.82	4.82	4.82	4.82	4.82
BLACK ROCK WSC	DENTON	TRINITY	5.07	5.46	5.46	5.46	5.46	5.46
BLACKLAND WSC	ROCKWALL	SABINE	2.01	2.27	2.27	2.27	2.27	2.27
BLACKLAND WSC	ROCKWALL	TRINITY	2.56	2.89	2.89	2.89	2.89	2.89
BLOOMING GROVE	NAVARRO	TRINITY	4.60	5.10	5.10	5.10	5.10	5.10
BLUE MOUND	TARRANT	TRINITY	4.42	4.94	4.94	4.94	4.94	4.94
BLUE RIDGE	COLLIN	TRINITY	4.10	4.53	4.53	4.53	4.53	4.53
BOIS D ARC MUD	FANNIN	SULPHUR	0.03	0.03	0.03	0.03	0.03	0.03
BOIS D ARC MUD	FANNIN	RED	4.50	5.02	5.02	5.02	5.02	5.02
BOLIVAR WSC	DENTON	TRINITY	4.98	5.50	5.50	5.50	5.50	5.50
BOLIVAR WSC	COOKE	TRINITY	4.98	5.50	5.50	5.50	5.50	5.50
BOLIVAR WSC	WISE	TRINITY	4.98	5.50	5.50	5.50	5.50	5.50
BONHAM	FANNIN	RED	4.79	5.31	5.31	5.31	5.31	5.31
BOYD	WISE	TRINITY	4.74	5.20	5.20	5.20	5.20	5.20
BRIDGEPORT	WISE	TRINITY	4.66	5.22	5.22	5.22	5.22	5.22
BUENA VISTA-BETHEL SUD	ELLIS	TRINITY	4.16	4.63	4.63	4.63	4.63	4.63
BURLESON	TARRANT	TRINITY	4.38	4.91	4.91	4.91	4.91	4.91
BUTLER WSC	FREESTONE	TRINITY	4.61	5.20	5.20	5.20	5.20	5.20
CADDO BASIN SUD	COLLIN	SABINE	2.31	2.58	2.58	2.58	2.58	2.58
CADDO BASIN SUD	COLLIN	TRINITY	1.91	2.13	2.13	2.13	2.13	2.13
CALLISBURG WSC	COOKE	RED	1.01	1.15	1.15	1.15	1.15	1.15
CALLISBURG WSC	COOKE	TRINITY	3.11	3.57	3.57	3.57	3.57	3.57
CARROLLTON	DENTON	TRINITY	4.78	5.48	5.48	5.48	5.48	5.48
CARROLLTON	DALLAS	TRINITY	4.78	5.48	5.48	5.48	5.48	5.48
CASH SUD	ROCKWALL	SABINE	4.37	4.87	4.87	4.87	4.87	4.87
CEDAR HILL	DALLAS	TRINITY	4.53	5.16	5.16	5.16	5.16	5.16
CELINA	DENTON	TRINITY	3.48	3.87	3.87	3.87	3.87	3.87
CELINA	COLLIN	TRINITY	3.48	3.87	3.87	3.87	3.87	3.87
CHATFIELD WSC	NAVARRO	TRINITY	4.57	5.15	5.15	5.15	5.15	5.15
CHICO	WISE	TRINITY	4.75	5.25	5.25	5.25	5.25	5.25
COCKRELL HILL	DALLAS	TRINITY	4.25	4.79	4.79	4.79	4.79	4.79
COLLEGE MOUND SUD	KAUFMAN	TRINITY	1.00	1.00	1.00	1.00	1.00	1.00
COLLEYVILLE	TARRANT	TRINITY	4.46	5.01	5.01	5.01	5.01	5.01

COLLINSVILLE	GRAYSON	TRINITY	4.52	5.04	5.04	5.04	5.04	5.04
COMBINE WSC	DALLAS	TRINITY	4.18	4.67	4.67	4.67	4.67	4.67
COMBINE WSC	KAUFMAN	TRINITY	4.18	4.67	4.67	4.67	4.67	4.67
COMMUNITY WSC	PARKER	TRINITY	4.48	4.95	4.95	4.95	4.95	4.95
COMMUNITY WSC	TARRANT	TRINITY	4.48	4.95	4.95	4.95	4.95	4.95
COPEVILLE SUD	COLLIN	TRINITY	4.13	4.54	4.54	4.54	4.54	4.54
COPPELL	DENTON	TRINITY	4.69	5.49	5.49	5.49	5.49	5.49
COPPELL	DALLAS	TRINITY	4.69	5.49	5.49	5.49	5.49	5.49
CORBET WSC	NAVARRO	TRINITY	4.54	5.02	5.02	5.02	5.02	5.02
CORINTH	DENTON	TRINITY	4.55	5.04	5.04	5.04	5.04	5.04
CORSICANA	NAVARRO	TRINITY	4.65	5.21	5.21	5.21	5.21	5.21
COUNTY-OTHER, COLLIN	COLLIN	SABINE	2.40	2.72	2.72	2.72	2.72	2.72
COUNTY-OTHER, COLLIN	COLLIN	TRINITY	4.13	4.67	4.67	4.67	4.67	4.67
COUNTY-OTHER, COOKE	COOKE	RED	0.82	0.92	0.92	0.92	0.92	0.92
COUNTY-OTHER, COOKE	COOKE	TRINITY	4.17	4.71	4.71	4.71	4.71	4.71
COUNTY-OTHER, DALLAS	DALLAS	TRINITY	3.40	4.29	4.29	4.29	4.29	4.29
COUNTY-OTHER, DENTON	DENTON	TRINITY	5.32	5.70	5.70	5.70	5.70	5.70
COUNTY-OTHER, ELLIS	ELLIS	TRINITY	3.91	4.48	4.48	4.48	4.48	4.48
COUNTY-OTHER, FANNIN	FANNIN	SULPHUR	1.54	1.69	1.69	1.69	1.69	1.69
COUNTY-OTHER, FANNIN	FANNIN	RED	3.59	3.92	3.92	3.92	3.92	3.92
COUNTY-OTHER, FREESTONE	FREESTONE	BRAZOS	0.10	0.11	0.11	0.11	0.11	0.11
COUNTY-OTHER, FREESTONE	FREESTONE	TRINITY	5.66	6.42	6.42	6.42	6.42	6.42
COUNTY-OTHER, GRAYSON	GRAYSON	RED	4.25	4.87	4.87	4.87	4.87	4.87
COUNTY-OTHER, HENDERSON	HENDERSON	TRINITY	4.98	5.44	5.44	5.44	5.44	5.44
COUNTY-OTHER, JACK	JACK	BRAZOS	1.74	1.97	1.97	1.97	1.97	1.97
COUNTY-OTHER, JACK	JACK	TRINITY	2.93	3.29	3.29	3.29	3.29	3.29
COUNTY-OTHER, KAUFMAN	KAUFMAN	SABINE	0.03	0.03	0.03	0.03	0.03	0.03
COUNTY-OTHER, KAUFMAN	KAUFMAN	TRINITY	4.13	4.54	4.54	4.54	4.54	4.54
COUNTY-OTHER, NAVARRO	NAVARRO	TRINITY	4.63	5.22	5.22	5.22	5.22	5.22
COUNTY-OTHER, PARKER	PARKER	BRAZOS	1.11	1.25	1.25	1.25	1.25	1.25
COUNTY-OTHER, PARKER	PARKER	TRINITY	3.15	3.52	3.52	3.52	3.52	3.52
COUNTY-OTHER, ROCKWALL	ROCKWALL	TRINITY	0.04	0.05	0.05	0.05	0.05	0.05
COUNTY-OTHER, ROCKWALL	ROCKWALL	SABINE	4.03	4.59	4.59	4.59	4.59	4.59
COUNTY-OTHER, TARRANT	TARRANT	TRINITY	4.85	5.38	5.38	5.38	5.38	5.38
COUNTY-OTHER, WISE	WISE	TRINITY	4.37	4.93	4.93	4.93	4.93	4.93
CRANDALL	KAUFMAN	TRINITY	4.82	5.30	5.30	5.30	5.30	5.30
CRESCENT HEIGHTS WSC	HENDERSON	TRINITY	4.58	5.18	5.18	5.18	5.18	5.18
CROSS TIMBERS WSC	DENTON	TRINITY	4.55	4.96	4.96	4.96	4.96	4.96
CROWLEY	TARRANT	TRINITY	4.20	4.73	4.73	4.73	4.73	4.73
CULLEOKA WSC	COLLIN	TRINITY	4.31	4.72	4.72	4.72	4.72	4.72
DALLAS	COLLIN	TRINITY	4.96	5.59	5.59	5.59	5.59	5.59
DALLAS	DALLAS	TRINITY	4.96	5.59	5.59	5.59	5.59	5.59
DALLAS	DENTON	TRINITY	4.96	5.59	5.59	5.59	5.59	5.59
DALWORTHINGTON GARDENS	TARRANT	TRINITY	4.75	5.36	5.36	5.36	5.36	5.36
DAWSON	NAVARRO	TRINITY	4.75	5.27	5.27	5.27	5.27	5.27
DECATUR	WISE	TRINITY	4.98	5.53	5.53	5.53	5.53	5.53
DENISON	GRAYSON	RED	4.90	5.45	5.45	5.45	5.45	5.45
DENTON	DENTON	TRINITY	4.57	5.06	5.06	5.06	5.06	5.06
DENTON COUNTY FWSD 10	DENTON	TRINITY	3.50	3.88	3.88	3.88	3.88	3.88
DENTON COUNTY FWSD 11-C	DENTON	TRINITY	0.00	0.00	0.00	0.00	0.00	0.00
DENTON COUNTY FWSD 1-A	DENTON	TRINITY	4.05	4.57	4.57	4.57	4.57	4.57
DENTON COUNTY FWSD 7	DENTON	TRINITY	3.87	4.33	4.33	4.33	4.33	4.33
DESERT WSC	COLLIN	TRINITY	4.71	5.20	5.20	5.20	5.20	5.20
DESERT WSC	FANNIN	RED	0.10	0.11	0.11	0.11	0.11	0.11
DESERT WSC	FANNIN	TRINITY	4.61	5.09	5.09	5.09	5.09	5.09
DESERT WSC	GRAYSON	TRINITY	4.71	5.20	5.20	5.20	5.20	5.20
DESOTO	DALLAS	TRINITY	4.58	5.18	5.18	5.18	5.18	5.18
DOGWOOD ESTATES WATER	HENDERSON	TRINITY	4.56	5.11	5.11	5.11	5.11	5.11
DORCHESTER	GRAYSON	RED	2.27	2.51	2.51	2.51	2.51	2.51
DORCHESTER	GRAYSON	TRINITY	2.48	2.75	2.75	2.75	2.75	2.75
DUNCANVILLE	DALLAS	TRINITY	4.60	5.20	5.20	5.20	5.20	5.20
EAST CEDAR CREEK FWSD	HENDERSON	TRINITY	1.00	1.00	1.00	1.00	1.00	1.00
EAST FORK SUD	COLLIN	TRINITY	3.87	4.39	4.39	4.39	4.39	4.39
EAST FORK SUD	DALLAS	TRINITY	3.87	4.39	4.39	4.39	4.39	4.39
EAST FORK SUD	ROCKWALL	TRINITY	3.87	4.39	4.39	4.39	4.39	4.39

EAST GARRETT WSC	ELLIS	TRINITY	4.20	4.58	4.58	4.58	4.58	4.58
EDGECLIFF	TARRANT	TRINITY	4.07	4.59	4.59	4.59	4.59	4.59
ELMO WSC	KAUFMAN	TRINITY	4.23	4.67	4.67	4.67	4.67	4.67
ENNIS	ELLIS	TRINITY	4.71	5.32	5.32	5.32	5.32	5.32
EULESS	TARRANT	TRINITY	4.56	5.14	5.14	5.14	5.14	5.14
EUSTACE	HENDERSON	TRINITY	4.31	4.74	4.74	4.74	4.74	4.74
EVERMAN	TARRANT	TRINITY	4.42	4.92	4.92	4.92	4.92	4.92
FAIRFIELD	FREESTONE	TRINITY	4.64	5.26	5.26	5.26	5.26	5.26
FAIRVIEW	COLLIN	TRINITY	4.63	5.22	5.22	5.22	5.22	5.22
FARMERS BRANCH	DALLAS	TRINITY	5.37	6.21	6.21	6.21	6.21	6.21
FARMERSVILLE	COLLIN	TRINITY	4.78	5.35	5.35	5.35	5.35	5.35
FATE	ROCKWALL	TRINITY	0.76	0.85	0.85	0.85	0.85	0.85
FATE	ROCKWALL	SABINE	2.88	3.19	3.19	3.19	3.19	3.19
FERRIS	ELLIS	TRINITY	4.72	5.27	5.27	5.27	5.27	5.27
FLOWER MOUND	TARRANT	TRINITY	4.42	4.87	4.87	4.87	4.87	4.87
FLOWER MOUND	DENTON	TRINITY	4.42	4.87	4.87	4.87	4.87	4.87
FOREST HILL	TARRANT	TRINITY	4.33	4.84	4.84	4.84	4.84	4.84
FORNEY	KAUFMAN	TRINITY	4.19	4.69	4.69	4.69	4.69	4.69
FORNEY LAKE WSC	KAUFMAN	TRINITY	3.74	4.15	4.15	4.15	4.15	4.15
FORT WORTH	TARRANT	TRINITY	4.53	5.13	5.13	5.13	5.13	5.13
FORT WORTH	WISE	TRINITY	4.53	5.13	5.13	5.13	5.13	5.13
FORT WORTH	PARKER	TRINITY	4.53	5.13	5.13	5.13	5.13	5.13
FORT WORTH	DENTON	TRINITY	4.53	5.13	5.13	5.13	5.13	5.13
FRISCO	COLLIN	TRINITY	4.17	4.71	4.71	4.71	4.71	4.71
FRISCO	DENTON	TRINITY	4.17	4.71	4.71	4.71	4.71	4.71
FROGNOT WSC	COLLIN	TRINITY	4.46	4.87	4.87	4.87	4.87	4.87
FROGNOT WSC	FANNIN	TRINITY	4.46	4.87	4.87	4.87	4.87	4.87
GAINESVILLE	COOKE	RED	0.13	0.15	0.15	0.15	0.15	0.15
GAINESVILLE	COOKE	TRINITY	4.67	5.25	5.25	5.25	5.25	5.25
GARLAND	DALLAS	TRINITY	4.59	5.21	5.21	5.21	5.21	5.21
GASTONIA SCURRY SUD	KAUFMAN	TRINITY	1.00	1.00	1.00	1.00	1.00	1.00
GLENN HEIGHTS	DALLAS	TRINITY	4.12	4.59	4.59	4.59	4.59	4.59
GLENN HEIGHTS	ELLIS	TRINITY	4.12	4.59	4.59	4.59	4.59	4.59
GRAND PRAIRIE	DALLAS	TRINITY	4.58	5.31	5.31	5.31	5.31	5.31
GRAND PRAIRIE	TARRANT	TRINITY	4.58	5.31	5.31	5.31	5.31	5.31
GRAPEVINE	TARRANT	TRINITY	5.35	6.21	6.21	6.21	6.21	6.21
GUNTER	GRAYSON	TRINITY	4.57	5.06	5.06	5.06	5.06	5.06
HACKBERRY	DENTON	TRINITY	3.46	3.86	3.86	3.86	3.86	3.86
HALTOM CITY	TARRANT	TRINITY	4.74	5.31	5.31	5.31	5.31	5.31
HASLET	TARRANT	TRINITY	5.60	6.90	6.90	6.90	6.90	6.90
HEATH	KAUFMAN	TRINITY	4.22	4.73	4.73	4.73	4.73	4.73
HEATH	ROCKWALL	TRINITY	4.22	4.73	4.73	4.73	4.73	4.73
HIGH POINT WSC	KAUFMAN	TRINITY	3.67	4.02	4.02	4.02	4.02	4.02
HIGH POINT WSC	ROCKWALL	TRINITY	3.67	4.02	4.02	4.02	4.02	4.02
HIGHLAND PARK	DALLAS	TRINITY	4.68	5.19	5.19	5.19	5.19	5.19
HIGHLAND VILLAGE	DENTON	TRINITY	4.46	4.95	4.95	4.95	4.95	4.95
HONEY GROVE	FANNIN	RED	0.99	1.10	1.10	1.10	1.10	1.10
HONEY GROVE	FANNIN	SULPHUR	3.84	4.25	4.25	4.25	4.25	4.25
HORSESHOE BEND WATER SYSTEM	PARKER	BRAZOS	4.64	5.03	5.03	5.03	5.03	5.03
HOWE	GRAYSON	RED	1.60	1.77	1.77	1.77	1.77	1.77
HOWE	GRAYSON	TRINITY	2.65	2.93	2.93	2.93	2.93	2.93
HUDSON OAKS	PARKER	TRINITY	4.21	4.79	4.79	4.79	4.79	4.79
HURST	TARRANT	TRINITY	4.79	5.42	5.42	5.42	5.42	5.42
HUTCHINS	DALLAS	TRINITY	5.11	6.47	6.47	6.47	6.47	6.47
IRVING	DALLAS	TRINITY	4.81	5.52	5.52	5.52	5.52	5.52
ITALY	ELLIS	TRINITY	4.47	4.94	4.94	4.94	4.94	4.94
JACKSBORO	JACK	TRINITY	5.10	5.64	5.64	5.64	5.64	5.64
JOHNSON COUNTY SUD	TARRANT	TRINITY	4.23	4.73	4.73	4.73	4.73	4.73
JOSEPHINE	COLLIN	SABINE	3.76	4.14	4.14	4.14	4.14	4.14
JUSTIN	DENTON	TRINITY	4.34	4.84	4.84	4.84	4.84	4.84
KAUFMAN	KAUFMAN	TRINITY	4.47	4.93	4.93	4.93	4.93	4.93
KAUFMAN COUNTY DEVELOPMENT DISTRICT 1	KAUFMAN	TRINITY	3.80	4.33	4.33	4.33	4.33	4.33
KAUFMAN COUNTY MUD 11	KAUFMAN	TRINITY	3.89	4.37	4.37	4.37	4.37	4.37
KAUFMAN COUNTY MUD 14	KAUFMAN	TRINITY	3.09	3.39	3.39	3.39	3.39	3.39
KELLER	TARRANT	TRINITY	4.41	4.97	4.97	4.97	4.97	4.97

KEMP	KAUFMAN	TRINITY	4.44	4.96	4.96	4.96	4.96	4.96
KENNEDALE	TARRANT	TRINITY	4.69	5.23	5.23	5.23	5.23	5.23
KENTUCKYTOWN WSC	GRAYSON	RED	2.25	2.49	2.49	2.49	2.49	2.49
KENTUCKYTOWN WSC	GRAYSON	TRINITY	2.27	2.52	2.52	2.52	2.52	2.52
KERENS	NAVARRO	TRINITY	4.56	5.12	5.12	5.12	5.12	5.12
KRUM	DENTON	TRINITY	4.28	4.75	4.75	4.75	4.75	4.75
LADONIA	FANNIN	SULPHUR	4.99	5.47	5.47	5.47	5.47	5.47
LAKE CITIES MUNICIPAL UTILITY AUTHORITY	DENTON	TRINITY	4.55	5.06	5.06	5.06	5.06	5.06
LAKE KIOWA SUD	COOKE	TRINITY	4.64	5.13	5.13	5.13	5.13	5.13
LAKE WORTH	TARRANT	TRINITY	5.22	5.98	5.98	5.98	5.98	5.98
LAKESIDE	TARRANT	TRINITY	4.13	4.69	4.69	4.69	4.69	4.69
LANCASTER	DALLAS	TRINITY	4.55	5.27	5.27	5.27	5.27	5.27
LANCASTER MUD 1	DALLAS	TRINITY	3.66	4.10	4.10	4.10	4.10	4.10
LEONARD	FANNIN	RED	0.03	0.03	0.03	0.03	0.03	0.03
LEONARD	FANNIN	SULPHUR	0.02	0.03	0.03	0.03	0.03	0.03
LEONARD	FANNIN	TRINITY	4.65	5.15	5.15	5.15	5.15	5.15
LEWISVILLE	DALLAS	TRINITY	4.69	5.32	5.32	5.32	5.32	5.32
LEWISVILLE	DENTON	TRINITY	4.69	5.32	5.32	5.32	5.32	5.32
LINDSAY	COOKE	RED	0.06	0.06	0.06	0.06	0.06	0.06
LINDSAY	COOKE	TRINITY	4.53	5.08	5.08	5.08	5.08	5.08
LITTLE ELM	DENTON	TRINITY	3.86	4.60	4.60	4.60	4.60	4.60
LOG CABIN	HENDERSON	TRINITY	4.94	5.41	5.41	5.41	5.41	5.41
LUCAS	COLLIN	TRINITY	4.05	4.55	4.55	4.55	4.55	4.55
LUELLA SUD	GRAYSON	TRINITY	0.57	0.63	0.63	0.63	0.63	0.63
LUELLA SUD	GRAYSON	RED	4.01	4.48	4.48	4.48	4.48	4.48
M E N WSC	NAVARRO	TRINITY	4.45	4.96	4.96	4.96	4.96	4.96
MABANK	KAUFMAN	TRINITY	4.07	4.72	4.72	4.72	4.72	4.72
MABANK	HENDERSON	TRINITY	4.07	4.72	4.72	4.72	4.72	4.72
MALAKOFF	HENDERSON	TRINITY	5.16	5.73	5.73	5.73	5.73	5.73
MANSFIELD	ELLIS	TRINITY	4.43	5.05	5.05	5.05	5.05	5.05
MANSFIELD	TARRANT	TRINITY	4.43	5.05	5.05	5.05	5.05	5.05
MARKOUT WSC	KAUFMAN	TRINITY	3.88	4.24	4.24	4.24	4.24	4.24
MCKINNEY	COLLIN	TRINITY	4.33	4.88	4.88	4.88	4.88	4.88
MELISSA	COLLIN	TRINITY	3.45	3.86	3.86	3.86	3.86	3.86
MESQUITE	DALLAS	TRINITY	4.63	5.28	5.28	5.28	5.28	5.28
MIDLOTHIAN	ELLIS	TRINITY	4.57	5.21	5.21	5.21	5.21	5.21
MILLIGAN WSC	COLLIN	TRINITY	4.92	5.64	5.64	5.64	5.64	5.64
MINERAL WELLS	PARKER	BRAZOS	4.83	5.42	5.42	5.42	5.42	5.42
MOUNT ZION WSC	ROCKWALL	TRINITY	4.82	5.53	5.53	5.53	5.53	5.53
MOUNTAIN PEAK SUD	ELLIS	TRINITY	3.99	4.46	4.46	4.46	4.46	4.46
MOUNTAIN SPRINGS WSC	DENTON	TRINITY	4.62	5.18	5.18	5.18	5.18	5.18
MOUNTAIN SPRINGS WSC	COOKE	TRINITY	4.62	5.18	5.18	5.18	5.18	5.18
MUENSTER	COOKE	TRINITY	4.98	5.64	5.64	5.64	5.64	5.64
MURPHY	COLLIN	TRINITY	4.16	4.96	4.96	4.96	4.96	4.96
MUSTANG SUD	COLLIN	TRINITY	3.41	3.72	3.72	3.72	3.72	3.72
MUSTANG SUD	GRAYSON	TRINITY	3.41	3.72	3.72	3.72	3.72	3.72
MUSTANG SUD	DENTON	TRINITY	3.41	3.72	3.72	3.72	3.72	3.72
NASH FORRESTON WSC	ELLIS	TRINITY	4.20	4.69	4.69	4.69	4.69	4.69
NAVARRO MILLS WSC	NAVARRO	TRINITY	4.50	5.00	5.00	5.00	5.00	5.00
NEVADA SUD	COLLIN	SABINE	1.44	1.59	1.59	1.59	1.59	1.59
NEVADA SUD	COLLIN	TRINITY	2.70	2.98	2.98	2.98	2.98	2.98
NEVADA SUD	ROCKWALL	SABINE	4.14	4.57	4.57	4.57	4.57	4.57
NEWARK	WISE	TRINITY	4.37	4.77	4.77	4.77	4.77	4.77
NORTH COLLIN SUD	COLLIN	TRINITY	4.17	4.64	4.64	4.64	4.64	4.64
NORTH FARMERSVILLE WSC	COLLIN	TRINITY	4.73	5.26	5.26	5.26	5.26	5.26
NORTH KAUFMAN WSC	KAUFMAN	TRINITY	2.00	2.00	2.00	2.00	2.00	2.00
NORTH RICHLAND HILLS	TARRANT	TRINITY	4.74	5.29	5.29	5.29	5.29	5.29
NORTHLAKE	DENTON	TRINITY	4.50	5.03	5.03	5.03	5.03	5.03
NORTHWEST GRAYSON COUNTY WCID 1	GRAYSON	RED	4.53	5.01	5.01	5.01	5.01	5.01
OAK RIDGE SOUTH GALE WSC	GRAYSON	RED	3.99	4.66	4.66	4.66	4.66	4.66
OVILLA	DALLAS	TRINITY	4.13	4.49	4.49	4.49	4.49	4.49
OVILLA	ELLIS	TRINITY	4.13	4.49	4.49	4.49	4.49	4.49
PALMER	ELLIS	TRINITY	4.27	4.72	4.72	4.72	4.72	4.72
PALOMA CREEK NORTH	DENTON	TRINITY	3.29	3.95	3.95	3.95	3.95	3.95
PALOMA CREEK SOUTH	DENTON	TRINITY	3.17	3.78	3.78	3.78	3.78	3.78

PANTEGO	TARRANT	TRINITY	5.43	6.26	6.26	6.26	6.26	6.26
PARKER	COLLIN	TRINITY	3.96	4.49	4.49	4.49	4.49	4.49
PARKER COUNTY SUD	PARKER	BRAZOS	4.03	4.49	4.49	4.49	4.49	4.49
PELICAN BAY	TARRANT	TRINITY	0.00	0.00	0.00	0.00	0.00	0.00
PILOT POINT	GRAYSON	TRINITY	4.46	4.85	4.85	4.85	4.85	4.85
PILOT POINT	DENTON	TRINITY	4.46	4.85	4.85	4.85	4.85	4.85
PINK HILL WSC	GRAYSON	RED	4.49	5.00	5.00	5.00	5.00	5.00
PLANO	COLLIN	TRINITY	4.82	5.39	5.39	5.39	5.39	5.39
PLANO	DENTON	TRINITY	4.82	5.39	5.39	5.39	5.39	5.39
PLEASANT GROVE WSC	FREESTONE	TRINITY	4.66	5.23	5.23	5.23	5.23	5.23
PLEASANT GROVE WSC	NAVARRO	TRINITY	4.66	5.23	5.23	5.23	5.23	5.23
POETRY WSC	KAUFMAN	SABINE	1.98	2.17	2.17	2.17	2.17	2.17
POETRY WSC	KAUFMAN	TRINITY	2.45	2.69	2.69	2.69	2.69	2.69
POINT ENTERPRISE WSC	FREESTONE	TRINITY	2.18	2.46	2.46	2.46	2.46	2.46
POINT ENTERPRISE WSC	FREESTONE	BRAZOS	2.42	2.72	2.72	2.72	2.72	2.72
PONDER	DENTON	TRINITY	4.15	4.63	4.63	4.63	4.63	4.63
POTTSBORO	GRAYSON	RED	4.67	5.22	5.22	5.22	5.22	5.22
PRINCETON	COLLIN	TRINITY	3.82	4.25	4.25	4.25	4.25	4.25
PROSPER	COLLIN	TRINITY	3.58	4.06	4.06	4.06	4.06	4.06
PROSPER	DENTON	TRINITY	3.58	4.06	4.06	4.06	4.06	4.06
PROVIDENCE VILLAGE WCID	DENTON	TRINITY	3.85	4.50	4.50	4.50	4.50	4.50
R C H WSC	ROCKWALL	TRINITY	3.83	4.25	4.25	4.25	4.25	4.25
RED OAK	ELLIS	TRINITY	4.01	4.50	4.50	4.50	4.50	4.50
RENO (PARKER)	PARKER	TRINITY	0.00	0.00	0.00	0.00	0.00	0.00
RENO (PARKER)	TARRANT	TRINITY	0.00	0.00	0.00	0.00	0.00	0.00
RHOME	WISE	TRINITY	5.00	5.58	5.58	5.58	5.58	5.58
RICE WATER SUPPLY AND SEWER SERVICE	ELLIS	TRINITY	4.23	4.71	4.71	4.71	4.71	4.71
RICE WATER SUPPLY AND SEWER SERVICE	NAVARRO	TRINITY	4.23	4.71	4.71	4.71	4.71	4.71
RICHARDSON	COLLIN	TRINITY	4.82	5.44	5.44	5.44	5.44	5.44
RICHARDSON	DALLAS	TRINITY	4.82	5.44	5.44	5.44	5.44	5.44
RICHLAND HILLS	TARRANT	TRINITY	4.81	5.37	5.37	5.37	5.37	5.37
RIVER OAKS	TARRANT	TRINITY	4.55	5.09	5.09	5.09	5.09	5.09
ROANOKE	DENTON	TRINITY	4.36	4.95	4.95	4.95	4.95	4.95
ROCKETT SUD	DALLAS	TRINITY	4.31	4.80	4.80	4.80	4.80	4.80
ROCKETT SUD	ELLIS	TRINITY	4.31	4.80	4.80	4.80	4.80	4.80
ROCKWALL	ROCKWALL	TRINITY	4.46	5.04	5.04	5.04	5.04	5.04
ROSE HILL SUD	KAUFMAN	TRINITY	4.32	4.82	4.82	4.82	4.82	4.82
ROWLETT	DALLAS	TRINITY	4.59	5.19	5.19	5.19	5.19	5.19
ROWLETT	ROCKWALL	TRINITY	4.59	5.19	5.19	5.19	5.19	5.19
ROYSE CITY	COLLIN	SABINE	4.29	4.85	4.85	4.85	4.85	4.85
ROYSE CITY	ROCKWALL	SABINE	4.29	4.85	4.85	4.85	4.85	4.85
RUNAWAY BAY	WISE	TRINITY	4.56	4.96	4.96	4.96	4.96	4.96
SACHSE	COLLIN	TRINITY	4.15	4.81	4.81	4.81	4.81	4.81
SACHSE	DALLAS	TRINITY	4.15	4.81	4.81	4.81	4.81	4.81
SAGINAW	TARRANT	TRINITY	4.40	5.06	5.06	5.06	5.06	5.06
SANGER	DENTON	TRINITY	4.53	5.03	5.03	5.03	5.03	5.03
SANSOM PARK	TARRANT	TRINITY	4.31	4.80	4.80	4.80	4.80	4.80
SARDIS LONE ELM WSC	ELLIS	TRINITY	4.20	4.67	4.67	4.67	4.67	4.67
SAVOY	FANNIN	RED	4.83	5.35	5.35	5.35	5.35	5.35
SEAGOVILLE	DALLAS	TRINITY	4.19	4.78	4.78	4.78	4.78	4.78
SEIS LAGOS UD	COLLIN	TRINITY	3.50	4.05	4.05	4.05	4.05	4.05
SHERMAN	GRAYSON	RED	5.00	5.59	5.59	5.59	5.59	5.59
SOUTH ELLIS COUNTY WSC	ELLIS	TRINITY	4.22	4.75	4.75	4.75	4.75	4.75
SOUTH ELLIS COUNTY WSC	NAVARRO	TRINITY	4.22	4.75	4.75	4.75	4.75	4.75
SOUTH FREESTONE COUNTY WSC	FREESTONE	BRAZOS	1.02	1.21	1.21	1.21	1.21	1.21
SOUTH FREESTONE COUNTY WSC	FREESTONE	TRINITY	3.05	3.60	3.60	3.60	3.60	3.60
SOUTH GRAYSON SUD	COLLIN	TRINITY	4.01	4.54	4.54	4.54	4.54	4.54
SOUTH GRAYSON SUD	GRAYSON	TRINITY	4.01	4.54	4.54	4.54	4.54	4.54
SOUTHERN OAKS WATER SUPPLY	FREESTONE	TRINITY	4.37	4.86	4.86	4.86	4.86	4.86
SOUTHERN OAKS WATER SUPPLY	NAVARRO	TRINITY	4.37	4.86	4.86	4.86	4.86	4.86
SOUTHLAKE	TARRANT	TRINITY	4.39	5.01	5.01	5.01	5.01	5.01
SOUTHLAKE	DENTON	TRINITY	4.39	5.01	5.01	5.01	5.01	5.01
SOUTHMAYD	GRAYSON	RED	5.22	5.86	5.86	5.86	5.86	5.86
SOUTHWEST FANNIN COUNTY SUD	FANNIN	TRINITY	0.81	0.91	0.91	0.91	0.91	0.91
SOUTHWEST FANNIN COUNTY SUD	FANNIN	RED	3.40	3.84	3.84	3.84	3.84	3.84

SOUTHWEST FANNIN COUNTY SUD	GRAYSON	RED	4.21	4.75	4.75	4.75	4.75	4.75
SPRINGTOWN	PARKER	TRINITY	4.81	5.30	5.30	5.30	5.30	5.30
STARR WSC	GRAYSON	RED	4.85	5.31	5.31	5.31	5.31	5.31
SUNNYVALE	DALLAS	TRINITY	4.49	5.29	5.29	5.29	5.29	5.29
TALTY SUD	KAUFMAN	TRINITY	4.03	4.50	4.50	4.50	4.50	4.50
TEAGUE	FREESTONE	TRINITY	2.20	2.45	2.45	2.45	2.45	2.45
TEAGUE	FREESTONE	BRAZOS	2.38	2.65	2.65	2.65	2.65	2.65
TERRA SOUTHWEST	DENTON	TRINITY	4.14	4.60	4.60	4.60	4.60	4.60
TERRELL	KAUFMAN	TRINITY	4.78	5.34	5.34	5.34	5.34	5.34
THE COLONY	DENTON	TRINITY	4.59	5.10	5.10	5.10	5.10	5.10
TIOGA	GRAYSON	TRINITY	4.32	4.77	4.77	4.77	4.77	4.77
TOM BEAN	GRAYSON	RED	0.88	0.98	0.98	0.98	0.98	0.98
TOM BEAN	GRAYSON	TRINITY	3.88	4.34	4.34	4.34	4.34	4.34
TRENTON	FANNIN	RED	0.10	0.11	0.11	0.11	0.11	0.11
TRENTON	FANNIN	TRINITY	4.93	5.46	5.46	5.46	5.46	5.46
TRINIDAD	HENDERSON	TRINITY	4.49	5.00	5.00	5.00	5.00	5.00
TROPHY CLUB MUD 1	TARRANT	TRINITY	3.76	4.29	4.29	4.29	4.29	4.29
TROPHY CLUB MUD 1	DENTON	TRINITY	3.76	4.29	4.29	4.29	4.29	4.29
TWO WAY SUD	COOKE	RED	4.57	5.10	5.10	5.10	5.10	5.10
TWO WAY SUD	GRAYSON	TRINITY	1.87	2.08	2.08	2.08	2.08	2.08
TWO WAY SUD	GRAYSON	RED	2.70	3.02	3.02	3.02	3.02	3.02
UNIVERSITY PARK	DALLAS	TRINITY	4.39	4.94	4.94	4.94	4.94	4.94
VAN ALSTYNE	GRAYSON	TRINITY	4.45	4.96	4.96	4.96	4.96	4.96
VERONA SUD	COLLIN	TRINITY	4.12	4.56	4.56	4.56	4.56	4.56
WALNUT CREEK SUD	WISE	TRINITY	4.30	4.73	4.73	4.73	4.73	4.73
WALNUT CREEK SUD	PARKER	TRINITY	4.30	4.73	4.73	4.73	4.73	4.73
WATAUGA	TARRANT	TRINITY	4.61	5.12	5.12	5.12	5.12	5.12
WAXAHACHIE	ELLIS	TRINITY	4.35	4.82	4.82	4.82	4.82	4.82
WEATHERFORD	PARKER	BRAZOS	0.69	0.77	0.77	0.77	0.77	0.77
WEATHERFORD	PARKER	TRINITY	4.01	4.46	4.46	4.46	4.46	4.46
WEST CEDAR CREEK MUD	KAUFMAN	TRINITY	0.00	0.00	0.00	0.00	0.00	0.00
WEST CEDAR CREEK MUD	HENDERSON	TRINITY	0.00	0.00	0.00	0.00	0.00	0.00
WEST LEONARD WSC	COLLIN	TRINITY	4.24	4.64	4.64	4.64	4.64	4.64
WEST LEONARD WSC	FANNIN	TRINITY	4.24	4.64	4.64	4.64	4.64	4.64
WEST WISE SUD	WISE	TRINITY	4.90	5.47	5.47	5.47	5.47	5.47
WESTLAKE	TARRANT	TRINITY	3.58	4.14	4.14	4.14	4.14	4.14
WESTMINSTER SUD	COLLIN	TRINITY	4.42	4.84	4.84	4.84	4.84	4.84
WESTMINSTER SUD	GRAYSON	TRINITY	4.42	4.84	4.84	4.84	4.84	4.84
WESTOVER HILLS	TARRANT	TRINITY	4.66	5.16	5.16	5.16	5.16	5.16
WESTWORTH VILLAGE	TARRANT	TRINITY	4.83	5.38	5.38	5.38	5.38	5.38
WHITE SETTLEMENT	TARRANT	TRINITY	4.72	5.27	5.27	5.27	5.27	5.27
WHITE SHED WSC	FANNIN	RED	4.77	5.25	5.25	5.25	5.25	5.25
WHITESBORO	GRAYSON	RED	2.09	2.31	2.31	2.31	2.31	2.31
WHITESBORO	GRAYSON	TRINITY	2.77	3.06	3.06	3.06	3.06	3.06
WHITEWRIGHT	FANNIN	RED	4.73	5.27	5.27	5.27	5.27	5.27
WHITEWRIGHT	GRAYSON	TRINITY	0.53	0.59	0.59	0.59	0.59	0.59
WHITEWRIGHT	GRAYSON	RED	4.20	4.68	4.68	4.68	4.68	4.68
WILLOW PARK	PARKER	TRINITY	4.32	4.84	4.84	4.84	4.84	4.84
WILMER	DALLAS	TRINITY	4.84	5.79	5.79	5.79	5.79	5.79
WOLFE CITY	FANNIN	SULPHUR	4.70	5.22	5.22	5.22	5.22	5.22
WOODBINE WSC	COOKE	RED	0.34	0.38	0.38	0.38	0.38	0.38
WOODBINE WSC	COOKE	TRINITY	4.19	4.66	4.66	4.66	4.66	4.66
WOODBINE WSC	GRAYSON	TRINITY	4.53	5.04	5.04	5.04	5.04	5.04
WORTHAM	FREESTONE	TRINITY	4.79	5.30	5.30	5.30	5.30	5.30
WYLIE	COLLIN	TRINITY	4.32	4.91	4.91	4.91	4.91	4.91
WYLIE NORTHEAST SUD	COLLIN	TRINITY	4.00	4.61	4.61	4.61	4.61	4.61

Appendix D

DB27 Reports

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APPENDIX D DB27 REPORTS

The Texas Water Development Board (TWDB) hosts a statewide database, known as DB27, which houses all the data and information from each of the 16 Regional Water Plans across the state. TWDB uses this data to assist in the development of the State Water Plan. In order to facilitate statewide data collection, there are specific requirements in how the data must be entered and reflected in DB27. In some cases, the aggregation and reporting of this data from the database differs from how the data is aggregated and reported in the written Regional Water Plan. The Regional Water Plan aims to present the data in a format that is easily understandable to stakeholders and the public. Divergence between the numbers in tables in the Plan and the DB27 reports do not necessarily represent errors.

Examples of these differences include:

> Total strategy water volumes are aggregated by water user group in the DB27 reports. If a strategy is not fully allocated to a water user group or multiple water user groups, then the total volumes may differ between the DB27 report and the Plan. This is the case for several strategies developed by major water providers.
>
> Water management strategy volumes only display the seller and the end user, not any intermediate sellers. For instance, if a Wholesale Provider sells to City A and City A sells a portion of that supply to City B, the volume sold to City B will only be shown under City B as a sale from the Wholesale Provider. The sale to City A will only show the supply used by City A. The total volume sold to City A is not shown and sale from City A to City B is not shown.

There are no database reports that are blank.

Region C's required DB27 reports can be accessed through the TWDB Database Reports application at https://www3.twdb.texas.gov/apps/SARA/reports/list and following the steps below. The reports available for access in DB27 are listed in **Table 1**.

1. Enter '2026 Regional Water Plan' into the "Report Name" field to filter to all DB27 reports associated with the 2026 Regional Water Plans
2. Click on the report name hyperlink to load the desired report
3. Enter the planning region letter parameter, click view report

In Region C, there are several strategies which are recommended but fully allocated in DB27 to 'Unassigned Volumes'. This occurs when a wholesale water provider plans to develop supplies beyond the exact projected needs of their customers (a management supply factor of greater than 1). This is prudent planning given uncertainty in growth of existing and potential future customers and the potential for a drought worse than the drought of record. In these cases, the strategy is still recommended. However, it is not allocated out to customers as surpluses because this water is not owned by the individual water user group (WUG). This is a surplus that the wholesale provider keeps as a margin of safety against a worse potential drought, unanticipated growth, or new customers. Since it is unknown which of these factors it will be used for, it is left on the wholesale water provider. In the database it is allocated to 'unassigned volumes.'

TABLE 1 TEXAS WATER DEVELOPMENT BOARD DATABASE REPORTS

REPORT
Report 1 – WUG Population
Report 2 – WUG Water Demand
Report 3 – Source Total Availability
Report 4 – WUG Existing Water Supply
Report 5 – WUG Needs/Surplus
Report 6 – WUG Second-Tier Identified Water Need
Report 7 – WUG Data Comparison to 2021 RWP
Report 8 – Source Data Comparison to 2021 RWP
Report 9 – WUG Unmet Needs
Report 10 – Recommended WUG Water Management Strategies
Report 11 – Recommended Projects Associated with Water Management Strategies
Report 12 – Alternative WUG Water Management Strategies
Report 13 – Alternative Projects Associated with Water Management Strategies
Report 14 – WUG Management Supply Factor
Report 15 – Recommended water Management Strategy Supply Associated with a new or amended IBT Permit
Report 16 – WUG Recommended WMS Supply Associated with a new or amended IBT Permit and Total Recommended conservation WMS Supply
Report 17 – Sponsored Recommended WMS Supplies Unallocated to WUGs
Report 18 – MWP Existing sales and Transfers
Report 19 – MWP WMS Summary

Appendix E

Water Supply Available

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E APPENDIX E WATER SUPPLY AVAILABLE TO REGION C

SECTION OUTLINE	
Section E.1	Methodology for Determining Surface Water Availability
Section E.2	Water Supply Systems in Region C
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Section E.4	Unpermitted Yields in Region C Reservoirs
Section E.5	Imports
Section E.6	Irrigation Local Supply and Other Local Supply
Section E.7	Reuse
Section E.8	Desalination
Section E.9	Groundwater

Table E.1 shows the overall water supply available to Region C. The rest of this appendix explains the sources of the data in **Table E.1**. The table represents the water supply that might be available to the region, whether it is currently connected to a water user group or not.

TABLE E.1 OVERALL WATER SUPPLY AVAILABILITY IN REGION C

SOURCE	VALUES IN ACRE-FEET PER YEAR					
	2030	2040	2050	2060	2070	2080
Reservoirs in Region C	1,359,066	1,343,176	1,327,280	1,311,410	1,294,751	1,279,105
Run-of-River Supply	9,197	9,197	9,197	9,197	9,197	9,197
Other Local Supply	18,151	18,351	18,824	19,192	19,192	19,192
Groundwater	159,525	160,586	161,649	162,712	163,670	163,670
Reuse	434,791	462,811	483,877	499,185	503,578	508,503
Surface Water and Groundwater Imports	492,630	486,139	479,700	472,940	465,623	458,799
REGION C TOTAL	***2,473,360***	***2,480,260***	***2,480,527***	***2,474,636***	***2,456,011***	***2,438,466***

E.1 Methodology for Determining Surface Water Availability

Table E.2 presents the water availability for reservoir systems and reservoirs in Region C. In accordance with the Texas Water Development Board's (TWDB) established procedures [(1)], these surface water supplies are determined using the TCEQ-approved Water Availability Models (WAM), Full Authorization Scenario (Run 3). WAMs have been completed for each of the major river basins in Texas. The WAM models were developed for the purpose of reviewing and granting new surface water rights permits. The assumptions in the WAM models are based on the legal interpretation of water rights. Availabilities for each water right are analyzed in priority date order, with water rights with the earliest permit date diverting first. WAM Run 3, which is the version used for planning, assumes full permitted diversions by all water rights and no return flows unless return flows are specifically required in the water right.

Run 3 also does not include agreements or operations that are not reflected in the water right permits and does not account for reductions in reservoir capacities due to sediment accumulation, and in some cases do not accurately reflect current operations. For planning purposes, adjustments were made to the WAMs to better reflect current and future surface water conditions in the region. These adjustments were approved by the Region C Water Planning Group and the Executive Administrator (EA) of the Texas Water Development Board in a letter to the Chairman of the Region C Water Planning Group, dated October 26, 2023. This letter and the requested hydrologic variances are included in **Attachment E.1**.

Generally, changes to the WAMs included:

- Assessment of reservoir sedimentation rates and calculation of area-capacity conditions for 2030, 2050, and 2080 conditions. This WAM change results in reservoir yields that usually decrease over time due to the assumed accumulation of sediment.
- Inclusion of subordination agreements not already included in the TCEQ WAM
- Inclusion of system operation where appropriate
- Other corrections

The reliable supply from run-of-the-river diversions was calculated as the minimum monthly diversion for the permitted water rights located on the main stem and tributaries of the river and are based on the TCEQ WAM Run 3.

Anticipated Sedimentation

- For all major reservoirs in the Trinity, Red, and Sulphur Basins, anticipated sedimentation rates and revised area-capacity rating curves were developed to estimate reservoir storage capacity for decades 2030, 2050, and 2080.
- Annual sedimentation rates, expressed in acre-feet per square mile (AF/SqMi), were estimated for each major reservoir based on sediment surveys, published sedimentation rates, or comparing changes in conservation pool capacity between two or more reservoir surveys.
- The total accumulated sediment for a specific year was calculated as: [Sedimentation Rate] x [Contributing Drainage Area] x [Number of years from the Initial Survey]
- New area-capacity tables were developed based on the volume reduction due to sedimentation.

The following lists specific adjustments to the WAMs to more accurately reflect the water rights and agreements for water supply sources in Region C are:

Trinity River Basin WAM

- Inclusion of any new water rights that are not currently included in the posted TCEQ WAM.
- Modeling of Lake Jacksboro and Lost Creek Reservoir as a system. System modeling includes subordination of Lake Bridgeport.
- Use of the full storage for Forest Grove Reservoir with an annual depletion limit (inflow for storage, diversion, and evaporation) of 16,348 acre-feet per year. The TCEQ WAM incorrectly uses the 16,348 acre-feet as the storage of the reservoir rather than the authorized storage of 20,038 acre-feet.

- Modeling of Corsicana's rights from Richland-Chambers Reservoir as a system with Lake Halbert, reflecting how these rights are actually used.

The following variances are required only for modeling the yields of these supplies. When calculating the firm yield of other sources, the modeling will be identical to Run 3.

- Modeling of Tarrant Regional Water District's West Fork reservoirs (Bridgeport, Eagle Mountain, and Worth) as a system.
- Modeling of Dallas' water rights in the Elm Fork of the Trinity River as a system with Lakes Grapevine, Lewisville and Ray Roberts.
- Modeling of Lake Benbrook as one pool instead of multiple pools to facilitate calculation of yields. The current modeling incorrectly assigns evaporation to the dead pool of the reservoir which does not refill because it is modeled as non-priority. In actual operation, TRWD cannot use water from the reservoir unless this dead storage is full. This modeling respects the USACE minimum elevation for water supply.

Red River Basin WAM

- Modeling of Lake Randell and Valley Lake as stand-alone reservoirs without Lake Texoma backups for the firm yield calculation of these two reservoirs. Backup supply for these reservoirs from Lake Texoma is included in the supplies from Lake Texoma. This prevents double counting of the makeup water from Lake Texoma. For firm yield calculations for reservoirs other than Lake Randell, Valley Lake and Lake Texoma, the backups for Lake Randell and Valley Lake were retained.
- Lake Texoma is located on the Texas-Oklahoma border, and in accordance with the Red River Compact, water in Lake Texoma is equally shared by Texas and Oklahoma. There are three distinct water storage pools in Lake Texoma: 1) water supply, 2) hydropower, and 3) sediment storage (dead pool). Use of water from Lake Texoma is authorized by multiple Texas water rights and Oklahoma water rights, as well as authorizations by the US Congress and contracts with the Corps. To assess the firm yield of the reservoir for Region C, the total firm yield for both the water supply and hydropower pools will be modeled. This total yield is equally split between Texas and Oklahoma. The reliable supplies from the lake are limited to the Texas water rights and associated storage contracts with the Corps.
- Removal of diversion backups of individual Texas water rights in Lake Texoma from the hydropower pool. All Texas water rights are 100% reliable in the WAM, so these backups are not invoked in the WAM. The code was removed because it made the modeling unnecessarily complicated.

Sulphur River Basin WAM

- Inclusion of any new water rights granted that are not currently included in the approved TCEQ WAM.
- Modeling of Lake Chapman as one pool instead of multiple pools to facilitate calculation of the firm yield. All authorizations have the same priority date, and a single pool correctly distributes inflows among the water right holders. This modeling respects the USACE minimum elevation for water supply.

Other WAMs

Region C has very few water supplies in the Brazos River Basin. Thus, the water availability information as determined by the Brazos G Regional Water Planning Group was adopted.

For water supplies in the Neches and Sabine River Basin, the water availability information as determined by the Region I Water Planning Group was adopted.

Alternative Yields

Several providers in Region C have chosen to use alternative yields to firm yield for planning purposes. Tarrant Regional Water District (TRWD) and Dallas Water Utilities (DWU or Dallas) have elected to use safe yields for the allocation and distribution of surface water supplies from reservoirs owned and operated by these two wholesale water providers. Safe yield is the amount of water that can be used during the critical drought while leaving a minimum supply in reserve (one-year reserve for TRWD and nine-month reserve for DWU). Safe yield is consistent with the current operations of these two surface water suppliers and previous regional water planning. Both firm yield and safe yield are reported for these reservoirs. However, the safe yield is what is used to determine the overall water supply availability in Region C.

The Texas Legislature authorized the regional water planning groups to consider droughts worse than the drought of record in its planning efforts, which can reflect expected climate uncertainties and trends in water availability. Several water providers in Region C consider such conditions in their long-term water planning. North Texas Municipal Water District (NTMWD) has recently completed a Long-Range Water Supply Plan(2) that did a detailed evaluation on the potential impacts of a drought worse than the drought of record on its water supplies. NTMWD requested the use of the results of this analysis for the allocation and distribution of surface water supplies from reservoirs owned and operated by NTMWD.

Table E.3 shows the firm and alternative yield for supplies using alternative yields as source availability. **Table E.4** shows the drought of record period for Reservoirs in Region C. At the end of this appendix, **Table E.10** summarizes the WAM models used for the *2026 Region C Plan*.

E.2 Water Supply Systems in Region C

The water availability for water supply systems in Region C is shown in **Table E.2**. The systems listed are operated as physical systems – the water they provide cannot easily be separated by individual source. The supply available is based on the calculation of the Water Availability Models (WAMs), as described above. More detailed discussions on water supply available for each system are given below.

Lost Creek/Jacksboro System (Jacksboro)

Lake Jacksboro is a 2,129-acre-foot reservoir located just outside of the City of Jacksboro in the Trinity River Basin in Jack County, and Lost Creek Reservoir is an 11,961-acre-foot reservoir located 1.5 miles downstream of the Lake Jacksboro dam. The City of Jacksboro holds a water right for the combined use of both reservoirs for municipal water supply and the right to divert 1,397 acre-feet per year. The water right authorizes the reservoirs to be operated as a system, so the WAM was modified to include system operation and the upstream diversion agreement with TRWD. According to the WAM, the firm yield from this system (without return flows) exceeds the permit amount. The available supply from this system is limited to the permitted amount of 1,397 acre-feet per year.

West Fork Including Bridgeport Local System (TRWD)

TRWD's West Fork Reservoir system is comprised of Lake Bridgeport, Lake Worth, and Eagle Mountain Lake. The WAM was modified to include the system operation of these three reservoirs. The water right for Lake Bridgeport allows for between 15,000 acre-feet per year and 27,000 acre-feet per year to be diverted for local use at Lake Bridgeport. Based on planned TRWD operations, the modified WAM model assumes 27,000 acre-feet per year is used locally at Lake Bridgeport. The resulting combined system firm yield was 118,961 acre-feet per year in 2030 and 115,711 acre-feet per year in 2080.

Under current conditions, this system provides somewhat less supply than the firm yield. TRWD operates its water supplies on a safe yield basis, which provides a smaller supply than the firm yield numbers shown. (In safe yield operation, the user takes less than the firm yield in order to leave a reserve supply in the reservoir in case a drought worse than any historical drought occurs). The safe yield for the West Fork System is 96,161 acre-feet per year in 2030 and 93,361 acre-feet per year in 2080.

Elm Fork/Lewisville/Ray Roberts/Grapevine System (Dallas)

This system is comprised of water rights owned by Dallas in Lake Lewisville, Lake Ray Roberts, Lake Grapevine, and run-of-the-river rights from the Elm Fork of the Trinity River. The WAM was modified to include the system operation of these supplies. The resulting combined system firm yield was 207,399 acre-feet per year in 2030 and 201,269 acre-feet per year in 2080. The safe yield of the reservoir system in 2030 is 174,899 acre-feet per year and in 2080 is 169,539 acre-feet per year.

TABLE E.2 SUPPLY AVAILABLE FROM WATER SUPPLY SYSTEMS AND RESERVOIRS IN REGION C (NOT CONSIDERING TRANSMISSION CONSTRAINTS)

RESERVOIR	WATER RIGHT NO.(S)	BASIN	VALUES IN ACRE-FEET PER YEAR					
			2030	2040	2050	2060	2070	2080
Systems in Region C								
Lost Creek/Jacksboro System	C3313	Trinity	1,397	1,397	1,397	1,397	1,397	1,397
West Fork (includes Bridgeport Local)[a]	C3340, C3809, C3808	Trinity	96,161	95,561	94,961	94,428	93,894	93,361
Elm Fork/Lewisville/Ray Roberts/Grapevine (Dallas)[a]	C2456, C2455, C2457, C5414, C2458	Trinity	174,899	174,109	173,319	172,059	170,799	169,539
Subtotal of Systems in Region C			**272,457**	**271,067**	**269,677**	**267,884**	**266,090**	**264,297**
Reservoirs in Region C								
Cedar Creek[a]	C4976	Trinity	157,150	155,340	153,530	151,797	150,063	148,330
Richland-Chambers (TRWD)[a]	C5035	Trinity	190,000	188,266	186,531	184,781	183,030	181,280
Richland-Chambers (Corsicana) and Halbert	C5030	Trinity	13,843	13,833	13,823	13,803	13,783	13,763
Moss	C4881	Red	4,900	4,800	4,700	4,633	4,567	4,500
Texoma (Texas' Share - NTMWD)	P/A 5003	Red	197,000	197,000	197,000	197,000	197,000	197,000
Texoma (Texas' Share - GTUA)	P4301, A2006	Red	83,200	83,200	83,200	83,200	83,200	83,200
Texoma (Texas' Share - Denison)	C4901	Red	24,400	24,400	24,400	24,400	24,400	24,400
Texoma (Texas' Share - Luminant)	C4900	Red	16,400	16,400	16,400	16,400	16,400	16,400
Texoma (Texas' Share - RRA)	C4898, C4899	Red	2,250	2,250	2,250	2,250	2,250	2,250
Randell	C4901	Red	1,600	1,600	1,600	1,600	1,600	1,600
Valley	C4900	Red	2,800	2,800	2,800	2,800	2,800	2,800
Bonham	C4925	Red	3,800	3,700	3,600	3,533	3,467	3,400
Ray Roberts (Denton)	C2335	Trinity	18,600	18,480	18,360	18,207	18,053	17,900
Lewisville (Denton)	C2348	Trinity	5,200	5,075	4,950	4,800	4,650	4,500
Benbrook[a]	P5157	Trinity	3,371	3,371	3,371	3,371	3,371	3,371
Weatherford	C3356	Trinity	2,860	2,810	2,760	2,717	2,673	2,630
Grapevine (DCPCM)	C2363	Trinity	17,300	17,125	16,950	16,750	16,550	16,350
Grapevine (Grapevine)	C2362	Trinity	2,050	2,025	2,000	1,960	1,920	1,880

RESERVOIR	WATER RIGHT NO.(S)	BASIN	VALUES IN ACRE-FEET PER YEAR					
			2030	2040	2050	2060	2070	2080
Arlington[a]	C3391	Trinity	7,500	7,385	7,270	7,157	7,043	6,930
Joe Pool	C3404	Trinity	14,050	13,725	13,400	13,133	12,867	12,600
Mountain Creek	C3408	Trinity	6,400	6,400	6,400	6,400	6,400	6,400
North	C2365	Trinity	70	70	70	70	70	70
Ray Hubbard (Dallas)[a]	C2462	Trinity	46,239	45,450	44,660	43,927	43,194	42,461
White Rock[a]	C4161	Trinity	2,540	2,375	2,210	2,023	1,837	1,650
Terrell	C4972	Trinity	2,410	2,395	2,380	2,370	2,360	2,350
Clark	C5019	Trinity	210	210	210	210	210	210
Bardwell	C5021	Trinity	9,410	9,010	8,610	8,287	7,963	7,640
Waxahachie	C5018	Trinity	2,980	2,910	2,840	2,773	2,707	2,640
Forest Grove	C4983	Trinity	650	328	5	3	2	-
Trinidad	C4970	Trinity	2,950	2,950	2,950	2,950	2,950	2,950
Navarro Mills	C4992	Trinity	17,000	15,975	14,950	13,817	12,683	11,550
Fairfield	C5041	Trinity	6,395	6,163	5,930	5,725	5,520	5,315
Bryson	C3462	Brazos	-	-	-	-	-	-
Mineral Wells	C4039	Brazos	2,495	2,483	2,470	2,458	2,445	2,433
Teague City	C5291	Brazos	189	189	189	189	189	189
Lavon[b]	C2410	Trinity	88,111	83,963	79,927	75,892	70,959	67,148
Bois d'Arc[b]	P12151	Red	89,456	86,878	84,187	81,497	78,918	76,228
Muenster	C2323	Trinity	250	250	250	250	250	250
Ralph Hall	P5821	Sulphur	40,580	40,525	40,470	40,393	40,317	40,240
Subtotal of Reservoirs in Region C			**1,086,609**	**1,072,109**	**1,057,603**	**1,043,526**	**1,028,661**	**1,014,808**

[a]*Amounts reported are safe yields.*
[b]*Amounts reported consider droughts worse than the drought of record.*

E.3 Reservoirs in Region C

All major reservoirs in Region C as well as some smaller reservoirs used for municipal supply are listed in **Table E.2**. The supply available is based on the calculation of the Water Availability Models (WAMs), which limits the supply to the lesser of the firm yield or the permit amount. In some cases, the safe yield is used as the supply available based on the operational policies of the reservoir owner.

Cedar Creek

Cedar Creek Reservoir is located on Cedar Creek in the Trinity River Basin in Henderson and Kaufman Counties. The reservoir has a permitted conservation storage of 678,900 acre-feet. TRWD holds a water right for diversion of 175,000 acre-feet per year. According to the WAM, the firm yield (not limited to the water right) is 207,350 acre-feet per year in 2030 decreasing to 201,200 acre-feet per year by 2080. The available supply from Cedar Creek is limited to the permit amount of 175,000 acre-feet per year. The safe yield, on which TRWD bases its supplies, is 157,150 acre-feet per year in 2030 decreasing to 148,330 acre-feet per year in 2080. The firm yield and safe yield include a deduction of 250 acre-feet per year associated with Trinidad Lake. Forest Grove is a reservoir located just upstream of Cedar Creek on Caney Creek. Based on feedback from TRWD, Cedar Creek was modeled assuming that the dam gates at Forest Grove were closed.

Richland-Chambers (Corsicana) and Halbert

Richland-Chambers Reservoir is located on Richland Creek in the Trinity River Basin in Freestone and Navarro Counties. The reservoir has a permitted conservation storage of 1,135,000 acre-feet. TRWD and City of Corsicana hold water rights in the reservoir (210,000 acre-feet per year for TRWD and 13,650 acre-feet per year for Corsicana). According to the WAM, the firm yield of the TRWD water right is 224,650 acre-feet per year in 2030, decreasing to 217,550 acre-feet per year by 2080. The firm yield from Richland-Chambers is limited to the permitted amount of 210,000 acre-feet per year. The safe yield is 190,000 acre-feet per year in 2030 decreasing to 181,280 acre-feet per year in 2080.

Corsicana's water right in Lake Halbert is backed up by the city's water right in Richland-Chambers. Lake Halbert is located on Elm Creek in the Trinity River Basin in Navarro County. The reservoir has permitted conservation storage of 7,357 acre-feet. The City of Corsicana holds a water right in Lake Halbert for 4,003 acre-feet per year. According to the WAM, the available supply from Richland-Chambers Reservoir and Lake Halbert to Corsicana is 13,843 acre-feet per year in 2030 and decreasing slightly to 13,763 acre-feet per year in 2080.

Moss

Moss Lake is located on Fish Creek in the Red River Basin in Cooke County. The reservoir has permitted conservation storage of 23,210 acre-feet. The City of Gainesville holds water rights in the reservoir for 7,740 acre-feet per year. According to the WAM, the available supply from Moss Lake in 2030 is 4,900 acre-feet per year and in 2080 is 4,500 acre-feet per year.

Texoma (Texas' share)

Lake Texoma is located along the Texas and Oklahoma border in the Red River Basin in Grayson and Cooke Counties. The permitted conservation storage for water supply in Texas is 300,000 acre-feet. NTMWD, Greater Texoma Utility Authority (GTUA), Denison, Luminant, and Red River Authority (RRA) all hold water rights in the reservoir. The total Texoma firm yield as of 2080 is limited to the total water rights of 323,250 acre-feet per year [197,000 acre-feet per year for NTMWD; 83,200 acre-feet per year for GTUA; 24,400 acre-feet per year for Denison; 16,400 acre-feet per year for Luminant, and 2,250 acre-feet per year for RRA]. The firm yield of Texas' share of Lake Texoma is greater than the total of the Texas water rights and is 477,850 acre-feet per year in 2030, decreasing to 457,200 acre-feet per year by 2080.

Randell

Randell Lake is located on an unnamed tributary of Shawnee Creek in the Red River Basin in Grayson County. The reservoir has permitted conservation storage of 5,400 acre-feet. The City of Denison holds a water right in the reservoir for 5,280 acre-feet per year. The supply from Randell Lake is backed up by up to 24,400 acre-feet per year of diversions from Lake Texoma, which are fully reliable. The available supply from Randell as of 2080 is 1,600 acre-feet per year without a backup from Lake Texoma.

Valley

Valley Lake is located on Sand Creek in the Red River Basin in Fannin and Grayson Counties. The reservoir has a permitted conservation storage of 15,000 acre-feet. This reservoir is operated by Luminant for steam electric power cooling in conjunction with their water right in Lake Texoma. The total amount of water that can be diverted from either Texoma or Valley Lake is 16,400 acre-feet per year. The available supply from Valley as of 2080 is 2,800 acre-feet per year without a backup from Lake Texoma.

Bonham

Lake Bonham is located on Timber Creek in the Red River Basin in Fannin County. The reservoir has permitted conservation storage of 13,000 acre-feet. The City of Bonham holds a water right in the reservoir for 5,340 acre-feet per year. NTMWD has an agreement with the City of Bonham to operate the lake and water treatment plant. According to the WAM, the firm yield of Lake Bonham is 3,800 acre-feet per year in 2030, decreasing to 3,400 acre-feet per year by 2080. NTMWD's Long Range Water Supply Plan(2) used a stand-alone yield model with mass balance to estimate the firm yield for Bonham, which was higher than the firm yield calculated using the WAM. Therefore, the firm yield from the WAM instead of NTWMD's Long Range Water Supply Plan was used as the available supply in the 2026 Plan to be conservative.

Ray Roberts (Denton)

Lake Ray Roberts and Lake Lewisville were modeled as part of the Elm Fork System to find the firm yields of Denton's water rights. Lake Ray Roberts is located on the Elm Fork of the Trinity River in Denton, Cooke, and Grayson Counties. The reservoir has a permitted conservation storage of 799,600 acre-feet. The City of Dallas and the City of Denton hold combined water rights in the reservoir totaling 799,600 acre-feet per year, which is much greater than the actual yield of the reservoir. Dallas' share of Lake Ray Roberts was discussed above under Water Supply Systems. According to the WAM, Denton's available supply from Ray Roberts as of 2030 was 18,600 acre-feet per year and as of 2080 is 17,900 acre-feet per year.

Lewisville (Denton)

Lake Lewisville is located on the Elm Fork of the Trinity River in Denton County. The reservoir has a permitted conservation storage of 618,400 acre-feet. The City of Dallas and the City of Denton hold combined water rights in the reservoir totaling 473,424 acre-feet per year, which is much greater than the actual yield of the reservoir. Dallas' share of Lake Lewisville was discussed above under Water Supply Systems. According to the WAM, Denton's available supply from Lewisville as of 2030 is 5,200 acre-feet per year and as of 2080 is 4,500 acre-feet per year.

Benbrook

Lake Benbrook is located on the Clear Fork of the Trinity River in Tarrant County. Certificate of Adjudication 08-5157 authorizes the impoundment of 72,500 acre-feet of water in Benbrook Reservoir between the elevations of 665 feet and 694 feet. The authorized diversions from Lake Benbrook are 72,500 acre-feet per year, of which only 6,833 acre-feet per year are on a priority basis. TRWD holds the water right, which specifies use amounts for Benbrook Water and Sewer Authority, City of Fort Worth, and City of Weatherford.

According to the WAM, the firm yield of Lake Benbrook is 4,271 acre-feet per year in 2080. The safe yield is 3,371 acre-feet per year in 2080. Lake Benbrook is used as terminal storage for water pumped from Cedar Creek and Richland-Chambers Reservoirs. The available supply does not include water from these sources. According to the 1998 TWDB volumetric survey of Benbrook Reservoir, the storage capacity at elevation 665.0 feet is 14,307 acre-feet and the capacity at 694.0 feet is 89,402 acre-feet. This results in a usable conservation storage of 71,341 acre-feet, which is less than the authorized amount.

Weatherford

Lake Weatherford is located on the Clear Fork of the Trinity River in Parker County. The reservoir has permitted conservation storage of 19,470 acre-feet. The City of Weatherford holds a water right for consumptive use of 5,220 acre-feet per year. (The permit also authorizes 59,400 acre-feet per year of non-consumptive industrial use). According to the WAM, the available supply from Lake Weatherford is 2,860 acre-feet per year in 2030, decreasing to 2,630 acre-feet per year in 2080.

Grapevine

Lake Grapevine is located on Denton Creek in the Trinity River Basin in Tarrant and Denton Counties. The reservoir has a permitted conservation storage of 161,250 acre-feet. The City of Dallas, City of Grapevine, and Dallas County Park Cities MUD hold combined water rights in the reservoir for a total diversion of 161,250 acre-feet per year, which is much greater than the actual yield of the reservoir. Dallas' share of Lake Grapevine was discussed above under Water Supply Systems. According to the WAM, Dallas County PCMUD's available supply from Lake Grapevine is 17,300 acre-feet per year in 2030, decreasing to 16,350 acre-feet per year in 2080. The City of Grapevine's available supply from Lake Grapevine is 2,050 acre-feet per year in 2030, decreasing to 1,880 acre-feet per year in 2080.

Arlington

Lake Arlington is located on Village Creek in the Trinity River Basin in Tarrant County. The reservoir has a permitted conservation storage of 45,710 acre-feet. The City of Arlington and Luminant jointly hold a water right for 23,120 acre-feet per year (13,000 acre-feet per year for Arlington and 10,120 acre-feet per year for Luminant). By contract, the City of Arlington has dedicated its Lake Arlington water rights to the TRWD System. According to the WAM, the firm yield of Lake Arlington is 9,500 acre-feet per year in 2030 and 8,800 acre-feet per year in 2080. The safe yield is 7,500 acre-feet per year in 2030 and 6,930 acre-feet per year in 2080. Like Lake Benbrook, Lake Arlington serves as terminal storage for water pumped from Richland-Chambers and Cedar Creek Reservoirs. The available supply from Lake Arlington does not include water from these sources.

Joe Pool

Joe Pool Lake is located on Mountain Creek in the Trinity River Basin in Dallas and Tarrant Counties. The reservoir has a permitted conservation storage of 176,900 acre-feet. The Trinity River Authority (TRA) holds a water right for 17,000 acre-feet per year. According to the WAM, available supply from Joe Pool Lake is 14,050 acre-feet per year in 2030, decreasing to 12,600 acre-feet per year in 2080.

Mountain Creek

Mountain Creek Lake is located on Mountain Creek in the Trinity River Basin in Dallas County. The reservoir has a permitted conservation storage of 22,840 acre-feet. Luminant holds a water right for 6,400 acre-feet per year. According to the WAM, the firm yield of Mountain Creek Lake is 10,200 acre-feet per year in 2030, decreasing to 9,600 acre-feet per year by 2080. The available supply from Mountain Creek Lake is limited to the permitted amount of 6,400 acre-feet per year.

North

North Lake is an off-channel reservoir located on the South Fork of Grapevine Creek in the Trinity River Basin in Dallas County. The reservoir has a permitted conservation storage of 17,100 acre-feet. Luminant holds a water right for 1,000 acre-feet per year. According to the WAM, available supply from North Lake as of 2080 is 70 acre-feet per year without backup from the Elm Fork.

Ray Hubbard

Lake Ray Hubbard is located on the Elm Fork of the Trinity River in Dallas, Kaufman, and Rockwall Counties. The reservoir has a permitted conservation storage of 490,000 acre-feet. The City of Dallas holds a water right for 208,067 acre-feet per year. According to the WAM, the firm yield of Ray Hubbard as of 2030 is 55,730 acre-feet per year, decreasing to 51,160 acre-feet per year by 2080. The safe yield, on which Dallas bases its supplies, is 46,239 acre-feet per year in 2030 and 42,461 acre-feet per year in 2080.

White Rock

White Rock Lake is located on White Rock Creek in the Trinity River Basin in Dallas County. The reservoir has a permitted conservation storage of 21,345 acre-feet. The City of Dallas holds a water right for 8,703 acre-feet per year. According to the WAM, available supply from White Rock Lake is 3,400 acre-feet per year in 2030 and 2,400 acre-feet per year in 2080. The safe yield is 2,540 acre-feet per year in 2030 and 1,650 acre-feet per year in 2080. The modeling on this lake assumes sedimentation to be conservative. Dallas may or may not continue dredging the lake to maintain its current capacity.

Terrell

Lake Terrell is located on Muddy Cedar Creek in the Trinity River Basin in Kaufman County. The reservoir has a permitted conservation storage of 8,712 acre-feet. The City of Terrell holds a water right for 5,800 acre-feet per year. According to the WAM, available supply from Terrell is 2,410 acre-feet per year in 2030, decreasing slightly to 2,350 acre-feet per year in 2080. The City of Terrell no longer uses water from Lake Terrell.

Clark

Lake Clark is located on Little Mustang Creek in the Trinity River Basin in Ellis County. The reservoir has a permitted conservation storage of 1,549 acre-feet. The City of Ennis holds a water right for 450 acre-feet per year. According to the WAM, the available supply from Lake Clark is 210 acre-feet per year. The City of Ennis no longer uses water from Lake Clark.

Bardwell

Lake Bardwell is located on Waxahachie Creek in the Trinity River Basin in Ellis County. The reservoir has a permitted conservation storage of 54,900 acre-feet. TRA holds a water right for 9,600 acre-feet per year for municipal purposes. According to the WAM, the firm yield of Lake Bardwell is 9,410 acre-feet per year in 2030, decreasing to 7,640 acre-feet per year by 2080.

Waxahachie

Lake Waxahachie is located on Waxahachie Creek in the Trinity River Basin in Ellis County. The reservoir has a permitted conservation storage of 13,500 acre-feet. Ellis County Water Control and Improvement District #1 (an entity of the City of Waxahachie) holds a water right for 3,570 acre-feet per year. According to the WAM, available supply from Lake Waxahachie is 2,980 acre-feet per year in 2030, decreasing slightly to 2,640 acre-feet per year in 2080.

Forest Grove

Forest Grove Reservoir is located on Caney Creek in the Trinity River Basin in Henderson County. The reservoir has a permitted conservation storage of 20,038 acre-feet. Luminant holds a water right for consumptive use of 9,500 acre-feet per year. Presently, the dam for Forest Grove Reservoir is built, but the gates have not been closed so the lake only stores a small amount of water. According to the WAM, available supply from Forest Grove is 650 acre-feet per year in 2030, decreasing to 0 acre-feet per year in 2080. Based on feedback from TRWD, Forest Grove was modeled assuming that the dam gates were open.

Trinidad

Lake Trinidad is an off-channel reservoir located just off the Trinity River in Henderson County, with permitted diversions from the Trinity River. The reservoir has a permitted conservation storage of 6,200 acre-feet. Luminant holds a water right for 4,000 acre-feet per year. According to the WAM, available supply from Lake Trinidad with the diversions from the Trinity is 2,950 acre-feet per year.

Navarro Mills

Lake Navarro Mills is located on Richland Creek in the Trinity River Basin in Navarro County. The reservoir has a permitted conservation storage of 63,300 acre-feet. TRA holds a water right to divert 19,400 acre-feet per year. According to the WAM, available supply from Navarro Mills is 17,000 acre-feet per year in 2030, decreasing to 11,550 acre-feet per year in 2080.

Fairfield

Lake Fairfield is located on Big Brown Creek in the Trinity River Basin in Freestone County. The reservoir has a permitted conservation storage of 50,600 acre-feet. According to the WAM, available supply from Lake Fairfield is 6,395 acre-feet per year in 2030 and 5,315 acre-feet per year in 2080 without backup from the Trinity River.

Bryson

Lake Bryson is located on East Rock Creek in the Brazos River Basin in Jack County. The reservoir has a permitted conservation storage of 950 acre-feet. The City of Bryson holds a water right for 90 acre-feet per year. According to the WAM, available supply from Bryson as of 2080 is 0 acre-feet per year.

Mineral Wells

Lake Mineral Wells is located on Rock Creek in the Brazos River Basin in Parker County. The reservoir has a permitted conservation storage of 7,065 acre-feet. The City of Mineral Wells holds a water right for 2,520 acre-feet per year. According to the WAM, available supply from Mineral Wells is 2,495 acre-feet per year in 2030, decreasing slightly to 2,433 in 2080. The City of Mineral Wells is not currently using water from Lake Mineral Wells.

Teague City

Teague City Lake is located on Holman Creek in the Brazos River Basin in Freestone County. The reservoir has permitted conservation storage of 1,160 acre-feet. The City of Teague holds a water right for 605 acre-feet per year. According to the WAM, available supply from Teague City Lake is 189 acre-feet per year. The City of Teague no longer uses Teague City Lake for water supply.

Lavon

Lake Lavon is located on the East Fork of the Trinity River in Collin County. The reservoir has permitted conservation storage of 443,800 acre-feet. NTMWD holds water rights for 118,670 acre-feet per year. According to the WAM, the firm yield from Lake Lavon is 105,000 acre-feet per year in 2030, decreasing to 101,600 acre-feet per year by 2080. This yield does not include return flows or imported water. The alternative yield, on which NTMWD bases its supplies, is 88,111 acre-feet per year in 2030, decreasing to 67,148 acre-feet per year by 2080.

Bois d’ Arc

Bois d’ Arc Lake is a new reservoir located on Bois d’ Arc Creek in Fannin County, northeast of the City of Bonham. NTMWD holds water rights for 175,000 acre-feet per year. Bois d’Arc Lake is the newest major Texas reservoir in over 30 years and NTMWD began delivering water in March of 2023.

According to the WAM, the firm yield of Bois d’ Arc Lake is 90,600 acre-feet per year in 2030 and 87,800 acre-feet per year in 2080. The alternative yield is 89,456 acre-feet per year in 2030 and 76,228 acre-feet per year in 2080.

Muenster

Lake Muenster is a 4,700-acre-foot lake located in the Trinity River Basin in Cooke County. Muenster Water Districts holds a water right to divert 500 acre-feet per year. According to the WAM, the available supply from Lake Muenster is 250 acre-feet per year.

Ralph Hall

Lake Ralph Hall is a new reservoir currently being constructed on the North fork of the Sulphur River in Fannin County. Construction of the reservoir began in June of 2021 with plans to deliver water by 2026. Upper Trinity Regional Water District (UTRWD) holds water rights for 45,000 acre-feet per year. According to the WAM, the firm yield of Lake Ralph Hall is 40,580 acre-feet per year in 2030 and 40,240 acre-feet per year in 2080.

TABLE E.3 FIRM YIELD AND ALTERNATIVE YIELD FOR SUPPLIES USING ALTERNATIVE YIELDS AS SOURCE AVAILABILITY

SOURCE	2030	2040	2050	2060	2070	2080
Tarrant Regional Water District[a]						
West Fork (includes Bridgeport Local)						
Firm Yield	118,961	118,361	117,761	117,078	116,394	115,711
Safe Yield	96,161	95,561	94,961	94,428	93,894	93,361
Cedar Creek						
Firm Yield	207,350	206,105	204,860	203,640	202,420	201,200
Safe Yield	157,150	155,340	153,530	151,797	150,063	148,330
Richland-Chambers (TRWD)						
Firm Yield	224,650	223,205	221,760	220,357	218,953	217,550
Safe Yield	190,000	188,266	186,531	184,781	183,030	181,280
Benbrook						
Firm Yield	4,271	4,271	4,271	4,271	4,271	4,271
Safe Yield	3,371	3,371	3,371	3,371	3,371	3,371
Arlington						
Firm Yield	9,500	9,350	9,200	9,067	8,933	8,800
Safe Yield	7,500	7,385	7,270	7,157	7,043	6,930
Dallas Water Utilities’						
Elm Fork/Lewisville/Ray Roberts (Dallas)						
Firm Yield	207,399	206,409	205,419	204,036	202,652	201,269
Safe Yield	174,899	174,109	173,319	172,059	170,799	169,539
Ray Hubbard (Dallas)						
Firm Yield	55,730	54,790	53,850	52,953	52,057	51,160

SOURCE	2030	2040	2050	2060	2070	2080
Safe Yield	46,239	45,450	44,660	43,927	43,194	42,461
White Rock						
Firm Yield	3,400	3,200	3,000	2,800	2,600	2,400
Safe Yield	2,540	2,375	2,210	2,023	1,837	1,650
North Texas Municipal Water District[c]						
Bois d' Arc						
Firm Yield	90,600	89,900	89,200	88,733	88,267	87,800
Alternative Yield	89,456	86,878	84,187	81,497	78,918	76,228
Chapman (NTMWD)						
Firm Yield	40,940	39,966	38,992	38,018	37,044	36,070
Alternative Yield	39,700	37,600	35,500	33,500	31,100	29,200
Lavon						
Firm Yield	105,000	104,350	103,700	103,000	102,300	101,600
Alternative Yield	88,111	83,963	79,927	75,892	70,959	67,148

[a]*Safe yield for TRWD is defined as retaining a minimum of 1-year supply in the reservoir during a repeat of the drought of record.*
[b]*Safe yield for DWU is defined as retaining a minimum of 9-month supply in the reservoir during a repeat of the drought of record.*
[c]*Alternative yield for NTMWD is based on a drought worse than the drought of record as evaluated in the NTMWD Long-Range Water Supply Plan*[(2)]

TABLE E.4 DROUGHT OF RECORDS FOR REGION C RESERVOIR

RIVER BASIN	RESERVOIR/SYSTEM	DATE OF MINIMUM CONTENT	DROUGHT OF RECORD
Red	Bois d'Arc	2/2015	4/2010 to 12/2015
Red	Bonham	12/2014	4/2012 to 5/2015
Red	Lake Ralph Hall	2/1957	7/1942 to 5/1969
Red	Lake Texoma	2/2015	10/2010 to 5/2015
Red	Moss	2/2015	4/2010 to 5/2015
Red	Randell	2/1957	7/1951 to 11/1957
Red	Valley	3/1967	6/1948 to 3/1975
Trinity	Arlington	3/1957	7/1951 to 4/1957
Trinity	Bardwell	10/1956	6/1952 to 4/1957
Trinity	Benbrook	1/1957	10/1950 to 5/1957
Trinity	Cedar Creek	1/1957	6/1950 to 6/1957
Trinity	Clark	10/1956	6/1948 to 5/1957
Trinity	Fairfield	4/1957	7/1950 to 5/1959
Trinity	Forest Grove	10/1956	6/1956 to 2/1957
Trinity	Grapevine - Total	3/1957	10/1950 to 4/1957
Trinity	Joe Pool	3/1957	10/1950 to 3/1958
Trinity	Lake Lavon	2/1957	7/1951 to 6/1957
Trinity	Lake Ray Hubbard	2/1957	7/1951 to 6/1957
Trinity	Lewisville	1/1957	10/1950 to 5/1957
Trinity	Lost Creek/ Jacksboro System	1/1957	2/1941 to 3/1957
Trinity	Mountain Creek	1/1957	6/1950 to 5/1957
Trinity	Muenster	3/1957	10/1950 to 5/1957
Trinity	Navarro Mills	1/1965	7/1962 to 4/1966
Trinity	North	2/1957	6/1950 to 4/1957
Trinity	Ray Roberts	3/1957	10/1950 to 6/1968
Trinity	Richland-Chambers	1/1957	6/1948 to 11/1957
Trinity	Terrell	10/1956	6/1953 to 5/1957
Trinity	Trinidad	12/1956	2/1954 to 1/1977
Trinity	Waxahachie	1/1957	6/1953 to 5/1957
Trinity	Weatherford	1/1957	7/1951 to 5/1957
Trinity	West Fork (Bridgeport, Eagle Mountain, Worth)	10/1956	10/1950 to 5/1966
Trinity	White Rock	3/1957	8/1953 to 5/1957

E.4 Unpermitted Firm Yields in Region C Reservoirs

According to the WAMs, there are four reservoirs and one reservoir system in Region C with firm yields that exceed the currently permitted diversion amounts. These reservoirs with their unpermitted firm yields are listed in **Table E.5**. Note that the Oklahoma share of Lake Texoma yield is not included in the table. The unpermitted yield in Lake Texoma is dedicated by contract for hydropower by the USACE.

TABLE E.5 UNPERMITTED FIRM YIELDS IN REGION C RESERVOIRS

SOURCE	BASIN	VALUES IN ACRE-FEET PER YEAR					
		2030	2040	2050	2060	2070	2080
Lost Creek/ Jacksboro System	Trinity	1,050	1,025	1,000	983	967	950
Cedar Creek	Trinity	32,600	31,355	30,110	28,890	27,670	26,450
Richland Chambers (TRWD)	Trinity	14,650	13,205	11,760	10,357	8,953	7,550
Texoma (Texas' Share)[a]	Red	154,600	151,725	148,850	143,883	138,917	133,950
Mountain Creek	Trinity	3,800	3,700	3,600	3,467	3,333	3,200

[a]This amount assumes the full permitted amount of 84,000 acre-feet per year, a portion of which NTMWD is not currently authorized to use. According to their water right, NTMWD is only authorized to use up to 77,300 acre-feet per year. The remaining 6,700 acre-feet per year are allocated to the channel losses between Lake Texoma and Lake Lavon.

E.5 Imports

The total supply available (not limited to infrastructure constraints) from imports is based upon the Water Availability Models (WAMs) from TCEQ and the current contracts with the owners of the water sources. **Table E.6** shows those imports. Below is a discussion of each of the imported water sources.

Chapman

Lake Chapman is a reservoir located in Region D. NTMWD, the City of Irving, and the Sulphur River Water District hold water rights in Lake Chapman totaling 146,520 acre-feet per year. Of this total, 127,320 acre-feet per year can be exported for use in Region C – 57,214 acre-feet per year for NTMWD, 54,000 acre-feet per year for Irving, and 16,106 acre-feet per year for UTRWD (purchased from the Sulphur River Water District through the City of Commerce). The firm yield of Lake Chapman was developed by the Region D Water Planning Group by which Region C applied the Chapman Accounting Plan distribution to. According to the WAM, the firm yield of Lake Chapman is 104,840 acre-feet per year in 2030 and 92,370 acre-feet per year in 2080.

The values in **Table E.6** show Lake Chapman's computed firm yield divided proportionally among the Region C water suppliers with a share of the water. According to the WAM, the firm yield of the NTMWD portion of Lake Chapman is 40,940 acre-feet per year in 2030 and 36,070 acre-feet per year in 2080. The firm yield for Lake Chapman developed for this round of planning was lower than the alternative yield developed as part of the NTMWD Long-Range Water Supply Plan.(2) Due to this, the expected factor from the NTMWD Long-Range Water Supply Plan(2) was applied to the new firm yield provided by Region D. This results in a slightly lower yield than the NTMWD Long-Range Water Supply Plan. The alternative yield is 39,700 acre-feet per year in 2030 and 29,200 acre-feet per year in 2080.

It should be noted that UTRWD's contract with the City of Commerce, which was originally signed in 1991, renews every 25 years unless UTRWD provides five years notice prior to termination. The contract was renewed in 2016 with no changes. According to the terms of the contract, after 2066, the City of Commerce can reduce the quantity of water supplied with each subsequent renewal, and in 2141 they have the right to cancel the contract if they wish. It should also be noted that the actual availability for UTRWD is limited by the yield rather than the contract amount.

TABLE E.6 TOTAL AVAILABLE SURFACE WATER SUPPLIES FROM IMPORTS

SOURCE	BASIN OF ORIGIN	VALUES IN ACRE-FEET PER YEAR					
		2030	2040	2050	2060	2070	2080
Chapman (NTMWD)[a]	Sulphur	39,700	37,600	35,500	33,500	31,100	29,200
Chapman (Irving)	Sulphur	38,644	37,725	36,805	35,886	34,967	34,048
Chapman (UTRWD)	Sulphur	11,522	11,248	10,974	10,700	10,425	10,151
Tawakoni (Dallas)	Sabine	180,991	179,634	178,278	176,922	175,565	174,208
Fork (Dallas)[b]	Sabine	107,473	106,299	105,124	103,948	102,773	101,599
Upper Sabine (NTMWD)[c]	Sabine	10,582	10,499	10,416	10,333	10,251	10,168
Palestine (Dallas)[d]	Neches	96,204	95,086	93,967	92,874	91,778	90,673
Lake Athens (Athens)[e]	Neches	665	1,187	1,807	1,964	1,967	1,969
Brazos River Authority		3,352	3,354	3,313	3,274	3,236	3,201
Lake Aquilla	*Brazos*	247	267	288	307	325	342
Main Stem Lake/Reservoir System)	*Brazos*	3,105	3,087	3,025	2,967	2,911	2,859
Parker County (from Lake Palo Pinto)	Brazos	1,566	1,583	1,604	1,629	1,653	1,676
TOTAL		***490,699***	***484,215***	***477,788***	***471,030***	***463,715***	***456,893***

[a]Although this Reservoir is physically located in another region, this source has been combined with other NTWMD supplies into a system in DB27 and is now included in the DB27 reports for Region C source.

[b]The import of water from Lake Fork to the Trinity Basin is limited to 120,000 acre-feet per year. The first phase of the infrastructure to transport this water to DWU is completed. The second phase is scheduled to be completed in the next five years.

[c]NTMWD acquired Terrell's and Ables Springs SUD's supply in Lake Tawakoni.

[d]There is no current infrastructure to transport the water from Lake Palestine to DWU.

[e]The amount of water from Lake Athens is the amount that is imported to Region C.

Tawakoni (Dallas)

Lake Tawakoni is located in the Sabine River Basin. The Sabine River Authority (SRA) holds water rights for 238,100 acre-feet per year. The City of Dallas has a contract with SRA for 190,480 acre-feet per year. The yield of Lake Tawakoni was determined by Region I using the Sabine River WAM. The firm yield of Lake Tawakoni is 226,239 in year 2030, reducing to 217,760 acre-feet per year by 2080. The supplies available to the cities of Dallas and NTMWD are based on the proportion of the contracted amount to the firm yield. Adjustments were made so that supplies to each customer of the SRA were reduced proportionally. NTMWD's share of the Lake Tawakoni supply is included in the Upper Sabine Basin Supply in **Table E.6**.

Lake Fork (Dallas)

Lake Fork is located in the Sabine River Basin. SRA holds water rights for 188,660 acre-feet per year. The City of Dallas has a contract for 131,860 acre-feet per year. Of this amount, 120,000 acre-feet per year can be exported to the Trinity Basin in Region C. The remainder can only be used in the Sabine River Basin. The firm yield of Lake Fork was determined by Region I and is estimated as 168,966 acre-feet per year in year 2030, decreasing to 159,730 acre-feet per year in 2080. The supply to Dallas is based on the proportion of the contracted amount to the firm yield. The total amount exported to Region C was limited to the 120,000 acre-feet per year specified in the trans-basin diversion permit.

Upper Sabine Basin Supply (NTMWD)

NTMWD has two contracts with SRA for a total of 11,210 acre-feet per year from Lake Tawakoni that were transferred from the City of Terrell and Ables Springs WSC. The available supply to NTMWD from the Upper Sabine Basin that is shown in **Table E.6** is based on the NTMWD Long-Range Water Supply Plan(2).

Palestine (Dallas)

Lake Palestine is located on the Neches River in the Neches River Basin. The lake is owned and operated by the Upper Neches River Municipal Water Authority (UNRMWA) in conjunction with a downstream diversion point (Rocky Point). The UNRMWA holds water rights totaling 238,110 acre-feet per year from the Lake Palestine system. The firm yield of the Palestine system using the numbers provided by Region I is estimated at 177,110 acre-feet per year in year 2030, reducing to 166,910 acre-feet per year by 2080. The City of Dallas has a contract with the UNRMWA for 114,337 acre-feet per year. The supply to Dallas was reduced due to the reduced yield. Presently there is no infrastructure to transport this water from Lake Palestine to Dallas. This will be considered as a water management strategy.

Athens (Athens)

Lake Athens is located in Henderson County in the Neches River Basin. The Athens Municipal Water Authority holds water rights in Lake Athens totaling 8,500 acre-feet per year. Of this amount 3,023 acre-feet per year is designated for industrial use for the Athens Fish Hatchery, which is located at the lake. The yield of Lake Athens determined by Region I, using the Neches Basin Water Availability Model was estimated at 4,540 acre-feet per year in 2030 and 4,300 acre-feet per year in 2080. The amount that is exported to Region C for use by the Region C portion of City of Athens is 665 acre-feet per year in 2030, increasing to 1,969 acre-feet per year in 2080.

Lake Aquilla

Lake Aquilla is located in the Brazos River Basin in Region G. The Aquilla Water Supply Corporation provides water to entities in Ellis and Navarro Counties in Region C. The total estimated supply provided to Region C from Lake Aquilla is 247 acre-feet per year in 2030, increasing to 342 acre-feet per year by 2080.

Main Stem Lake/Reservoir System (Lake Granbury)

Lake Granbury is located in the Brazos River Basin in Region G. The Brazos River Authority (BRA) owns and operates the lake as part of the Authority's water system (Main Stem Lake/Reservoir System). Currently, the Authority sells water from Lake Granbury to Johnson County Special Utility District (SUD) and Parker County SUD. The amount of existing supplies imported to Region C is estimated at 3,105 acre-feet per year in 2030, increasing to 2,859 acre-feet per year in 2080.

Lake Palo Pinto

Lake Palo Pinto is located in Palo Pinto County in the Brazos River Basin in Region G. A portion of Mineral Wells is in Parker County in Region C. All of Mineral Wells' water supply currently comes from Lake Palo Pinto. (Mineral Wells has a water right in Lake Mineral Wells in Parker County but has no plans to use that source for water supply.) The supply from Lake Palo Pinto to Region C also supplies Mineral Wells' customers located in Region C, which include portions of Parker County Other, Parker County Manufacturing, and Santo SUD. The amount of existing supplies imported to Region C from Lake Palo Pinto is estimated at 1,566 acre-feet per year in 2030 to 1,676 acre-feet per year in 2080.

E.6 Irrigation Local Supply and Other Local Supply

Other local supplies include run-of-the-river supplies associated with water rights and used for irrigation, manufacturing, mining, municipal, and steam electric power generation. They also include local surface water supplies used for livestock and mining. For irrigation and mining, the reliable supply from run-of-the-river diversions was calculated using the minimum annual diversion from WAM Run 3 for the permitted water rights. For municipalities with run-of-river supplies as their sole source and manufacturing and steam electric users, an individual firm yield analysis was performed.

Other local supplies include mining and livestock local supplies that do not have a water right. Most surface water used for livestock is taken from stock ponds or directly from streams. Most of the livestock supplies are exempt from needing a water right so they are not included in the WAMs, so these supplies are based on historical use. For livestock and mining local supplies, the available supply volumes are based on the maximum historical use from 2015-2019 [3,4] and the projected demands. **Table E.7** shows the available supply for irrigation and other local supplies.

TABLE E.7 SUMMARY OF LOCAL SURFACE WATER SUPPLIES FOR REGION C

USE	COUNTY	BASIN	VALUES IN ACRE-FEET PER YEAR					
			2030	2040	2050	2060	2070	2080
Irrigation Run-of-River Supplies								
Irrigation	Fannin	Red	2,295	2,295	2,295	2,295	2,295	2,295
Irrigation	Grayson	Red	768	768	768	768	768	768
Irrigation	Collin	Trinity	265	265	265	265	265	265
Irrigation	Dallas	Trinity	309	309	309	309	309	309
Irrigation	Ellis	Trinity	1	1	1	1	1	1
Irrigation	Freestone	Trinity	91	91	91	91	91	91
Irrigation	Henderson	Trinity	1,246	1,246	1,246	1,246	1,246	1,246
Irrigation	Kaufman	Trinity	83	83	83	83	83	83
Irrigation	Navarro	Trinity	535	535	535	535	535	535
Irrigation	Parker	Trinity	68	68	68	68	68	68
Irrigation	Tarrant	Trinity	513	513	513	513	513	513
Irrigation	Parker	Brazos	66	66	66	66	66	66
Subtotal Irrigation Run-of-River			**6,240**	**6,240**	**6,240**	**6,240**	**6,240**	**6,240**
Non-Irrigation Run-of-River Supplies								
Municipal	Fannin	Sulphur	45	45	45	45	45	45
Municipal	Freestone	Trinity	41	41	41	41	41	41
Municipal	Navarro	Trinity	252	252	252	252	252	252
Mining	Fannin	Red	75	75	75	75	75	75
Mining	Wise	Trinity	39	39	39	39	39	39
Manufacturing	Grayson	Red	3	3	3	3	3	3
Steam Electric Power	Dallas	Trinity	1,423	1,423	1,423	1,423	1,423	1,423
Steam Electric Power	Tarrant	Trinity	1,079	1,079	1,079	1,079	1,079	1,079
Subtotal Non-Irrigation Run-of-River			**2,957**	**2,957**	**2,957**	**2,957**	**2,957**	**2,957**
Livestock and Mining Local Supplies								
Livestock	Collin	Sabine	39	39	39	39	39	39
Livestock	Collin	Trinity	762	762	762	762	762	762
Livestock	Cooke	Red	429	429	429	429	429	429
Livestock	Cooke	Trinity	910	910	910	910	910	910
Livestock	Dallas	Trinity	51	51	51	51	51	51
Livestock	Denton	Trinity	618	618	618	618	618	618
Livestock	Ellis	Trinity	931	931	931	931	931	931
Livestock	Fannin	Red	99	99	99	99	99	99
Livestock	Fannin	Sulphur	34	34	34	34	34	34
Livestock	Fannin	Trinity	8	8	8	8	8	8
Livestock	Freestone	Brazos	106	106	106	106	106	106
Livestock	Freestone	Trinity	1,229	1,229	1,229	1,229	1,229	1,229
Livestock	Grayson	Red	566	566	566	566	566	566
Livestock	Grayson	Trinity	367	367	367	367	367	367
Livestock	Henderson	Trinity	430	430	430	430	430	430
Livestock	Jack	Brazos	173	173	173	173	173	173
Livestock	Jack	Trinity	425	425	425	425	425	425
Livestock	Kaufman	Sabine	86	86	86	86	86	86
Livestock	Kaufman	Trinity	1,340	1,340	1,340	1,340	1,340	1,340
Livestock	Navarro	Trinity	1,492	1,492	1,492	1,492	1,492	1,492

USE	COUNTY	BASIN	VALUES IN ACRE-FEET PER YEAR					
			2030	2040	2050	2060	2070	2080
Livestock	Parker	Brazos	649	649	649	649	649	649
Livestock	Parker	Trinity	732	732	732	732	732	732
Livestock	Rockwall	Sabine	64	64	64	64	64	64
Livestock	Rockwall	Trinity	72	72	72	72	72	72
Livestock	Tarrant	Trinity	351	351	351	351	351	351
Livestock	Wise	Trinity	1,210	1,210	1,210	1,210	1,210	1,210
Mining	Denton	Trinity	764	764	764	764	764	764
Mining	Fannin	Red	1,800	2,100	2,373	2,373	2,373	2,373
Mining	Freestone	Trinity	32	32	32	32	32	32
Mining	Kaufman	Trinity	1,162	1,162	1,162	1,162	1,162	1,162
Mining	Navarro	Trinity	800	1,000	1,200	1,568	1,568	1,568
Mining	Parker	Brazos	20	20	20	20	20	20
Mining	Tarrant	Trinity	400	100	100	100	100	100
Subtotal Livestock and Mining			**18,151**	**18,351**	**18,824**	**19,192**	**19,192**	**19,192**
TOTAL RUN-OF-RIVER AND LOCAL SUPPLIES			***27,348***	***27,548***	***28,021***	***28,389***	***28,389***	***28,389***

E.7 Reuse

The reuse quantities listed in **Table E.1** are limited to currently permitted and operating indirect reuse projects and existing direct reuse for irrigation or industrial purposes. **Table E.8** shows the individual reuse projects that make up the total overall (not limited to infrastructure constraints) reuse amount in **Table E.1** along with the methodology and sources of quantities. The recommended regional reuse plan is outlined in **Chapter 5B** of the *2026 Region C plan*.

- RWPGs must classify reuse availability as either direct or indirect. (Contract Exhibit C, Section 2.3.3)
- For indirect reuse [existing supplies], RWPGs must base their drought of record existing indirect reuse analyses on currently installed wastewater treatment infrastructure; currently permitted wastewater discharge amounts; and the amount of wastewater anticipated to be treated at the WWTP, based on associated decade populations/demands. These amounts may not exceed the amounts of water available to utilities generating the wastewater. (Contract Exhibit C, Section 2.3.6)

TABLE E.8 SUMMARY OF SUPPLIES AVAILABLE FROM REUSE

PROJECT NAME	METHODOLOGY/SOURCE	TYPE	COUNTY	VALUES IN ACRE-FEET PER YEAR					
				2030	2040	2050	2060	2070	2080
City of Annetta/Golf Course Irrigation	Based on a return flow factor of 29% which is the average return factor from the 2021 Plan.	Direct Reuse	Parker	129	154	180	205	231	256
City of Azle/ Golf Course Irrigation	Wastewater treatment plant discharge.	Direct Reuse	Tarrant	300	300	300	300	300	300
City of Bryson/Jack County Irrigation	Based on current population reported TML of 561, 100 gpcd, and a 40% return factor. This also assumes the population will remain constant for the City of Bryson.	Direct Reuse	Jack	25	25	25	25	25	25
City of Crandall/Golf Course Irrigation	Based on actual 2011 water use and return flow (58.4% return flow).	Direct Reuse	Kaufman	579	666	666	666	666	666
City of Dallas/Golf Course Irrigation	Provided under Chapter 210 Authorization R10060001 for Cedar Crest Golf Course (561 AF/Y) and Stevens Park Golf Course irrigation (560 AF/Y).	Direct Reuse	Dallas	1,121	1,121	1,121	1,121	1,121	1,121
City of Denton/Denton County SEP	Set equal to the SEP demands in Denton County.	Direct Reuse	Denton	1,175	1,175	1,175	1,175	1,175	1,175
City of Denton/Irrigation	Based on 5-year average data from 2007-2011.	Direct Reuse	Denton	265	265	265	265	265	265
City of Denton/Lake Lewisville	Wastewater treatment plant discharge.	Indirect Reuse	Denton	4,608	4,969	4,953	6,457	8,320	10,143
City of Ennis /Lake Bardwell	TRA is authorized to divert up to 3,696 ac-ft/yr from the City of Ennis WWTP. For 2030 2/3 of the total permitted amount minus other Ennis projected reuse. For 2040-2080 total permitted amount minus other Ennis projected reuse.	Indirect Reuse	Ellis	890	2,122	2,122	2,122	2,122	2,122
City of Ennis/Vistra Energy Generation Power Plant	Based on Ellis County SEP demands on the City of Ennis.	Direct Reuse	Ellis	1,574	1,574	1,574	1,574	1,574	1,574

PROJECT NAME	METHODOLOGY/SOURCE	TYPE	COUNTY	VALUES IN ACRE-FEET PER YEAR					
				2030	2040	2050	2060	2070	2080
City of Fort Worth/Cities of Fort Worth, Arlington, Euless, and DFW Airport	Based on 2017 reuse sales.	Direct Reuse	Tarrant	2,296	2,296	2,296	2,296	2,296	2,296
City of Fort Worth/Golf Course Irrigation	Based on 2017 reuse sales.	Direct Reuse	Tarrant	550	550	550	550	550	550
City of Gainesville/Irrigation	Based on feedback from Gainesville 2/2018.	Direct Reuse	Cooke	4	4	4	4	4	4
City of Garland /Luminant	From the NTMWD LRWSP.	Direct Reuse	Kaufman	10,089	10,089	10,089	10,089	10,089	10,089
City of Grapevine/Lake Grapevine	Based on a return flow factor of 17.9%.	Indirect Reuse	Tarrant	3,355	3,346	3,346	3,346	3,346	3,346
City of Lewisville/Golf Course Irrigation	Based on an anticipated peak demand of 2 MGD (contract) with a 2.5 peaking factor.	Direct Reuse	Denton	897	897	897	897	897	897
City of The Colony/Golf Course Irrigation	Based on maximum reported historical usage from 2016 RCWP.	Direct Reuse	Collin	457	457	457	457	457	457
City of Weatherford/Golf Course Irrigation	Based on available WTP flows to the lagoons (10%), limited to historic use of 123 AF/Y provided from Weatherford.	Direct Reuse	Parker	123	123	123	123	123	123
City of Weatherford/Lake Weatherford	Based on WWTP discharges with a 50% return flow limited to Lake Weatherford's firm yield. Plus	Indirect Reuse	Parker	2,860	2,810	2,760	2,717	2,673	2,630
City of Weatherford/Lake Weatherford	Based on available WTP flows to the lagoons (10%) less direct reuse to the Oeste Ranch Golf Course, limited by 1 MGD.	Indirect Reuse	Parker	700	855	1,034	1,121	1,121	1,121
DWU/Lake Lewisville	Wastewater treatment plant discharge from various DWU WWTPs located upstream of Lake Lewisville.	Indirect Reuse	Denton	44,265	51,332	59,790	62,160	64,842	68,097
Millsap ISD/Irrigation	Based on wastewater treatment plant discharge.	Direct Reuse	Parker	2	2	2	2	2	2
NTMWD/ Lake Lavon	Based on wastewater treatment plant discharge limited to the permitted capacity of 73,008 AF/Y (71,882 AF/Y	Indirect Reuse	Collin	69,402	73,008	73,008	73,008	73,008	73,008

PROJECT NAME	METHODOLOGY/SOURCE	TYPE	COUNTY	VALUES IN ACRE-FEET PER YEAR					
				2030	2040	2050	2060	2070	2080
	Wilson Creek, 252 AF/Y Farmersville No. 1, 594 AF/Y Farmersville No. 2, and 280 AF/Y Seis Lagos).								
NTMWD/City of Frisco	From the NTMWD LRWSP.	Direct Reuse	Collin	3,038	3,038	3,038	3,038	3,038	3,038
NTMWD/East Fork Wetlands to Lake Lavon	Limited by wetland treatment capacity.	Indirect Reuse	Kaufman	102,000	102,000	102,000	102,000	102,000	102,000
NTMWD/Golf Course Irrigation	Based on feedback from NTMWD on 10/2024.	Direct Reuse	Rockwall	672	0	0	0	0	0
NTMWD/Golf Course Irrigation	Wastewater treatment plant discharge.	Direct Reuse	Collin	1,540	1,540	1,540	1,540	1,540	1,540
NTMWD/Irrigation, Collin	Wastewater treatment plant discharge.	Direct Reuse	Collin	100	100	100	100	100	100
Pinnacle Club WWTP/Pinnacle Club Golf Course	Limited by projected flow to the Pinnacle Club WWTP.	Direct Reuse	Henderson	32	32	32	32	32	32
TRA/DCURD Las Colinas	Wastewater treatment plant discharge.	Indirect Reuse	Dallas	8,000	8,000	8,000	8,000	8,000	8,000
TRA/Fishing Hole Lake	Lake has no yield on its own. This is only a holding pond for effluent from TRA Central RWS for City of Irving Reuse Diversions. Based on current contract between TRA and Irving to purchase 25 MGD of effluent from TRA Central WWTP minus 486 AF/Y for TRA/Trinity River (City of Irving) reuse supply.	Indirect Reuse	Dallas	27,539	27,539	27,539	27,539	27,539	27,539
Waxahachie/Lake Bardwell	Assumed full permitted amount of 5,129 AF/Y.	Indirect Reuse	Ellis	5,129	5,129	5,129	5,129	5,129	5,129
Mountain Creek WWTP/Joe Pool	Projections received from TRA 7/2024.	Indirect Reuse	Ellis	10,089	13,452	13,452	13,452	13,452	13,452
TRA/South Creek Ranch Irrigation	Wastewater treatment plant discharge.	Direct Reuse	Dallas	125	125	125	125	125	125
TRA/Central RWS (TRWD)	Projections received from TRA and approved by TRWD 7/2024.	Indirect Reuse	Dallas	25,500	37,000	48,500	60,000	60,000	60,000

PROJECT NAME	METHODOLOGY/SOURCE	TYPE	COUNTY	VALUES IN ACRE-FEET PER YEAR					
				2030	2040	2050	2060	2070	2080
TRA/Trinity River (City of Irving)	Irving has water right 03-4799D Which permits them to withdraw 486 AF/Y for this purpose.	Indirect Reuse	Dallas	486	486	486	486	486	486
TRA/Landscape Irrigation, Flower Mound	Based on the 2014 DCRWS Master Plan Update.	Direct Reuse	Tarrant	222	556	556	556	556	556
Trophy Club Mud #1/Golf Course Irrigation	Based on upper limit of 800 AF/Y placed in 2011 RCWP.	Direct Reuse	Denton	800	800	800	800	800	800
TRWD/Richland-Chambers Reservoir	Based on FW VCWRF only and is the minimum of RC permit amount and the FW VCWRF reuse flows available. Limited to full permitted amount of 100,456 AF/Y.	Indirect Reuse	Navarro	100,465	100,465	100,465	100,465	100,465	100,465
UTRWD/Lake Lewisville Originating From Lake Chapman	Assumed 30% return flows in 2030, 40% in 2040, and 50% 2050-2080 from UTRWD's portion of Chapman.	Indirect Reuse	Denton	3,388	4,409	5,378	5,243	5,109	4,974
TOTAL IN ACRE-FEET PER YEAR				***434,791***	***462,811***	***483,877***	***499,185***	***503,578***	***508,503***
TOTAL IN MGD				***388***	***413***	***432***	***445***	***449***	***454***

E.8 Desalination

Two desalination facilities are currently operated by public water systems within Region C. The City of Sherman operates a 10 MGD electrodialysis reversal membrane plant to treat brackish water from Lake Texoma and has recently expanded its treatment capacity with a 10 MGD expansion reverse osmosis facility. The City of Bardwell operates a reverse osmosis facility to treat brackish groundwater. These supplies are included in the total supplies from reservoirs (Sherman) and groundwater (Bardwell). In addition, the Brazos River Authority (BRA) operates the Lake Granbury Surface Water and Treatment System (SWATS). Although Lake Granbury is located in Region G, BRA provides water from SWATS to the Johnson County SUD, which serves customers within Region C. The amount of water provided by SWATS is accounted for in **Table E.6** (imports to Region C).

E.9 Groundwater

Groundwater supplies in Region C are obtained from the following;

- Two major aquifers (Carrizo-Wilcox and Trinity),
- Four minor aquifers (Woodbine, Nacatoch, Cross Timbers, Queen City), and
- Locally undifferentiated formations, referred to as “Other aquifer.”

As required by regional planning rules, Modeled Available Groundwater (MAG) estimates provided by the TWDB were used to determine groundwater availability[5]. For Region C, TWDB provided estimates for the Carrizo-Wilcox, Trinity, Woodbine and Queen City aquifers.

There are sixteen Groundwater Management Areas in Texas. GMA 8 covers all of Region C except for Jack County, Henderson County, and a small portions of Navarro, Parker, and Wise County. GMA 6, GMA 11, and GMA 12 cover small portions of Region C. The GMAs are responsible for developing Desired Future Conditions (DFCs) for aquifers within their respective areas. The TWDB quantifies Modeled Available Groundwater (MAG) based on the DFCs provided by the GMAs. The regional water planning groups must use MAG estimates as the basis for existing groundwater supplies for all locations that have a DFC [2].

GMA-8 and GMA-11 deemed the Nacatoch aquifer “non-relevant”, and new water availability estimates for this aquifer were not included in the MAGs developed by TWDB. Therefore, availability for this aquifer was assumed to be the same as the amounts used in the *2021 Region C Water Plan*. The Cross Timbers aquifer was designated as a new minor aquifer in 2017. No desired future conditions have been established by the GMAs for this aquifer, therefore no MAG amounts are available. For this reason, the availability from this aquifer is assumed to be the same as the amounts used in the *2021 Region C Water Plan*. There are also several locally undifferentiated formations in Region C, referred to as “Other aquifer.” Other aquifer supplies are used in Fannin and Navarro counties in Region C. Available supplies from these undifferentiated formations are not included in the MAG numbers. Other aquifer available supply amounts are based on historical pumping data obtained from the TWDB[5] and are assumed to be the same as the amounts used in the *2021 Region C Water Plan*. **Table E.9** details the groundwater availability for Region C.

There are currently seven Groundwater Conservation Districts (GCDs) that include one or more counties in Region C:

- Upper Trinity GCD (Wise and Parker Counties)
- Northern Trinity GCD (Tarrant County)
- Neches and Trinity Valleys GCD (Henderson County)
- MID-EAST TEXAS GCD (FREESTONE COUNTY)
- Prairielands GCD (Ellis County)
- North Texas GCD (Collin, Cooke, and Denton Counties)
- Red River GCD (Grayson and Fannin Counties)

TABLE E.9 GROUNDWATER AVAILABILITY FOR REGION C

AQUIFER	COUNTY	BASIN	VALUES IN ACRE-FEET PER YEAR					
			2030	2040	2050	2060	2070	2080
Trinity	Collin	Sabine	0	0	0	0	0	0
Trinity	Collin	Trinity	5,795	5,795	5,795	5,795	5,795	5,795
Woodbine	Collin	Sabine	0	0	0	0	0	0
Woodbine	Collin	Trinity	4,254	4,254	4,254	4,254	4,254	4,254
Subtotal	**Collin**		**10,049**	**10,049**	**10,049**	**10,049**	**10,049**	**10,049**
Trinity	Cooke	Red	2,186	2,186	2,186	2,186	2,186	2,186
Trinity	Cooke	Trinity	8,335	8,335	8,335	8,335	8,335	8,335
Woodbine	Cooke	Red	262	262	262	262	262	262
Woodbine	Cooke	Trinity	539	539	539	539	539	539
Subtotal	**Cooke**		**11,322**	**11,322**	**11,322**	**11,322**	**11,322**	**11,322**
Trinity	Dallas	Trinity	3,691	3,691	3,691	3,691	3,691	3,691
Woodbine	Dallas	Trinity	2,798	2,798	2,798	2,798	2,798	2,798
Subtotal	**Dallas**		**6,489**	**6,489**	**6,489**	**6,489**	**6,489**	**6,489**
Trinity	Denton	Trinity	30,091	30,091	30,091	30,091	30,091	30,091
Woodbine	Denton	Trinity	3,609	3,609	3,609	3,609	3,609	3,609
Subtotal	**Denton**		**33,700**	**33,700**	**33,700**	**33,700**	**33,700**	**33,700**
Nacatoch	Ellis	Trinity	20	20	20	20	20	20
Trinity	Ellis	Trinity	6,168	6,168	6,168	6,168	6,168	6,168
Woodbine	Ellis	Trinity	2,074	2,074	2,074	2,074	2,074	2,074
Subtotal	**Ellis**		**8,262**	**8,262**	**8,262**	**8,262**	**8,262**	**8,262**
Trinity	Fannin	Red	0	0	0	0	0	0
Trinity	Fannin	Sulphur	2,088	2,088	2,088	2,088	2,088	2,088
Trinity	Fannin	Trinity	0	0	0	0	0	0
Woodbine	Fannin	Red	3,547	3,547	3,547	3,547	3,547	3,547
Woodbine	Fannin	Sulphur	550	550	550	550	550	550
Woodbine	Fannin	Trinity	827	827	827	827	827	827
Other	Fannin	Red	2,919	2,919	2,919	2,919	2,919	2,919

AQUIFER	COUNTY	BASIN	VALUES IN ACRE-FEET PER YEAR					
			2030	2040	2050	2060	2070	2080
Subtotal	**Fannin**		**9,931**	**9,931**	**9,931**	**9,931**	**9,931**	**9,931**
Carrizo-Wilcox	Freestone	Trinity	5,946	6,823	7,698	8,575	9,363	9,363
Carrizo-Wilcox	Freestone	Brazos	1,257	1,432	1,609	1,784	1,941	1,941
Queen City	Freestone	Trinity	77	77	77	77	77	77
Subtotal	**Freestone**		**7,280**	**8,332**	**9,384**	**10,436**	**11,381**	**11,381**
Trinity	Grayson	Red	6,665	6,665	6,665	6,665	6,665	6,665
Trinity	Grayson	Trinity	4,051	4,051	4,051	4,051	4,051	4,051
Woodbine	Grayson	Red	5,603	5,603	5,603	5,603	5,603	5,603
Woodbine	Grayson	Trinity	1,923	1,923	1,923	1,923	1,923	1,923
Subtotal	**Grayson**		**18,242**	**18,242**	**18,242**	**18,242**	**18,242**	**18,242**
Carrizo-Wilcox	Henderson	Trinity	3,226	3,226	3,226	3,226	3,226	3,226
Queen City	Henderson	Trinity	154	154	154	154	154	154
Subtotal	**Henderson**		**3,380**	**3,380**	**3,380**	**3,380**	**3,380**	**3,380**
Cross Timbers	Jack	Brazos	284	284	284	284	284	284
Cross Timbers	Jack	Trinity	650	650	650	650	650	650
Trinity	Jack	Trinity	449	449	449	449	449	449
Trinity	Jack	Brazos	188	188	188	188	188	188
Subtotal	**Jack**		**1,571**	**1,571**	**1,571**	**1,571**	**1,571**	**1,571**
Nacatoch	Kaufman	Sabine	49	49	49	49	49	49
Nacatoch	Kaufman	Trinity	877	877	877	877	877	877
Other	Kaufman	Trinity	1,756	1,756	1,756	1,756	1,756	1,756
Trinity	Kaufman	Sabine	0	0	0	0	0	0
Trinity	Kaufman	Trinity	0	0	0	0	0	0
Woodbine	Kaufman	Trinity	0	0	0	0	0	0
Woodbine	Kaufman	Sabine	0	0	0	0	0	0
Subtotal	**Kaufman**		**2,682**	**2,682**	**2,682**	**2,682**	**2,682**	**2,682**
Carrizo-Wilcox	Navarro	Trinity	105	114	125	136	149	149
Nacatoch	Navarro	Trinity	980	980	980	980	980	980
Other	Navarro	Trinity	435	435	435	435	435	435
Trinity	Navarro	Trinity	0	0	0	0	0	0
Woodbine	Navarro	Trinity	68	68	68	68	68	68
Subtotal	**Navarro**		**1,588**	**1,597**	**1,608**	**1,619**	**1,632**	**1,632**
Cross Timbers	Parker	Brazos	50	50	50	50	50	50
Trinity	Parker	Trinity	11,793	11,793	11,793	11,793	11,793	11,793
Trinity	Parker	Brazos	2,656	2,656	2,656	2,656	2,656	2,656
Subtotal	**Parker**		**14,499**	**14,499**	**14,499**	**14,499**	**14,499**	**14,499**
Nacatoch	Rockwall	Trinity	13	13	13	13	13	13
Nacatoch	Rockwall	Sabine	0	0	0	0	0	0
Trinity	Rockwall	Trinity	0	0	0	0	0	0
Trinity	Rockwall	Sabine	0	0	0	0	0	0
Woodbine	Rockwall	Trinity	0	0	0	0	0	0
Woodbine	Rockwall	Sabine	0	0	0	0	0	0

AQUIFER	COUNTY	BASIN	VALUES IN ACRE-FEET PER YEAR					
			2030	2040	2050	2060	2070	2080
Subtotal	**Rockwall**		**13**	**13**	**13**	**13**	**13**	**13**
Trinity	Tarrant	Trinity	17,926	17,926	17,926	17,926	17,926	17,926
Woodbine	Tarrant	Trinity	1,139	1,139	1,139	1,139	1,139	1,139
Subtotal	**Tarrant**		**19,065**	**19,065**	**19,065**	**19,065**	**19,065**	**19,065**
Trinity	Wise	Trinity	11,452	11,452	11,452	11,452	11,452	11,452
Subtotal	**Wise**		**11,452**	**11,452**	**11,452**	**11,452**	**11,452**	**11,452**
REGION C TOTAL			***159,525***	***160,586***	***161,649***	***162,712***	***163,670***	***163,670***

TABLE E.10 SUMMARY OF WATER AVAILABILITY MODELS (WAMS) USE BY REGION C

WAM MODEL VERSION	MODIFICATIONS TO MODEL	DATE MODIFICATIONS APPROVED BY EA	ENTITY THAT PERFORMED MODEL RUN	DATE OF MODEL RUN
TCEQ Trinity WAM Run 3	See hydraulic variance request letter dated August 22, 2023.	October 26, 2023	Freese and Nichols, Inc.	October 2023
TCEQ Red WAM Run 3	See hydraulic variance request letter dated August 22, 2023.	October 26, 2023	Freese and Nichols, Inc.	October 2023
TCEQ Sulphur WAM Run 3	See hydraulic variance request letter dated August 22, 2023.	October 26, 2023	Freese and Nichols, Inc.	October 2023
TCEQ Neches WAM Run 3	See Hydraulic Variance Request from Region I Planning Group.	See Region I Plan	Carollo Engineers	See Region I Plan
TCEQ Sabine WAM Run 3	See Hydraulic Variance Request from Region I Planning Group.	See Region I Plan	Carollo Engineers	See Region I Plan
TCEQ Brazos WAM Run 3	See Hydraulic Variance Request from Region G Planning Group.	See Region G Plan	Plummer Associates, Inc.	See Region G Plan
TCEQ Sulphur WAM Run 3[1]	No modifications except for Consensus Environmental Flows	N/A	Freese and Nichols, Inc.	November 2024
TCEQ Trinity WAM Run 3[2]	Project was added.	N/A	Freese and Nichols, Inc.	November 2024

1. WAM run for Marvin Nichols Reservoir and Wright Patman.
2. WAM run for Lake Tehuacana.
3. Project yields for George Parkhouse (North) and George Parkhouse (South) were obtained from the NTMWD Long-Range Water Supply Plan (2024). This plan used the TCEQ-approved WAM for the Sulphur River Basin.
4. Surface water supplies for DWU strategies were obtained from Dallas Long-Range Water Supply Plan (2024).

Appendix E List of References

(1) Texas Water Development Board: *Exhibit C Second Amended General Guidelines for Development of the 2026 Regional Water Plans* (September, 2023), Austin, [Online] Available URL: https://www.twdb.texas.gov/waterplanning/rwp/planningdocu/2026/projectdocs/2026RWP_ExhibitC.pdf?d=5272, July 1, 2024.

(2) Freese and Nichols, Inc., Advanced Groundwater Solutions, ATMOS Research and Consulting, Alan Plummer Associates, Inc.: *North Texas Municipal Water District Long Range Water Supply Plan*, prepared for North Texas Municipal Water District, August 2024.

(3) Texas Water Development Board: *2010-2019 Historical Water Use Estimates: Non-Surveyed Livestock Water Use Estimates by Region-County* (January 2022).

(4) Texas Water Development Board: *2010-2019 Historical Water Use Estimates: Mining by Region-County* (August 2022).

(5) Texas Water Development Board: *RWP 27 Groundwater Data Details*, (July 2023).

(6) HDR Engineering, Inc., Maddaus Water Management: *2024 Dallas Long Range Water Supply Plan*, prepared for Dallas Water Utilities, City of Dallas, December 2024.

Attachment E-1

Hydrologic Variance Request and Approval for Surface Water

REGION C WATER PLANNING GROUP

Senate Bill One Sixth Round of Regional Water Planning - Texas Water Development Board

August 2023

Jeff Walker
Texas Water Development Board
1700 North Congress
Austin, Texas 78711-3231

RE: Region C Request for Modifications to TCEQ Water Availability Models for Planning Purposes

Dear Mr. Walker:

Region C is located primarily within the Trinity and Red River Basins. Small areas of the region are in the Sabine, Sulphur and Brazos River Basins. Reservoirs in each of these river basins and the Neches River Basin supply water to Region C. As part of the 2026 planning efforts, the Full Authorization Water Availability Models (WAM[1]), also known as Run 3, for each of these basins will be updated to determine surface water availability in the region. To reflect the current conditions and operations of the region, the following hydrologic variances are summarized below. Completed hydrologic variance request forms for each river basin are included in Attachment A.

<u>Safe Yield</u>
Based on requests from Tarrant Regional Water District (TRWD) and Dallas Water Utilities (DWU), Region C requests the use of safe yield for the allocation and distribution of surface water supplies from reservoirs owned and operated by these two wholesale water providers. In accordance with the TWDB planning rules, firm yields will also be determined and reported in the plan. Firm yield will be used for other surface water reservoirs.

<u>Drought Worse than the Drought of Record</u>
The Texas Legislature authorized the regional water planning groups to consider droughts worse than the drought of record in its planning efforts, which can reflect expected climate uncertainties and trends in water availability. Several water providers in Region C consider such conditions in their long-term water planning. NTMWD has recently completed a Long-Range Water Supply Plan that did a detailed evaluation on the potential impacts of a drought worse than the drought of record on its water supplies. Region C requests the use of the results of this analysis for the allocation and distribution of surface water supplies from reservoirs owned and operated by NTMWD. DWU is also considering the potential impacts of climatic uncertainties in the update of its Long-Range Water Supply Plan, but this update is not available at this time. Therefore, Region C has requested the use of safe yield as discussed above.

[1] The term WAM refers throughout this document to TCEQ's Full Authorization Scenario, also known as Run 3, with modifications as proposed in this letter.

If the DWU update becomes available prior to the completion of the 2026 Region C Water Plan, Region C respectfully requests the option to use these results for the allocation and distribution of surface water supplies from reservoirs owned and operated by DWU.

Trinity River WAM

Multiple changes are requested for the Trinity WAM to account for current operating conditions, including:

- Subordination agreements,
- System operations, where appropriate, and
- Other corrections noted during review of the models.

Red River WAM

Water supplies from the Red River Basin include supplies from Lake Texoma, several small lakes, and run of the river supplies. Hydrologic variance requests for the Red River WAM include changes to Lake Texoma and associated water rights to avoid potential double counting of supply and more accurately define the firm yields of the Region C reservoirs.

Sulphur WAM

The only reservoir in the Sulphur Basin currently used by Region C is Lake Chapman. This reservoir is used by multiple providers and is modeled in the WAM as individual water rights. Region C requests modeling Lake Chapman as a single pool to assess the firm yield, and then assign supplies proportionally based on each provider's water right.

Other WAMs

For the 2026 Region C Water Plan, we request to use the Neches and Sabine River WAM models as modified by the Region I Planning Group with the approval of the Texas Water Development Board. For supplies in the Brazos River Basin, we request to use the Brazos G WAM as modified by the Brazos G Planning Group with the approval of the Texas Water Development Board.

As intended by Senate Bill 1, the assessment of surface water availability in Region C will be conducted to accurately reflect water supplies that are available for use.

Please call me if you have any questions regarding our request.

Sincerely,

Kevin Ward
Chair, Region C Water Planning Group

Attachment A

Hydrologic Variance Request Forms

Surface Water Hydrologic Variance Request Checklist

Texas Water Development Board (TWDB) rules[1] require that regional water planning groups (RWPG) use most current Water Availability Models (WAM) from the Texas Commission on Environmental Quality (TCEQ) and assume full utilization of existing water rights and no return flows for surface water supply analysis. Additionally, evaluation of existing stored surface water available during Drought of Record conditions must be based on Firm Yield using anticipated sedimentation rates. However, the TWDB rules also allow, and **we encourage**, RWPGs to use more representative, water availability modeling assumptions; better site-specific information; or justified operational procedures other than Firm Yield with written approval (via a Hydrologic Variance) from the Executive Administrator in order to better represent and therefore prepare for expected drought conditions.

RWPGs must use this checklist, which is intended to save time and reduce effort, to request a Hydrologic Variance for estimating the availability of surface water sources. For Questions 4 – 10, please indicate whether the requested variance is for determining Existing Supply, Strategy Supply, or both. Please complete a separate checklist for each river basin in which variances are being requested.

Water Planning Region: C

1. Which major river basin does the request apply to? Please specify if the request only applies part of the basin or only to certain reservoirs.

   Trinity River Basin

2. Please give a brief, bulleted, description of the requested hydrologic variances including how the alternative availability assumptions vary from rule requirements, how the modifications will affect the associated annual availability volume(s) in the regional water plan, and why the variance is necessary or provides a better basis for planning. You must provide more-detailed descriptions in the subsequent checklist questions. Attach any available documentation supporting the request.

   Region C requests to use the posted TCEQ Trinity WAM for use in the 2021 Region C Plan with the following variances for all water supply analyses:
   - Inclusion of any new water rights that are not currently included in the posted TCEQ WAM.
   - Modeling of Lake Jacksboro and Lost Creek Reservoir as a system. System modeling includes subordination of Lake Bridgeport.
   - Use of the full storage for Forest Grove Reservoir with an annual depletion limit (inflow for storage, diversion, and evaporation) of 16,348 acre-feet per year. The TCEQ WAM incorrectly uses the 16,348 acre-feet as the storage of the reservoir rather than the authorized storage of 20,038 acre-feet.

[1] 31 Texas Administrative Code (TAC) §§ 357.10(14) and 357.32(c)

- Modeling of Corsicana's rights from Richland-Chambers Reservoir as a system with Lake Halbert, reflecting how these rights are actually used.

The following variances are required only for modeling the yields of these supplies. When calculating the firm yield of other sources, the modeling will be identical to Run 3.

- Modeling of Tarrant Regional Water District's West Fork reservoirs (Bridgeport, Eagle Mountain, and Worth) as a system.
- Modeling of Dallas' water rights in the Elm Fork of the Trinity River as a system with Lakes Grapevine, Lewisville and Ray Roberts.
- Modeling of Lake Benbrook as one pool instead of multiple pools to facilitate calculation of yields. The current modeling incorrectly assigns evaporation to the dead pool of the reservoir which does not refill because it is modeled as non-priority. In actual operation, TRWD cannot use water from the reservoir unless this dead storage is full. This modeling respects the USACE minimum elevation for water supply.

These adjustments to the WAMs are requested to reflect the water rights and agreements more accurately for water supply sources in Region C.

3. Was this request submitted in a previous planning cycle? If yes, please indicate which cycle and note how it is different, if at all, from the previous request?

   Yes

   The same hydrologic variance requests were implemented in the 2021 Region C Water Plan. This request only differs in the inclusion of any new water rights that are not currently in the WAM.

4. Are you requesting to extend the period of record beyond the current applicable WAM hydrologic period? If yes, please describe the proposed methodology. Indicate whether you believe there is a new drought of record in the basin.

   No

   Choose an item.

   Click or tap here to enter text.

5. Are you requesting to use a reservoir safe yield? If yes, please describe in detail how the safe yield would be calculated and defined, which reservoir(s) it would apply to, and why the modification is needed or preferrable for drought planning purposes.

   Yes

   Existing Supply

Based on requests from Tarrant Regional Water District (TRWD) and Dallas Water Utilities, Region C requests the use of safe yield for the allocation and distribution of surface water supplies from reservoirs owned and operated by these two wholesale water providers. The TRWD reservoirs include Lake Bridgeport, Eagle Mountain Lake, Lake Worth, Lake Benbrook, Lake Arlington, Richland-Chambers Reservoir and Cedar Creek Reservoir. Dallas reservoirs include Lake Ray Roberts, Lake Lewisville, Lake Grapevine, Lake Ray Hubbard, Lake Tawakoni, and Lake Fork. For some of these lakes, Dallas holds only a portion of the water rights. Supply for the other water right holders in these lakes will continue to be calculated using firm yield.

Safe yield is the amount of water that can be used during the critical drought while leaving a minimum supply in reserve. Safe yield is consistent with the current operations of these two surface water suppliers and previous regional water planning. In accordance with the TWDB planning rules, firm yields will also be determined and reported in the plan.

6. Are you requesting to use a reservoir yield other than firm yield or safe yield? If yes, please describe, in a bulleted list, each modification requested including how the alternative yield was calculated, which reservoir(s) it applies to, and why the modification is needed or preferrable for drought planning purposes. Examples of alternative reservoir yield analyses may include using an alternative reservoir level, conditional reliability, or other special reservoir operations.

   Yes

   Existing Supply

   The Texas Legislature authorized the regional water planning groups to consider droughts worse than the drought of record in its planning efforts, which can reflect expected climate uncertainties and trends in water availability. Several water providers in Region C consider such conditions in their long-term water planning. NTMWD has recently completed a Long-Range Water Supply Plan that did a detailed evaluation on the potential impacts of a drought worse than the drought of record on its water supplies. Region C requests the use of the results of this analysis for the allocation and distribution of surface water supplies from reservoirs owned and operated by NTMWD. DWU is also considering the potential impacts of climatic uncertainties in the update of its Long-Range Water Supply Plan, but this update is not available at this time. Therefore, Region C has requested the use of safe yield as discussed above.

   If the DWU update becomes available prior to the completion of the 2026 Region C Water Plan, Region C respectfully requests the option to use these results for the allocation and distribution of surface water supplies from reservoirs owned and operated by DWU.

7. Are you requesting to use a different model (such as a RiverWare or Excel-based models) than RUN 3 of the applicable TCEQ WAM? If yes, please describe the model being considered including how it incorporates water rights and prior appropriation and how it is more conservative than RUN 3 of the applicable TCEQ WAM.

   No

Choose an item.

Click or tap here to enter text.

8. Are you requesting to use a modified TCEQ WAM? If yes, please describe in a bulleted list all modifications in detail including all specific changes to the WAM and whether the modified WAM is more conservative than the TCEQ WAM RUN 3. Examples of WAM modifications may include adding subordination agreements, contracts, updated water rights, modified spring flows, updated lake evaporation, updated sedimentation[2], system or reservoir operations, or special operational procedures into the WAM.

   Yes

   Existing Supply

Multiple changes are requested for the Trinity WAM to account for current operating conditions, including:

- Subordination agreements,
- System operations, and
- Other corrections noted during review of the models.

These changes are detailed in Question 2.

9. Are you requesting to include return flows in the modeling? If yes, are you doing so to model an indirect reuse water management strategy (WMS)? Please provide complete details regarding the proposed methodology for determining reuse WMS availability.

   No

   Choose an item.

   Only return flows authorized in existing surface water rights and modeled in the existing WAM Run 3 will be included in the analysis.

10. Are any of the requested Hydrologic Variances also planned to be used by another region for the same basin? If yes, please indicate the other Region. Please indicate if unknown.

    Unknown

    Each of the river basins modeled by Region C are also used by other regions. It is unknown whether the other regions will adopt the modifications made by Region C in the analysis of

[2] Updating anticipated sedimentation rates does not require a hydrologic variance under 31 TAC § 357.10(14). The Technical Memorandum will require providing details regarding the sedimentation methodology utilized. Please consider providing that information with this request.

the supplies for each respective region. We do not expect our modifications to affect the supplies for these regions.

11. Please describe any other variance requests not captured on this checklist or add any other information regarding the variance requests on this checklist.

Click or tap here to enter text.

Surface Water Hydrologic Variance Request Checklist

Texas Water Development Board (TWDB) rules[1] require that regional water planning groups (RWPG) use most current Water Availability Models (WAM) from the Texas Commission on Environmental Quality (TCEQ) and assume full utilization of existing water rights and no return flows for surface water supply analysis. Additionally, evaluation of existing stored surface water available during Drought of Record conditions must be based on Firm Yield using anticipated sedimentation rates. However, the TWDB rules also allow, and **we encourage**, RWPGs to use more representative, water availability modeling assumptions; better site-specific information; or justified operational procedures other than Firm Yield with written approval (via a Hydrologic Variance) from the Executive Administrator in order to better represent and therefore prepare for expected drought conditions.

RWPGs must use this checklist, which is intended to save time and reduce effort, to request a Hydrologic Variance for estimating the availability of surface water sources. For Questions 4 – 10, please indicate whether the requested variance is for determining Existing Supply, Strategy Supply, or both. Please complete a separate checklist for each river basin in which variances are being requested.

Water Planning Region: C

1. Which major river basin does the request apply to? Please specify if the request only applies part of the basin or only to certain reservoirs.

   Red River Basin

2. Please give a brief, bulleted, description of the requested hydrologic variances including how the alternative availability assumptions vary from rule requirements, how the modifications will affect the associated annual availability volume(s) in the regional water plan, and why the variance is necessary or provides a better basis for planning. You must provide more-detailed descriptions in the subsequent checklist questions. Attach any available documentation supporting the request.

   Region C requests to use the posted TCEQ Red River WAM for use in the 2021 Region C Plan with the following variances;
   - Modeling of Lake Randell and Valley Lake as stand-alone reservoirs without Lake Texoma backups for the firm yield calculation of these two reservoirs. Backup supply for these reservoirs from Lake Texoma is included in the supplies from Lake Texoma. This prevents double counting of the makeup water from Lake Texoma. For firm yield calculations for reservoirs other than Lake Randell, Valley Lake and Lake Texoma, the backups for Lake Randell and Valley Lake were retained.
   - Lake Texoma is located on the Texas-Oklahoma border, and in accordance with the Red River Compact, water in Lake Texoma is equally shared by Texas and Oklahoma. There are three distinct water storage pools in Lake Texoma: 1) water supply, 2) hydropower, and 3) sediment storage (dead pool). Use of water from Lake Texoma is authorized by

[1] 31 Texas Administrative Code (TAC) §§ 357.10(14) and 357.32(c)

multiple Texas water rights and Oklahoma water rights, as well as authorizations by the US Congress and contracts with the Corps. To assess the firm yield of the reservoir for Region C, the total firm yield for both the water supply and hydropower pools will be modeled. This total yield is equally split between Texas and Oklahoma. The reliable supplies from the lake are limited to the Texas water rights and associated storage contracts with the Corps.

- Removal of diversion backups of individual Texas water rights in Lake Texoma from the hydropower pool. All Texas water rights are 100% reliable in the WAM, so these backups are not invoked in the WAM. The code was removed because it made the modeling unnecessarily complicated.

These adjustments to the WAMs are requested to reflect the water rights and agreements more accurately for water supply sources in Region C.

3. Was this request submitted in a previous planning cycle? If yes, please indicate which cycle and note how it is different, if at all, from the previous request?

   Yes

   The same hydrologic variance requests were implemented in the 2021 Region C Water Plan.

4. Are you requesting to extend the period of record beyond the current applicable WAM hydrologic period? If yes, please describe the proposed methodology. Indicate whether you believe there is a new drought of record in the basin.

   No

   Choose an item.

   Click or tap here to enter text.

5. Are you requesting to use a reservoir safe yield? If yes, please describe in detail how the safe yield would be calculated and defined, which reservoir(s) it would apply to, and why the modification is needed or preferrable for drought planning purposes.

   No

   Choose an item.

   Click or tap here to enter text.

6. Are you requesting to use a reservoir yield other than firm yield or safe yield? If yes, please describe, in a bulleted list, each modification requested including how the alternative yield was calculated, which reservoir(s) it applies to, and why the modification is needed or preferrable for drought planning purposes. Examples of alternative reservoir yield analyses may include using an alternative reservoir level, conditional reliability, or other special reservoir operations.

No

Choose an item.

Click or tap here to enter text.

7. Are you requesting to use a different model (such as a RiverWare or Excel-based models) than RUN 3 of the applicable TCEQ WAM? If yes, please describe the model being considered including how it incorporates water rights and prior appropriation and how it is more conservative than RUN 3 of the applicable TCEQ WAM.

No

Choose an item.

Click or tap here to enter text.

8. Are you requesting to use a modified TCEQ WAM? If yes, please describe in a bulleted list all modifications in detail including all specific changes to the WAM and whether the modified WAM is more conservative than the TCEQ WAM RUN 3. Examples of WAM modifications may include adding subordination agreements, contracts, updated water rights, modified spring flows, updated lake evaporation, updated sedimentation[2], system or reservoir operations, or special operational procedures into the WAM.

Yes

Existing Supply

Multiple changes are requested for the Red River WAM to account for current operating conditions, as detailed in the response to Question 2

9. Are you requesting to include return flows in the modeling? If yes, are you doing so to model an indirect reuse water management strategy (WMS)? Please provide complete details regarding the proposed methodology for determining reuse WMS availability.

No

Choose an item.

[2] Updating anticipated sedimentation rates does not require a hydrologic variance under 31 TAC § 357.10(14). The Technical Memorandum will require providing details regarding the sedimentation methodology utilized. Please consider providing that information with this request.

Only return flows authorized in existing surface water rights and modeled in the existing WAM Run 3 will be included in the analysis.

10. Are any of the requested Hydrologic Variances also planned to be used by another region for the same basin? If yes, please indicate the other Region. Please indicate if unknown.

    Unknown

    Click or tap here to enter text.

11. Please describe any other variance requests not captured on this checklist or add any other information regarding the variance requests on this checklist.

    Click or tap here to enter text.

Surface Water Hydrologic Variance Request Checklist

Texas Water Development Board (TWDB) rules[1] require that regional water planning groups (RWPG) use most current Water Availability Models (WAM) from the Texas Commission on Environmental Quality (TCEQ) and assume full utilization of existing water rights and no return flows for surface water supply analysis. Additionally, evaluation of existing stored surface water available during Drought of Record conditions must be based on Firm Yield using anticipated sedimentation rates. However, the TWDB rules also allow, and **we encourage**, RWPGs to use more representative, water availability modeling assumptions; better site-specific information; or justified operational procedures other than Firm Yield with written approval (via a Hydrologic Variance) from the Executive Administrator in order to better represent and therefore prepare for expected drought conditions.

RWPGs must use this checklist, which is intended to save time and reduce effort, to request a Hydrologic Variance for estimating the availability of surface water sources. For Questions 4 – 10, please indicate whether the requested variance is for determining Existing Supply, Strategy Supply, or both. Please complete a separate checklist for each river basin in which variances are being requested.

Water Planning Region: C

1. Which major river basin does the request apply to? Please specify if the request only applies part of the basin or only to certain reservoirs.

   Sulphur River Basin

2. Please give a brief, bulleted, description of the requested hydrologic variances including how the alternative availability assumptions vary from rule requirements, how the modifications will affect the associated annual availability volume(s) in the regional water plan, and why the variance is necessary or provides a better basis for planning. You must provide more-detailed descriptions in the subsequent checklist questions. Attach any available documentation supporting the request.

   Region C requests to use the approved TCEQ Sulphur WAM for use in the 2021 Region C Plan with the following variances for all water supply analyses:
   - Inclusion of any new water rights granted that are not currently included in the approved TCEQ WAM.

The following variance is requested for modeling existing supplies from Lake Chapman.

- Modeling of Lake Chapman as one pool instead of multiple pools to facilitate calculation of the firm yield. All authorizations have the same priority date, and a single pool correctly distributes inflows among the water right holders. This modeling respects the USACE minimum elevation for water supply.

[1] 31 Texas Administrative Code (TAC) §§ 357.10(14) and 357.32(c)

These adjustments to the WAMs are requested to reflect the water rights and agreements more accurately for water supply sources in Region C.

3. Was this request submitted in a previous planning cycle? If yes, please indicate which cycle and note how it is different, if at all, from the previous request?

   Yes

   The same hydrologic variance requests were implemented in the 2021 Region C Water Plan. This request only differs in the inclusion of any new water rights that are not currently in the WAM.

4. Are you requesting to extend the period of record beyond the current applicable WAM hydrologic period? If yes, please describe the proposed methodology. Indicate whether you believe there is a new drought of record in the basin.

   No

   Choose an item.

   Click or tap here to enter text.

5. Are you requesting to use a reservoir safe yield? If yes, please describe in detail how the safe yield would be calculated and defined, which reservoir(s) it would apply to, and why the modification is needed or preferrable for drought planning purposes.

   No

   Choose an item.

   Click or tap here to enter text.

6. Are you requesting to use a reservoir yield other than firm yield or safe yield? If yes, please describe, in a bulleted list, each modification requested including how the alternative yield was calculated, which reservoir(s) it applies to, and why the modification is needed or preferrable for drought planning purposes. Examples of alternative reservoir yield analyses may include using an alternative reservoir level, conditional reliability, or other special reservoir operations.

   No

   Choose an item.

7. Are you requesting to use a different model (such as a RiverWare or Excel-based models) than RUN 3 of the applicable TCEQ WAM? If yes, please describe the model being considered including how it incorporates water rights and prior appropriation and how it is more conservative than RUN 3 of the applicable TCEQ WAM.

   No

   Choose an item.

   Click or tap here to enter text.

8. Are you requesting to use a modified TCEQ WAM? If yes, please describe in a bulleted list all modifications in detail including all specific changes to the WAM and whether the modified WAM is more conservative than the TCEQ WAM RUN 3. Examples of WAM modifications may include adding subordination agreements, contracts, updated water rights, modified spring flows, updated lake evaporation, updated sedimentation[2], system or reservoir operations, or special operational procedures into the WAM.

   Yes

   Existing Supply

Changes are requested for the Sulphur WAM are in Question 2.

-

9. Are you requesting to include return flows in the modeling? If yes, are you doing so to model an indirect reuse water management strategy (WMS)? Please provide complete details regarding the proposed methodology for determining reuse WMS availability.

   No

   Choose an item.

   Only return flows authorized in existing surface water rights and modeled in the existing WAM Run 3 will be included in the analysis.

[2] Updating anticipated sedimentation rates does not require a hydrologic variance under 31 TAC § 357.10(14). The Technical Memorandum will require providing details regarding the sedimentation methodology utilized. Please consider providing that information with this request.

10. Are any of the requested Hydrologic Variances also planned to be used by another region for the same basin? If yes, please indicate the other Region. Please indicate if unknown.

    Unknown

    Click or tap here to enter text.

11. Please describe any other variance requests not captured on this checklist or add any other information regarding the variance requests on this checklist.

    Click or tap here to enter text.

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

October 26, 2023

Mr. Kevin Ward
Chair
Region C Regional Water Planning Group
c/o Trinity River Authority
P.O. Box 60
Arlington, Texas 76044

Dear Chairman Ward:

I have reviewed your request dated August 22, 2023, for approval of alternative water supply assumptions to be used in determining existing surface water availability. This letter confirms that the TWDB approves the following assumptions:

1. Use of safe yield for the allocation and distribution of surface water supplies from reservoirs owned and operated by Dallas Water Utilities (nine-month safe yield) and Tarrant Regional Water District (one-year safe yield).

2. Use of the results of North Texas Municipal Water District's Long-Range Water Supply plan, which accounted for the potential impacts of a drought worse than the drought of record, for the allocation and distribution of surface water supplies from reservoirs owned and operated by North Texas Municipal Water District.

3. Multiple changes to the Trinity WAM to account for current operating conditions, including subordination agreements, systems operations, and other corrections noted during review of the models, as detailed in Attachment A of the hydrologic variance request.

4. Changes to Lake Texoma and associated water rights in the Red River WAM to avoid potential double counting of supply and to improve the accuracy of firm yield estimates from Region C reservoirs, as detailed in Attachment A of the hydrologic variance request.

5. Model Lake Chapman, in the Sulphur WAM, as a single pool to assess its firm yield and then assign supplies proportionally based on each provider's water right, with inclusion of any new water rights granted that are not currently in the approved TCEQ WAM.

6. Use of surface water availabilities, based upon the hydrologic variance approved for use by the Region I RWPG and the TWDB for the Neches and Sabine River Basins.

7. Use of surface water availabilities, based upon the hydrologic variance approved for use by the Brazos G RWPG and the TWDB for the Brazos River Basin.

Because we have not had the opportunity to review the related information, the TWDB is not pre-approving the use of potential impacts of climatic uncertainties from the Dallas Water Utilities Long-Range Water Supply plan at this time. Once the updated long-range plan information is made available including the information on the methodology that will be the basis for assessing climatic uncertainties as will be incorporated into the regional water plan, the TWDB requests that a separate hydrologic variance request be submitted to approve this one item so that staff can review the updated information.

Although the TWDB approves the use of a nine-month (Dallas Water Utilities) and one-year (Tarrant Regional Water District) safe yield for developing estimates of current water supplies, firm yield for each reservoir must still be reported to TWDB in the online planning database and plan documents. For the purpose of evaluating potentially feasible water management strategies, the TCEQ WAM Run 3 is to be used, unless a separate hydrologic variance for water management strategy availability is submitted and approved by the TWDB.

While the TWDB authorizes these modifications to evaluate existing water supplies for development of the 2026 Region C RWP, it is the responsibility of the RWPG to ensure that the resulting estimates of water availability are reasonable for drought planning purposes and will reflect conditions expected in the event of actual drought conditions; and in all other regards will be evaluated in accordance with the most recent version of regional water planning contract Exhibit C, *General Guidelines for Development of the 2026 Regional Water Plans.*

If you have any questions, please do not hesitate to contact Kevin Smith of our Regional Water Planning staff at 512-475-1561 or kevin.smith@twdb.texas.gov.

Sincerely,

Jeff Walker
Executive Administrator

c: Howard Slobodin, Trinity River Authority
Abigail Gardner, P.E., Freese and Nichols, Inc.
Tony Smith, P.E., Carollo Engineers (Region G)
Brigit Buff, P.E., Plummer Associates, Inc. (Region I)
Kevin Smith, Water Supply Planning

Nelun Fernando, Ph.D., Surface Water

Appendix F

Potentially Feasible Water Management Strategies

Table F.1 TABULAR LIST OF POTENTIALLY FEASIBLE WATER MANAGEMENT STRATEGIES

POTENTIALLY FEASIBLE WATER MANAGEMENT STRATEGIES
CONSERVATION:
Conservation Measures
Drought Management:
Implementation of Drought Contingency Plans/Measures as needed
Reuse:
Purchase Reuse Water from DCPCMUD (Lake Grapevine)
Additional Reuse (TBD)
Athens Indirect Reuse
Cedar Creek Reuse (Wetlands)
Direct Reuse
Direct Reuse From Local WWTPs
Direct Reuse From Sherman
Direct Reuse From UTRWD
Ennis Indirect Reuse
Indirect Reuse (Athens MWA) (Interbasin Transfer)
Indirect Reuse to Lake Weatherford/Sunshine
Indirect Reuse From Jacksboro
Irving Indirect Reuse
Joe Pool Reuse
Las Colinas Direct Reuse
Main Stem Balancing Reservoir
Main Stem Pump Station
Reuse for Steam Electric Power
Reuse from TRA Central Regional WWTP
TRA Reuse for SEP
Lake Ralph Hall Reuse - UTRWD
Existing Supplies:
Additional Measure to Access Full Lavon Yield
Carrizo-Wilcox Groundwater From Counties TBD
Chapman Booster Pump Station
Develop Muenster Lake Supply
Lake Dredging
Expansion of Treatment and Delivery System
Freestone/Anderson County Groundwater (Forestar)
IPL Connect to Lake Palestine

POTENTIALLY FEASIBLE WATER MANAGEMENT STRATEGIES
IPL Connection of Supplies (Cedar Creek wetlands and Richland-Chambers)
IPL Connection to Bachman
Lake O' the Pines
Lake Texoma Blending
Lake Texoma Desalination
Lake Texoma Raw Water for SEP
Navarro Mills (Additional)
Oklahoma
Renew/Expand Contract for Supplies from Current Provider
Toledo Bend
Development of New Supplies:
New Groundwater
New Surface Water
Lake Tehuacana
Lake Columbia (New IBT)
Neches Run-of-River Diversions (IBT)
Richland-Chambers Reservoir for SEP
George Parkhouse North Lake (New IBT)
George Parkhouse South Lake (New IBT)
Red River Off Channel Reservoir (New IBT)
New Supplies From Raised Dam at Wright Patman (New IBT)
Sulphur Basin Supplies (New IBT)
Marvin Nichols Reservoir (New IBT)
New reservoir in Wise County
Reallocation/Management of Supplies:
Expansion of Treatment and Delivery System
Expansion of Raw Water Supply System
Unallocated Supply Utilization
Conjunctive Use:
Conjunctive Use of Multiple Sources of Water
Aquifer Storage and Recovery:
General Aquifer Storage and Recovery
Aquifer Storage and Recovery - NTMWD
Aquifer Storage and Recovery Pilot - TRWD
Acquisition of Available Supplies:
Lake Texoma

POTENTIALLY FEASIBLE WATER MANAGEMENT STRATEGIES
Additional Lake Texoma
Additional Supplies From Current Provider
Begin Purchasing From New Provider
Connect to and Begin Purchasing From New Provider
Connect to and Purchase From Lake Texoma
New Well(s) in Trinity Aquifer
New Well(s) in Carrizo-Wilcox Aquifer
New Well(s) in Woodbine Aquifer
New Well(s) in Queen City Aquifer
New Well(s) in Nacatoch Aquifer
New Well(s) in Cross Timbers Aquifer
New Well(s) in Other Aquifer
Treatment of Brackish Groundwater
Raw Water From TRWD for SEP
Water Rights in Navarro Mills Reservoir
Development of Regional Water Supply or Providing Regional Management of Water Supply Facilities:
TRA Ellis County Water Supply Project
Collin-Grayson Municipal Alliance
Cooke County Water Supply Project
Fannin County Water Supply Project
Grayson County Water Supply Project
Infrastructure to Deliver to Cooke County WUGs
Other Regional Systems as Feasible
Voluntary Transfer of Water (Incl. Regional Water Banks, Sales, Leases, Options, Subordination Agreements, and Financing Agreements):
Interim Purchase From Water Provider
Emergency Transfer of Water:
System Optimization, Subordination, Leases, Enhancement of Yield, Improvement of Water Quality:
System Operation
Desalination:
Desalination Plant
Supplies From the Gulf of Mexico with Desalination
Desalination Plant - Grayson County WUGs, Sherman, Denison
Desalination of Texoma supplies for NTMWD

Table F.2
Potentially Feasible Water Management Strategies for Major Water Providers and Regional Wholesale Water Providers

Water Management Strategies	DWU	TRWD	NTMWD	TRA	UTRWD	Fort Worth	GTUA	Corsicana
Conservation*:	PF	PF	PF	PF	PF	PF	PF	PF
Drought Management:								
Implementation of Drought Contingency Plans/Measures as needed	PF	PF	PF	PF	PF	PF	PF	PF
Reuse:								
Elm Fork Swap	PF		PF					
Main Stem Balancing Reservoir	PF							
Direct Reuse	PF			PF	PF	PF		
Cedar Creek Reuse (Wetlands)		PF						
Ennis Indirect Reuse				PF				
Joe Pool Reuse				PF				
Reuse from TRA Central Regional WWTP		PF		PF				
Lake Ralph Hall Reuse					PF			
Expanded Wetland Reuse			PF					
Additional Lavon Watershed Reuse			PF					
Additional Indirect Reuse	PF				PF			
Existing Supplies:								
Expansion of Treatment and Delivery System	PF	PF	PF	PF	PF	PF	PF	PF
Connection to Bachman	PF							
Lake Texoma Desalination	PF		PF				PF	
Toledo Bend	PF	PF	PF		PF			
Carrizo-Wilcox Groundwater from Upshur, Wood, Smith Counties	PF							
Carrizo-Wilcox Groundwater from Counties TBD		PF						
IPL Connect to Lake Palestine	PF							
IPL Connection of Existing Supplies (Richland-Chambers)		PF						
Oklahoma		PF	PF		PF			
Dredging Existing Reservoirs	PF	PF						
Add'l measure to access full Lavon yield			PF					
Chapman Booster Pump Station			PF					
Lake Texoma Blending			PF		PF			
Lake O' the Pines			PF					
Freestone/Anderson Co Groundwater (Forestar)			PF					
Purchase of Additional Supplies from current provider					PF			
Renew Contract for Supplies from current provider					PF			
Lake Texoma Raw water for SEP							PF	
Navarro Mills (additional)								PF
Reallocation of flood storage at Wright Patman (New IBT)	PF	PF	PF		PF			
Additional Upper Sabine			PF					
Water/additional water from TRWD				PF		PF		
Conjunctive Use:								
Conjunctive use of Ground & Surface water	PF							
Aquifer Storage and Recovery		PF	PF					
Development of New Supplies:								
Bois d'Arc Lake (New IBT)			PF					
Marvin Nichols Reservoir 328' MSL (New IBT)	PF	PF	PF		PF			
Marvin Nichols Reservoir 313.5' MSL (New IBT)	PF	PF	PF		PF			
Lake Ralph Hall (New IBT)					PF			
George Parkhouse North Lake (New IBT)			PF		PF			
George Parkhouse South Lake (New IBT)			PF		PF			
Lake Columbia (New IBT)	PF							
Tehuacana Reservoir		PF						
Neches Run-of-River Diversions (IBT)	PF							
Red River Off Channel Reservoir (New IBT)	PF				PF			
Sabine Off Channel Reservoir (New IBT)	PF							

Table F.2
Potentially Feasible Water Management Strategies for Major Water Providers and Regional Wholesale Water Providers

Water Management Strategies	DWU	TRWD	NTMWD	TRA	UTRWD	Fort Worth	GTUA	Corsicana
Development of Regional Water Supply or Providing Regional Management of Water Supply Facilities:**								
Fannin County Water Supply Project			PF					
Collin-Grayson Municipal Alliance							PF	
GTUA Regional System							PF	
Voluntary Transfer of Water (incl. regional water banks, sales, leases, options, subordination agreements, and financing agreements):								
Emergency Transfer of Water (Section 11.139):								
System Optimization, Subordination, Leases, Enhancement of Yield, Improvement of Water Quality								
System Operation	PF	PF	PF					
Desalination:								
Supplies from the Gulf of Mexico with Desalination	PF	PF	PF	PF	PF	PF	PF	PF
Desalination Plant - Northeast Grayson, Sherman, Denison	PF						PF	

Blanks Indicate nPF = determined 'not potentially feasible' (may include WMSs that were initially considered)
PF = considered 'potentially feasible' and therefore evaluated

* Note: Specific Conservation Strategies are listed in a separate analysis.
** Note: All strategies for wholesale water suppliers could be considered as "Development of Regional Water Supply"
IBT denotes a Permitted Interbasin Transfer.
New IBT denotes an Interbasin Transfer requiring a new IBT permit.

Table F.3

Potentially Feasible Water Management Strategies for Wholesale Water Providers

Water Management Strategies	Arlington	Athens MWA	DCPCMUD	Denison	Denton	Ennis	Forney	Gainesville	Garland	Grand Prairie	Mansfield	Midlothian
Conservation*:	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF
Drought Management:												
Implementation of Drought Contingency Plans as needed	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF
Reuse:								PF				PF
Athens Indirect Reuse		PF										
Reallocation/Management of Existing Supplies:												
Expansion of Treatment and Delivery System		PF		PF	PF	PF	PF	PF		PF	PF	PF
Conjunctive Use:												
Acquisition of Available Existing Supplies:												
Purchase of Additional Supplies from current provider	PF	PF		PF	PF	PF	PF		PF	PF	PF	PF
Additional Lake Texoma				PF								
Begin Purchasing from Arlington										PF		
Development of New Supplies:												
New Wells in Carrizo-Wilcox		PF										
Development of Regional Water Supply or Providing Regional Management of Water Supply Facilities:**												
Infrastructure to deliver to Cooke County WUGS								PF				
GTUA Regional Water Supply Plan				PF				PF				
Voluntary Transfer of Water (incl. regional water banks, sales, leases, options, subordination agreements, and financing agreements):												
Emergency Transfer of Water (Section 11.139):												
System Optimization, Subordination, Leases, Enhancement of Yield, Improvement of Water Quality												
System Operation												
Desalination:												
Desalination Plant				PF								

Blanks Indicate nPF = determined 'not potentially feasible' (may include WMSs that were initially considered)
PF = considered 'potentially feasible' and therefore evaluated

* Note: Specific Conservation Strategies are listed in a separate analysis.
** Note: All strategies for wholesale water suppliers could be considered as "Development of Regional Water Supply"

Table F.3 (Cont.)

Potentially Feasible Water Management Strategies for Wholesale Water Providers

Water Management Strategies	Mustang SUD	North Richland Hills	Princeton	Rockett SUD	Rockwall	Seagoville	Sherman	Terrell	Walnut Creek SUD	Waxahachie	Weatherford	Wise Co. WSD
Conservation*:	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF
Drought Management:												
Implementation of Drought Contingency Plans as needed	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF
Reuse:												
Indirect Reuse to Lake Weatherford/Sunshine											PF	
Reallocation/Management of Existing Supplies:												
Expansion of Treatment and Delivery System	PF	PF	PF	PF	PF		PF	PF	PF	PF	PF	PF
Expansion of Raw Water Supply System										PF		
Conjunctive Use:												
Acquisition of Available Existing Supplies:				PF								
Purchase of Additional Supplies from current provider	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF
Development of New Supplies:												
Development of Regional Water Supply or Providing Regional Management of Water Supply Facilities:**												
GTUA Regional Water Supply Plan							PF					
Voluntary Transfer of Water (incl. regional water banks, sales, leases, options, subordination agreements, and financing agreements):												
Emergency Transfer of Water (Section 11.139):												
System Optimization, Subordination, Leases, Enhancement of Yield, Improvement of Water Quality												
System Operation												
Desalination:												
Desalination Plant							PF					

Blanks Indicate nPF = determined 'not potentially feasible' (may include WMSs that were initially considered)
PF = considered 'potentially feasible' and therefore evaluated

* Note: Specific Conservation Strategies are listed in a separate analysis.
** Note: All strategies for wholesale water suppliers could be considered as "Development of Regional Water Supply"

Table F.4 - Potentially Feasible Water Management Strategies for Collin County Municipal WUGs*

Water Management Strategies	Allen	Anna	Bear Creek SUD	Blue Ridge	Caddo Basin SUD	Celina	Copeville SUD	County-Other	Culleoka WSC	East Fork SUD	Fairview	Farmersville	Frisco	Frognot WSC	Josephine	Lucas	McKinney	Melissa	Milligan WSC	Murphy	Nevada SUD	North Collin SUD	North Farmersville WSC	Parker	Plano	Princeton	Prosper	Seis Lagos UD	Verona SUD	Westminster WSC	Wylie	Wylie Northeast SUD	Irrigation	Livestock	Manufacturing	SEP
WMSs NAMED TO BE CONSIDERED BY STATUTE																																				
Conservation	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF		PF	
Drought Management																																				
Implement Drought Contingency Plan/measures as needed	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF		PF	
Reuse													PF																							
Reallocation/ Management of Existing Supplies																																				
Expansion of Treatment and Delivery System				PF						PF								PF						PF			PF					PF				
Desalination																																				
Conjuctive Use																																				
Acquisition of Available Existing Supplies																																				
Additional Supplies from current provider	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF		PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF			PF	PF	PF		PF	
Grayson County Water Supply Project		PF				PF		PF										PF																		
New wells in Woodbine Aquifer		PF																																	PF	
Development of New Supplies																																				
New Surface water																																				
New Groundwater																																				
Development of Regional Water Supply or Providing Regional Management of Water Supply Facilities																																				
Voluntary Transfer of Water (incl. regional water banks, sales, leases, options, subordination agreements, and financing agreements)																																				
Emergency Transfer of Water (Section 11.139)																																				
Additional WMSs named to be considered by rule**																																				
System optimazation, reallocation of reservoir storage, contracts, water marketing, enhancement of yield, improvement of water quality																																				
Interbasin Transfer																																				
Aquifier Storage and Recovery																																				

Blanks indicate nPF = determined 'not potentially feasible' (may include WMSs that were initially considered or identified as potentially feasible)

PF = considered 'potentially feasible' and therefore evaluated

*If a WUG is located in Multiple Counties, it is only shown on the County in which the majority of the WUG is located.

**Region C does not consider the following WMSs to be potentially feasible for Region C WUGs: brush control; precipitation enhancement; cancellation of water rights; and rainwater harvesting. Region C supports rainwater harvesting on an individual basis but does not considered it to be a strategy that is feasible for a water provider to implement.

Table F.5 - Potentially Feasible Water Management Strategies for Cooke County Municipal WUGs*

Water Management Strategies	Callisburg WSC	County-Other	Lake Kiowa SUD	Lindsay	Mountain Springs WSC	Muenster	Two Way WSC	Woodbine WSC	Irrigation	Livestock	Manufacturing	Mining	SEP
WMSs NAMED TO BE CONSIDERED BY STATUTE													
Conservation	PF	PF	PF	PF	PF	PF	PF	PF			PF		
Drought Management													
Implement Drought Contingency Plan/measures as needed	PF	PF	PF	PF	PF	PF	PF	PF	PF		PF	PF	
Reuse													
Reallocation/ Management of Existing Supplies													
Desalination													
Conjuctive Use													
Acquisition of Available Existing Supplies													
Additional Supplies from current provider									PF		PF	PF	
Connect to and purchase from Gainesville		PF	PF	PF	PF	PF	PF	PF				PF	
Development of New Supplies													
New Surface water													
New Groundwater													
Development of Regional Water Supply or Providing Regional Management of Water Supply Facilities													
Voluntary Transfer of Water (incl. regional water banks, sales, leases, options, subordination agreements, and financing agreements)													
Emergency Transfer of Water (Section 11.139)													
Additional WMSs named to be considered by rule**													
System optimazation, reallocation of reservoir storage, contracts, water marketing, enhancement of yield, improvement of water quality													
Interbasin Transfer													
Aquifier Storage and Recovery													
Other													
Treatment facilities for additional supply						PF							
Lake Muenster						PF							

Blanks indicate nPF = determined 'not potentially feasible' (may include WMSs that were initially considered or identified as potentially feasible)
PF = considered 'potentially feasible' and therefore evaluated

*If a WUG is located in Multiple Counties, it is only shown on the County in which the majority of the WUG is located.

**Region C does not consider the following WMSs to be potentially feasible for Region C WUGs: brush control; precipitation enhancement; cancellation of water rights; and rainwater harvesting. Region C supports rainwater harvesting on an individual basis but does not considered it to be a strategy that is feasible for a water provider to implement.

Table F.6 - Potentially Feasible Water Management Strategies for Dallas County Municipal WUGs*

Water Management Strategies	Addison	Balch Springs	Cedar Hill	Cockrell Hill	Coppell	County-Other	DeSoto	Duncanville	Farmers Branch	Glenn Heights	Highland Park	Hutchins	Irving	Lancaster	Lancaster MUD 1	Mesquite	Richardson	Rowlett	Sachse	Sunnyvale	University Park	Wilmer	Irrigation	Livestock	Manufacturing	Mining	SEP
WMSs NAMED TO BE CONSIDERED BY STATUTE																											
Conservation	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF		PF	PF	PF
Drought Management																											
Implement Drought Contingency Plan/measures as needed	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF		PF	PF	PF
Reuse																											
Irving Indirect Reuse													PF														
TRA Reuse for SEP																											PF
Reallocation/ Management of Existing Supplies																											
Expansion of Treatment and Delivery System													PF					PF		PF		PF					
Desalination																											
Conjuctive Use																											
Acquisition of Available Existing Supplies																											
Additional Supplies from current provider	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF					PF
Additional Supplies from current provider through Lancaster																						PF					
Additional Supplies from current provider-direct connection																						PF					
Development of New Supplies																											
New Surface water																											
Marvin Nichols Reservoir													PF														
New Groundwater																											
Development of Regional Water Supply or Providing Regional Management of Water Supply Facilities																											
Voluntary Transfer of Water (incl. regional water banks, sales, leases, options, subordination agreements, and financing agreements)																											
Emergency Transfer of Water (Section 11.139)																											
Additional WMSs named to be considered by rule**																											
System optimazation, reallocation of reservoir storage, contracts, water marketing, enhancement of yield, improvement of water quality																											
Interbasin Transfer																											
Aquifier Storage and Recovery																											

Blanks indicate nPF = determined 'not potentially feasible' (may include WMSs that were initially considered or identified as potentially feasible)

PF = considered 'potentially feasible' and therefore evaluated

*If a WUG is located in Multiple Counties, it is only shown on the County in which the majority of the WUG is located.

**Region C does not consider the following WMSs to be potentially feasible for Region C WUGs: brush control; precipitation enhancement; cancellation of water rights; and rainwater harvesting. Region C supports rainwater harvesting on an individual basis but does not considered it to be a strategy that is feasible for a water provider to implement.

Table F.7 - Potentially Feasible Water Management Strategies for Denton County Municipal WUGs*

Water Management Strategies	Argyle WSC	Aubrey	Black Rock WSC	Bolivar WSC	Carrollton	Corinth	County-Other	Cross Timbers WSC	Denton County FWSD 1-A	Denton County FWSD 7	Denton County FWSD 10	Denton County FWSD 11-C	Flower Mound	Hackberry	Highland Village	Justin	Krum	Lake Cities MUA	Lewisville	Little Elm	Northlake	Paloma Creek North CRU	Paloma Creek South CRU	Pilot Point	Ponder	Providence Village WCID	Roanoke	Sanger	Terra Southwest	The Colony	Trophy Club	Irrigation	Livestock	Manufacturing	Mining	SEP
WMSs NAMED TO BE CONSIDERED BY STATUTE																																				
Conservation	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF		PF		
Drought Management																																				
Implement Drought Contingency Plan/measures as needed	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF		PF	PF	
Reuse																																				
Direct Reuse from UTRWD																																PF				
Direct Reuse from local WWTPs													PF																							
Reallocation/ Management of Existing Supplies																																				
Expansion of Treatment and Delivery System							PF	PF						PF					PF																	
Desalination																																				
Conjuctive Use																																				
Acquisition of Available Existing Supplies																																				
New Well(s) in Trinity Aquifer	PF		PF	PF			PF	PF								PF								PF												
Additional Supplies from current provider	PF	PF		PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF		PF	PF	PF		PF	PF	PF		PF	PF	
Begin Purchasing from Gainesville				PF																																
Begin Purchasing from UTRWD				PF			PF																	PF	PF											
GTUA Regional Water Supply Project																								PF												
Development of New Supplies																																				
New Surface water																																				
New Groundwater																																				
Development of Regional Water Supply or Providing Regional Management of Water Supply Facilities																																				
Voluntary Transfer of Water (incl. regional water banks, sales, leases, options, subordination agreements, and financing agreements)																																				
Emergency Transfer of Water (Section 11.139)																																				
Additional WMSs named to be considered by rule**																																				
System optimazation, reallocation of reservoir storage, contracts, water marketing, enhancement of yield, improvement of water quality																																				
Interbasin Transfer																																				
Aquifier Storage and Recovery																																				

Blanks indicate nPF = determined 'not potentially feasible' (may include WMSs that were initially considered or identified as potentially feasible)

PF = considered 'potentially feasible' and therefore evaluated

*If a WUG is located in Multiple Counties, it is only shown on the County in which the majority of the WUG is located.

**Region C does not consider the following WMSs to be potentially feasible for Region C WUGs: brush control; precipitation enhancement; cancellation of water rights; and rainwater harvesting. Region C supports rainwater harvesting on an individual basis but does not considered it to be a strategy that is feasible for a water provider to implement.

Table F.8 - Potentially Feasible Water Management Strategies for Ellis County Municipal WUGs*

Water Management Strategies	Avalon Water Supply and Sewer Service	Buena Vista-Bethel SUD	County-Other	East Garrett WSC	Ferris	Files Valley WSC	Hilco United Services	Italy	Mountain Peak SUD	Nash Forreston WSC	Ovilla	Palmer	Red Oak	Rice Water Supply and Sewer Service	Sardis Lone Elm WSC	South Ellis County WSC	Venus	Irrigation	Livestock	Manufacturing	SEP
WMSs NAMED TO BE CONSIDERED BY STATUTE																					
Conservation	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF		PF	
Drought Management																					
Implement Drought Contingency Plan/measures as needed	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF		PF	
Reuse																					
Reallocation/ Management of Existing Supplies																					
Expansion of Treatment and Delivery System					PF	PF					PF	PF									
Desalination																					
Conjuctive Use																					
Acquisition of Available Existing Supplies																					
New Well(s) in Woodbine Aquifer									PF												
Additional Supplies from current provider		PF	PF	PF	PF	PF			PF	PF	PF	PF	PF	PF	PF		PF			PF	
Connect to Waxahachie	PF					PF		PF								PF					
Development of New Supplies																					
New Surface water																					
New Groundwater																					
Development of Regional Water Supply or Providing Regional Management of Water Supply Facilities																					
Voluntary Transfer of Water (incl. regional water banks, sales, leases, options, subordination agreements, and financing agreements)																					
Emergency Transfer of Water (Section 11.139)																					
Additional WMSs named to be considered by rule**																					
System optimazation, reallocation of reservoir storage, contracts, water marketing, enhancement of yield, improvement of water quality																					
Interbasin Transfer																					
Aquifier Storage and Recovery																					

Blanks indicate nPF = determined 'not potentially feasible' (may include WMSs that were initially considered or identified as potentially feasible)

PF = considered 'potentially feasible' and therefore evaluated

*If a WUG is located in Multiple Counties, it is only shown on the County in which the majority of the WUG is located.

**Region C does not consider the following WMSs to be potentially feasible for Region C WUGs: brush control; precipitation enhancement; cancellation of water rights; and rainwater harvesting. Region C supports rainwater harvesting on an individual basis but does not considered it to be a strategy that is feasible for a water provider to implement.

Table F.9 - Potentially Feasible Water Management Strategies for Fannin County Municipal WUGs*

Water Management Strategies	Arledge Ridge WSC	Bois D Arc MUD	Bonham	County-Other	Delta County MUD	Desert WSC	Hickory Creek SUD	Honey Grove	Ladonia	Leonard	North Hunt SUD	Savoy	SW Fannin Co SUD	Trenton	West Leonard WSC	White Shed WSC	Wolfe City	Irrigation	Livestock	Manufacturing	Mining	SEP
WMSs NAMED TO BE CONSIDERED BY STATUTE																						
Conservation	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF				
Drought Management																						
Implement Drought Contingency Plan/measures as needed	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF				
Reuse																						
Reallocation/ Management of Existing Supplies																						
Expansion of Treatment and Delivery System									PF													
Desalination																						
Conjuctive Use																						
Acquisition of Available Existing Supplies																						
New Well(s) In Trinity or Woodbine Aquifer	PF					PF							PF	PF			PF	PF				
Begin Purchasing from NTMWD		PF	PF	PF				PF		PF			PF	PF								
Fannin County Water Supply Project			PF	PF				PF		PF				PF								
Lake Ralph Hall Supply									PF													
Additional Supplies from current provider							PF															
Development of New Supplies																						
New Surface water																						
New Groundwater																						
Development of Regional Water Supply or Providing Regional Management of Water Supply Facilities																						
Voluntary Transfer of Water (incl. regional water banks, sales, leases, options, subordination agreements, and financing agreements)																						
Emergency Transfer of Water (Section 11.139)																						
Additional WMSs named to be considered by rule**																						
System optimazation, reallocation of reservoir storage, contracts, water marketing, enhancement of yield, improvement of water quality																						
Interbasin Transfer																						
Aquifier Storage and Recovery																						

Blanks indicate nPF = determined 'not potentially feasible' (may include WMSs that were initially considered or identified as potentially feasible)

PF = considered 'potentially feasible' and therefore evaluated

*If a WUG is located in Multiple Counties, it is only shown on the County in which the majority of the WUG is located.

**Region C does not consider the following WMSs to be potentially feasible for Region C WUGs: brush control; precipitation enhancement; cancellation of water rights; and rainwater harvesting. Region C supports rainwater harvesting on an individual basis but does not considered it to be a strategy that is feasible for a water provider to implement.

Table F.10 - Potentially Feasible Water Management Strategies for Freestone County Municipal WUGs*

Water Management Strategies	Butler WSC	County-Other	Fairfield	Flo Community WSC	Pleasant Grove WSC	Point Enterprise WSC	South Freestone Co WSC	Southern Oaks Water Supply	Teague	Wortham	Irrigation	Livestock	Manufacturing	SEP
WMSs NAMED TO BE CONSIDERED BY STATUTE														
Conservation	PF	PF	PF	PF	PF	PF	PF		PF	PF	PF			
Drought Management														
Implement Drought Contingency Plan/measures as needed	PF	PF	PF	PF	PF	PF	PF		PF	PF	PF			PF
Reuse														
Reallocation/ Management of Existing Supplies														
Expansion of Treatment and Delivery System			PF											
Desalination														
Conjuctive Use														
Acquisition of Available Existing Supplies														
New Well(s) in Carrizo-Wilcox Aquifer				PF										
Additional Supplies from current provider										PF				PF
Begin Purchasing from TRWD			PF											
Development of New Supplies														
New Surface water														
New Groundwater														
Development of Regional Water Supply or Providing Regional Management of Water Supply Facilities														
Voluntary Transfer of Water (incl. regional water banks, sales, leases, options, subordination agreements, and financing agreements)														
Emergency Transfer of Water (Section 11.139)														
Additional WMSs named to be considered by rule**														
System optimazation, reallocation of reservoir storage, contracts, water marketing, enhancement of yield, improvement of water quality														
Interbasin Transfer														
Aquifier Storage and Recovery														

Blanks indicate nPF = determined 'not potentially feasible' (may include WMSs that were initially considered or identified as potentially feasible)
PF = considered 'potentially feasible' and therefore evaluated
*If a WUG is located in Multiple Counties, it is only shown on the County in which the majority of the WUG is located.

**Region C does not consider the following WMSs to be potentially feasible for Region C WUGs: brush control; precipitation enhancement; cancellation of water rights; and rainwater harvesting. Region C supports rainwater harvesting on an individual basis but does not considered it to be a strategy that is feasible for a water provider to implement.

Table F.11 - Potentially Feasible Water Management Strategies for Grayson County Municipal WUGs*

Water Management Strategies	Bells	Collinsville	County-Other	Dorchester	Gunter	Howe	Kentucky Town WSC	Luella SUD	Northwest Grayson Co WCID1	Oak Ridge South Gale WSC	Pink Hill WSC	Pottsboro	Red River Authority of Texas	South Grayson SUD	Southmayd	Starr WSC	Tioga	Tom Bean	Two Way SUD	Van Alstyne	Whitesboro	Whitewright	Woodbine WSC	Irrigation	Livestock	Manufacturing	Mining	SEP
WMSs NAMED TO BE CONSIDERED BY STATUTE																												
Conservation	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF		PF		PF
Drought Management																												
Implement Drought Contingency Plan/measures as needed	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF		PF		PF
Reuse																												
Direct Reuse from Sherman																										PF		PF
Reallocation/ Management of Existing Supplies																												
Expansion of treatment and delivery system						PF														PF								
Desalination																												
Conjuctive Use																												
Acquisition of Available Existing Supplies									PF																			
New Well(s) In Trinity Aquifer				PF	PF																							
New Well(s) In Woodbine Aquifer	PF																											
Additional Supplies from current provider						PF						PF		PF						PF						PF		
Development of New Supplies																												
New Surface water																												
New Groundwater																												
Development of Regional Water Supply or Providing Regional Management of Water Supply Facilities																												
GTUA Water Supply Project	PF	PF	PF		PF	PF	PF	PF		PF		PF		PF	PF		PF	PF	PF		PF	PF	PF			PF		
Collin Grayson Municipal Alliance						PF														PF						PF		
Voluntary Transfer of Water (incl. regional water banks, sales, leases, options, subordination agreements, and financing agreements)																												
Emergency Transfer of Water (Section 11.139)																												
Additional WMSs named to be considered by rule**																												
System optimazation, reallocation of reservoir storage, contracts, water marketing, enhancement of yield, improvement of water quality																												
Interbasin Transfer																												
Aquifier Storage and Recovery																												

Blanks indicate nPF = determined 'not potentially feasible' (may include WMSs that were initially considered or identified as potentially feasible)
PF = considered 'potentially feasible' and therefore evaluated
*If a WUG is located in Multiple Counties, it is only shown on the County in which the majority of the WUG is located.
**Region C does not consider the following WMSs to be potentially feasible for Region C WUGs: brush control; precipitation enhancement; cancellation of water rights; and rainwater harvesting. Region C supports rainwater harvesting on an individual basis but does not considered it to be a strategy that is feasible for a water provider to implement.

Table F.12 - Potentially Feasible Water Management Strategies for Henderson County Municipal WUGs*

Water Management Strategies	B B S WSC	County-Other	Crescent Heights WSC	Dogwood Estates Water	East Cedar Creek FWSD	Eustace	Log Cabin	Malakoff	Trinidad	Virginia Hills WSC	West Cedar Cr MUD	Irrigation	Livestock	Manufacturing	Mining	SEP
WMSs NAMED TO BE CONSIDERED BY STATUTE																
Conservation	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF		PF		
Drought Management																
Implement Drought Contingency Plan/measures as needed	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF		PF		
Reuse																
Reallocation/ Management of Existing Supplies																
Desalination																
Conjuctive Use																
Acquisition of Available Existing Supplies																
New Well(s) in Carrizo-Wilcox Aquifer				PF		PF							PF			
Additional Supplies from current provider		PF			PF			PF	PF		PF			PF		
Development of New Supplies																
New Surface water																
New Groundwater																
Development of Regional Water Supply or Providing Regional Management of Water Supply Facilities																
Voluntary Transfer of Water (incl. regional water banks, sales, leases, options, subordination agreements, and financing agreements)																
Emergency Transfer of Water (Section 11.139)																
Additional WMSs named to be considered by rule**																
System optimazation, reallocation of reservoir storage, contracts, water marketing, enhancement of yield, improvement of water quality																
Interbasin Transfer																
Aquifier Storage and Recovery																

Blanks indicate nPF = determined 'not potentially feasible' (may include WMSs that were initially considered or identified as potentially feasible)

PF = considered 'potentially feasible' and therefore evaluated

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**Region C does not consider the following WMSs to be potentially feasible for Region C WUGs: brush control; precipitation enhancement; cancellation of water rights; and rainwater harvesting. Region C supports rainwater harvesting on an individual basis but does not considered it to be a strategy that is feasible for a water provider to implement.

Table F.13 - Potentially Feasible Water Management Strategies for Jack County Municipal WUGs*

Water Management Strategies	County-Other	Jacksboro	Irrigation	Livestock	Mining	SEP
WMSs NAMED TO BE CONSIDERED BY STATUTE						
Conservation	PF	PF	PF			
Drought Management						
Implement Drought Contingency Plan/measures as needed	PF	PF	PF		PF	PF
Reuse						
Indriect Reuse from Jacksboro		PF			PF	
Reallocation/ Management of Existing Supplies						
Expansion of treatment and delivery system	PF					
Desalination						
Conjuctive Use						
Acquisition of Available Existing Supplies						
Purchase water from Walnut Creek SUD	PF					
Purchase water from Jacksboro	PF					
Purchase water from TRWD					PF	PF
Development of New Supplies						
New Surface water						
New Groundwater						
Development of Regional Water Supply or Providing Regional Management of Water Supply Facilities						
Voluntary Transfer of Water (incl. regional water banks, sales, leases, options, subordination agreements, and financing agreements)						
Emergency Transfer of Water (Section 11.139)						
Additional WMSs named to be considered by rule**						
System optimazation, reallocation of reservoir storage, contracts, water marketing, enhancement of yield, improvement of water quality						
Interbasin Transfer						
Aquifier Storage and Recovery						

Blanks indicate nPF = determined 'not potentially feasible' (may include WMSs that were initially considered or identified as potentially feasible)

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**Region C does not consider the following WMSs to be potentially feasible for Region C WUGs: brush control; precipitation enhancement; cancellation of water rights; and rainwater harvesting. Region C supports rainwater harvesting on an individual basis but does not considered it to be a strategy that is feasible for a water provider to implement.

Table F.14 - Potentially Feasible Water Management Strategies for Kaufman County Municipal WUGs*

Water Management Strategies	Ables Springs WSC	Becker Jiba WSC	College Mound WSC	Combine WSC	County-Other	Crandall	Elmo WSC	Forney Lake WSC	Gastonia Scurry SUD	High Point WSC	Kaufman	Kaufman Co Dev Dist 1	Kaufman Co MUD 11	Kaufman Co MUD 14	Kemp	Mabank	MacBee SUD	Markout WSC	North Kaufman WSC	Poetry WSC	Rose Hill SUD	Talty SUD	West Cedar Ck MUD	Irrigation	Livestock	Manufacturing	Mining	SEP
WMSs NAMED TO BE CONSIDERED BY STATUTE																												
Conservation	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF		PF		
Drought Management																												
Implement Drought Contingency Plan/measures as needed	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF		PF	PF	PF
Reuse																												
TRA Reuse for SEP																												PF
Reallocation/ Management of Existing Supplies																												
Expansion of Treatment and Delivery System			PF		PF											PF											PF	
Desalination																												
Conjuctive Use																												
Acquisition of Available Existing Supplies																												
Additional Supplies from current provider	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF		PF	PF	PF	PF	PF	PF	PF		PF		PF
Development of New Supplies																												
New Surface water																												
New Groundwater																												
Development of Regional Water Supply or Providing Regional Management of Water Supply Facilities																												
Voluntary Transfer of Water (incl. regional water banks, sales, leases, options, subordination agreements, and financing agreements)																												
Emergency Transfer of Water (Section 11.139)																												
Additional WMSs named to be considered by rule**																												
System optimazation, reallocation of reservoir storage, contracts, water marketing, enhancement of yield, improvement of water quality																												
Interbasin Transfer																												
Aquifier Storage and Recovery																												

Blanks indicate nPF = determined 'not potentially feasible' (may include WMSs that were initially considered or identified as potentially feasible)
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**Region C does not consider the following WMSs to be potentially feasible for Region C WUGs: brush control; precipitation enhancement; cancellation of water rights; and rainwater harvesting. Region C supports rainwater harvesting on an individual basis but does not considered it to be a strategy that is feasible for a water provider to implement.

Table F.15 - Potentially Feasible Water Management Strategies for Navarro County Municipal WUGs*

Water Management Strategies	B and B WSC	Blooming Grove	Brandon Irene WSC	Chatfield WSC	Corbet WSC	County-Other	Dawson	Kerens	M E N WSC	Navarro Mills WSC	Post Oak SUD	Irrigation	Livestock	Manufacturing	Mining	SEP
WMSs NAMED TO BE CONSIDERED BY STATUTE																
Conservation	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF		PF		
Drought Management																
Implement Drought Contingency Plan/measures as needed	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF		PF		
Reuse																
Reallocation/ Management of Existing Supplies																
Expansion of Treatment and Delivery System									PF							
Desalination																
Conjuctive Use																
Acquisition of Available Existing Supplies																
New Wells in Woodbine Aquifer										PF						
Additional Supplies from current provider	PF	PF		PF	PF	PF	PF	PF	PF	PF	PF			PF		
Development of New Supplies																
New Surface water																
New Groundwater																
Development of Regional Water Supply or Providing Regional Management of Water Supply Facilities																
Voluntary Transfer of Water (incl. regional water banks, sales, leases, options, subordination agreements, and financing agreements)																
Emergency Transfer of Water (Section 11.139)																
Additional WMSs named to be considered by rule**																
System optimazation, reallocation of reservoir storage, contracts, water marketing, enhancement of yield, improvement of water quality																
Interbasin Transfer																
Aquifier Storage and Recovery																

Blanks indicate nPF = determined 'not potentially feasible' (may include WMSs that were initially considered or identified as potentially feasible)

PF = considered 'potentially feasible' and therefore evaluated

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**Region C does not consider the following WMSs to be potentially feasible for Region C WUGs: brush control; precipitation enhancement; cancellation of water rights; and rainwater harvesting. Region C supports rainwater harvesting on an individual basis but does not considered it to be a strategy that is feasible for a water provider to implement.

Table F.16 - Potentially Feasible Water Management Strategies for Parker County Municipal WUGs*

Water Management Strategies	Aledo	Annetta	County-Other	Horseshoe Bend Water System	Hudson Oaks	Mineral Wells	North Rural WSC	Parker County SUD	Reno	Santo SUD	Springtown	Willow Park	Irrigation	Livestock	Manufacturing	Mining	SEP
WMSs NAMED TO BE CONSIDERED BY STATUTE																	
Conservation	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF		PF		
Drought Management																	
Implement Drought Contingency Plan/measures as needed	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF		PF		
Reuse																	
Reallocation/ Management of Existing Supplies																	
Expansion of Treatment and Delivery System	PF		PF					PF			PF	PF					
Desalination																	
Conjuctive Use																	
Acquisition of Available Existing Supplies																	
New Well(s) in Trinity Aquifer			PF														
Additional Supplies from current provider	PF				PF			PF	PF	PF	PF	PF			PF		
Begin Purchasing from Weatherford (TRWD)		PF	PF														
Development of New Supplies																	
New Surface water																	
New Groundwater																	
Development of Regional Water Supply or Providing Regional Management of Water Supply Facilities																	
Parker County Water Supply Project			PF					PF									
Voluntary Transfer of Water (incl. regional water banks, sales, leases, options, subordination agreements, and financing agreements)																	
Emergency Transfer of Water (Section 11.139)																	
Additional WMSs named to be considered by rule**																	
System optimazation, reallocation of reservoir storage, contracts, water marketing, enhancement of yield, improvement of water quality																	
Interbasin Transfer																	
Aquifier Storage and Recovery																	

Blanks indicate nPF = determined 'not potentially feasible' (may include WMSs that were initially considered or identified as potentially feasible)

PF = considered 'potentially feasible' and therefore evaluated

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**Region C does not consider the following WMSs to be potentially feasible for Region C WUGs: brush control; precipitation enhancement; cancellation of water rights; and rainwater harvesting. Region C supports rainwater harvesting on an individual basis but does not considered it to be a strategy that is feasible for a water provider to implement.

Table F.17 - Potentially Feasible Water Management Strategies for Rockwall County Municipal WUGs*

Water Management Strategies	Blackland WSC	Cash SUD	County-Other	Fate	Heath	Mount Zion WSC	R C H WSC	Royse City	Irrigation	Livestock	Manufacturing
WMSs NAMED TO BE CONSIDERED BY STATUTE											
Conservation	PF	PF	PF	PF	PF	PF	PF	PF	PF		PF
Drought Management											
Implement Drought Contingency Plan/measures as needed	PF	PF	PF	PF	PF	PF	PF	PF	PF		PF
Reuse											
Reallocation/ Management of Existing Supplies											
Expansion of Treatment and Delivery System	PF	PF		PF							
Desalination											
Conjuctive Use											
Acquisition of Available Existing Supplies											
Additional Supplies from current provider	PF	PF	PF	PF	PF	PF	PF	PF	PF		PF
Development of New Supplies											
New Surface water											
New Groundwater											
Development of Regional Water Supply or Providing Regional Management of Water Supply Facilities											
Voluntary Transfer of Water (incl. regional water banks, sales, leases, options, subordination agreements, and financing agreements)											
Emergency Transfer of Water (Section 11.139)											
Additional WMSs named to be considered by rule**											
System optimazation, reallocation of reservoir storage, contracts, water marketing, enhancement of yield, improvement of water quality											
Interbasin Transfer											
Aquifier Storage and Recovery											

Blanks indicate nPF = determined 'not potentially feasible' (may include WMSs that were initially considered or identified as potentially feasible)

PF = considered 'potentially feasible' and therefore evaluated

*If a WUG is located in Multiple Counties, it is only shown on the County in which the majority of the WUG is located.

**Region C does not consider the following WMSs to be potentially feasible for Region C WUGs: brush control; precipitation enhancement; cancellation of water rights; and rainwater harvesting. Region C supports rainwater harvesting on an individual basis but does not considered it to be a strategy that is feasible for a water provider to implement.

Table F.18 - Potentially Feasible Water Management Strategies for Tarrant County Municipal WUGs*

Water Management Strategies	Azle	Bedford	Benbrook	Bethesda WSC	Blue Mound	Burleson	Colleyville	Community WSC	County-Other	Crowley
WMSs NAMED TO BE CONSIDERED BY STATUTE										
Conservation	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF
Drought Management										
Implement Drought Contingency Plan/measures as needed	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF
Reuse										
Purchase Reuse water from DCPCMUD (Lake Grapevine)										
Reallocation/ Management of Existing Supplies										
Expansion of Treatment and Delivery System	PF		PF	PF		PF				PF
Desalination										
Conjuctive Use										
Acquisition of Available Existing Supplies										
New Well(s) in Trinity Aquifer										
Additional Supplies from current provider	PF	PF	PF	PF		PF	PF	PF	PF	PF
Begin Purchasing from Arlington (TRWD)										
Begin Purchasing from Azle (Ft Worth)										
Begin Purchasing from Fort Worth (TRWD)										
Development of New Supplies										
New Surface water										
New Groundwater										
Development of Regional Water Supply or Providing Regional Management of Water Supply Facilities										
Voluntary Transfer of Water (incl. regional water banks, sales, leases, options, subordination agreements, and financing agreements)										
Emergency Transfer of Water (Section 11.139)										
Additional WMSs named to be considered by rule**										
System optimazation, reallocation of reservoir storage, contracts, water marketing, enhancement of yield, improvement of water quality										
Interbasin Transfer										
Aquifier Storage and Recovery			PF							
Other										
Purchase water system										

Water Management Strategies	Dalworth. Gardens	Edgecliff	Euless	Everman	Forest Hill	Grapevine	Haltom City	Haslet	Hurst	Johnson Co SUD	Keller
WMSs NAMED TO BE CONSIDERED BY STATUTE											
Conservation	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF
Drought Management											
Implement Drought Contingency Plan/measures as needed	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF
Reuse											
Purchase Reuse water from DCPCMUD (Lake Grapevine)						PF					
Reallocation/ Management of Existing Supplies											
Expansion of Treatment and Delivery System											
Desalination											
Conjuctive Use											
Acquisition of Available Existing Supplies											
New Well(s) in Trinity Aquifer											
Additional Supplies from current provider	PF	PF	PF		PF	PF	PF	PF	PF	PF	PF
Begin Purchasing from Arlington (TRWD)											
Begin Purchasing from Azle (Ft Worth)											
Begin Purchasing from Fort Worth (TRWD)											
Development of New Supplies											
New Surface water											
New Groundwater											
Development of Regional Water Supply or Providing Regional Management of Water Supply Facilities											
Voluntary Transfer of Water (incl. regional water banks, sales, leases, options, subordination agreements, and financing agreements)											
Emergency Transfer of Water (Section 11.139)											
Additional WMSs named to be considered by rule**											
System optimazation, reallocation of reservoir storage, contracts, water marketing, enhancement of yield, improvement of water quality											
Interbasin Transfer											
Aquifier Storage and Recovery											
Other											
Purchase water system											

Water Management Strategies	Kennedale	Lake Worth	Lakeside	Pantego	Pelican Bay	Richland Hills	River Oaks	Saginaw	Sansom Park Village	Southlake	Watauga	Westlake
WMSs NAMED TO BE CONSIDERED BY STATUTE												
Conservation	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF
Drought Management												
Implement Drought Contingency Plan/measures as needed	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF
Reuse												
Purchase Reuse water from DCPCMUD (Lake Grapevine)												
Reallocation/ Management of Existing Supplies												
Expansion of Treatment and Delivery System	PF			PF	PF					PF		
Desalination												
Conjuctive Use												
Acquisition of Available Existing Supplies												
New Well(s) in Trinity Aquifer					PF							
Additional Supplies from current provider	PF	PF			PF	PF	PF	PF	PF	PF	PF	PF
Begin Purchasing from Arlington (TRWD)				PF								
Begin Purchasing from Azle (Ft Worth)					PF							
Begin Purchasing from Fort Worth (TRWD)				PF								
Development of New Supplies												
New Surface water												
New Groundwater												
Development of Regional Water Supply or Providing Regional Management of Water Supply Facilities												
Voluntary Transfer of Water (incl. regional water banks, sales, leases, options, subordination agreements, and financing agreements)												
Emergency Transfer of Water (Section 11.139)												
Additional WMSs named to be considered by rule**												
System optimazation, reallocation of reservoir storage, contracts, water marketing, enhancement of yield, improvement of water quality												
Interbasin Transfer												
Aquifier Storage and Recovery												
Other												
Purchase water system												

Water Management Strategies	Westover Hills	Westworth Village	White Settlement	Irrigation	Livestock	Manufacturing	Mining	SEP
WMSs NAMED TO BE CONSIDERED BY STATUTE								
Conservation	PF	PF	PF	PF		PF		PF
Drought Management								
Implement Drought Contingency Plan/measures as needed	PF	PF	PF	PF		PF		PF
Reuse								
Purchase Reuse water from DCPCMUD (Lake Grapevine)								
Reallocation/ Management of Existing Supplies								
Expansion of Treatment and Delivery System								
Desalination								
Conjuctive Use								
Acquisition of Available Existing Supplies								
New Well(s) in Trinity Aquifer					PF			
Additional Supplies from current provider	PF	PF	PF	PF		PF		PF
Begin Purchasing from Arlington (TRWD)								
Begin Purchasing from Azle (Ft Worth)								
Begin Purchasing from Fort Worth (TRWD)								
Development of New Supplies								
New Surface water								
New Groundwater								
Development of Regional Water Supply or Providing Regional Management of Water Supply Facilities								
Voluntary Transfer of Water (incl. regional water banks, sales, leases, options, subordination agreements, and financing agreements)								
Emergency Transfer of Water (Section 11.139)								
Additional WMSs named to be considered by rule**								
System optimazation, reallocation of reservoir storage, contracts, water marketing, enhancement of yield, improvement of water quality								
Interbasin Transfer								
Aquifier Storage and Recovery								
Other								
Purchase water system								

Blanks indicate nPF = determined 'not potentially feasible' (may include WMSs that were initially considered or identified as potentially feasible)

PF = considered 'potentially feasible' and therefore evaluated

*If a WUG is located in Multiple Counties, it is only shown on the County in which the majority of the WUG is located.

**Region C does not consider the following WMSs to be potentially feasible for Region C WUGs: brush control; precipitation enhancement; cancellation of water rights; and rainwater harvesting. Region C supports rainwater harvesting on an individual basis but does not considered it to be a strategy that is feasible for a water provider to implement.

Appendix G

Water Management Strategy Evaluation

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APPENDIX G WATER MANAGEMENT STRATEGY EVALUATION

The information contained in this appendix details the strategy evaluation for water management strategies in Region C.

In accordance with TWDB rules and guidelines, the Region C Water Planning Group has adopted a standard procedure for providing an equitable comparison of potential water management strategies. This procedure classifies the strategies using the TWDB's standard categories developed for regional water planning. The overall strategy evaluations can be found in **Table G.3** and **Table G.4.** Technical memorandums on each strategy can be found afterwards.

G.1 Water Management Strategy Evaluation Process

All strategies are compared based upon the following categories:

- Quantity
- Reliability
- Cost
- Environmental Factors
- Agricultural Resources/Rural Areas
- Other Natural Resources
- Key Water Quality Parameters
- Third Party Social & Economic Factors

Each category is quantitatively assessed. If quantitative values were not available, a ranking from 1 to 5 was assigned. **Table G.1** shows the correlation between the category and the ranking of the non-environmental categories where quantitative values were not available. (The Environmental Factors are discussed in the next section.)

TABLE G.1 EVALUATION MATRIX CATEGORY RANKING CORRELATION

RANK	RELIABILITY	REMAINING STRATEGY IMPACTS[A]
1	Low	High
2	Low to Medium	Medium High
3	Medium	Medium
4	Medium to High	Medium Low
5	High	Low or None

[a]Includes impacts on agricultural resources, other natural resources, key water quality parameters, and third party impacts.

Impacts on Agricultural Resources are quantified based on the permanent impacts to water supplies to irrigation users or direct impacts to irrigated acreage. Projects with only temporary impacts, such as pipeline projects, would be classified as low impacts. Specific assumptions include:

- If the location of the strategy is known and data is available, actual impacts on agricultural lands will be used.
- If a strategy impacts more than 5,000 acres of agricultural land, the impacts are classified as "high". If a strategy impacts less than 1,000 acres of agricultural lands, the impacts are classified as "low".
- If actual impact data was not available for a new reservoir, impacts of medium high were assumed.

More detailed information regarding the scoring for key water quality parameters is included in Chapter 6. Key water quality parameters were scored according to the "remaining strategy impacts" ranking listed in **Table G.1**.

In addition to the required evaluation categories, Region C considered whether the strategy was consistent with the provider's water supply plan. This could be verified with an independent water supply plan developed specifically for the provider or direct correspondence from the provider during the development of the Region C Water Plan. Strategies that are considered but not recommended in a provider's plan are considered consistent with the Region C Water Plan. Only those strategies not requested by the provider or considered in the providers' plans are shown as not consistent.

G.1.1 Environmental Matrix

The Environmental Matrix (**Table G.4**) is used to determine the score of the 'Environmental Factors' category on the Evaluation Matrix (**Table G.3**).

The Environmental Matrix (**Table G.4**) 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

Each category is quantitatively assessed. If quantitative values were not available, a ranking from 1 to 5 was assigned. **Table G.2** shows the correlation between the rankings assigned within each category.

TABLE G.2 ENVIRONMENTAL MATRIX CATEGORY RANKING CORRELATION

RANK	HABITAT	ALL REMAINING CATEGORIES
1	Greater than 30,000 Acres	High Impact
2	20,000-30,000 Acres	Medium High Impact
3	7,000-20,000 Acres	Medium Impact
4	5,000-7,000 Acres	Medium Low Impact
5	0-5,000 Acres (or 'varies')	Low Impact or n/a

G.1.2 Acres Impacted

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 or storage tank will impact approximately 2 acres of land.
- The acres impacted by 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.
- Conservation strategies will have no impact on acres.

G.1.3 Wetland Acres Impacted

Wetland Acres refers to how many acres that are classified as wetlands are impacted by implementation of the strategy.

The following conservative assumptions were made (unless more detailed information was available):

- For pipelines and groundwater wells, it was assumed wetlands would be avoided as feasible and would therefore have low impacts.

G.1.4 Environmental Water Needs

Environmental Water Needs refers to how the strategy will impact the area's overall environmental water needs. Water is vital to the environmental health of a region, and so it is important to take into account how strategies will impact the amount of water that will be available to the environment.

The following conservative assumptions were made (unless more detailed information was available):

- The majority of the strategies will have a low impact on environmental water needs.
- Reuse will have a medium impact if the effluent was previously used for irrigation or discharged back into the water system. This will decrease the overall amount of water that is available to the environment by diverting the effluent and using it for another purpose.

G.1.5 Habitat

Habitat refers to how the strategy will impact the habitat of the local area. The more area that is impacted due to the implementation of the strategy, the more the area's habitat will be disrupted. The ranges used for this ranking are in **Table G.2**, unless more detailed information is available.

G.1.6 Threatened and Endangered Species

Threatened and endangered species refers to how the strategy would potentially impact those species in the area once implemented.

The following conservative assumptions were made (unless more detailed information was available):

- Only applicable to strategies implementing infrastructure.
- Rankings were based on the number 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.

G.1.7 Cultural Resources

Cultural Resources refers to how the strategy will impact cultural resources located within the area. Cultural resources are defined as the collective evidence of the past activities and accomplishments of people. Locations, buildings and features with scientific, cultural or historic value are considered to be cultural resources.

The following conservative assumptions were made (unless more detailed information was available):

- Only applicable to strategies implementing infrastructure.
- All strategies requiring only a pipeline or groundwater wells will have low impacts.
- New reservoirs will have medium high impacts.

G.1.8 Bays and Estuaries

Region C is located too far away from any bays or estuaries to have a quantifiable impact. It was assumed that the only strategies that could have potential impacts to bays and estuaries are the Gulf of Mexico and Toledo Bend strategies. These were given a ranking of medium low impacts.

Table G.3 Evaluation Matrix

Strategy	Entity	Potentially Feasible, Recommended, or Alternative Strategy	County Used	Basin Used	Quantity (Ac-Ft/Yr)	Reliability	Cost ($/Ac-Ft)	Impacts of Strategy on:					Consistency		Implementation Issues	Comments
								Agricultural Resources/ Rural Areas (Acres)	Agricultural Resources/ Rural Areas Score	Other Natural Resources	Key Water Quality Parameters	Third Party Social & Economic Factors	Suppliers	Other Regions		
Conservation - General	Multiple	Recommended	Multiple	Multiple	295,793	5	Varies	Low	5	5	5	5	Yes	N/A		
Dredging - General	Multiple	Potentially Feasible	Multiple	Multiple	7,200	3	Varies	Low	5	5	5	5	N/A	N/A	Requires Section404 Permit and DPES permit for discharging materials	
Groundwater - General	Multiple	Varies	Multiple	Multiple	Varies	Varies	Varies	Low	5	5	5	5	Yes	N/A		
Increase Delivery Infrastructure - General	Multiple	Varies	Multiple	Multiple	0[a]	N/A	Varies	Low	5	5	5	5	Yes	N/A		
Indirect Reuse - General	Multiple	Varies	Multiple	Multiple	Varies	5	Varies	Low	5	5	4	5	Yes	N/A		
Direct Reuse - General	Multiple	Varies	Multiple	Multiple	Varies	5	Varies	Low	5	5	5	5	Yes	N/A		
Aquifer Storage and Recovery - Large	Multiple	Potentially Feasible	Multiple	Multiple	Varies	4	Varies	Low	5	4	5	5	No	N/A	Unknown technical feasibility in Region C	
Aquifer Storage and Recovery - Small	Multiple	Varies	Multiple	Multiple	2,500	4	Varies	Low	5	4	5	5	Yes	N/A		
Water Treatment Plants - General	Multiple	Varies	Multiple	Multiple	0[a]	N/A	Varies	Low	5	5	5	5	Yes	N/A		
Gulf of Mexico - Desalination	Multiple	Potentially Feasible	Multiple	Multiple	Unlimited	4	$6,979	Low	5	4	4	4	No	N/A	Technology is still developing for this application at this scale. May require state water right permit and IBT.	Slightly lower reliability due to long transmission. Strategy was costed to central location. Supply is treated water.
George Parkhouse South	NTWMD and/or UTRWD	Alternative	Multiple	Multiple	114,960	4	$966	16,120[b]	1	3	4	3	Yes	Not inconsistent	Requires new water rights permit and IBT.	Yield impactsed by development of other strategies in Sulphur Basin
George Parkhouse North	NTMWD and/or UTRWD	Alternative	Multiple	Multiple	94,460	4	$1,173	11,344[b]	1	3	4	3	Yes	Not inconsistent	Requires new water rights permit and IBT.	Yield impactsed by development of other strategies in Sulphur Basin
Integrated Pipeline (IPL)	TRWD and DWU	Recommended	Multiple	Trinity	N/A	N/A	N/A	Low	5	5	5	5	Yes	N/A		Pipeline delivers existing supplies.
Marvin Nichols Reservoir (328')	NTMWD, TRWD, UTRWD, DWU and/or Irving	Recommended (Alternative for DWU and Irving)	Multiple	Multiple	320,000	5	$1,505	30170[c]	1	2	4	1	Yes	Not inconsistent (does not use same water)	Requires new water rights permit and IBT. Known public opposition.	
Wright Patman Reallocation (235')	NTMWD, TRWD, UTRWD, DWU and/or Irving	Recommended (Alternative for UTRWD, DWU, and Irving)	Multiple	Multiple	125,000	5	$2,473	194	5	4	4	4	Yes	Not inconsistent	Requires Congressional approval	Slight impacts to White Oak Mitigation area
Lake Texoma Blending	NTMWD	Recommended	Multiple	Multiple	111,699	5	$889	Low	5	5	3	5	Yes	N/A	Requires fresh wate rsource for blending	
Lake Texoma Blending	UTRWD	Alternative	Multiple	Trinity	25,000	5	$2,134	Low	5	3	3	4	Yes	N/A	Requires IBT, state water right, Congressional authorization, and contract with USACE.	Requires reallocation of storage in Lake Texoma
Lake Texoma Desalination	DWU	Alternative	Multiple	Trinity	145,730	5	$2,952	Low	5	3	3	3	Yes	N/A	Requires IBT, state water right, Congressional authorization, and contract with USACE.	Requires reallocation of storage in Lake Texoma. Delivers treated water.
Lake Texoma Desalination	NTMWD	Alternative	Multiple	Multiple	33,630	5	$4,308	Low	5	3	3	4	Yes	N/A		Delivers treated water.
Additional Measures to Access Full Lake Lavon Yield	NTMWD	Recommended	Multiple	Multiple	12,667	5	$1,225	Low	5	2	3	3	Yes	N/A		
Aquifer Storage and Recovery	TRWD	Recommended	Multiple	Trinity	5,000	5	$319	Low	5	2	4	3	Yes	N/A		
Carrizo-Wilcox Aquifer	NTMWD	Alternative	Multiple	Multiple	42,000	4	$2,030	Low	5	2	4	3	Yes	Not inconsistent	Requires coordination with local groundwater districts. Competing uses for water.	Supplies are limited to MAGs
Carrizo-Wilcox Aquifer	DWU	Recommended	Multiple	Trinity	27,800	4	$1,971	Low	5	2	3	3	Yes	Not inconsistent	Requires coordination with local groundwater districts. Competing uses for water.	Supplies are limited to MAGs, but there are no GCDs in location of groundwater
Carrizo-Wilcox Aquifer	TRWD	Recommended	Multiple	Trinity	26,800	4	$1,222	Low	5	2	3	3	Yes	Not inconsistent	Requires coordination with local groundwater districts. Competing uses for water.	Supplies are limited to MAGs
Marty Leonard Wetland Reuse	TRWD	Recommended	Multiple	Trinity	48,455	5	$652	High	1	5	3	5	Yes	N/A	TRWD has permit for reuse.	
Lake of the Pines (Cypress Basin Supplies)	NTMWD	Recommended	Multiple	Multiple	76,694	5	$1,320	Low	5	5	4	4	Yes	Not inconsistent	Requires IBT, renegotiating existing contracts, and contract with NETMWD.	
Lake Columbia	DWU	Alternate	Multiple	Trinity	53,808	5	$1,075	135	5	3	3	3	Yes	Yes	Requires contract with ANRA and IBT.	
Connect IPL to Bachman (Lake Palestine)	DWU	Recommended	Multiple	Trinity	95,086	5	$394	Low	5	5	3	4	Yes	Yes	DWU has IBT permit.	
Lake Ralph Hall Reuse	UTRWD	Recommended	Multiple	Trinity	20,204	5	$1,339	Low	5	4	4	4	Yes	N/A	Requires new water right and IBT.	
Lake Tehuacana	TRWD	Recommended	Multiple	Trinity	22,330	5	$1,082	4,128	2	3	4	3	Yes	N/A	Requires new water rights permit.	
Main Stem Balancing Reservoir	DWU	Recommended	Multiple	Trinity	114,342	5	$1,209	3,500	2	4	4	4	Yes	N/A		
Expanded Wetland Reuse	NTMWD	Recommended	Multiple	Multiple	33,809	5	$1,645	Low	5	5	3	5	Yes	N/A	Requires water right permit amendment.	
Neches Run-of-River Diversions	DWU	Recommended	Multiple	Trinity	53,808	5	$1,290	Low	5	4	4	4	Yes	Not inconsistent	Requires new water rights permit and IBT.	
Red River Off-Channel Reservoir	DWU	Alternative	Multiple	Trinity	114,000	5	$1,874	Medium High	2	5	4	5	Yes	N/A		
Red River Off-Channel Reservoir	DWU and UTRWD	Alternative	Multiple	Trinity	129,000	5	$1,874	Medium High	2	5	4	5	Yes	N/A		
Toledo Bend	DWU, NTMWD TRWD, and UTRWD	Alternative	Multiple	Multiple	350,000	5	$2,333	Low	5	5	4	4	Yes	Yes	Requires IBT and agreements with multiple users.	Cost shown is total cost for all participants.
GTUA Regional Water System – Phase I	GTUA	Recommended	Multiple	Red	14,150	5	$5,002	Low	5	5	3	5	Yes	N/A		
GTUA Regional Water System – Phase II	GTUA	Recommended	Multiple	Red	23,800	5	$4,057	Low	5	5	3	5	Yes	N/A		

Table G.3 Evaluation Matrix

Strategy	Entity	Potentially Feasible, Recommended, or Alternative Strategy	County Used	Basin Used	Quantity (Ac-Ft/Yr)	Reliability	Cost ($/Ac-Ft)	Impacts of Strategy on:					Consistency		Implementation Issues	Comments
								Agricultural Resources/ Rural Areas (Acres)	Agricultural Resources/ Rural Areas Score	Other Natural Resources	Key Water Quality Parameters	Third Party Social & Economic Factors	Suppliers	Other Regions		
Parker County Regional Water Provider	New Water Provider	Recommended	Parker	Trinity	22,000	5	$2,411	Low	5	5	5	5	Yes	N/A	Requires creation of new district	
Parker County Regional Water Provider	New Water Provider	Alternate	Parker	Brazos	5,259	3	$5,842	Low	5	4	3	4	Yes	N/A	Requires creation of new district	Requires new source of water. No provider has agreed to supplying water.
Wise County Regional Water Provider	New Regional Water Provider	Recommended	Wise	Trinity	27,463	5	$2,255	Low	5	5	5	5	Yes	N/A	Requires creation of new district	
Irving Reuse - Indirect	Irving	Alternative	Dallas	Trinity	27,539	5	$1,251	Low	5	5	4	4	Yes	N/A	Requires agreements with other providers	
Irving Reuse - Direct	Irving	Alternative	Dallas	Trinity	19,277	5	$1,558	Low	5	5	4	5	Yes	N/A	Requires discharge permits and TCEQ approval for DPR	
Reallocation of Storage in Lake Texoma	GTUA, DWU, UTRWD	Recommended, Alt, Alt	Multiple	Multiple	Varies	5	n/a	Low	5	4	3	3	Yes	N/A	Requires USACE approval, contract with USACE and water right	Quantity is below the threshold for Congressional approval
Sabine River Off-Channel Reservoir	DWU	Recommended	Multiple	Trinity	73,986	5	$1,004	800	5	4	4	5	Yes	Not inconsistent		
Main Stem Pump Station - DWU, NTMWD	DWU, NTMWD	Recommended for DWU	Multiple	Trinity	12,638	5	TBD	Low	5	5	4	5	Yes	N/A		
Out-of-State		Alternate for DWU	Multiple	Multiple												
Arkansas (Little River Millwood Lake)	DWU	Alternate	Multiple	Trinity	300,000	3	$2,050	Low	5	5	4	4	Yes	N/A	Requires agreement with Arkansas and/or modification to Red River Compact	Reliability is moderate due to the uncertainity of securing long-term agreements
Louisiana (Toldeo Bend, SRA-Louisiana	DWU	Alternate	Multiple	Trinity	200,000	3	$2,965	Low	5	5	4	4	Yes	N/A	Requires agreement with SRA- LA and/or modification to Sabine River Compact	
Oklahoma (Kiamachi River)	DWU	Alternate	Multiple	Trinity	300,000	3	$1,202	Low	5	5	4	4	Yes	N/A	Oklahoma has moratorium for export of water out of state.	
Oklahoma	NTMWD	Alternate	Multiple	Multiple	50,000	3	$1,430	Low	5	5	4	4	Yes	N/A		
Oklahoma (Hugo to Lake Lewisville)	UTRWD	Alternative	Multiple	Trinity	55,000	3	$903	Low	5	5	4	4	Yes	N/A		
Interim Upper Sabine Basin	NTMWD	Recommended	Multiple	Multiple	10,000	5	$0	Low	5	5	5	4	Yes	Yes		
Fannin County Water Supply System	NTMWD	Recommended	Fannin	Multiple	3,916	5	$4,109	Low	5	5	5	5	Yes	N/A		
Reuse from Fort Worth Mary's Creek WWTP	TRWD	Recommended	Multiple	Trinity	25,928	5	$209	Low	5	5	4	4	Yes	N/A		
Additional Richland Chambers Reuse	TRWD	Recommended	Multiple	Trinity	66,691	5	$0	Low	5	5	4	4	Yes	N/A		
Reuse from TRA Central WWTP	TRWD	Recommended	Multiple	Trinity	60,000	5	$127	Low	5	5	4	4	Yes	N/A		
Tarrant County Water Supply Project	TRA	Recommended	Multiple	Trinity	19,741	5	$489	Low	5	5	5	5	Yes	N/A		
Denton Direct Potable Reuse	Denton	Recommended	Denton	Trinity	5,605	5	$3,855	Low	5	5	4	4	Yes	N/A		
Voluntary Purchase of Water	Multiple	Varies	Varies	Varies	Varies	5	Varies	Low	5	5	5	5	Varies	N/A		
Main Stem Balancing Reservoir	Irving, DWU	Alternate	Dallas	Trinity	139,342	5	$629	3500	2	4	4	4	No	N/A		May require increased storage

[a] Does not create new supply, but is necessary to utilize the supplies created by other strategies.

[b] Includes grassland and row crops. Bottomland and Upland Forests and forested wetlands were not considered a potential agricultural resource for these reservoirs.

[b] Includes grassland, row crops, and upland forests for timber harvesting.

Table G.4 Environmental Matrix

Entity	County	Basin	Environmental Factors												
			Acres Impacted	Wetland Acres Impacted	Env. Water Needs	Env. Water Needs Score	Habitat[a]	Habitat Score	County Impacted	Threat and Endanger Species	Threat and Endanger Species Score	Cultural Resources	Cultural Resources Score	Bays & Estuaries	Bays & Estuaries Score
Multiple	Multiple	Multiple	0	0	N/A	5	N/A	5	N/A	N/A	5	N/A	5	N/A	5
Multiple	Multiple	Multiple	Varies	0	N/A	5	Low	5	N/A	N/A	5	Low	5	N/A	5
Multiple	Multiple	Multiple	Varies	0	N/A	5	Low	5	N/A	N/A	5	Low	5	N/A	5
Multiple	Multiple	Multiple	Varies	Varies	N/A	5	Low	5	Varies	Varies	5	Low	5	N/A	5
Multiple	Multiple	Multiple	Varies	Varies	Low	5	Low	5	Varies	Varies	5	Low	5	N/A	5
Multiple	Multiple	Multiple	Varies	Varies	Low	5	Low	5	Varies	Varies	5	Low	5	N/A	5
Multiple	Multiple	Multiple	Varies	0	Low	5	Low	5	N/A	N/A	5	Low	5	N/A	5
Multiple	Multiple	Multiple	Varies	0	Low	5	Low	5	N/A	N/A	5	Low	5	N/A	5
Multiple	Multiple	Multiple	Varies	0	N/A	5	N/A	5	N/A	N/A	5	N/A	5	N/A	5
Multiple	Multiple	Multiple	4,521	0	Medium Low	4	Low	5	Harris, Montgomery, Madison, Leon, Navarro, Ellis, Dallas	>40	1	Low	5	Medium Low	4
NTWMD and/or UTRWD	Multiple	Multiple	28,900	6,197	Medium High	2	Medium High	2	Fannin, Delta, Hopkins	15	3	Medium High	2	N/A	5
NTMWD and/or UTRWD	Multiple	Multiple	14,400	1,235	Medium High	2	Medium	3	Fannin, Delta, Hopkins	15	3	Medium High	2	N/A	5
TRWD and DWU	Multiple	Trinity	0	0	Low	5	Low	5	Anderson, Henderson, Navarro, Ellis, Johnson, Tarrant	N/A	5	Low	5	N/A	5
NTMWD, TRWD, UTRWD, DWU and/or Irving	Multiple	Multiple	66,103	24,959	Medium	3	High	1	Franklin, Titus, and Red River Counties	17	2	Medium High	2	N/A	5
NTMWD, TRWD, UTRWD, DWU and/or Irving	Multiple	Multiple	14,372	11,009	Medium Low	4	Medium	3	Bowie, Red River, Delta, Fanin, Denton	23	3	Medium High	2	N/A	5
NTMWD	Multiple	Multiple	866	0	Low	5	Low	5	Fannin	12	5	Low	5	N/A	5
UTRWD	Multiple	Trinity	400	0	Medium Low	4	Low	5	Fannin	12	5	Low	5	N/A	5
DWU	Multiple	Trinity	1,914	0	Medium Low	4	Low	5	Grayson	20	4	Low	5	N/A	5
NTMWD	Multiple	Multiple	522	0	Medium Low	4	Low	5	Fannin	12	4	Low	5	N/A	5
NTMWD	Multiple	Multiple	0	0	Low	5	Low	5	Collin	12	4	Low	5	N/A	5
TRWD	Multiple	Trinity	4	0	N/A	5	Low	5	Tarrant	13	5	Low	5	N/A	5
NTMWD	Multiple	Multiple	1,462	0	N/A	5	Low	5	Henderson, Anderson	25	5	Low	5	N/A	5
DWU	Multiple	Trinity	1,010	0	N/A	5	Low	5	Cherokee County	22	5	Low	5	N/A	5
TRWD	Multiple	Trinity	422	0	N/A	5	Low	5	Freestone, Anderson	28	5	Low	5	N/A	5
TRWD	Multiple	Trinity	243	0	Low	5	Low	5	Henderson, Navarro	22	5	Low	5	N/A	5
NTMWD	Multiple	Multiple	1,234	0	Low	5	Low	5	Harrison, Upshur, Wood	29	5	Low	5	N/A	5
DWU	Multiple	Trinity	11,989	5,746	Medium	3	Medium	3	Cherokee	22	3	Medium High	2	N/A	5
DWU	Multiple	Trinity	1,629	0	Low	5	Low	5		28	5	Low	5	N/A	5
UTRWD	Multiple	Trinity	0	0	Medium	3	Low	5	Denton	11	5	Medium	3	N/A	5
TRWD	Multiple	Trinity	15,000	4,000	Medium	3	Medium	3	Freestone	21	4	Medium High	2	N/A	5
DWU	Multiple	Trinity	4,584	300	Medium	3	Medium Low	4	Ellis	14	5	Medium	3	N/A	5
NTMWD	Multiple	Multiple	391	0	Low	5	Low	5	Kaufman	16	4	Low	5	N/A	5
DWU	Multiple	Trinity	266	0	Low	5	Low	5	Cherokee	22	4	Low	5	N/A	5
DWU	Multiple	Trinity	3,286	20	Medium	3	Medium	3	Lamar, Fannin, Grayson	17	4	Medium	3	N/A	5

Table G.4 Environmental Matrix

Entity	County	Basin	Environmental Factors												
			Acres Impacted	Wetland Acres Impacted	Env. Water Needs	Env. Water Needs Score	Habitat[a]	Habitat Score	County Impacted	Threat and Endanger Species	Threat and Endanger Species Score	Cultural Resources	Cultural Resources Score	Bays & Estuaries	Bays & Estuaries Score
DWU and UTRWD	Multiple	Trinity	3,286	20	Medium	3	Medium	3	Lamar, Fannin, Grayson, Denton	19	4	Medium	3	N/A	5
DWU, NTMWD TRWD, and UTRWD	Multiple	Multiple	3,110	0	Medium Low	4	Low	5	Sabine, Shelby, Upshur, Hunt	24	4	Low	5	Medium	3
GTUA	Multiple	Red	180	0	Low	5	Low	5	Grayson, Cook, Denton, Collin	19	4	Low	5	N/A	5
GTUA	Multiple	Red	117	0	Low	5	Low	5	Grayson, Cook, Denton, Collin	19	4	Low	5	N/A	5
New Water Provider	Parker	Trinity	306	0	Low	5	Low	5	Parker	13	4	Low	5	N/A	5
New Water Provider	Parker	Brazos	144	0	Low	5	Low	5	Parker	13	4	Low	5	N/A	5
New Regional Water Provider	Wise	Trinity	136	0	Low	5	Low	5	Wise	11	4	Low	5	N/A	5
Irving	Dallas	Trinity	14	0	Medium	3	Low	5	Dallas	16	4	Low	5	N/A	5
Irving	Dallas	Trinity	52	0	Medium	3	Low	5	Dallas	16	4	Low	5	N/A	5
GTUA, DWU, UTRWD	Multiple	Multiple	0	0	Low	5	Low	5	Grayson, Cook, Denton, Collin	19	4	N/A	5	N/A	5
DWU	Multiple	Trinity	380	0	Medium	3	Low	5	Cherokee	22	4	Medium High	2	N/A	5
DWU, NTMWD	Multiple	Trinity	TBD	0	Medium	3	Low	5	Kaufman	16	5	Low	5	N/A	5
DWU	Multiple	Trinity	2523	0	Low	5	Low	5	Little River, Red River, Fannin	17	3	Low	5	N/A	5
DWU	Multiple	Trinity	3110	0	Medium Low	4	Low	5	Sabine, Shelby, Upshur, Hunt	24	4	Low	5	Medium	3
DWU	Multiple	Trinity	1524	0	Low	5	Low	5	Choctaw, Lamar, Grayson	17	4	Low	5	N/A	5
NTMWD	Multiple	Multiple	1,347	0	Low	5	Low	5	Dallas	16	4	Low	5	N/A	5
UTRWD	Multiple	Trinity	350	0	Low	5	Low	5		17[c]	4	Low	5	N/A	5
NTMWD	Multiple	Multiple	0	0	Low	5	Low	5	Hunt	16	5	N/A	5	N/A	5
NTMWD	Fannin	Multiple	34	0	Low	5	Low	5	Fannin	12	5	Low	5	N/A	5
TRWD	Multiple	Trinity	19	0	Medium	3	Low	5	Tarrant	13	5	Low	5	N/A	5
TRWD	Multiple	Trinity	0	0	Medium	3	Low	5	Navarro, Ellis, Johnson, Tarrant	20	5	N/A	5	N/A	5
TRWD	Multiple	Trinity	0	0	Medium	3	Low	5	Henderson, Navarro	22	5	N/A	5	N/A	5
TRA	Multiple	Trinity	0		Low	5	Low	5	Tarrant	13	5	N/A	5	N/A	5
Denton	Denton	Trinity	49	0	Medium	3	Low	5	Denton	13	5	Low	5	N/A	5
Varies	Varies	Varies	Varies	Varies	Low	5	Low	5	Varies	Varies	N/A	Low	5	N/A	5
Irving, Dallas	Dallas	Trinity	4584	300	Medium	3	Low	5	Ellis	14	4	Medium	3	N/A	5

G.2 General Water Management Strategy Technical Memorandums

G.2.1 Conservation

Potential Sponsor(s)	All Municipal, Irrigation, and Mining WUGs Considered
WMS/Project Type:	Conservation
Potential Supply Quantity[a]:	284,809 acre-feet/year Municipal 10,984 acre-feet/year Non-Municipal
Implementation Decade:	2030
Strategy Capital Cost:	Varies
Unit Water Cost ($/kgal)	Varies; See Table H.11A through Table H.12
Application:	Recommended

[a]Does not include passive savings associated with low flow plumbing fixtures, efficient residential clothes washer standards, and efficient residential dishwasher standards already included in the demand projections.

Strategy Description

More detailed information on this strategy can be found in **Appendix I**. This strategy is to proactively reduce water demands through water conservation efforts. In Region C this strategy was assessed for municipal, irrigation, and mining users. This strategy represents a compilation of actions that may include but are not limited to, public education and outreach, reducing water waste, conservation-oriented rate structures, enhanced water loss control programs, limiting of outdoor water use (both time-of-day and twice per week limits), adding a conservation coordinator, establishment of a landscape ordinance for new development, increasing efficiency of irrigation processes, and onsite reuse for mining customers.

Supply Development (Quantity, Reliability, Quality)

This strategy delays the need to develop other water supplies through demand reductions of users. High levels of conservation have already been achieved in Region C to date.

Water Quantity

The total demand reduction achieved through conservation savings in Region C is shown in **Table G.5**.

TABLE G.5 SUMMARY OF QUANTITIES (AC-FT/YR)

DESCRIPTION	2030	2040	2050	2060	2070	2080
Municipal Conservation	84,160	158,062	209,470	236,448	261,718	284,809
Non-Municipal Conservation	168	978	2,330	4,399	7,267	10,984
TOTAL CONSERVATION	***84,328***	***159,040***	***211,800***	***240,847***	***268,985***	***295,793***

[a]The conservation quantities shown above are associated with the Region C primary WUGs whose demand is located within the Region C area. Conservation quantities for non-Region C primary WUGs within the Region C area will be determined after other regions finalize their conservation estimates, potentially following the release of the Initially Prepared Plan (IPP).

Reliability

Since this strategy is a demand reduction the reliability is high.

Water Quality

This strategy equates to a reduction in need from other water management strategies and therefore has no associated water quality parameters.

Environmental Considerations

This strategy is expected to have no adverse environmental impacts. Rather, it is anticipated to positively impact the environment by delaying the need for other projects that potentially have more impacts.

Permitting and Development

Conservation does not require any permits and is generally accepted by the public. The TCEQ and TWDB requires specific water users to maintain a conservation plan.

Cost Analysis

Cost estimates were prepared for each individual WUGs conservation strategy. These cost estimates are contained in **Appendix H**.

Water Management Strategy Evaluation

Conservation was applied to all municipal water user groups, golf course irrigation water users, and mining customers with needs. Based on the analysis provided above, the conservation strategy was evaluated across different criteria for the purpose of quick comparison against alternative strategies that may be incorporated into the Regional Water Plan.

G.2.2 Increased Capacity at Existing Reservoirs (Dredging)

Potential Sponsor(s)	Various
WMS/Project Type:	Existing Surface Water (Dredging)
Potential Supply Quantity:	1,700 to 7,200 acre-feet per year
Implementation Decade:	Various
Strategy Capital Cost:	$1.3 billion to $2.7 billion for dredging
Unit Water Cost ($/kgal)	$128 to $138 per 1,000 gallons
Application:	Potentially Feasible for select Region C Reservoirs

Strategy Description

This strategy evaluates the options to increase water supply through increasing storage at local area lakes in the Metroplex. This increase in supply could be achieved through dredging existing lakes up to the original permitted capacity.

Over time reservoirs can lose storage capacity due to sediment accumulation. This reduction in storage can affect the reliable supplies from these sources. In Region C, the reliable supplies of existing reservoirs are shown to decrease approximately 6 percent over the 50-year planning horizon.

To regain potential loss of supply, there have been suggestions from the public to dredge the lakes. Dredging of lakes has been done for a few local reservoirs, such as White Rock Lake and Lake Worth, for recreational and water quality purposes. There has not been a wholesale dredging project conducted on a large major reservoir for water supply purposes. This is likely for multiple reasons, including ownership of the lake, cost, challenges with disposal, and limited gains in water supply.

There are 9 large lakes In the Metroplex area that are used for water supply: Bridgeport, Eagle Mountain, Benbrook, Grapevine, Lewisville, Ray Roberts, Lavon, Ray Hubbard, Joe Pool. Of these lakes, Benbrook, Grapevine, Lewisville, Ray Roberts, Joe Pool and Lavon are operated by the USACE for flood control with contracts for water supply. Each of these lakes has a sediment pool to account for sediment accumulation and would not be amenable to increasing water supply conservation through dredging. Therefore, these lakes were not considered for dredging.

Bridgeport and Eagle Mountain Lake are owned and operated by TRWD and Ray Hubbard is owned and operated by DWU. Any dredging project of these lakes would be a substantial effort. The potential to regain lost storage capacity is shown on **Table G.6**. It was assumed that 75% of the lost capacity could be regained through dredging. The volume of sediment is based on the most recent sediment survey of the lakes.

TABLE G.6 POTENTIAL FOR INCREASE IN STORAGE CAPACITY (ACRE-FEET)

RESERVOIR	ACCUMULATED SEDIMENT[A]	REGAINED CAPACITY
Bridgeport	25,019	18,764
Eagle Mountain	15,861	11,896
Ray Hubbard	33,085	24,814

[a]Accumulated sediment volumes are from the latest TWDB sediment survey (see references)

One of the biggest challenges to dredging large quantities of sediment is the disposal of the removed materials. For purposes of this analysis, it was assumed that a suitable site could be found in the vicinity of the lake. If no site is available and materials must be trucked to an offsite location, the costs would increase significantly.

Supply Development (Quantity, Reliability, Quality)

Water supply quantities were determined using the TCEQ Trinity River WAM for Region C. It was assumed that any increase in available supply would be associated with the existing water rights for the respective lake.

Water Quantity

The water quantities in **Table G.7** represent the increased supply associated with the increased storage.

TABLE G.7 SUMMARY OF QUANTITIES (AC-FT/YR)

RESERVOIR	DREDGING
Bridgeport	2,500
Eagle Mountain	1,700
Ray Hubbard	3,360

Reliability

The reliability of increased supplies associated with dredging would be the same as the permitted water. Water rights with more senior priority would be highly reliable. However, a new drought of record could impact supplies.

Water Quality

The quality of the water is expected to be similar to existing quality of the reservoir or slightly improved as additional fresh water becomes available. However, dredging operations may increase turbidity and suspended solids in the lake. This is expected to be temporary.

Environmental Considerations

For dredging scenarios, there are concerns about the disposal of the dredged materials and potential impingement of aquatic species through the operations. Care would be taken to limit impingement. The dredged material would need to be tested to ensure that the materials can be land placed. If elevated constituents (such as heavy metals, organics, etc.) are identified, the material would need to be disposed an appropriate classified disposal facility. This would significantly increase the costs for dredging.

Permitting and Development

Dredging would require a Section 404 permit and a DPES permit for the discharged materials. It is assumed that no changes to the existing water rights are needed. One of the biggest development obstacles is the location and quantity of the discharged materials.

Cost Analysis

Capital costs were based on previous projects and dredging costs. However, the scale of these projects is quite different, and the technical challenges associated with the much larger quantities may affect the assumed unit costs, which could increase or slightly decrease. Whether these costs change slightly, the project would be very expensive for the additional quantity of water developed. Costs associated with general dredging projects include bathymetric survey, sediment testing, dredging, and disposal. While the unit cost after debt service is shown as zero, it is likely that the sponsor would need to dredge the lake again in 20 to 40 years to maintain the gain in water supply.

TABLE G.8 SUMMARY OF GENERAL DREDGING COSTS

ENTITY	CAPITAL COST	UNIT COST ($/1,000 GAL)	
		WITH DEBT SERVICE	AFTER DEBT SERVICE
Bridgeport	$2,065,275,000	$137.82	--
Eagle Mountain	$1,309,461,000	$128.51	--
Ray Hubbard	$2,731,484,000	$135.63	--

Water Management Strategy Evaluation

Dredging a large major reservoir is a massive technical and financial undertaking with only small gains in water supply. For a lake like Ray Hubbard that is 21,000 acres, the technology and cost to build the infrastructure needed to discharge the dredged materials to the shore is unprecedented. Also, the quantity of dredged materials would cover nearly 4,000 acres at a depth of 10 feet. Land application at lower depths (<10 feet) would require additional acreage. If the material needs to be disposed of as Special Waste, the costs will increase significantly.

Increasing the storage capacity of area lakes is not a practical or economically feasible strategy.

Water User Group Application

This strategy was considered for owners and sponsors of area lakes in the Metroplex.

G.2.3 Additional Groundwater and New Wells

Potential Sponsor(s)	Multiple
WMS/Project Type:	New Groundwater Source
Potential Supply Quantity:	Varies
Implementation Decade:	Varies
Strategy Capital Cost:	Varies, Total Cost of all Well WMSs: $109,654,000
Unit Water Cost ($/kgal)	Varies; See Table H.14
Application:	Varies

Strategy Description

This strategy is to develop groundwater through the drilling of a new well(s). It also includes the construction of all associated transmission and treatment that may be required.

Supply Development (Quantity, Reliability, Quality)

This strategy was developed in accordance with Modeled Available Groundwater (MAG) values for the appropriate aquifer and county. As such, it is considered to be reliable supply that will not compromise the Desired Future Conditions (DFCs) as established by the Groundwater Management Area (GMA).

Environmental Considerations

The right of way for the wells and transmission lines may temporarily affect the environment during construction. Additional study and mitigation may be required before construction of the well and transmission pipeline. It may be possible to route the pipeline to avoid environmentally sensitive areas.

Additionally, the right of way for the transmission lines may temporarily affect a small amount of agricultural acreage during construction. To the extent that this strategy is recommended for a rural user, the increased water supply may enhance the vitality of the community.

Permitting and Development

All recommended groundwater strategies comply within the Modeled Available Groundwater (MAG) values for their respective counties and aquifers. As such, these strategies should have no adverse effects on the Desired Future Conditions of the aquifers.

Cost Analysis

Cost estimates were prepared for each individual groundwater strategy. These cost estimates are contained in **Appendix H**.

Water Management Strategy Evaluation

Based on the analysis provided above, the Additional Groundwater and New Wells strategy was evaluated across different criteria for the purpose of quick comparison against alternative strategies that may be incorporated into the Regional Water Plan. The evaluation results can be found in **Table G.3** and **Table G.4.**

Water User Group Application

The Additional Groundwater and New Wells strategy was evaluated on the 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 suitability of the strategy to the WUGs served.

G.2.4 Increase Delivery Infrastructure

Potential Sponsor(s):	Multiple
WMS/Project Type:	Various
Potential Supply Quantity:	0 acre-feet per year This strategy does not create new supply but is essential for transporting supplies to end users.
Implementation Decade:	Multiple
Strategy Capital Cost:	Varies
Unit Water Cost ($/kgal):	Varies
Application:	Varies

Strategy Description

This strategy is to develop new transmission facilities or increase the size of existing water supply transmission pipelines and pump stations. In many cases this represents the connection of an entity to a wholesale provider or the expansion of an existing transmission system. In other cases, the transmission supply is to connect existing supplies to the end users. This strategy may also include some infrastructure needed to take delivery of water from another provider such as ground storage.

Several regional systems fit into this category of Infrastructure development. The Parker County Regional System, Wise County Regional System, and GTUA Regional System are discussed separately in **Section G.8**. Two other regional systems are discussed here. One is the Fannin County Water Supply Project. For this project, NTWMD will cooperate with Fannin County entities to develop a treated water supply system for Fannin County water users by 2040. This project will include over 70 miles of pipelines (8" to 24" pipelines) and associated pump stations to deliver water to up to six WUGs, with delivery of over 3,900 acre-feet per year by 2080.

The other regional system is GTUA's Collin-Grayson Municipal Alliance (CGMA) Water System. This system serves Anna, Melissa, Howe and Van Alstyne. Currently GTUA purchases treated water from NTWMD and delivers this water to four WUGs in southern Grayson and northern Collin Counties. GTUA plans to expand this system in the future by paralleling existing pipelines and coordinating with NTMWD for treatment.

Supply Development (Quantity, Reliability, Quality)

While this strategy does not create supply, it is vital to making existing and future supplies usable to those with needs. This transmission infrastructure enables the entity to receive the water.

Environmental Considerations

The right of way for the transmission lines may temporarily affect the environment during construction. Additional study and mitigation may be required before construction of the transmission pipeline. The pipeline may be able to be routed to avoid environmentally sensitive areas.

Additionally, the right of way for the transmission line may temporarily affect a small amount of agricultural acreage during construction. To the extent that this strategy is recommended for a rural user, the increased water supply may enhance the vitality of the community.

Permitting and Development

Construction of the pipeline can likely be done under a nationwide permit. If the pipeline is part of another larger supply development strategy, there may be additional permitting requirements. Those requirements are considered with the appropriate larger supply development strategy.

Cost Analysis

Cost estimates were prepared for each individual water management strategy. These cost estimates are contained in **Appendix H.**

Water Management Strategy Evaluation

Based on the analysis provided above, the Increase Delivery Infrastructure strategy was evaluated across different criteria for the purpose of quick comparison against alternative strategies that may be incorporated into the Regional Water Plan. The evaluation results can be found in **Table G.3** and **Table G.4**.

Water User Group Application

The Increase Delivery Infrastructure strategy was evaluated on the basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the current capacity of delivery infrastructure and the ultimate needed capacity of delivery infrastructure.

G.2.5 Reuse

Potential Sponsor(s)	Multiple
WMS/Project Type:	Reuse
Potential Supply Quantity:	Varies
Implementation Decade:	Varies
Strategy Capital Cost:	Varies
Unit Water Cost ($/kgal)	Varies
Application:	Varies

Strategy Description

This strategy is to develop projects that reuse treated wastewater effluent, either directly or indirectly. It includes the construction of all associated transmission that may be required. Recommended reuse projects are summarized in **Chapter 5B,** specifically **Table 5B.8**. Further descriptions of large individual reuse projects are in **Chapter 5C**. Several large reuse projects sponsored by a Major Water Provider (MWP) are discussed in this appendix under the respective section for the MWP. Recommended reuse projects also are included in **Chapter 5D** and **Chapter 5E,** organized by project sponsor.

Supply Development (Quantity, Reliability, Quality)

The supply amounts for this strategy were developed based on estimates of water use and related return flows from specific wastewater treatment plants. Where applicable, consideration was given for specific minimum by-pass flow requirements if required by water rights. For Direct Potable Reuse projects, it was assumed that 30% of the supply would be lost as reject water during the treatment process. There are no losses associated with Direct Non-Potable Reuse or Indirect Reuse.

Environmental Considerations

Direct reuse projects will reduce the volume of treated wastewater effluent that is returned to natural waterways. The right of way for transmission lines may temporarily affect the environment during construction, for which there would be mitigation. Additional studies and mitigation may be required before the construction of transmission pipelines. Pipelines may be able to be routed to avoid environmentally sensitive areas.

Indirect reuse projects may reduce the volume of flow in natural waterways in certain areas, but only to the extent that they remove flows returned by upstream wastewater treatment plants. Much of the indirect reuse is from new water developed from outside of the receiving basin, such that there is minimal to no impact on the receiving basin. No naturalized stream flow (naturally occurring runoff from precipitation) will be removed from waterways as part of any reuse projects. It should be noted that some return flow water rights dictate the allowable use of return flow and minimum by-pass requirements in order to protect the environment.

Additionally, the right of way for any transmission lines may temporarily affect a small amount of agricultural acreage during construction.

Permitting and Development

All recommended indirect reuse strategies that are currently permitted have been structured to comply with the terms of the associated water right. All recommended reuse strategies (both direct and indirect) that are not currently permitted are anticipated to apply for and obtain any necessary permits from TCEQ including but not limited to reuse water right permits and Section 210 permits.

Cost Analysis

Cost estimates were prepared for each reuse strategy except for the Athens Fish Hatchery (see below). These cost estimates are contained in **Appendix H**.

Athens Fish Hatchery – The Texas Freshwater Fisheries Center in Athens ("Fish Hatchery") has a contract with Athens MWA for 3,023 acre-feet per year from Lake Athens. After using the water in its facility, the Fish Hatchery discharges almost all of that water back into Lake Athens. Athens MWA has an agreement that allows them to use this return flow. Since Athens MWA already has existing pumping and treatment facilities on the lake, there are no additional facilities needed and thus no capital costs.

Water Management Strategy Evaluation

Based on the analysis provided above, the Reuse strategy was evaluated across different criteria for the purpose of comparison against alternative strategies that may be incorporated into the Regional Water Plan. The evaluation results can be found in **Table G.3** and **Table G.4.**

Water User Group Application

The reuse strategy was evaluated on 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 suitability of the strategy to the WUGs served.

G.2.6 Aquifer Storage and Recovery

Potential Sponsor(s):	Multiple
WMS/Project Type:	Aquifer Storage and Recovery
Potential Supply Quantity:	50,000 acre-feet per year
Implementation Decade:	Varies
Strategy Capital Cost:	$4,603,318,000
Unit Water Cost ($/kgal):	$22.08 during Debt Service; $6.72 after Debt Service
Application:	Potentially Feasible

Strategy Description

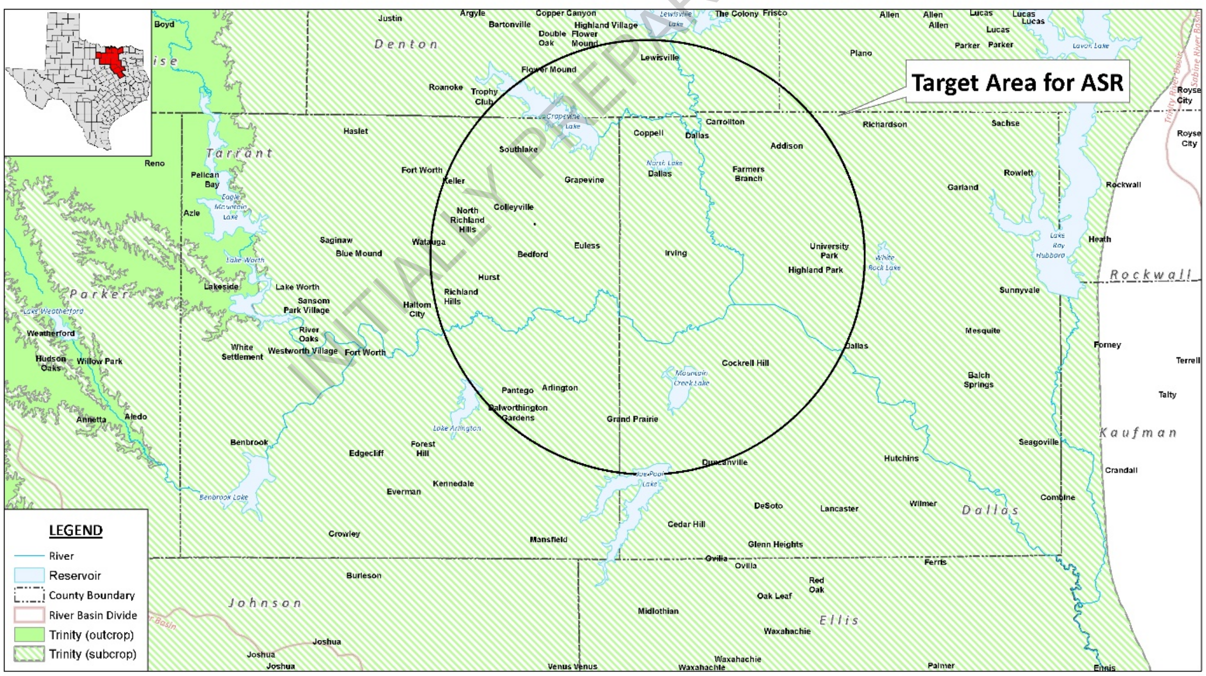
Aquifer Storage and Recovery (ASR) is a water management solution that allows for storing surplus water in local aquifers during periods of high or surplus surface flows and withdrawing the stored water later during periods of drought or peak demands. It also can be used to temporarily store treated brackish groundwater or treated wastewater for use during high demand periods. ASR can provide a cost-effective and reliable alternative to the construction of above-ground storage reservoirs; however, identifying and securing suitable aquifer formations for storage and the geochemical evaluation of the mixed waters can be challenging. ASR in Texas is currently being studied to assess if it is a reliable and cost-effective technology that should be considered as part of a diversified portfolio of water supply options. Current regulatory framework allows recharge of either fully treated or partially treated surface water, provided that recharge of the surface water is not degrading the native groundwater quality any further. The most desirable feature of the ASR as a water management strategy is its scalability. It can be developed as a region-wide strategy to serve as an alternative drought-resilient long-term WMS for multiple major water providers. It can also be developed as an entity-specific strategy to meet short-term peak demands. The WMS discussed in this technical memorandum is a region-wide strategy that benefits multiple major water providers in Region C.

In Region C, the most likely application of ASR would be to store surplus surface water when lakes are full and spilling, store reuse water, increase operational flexibility of multiple sources, and serve as a short-term source to meet peak demands. ASR could reduce evaporative losses, store water that otherwise would have spilled downstream, maximize use of water rights, and possibly delay infrastructure improvements that would be needed to meet peak demands.

To fully evaluate an ASR strategy, detailed hydrogeological studies are needed to identify an appropriate receiving formation and size the infrastructure of the recharge system. Owing to that, there are fewer hydrogeological studies defining the aquifer characteristics of the Trinity Aquifer (the primary aquifer for potential ASR operations). There are a couple of studies that were recently conducted to define the storage and migration potential of the Trinity aquifer and some regional water providers are currently in the process of confirming the information from the hydrogeological models by means of a pilot study. For these reasons, a generic ASR strategy for 50,000 acre-feet per year was developed for the purpose of this study. Based on the available literature, this strategy assumes that an appropriate receiving site can be identified in the Trinity Aquifer within 50 miles of the major water providers. The depth of this formation is about 2,000 feet below ground surface and the migration potential is minimal to retain the stored water bubble. Since much of the shallow overlying formations in the metroplex area consist of clays and less permeable soils, it is assumed that recharge wells would be used rather than an infiltration basin. It is also assumed that there is existing infrastructure capacity to move water to within 50 miles of the ASR site. Additional infrastructure would be needed to move the water to the recharge site. For this strategy, it is assumed that the recharge wells will double as recovery wells.

In general, an ASR system in Region C would consist of a combination of the following infrastructure elements:

- Pump station, with ground storage, and transmission pipelines to move the water 50 miles from existing infrastructure to the ASR site
- Water Treatment Plant (in Texas it is required to treat source water to the same level as the groundwater formation prior to injecting it underground)
- Wellfield facilities (recharge / recovery wells) and wellfield piping
- Transmission system from the ASR site to the end location (the transmission system could connect directly to a treatment plant for further treatment or to a distribution system if the water quality meets drinking water standards. For this generic strategy, the transmission pipeline is assumed to be 50 miles long.)



Supply Development (Quantity, Reliability, Quality)

Water Quantity

It is assumed that the source of water for this strategy would be excess surface water or reuse water from water rights owned by NTMWD, DWU, TRWD, TRA or UTRWD. The project is sized to store and use 50,000 acre-feet per year. Water would be pumped directly to the ASR site from existing raw water transmission systems. At the ASR site, the water is treated to the same level or better than the receiving formation groundwater. (Note: there could be scenarios where the water is pretreated at an existing water treatment facility and then diverted to the ASR site. However, this generic strategy assumes that the raw water is treated on site at the ASR facility.) The water is then recharged into the receiving formation through 49 recharge wells. It is assumed that these facilities are sized to transport and recharge the 50,000 acre-feet per year over a 6-month period, with a peaking factor of 2. This provides the peak capacity to recover and utilize excess flows over a short period and then have access to the water during peak demand periods. The assumed maximum recharge capacity for each recharge well is 1,500 gpm. A 102-in diameter transmission pipeline would be required to convey raw water to an on-site 180 MGD water treatment plant. In Texas, it is required to treat source water to the same level as the groundwater formation prior to injecting it underground.

Reliability

Successful ASR development is highly reliable. It is normally possible to achieve 90-95% recovery efficiency. Challenges to reliability include natural groundwater flow away from the ASR site and the associated drift of the storage bubble, thus reducing available supplies. Flat hydraulic gradients are not typical in Texas, especially in shallow aquifers. This migration of stored water is an important consideration in determining the reliability and viability of an ASR project. Also, since withdrawal of groundwater is a property right, competition with other nearby users could reduce the reliability of this water. One way to address the issue of other competing wells is to own the property rights over the storage bubble but that will drive up the strategy costs. If the water is recharged and recovered over a relatively short period (e.g., one year), the likelihood of reduced reliability is low. However, short-term ASR operations are highly dependent on the local aquifer hydrogeological features and that may impact reliability as well.

Water Quality

Because of the guidelines stipulated in the ASR regulations for Texas, the quality of the recharge water would be the same as the receiving aquifer, which is generally good. The recovered ASR water would be treated to standards required by the end use unless the native groundwater quality is equivalent to the potable water quality. When recharge water is treated to meet drinking water standards prior to storage, the recovered water will only need simple re-disinfection prior to being distributed to end-users.

Environmental Considerations

Environmental impacts are expected to be low. The footprint of an ASR project may be significantly smaller than a surface reservoir project of similar storage capacity and eliminates the need to inundate large areas of land. The transmission system and the ASR facilities can be designed to avoid environmentally sensitive areas. As previously mentioned, the recharge water must be of equal or better quality than the native groundwater in the receiving aquifer.

The challenge will be to locate the facilities (transmission, treatment, and wellfield) in areas that are increasingly urban.

Permitting and Development

There is much support for developing ASR projects in Texas, but the principal challenge for development is identifying appropriate receiving formations and aquifer zones that are near areas of water sources and demand. The Texas Legislature has enacted legislation to remove some of the legal and regulatory frameworks that have previously impeded application of this technology. This legislation now allows the water quality of the recharge water to be at the same level or higher as the receiving formation (versus drinking water standards) and permits the recovery of the same amount of recharge water under the new ASR regulations. However, there remains concerns about protection of the water once it is recharged for storage. Since groundwater is considered a property right, stored ASR water can become subject to competition for use by other property owners, especially if the natural flow is not restricted.

Recharge wells for ASR projects are regulated by TCEQ's Underground Injection Control (UIC) program and are classified as Class V Injection Wells. Thus, they must be permitted pursuant to Chapter 27, Texas Code, and Chapter 331, Title 30 of the Texas Administrative Code.

An ASR project may require groundwater permits from GCDs. The Northern Trinity GCD (Tarrant County) does not require permits for wells that are used solely for ASR. If a withdrawal well also extracts native groundwater, a permit is required. There are groundwater districts in Tarrant, Collin, Denton, Johnson and Ellis Counties. There are no groundwater districts in Dallas County.

Cost Analysis

For the Region C cost analysis, planning level opinions of costs for this strategy have been developed using the TWDB's costing tool. In accordance with TWDB Guidance, the analysis of costs for WMSs includes capital costs, debt service, and annual operating and maintenance expenses over the planning horizon. This strategy assumes that there are no purchased water costs, and water already developed by a sponsor is the source for the ASR project.

There may be opportunities to reduce cost associated with treatment facilities, but for a large-scale ASR project it is unlikely that there are sufficient capacities at existing facilities to treat these quantities.

TABLE G.9 SUMMARY OF COSTS

ENTITY	CAPITAL COST	UNIT COST ($/1,000 GAL)	
		WITH DEBT SERVICE	AFTER DEBT SERVICE
Region C WWP	$4,603,318,000	$22.08	$6.72

Water Management Strategy Evaluation

Based on the analysis provided above, the Aquifer Storage and Recovery strategy was evaluated across different criteria for the purpose of quick comparison against alternative strategies that may be incorporated into the Regional Water Plan. The evaluation results can be found in **Table G.3 and Table G.4.**

The table below summarizes the main advantages and disadvantages of ASR projects.

TABLE G.10 ADVANTAGES AND DISADVANTAGES OF ASR PROJECTS

ADVANTAGES	DISADVANTAGES
Conservation of water through reduced evaporation, capture of spills, and excess flows	Suitable ASR sites may not be located at a reasonable distance from demand centers
High recovery efficiency (could reach 90-95%)	Potential for water losses due to hydraulic gradients
Eliminates the need for inundating large areas of land for storage	Technical uncertainties for a large-scale ASR project. Technical operation of the system poses challenges to infrastructure that may not be used regularly.
No storage loss due to sedimentation	Lack of clarity in the regulatory processes
Minimal environmental impacts	Significant capital investment for a 50,000

Water User Group Application

This strategy is a considered strategy for water providers in Region C with a need. It is not a recommended strategy. Specific ASR strategies are considered for individual water users.

G.2.7 Small Aquifer Storage and Recovery

Potential Sponsor(s):	Wholesale Water Providers
WMS/Project Type:	Aquifer Storage and Recovery
Potential Supply Quantity:	2,500 acre-feet per year during drought
Implementation Decade:	Varies
Strategy Capital Cost:	$ 11,232,000
Unit Water Cost ($/kgal):	$1.32 during Debt Service; $0.57 after Debt Service
Application:	Potentially Feasible

Strategy Description

Aquifer Storage and Recovery (ASR) is a water management solution that allows for storing surplus water in local aquifers during periods of excess surface water availability and withdrawing the stored water later during periods of drought or peak demands. Region C evaluated a large-scale generic ASR project to provide water each year to meet growing demands. This strategy was determined to be economically infeasible and uncertain from a technical perspective. However, a small-scale ASR project that is used to help meet peak demands during drought conditions may be feasible and is highly dependent on local hydrogeology.

Conceptually, the small-scale ASR project would treat excess surface water or reuse water at an existing water treatment plant. The water is treated to a level that will not degrade receiving formation groundwater. The treated water would then be stored in a local aquifer within one mile of the water treatment plant during low demand months and normal to wet years. This concept recognizes that during summer months and periods of drought, the ability to store water may be limited. Therefore, this project would likely be operated as part of a system that stores water during wet periods and uses stored water during dry periods. During recovery, the water would be retrieved and pumped to the water treatment plant for subsequent treatment and distribution.

A small-scale ASR system would consist of a combination of the following infrastructure elements:

- Wellfield facilities (3 recharge / recovery wells) and wellfield piping. Wells are approximately 1,000 feet below the ground surface, depending on local hydrogeology. The Trinity aquifer depth ranges from 130 to 1,500 ft thick.
- Transmission infrastructure to move the water between the treatment plant and the wellfield.

It is assumed that there is sufficient capacity of existing infrastructure to move the raw water to the treatment plant and to treat this supply. The Trinity aquifer, which is primarily composed of sand, gravels, sandstone, and limestone with some faults and fractures, has the potential for successful ASR. The suitability score of the Trinity aquifer for ASR is 0.69 overall, and the Trinity aquifer is ranked in the top four of the nine major aquifers examined for the TWDB.

Supply Development (Quantity, Reliability, Quality)

Water Quantity

The quantity of water is contingent upon the excess treatment capacity at the water treatment plant, available excess surface water and/or reuse supplies, and the ability of the local aquifer to accept the stored water. Each of these factors will be unique to the sponsor and selected ASR site. For purposes of this generic analysis, it is assumed that the water would be stored in the subcrop, confined portion of the lower layer of the Trinity Aquifer. Maximum recharge/recovery rates are assumed to be 600 gallons per minute, and a minimum of five wells would be installed. Based on these assumptions, a small-scale ASR project would store up to 5,000 acre-feet over a three-year period and recover this amount over a two-year period.

Based on these assumptions, the project would supply up to 2,500 acre-feet per year during a recovery year (up to four years each decade). This requires a minimum of two to three years of storage before water could be retrieved, during which additional treatment capacity could be utilized to generate excess treated water to be stored in cold-weather (low-irrigation) months. After this period, stored supply would aid during high-demand months and to meet increased demand, with storage occurring approximately 6 months out of the year and recovery on a monthly basis. The amount of retrievable water would be determined on a case-by-case basis.

Reliability

Successful ASR development is highly reliable. It is normally possible to achieve 90-95% recovery efficiency. Challenges to reliability include natural groundwater flow away from the ASR site and the associated drift of the storage bubble, thus reducing available supplies. This migration of stored water is an important consideration in determining the reliability and viability of an ASR project, and for this reason confined aquifer locations are preferred. The potential for migration increases as residence time in the aquifer increases. Also, since withdrawal of groundwater is a property right, competition with other nearby users could reduce the reliability of this water. One way to address the issue of other competing wells is to own the property rights over the storage bubble, which would increase strategy costs.

Water Quality

Because of the guidelines stipulated in the ASR regulations for Texas, the quality of the recharge water must not degrade the quality of the receiving aquifer, which is generally good. The recovered ASR water would be treated to standards required by the end use unless the native groundwater quality is equivalent to the potable water quality. When recharge water is treated to meet drinking water standards prior to storage, the recovered water may only need simple re-disinfection prior to being distributed to end-users.

Treatment to deoxygenate water prior to storage is required in addition to meeting turbidity and drinking water standards to prevent mobilization of arsenic and other constituents of concern from pyrite. Additionally, chlorine and ammonia removal are necessary to prevent formation of trihalomethanes (THMs) in the stored supply resulting from disinfection byproducts (DBPs).

Environmental Considerations

Environmental impacts are expected to be low. The footprint of an ASR project may be significantly smaller than a surface reservoir project of similar storage capacity and eliminates the need to inundate large areas of land. The transmission system and the ASR facilities can be designed to avoid environmentally sensitive areas. As previously mentioned, the recharge water must not degrade the quality of the groundwater in the receiving aquifer.

The challenge will be to locate the facilities (transmission, treatment, and wellfield) in areas that are increasingly urban.

Permitting and Development

There is much support for developing ASR projects in Texas, but the principal challenge for development is identifying appropriate receiving formations and aquifer zones that are near areas of water sources and demand. The Texas Legislature has enacted legislation to remove some of the legal and regulatory obstacles that have previously impeded application of this technology. This legislation now allows the water quality of the recharge water to be such that it does not degrade the quality of water in the formation (versus drinking water standards) and permits the recovery of nearly the same amount of recharge water under the new ASR regulations. However, there remains concerns about protection of the water once it is recharged for storage. Since groundwater is considered a property right, stored ASR water can become subject to competition for use by other property owners, especially if the natural flow is not restricted. While the TCEQ does not limit the size of an ASR project, any water recovered beyond the recoverable water percentage may be subject to GCD rules and an ASR project may be required to follow GCD reporting requirements.

Recharge wells for ASR projects are regulated by TCEQ’s Underground Injection Control (UIC) program and are classified as Class V Injection Wells. Thus, they must be permitted pursuant to Chapter 27, Texas Code, and Chapter 331, Title 30 of the Texas Administrative Code.

An ASR project may require groundwater permits from GCDs. Some GCDs do not require permits for wells that are used solely for ASR. If a withdrawal well also extracts native groundwater, a permit is required.

Cost Analysis

For the Region C cost analysis, planning level opinions of costs for this strategy have been developed using the TWDB’s costing tool. In accordance with TWDB Guidance, the analysis of costs for WMSs includes capital costs, debt service, and annual operating and maintenance expenses over the planning horizon. This strategy assumes no water treatment costs, no purchased water costs, and water already developed by a sponsor is the source for the ASR project.

TABLE G.11 SUMMARY OF COSTS

ENTITY	CAPITAL COST	UNIT COST ($/1,000 GAL)	
		WITH DEBT SERVICE	AFTER DEBT SERVICE
Region C WWP	$11,232,000	$1.32	$0.57

Water Management Strategy Evaluation

ASR provides a drought resiliency strategy that has considerable potential for users with sources of excess water. Depending upon the storage formation, the recovery efficiency could be as high as 90 to 95 percent. This recovery efficiency in part depends on TDS in the receiving aquifer, as higher TDS relates to lower recovery efficiency and recoverability. Care must be taken to limit losses due to the natural movement of groundwater and competition from adjacent landowners. For multi-year droughts, this strategy may not provide supplies in some years.

Further study is needed to address technical uncertainties. Technical operation of the system may pose challenges to infrastructure that may not be used regularly.

Water User Group Application

This 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 suitability of the strategy to the WUGs served.

This strategy is a considered strategy for wholesale providers with potential surplus supplies during non-drought periods. A table showing the water providers and quantities from ASR is shown below (**Table G.12**).

TABLE G.12 ASR PROJECTS FOR WWPS AND WUGS

ENTITY	COUNTY	AQUIFER	SOURCE	QUANTITY (AC-FT/YR)
Recommended WMS				
TRWD[1]	Tarrant	Trinity	TRWD System	5,000
Denton	Denton	Trinity	Lewisville/Ray Roberts	5,000
Alternative WMS				
NTMWD	Collin	Trinity	Multiple sources	2,500
UTRWD	Denton	Trinity	Multiples sources	2,500
New Provider	Parker	Trinity/ Cross Timbers	TRWD System	2,500

1. A separate technical memorandum and cost was prepared for this project.

G.2.8 Water Treatment Plants

Potential Sponsor(s)	Multiple
WMS/Project Type:	Water Treatment Plants
Potential Supply Quantity:	0 ac-ft/yr. This strategy does not create new supply, but it is necessary to utilize the supplies created by other strategies.
Implementation Decade:	Varies
Strategy Capital Cost:	Varies
Unit Water Cost ($/kgal)	Varies; See Tables H.12 and H.13
Application:	Varies

Strategy Description

This strategy is to develop required water treatment capacity to use raw water supplies developed as part of other strategies. In some cases, this strategy involves the construction of a new facility and in other instances it is an expansion of existing facilities.

For plant expansions, the cost estimates assume there is existing land available at the site for the expansion. The costs also assume there is existing piping such that the expansion would only require addition of basic infrastructure like treatment trains. For that reason, it was assumed that if the expansion capacity of a treatment plant was more than 50% of the existing water treatment plant capacity, there would not be existing land, piping, and other items that are assumed to be available in the costing of an expansion. Therefore, those expansions were costed as new water treatment plants.

Supply Development (Quantity, Reliability, Quality)

This strategy is to develop required water treatment capacity to use raw water supplies developed as part of other strategies. While this strategy does not explicitly create supply, it is necessary to utilize the supplies as drinking water.

Environmental Considerations

The construction of the treatment plant may temporarily impact the environment during construction. Additional study and mitigation may be required before construction of the water treatment plant. In most cases, water treatment plants can be located to avoid environmentally sensitive areas.

Permitting and Development

Wastewater discharge permits may be necessary for new facilities. Further evaluation and study will be needed to determine the impact of discharges on receiving water bodies. This will be performed as part of the permitting process.

Cost Analysis

Cost estimates were prepared using the TWDB Costing Tool. It was assumed that if the expansion capacity of a treatment plant was more than 50% of the existing water treatment plant capacity, there would not be existing land, piping, and other items that are assumed to be available in the costing of an expansion. Therefore, those expansions were costed as new water treatment plants. Also, if the capacity of a plant expansion was very large (example, Fort Worth 50 MGD expansion), this plant was costed as a new water treatment plant. **Tables H.12** and **H.13** summarize the costs.

Water Management Strategy Evaluation

Based on the analysis provided above, the Water Treatment Plants strategy was evaluated across different criteria for the purpose of quick comparison against alternative strategies that may be incorporated into the Regional Water Plan. The evaluation results can be found in **Table G.3 and Table G.4.**

Water User Group Application

This 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 suitability of the strategy to the WUGs served.

This strategy is a recommended strategy for wholesale providers and water users with raw water sources and not enough treatment capacity.

G.2.9 Gulf of Mexico Desalination

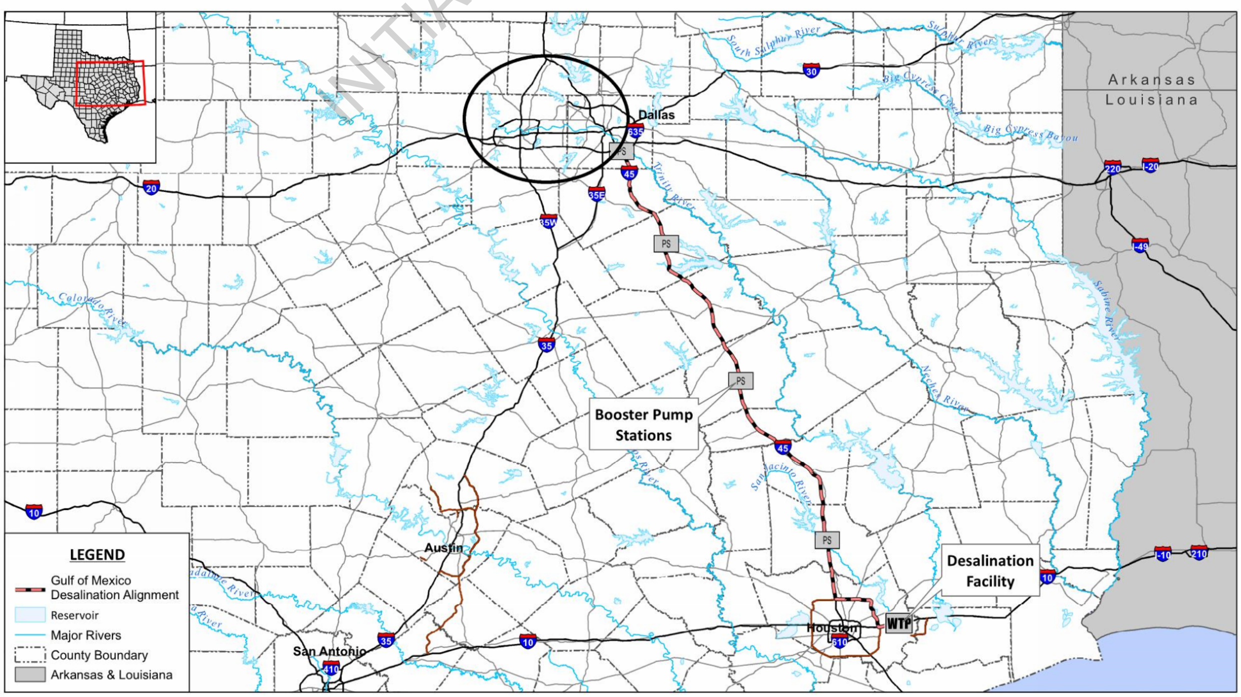
Potential Sponsor(s):	Metroplex Water Provider
WMS/Project Type:	New Surface Water (Desalination)
Potential Supply Quantity:	200,000 acre-feet per year
Implementation Decade:	N/A
Strategy Capital Cost:	$15,157,402,000
Unit Water Cost ($/kgal):	$21.24 during Debt Service; $8.60 after Debt Service
Application:	Potentially Feasible

Strategy Description

The cost of desalination has been decreasing in recent years, and some municipalities in Florida and California have developed desalinated seawater as a supply source. The State of Texas has recently permitted a seawater desalination project, and this is seen as a potential future supply source for the state. While Region C is not a coastal region, seawater desalination has been mentioned through public input during the planning process, and a generic strategy was evaluated in response to that input.

This strategy assumes seawater would be taken from the Gulf of Mexico near Baytown, Texas, and desalinated near the diversion location as shown. The treated water would be transported to the Metroplex generally following the I-45 corridor.

For planning purposes, it is assumed that the initial strategy would deliver 200,000 acre-feet per year by means of one 132-inch pipeline (alternatively, could use two parallel pipelines) and multiple booster pump stations. The water would be desalinated by reverse osmosis and the reject stream from the treatment process would be discharged back to the Gulf of Mexico. This would likely be developed as a joint strategy with multiple providers.



Supply Development (Quantity, Reliability, Quality)

Water Quantity

The quantity of water available from the Gulf of Mexico is relatively unlimited. For this strategy it is assumed that 200,000 acre-feet per year of treated water would be delivered to the Metroplex. Since all of the water would require desalination, the amount of source water would need to be 400,000 acre-feet per year and 200,000 acre-feet per year would be discharged as waste.

Reliability

The availability of the water from the Gulf of Mexico is high; however, due to the long transmission of the water to the Metroplex, the reliability of the transmission system may be moderate.

Water Quality

The treated water quality should be good. However, maintaining and operating a very large desalination plant is challenging and maintaining the treated quality will require highly skilled operators. Changes in the water quality of the source water can affect the operations and treated water quality.

Environmental Considerations

There are several environmental considerations associated with desalinating large quantities of Gulf of Mexico water. The location of the intake could potentially affect aquatic life near the intake. Care would be needed to be sure that aquatic life was not impinged in the intake pump station and there are no significant changes to general salt content of the source area, especially if the intake is located in a brackish area of the Gulf. The brine water in the reject stream could potentially affect aquatic life near the discharge location as well.

The transmission pipeline would likely cross wetlands and streams, but highly sensitive areas may be avoided.

Permitting and Development

Technology for desalination is still developing for this application at this scale. This strategy will require a state water right permit, interbasin transfer (IBT), and a discharge permit. It will also likely require a Section 404 permit for the intake structure, discharge structure, and stream crossings of the transmission system.

There are mixed views on seawater desalination and the project could face public opposition. Considering the permitting requirements, verification of the treatment technology, and construction of an approximately 300-mile transmission system, the strategy would likely take about 20 years to develop.

Cost Analysis

TWDB costing guidance was followed. Infrastructure was sized with a 1.5 peaking factor. Annual costs were also developed following TWDB guidance for debt service and operation and maintenance costs.

TABLE G.13 SUMMARY OF COSTS

ENTITY	CAPITAL COST	UNIT COST ($/1,000 GAL)	
		WITH DEBT SERVICE	AFTER DEBT SERVICE
Metroplex Provider	$15,157,402,000	$21.24	$8.60

Water Management Strategy Evaluation

Because the cost of desalination and the distance to the Gulf of Mexico, seawater desalination is not a particularly promising source of supply for Region C. The major challenges for this strategy are the technical developments for a project of this scale. Maintaining and operating a remote desalination water treatment plant and a 300-mile transmission system is costly and difficult for the water providers.

The supply from seawater desalination is essentially unlimited, but the cost is a great deal higher than the cost of the other water management strategies for Region C.

Water User Group Application

The Gulf of Mexico desalination strategy was evaluated on a basis of several criteria to determine the providers 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 suitability of the strategy to the WUGs served.

The Gulf of Mexico Desalination Project is not a recommended or alternative strategy for any water supplier in Region C.

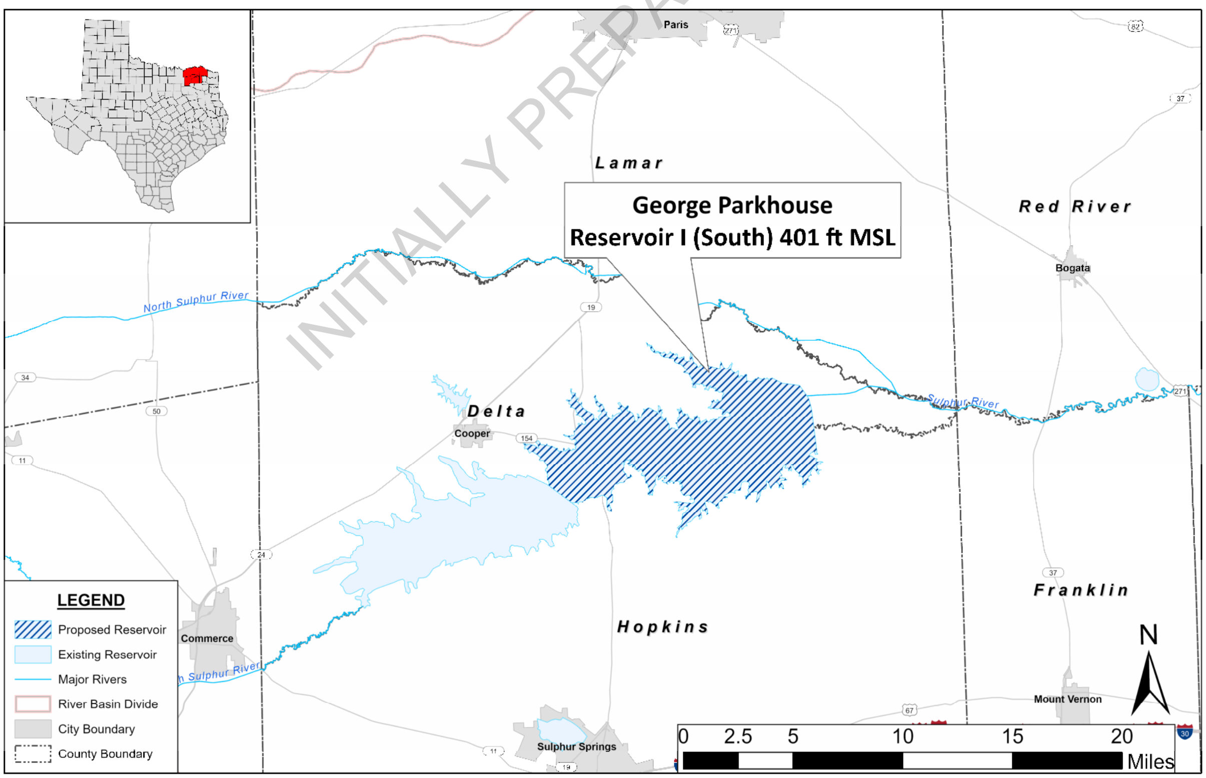
G.3 Joint Major Water Management Strategy Technical Memorandums

G.3.1 George Parkhouse Reservoir I (South)

Potential Sponsor(s):	NTMWD and/or UTRWD
WMS/Project Type:	New Surface Water (Reservoir)
Potential Supply Quantity:	Up to 114,960 ac-ft/yr (102.6 MGD)
Implementation Decade:	2060
Strategy Capital Cost:	$1,862,106,000 (Joint Strategy)
Unit Water Cost ($/kgal)	$3.04 during Debt Service; $0.53 after Debt Service
Application:	Alternative

Strategy Description

George Parkhouse Reservoir I (South) is a potential reservoir located on the South Sulphur River in Hopkins and Delta Counties as shown. This reservoir site was originally proposed as the first phase of the larger George Parkhouse Reservoir, also known as Sulphur Bluff. It is located immediately downstream from Jim Chapman Lake and would yield 114,960 acre-feet per year. At conservation elevation 401 ft. MSL, George Parkhouse Reservoir I (South) would inundate approximately 28,900 acres and store 651,700 acre-feet.



The reservoir, as currently configured, would abut the dam for Jim Chapman Lake and over fifty percent of the land impacted would be bottomland hardwood forest or marsh (HDR et al, 2007). This project is considered a potential strategy for NTMWD and UTRWD. It is assumed that the project will either be pursued solely by NTMWD or jointly with UTRWD. It is assumed that the entire yield will be available to Region C users. Pipelines and pump station(s) are included in both strategies to transport the supplies from the reservoir to the service area of the sponsor.

Supply Development (Quantity, Reliability, Quality)

Water supplies from George Parkhouse I (South) were determined using the Sulphur Basin WAM model. Environmental flows as specified under the Senate Bill 3 have not been developed for the Sulphur Basin. As required by regional water planning, the Consensus Criteria for Environmental Flow Needs (CCEFN) were used to estimate environmental flows. The process set by Senate Bill 3 could result in different environmental releases and that could reduce the yields determined using the CCEFN.

Considerations regarding supplies from George Parkhouse I (South) include:

- The project, if constructed, would have an impact on the yield of other projects being considered for development in the Sulphur Basin, including the proposed Marvin Nichols Reservoir and Lake Wright Patman reallocation. This impact was not assessed.

Water Quantity

The quantity of water available to Region C water providers is 114,960 acre-feet per year. The quantities for the joint project are shown in **Table G.14**. The yield of George Parkhouse I (South) is contingent upon other water development in the Sulphur River Basin. If other downstream projects are permitted with a senior priority to George Parkhouse I, then the yield would decrease. Previous studies have indicated the reduction in yield could be up to 60% of the stand-alone firm yield (HDR et.al., 2008). This would likely make this project not economically viable for Region C providers.

This project could be developed in conjunction with George Parkhouse II (North). The yield of the combined projects has not been assessed.

Imposition of different environmental flow criteria could also impact the reliable supply from the project.

TABLE G.14 SUMMARY OF QUANTITIES (AC-FT/YR)

DESCRIPTION	PERCENT OF TOTAL	QUANTITY (Ac-ft/Yr)
Joint Project		
NTMWD	*70%*	*80,472*
UTRWD	*30%*	*34,488*
TOTAL		**114,960**

Reliability

The reliability of this supply would be moderately high, pending the implementation of other projects in the Sulphur River Basin. However, a drought worse than the drought of record could occur which could impact the reservoir yield.

Water Quality

This project is located on the South Sulphur River immediately downstream of Lake Jim Chapman. Lake Jim Chapman has been listed on the 303(d) list for high pH levels. The high pH is assumed to come from natural sources. Since there is a required minimum release of 5 cfs from Lake Chapman, there could be an impact on George Parkhouse I (South).

Environmental Considerations

The reservoir is a new source of surface water, therefore environmental impacts have the potential to be greater than other strategies utilizing existing sources.

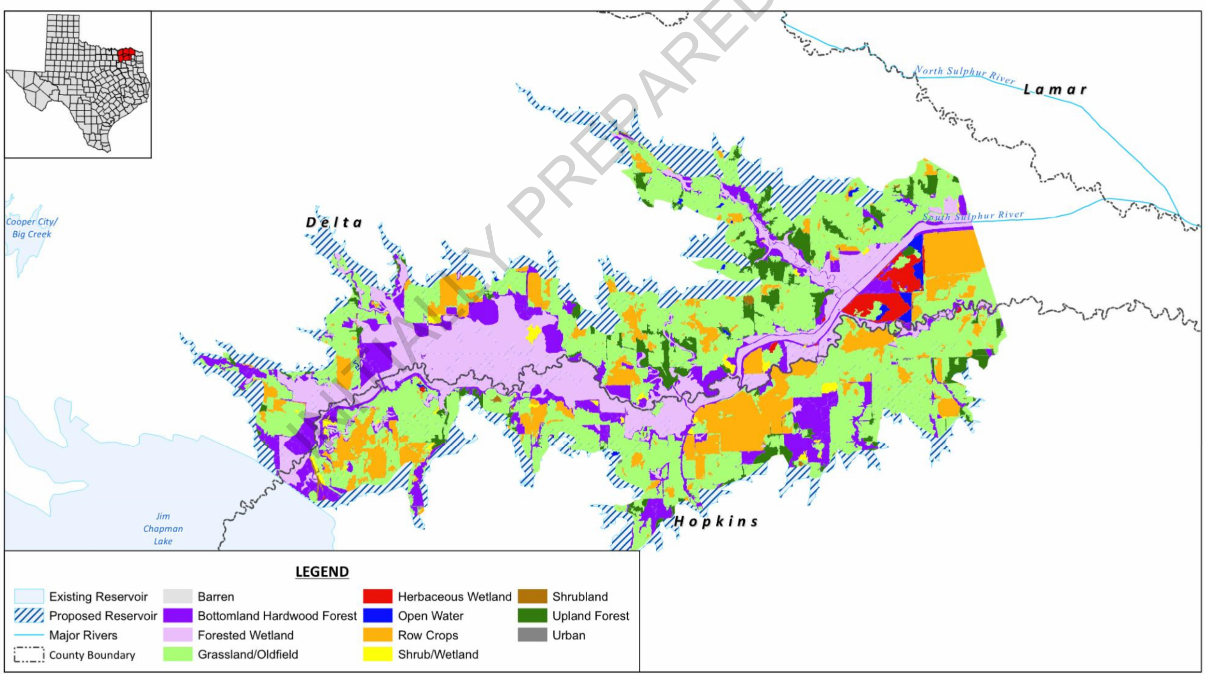
- **Habitat and Vegetative Cover**. George Parkhouse I (South) would impact approximately 28,362 acres. **Figure G.1** shows different cover types within the impact area at the reservoir site, and **Table G.15** documents the estimated acreages of each cover type. Most of the land cover is grassland and agricultural lands. Approximately 9,754 acres are classified as bottomland hardwoods or forested wetlands. All data are based on desktop evaluations. The proposed reservoir is upstream of priority 1 bottomland hardwoods in Red River County. Priority 1, as classified by USFWS, means excellent quality bottomlands of high value to key waterfowl species (USFWS, 1984). While these designated bottomland hardwoods are located to the east of the reservoir, further study would be needed to assess the potential indirect impacts of the proposed reservoir on these resources.
- **Threatened and endangered species.** There are 22 threatened or endangered species that are known to occur or have the potential to occur within Delta and Hopkins counties. Of these species, six are federally listed and 16 are state listed. The three federally listed species: American Burying Beetle, Black Rail, Ouachita Rock Pocketbook, Piping Plover, Rufa Red Knot, and Whooping Crane have low to no potential to be negatively impacted by the proposed Parkhouse South reservoir. Of the state-listed species, there is a moderate potential that the reservoir could negatively impact the creek chubsucker and timber rattlesnake. No impact or low impact would be expected to the other species. The timber rattlesnake is listed as threatened by the TPWD and prefers moist lowland forests and hilly woodlands or thickets near streams. Within the Parkhouse South site, there are approximately 9,754 acres of bottomlands and forested wetlands that could provide habitat for this species. The creek chubsucker is a freshwater fish that prefers small rivers and creeks that are often highly vegetated. This species has potential to occur within the Parkhouse South area and is listed as threatened by the TPWD. This species seldom inhabits impoundments, such as ponds and lakes. Based on its preferred habitat, there are approximately 176 miles of potential stream habitats for the creek chubsucker within the Parkhouse South reservoir site (FNI, 2013).

TABLE G.15 VEGETATION COVER TYPES WITHIN RESERVOIR FOOTPRINT[A]

TYPE OF COVER	ACRES
Barren	1
Riparian Woodland/Bottomland Hardwood	4,267
Forested Wetland	5,487
Emergent/Herbaceous Wetland	432
Grassland/Old Field	12,133
Cropland	3,987
Shrub wetland	278
Evergreen forest	1,521
Upland deciduous forest	
Shrubland	65
Open water/Lacustrine	181
Urban	10
Total	***28,362***

[a]*Environmental Evaluation Interim Report, Sulphur River Basin Comparative Assessment, June 2013*

FIGURE G.1 COVER TYPES



- **Cultural resources.** There are nine known cultural resource sites within the Parkhouse South site. Eight sites are prehistoric. Several of these sites have moderate to high potential for listing under the National Register of Historic Places (NRHP). At this time no detailed cultural resource survey has been conducted at the Parkhouse South site.

Permitting and Development

Development of George Parkhouse Reservoir I (South) requires a water right permit and an interbasin transfer permit from TCEQ and a Section 404 permit from the Fort Worth District USACE. The permitting process requires numerous studies and coordination with state and federal agencies. As part of the permitting process, a mitigation plan would be required to compensate for impacts to waters of the U.S. (includes wetlands and streams). Permits for a new lake can take 10 to 20 years to obtain, pending public opposition.

Cost Analysis

Detailed cost estimates for the reservoir were provided by the sponsor where available. For consistency with SB1 planning guidance, the costs were updated to September 2023 dollars using the ENR index. Transmission costs were developed using the Uniform Cost Model and TWDB costing guidance was followed. Annual costs were also developed following TWDB guidance.

TABLE G.16 SUMMARY OF COSTS

ENTITY	CAPITAL COST	UNIT COST ($/1,000 GAL)	
		WITH DEBT SERVICE	AFTER DEBT SERVICE
NTMWD (only)	$1,976,311,000	$3.23	$0.56
NTMWD (joint)	$1,415,171,000	$3.34	$0.61
UTRWD (joint)	$446,935,000	$2.34	$0.33

Water Management Strategy Evaluation

The proposed George Parkhouse Reservoir I (South) reservoir is a potentially feasible strategy for two water providers in the Metroplex. The available yield of the project is contingent upon other water supply development in the basin. This reservoir site has over 10,000 acres of vegetative coverage in bottomland hardwood forest or potential wetlands (marsh and seasonally flooded shrubland). The impacts to these resources would require mitigation and likely face opposition from the public and environmental groups.

The proposed reservoir would be located immediately downstream of an existing water source for both NTMWD and UTRWD. There may be potential to operate these lakes as a system for both supply and transport.

Water User Group Application

The George Parkhouse Reservoir I (South) strategy was evaluated on the 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 suitability of the strategy to the WUGs served.

The potential sponsors of this strategy are NTMWD and UTRWD and their customers. This strategy is an alternative strategy for NTMWD and UTRWD.

G.3.2 George Parkhouse Reservoir II (North)

Potential Sponsor(s)	NTMWD or UTRWD
WMS/Project Type:	New Surface Water (Reservoir)
Potential Supply Quantity:	94,460 ac-ft /yr (84.3 MGD)
Implementation Decade:	2060
Strategy Capital Cost:	$1.8 million
Unit Water Cost ($/kgal)	$3.56 during Debt Service; $0.65 after Debt Service
Application:	Alternative

Strategy Description

George Parkhouse Reservoir II (North), also known as Parkhouse II, is a potential reservoir located on the North Sulphur River in Lamar and Delta Counties, about 15 miles southeast of the City of Paris as shown. This reservoir site was originally proposed as the second phase of the larger George Parkhouse Reservoir, formerly known as Sulphur Bluff. At a proposed conservation elevation of 410.0 ft MSL, the reservoir would store approximately 331,000 acre-feet of water and inundate 14,400 acres. This project is a potential strategy for NTMWD and UTRWD. It is assumed that the project will either be pursued solely by NTMWD or solely by UTRWD. Pipelines and pump station(s) are included in both strategies to transport the supplies from the reservoir to the service area of the sponsor.

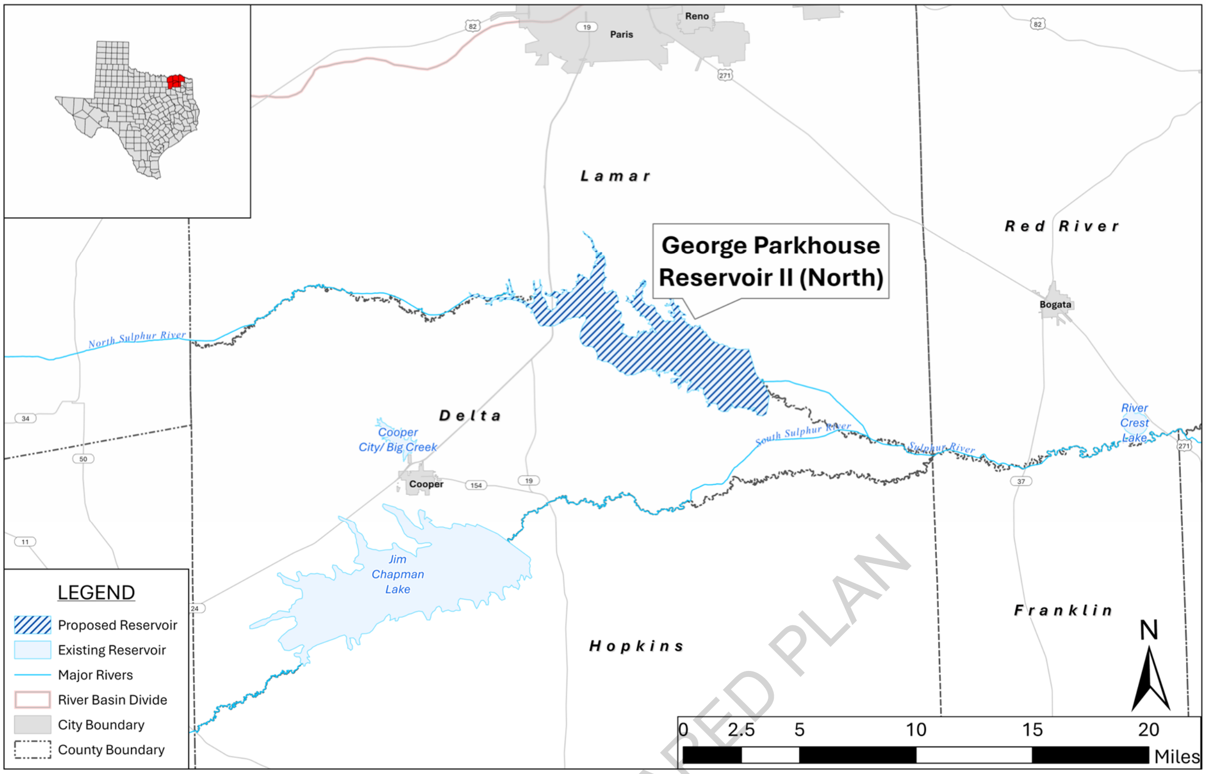
Facilities included in this strategy include both the proposed reservoir and the infrastructure needed to transport raw water to the Leonard Water Treatment Plant in Fannin County for NTMWD. For UTRWD, the transmission system delivers water to the Lake Ralph Hall Terminal Storage, located west of Greenville. Alternatively, UTRWD may take the water directly to Lake Ralph Hall and construct a pipeline to the Harpool Water Treatment Plant in Providence Village.

Supply Development (Quantity, Reliability, Quality)

Water supplies from George Parkhouse Reservoir II (North) were determined using the Sulphur River WAM. Environmental flows as specified under Senate Bill 3 have not been developed for the Sulphur Basin. Yields were evaluated using the Consensus Criteria for Environmental Flow Needs (CCEFN), as reported in the Site Protection Study (HDR et al. 2008). The new process set by Senate Bill 3 could result in different environmental releases and that could reduce the yields determined using the CCEFN.

Considerations regarding supplies from George Parkhouse Reservoir II (North) include:

- The project, if constructed, would have an impact on the yield of other projects being considered for development in the Sulphur Basin, including the proposed Marvin Nichols Reservoir and Lake Wright Patman reallocation. This impact was not assessed.



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Water Quantity

With these assumptions, the firm yield of George Parkhouse Reservoir II (North) with CCEFN instream flow releases is estimated at 94,460 acre-feet per year. The entire firm yield will be available to Region C users. The yield of George Parkhouse Reservoir II (North) is contingent upon other water development in the Sulphur River Basin. If other downstream projects are permitted with a senior priority to George Parkhouse Reservoir II (North), then the yield would decrease. Previous studies have shown that the reduction in yield could be more than 70% (HDR et.al., 2008). This would likely make this project not economically viable for Region C providers.

This project could be developed in conjunction with George Parkhouse Reservoir I (South). The yield of the combined projects has not been assessed.

Reliability

The reliability of this supply would be moderately high, pending the development of other projects in the Sulphur River Basin. However, a drought worse than the drought of record could occur which could impact the reservoir yield. Imposition of different environmental flow criteria could also impact the reliable supply from the project.

Water Quality

The North Sulphur River and its tributaries are deeply incised and eroding. Current conditions are the result of channelization in the 1920s to early 1930s, which has caused accelerated erosion such that the river channel is now about 300 feet wide and 40 feet deep in some places. These drastic changes to the stream channel have resulted in an extremely flashy stream system with often little to no flow. Large flow events continue to erode the channel carrying heavy sediment loads which would accumulate in the proposed reservoir. The construction of Lake Ralph Hall would reduce some of this sediment transport downstream.

The segment of the North Sulphur where Parkhouse North would be located has elevated chlorophyll-a levels. Also, a tributary to the proposed reservoir, Aud's Creek, has been listed for a concern for habitat and impaired macrobenthic community. The entire stretch of the North Sulphur River is listed as not fully supporting aquatic life (FNI, 2013). Aside from these impairments, the water in the North Sulphur is generally freshwater runoff. Based on expected water quality parameters in Bois d'Arc Lake, total dissolved solids (TDS) levels are expected to be about 300 mg/L in Parkhouse North.

Environmental Considerations

The reservoir is a new source of surface water, therefore environmental impacts have the potential to be greater than other strategies utilizing existing sources.

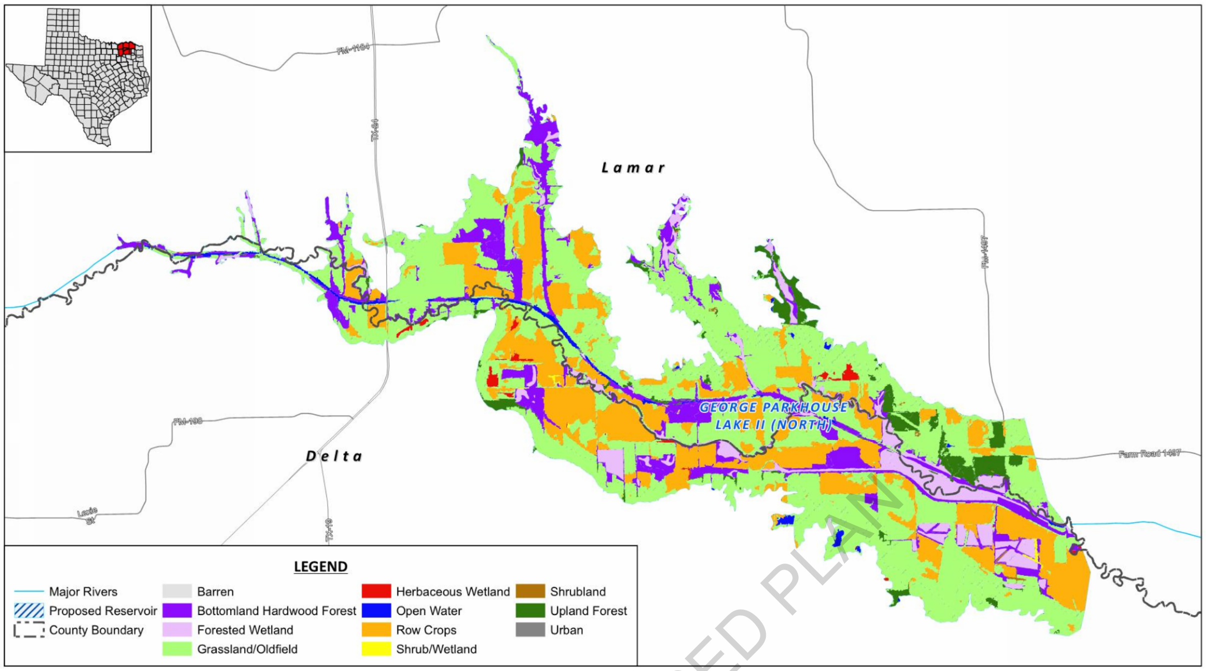
- **Habitat and Vegetative Cover.** Parkhouse North would inundate 14,400 acres and impact an additional 1,600 acres for construction of the dam, spillway, pump station and pipeline. **Figure G.2** shows different cover types within the impact area at Parkhouse North site (including the dam footprint), and **Table G.17** documents the estimated acreages of each cover type. Most of the land cover is grassland and agricultural lands. Approximately 3,076 acres are classified as bottomland hardwoods or forested wetlands. Using NHD stream data, approximately 93 miles of streams would be inundated. All data are based on desktop evaluations. Parkhouse North is upstream of priority 1 bottomland hardwoods in Red River County. While these designated bottomland hardwoods are located approximately 27 miles to the east of the reservoir, further study would be needed to assess the potential indirect impacts of the proposed reservoir on these resources.

TABLE G.17 VEGETATION COVER TYPES WITHIN RESERVOIR FOOTPRINT[A]

TYPE OF COVER	ACRES
Riparian Woodland/Bottomland Hardwood	1,960
Forested Wetland	1,116
Emergent/Herbaceous Wetland	91
Grassland/Old Field	7,718
Cropland	3,626
Shrub wetland	28
Evergreen forest and Upland deciduous forest	602
Shrubland	19
Open water/Lacustrine	182
Urban	14
Total	*15,356*

[a] [a] *Environmental Evaluation Interim Report, Sulphur River Basin Comparative Assessment, June 2013*

FIGURE G.2 COVER TYPES



- **Threatened and endangered species**. There are 23 threatened or endangered species that are known to occur or have the potential to occur within Lamar and Delta counties. Of these species, six are federally listed and seventeen are state-listed. The six federally listed species: American Burying Beetle, Black Rail, Ouachita Rock Pocketbook, Piping Plover, Rufa Red Knot, and Whooping Crane have low to no potential to be negatively impacted by the proposed Parkhouse North reservoir. Of the state-listed species, there is a moderate potential that the reservoir could negatively impact the creek chubsucker and timber rattlesnake. No impact or low impact would be expected to the other species. The timber rattlesnake is listed as threatened by the TPWD and prefers moist lowland forests and hilly woodlands or thickets near streams. Within the Parkhouse North site, there are approximately 3,076 acres of bottomlands and forested wetlands that could provide habitat for this species. The creek chubsucker is a freshwater fish that prefers small rivers and creeks that are often highly vegetated. This species has potential to occur within the Parkhouse North area and is listed as threatened by the TPWD. This species seldom inhabits impoundments, such as ponds and lakes. Based on its preferred habitat, there are approximately 93 miles of potential stream habitats for the creek chubsucker within the Parkhouse North reservoir site (FNI, 2013).

- **Cultural resources**. Parkhouse North is located in an area with moderate potential for cultural resources. There are seven known cultural resource sites within the Parkhouse North site. Two sites are associated with the Caddo Nation and five sites are prehistoric. There is the possibility that one site may contain human remains. Several of these sites have moderate to high potential for listing under the National Register of Historic Places

(NRHP). Preliminary field investigations at the Lake Ralph Hall site, located 15 miles upstream of the Parkhouse North site, suggest that there is strong potential for unrecorded prehistoric and historic properties along the first terrace of the Sulphur River valley (Skinner et al, 2005). At this time no detailed cultural resource survey has been conducted at the Parkhouse North site.

Permitting and Development

To construct a new reservoir, both a state water right permit and a federal Section 404 permit are required. Parkhouse II also would require an interbasin transfer basin to move the water from the Sulphur River Basin to the Trinity River Basin. As part of the permitting process, a mitigation plan would be required to compensate for impacts to waters of the U.S. (includes wetlands and streams).

The permitting process for a new reservoir often takes 15 to 20 years, depending upon the permit requests, complexity of the project site, and potential opposition to the project. The project design and construction could then take an additional 5 to 10 years. This project is proposed to be developed by 2060.

Cost Analysis

Detailed cost estimates for this strategy were provided by the sponsor where available. These costs are more detailed estimates developed during planning and/or design. For consistency with SB1 planning guidance, the costs were updated to September 2023 dollars using the ENR index. When detailed costs were not available, TWDB costing guidance was followed. Annual costs were also developed following TWDB guidance.

TABLE G.18 SUMMARY OF COSTS

ENTITY	CAPITAL COST	UNIT COST ($/1,000 GAL)	
		WITH DEBT SERVICE	AFTER DEBT SERVICE
NTMWD (only)	$1,762,143,000	$3.56	$0.65
UTRWD (only)	$1,811,487,000	$3.64	$0.64

Water Management Strategy Evaluation

This project has the potential to produce a reliable source for Region C. The proposed George Parkhouse Reservoir II (North) is a potentially feasible strategy for two water providers in the Metroplex. The available yield of the project is contingent upon other water supply development in the basin. It is located near Lake Jim Chapman and Lake Ralph Hall, so it could be operated as a system with those sources.

Although this project has been considered for many years, it has not been studied in detail and a feasibility study is recommended before pursuing this project.

Water User Group Application

The George Parkhouse Reservoir II (North) strategy was evaluated on the 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 suitability of the strategy to the WUGs served.

The potential sponsors of this strategy are NTMWD or UTRWD. This strategy is an alternative strategy for NTMWD and UTRWD.

G.3.3 Integrated Pipeline

Potential Sponsor(s):	TRWD and DWU
WMS/Project Type:	New Surface Water (Infrastructure)
Potential Supply Quantity:	This is an infrastructure project that will transport supplies from multiple strategies for TRWD and DWU. Supply quantities are shown with the source water strategy.
Implementation Decade:	2040
Strategy Capital Cost:	$1.4 billion
Unit Water Cost ($/kgal):	N/A
Application:	Recommended

Strategy Description

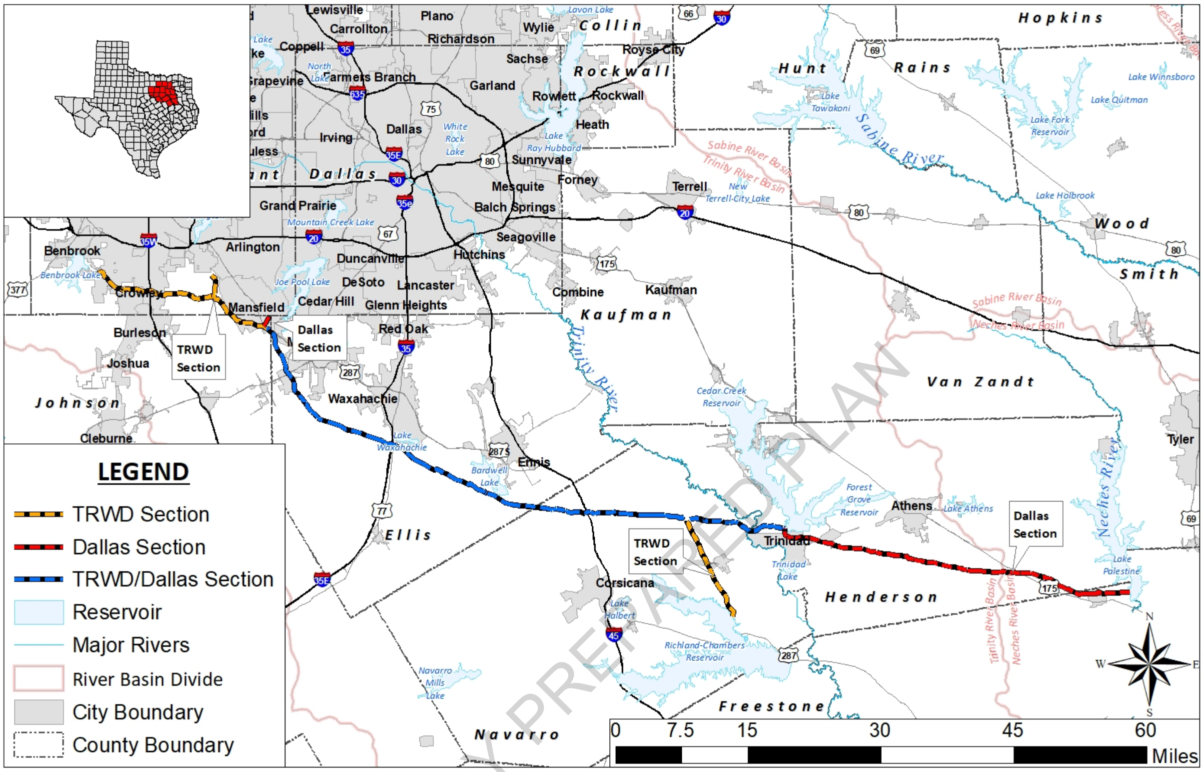
The Tarrant Regional Water District (TRWD) and Dallas Water Utilities (DWU) have partnered to construct and operate the Integrated Pipeline (IPL) Project. The IPL project is an integrated water delivery transmission system that extends from Lake Palestine to Benbrook Lake with connections to Cedar Creek and Richland-Chambers Reservoirs. The pipeline will have an ultimate capacity of approximately 350 MGD (200 MGD for TRWD and 150 MGD for DWU). Dallas's share of the project will deliver water from Lake Palestine and TRWD's share will deliver surface water and reuse supplies from Cedar Creek and Richland-Chambers Reservoirs.

A portion of the IPL has been constructed and is currently delivering raw water to TRWD customers. The intake and pump station on Lake Palestine is under construction and should be completed before 2030. The pipeline to transport DWU's supplies from Lake Palestine to the IPL pump station at Cedar Creek Reservoir is also under construction and when completed would be able to transport DWU's full contracted supply from Lake Palestine and the Neches Run-of River supplies. None of the DWU water supplies are discharged to TRWD reservoirs. The remaining portions of the IPL to be completed, which are included in this project, will provide capacity to deliver the TRWD permitted reuse supplies that are currently limited by infrastructure capacity. Additional projects will be needed to fully develop these reuse supplies, such as construction of the Marty Leonard Wetlands at Cedar Creek Reservoir. The completed IPL will be used to transport additional reuse at Richland-Chambers, reuse at Cedar Creek Reservoir, and a portion of the reuse from TRA.

The IPL project addresses only the portions of the IPL that have not yet been completed and includes:

- TRWD Joint Richland-Chambers Pump Station (250 MGD ultimate design capacity)
- TRWD Pipeline Segment Section 9 (10.6 mile 84" Pipeline and 5 mile 120" tunnel; Kennedale Balancing Reservoir turn-out tee to existing Benbrook connection pipeline)
- TRWD Pipeline Segment Section 16 (12.3 mile 96" Pipeline)
- TRWD Booster Pump Station (JB4 at 197 MGD)
- Shared Booster Pump Stations (JB2 and JB3 at 347 MGD). JB3 exists but there will be a future expansion for additional pumps, motors, VFDs, and substation equipment.

Additional transmission capacity for TRWD will be needed by 2050 to move new water developed from Lake Tehuacana, Carrizo-Wilcox aquifer and the remaining reuse from TRA. The timing of this additional delivery system may be delayed if there is unused capacity in the IPL. The additional transmission system would be a separate project from the IPL, dedicated only for TRWD.



TR116409: H:\WR_PLANNING\1 - Working\5C_Major WMS\IPL.mxd

Supply Development (Quantity, Reliability, Quality)

This project provides the infrastructure necessary to transport existing TRWD permitted water from Richland-Chambers and Cedar Creek Reservoirs and additional reuse supplies that will become available after the completion of the wetland project at Cedar Creek Reservoir (see *TRWD Marty Leonard Wetlands*). This joint project also includes the infrastructure needed to transport DWU's contracted water in Lake Palestine (see *IPL Connection to Dallas System)*.

<u>Water Quantity</u>

Since this project addresses only the portions of the IPL that are not complete, the quantity of water represents the amount of TRWD water (both surface water and reuse supplies) that is not available today due to infrastructure constraints and future supplies to be developed. The quantities for future supplies for TRWD and DWU are listed in **Table G.19** but are associated with the respective water management strategy. The future supplies include additional TRWD reuse, DWU's contract for Lake Palestine water, and future developed water from the Neches Run-of-River strategy.

TABLE G.19 SUMMARY OF ADDITIONAL SUPPLIES THROUGH IPL (AC-FT/YR)

DESCRIPTION	2030	2040	2050	2060	2070	2080
TRWD	0	60,086	60,086	60,086	60,086	60,086
DWU	0	95,086	93,967	92,874	145,586	144,481

Reliability

The reliability of the source water is addressed under each strategy. The reliability of the IPL itself is high. Both TRWD and DWU have multiple sources of water and transmission systems to accommodate periodic downtimes for maintenance and/or repairs.

Water Quality

The water quality of the source water is expected to be good. There will be a review of the different sources to assess potential mixing concerns. Water from Lake Palestine is not intended to be stored but is planned to be delivered directly to a point upstream of Joe Pool Lake in Dallas. Alternatively, DWU could deliver the water to a potential new water treatment facility in southeast Dallas.

Environmental Considerations

As previously noted, much of the IPL from TRWD's sources has been completed. Environmental studies for the remaining sections from Richland Chambers have been completed, and environmentally sensitive areas have been avoided. The environmental studies for the segment from Lake Palestine are on-going.

- **Habitat and Vegetative Cover**. Lake intake and transmission pipeline infrastructure were located to avoid conflicts with environmentally sensitive bottomland hardwoods and riparian areas in addition to ecologically significant stream sections. Where possible, the pipeline follows existing road rights-of-way or crosses areas of agricultural use.
- **Threatened and Endangered Species**. The project area includes 28 species that are federally or state listed as threatened or endangered or are federal candidate species in the counties for which the project is located. No designated areas of critical habitat currently occur within the project area.
- **Environmental Water Needs.** Implementation and operation of the IPL will have a very limited impact on daily flows since it will operate in accordance with authorized water right permits.
- **Wetlands.** Impacts to wetlands associated with this project are anticipated to be low.

Permitting and Development

This project would pose limited permitting challenges. A Section 404 permit from the USACE for impacts to a waterway from construction activities has been obtained and construction activities for several components are underway.

Cost Analysis

Detailed cost estimates for portions of the IPL were provided by TRWD where available. These costs are more detailed estimates developed during design and were used for the specific components. It does not include costs for portions of the project already constructed. Annual costs were not developed because the project does not directly provide water, only infrastructure capacity.

DWU has additional costs associated with connecting supplies from the IPL to their Bachman WTP that are not included in the costs below. The Bachman WTP connection is discussed in **Section G.4.2**

TABLE G.20 SUMMARY OF COSTS

ENTITY	CAPITAL COST	UNIT COST ($/1,000 GAL)	
		WITH DEBT SERVICE	AFTER DEBT SERVICE
IPL Completion			
TRWD	$1,327,000,000	N/A	N/A
DWU	$114,000,000	N/A	N/A
TOTAL	**$1,441,000,000**	N/A	N/A

Water Management Strategy Evaluation

The IPL provides the means to use existing water supplies that are currently not available to TRWD or DWU because of infrastructure limitations. This project has minimal environmental impacts. Extensive environmental studies have been conducted or are on-going to identify potentially environmentally sensitive areas. Where possible, these areas have been avoided. The IPL also provides a means to share water resources between TRWD and DWU during emergencies or on an interim basis. This flexibility in operations, provided by the IPL, increases the resiliency of the source water.

Water User Group Application

The 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 suitability of the strategy to the WUGs served.

The IPL Project is recommended by the Region C Regional Water Planning Group. The IPL Project is sponsored by TRWD and DWU and will serve the customers of both.

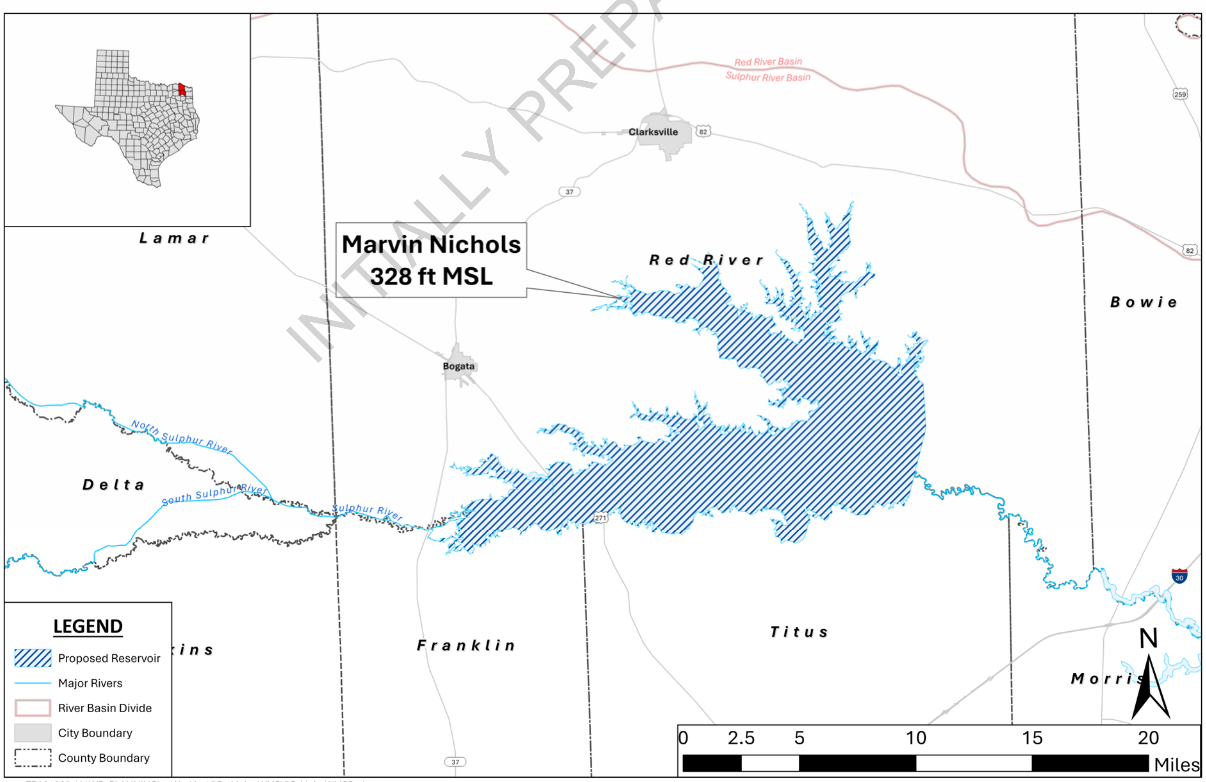
G.3.4 Marvin Nichols Reservoir Site 1A (328' MSL)

Potential Sponsor(s):	NTMWD, TRWD, UTRWD, DWU and/or Irving
WMS/Project Type:	New Surface Water (Reservoir)
Potential Supply Quantity:	320,160 acre-feet per year
Implementation Decade:	2060
Strategy Capital Cost:	$7,364,971,000
Unit Water Cost ($/kgal):	$4.62 during Debt Service, $0.96 after Debt Service
Application:	Recommended (NTMWD, TRWD, UTRWD) Alternative (DWU and Irving)

Strategy Description

Marvin Nichols Reservoir (Site 1A) is a potential reservoir located on the Sulphur River in Titus, Red River and Franklin Counties, about 45 miles west of Texarkana as shown in **Figure G.3**. The reservoir, if constructed, would be approximately 100 miles from the Metroplex. This strategy has been included in every state water plan since 1968. At a proposed conservation elevation of 328 feet MSL, the reservoir would store 1,532,000 acre-feet of water with a water surface area of 66,103 acres. This strategy has historically been developed as a joint strategy by several Metroplex water providers.

FIGURE G.3 MAP OF MARVIN NICHOLS RESERVOIR (328 MSL)



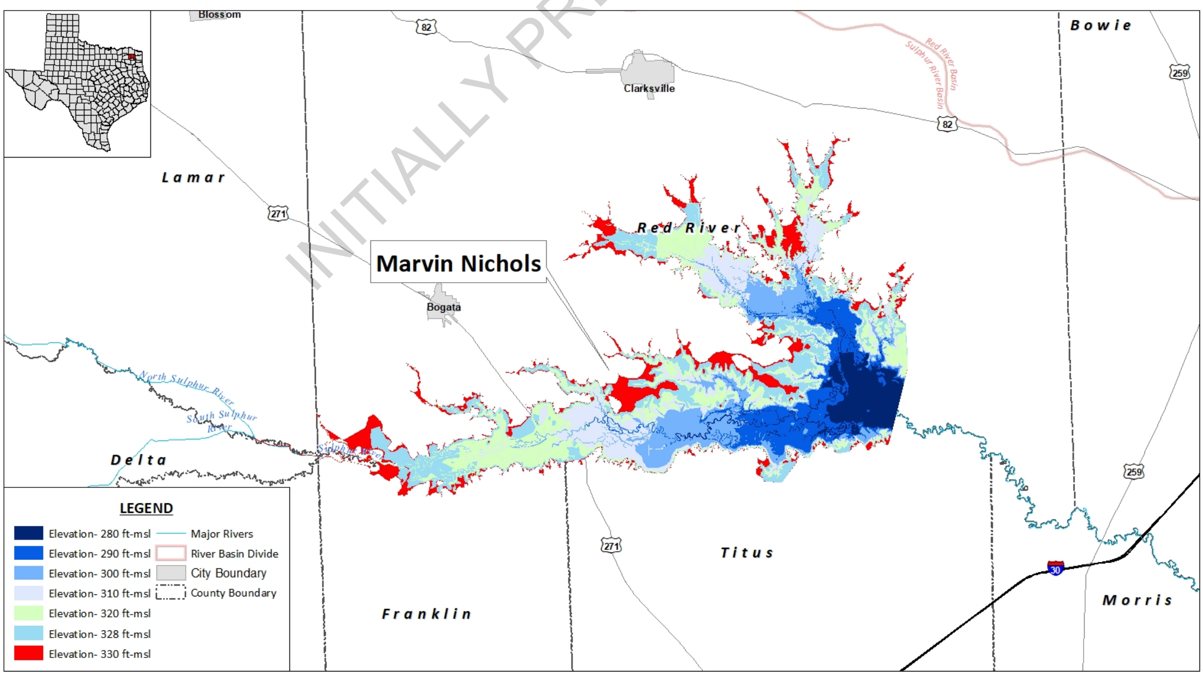
Supply Development (Quantity, Reliability, Quality)

The available supply from Marvin Nichols Reservoir at 328 feet MSL was determined using the TCEQ's Sulphur River Basin water availability model (WAM). The Sulphur River Basin is one of a few river basins that TCEQ has not established environmental flow criteria. Therefore, environmental flow bypasses were estimated based on the Consensus Criteria for Environmental Flow Needs (CCEFN) as required by TWDB for regional water planning. It was also assumed that if the TCEQ received a major water application in the Sulphur River Basin (such as Marvin Nichols Reservoir), TCEQ would establish environmental flows for the entire basin prior to evaluating the application. Based on this assumption environmental by-pass criteria were estimated at two locations in the Sulphur WAM: below the Marvin Nichols Reservoir and below Lake Wright Patman.

Considerations regarding supplies from Marvin Nichols Reservoir include:

- Twenty percent of the yield of the project is reserved for local use in the Sulphur Basin. This assumption is based on an informal agreement with the Sulphur Basin Authority.
- Releases from Marvin Nichols for environmental flows were based on CCEFN.
- The yield of the project assumed without consideration of pending water right applications and other proposed Sulphur Basin projects. However, other projects being considered for development in the Sulphur Basin, including the Lake Wright Patman reallocation, could have an impact on the yield if permitted as senior to Marvin Nichols Reservoir.

FIGURE G.4 INUNDATION MAP OF MARVIN NICHOLS RESERVOIR



Water Quantity

With these assumptions, the firm yield of Marvin Nichols Reservoir at 328 feet MSL (with CCEFN environmental flow releases) is estimated to be 400,200 acre-feet per year. Of this amount, 320,160 acre-feet per year would be available to water providers in Region C. The remaining 20% of the yield would remain in the Sulphur Basin for local use. Also, if other proposed projects in the Sulphur River Basin are permitted as senior to the Marvin Nichols Reservoir, this could have an impact on the quantity of available supply. Application of different environmental flow requirements could also have an impact on project yield.

There are five potential sponsors of this strategy: TRWD, NTMWD, DWU, UTRWD and the city of Irving. For the 2026 Region C Plan, the Marvin Nichols Reservoir is a recommended strategy for TRWD, NTMWD and UTRWD. It is an alternate strategy for all five sponsors. The supply distribution to each sponsor is shown below.

TABLE G.21 SUMMARY OF QUANTITIES (AC-FT/YR)

DESCRIPTION	2030	2040	2050	2060	2070	2080
Recommended Strategy						
TRWD	0	0	0	148,474	148,474	148,474
NTMWD	0	0	0	148,474	148,474	148,474
UTRWD	0	0	0	23,052	23,052	23,052
Alternative Strategy						
TRWD	0	0	0	103,092	103,092	103,092
NTMWD	0	0	0	103,092	103,092	103,092
UTRWD	0	0	0	23,052	23,052	23,052
DWU	0	0	0	74,597	74,597	74,597
Irving	0	0	0	16,328	16,328	16,328
Total	***0***	***0***	***0***	***320,160***	***320,160***	***320,160***

Reliability

The Sulphur River Basin is in an area with average rainfall between 42 and 50 inches. The reliability of this supply would be high. However, a drought worse than the drought of record could occur which could impact the reservoir yield.

Water Quality

There are no major impairments or concerns on the segment of the Sulphur River where Marvin Nichols would be located; however, Kickapoo Creek, a tributary to the Sulphur River within the footprint of Marvin Nichols, is listed for impaired macrobenthic community (FNI, 2013). Inundation of the channel by the reservoir should serve to dilute the pollutants that may be affecting the macrobenthic organisms. There is also a concern for habitat and impaired macrobenthic community in Big Sandy Creek, a tributary of the North Sulphur River upstream of the reservoir. Existing impairments upstream are not currently affecting water quality in this reach, so they would not be expected to negatively impact the water quality of the reservoir (FNI, 2013).

Environmental Considerations

The reservoir is a new source of surface water, therefore environmental impacts have the potential to be greater than other strategies utilizing existing sources.

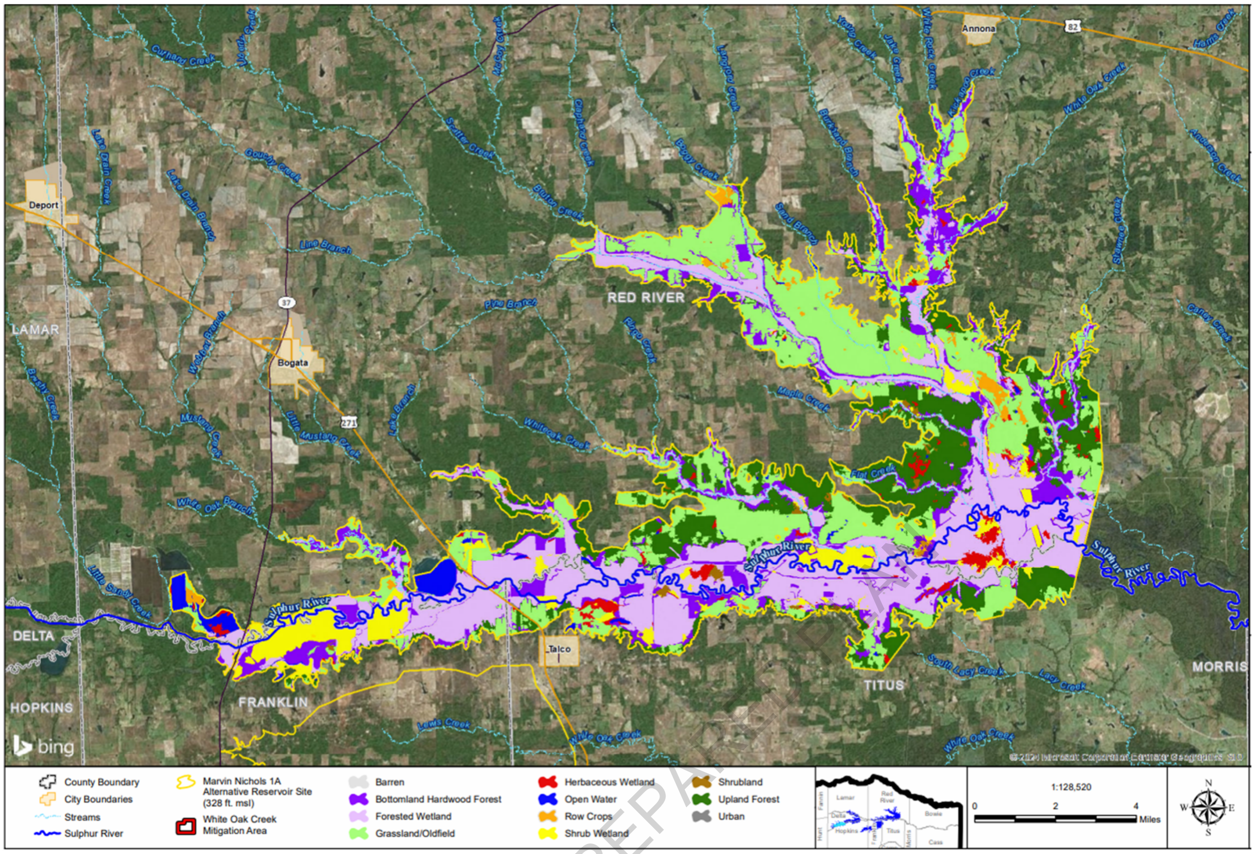
- **Habitat and Vegetative Cover.** Marvin Nichols Reservoir at 328 feet MSL would inundate 66,103 acres. The additional acres impacted by construction of the dam, spillway, pump station and pipeline were not available for this evaluation. **Figure G.5** shows different cover types within the impact area at the Marvin Nichols site, and **Table G.22** documents the estimated acreages of each cover type. Over 90% of the land cover is made up of four land use categories: forested wetland, grassland, bottomland hardwood forest, and upland forest. Approximately 28,900 acres are classified as bottomland hardwoods or forested wetlands. All data are based on desktop evaluations and have not been field verified. Priority 1 bottomland hardwoods are located within and downstream of the Marvin Nichols Reservoir site. Priority 1, as classified by USFWS, means excellent quality bottomlands of high value to key waterfowl species (USFWS, 1984). Further study would be needed to assess the potential indirect impacts of the proposed reservoir on the downstream bottomland hardwoods.

TABLE G.22 VEGETATION COVER TYPES[A]

COVER TYPE	ACRES IMPACTED
Barren	<1
Bottomland Hardwood Forest	9,289
Forested Wetland	19,622
Grassland/Old Field	18,241
Herbaceous Wetland	1,244
Open Water	1,162
Row Crops	706
Shrub Wetland	4,093
Shrubland	444
Upland Forest	11,223
Urban	78
Total	66,103

[a]Watershed Overview Sulphur River Basin Overview Final Report January 2014, table updated by FNI, 2024

FIGURE G.5 LAND COVER TYPES



- **Threatened and endangered species.** There are 20 threatened or endangered species that are known to occur or have the potential to occur within Titus, Red River, and Franklin counties. Of these species, seven are federally listed and 13 are state listed. . Three of the federally listed species are unlikely to be impacted by the project. The Piping plover has a moderate potential to be impacted. The species with a high potential to be impacted include the Yellow-billed cuckoo (*Coccyzus americanus*), the American burying beetle (*Nicrophorus americanus*), and the Ouachita rock pocketbook (*Arcidens wheeleri*). There are seven state-listed threatened or endangered species that have moderate to high potential to be impacted.

- **Cultural Resources**. Marvin Nichols is located in an area with high potential for cultural resources. There are 66 known cultural resource sites within the Marvin Nichols site. Thirteen sites are associated with the Caddo Nation, 43 sites are prehistoric, seven span more than one category, and three lack sufficient information to evaluate. Several of these sites have moderate to high potential for listing under the National Register of Historic Places (NRHP). No detailed cultural resource survey has been conducted at the Marvin Nichols site.

Permitting and Development

Feasibility studies have been conducted for the Marvin Nichols Reservoir, but no detailed field studies or permit applications have been submitted. To construct a new reservoir, both a state water right permit and a federal Section 404 permit are required. Marvin Nichols also requires an interbasin transfer permit to move the water from the Sulphur River Basin to the Trinity River Basin. Permits for a new lake can take 15 to 20 years or longer to obtain, pending public opposition.

Cost Analysis

In 2024, the sponsors of the Marvin Nichols Reservoir conducted a study to update the hydraulic and hydrologic analysis of the reservoir and cost estimates. The capital costs for this project are based on detailed costs developed for this Sulphur Basin Study (FNI, 2024). All costs were updated to September 2023 dollars, following TWDB cost guidance. Annual costs were also developed following TWDB guidance.

TABLE G.23 SUMMARY OF COSTS

ENTITY	CAPITAL COST	UNIT COST ($/1,000 GAL)	
		WITH DEBT SERVICE	AFTER DEBT SERVICE
Recommended Strategy			
TRWD	$4,389,997,000	$6.04	$1.29
NTMWD	$2,559,708,000	$3.39	$0.70
UTRWD	$415,266,000	$3.42	$0.60
Total	**$7,364,971,000**	**$4.62**	**$0.96**
Alternative Strategy			
TRWD	$3,088,764,000	$6.13	$1.32
NTMWD	$1,873,622,000	$3.57	$0.72
UTRWD	$408,707,000	$3.38	$0.60
DWU	$1,690,464,000	$4.53	$0.93
Irving	$201,397,000	$2.23	$0.35
Total	**$7,262,954,000**	**$4.54**	**$0.93**

Water Management Strategy Evaluation

This strategy provides a reliable new source of freshwater supplies for Region C water providers at a reasonable cost. It is located near other existing water sources that could potentially be operated as a system.

The challenges to this strategy are permitting and the current political opposition. Based on desktop analyses, there are approximately 25,000 acres of wetlands and another 9,000 acres of bottomland hardwoods. These natural resources are valuable to the local ecosystem and would require compensatory mitigation. A mitigation plan would be required to compensate for impacts to waters of the U.S. (includes wetlands and streams) as part of the permitting process. Based on recently permitted new reservoirs, the land required for mitigation is approximately equivalent to the total acreage of the proposed new reservoir (i.e., 1:1 ratio or more). The land most desirable for mitigation would be non-forested acreage that could be restored into emergent and forested wetlands and bottomland hardwoods.

Economic studies conducted as part of the 2021 Region C Water Plan show that the construction and operation of the reservoir would induce economic benefit to the local communities. The construction of the reservoir would provide nearly $5.5 billion economic benefits over the construction period and $228 million annually during operation (**Appendix J, Attachment J-2**).

Appendix J contains additional information on the quantitative evaluation of this strategy.

Water User Group Application

This strategy was considered for the major water providers in Region C. This strategy is a recommended strategy for NTMWD, TRWD, and UTRWD. It is an alternative strategy for DWU and Irving.

G.3.5 Wright Patman Reallocation

Potential Sponsor(s):	NTMWD, UTRWD, TRWD, DWU and/or Irving
WMS/Project Type:	New Surface Water (Reallocation)
Potential Supply Quantity:	125,000 acre-feet per year
Implementation Decade:	2080
Strategy Capital Cost:	$4.76 billion
Unit Water Cost ($/kgal):	$7.59 during Debt Service; $1.39 after Debt Service
Application:	Recommended (NTMWD and TRWD) Alternative (DWU, Irving, and UTRWD)

Strategy Description

The Wright Patman Reallocation strategy involves development of new surface water supplies from the Sulphur River Basin through a reallocation of storage at Wright Patman Lake from its current purpose, flood control, to water conservation storage. The supply quantity and cost identified above are for a specific reallocation of Wright Patman at elevation 235 ft MSL. At that conservation pool elevation, the pool raise at Wright Patman Lake would impact up to 15,152 acres above the permitted conservation pool elevation (ultimate rule curve). Infrastructure would be developed to transport the water to the Region C water providers. The Wright Patman Reallocation strategy is considered for NTMWD, UTRWD, TRWD, Dallas and the City of Irving.

Wright Patman Lake is an existing reservoir on the Sulphur River, about 150 miles from the Metroplex. It is owned and operated by the U.S. Army Corps of Engineers (USACE), and the City of Texarkana has contracted with the Corps of Engineers for storage in the lake and holds a Texas water right to use up to 180,000 acre-feet per year from the lake.

The Region C entities that are interested in the development of Sulphur Basin Supplies conducted joint studies with the USACE on the potential reallocation of Lake Wright Patman. Based on these analyses, the Fort Worth USACE recommended the reallocation of Wright Patman to 235 ft MSL. This recommendation provides quantity of water for Region C, while minimizing impacts on the White Oak Mitigation Area.

Supply Development (Quantity, Reliability, Quality)

This strategy is conceived as an independent strategy from other potential Sulphur Basin supplies. The amount of supply available from Wright Patman was determined using Sulphur Basin WAM. Since the Sulphur River Basin does not have approved SB3 flows, consistent with TWDB rules, environmental flow bypasses are based on the Consensus Criteria for Environmental Flow Needs (CCEFN).

Considerations regarding Wright Patman supplies include:

- The yield of the project assumed senior priority over other proposed Sulphur Basin projects, excluding Marvin Nichols Reservoir. However, other projects being considered for development in the Sulphur Basin, including Parkhouses I and II, could have an impact on the yield if permitted senior to either Marvin Nichols Reservoir or Lake Wright Patman reallocation.

- Yield for the Wright Patman reallocation assumed that the City of Texarkana would receive its full water right amount of 180,000 acre-feet per year that is associated with the Ultimate Rule Curve operation of Wright Patman.
- Sensitivity to project supplies was evaluated based on the order of priority between Marvin Nichols Reservoir and Lake Wright Patman (FNI, 2024).

Water Quantity

The firm yield with reallocation of Wright Patman to elevation 235 ft MSL, above the 180,000 acre-feet per year permitted to Texarkana, would be 125,000 acre-feet per year. It is assumed that all the reallocation supplies would be available to Region C providers. This reallocation would still increase the reliable supply to Region D since it firms up Texarkana's water right. Without the reallocation, the reliable supply for Texarkana is less than 180,000 acre-feet per year.

These quantities assume that Marvin Nichols is permitted senior to Lake Wright Patman. If Lake Wright Patman is permitted as senior to the Marvin Nichols Reservoir, the supply from Wright Patman would increase, but the supply from Marvin Nichols would decrease. Application of different environmental flow requirements could also have an impact on project yield.

TABLE G.24 SUMMARY OF QUANTITIES (AC-FT/YR)

DESCRIPTION	2030	2040	2050	2060	2070	2080
Recommended Strategy						
TRWD	0	0	0	0	0	62,500
NTMWD	0	0	0	0	0	62,500
Alternative Strategy						
TRWD	0	0	0	0	0	40,250
NTMWD	0	0	0	0	0	40,250
UTRWD	0	0	0	0	0	9,000
DWU	0	0	0	0	0	29,125
Irving	0	0	0	0	0	6,375
Total	***0***	***0***	***0***	***0***	***0***	***125,000***

Reliability

The Sulphur River Basin is in an area with average rainfall between 42 and 50 inches. The reliability of this supply would be high. However, a drought worse than the drought of record could occur which could impact the reservoir yield.

Water Quality

Lake Wright Patman has been listed on the Texas 303(d) list since 1996. Some subsegments in the lake do not meet pH or dissolved oxygen (DO) criteria. Occasional fish kills have been attributed to low DO levels. There also have been concerns for chlorophyll-a, orthophosphorus, and total phosphorus. Increasing the water conservation pool will likely not improve or worsen current water quality issues since much of the sources of the concerns are associated with the tributaries to the lake. Generally, this water source will continue to be a suitable municipal water supply (FNI, 2013).

Environmental Considerations

There are several environmental considerations associated with this joint strategy.

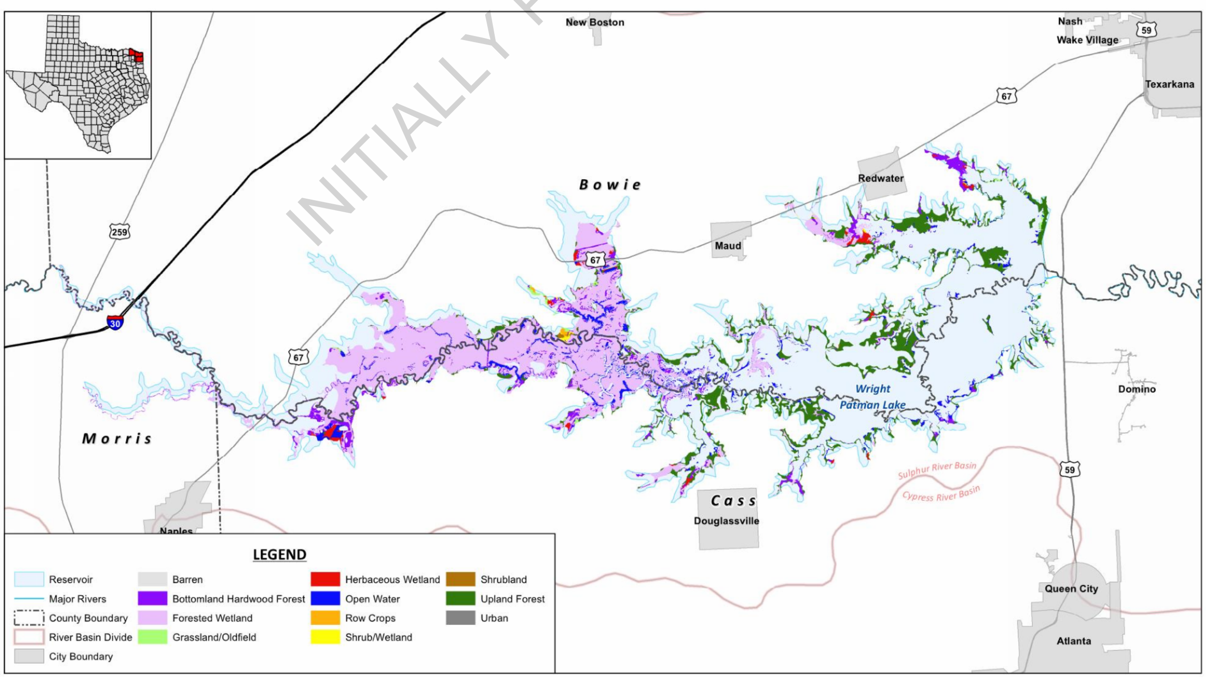
- **Habitat and Vegetative Cover.** Reallocated storage would permanently inundate agricultural, silvicultural, and natural resources. The pool raise at Wright Patman Lake would convert 14,327 acres above the ultimate rule curve conservation pool elevation to permanent open water and create 825 acres of additional swamp land. For the Wright Patman reallocation, the cover types were classified by the different types of bottomland forest wetlands (swamp, bottomland, seasonally flooded and temporarily flooded) and uplands, which are shown on **Table G.25**. These quantities are compared to the cover types and areas inundated under the Ultimate Rule Curve.

TABLE G.25 VEGETATIVE COVER TYPE FOR WRIGHT PATMAN REALLOCATION AT 235' MSL[A]

HABITAT	WIGHT PATMAN (URC)	REALLOCATION TO 235' MSL	
		REMAINING HABITAT	NET CHANGE
Open Water	36,870	51,242	14,372
Swamp	1,476	2,301	825
Bottomland	5,177	954	-4,223
Seasonally Flooded	20,629	19,273	-1,356
Temporarily Flooded	23,750	17,495	-6,255
Upland	17,704	17,898	194

[a]Sulphur Basin Study, Terrestrial habitat Modeling, September 2018
URC – Ultimate Rule Curve (elevation 228 ft)

FIGURE G.6 VEGETATIVE COVER TYPES FOR WRIGHT PATMAN REALLOCATION AT 235' MSL



- **Threatened and Endangered Species**. There are six federally listed threatened and endangered species with the potential to occur within the counties in which this WMS is located: American Burying Beetle, Black Rail, Ouachita Rock Pocketbook, Piping Plover, Rufa Red Knot, and Whooping Crane. There is low to no potential to impact any of these species from the construction of this project. There are no preferred habitats for these species within the project sites. In addition to these three species, there are 23 state listed species potentially occurring within the project counties (this includes the recently federally delisted bald eagle and black bear). Of these state-listed species, the western creek chubsucker, northern scarlet snake, and timber rattlesnake have moderate potential to be negatively impacted by the project. Further study would be needed to assess potential impacts, if any.
- **Cultural Resources.** A desktop assessment of the potential for cultural resources was conducted as part of the Sulphur Basin study. The Wright Patman reallocation would require additional cultural resources surveys. However, some of the areas have had surveys conducted as part of the initial development of the reservoir. Of the area for high potential for cultural resources, over half have been previously surveyed. There are approximately 150 known cultural resource sites, of which less than 50 have the potential for significance.
- **Other Considerations**. In addition to considerations of impacts to habitats and waters of the U.S., the reallocation of Wright Patman has the potential to impact the White Oak Creek Wildlife Management Area (WOCWMA). This site is located upstream of Lake Wright Patman and is designated as mitigation for the construction of Jim Chapman Reservoir. At elevation 235 ft MSL, the increase in the conservation pool at Lake Wright Patman would increase water levels on approximately 450 acres of the WOCWMA and affect some riparian bottomland hardwoods. However, reallocation at this elevation would not affect the functioning of constructed wetland structures and would still allow the wetland structures to function as designed.

Permitting and Development

Reallocation at Wright Patman Lake on the scale envisioned in this strategy would require approval of the U.S. Congress. A new State water right and inter-basin transfer approval would be required from TCEQ to implement each component of the strategy. A section 404 permit would be needed for the transmission system and a Section 408 authorization is needed for impacts to federal lands.

Cost Analysis

This planning level opinion of costs has been developed using the TWDB's costing tool, except where more detailed cost analysis has been provided by the WUG or WWP. The costs developed for the Sulphur Basin study were the basis of this cost update for the dam modification and increased storage at Lake Wright Patman (FNI, 2014b). Transmission costs were updated to reflect updated quantities and delivery points using the TWDB costing tool.

TABLE G.26 SUMMARY OF COSTS

ENTITY	CAPITAL COST	UNIT COST ($/1,000 GAL)	
		WITH DEBT SERVICE	AFTER DEBT SERVICE
Recommended Strategy			
TRWD	$3,127,515,500	$10.36	$1.87
NTMWD	$1,632,513,500	$4.82	$0.91
Total	**$4,760,029,000**	**$7.59**	**$1.39**
Alternative Strategy			
TRWD	$2,211,508,800	$11.27	$2.17
NTMWD	$1,108,788,700	$5.08	$0.90
UTRWD	$251,248,700	$7.24	$1.27
DWU	$1,102,983,500	$7.30	$1.35
Irving	$116,548,700	$3.56	$0.58
Total	**$4,791,259,000**	**$7.67**	**$1.42**

Water Management Strategy Evaluation

This strategy provides a reliable new source of fresh water supplies for Region C water providers. It is located near other existing water sources that could potentially be operated as a system.

The challenges to this strategy are permitting and Congressional approval needed for reallocation. While impacts to the WOCWMA are minimized, there is uncertainty regarding mitigating for any impacts to an existing mitigation site. These natural resources are valuable to the local ecosystem and would require compensatory mitigation. A mitigation plan would be required to compensate for impacts to waters of the U.S. (includes wetlands and streams) as part of the permitting process.

Reallocation of Lake Wright Patman would be sponsored by the USACE and would require additional environmental studies. Currently, the USACE is reluctant to approve reallocation of flood storage to water conservation storage. Further study would be needed to ensure that there is no increase in flooding risks after reallocation.

Positive economic benefits are expected for the construction and operation of the Lake Wright Patman reallocation.

Water User Group Application

The Wright Patman Reallocation strategy was considered for DWU, TRWD, City of Irving, UTRWD, and NTMWD. This strategy is a recommended strategy for TRWD and NTMWD. This strategy is an alternative strategy for UTRWD, DWU, and Irving.

G.3.6 Water from Oklahoma

Potential Sponsor(s):	NTMWD, UTRWD, Irving
WMS/Project Type:	New Surface Water (Purchase)
Potential Supply Quantity:	Up to 55,000 acre-feet per year
Implementation Decade:	Varies
Strategy Capital Cost:	Varies
Unit Water Cost ($/kgal):	Varies
Application:	Alternative (NTMWD, UTRWD and Irving)

Strategy Description

Several wholesale water providers in the Metroplex have been pursuing the purchase of water from Oklahoma. At the present time, the Oklahoma Legislature has established a moratorium on the export of water from the state. Previously, the Tarrant Regional Water District pursued a case in Federal Court to determine whether this moratorium could be overturned, and the Supreme Court subsequently ruled in favor of Oklahoma. For the long term, Oklahoma remains a potential source of water supply for Region C.

There are multiple sources of Oklahoma water that have been evaluated in previous studies. These sources include Lake Hugo, Kiamichi River, Boggy Creek, Cache Creek and Beaver Creek. Since this strategy would not be implemented for several decades, the source of water will be simply defined as Oklahoma water. For purposes of developing a cost estimate, it is assumed that the water would be taken from the Kiamichi River in southeastern Oklahoma, just north of the Texas-Oklahoma state line. For planning purposes, the strategy is evaluated for 50,000 acre-feet per year. Pending future agreements with Oklahoma, the ultimate amount of water from Oklahoma may be greater.

This strategy was evaluated for three wholesale water providers in Region C: NTMWD, UTRWD, and the City of Irving. It is assumed that if this strategy is pursued, it would be developed individually by each provider. As such, the infrastructure and delivery location will be unique to each provider. For all providers, a new river diversion and pump station would be constructed on the Kiamichi River just upstream of the confluence with the Red River. A transmission pipeline would be tunneled beneath the Red River and then constructed to the final delivery location. **Table G.27** shows the delivery locations for each water provider.

TABLE G.27 WATER PROVIDER AND DELIVERY LOCATION

WATER PROVIDER	DELIVERY LOCATION
NTMWD	Bois d'Arc Lake
UTRWD	Lake Ralph Hall
Irving	Lake Lewisville

Supply Development (Quantity, Reliability, Quality)

Previous studies and the Oklahoma State Water Plan have shown substantial amounts of water is available in the Kiamichi watershed.

Water Quantity

Lake Hugo has a storage capacity of 157,600 acre-feet at conservation pool. The Kiamichi watershed encompasses approximately 1,830 square miles, of which some is regulated through existing lakes. No yield analyses were conducted for the supplies. It is assumed based on the Oklahoma Resource Board assessment of water supplies that there is 50,000 acre-feet per year or more water available to other users at this location. The quantity of supplies for each strategy is summarized in **Table G.28**.

TABLE G.28 SUMMARY OF QUANTITIES (AC-FT/YR)

DESCRIPTION	2030	2040	2050	2060	2070	2080
NTMWD	-	-	-	-	-	50,000
UTRWD	-	25,000	55,000	55,000	55,000	55,000
Irving	-	-	25,000-	25,000	25,000	25,000

Reliability

The water from Oklahoma is expected to be highly reliable. Historically these supplies have been reliable, however increased use in Oklahoma might change this. Additionally, there is always the potential that a new drought could occur that would reduce the supplies, but the quantity used in this evaluation is less than the firm yield. An availability analysis would be required prior to implementation. The greatest potential to reliability is a changing political climate that may impede out-of-state water sales.

Water Quality

Water quality in Lake Hugo and the lower Kiamichi River watershed is generally good. Main issues are turbidity (average turbidity is 36 NTU) and pH (6.3-8.3 pH units).

Environmental Considerations

Environmental studies will need to be conducted before construction begins on any of the strategies.

- **Habitat and Vegetative Cover.** Impacts to environmentally sensitive areas along the pipeline route should be minimal and would be avoided where possible. Lake intake and transmission pipeline infrastructure would be located to avoid conflicts with environmentally sensitive areas in addition to ecologically significant stream sections. Where possible, the pipeline follows existing road rights-of-way or crosses areas of agricultural use. Impacts to the Red River are avoided by tunneling beneath the river. This strategy proposes to transfer the water to existing lakes. Care should be taken to minimize the transfer of invasive species, especially since this water crosses state lines. If the placement of water into an existing lake becomes a concern, the water could be delivered directly to the intake at the receiving lake.

- **Threatened and Endangered Species**. The project area includes 19 species that are federal or state-listed as threatened or endangered or are federal candidate species in the counties for which the project is located. No designated areas of critical habitat currently occur within the project area.
- **Environmental Water Needs**. Implementation and operation of the strategies will have a limited impact on daily flows since the strategies will operate in accordance with authorized water right permits.
- **Wetlands.** Impacts to wetlands associated with this project are anticipated to be low.

Permitting and Development

Permitting and development of Oklahoma water has been an obstacle to developing this strategy. Currently Oklahoma has moratorium for export of water out of state. This includes both sales of water that is already permitted and new water right permits.

There are also several issues beyond the moratorium:

- The Chickasaw and Choctaw Indian Nations have asserted legal claims to water in southeastern Oklahoma. Neither tribe has asserted their claims in court but may do so in the future.
- Oklahoma City has filed permit applications for water from the Kiamichi River basin. The courts will have to assess the impact of intrastate needs in conjunction with the interstate permit applications filed by Texas entities.
- The use of Oklahoma water in Texas has no precedence in Texas Water law or TCEQ rules.

A new water right requires the granting of this right by the Oklahoma Water Resource Board. Alternatively, water could be sold directly from an existing water right holder, such as the City of Hugo or others. The river diversion and transmission pipeline would require a federal Section 404 permit. Since this water originates outside of Texas, an interbasin transfer permit is not required by TCEQ.

The public and political opposition to this strategy effectively limits development opportunities in the near future. It is expected that this opposition will subside over time. Another major obstacle is the federal Lacey Act that prohibits the transference of invasive species across state lines. This could be addressed through changes in legislation. The resolution of these development issues will likely take some time. As a result, this strategy is considered for implementation by 2070.

Cost Analysis

TWDB costing guidance was followed. Annual costs were also developed following TWDB guidance for debt service and operation and maintenance costs.

TABLE G.29 SUMMARY OF COSTS

ENTITY	CAPITAL COST	UNIT COST ($/1,000 GAL)	
		WITH DEBT SERVICE	AFTER DEBT SERVICE
NTMWD	$1,075,067,000	$4.39	$0.84
UTRWD	$645,268,000	$2.77	$0.82
Irving	$341,796,025	$3.53	$1.25

Water Management Strategy Evaluation

This strategy provides a reliable water supply in close proximity to other existing water sources for the identified potential sponsors. There are minimal environmental concerns with the intake and pipeline. The challenges with this strategy are the development issues, including the political moratorium on out-of-state water sales and the Lacey Act. Under the Lacey Act, it is unlawful to import, export, sell, acquire or purchase fish, wildlife or plants that are taken, possessed, transported, or sold: 1) in violation of U.S. or Indian law, or 2) in interstate or foreign commerce involving any fish, wildlife, or plants taken, possessed or sold in violation of State or foreign law. Since there is considerable uncertainty as to when these obstacles could be overcome, this strategy cannot be counted on for near-term water supplies.

Water User Group Application

The Oklahoma strategies were evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which they 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 suitability of the strategy to the WUGs served.

The Oklahoma Strategy is recommended as an alternative strategy for NTMWD, UTRWD, and Irving by the Region C Regional Water Planning Group.

G.3.7 Lake Texoma Supplies

Potential Sponsor(s)	DWU, GTUA, NTMWD, UTRWD, Sherman, and Denison
WMS/Project Type:	New Surface Water (Desalination/Blending)
Potential Supply Quantity:	Varies.
Implementation Decade:	Varies.
Strategy Capital Cost:	Varies.
Unit Water Cost ($/kgal)	Varies.
Application:	Varies.

Strategy Description

Lake Texoma is an existing Corps of Engineers reservoir on the Red River on the border between Texas and Oklahoma. The reservoir is about 50 miles from the Metroplex. The lake is used for water supply, hydropower generation, flood control, and recreation. In Texas, the North Texas Municipal Water District (NTMWD), the Greater Texoma Utility Authority (GTUA), the City of Denison, Texas Utilities (TXU), and the Red River Authority (RRA) have contracts with the Corps of Engineers and Texas water rights allowing them to use water from Lake Texoma.

Water from Lake Texoma is brackish, which means that the use of Texoma water requires the water to be blended with a freshwater source or desalinated. This has historically limited the amount of water that is used from Lake Texoma, either due to limited quantities of fresh water for blending or operational constraints for desalination. The water rights for each entity are summarized in **Table G.30**. GTUA has contracted their water right to several entities within the region. Currently the only entities that have the transmission infrastructure to access these supplies through GTUA are Sherman and its customers.

TABLE G.30 LAKE TEXOMA REGION C WATER RIGHTS

ENTITY	WATER RIGHT YIELD (AC-FT/YR)	CONSTRAINT
NTMWD	197,000	Must blend with other supplies due to quality (3:1 Blending Ratio).
GTUA	**83,200**	Limited by the Sherman Desalination Plant Capacity.
Collinsville	*1,130*	*No transmission infrastructure.*
Denison	*12,204*	*Limited by plant capacity and quality. This is in addition to Denison's own right.*
Gainesville	*12,204*	*No transmission infrastructure.*
Gunter	*1,130*	*No transmission infrastructure.*
Lake Kiowa	*848*	*No transmission infrastructure.*
Lindsay	*1,695*	*No transmission infrastructure.*
Marilee SUD	*2,260*	*No transmission infrastructure.*
NWGCWCID #1	*678*	*No transmission infrastructure.*
Pottsboro	*5,650*	*No transmission infrastructure.*
Sherman	*37,209*	*Limited by the Sherman Desalination Plant Capacity.*
Southmayd	*565*	*No transmission infrastructure.*
Two Way SUD	*2,260*	*No transmission infrastructure.*
Whitesboro	*2,260*	*No transmission infrastructure.*

ENTITY	WATER RIGHT YIELD (AC-FT/YR)	CONSTRAINT
Woodbine	*848*	*No transmission infrastructure.*
Denison	24,400	Limited by Plant capacity and quality. This is in addition to supplies contracted with GTUA.
TXU	16,400	TXU facility closed. Valley Lake was sold to a private entity. TXU still holds water right but relinquished its contract with the USACE for storage.
RRA	2,250	

Dallas (DWU), Upper Trinity Regional Water District (UTRWD), GTUA, and Sherman have expressed interest in developing additional supplies from Lake Texoma. However, all the currently authorized Texas storage in the lake is contracted with existing users. For entities without or without enough existing water rights in Lake Texoma, there are three possibilities to obtain additional Texoma supplies:

(1) **Purchase of existing water rights in Lake Texoma.** There are several unused water rights in Lake Texoma, including the TXU water right. Purchasing the USACE storage contract and water right would provide additional supply to the new owner. If only the storage contract is available for purchase, an entity would need to seek a new water right to divert the water.

(2) **Additional reallocation of hydropower storage to water supply in Lake Texoma.** According to the Corps of Engineers, the firm yield of Lake Texoma with all hydropower storage reallocated to water supply would be 1,088,500 acre-feet per year. Texas' share would be 544,250 acre-feet per year, leaving about 220,000 acre-feet per year of additional supply available to Texas (beyond the supplies already contracted for the currently authorized reallocation). Reallocation above 50,000 acre-feet would require a new authorization by Congress.

(3) **Texas water providers could contract directly with Oklahoma for supply from the Oklahoma share of Texoma.** There are political issues with this option that are discussed in more detail under the *Water from Oklahoma Technical Memorandum* included within this appendix.

Due to the proximity of Lake Texoma to the Metroplex and the individual needs of the Region C water providers, there are multiple strategies that propose to use water from Lake Texoma.

Supply Development (Quantity, Reliability, Quality)

Water Quantity

The amount of water available for each of the Texoma blending strategies is highly dependent upon the water quality of Lake Texoma and the fresh water source. For NTMWD, there are multiple potential sources of water for blending: Bois d'Arc Lake, Lake O' the Pines, Marvin Nichols Reservoir, and Wright Patman Reservoir reallocation. All these sources are expected to have good quality water with TDS levels at 300 mg/l or less. If all the blending strategies are implemented, then there will be minimal remaining permitted supplies available for the desalination strategy and additional supplies would need to be permitted and/or contracted. The blending source for UTRWD includes Lake Ralph Hall and Marvin Nichols Reservoir. Considering these sources, a blend ratio of 3:1 is assumed to be achievable. However, operational testing after implementation would be needed to verify this assumption.

For desalination strategies, a portion of the Texoma source water would be discharged as waste. Loss amounts from the desalination process can range depending on the source water quality. To minimize the amount of treatment losses, the desalinated water could be blended back with only conventionally treated Texoma water. For this analysis, the loss from the treatment process is assumed to be 15 percent of the total supply.

A summary of the quantities of Texoma water for each strategy is shown in **Table G.31**.

TABLE G.31 SUMMARY OF QUANTITIES (AC-FT/YR)

	WMS	BLEND WATER	TEXOMA RAW (AF/Y)	2030	2040	2050	2060	2070	2080
NTMWD	Blending	Bois d'Arc Lake/ Lavon	39,309	3,844	36,934	38,137	39,309	38,997	38,170
		Lake O' the Pines	24,372	-	-	24,372	23,872	23,372	22,872
		Marvin Nichols	49,518					49,518	49,518
		Total	***111,887***	***3,844***	***36,934***	***62,509***	***63,181***	***111,887***	***110,560***
	Desal	NA	40,000	-	-	-	-	-	33,630
GTUA	Desal	NA	36,300[1]		7,050	30,850	30,850	30,850	30,850
Sherman	Desal	NA	20,824[2]	5,900	17,700	17,700	17,700	17,700	17,700
DWU	Desal	NA	175,000[3]	-	-	-	-	-	146,000
UTRWD	Blending	Sulphur Basin	25,000[3]	-	25,000	25,000	25,000	25,000	25,000
Denison	Desal	NA	9,232	4,906	7,581	7,847	7,847	7,847	7,847

1. Quantity includes reallocation of storage in Lake Texoma and use of some of GTUA's existing water right.
2. Quantity includes acquisition of unused storage contract and water right in Lake Texoma and use of some of Sherman's unused contract with GTUA.
3. Quantity assumes reallocation of storage in Lake Texoma and/or contracts with Oklahoma.

Reliability

Lake Texoma is a reliable source for water supply. NTMWD, GTUA and customers, Sherman and Denison hold the water rights to this source. Blending of Texoma water is as reliable as the fresh water source. If there is a decrease in available fresh water, then the amount of water that can be used from Texoma will also decrease. For UTRWD and DWU, there is considerable uncertainty regarding reallocation of Texoma water at the amount proposed for municipal water supply. The smaller reallocation for GTUA also has uncertainties, but it does not require Congressional approval.

There is some uncertainty regarding the ability to desalinate and dispose of the large quantities of reject water. The technology to dispose of large quantities of saline waste for an inland desalination project is uncertain. Large quantities of brine would likely need to be disposed of through deep well injection. Smaller quantities could potentially be discharged back to water in the Red River Basin, including Lake Texoma and the Red River. For deep well injection, no hydrogeologic studies have been conducted to identify a suitable formation to receive the brine discharges. If the sponsor cannot locate suitable disposal sites nearby, the quantity available from this alternative could be considerably smaller and/or considerably more expensive.

Water Quality

The lake has elevated levels of dissolved solids, and the water must be blended with higher quality water or desalinated for municipal use. The elevated dissolved solids in Lake Texoma would have some environmental impacts whether the water is used by blending or desalination. Blending water from Lake Texoma with water from other sources provides an inexpensive supply for Region C. Desalination provides treated water but is a more expensive strategy, and there are uncertainties in the long-term costs.

Environmental Considerations

The reservoir is an existing source of water, therefore environmental impacts are limited for use of permitted supplies. Reallocation of hydropower storage could reduce hydropower flows that are currently released downstream. The primary environmental impacts of this project are associated with the pipeline, pump station, terminal storage reservoir, desalination plant and the carbon emissions associated with the electricity needed to pump the water. Additionally, for the blending strategies, there is the potential to transfer invasive species (zebra mussels) from Texoma. Infrastructure can be designed or improved in a way to minimize such transfers. Impacts of increased demand on Lake Texoma would also occur but have not been evaluated.

- **Vegetative Cover.** No detailed studies have been conducted of the vegetative cover for this alternative. The location of the proposed infrastructure generally lies within urban and rural areas. The proposed pipelines could be routed to avoid highly sensitive environmental areas. There are numerous stream crossings to move the water from Texoma as well.
- **Threatened and endangered species.** There are six threatened or endangered federal species that are known to occur or have the potential to occur within the counties in which the project is located. Also, the bald eagle, which is delisted but being monitored, may occur in these counties. It is expected that implementation of this alternative would have low to no potential to negatively impact the species.
- **Other.** The presence of zebra mussels in Lake Texoma can create additional obstacles for entities planning on using this source. Additional steps need to be taken when developing transmission infrastructure to prevent the spread of zebra mussels. Additionally, injecting large quantities of brackish water (desalination strategies) could potentially increase seismic activity in the area. Recent studies on oil and gas fracking activities have indicated a connection with injection wells and increases in small earthquakes. The reject water would need to be injected deep enough to prevent impacts to the overlying aquifer.

Permitting and Development

Lake Texoma supplies require an interbasin transfer permit if used outside the Red River Basin, state water right, possible Congressional authorization, and a contract with USACE. For the desalination strategies, a brine discharge permit for deep well injection may be needed. For brine discharges to surface water, a TPDES permit from TCEQ would be needed.

The State of Oklahoma does retain the right to a significant portion of unpermitted water that is allocated to municipal and industrial use. However, Oklahoma has a moratorium on exporting water. UTRWD has applied for up to 115,000 acre-feet per year from any three sources in Oklahoma, including Lake Texoma.

Development of this supply will require agreement between the water rights stakeholders in Texas along with the state of Oklahoma and the Corps of Engineers.

Cost Analysis

Detailed cost estimates for the Lake Texoma Desalination and Blending Projects were provided by the associated sponsors where available. These costs are more detailed estimates developed during design. For consistency with SB1 planning guidance, the costs were updated to September 2023 dollars using the ENR index.

When detailed costs were not available, the UCM and TWDB costing guidance were followed. Annual costs were also developed following TWDB guidance for debt service and operation and maintenance costs.

TABLE G.32 SUMMARY OF COSTS

ENTITY	CAPITAL COST	UNIT COST ($/1,000 GAL)	
		WITH DEBT SERVICE	AFTER DEBT SERVICE
NTMWD – Blending Phase I	$465,653,000	$2.46	$0.48
NTMWD – Blending Phase II	$741,772,000	$2.10	$0.42
NTMWD – Desalination[1]	$1,447,262,000	$16.43	$7.22
GTUA – Phase 1[1,2]	$553,807,000	$15.30	$6.15
GTUA – Phase 2[1]	$570,036,000	$12.45	$6.65
Sherman[1]	$487,865,000	$23.40	$11.60
DWU[1]	$3,823,824,000	$9.06	$3.42
UTRWD	$809,697,000	$6.55	$1.18
Denison[1,3]	$256,786,000	Varies	Varies

1. Costs are for treated water.
2. Costs for GTUA – Phase 1 includes both Texoma water and brackish groundwater.
3. Costs for Denison include increased transmission capacity that would be used for both blending and desalination of Texoma water.

Water Management Strategy Evaluation

Based on the yield of Lake Texoma, these strategies provide a reliable source of additional supplies with limited impacts. However, for this supply to be viable for the blending strategies, another freshwater source of supply must be acquired as well.

For the desalination strategies, there is no need to acquire a separate source, however, there are significant costs associated with desalination as well as issues with waste disposal. Costs vary depending on the new infrastructure required. Blending of Texoma water with existing sources is the least expensive option. Desalination is more expensive to construct and operate. However, Lake Texoma is a nearby source and the infrastructure to move the water to the areas with needs is relatively short as compared to other major new sources of water.

Water User Group Application

This is a recommended strategy for NTMWD Blending, GTUA Desalination, Sherman Desalination, Sherman Water Right Acquisition, and Denison Desalination. It is an alternative strategy for NTMWD Desalination, DWU Desalination, and UTRWD Blending.

G.3.8 Toledo Bend

Potential Sponsor(s):	NTMWD, TRWD, DWU, and UTRWD
WMS/Project Type:	New Surface Water (Purchase)
Potential Supply Quantity:	Phase One - 350,000 acre-feet per year
Implementation Decade:	2060
Strategy Capital Cost:	$11,334,237,000
Unit Water Cost ($/kgal):	$7.25 during Debt Service; $1.71 after Debt Service
Application:	Alternative

Strategy Description

Toledo Bend Reservoir is located on the state border with Louisiana, approximately 200 miles from the Metroplex. The reservoir is owned and operated by the Sabine River Authority (SRA) of Texas and the Sabine River Authority of Louisiana for water supply and hydropower generation. The reservoir has a conservation surface area of 181,600 acres and a shared storage capacity of 4,477,000 acre-feet. The SRA Texas holds a Texas water right to divert 970,067 acre-feet per year from Toledo Bend.

Several Region C Metroplex suppliers have been investigating the possibility of developing additional water supplies from the Toledo Bend Reservoir, with ultimately up to 650,000 acre-feet per year delivered to Region C. Although these supplies are intended to be used within Region C, the Toledo Bend Reservoir is physically located in Region I, the East Texas Region. The development of this supply will require an agreement among the SRA and Metroplex suppliers, an interbasin transfer permit from the Sabine River Basin to the Trinity River Basin (and possibly other basins), and development of water transmission facilities.

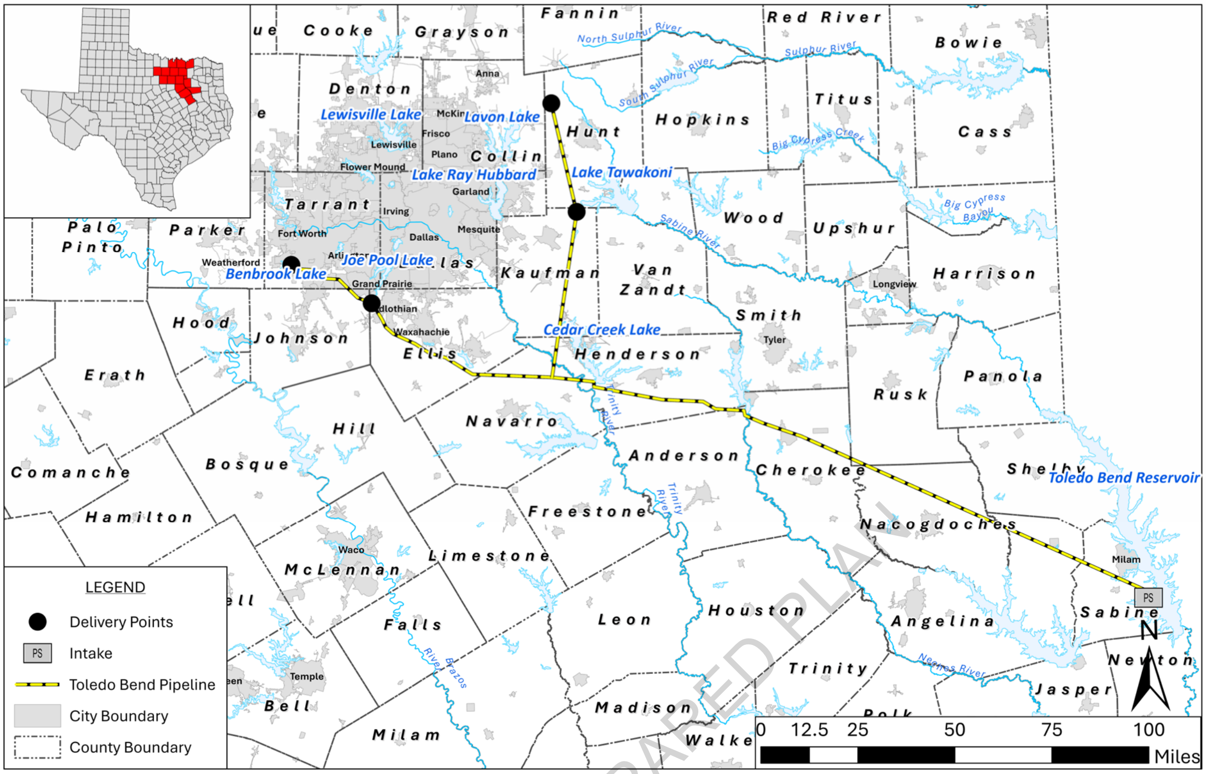
This strategy is envisioned as an alternative joint strategy with multiple water providers in the Region C area. Participants in the joint strategy would include NTMWD, TRWD, DWU, and UTRWD. The joint pipeline would convey supplies to the reservoirs or terminal storage of each respective participant as summarized in **Table G.33**.

TABLE G.33 PROPOSED DELIVERY LOCATIONS FOR PARTICIPATING ENTITY

PARTICIPATING ENTITY	PROPOSED DELIVERY LOCATION
NTMWD	Tawakoni WTP
TRWD	Benbrook Lake
DWU	Joe Pool Lake
UTRWD	Lake Ralph Hall Balancing Reservoir

Figure G.7 shows a potential layout for the alternative joint strategy. The strategy would be constructed in two phases, with approximately half of the ultimate capacity constructed in the first phase and the remainder in the second phase. Phase 2 is not included in the strategy evaluation.

FIGURE G.7 TOLEDO BEND ROUTE



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Supply Development (Quantity, Reliability, Quality)

Water Quantity

The SRA water right for Toledo Bend authorizes the diversion and use of 970,067 acre-feet per year for municipal, industrial and irrigation purposes. Currently only a small portion of this water right is under contract and in use. There is sufficient supply available to provide a project yield of 350,000 acre-feet per year (Phase 1). Agreements with SRA on the quantity and price of water and an interbasin transfer permit to move the water to the Metroplex would be needed. The projected supplies for Phase 1 are summarized in **Table G.34**. Phase 2 would provide the same amounts as Phase 1 to NTMWD, TRWD and DWU for a total of 300,000 acre-feet per year.

TABLE G.34 SUMMARY OF QUANTITIES (AC-FT/YR)

DESCRIPTION	PHASE 1 QUANTITY
DWU	100,000
TRWD	100,000
NTMWD	100,000
UTRWD	50,000
Total	***350,000***

Reliability

The water is considered reliable since only a portion of the available supply is currently used, and it is an existing supply. However, the water must be conveyed using multiple pump stations (including the intake) and approximately 200 miles of pipeline. There is concern that if there is a line breakage or pump failure, the down time could impact the ability to meet customers' demands.

Water Quality

The Sabine River Basin and Toledo Bend Reservoir are considered to have good quality water. According to stream standards, Toledo Bend has lower total dissolved solids than Lake Lavon (TAC 307). Toledo Bend does contain giant salvinia, an invasive plant species. Specific management actions would be needed to limit transfer of this species to other lakes and streams along the pipeline route. Generally, it is not anticipated that there would be any water quality impact to Region C supplies from using Toledo Bend Reservoir.

Environmental Considerations

The reservoir is an existing source of water, therefore environmental impacts are limited. The primary environmental impacts of this project are associated with the pipeline, pump station, terminal storage reservoir and the carbon emissions associated with the electricity needed to pump the water. Impacts of increased demand on Toledo Bend Reservoir would also occur but have not been evaluated.

- **Habitat and Vegetative Cover.** No detailed studies have been conducted of the vegetative cover for this alternative. The location of the proposed infrastructure generally lies within rural areas. The pipeline route will cross through the Sabine National Forest which is adjacent to almost the entire shoreline of Toledo Bend Reservoir in Texas. The pipeline will follow a general rural path. Where possible the alignment will follow the IPL right-of-way, minimizing habitat disturbances. If needed, the proposed pipeline alignments possibly could be routed to avoid sensitive environmental areas.
- **Threatened and endangered species**. The strategy crosses portions of twelve counties which include numerous state and federally listed endangered or threatened species, and federal candidate species that use these various habitats. More detailed analysis of the pipeline alignment would need to be conducted to identify if any potential habitat for these species is impacted.
- **Environmental Water Needs.** Implementation and operation of this strategy could have an impact on daily flows in the Sabine River due to the amount of supply diverted from storage that might have been previously passed downstream. The project will abide by any environmental flow requirements determined by TCEQ, as appropriate.
- **Bays and Estuaries**. Quantifying the impact from transporting supplies out of the basin will require additional detailed analysis. The implementation of the strategy may impact flows to Sabine Lake and its estuary downstream of the Toledo Bend Reservoir since freshwater stream flows are critical to the health of the Sabine estuary system. However, since this strategy proposes to use existing water sources that have been permitted (i.e., no new

appropriations), utilization of existing water rights was considered as part of the SB3 environmental flow evaluations.

- **Wetlands.** There may be several wetlands along the proposed pipeline alignments; however, flexibility in the pipeline routing can be used to minimize or avoid potential impacts.

Permitting and Development

As previously discussed, this strategy would require an interbasin permit to transfer the water from the Sabine River Basin to the Trinity River Basin and potential other basins. It is uncertain if the transfer of water from the Sabine River Basin would subject the existing water right to Texas environmental flow standards (TAC Title 30 Chapter 298). Construction of a transmission system would require a Section 404 permit for the intake pump station and stream and wetland crossings of the pipeline and related infrastructure. Because of the size of the Toledo Bend pipeline current conceptual status, development and implementation of this alternative would take 15 to 20 years.

Cost Analysis

Detailed costs were developed using the Uniform Cost Model. Costs to purchase water from SRA are based on the Region C rate for raw water at the source, which is a placeholder for the strategy evaluation. The purchase water cost would be negotiated between the buyers and sellers.

TABLE G.35 SUMMARY OF COSTS

ENTITY	CAPITAL COST	UNIT COST ($/1,000 GAL)	
		WITH DEBT SERVICE	AFTER DEBT SERVICE
DWU	$3,009,692,000	$6.69	$1.53
TRWD	$3,526,584,000	$7.87	$1.82
NTMWD	$2,930,008,000	$6.43	$1.43
UTRWD	$1,877,953,000	$8.13	$1.75
Total	***$11,334,237,000***	***$7.16***	***$1.62***

Water Management Strategy Evaluation

Toledo Bend Reservoir is approximately 200 miles from Region C, so this is a relatively more expensive source of supply for the Region. Additionally, the project would pose several permitting challenges, including obtaining an interbasin permit and a Section 404 permit. However, it does offer a substantial water supply, and environmental impacts will be limited because it is an existing source.

There is some uncertainty regarding reaching agreements with SRA and other water providers if a joint strategy is pursued. There may be competition for this supply.

Water User Group Application

The Toledo Bend strategy was evaluated on a basis of several criteria to determine the Water User application. 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 This is an alternative strategy for DWU, UTRWD, TRWD, and NTMWD.

G.3.9 Red River Off-Channel Reservoir

Potential Sponsor(s):	DWU, UTRWD
WMS/Project Type:	New Surface Water (Off-Channel Reservoir)
Potential Supply Quantity:	114,000 acre-feet per year (102 MGD)
Implementation Decade:	2060
Strategy Capital Cost:	$2,062,385,000
Unit Water Cost ($/kgal):	$5.75 during Debt Service; $1.18 after Debt Service
Application:	Alternative

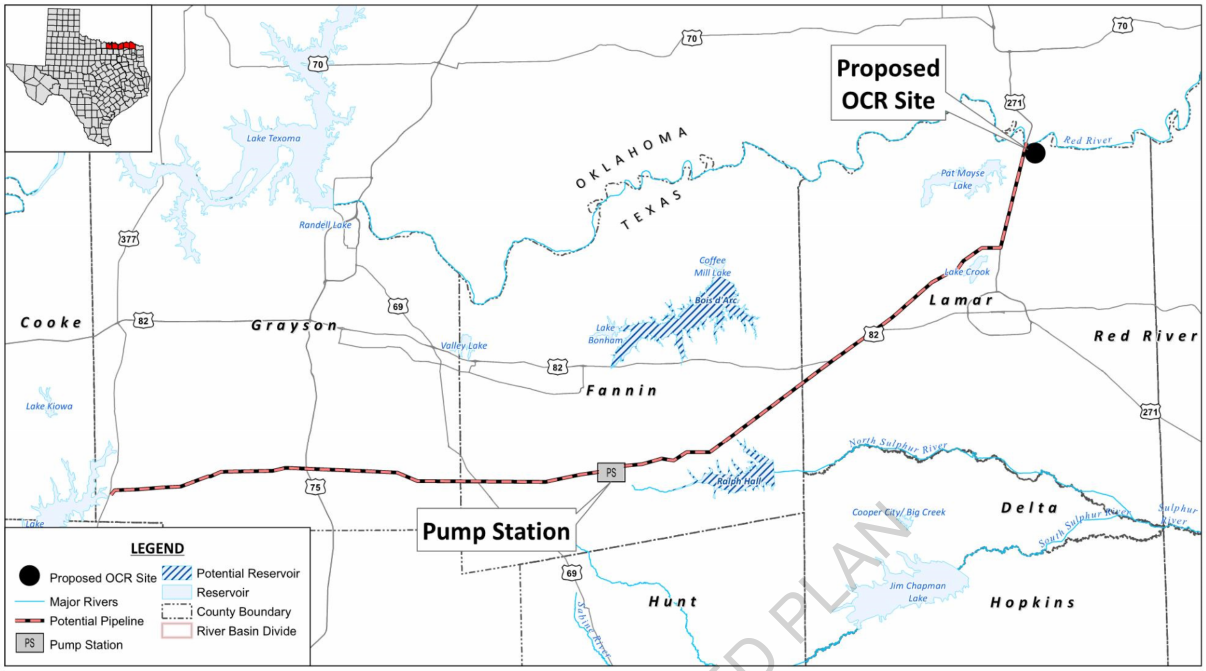
Strategy Description

This strategy would develop new water supplies from the Red River, downstream of Lake Texoma. In this stretch of the Red River, water flowing in the river is equally split between Texas and Oklahoma. Dallas proposes to permit a portion of Texas' share of this flow for diversion and impoundment in a series of off-channel reservoirs. The water would then be transported to Lake Ray Roberts for subsequent diversion and use. UTRWD is also interested in a joint version of this strategy where UTRWD would connect to Dallas' pipeline and transport supplies to the Tom Harpool Water Treatment plant.

This project includes a 162 MGD (250 cfs) intake and pump station on the Red River at Arthur City, TX immediately downstream of the Highway 271 Bridge as shown. Diversions from the Red River would be pumped approximately 2 miles to three off-channel reservoirs (OCR) in series. The first OCR would consist of a 2,500 AF basin for initial sediment settling and removal. The next OCR in the series would have a capacity of 5,300 AF and would provide additional sediment removal and water quality improvement. The third and final OCR would consist of a 32,000 AF storage basin to allow for extended pumping when the flow in the Red River is extremely low or water quality is impaired. Water would then be diverted from the third OCR by a 129 MGD (200 cfs) intake and pump station that would transport supplies via an 84-inch transmission pipeline to Lake Ray Roberts for subsequent blending and use by Dallas.

The total area of the reservoirs is 803 acres with a total capacity of 39,800 AF. The upper OCR has a conservation pool elevation of 525 ft-msl, a storage capacity of 2,500 AF and surface area of 76 acres. The middle OCR has a conservation pool elevation of 151 ft-msl, a storage capacity of 5,300 AF with a surface area of 189 acres. The third and largest OCT has a conservation pool elevation of 505 ft-msl with an embankment height of 70 feet and an active conservation pool capacity of 32,000 AF.

FIGURE G.8 RED RIVER OFF CHANNEL RESERVOIR AND ROUTE



Supply Development (Quantity, Reliability, Quality)

Water Quantity

As part of the *Dallas Long Range Water Supply Plan*, a yield analysis was completed using monthly available flow at Arthur City extracted from the TCEQ Red River WAM. The flows were adjusted to account for instream flow requirements in the Red River Compact (RRC). The results found that the 129 MGD river diversion would be able to be exercised approximately 94% of the time without consideration of water quality. However, the available yield from this supply, as an alternative strategy for Dallas, is limited by the proposed infrastructure to approximately 102 MGD. If this WMS is pursued jointly, UTRWD would participate for 15,000 acre-feet/year.

TABLE G.36 SUMMARY OF QUANTITIES

DESCRIPTION	QUANTITY
DWU	114,000
UTRWD	15,000

Reliability

The reliability of the water supplies is projected to be good.

Water Quality

From 1968 to 2012, the City of Dallas in cooperation with the USGS conducted water quality sampling of the Red River for the reach downstream of Denison Dam and specifically at the Arthur City USGS stream gage. The sampling done showed that slightly less than 15% of the time, the water quality within the Red River would not meet drinking water standards for TDS, chlorides and sulfates without blending from other water sources with better quality. Additionally, since the city of Dallas uses ozone in its water treatment process the formation of bromates can be a problem when bromide concentration exceeds 0.2 mg/L. Dallas plans to mitigate these concerns by not operating the Red River Pump Station when water quality is problematic and would also plan to blend the Red River water with other water supplies.

Environmental Considerations

Environmental issues for this project are expected to be low.

- **Habitat and Vegetative Cover.** River and transmission infrastructure would be located to avoid conflicts with environmentally sensitive areas where feasible. There are currently no areas of designated critical habitat within the project area. The OCR site is primarily pasture areas with some forested areas. The use of best management practices during construction activities will help to minimize potential impacts to these areas.
- **Threatened and Endangered Species.** The counties within which the project is located include 18 species that are federally or state listed as threatened or endangered or are federal candidate species. No known designated areas of critical habitat currently occur within the project area.
- **Environmental Water Needs.** Implementation will have a limited impact on daily flows in the Red River since average gaged streamflow from 1998 to 2013 has been over 13 million AF per year and the 162 MGD intake facility would divert less than 2 percent of the flows on average.
- **Wetlands.** Impacts to wetlands associated with this project are anticipated to be low.

Permitting and Development

Dallas would need to obtain a water rights permit for the river diversion from the TCEQ including an interbasin transfer authorization. In addition to the water rights permit, Dallas would need to obtain a 404 permit from the USACE for impacts to a waterway from construction activities.

Diversions from the Red River would potentially need to comply with provisions of the Lacey Act which prohibits the transport of non-native species across state boundaries. In this case zebra mussels might be a concern, depending on where the intake and pump station facilities are constructed. Diversions would also need to comply with the Red River Compact.

Cost Analysis

Detailed cost estimates for the strategy were provided by DWU. For the joint strategy, the split of costs for UTRWD is based on the relative quantities of water (approximately 13%). TWDB costing guidance was followed. Annual costs were developed following TWDB guidance for debt service and operation and maintenance costs.

Cost estimates for the Red River OCR supplies are included in **Appendix H**.

TABLE G.37 SUMMARY OF COSTS

ENTITY	CAPITAL COST	UNIT COST ($/1,000 GAL)	
		WITH DEBT SERVICE	AFTER DEBT SERVICE
DWU (Stand-Alone)	$2,062,385,000	$5.75	$1,18
UTRWD (Joint)	*$334,802,000*	*$5.75*	*$1.18*

Water Management Strategy Evaluation

Although the Red River OCR project has the potential to provide DWU with significant new water supplies, there are several concerns with the project in its current state. These issues include bank stability for the intake structure along the Red River, water quality, sediment control and invasive species. Additionally, the Red River OCR project possesses a high level of risk associated with permitting as well as performance risk associated with a worse drought of record and future upstream diversions and impoundments. A significant portion of the available flow to the project originates in the Blue and Muddy Boggy River watershed in Oklahoma. If large reservoirs are constructed in these watersheds, the available flow could be reduced.

Water User Group Application

The Red River OCR project is an alternative strategy by the Region C Regional Water Planning Group for DWU and UTRWD.

G.3.10 Carrizo-Wilcox Groundwater from Region I

Potential Sponsor(s):	NTMWD, TRWD
WMS/Project Type:	New Groundwater
Potential Supply Quantity:	42,000 acre-feet per year
Implementation Decade:	2040
NTMWD:	
Strategy Capital Cost:	$1,253,455,000
Unit Water Cost ($/kgal):	$6.23 during Debt Service; $1.25 after Debt Service
Application:	Alternative
TRWD:	
Strategy Capital Cost:	$823,439,000
Unit Water Cost ($/kgal):	$4.71 during Debt Service; $1.23 after Debt Service
Application:	Alternative

Strategy Description

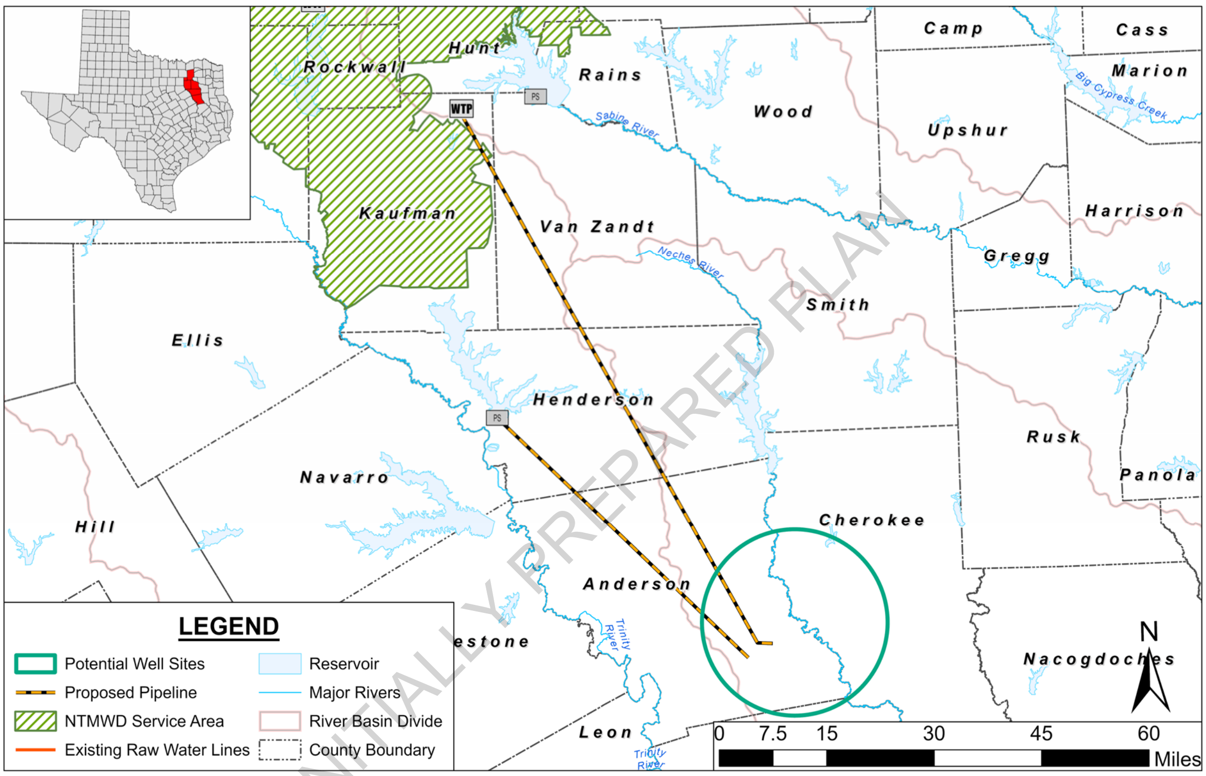
There are existing groundwater holdings in multiple counties in east Texas south of Lake Palestine that could be developed for use in Region C. A portion of these holdings are in the southeastern part of Anderson County. Additionally, there are groundwater supplies available in Wood, Upshur, and Smith counties.

This strategy is considered for NTMWD and TRWD. The project would develop a new well field and pump the water to the NTMWD Tawakoni Water Plant (or a new southeast water plant) through a new transmission line. For TRWD, the water would be delivered to the IPL near Cedar Creek

Reservoir. The proposed groundwater supplies would provide up to 42,000 acre-feet per year of supply.

The well field in southeastern Anderson County is located about 90 miles southeast of the NTMWD delivery point and 53 miles southeast of the TRWD delivery point. A total of 92 wells at 46 well sites were assumed for this strategy, supplying 37.5 MGD on an average basis for 50 years. Each well site contains a well completed in the Queen City aquifer and a well completed in the Carrizo aquifer.

FIGURE G.9 GROUNDWATER IN ANDERSON COUNTY (REGION I)



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Supply Development (Quantity, Reliability, Quality)

Water Quantity

Previous studies indicate there is approximately 42,000 acre-feet of groundwater available from the Carrizo-Wilcox and Queen City aquifers beneath existing holdings in Anderson County. For planning purposes, this strategy is sized for the full 42,000 acre-feet per year. However, the amount of groundwater that could be developed under regional planning rules may be less.

Reliability

The reliability is low to moderate. Previous studies indicate the water is available, but the regulatory framework does not confirm these amounts. Even with regulatory management of these aquifers, the aquifers are subject to recharge and pumpage from other users, both within the GCD and adjacent areas. Also, changes in GCD operating rules and Desired Future Conditions (DFCs), as well as the Modeled Available Groundwater (MAG) may affect the long-term reliability of this source.

Water Quality

Water from the Carrizo-Wilcox and Queen City aquifers in Anderson County is fresh water with TDS levels of 200 to 300 mg/l and is anticipated to only need disinfection. If the water quality is poorer, further study would likely be needed to determine any potential additional treatment required.

Environmental Considerations

Environmental impacts would be low. The pipeline would require multiple stream crossings, but likely could be routed to avoid and/or minimize environmentally sensitive areas.

Permitting and Development

Anderson County is in the Neches and Trinity Valley GCD. It is assumed that most to all the proposed groundwater is already permitted by the current owners.

The construction of the groundwater project such as described above could be implemented by 2040. This time frame includes negotiations with the seller, water testing, design and construction of the infrastructure.

Cost Analysis

Costs were developed using the TWDB Uniform Cost model. Annual costs were also developed following TWDB guidance for debt service and operation and maintenance costs.

Cost estimates for the strategy supplies are included in **Appendix H.**

TABLE G.38 SUMMARY OF COSTS

ENTITY	CAPITAL COST	UNIT COST ($/1,000 gal)	
		WITH DEBT SERVICE	AFTER DEBT SERVICE
NTMWD	$1,253,455,000	$6.23	$1.25
TRWD	$823,439,000	$4.71	$1.23

Water Management Strategy Evaluation

This strategy can provide additional supplies, but the reliability is uncertain. Further study is needed to confirm the reliability of the supplies . Supply amounts can change based on changes in regulatory rules, which can also affect the long-term reliability of this source.

Water User Group Application

The Carrizo Groundwater Project is designated as an alternative strategy for NTMWD and TRWD by the Region C Water Planning Group.

G.4 DWU Major Water Management Strategy Technical Memorandums

G.4.1 Main Stem Balancing Reservoir

Potential Sponsor(s):	DWU
WMS/Project Type:	Reuse (Off-Channel Reservoir)
Potential Supply Quantity:	95,829 acre-feet per year
Implementation Decade:	2050
Strategy Capital Cost:	$1,767,099,000
Unit Water Cost ($/kgal):	$3.71 during Debt Service; $0.72 after Debt Service
Application:	Recommended

Strategy Description

The project description for the Main Stem Balancing Reservoir is based on the information provided by the Dallas Long Range Plan (DWU, 2024). Dallas has been granted water rights (permit 12468) to store return flows from the Central and Southside wastewater treatment plants in an off-channel reservoir, the Main Stem Balancing Reservoir. The Main Stem Balancing Reservoir would be located in Ellis County southeast of Bristol, Texas, and will receive diversion from the Trinity River. This project has a good amount of flexibility and different potential configurations require additional evaluation. For the configuration selected for Region C, reuse water is delivered from the balancing reservoir to Joe Pool Lake through a 36.5-mile transmission system. The proposed siting and transmission infrastructure for the Main Stem Balancing Reservoir are shown.

The source of water for the Main Stem Balancing Reservoir is return flows from Dallas' Central and Southside wastewater treatment plants. However, total return flows available to be stored in the reservoir consider certain obligations and an amendment to instream flow requirements. Obligations pertain to the proposed Elm Fork and Lake Ray Hubbard Swap, which are agreements made with North Texas Municipal Water District (NTMWD). DWU will provide NTMWD with water from the Central and Southside WWTP in equal exchange for NTMWD's reuse flows into Lake Lewisville (above agreed upon historical amounts) and Lake Ray Hubbard. The quantities shown in the 2026 Region C Regional Water Plan are projected for planning purposes, however it is important to note that these return flows are contingent on actual return flows.

Supply Development (Quantity, Reliability, Quality)

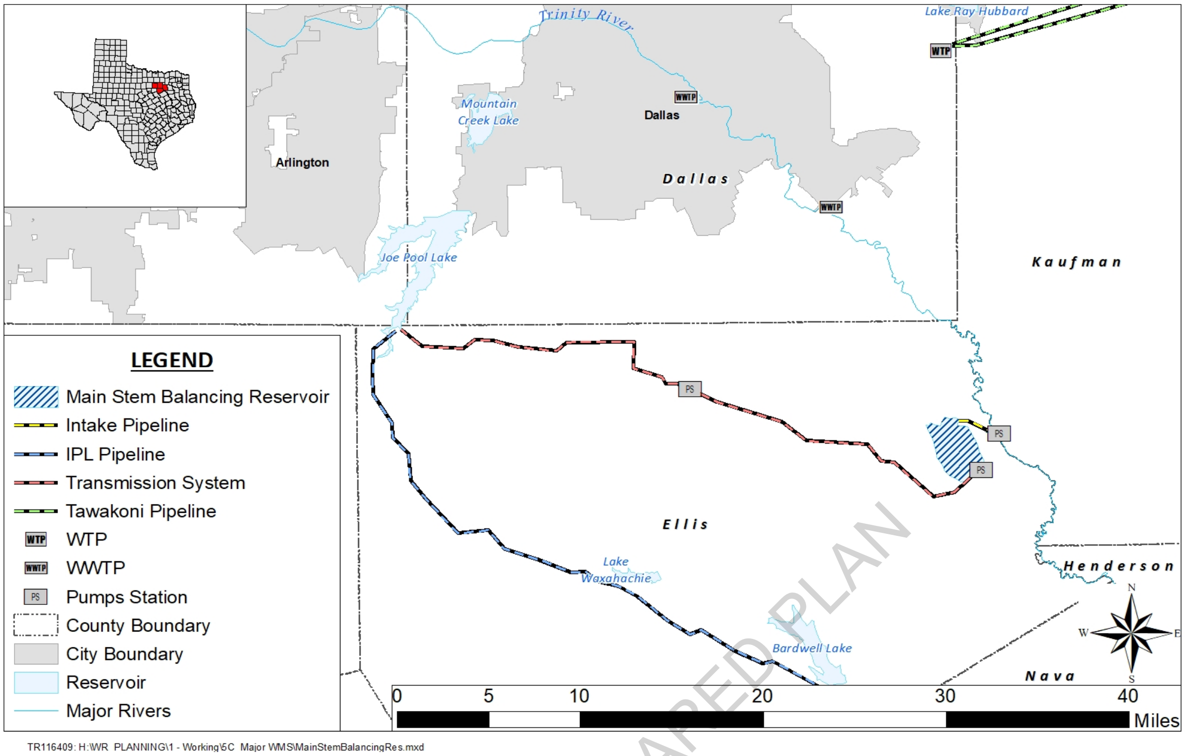
<u>Water Quantity</u>

The quantity of water associated with the Main Stem Balancing Reservoir is shown in **Table G.39**. These supplies reconsider the swap agreement with NTMWD and an amendment to Dallas' instream flow requirement.

TABLE G.39 SUMMARY OF QUANTITIES (AC-FT/YR)

DESCRIPTION	2030	2040	2050	2060	2070	2080
DWU	0	0	112,997	114,342	114,342	114,342

FIGURE G.10 MAIN STEM BALANCING RESERVOIR



Reliability

The return flows from the Central and Southside wastewater treatment plants are expected to be highly reliable.

Water Quality

There are some water quality concerns with the Main Stain Balancing Reservoir strategy. The Trinity River is on the TCEQ 303(d) list of dioxins, Polychlorinated Biphenyls (PCBs), and Bacteria. Further, there may be PFAS contamination in the Dallas-Fort Worth area. The project's water quality risks could be mitigated through blending with other DWU sources and by operating the reservoir to maintain adequate residence time to allow natural processes to enhance water quality, and by the addition of mixing units at the reservoir to reduce stratification. Water quality is to be evaluated and addressed during design.

Environmental Considerations

- **Habitat and Vegetative Cover.** The footprint of the Main Stem Balancing Reservoir and associated pipeline will cover developed agricultural land, forested areas, wooded riparian areas, and wetlands. No critical habitat lies within the project area. Utilizing previously disturbed agricultural areas in preference to preferred habitats will help reduce impacts. Where necessary, impacts on different species and wetland areas should be avoided as much as possible. Best management practices (BMPs) during construction of the pipeline will reduce potential impacts to wetlands.

- **Environmental Flows.** This project proposes to conform to the environmental flow standards adopted by TCEQ for the Trinity River, as granted by TCEQ in a January 2019 amendment to the reuse authorization. It is presumed that compliance with the TCEQ environmental flow criteria provides adequate instream flows for the Trinity River.
- **Bays and Estuaries.** Implementation and operation of the Main Stem Balancing Reservoir relies on permitted return flows and is expected to have limited effects on flow to the Trinity Bay by TCEQ environmental flow standards.
- **Threatened and Endangered Species.** The Main Stem Balancing Reservoir project area includes 25 species that are federally or state listed as threatened or endangered species and federal candidate species in the county for which the project will be located.

Permitting and Development

Dallas has water rights for the use of return flows for the Main Stem Balancing Reservoir. Additional permits would be required. Similar to other new water projects in Texas, a surface water permit for the channel dam (if needed) on the Trinity River would be required from TCEQ. In addition to the potential surface water permit, a Section 404 permit from the USACE for impacts to a waterway from construction activities would be needed for the construction of the diversion facilities and pipeline. **Table G.40** summarizes the permits required and the challenges associated with implementation of this strategy.

TABLE G.40 SUMMARY OF REQUIRED PERMITS AND POTENTIAL CHALLENGES

PERMIT	REGULATORY ENTITY	POTENTIAL CHALLENGES
Water Right and Storage Permit	TCEQ	Dallas has rights to divert its wastewater discharges but will need additional permits to store water in the Balancing Reservoir and channel dam.
Section 404	USACE	Required for construction in waters of the US.

Cost Analysis

The costs for this project are based on the costs developed for the Dallas Long-Range Water Supply Plan. When detailed costs were not available, TWDB costing guidance was followed. Annual costs were also developed following TWDB guidance for debt service and operation and maintenance costs.

Cost estimates for the Main Stem Balancing Reservoir supplies are included in **Appendix H**.

TABLE G.41 SUMMARY OF COSTS

ENTITY	CAPITAL COST	UNIT COST ($/1,000 GAL)	
		WITH DEBT SERVICE	AFTER DEBT SERVICE
DWU	$1,767,099,000	$ 3.71	$ 0.72

Water Management Strategy Evaluation

The Main Stem Balancing Reservoir is a potentially feasible strategy for DWU. The reservoir would provide a means to store reuse water and manage water supplies across the DWU system. With the diversion pump station located downstream of the confluence of the Trinity River and East Fork of the Trinity River, water could be released from DWU's eastern supplies and moved to the western areas of its service area. The size of the balancing reservoir would allow temporary storage of available reuse water.

Reuse water is a reliable supply, and this project does not require additional appropriation of state water. An off-channel reservoir is expected to have fewer environmental concerns.

Water User Group Application

The Main Stem Balancing Reservoir strategy was evaluated for DWU and its customers. It is a recommended strategy in Dallas' Long-Range Water Supply Plan. This strategy is recommended for DWU by the Region C Regional Water Planning Group.

G.4.2 IPL Connection to Dallas System

Potential Sponsor(s):	Dallas Water Utilities
WMS/Project Type:	Surface Water (Infrastructure)
Potential Supply Quantity:	114,337 acre-feet per year (Lake Palestine)
Implementation Decade:	2040
Strategy Capital Cost:	$586,902,000 (Capital costs associated with the IPL Project for DWU are shown with the IPL Project)
Unit Water Cost ($/kgal)	N/A, Part of the infrastructure needed to access Lake Palestine water
Application:	Recommended

Strategy Description

Lake Palestine is an existing reservoir located in the East Texas Region (Region I) on the Neches River. The lake is owned and operated by the Upper Neches River Municipal Water Authority (UNRMWA). The permitted diversion is 238,110 acre-feet per year. Dallas Water Utilities (DWU) has a contract with UNRMWA for 53.73% of the yield of the reservoir up to a maximum of 114,337 acre-feet per year (102 MGD). The contract includes an interbasin transfer permit allowing the use of water from the lake in the Trinity River Basin.

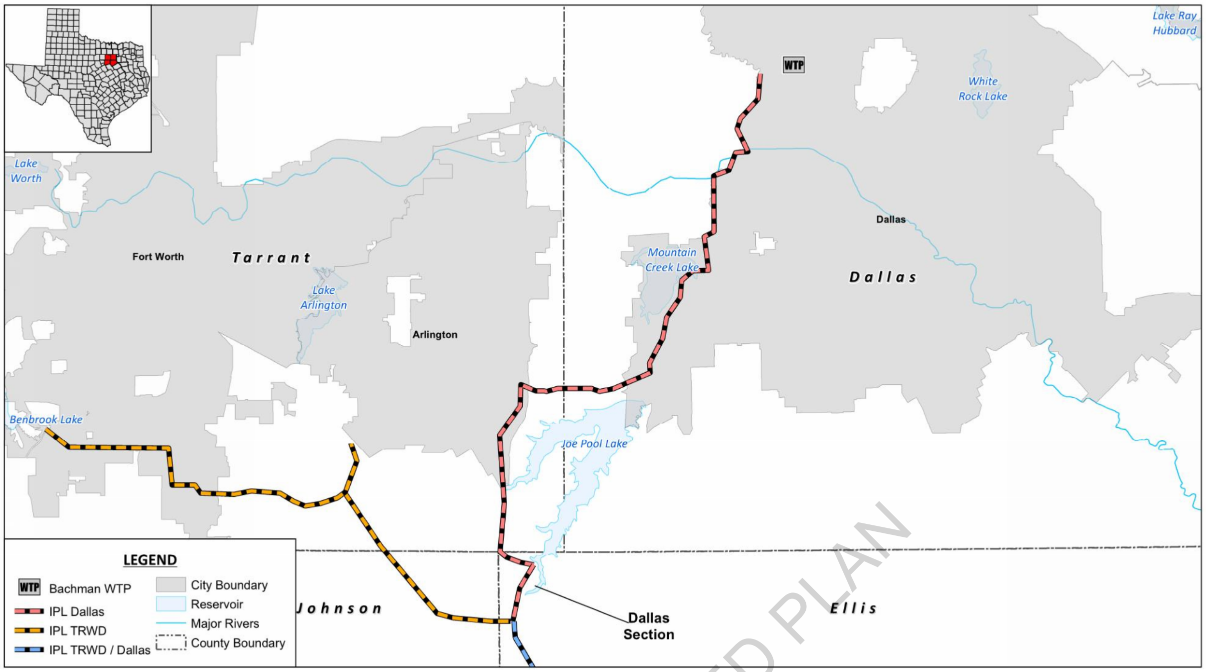
To date, DWU has not used water from Lake Palestine because there is no infrastructure to transport the water to the Dallas area. TRWD will own and operate the 150-mile long raw water transmission pipeline, which ranges in diameter from 84-inch to 108-inch and will convey water at a planned peak capacity of 347 MGD. Dallas has contracted with TRWD for a portion of the capacity in the IPL. Dallas' capacity of the shared pipeline is currently planned to be 150 MGD. Dallas has contracted with Upper Neches River Municipal Water Authority (UNRMWA) for 102 MGD of Lake Palestine supply, which will be conveyed through the IPL to Dallas' system.

The IPL is subdivided into segments to allocate costs between TRWD and Dallas as well as to split the permitting, design, and construction into multiple packages. The IPL will initially deliver Dallas' share of Lake Palestine water to a location near the upper end of Joe Pool Lake as shown in **Figure G.11**. From this location, Dallas will construct a delivery system to transport water to the Dallas system. A 2020 study conducted by HDR recommends an expansion of Bachman's capacity; however, alternative delivery points are being considered by DWU which could result in a change from this specific strategy.

After the Neches Run-of-River strategy is developed, the IPL would be used to convey this water in addition to the Lake Palestine water to DWU's delivery point.

This project includes the transmission pipeline from Lake Palestine to the IPL connection at Cedar Creek Reservoir. The intake and pump station on Lake Palestine is under construction and is not included in costs of this project.

FIGURE G.11 LAKE PALESTINE PIPELINE PROJECT



Supply Development (Quantity, Reliability, Quality)

Water Quantity

The proposed project would carry water from the IPL transmission pipeline to the DWU system. DWU has contracted 150 MGD of transmission capacity in the IPL from TRWD. Currently, DWU plans to utilize up to 102 MGD of the capacity with water from Lake Palestine. The remaining 48 MGD capacity will be used to convey the Neches Run-of-River supply.

Reliability

The water from Lake Palestine is expected to be highly reliable.

Water Quality

Water quality in Lake Palestine is considered to be generally good. However, Lake Palestine is on the TCEQ 303(d) list for depressed levels of dissolved Oxygen and for pH impairments. Lake Joe Pool also causes some concern with high levels of Bromide and Manganese. These water quality issues are common and both Lake Palestine and Joe Pool are currently treated to EPA standards by DWU or other entities. The 2020 DWU report from HDR recommends additional pre-oxidant for manganese removal and modifications to Bachman WTP's ozone treatment procedure.

Environmental Considerations

The environmental concerns for use of an existing surface water source are low. Environmental studies are currently ongoing for this project.

- **Habitat and Vegetative Cover.** Where possible, the pipeline route follows existing road rights-of-way to minimize impacts on habitat and vegetative cover by utilizing these previously disturbed areas. Wooded riparian areas commonly occur along and adjacent to stream and river crossings that will be crossed by the pipeline corridor. These areas are commonly utilized by many different species and should be avoided as much as reasonably possible. However, pipelines generally have sufficient design flexibility to avoid most impacts or significantly reduce potential impacts to geographically limited environmental habitats.
- **Threatened and Endangered Species.** There are 18 species that are federally or state listed as threatened or endangered species in Tarrant and Dallas Counties. Much of the pipeline connection to Bachman Lake will be constructed in urban areas in Dallas County. No designated areas of critical habitat currently occur within the project area.
- **Environmental Water Needs.** Implementation and operation of this project could reduce flows in the Neches River as more water is diverted and exported to the Trinity River Basin. Return flows from this project will either be reused for beneficial use or discharged to the Trinity River Basin, which could increase instream flows in the Trinity River.
- **Wetlands**. Flexibility in the pipeline siting would be used to minimize or avoid potential impacts to wetland areas. Therefore, impacts to wetlands associated with this project are expected to be low.

Permitting and Development

Permits to use the water from Lake Palestine have already been obtained. A Section 404 permit from the USACE would be needed for the pipeline and new intake and pump station at Lake Palestine. A Section 408 permit from the USACE may be required for construction activities near a levee. The project is expected to be online by 2040.

The conservation pool of Joe Pool Lake is owned by the USACE and is regulated by the USACE in coordination with the TRA under TRA's state water rights permit. Coordination will be necessary with the USACE and TRA to allow Dallas to temporarily store water in Joe Pool Lake. Coordination with TPWD is necessary to obtain permission to cross Cedar Hill State Park, outside of existing easements. A new easement agreement may be required with TPWD or Dallas County (property owner). The Wildlife Habitat Assessment Project Review will occur during the EA process, unless no EA is required, then the project review will occur independently. TPWD will likely require BMPs for construction and maintenance activities.

Cost Analysis

Capital costs for this strategy include only the pipeline portion from the IPL delivery point to the Bachman WTP. Capital costs to move the water from Lake Palestine to the IPL delivery point are shown in the IPL Technical Memorandum. To understand DWU's total unit cost for the supplies from Lake Palestine, the transport cost to Joe Pool Lake is included as an annual cost.

Cost estimates for this project are included in **Appendix H.**

TABLE G.42 SUMMARY OF COSTS

ENTITY	CAPITAL COST	UNIT COST ($/1,000 GAL)	
		WITH DEBT SERVICE	AFTER DEBT SERVICE
DWU	$586,902,000	$1.21	$0.10

Water Management Strategy Evaluation

As previously discussed, DWU plans to connect Lake Palestine to its water supply system as part of the IPL Project being developed jointly with Tarrant Regional Water District. This is a source that DWU contracted for when the reservoir was built for long-term water supply. Several alternatives were evaluated to bring the IPL supplies from the delivery point to the DWU service area. Delivery of the water directly to the Bachman WTP through a pipeline was recommended because it carried the lowest implementation and permitting risk. Development of a supply from Lake Palestine provides water at a low cost and with a low environmental impact.

Water User Group Application

The Lake Palestine strategy is sponsored by DWU, and the strategy is recommended for DWU by the Region C Regional Water Planning Group. The water provided from Lake Palestine and transported by the IPL Project will be used by DWU and customers.

G.4.3 Neches River Basin Supply

Neches Run-of-River Strategy	
Potential Sponsor(s):	Upper Neches River Municipal Water Authority
WMS/Project Type:	Existing Surface Water (Run-of-River)
Potential Supply Quantity:	47,250 acre-feet per year
Implementation Decade:	2060
Strategy Capital Cost:	$719,027,000
Unit Water Cost[a] ($/kgal):	$3.96 during Debt Service; $0.59 after Debt Service
Application:	Recommended

[a]These unit costs do not include the cost to transport this water from Lake Palestine to DWU through the IPL.

Lake Columbia Strategy	
Potential Sponsor(s):	DWU
WMS/Project Type:	New Surface Water (Reservoir and Water Purchase)
Potential Supply Quantity:	56,050 acre-feet per year
Implementation Decade:	After 2080
Strategy Capital Cost:	$685,022,000 (DWU Portion Only)[a]
Unit Water Cost ($/kgal):	$3.30 during Debt Service; $0.96 after Debt Service
Application:	Alternative

[a]Cost reflects transmission to Lake Palestine. Additional infrastructure to move the water to DWU is discussed under DWU infrastructure expansion.

Strategy Description

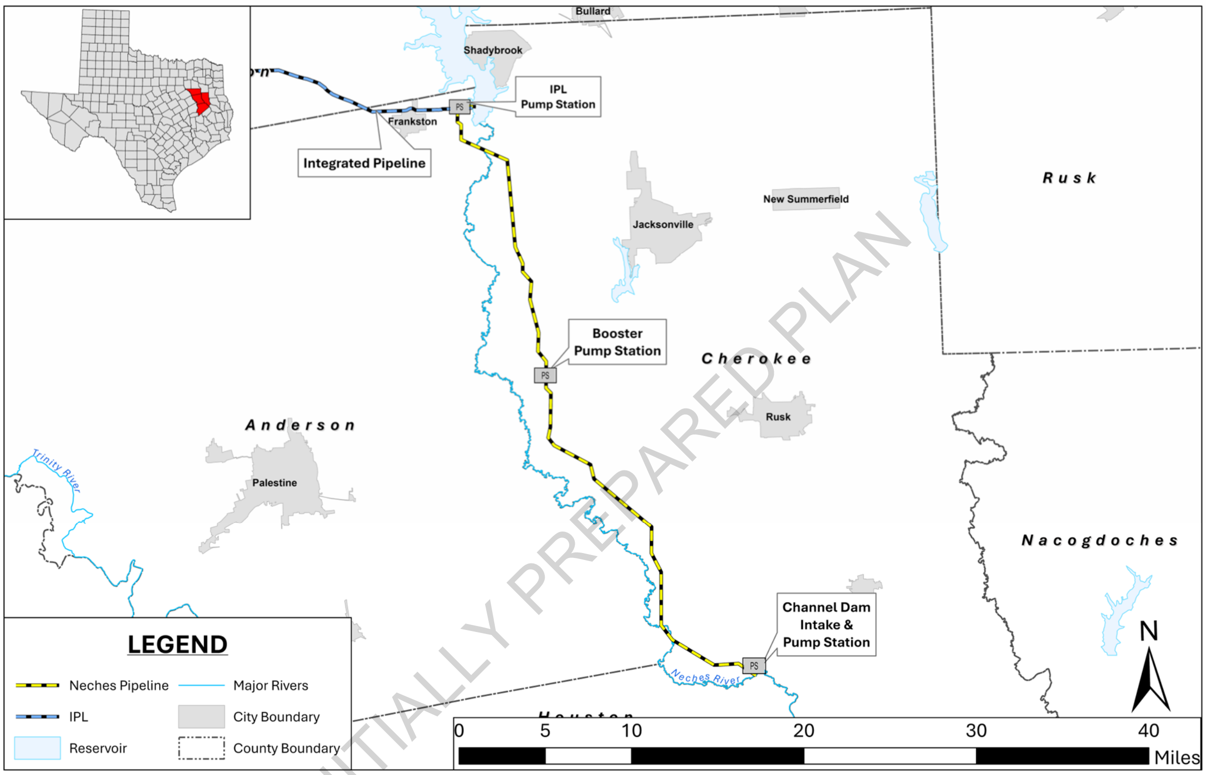
There are two proposed strategies located in the Neches River Basin, Neches Run-of-River and Lake Columbia. Both projects assume delivery to the DWU system through the available capacity of the IPL.

Neches Run-of-River. The Neches River Run-of-River Diversion Strategy would be sponsored by the Upper Neches River Municipal Water Authority (UNRMWA) with contracted water supplies to Dallas Water Utilities (DWU).

The Neches Run-of-River strategy includes a new river intake and pump station for a run-of-river diversion from the Neches River near the SH 21 crossing. Water would be delivered through a 42-mile pipeline (23 miles of 72-inch diameter pipe and 19 miles of 66-inch pipe) to Dallas' pump station at Lake Palestine for delivery to Dallas through the IPL. 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 **(Figure G-11).** Modeling indicates that up to 74 MGD of Neches River water could be reliably diverted as part of this strategy; however, the available capacity of the IPL is less.

The proposed integrated pipeline project (IPL) includes the construction of a new intake and pump station at Lake Palestine that is currently proposed to have an initial 150 MGD capacity to deliver Dallas' Lake Palestine supplies through the IPL. Dallas' existing contract with UNRMWA for Lake Palestine water is for 53.73% of the annual dependable yield, limited to 114,337 acre-feet per year (102 MGD). Based on the most recent Neches WAM, the firm yield of Lake Palestine decreased to 177,110 acre-feet per year, potentially resulting in reduced supplies to DWU. To address a potential reduction during drought, DWU may contract for unused supply by local water users for a total supply of 102 MGD from Lake Palestine. Since the IPL will have a capacity of 150 MGD, the remaining capacity of approximately 48 MGD (or about 53,800 ac) could be utilized by Dallas to deliver additional water from the Neches Run-of-River strategy. Potential additional supply from this strategy and other sources in the Neches River Basin (such as Lake Columbia – see below) would be transported through a new parallel IPL to the DWU service area that would be implemented after 2080.

FIGURE G.12 NECHES RUN-OF-RIVER PROJECT



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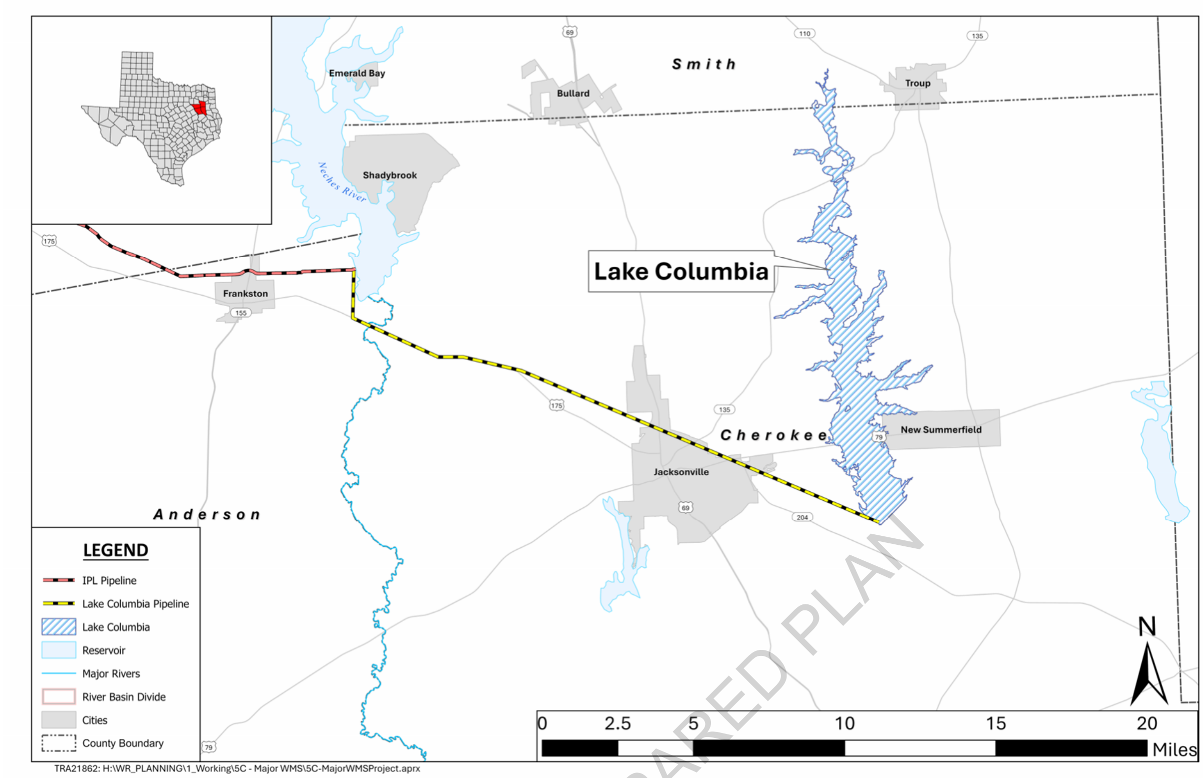
Lake Columbia. The project description for the Lake Columbia Strategy is based on the information provided by Angelina and Neches River Authority (ANRA) and summarized in the Dallas Long Range Water Supply Plan (DWU, 2024). ANRA is the sponsor for the Lake Columbia project on Mud Creek in Cherokee and Rusk Counties. ANRA 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. Lake Columbia is identified as a potential component of a recommended WMS for Dallas Water Utilities (DWU) in Dallas' Long-Range Water Supply Plan (DWU, 2024). After considering the local needs in the East Texas Region, DWU would purchase up to 56,000 acre-feet per year from Lake Columbia.

The water from Lake Columbia would be connected to Dallas' western system via a pipeline from the reservoir to the IPL pump station at Lake Palestine. Supplies would then be transported to the Lake Joe Pool area via a new pipeline parallel to the IPL. The proposed siting and transmission infrastructure to Lake Palestine are shown.

FIGURE G.13 LAKE COLUMBIA PROJECT



Supply Development (Quantity, Reliability, Quality)

The firm yield of the project was determined using the TCEQ Neches River Water Availability Model. The run-of-river supplies are modeled with back-up from storage in Lake Palestine when stream flows are not available due to drought conditions, senior water rights calls and/or TCEQ environmental flow restrictions. The new run-of-river diversion will be interruptible, so the quantity available with this strategy is the incremental increase in the firm yield of Lake Palestine resulting from system operations of the new diversion and the existing reservoir.

Lake Columbia is a proposed new reservoir in the upper Neches River basin. The Angelina-Neches River Authority (ANRA) has been granted a water right permit by the TCEQ to impound 195,500 acre-feet and to divert 85,507 acre-feet per year (76.3 MGD) for municipal and industrial purposes. Based on discussions between ANRA and DWU, Dallas would contract for supplies from ANRA and participate in the development of this project. The projected share of the proposed Lake Columbia project for DWU is 56,000 acre-feet per year.

<u>Water Quantity</u>

Dallas' existing contract with UNRMWA for Lake Palestine water is for an annual quantity of 114,337 ac-ft/yr (102 MGD). The strategy can provide 74 MGD of reliable supply from the Neches River Basin. The IPL, when completed, will have a capacity of 150 MGD, so there is a remaining infrastructure capacity of approximately 48 MGD available for this strategy. The remaining 26 MGD of available supply would require additional transmission capacity to convey the water to DWU's service area. If other new water rights are granted in the Neches River Basin prior to obtaining a water right for this project, the yield could be affected.

The quantity of water from the Lake Columbia strategy is assumed to be 56,000 acre-feet per year.

TABLE G.43 SUMMARY OF QUANTITIES (AC-FT/YR)

DESCRIPTION	2030	2040	2050	2060	2070	2080
Neches Run-of-River	-	-	-	-	53,800-	53,800
DWU – Lake Columbia[1]						56,000

1. Lake Columbia is recommended to be implemented after 2080 or an alternative strategy in 2080.

Reliability

The reliability of Neches Run-of-River source is moderately high, provided Lake Palestine provides the backup supplies as modeled. A drought worse than the drought of record could affect the run-of-river supplies and backup from Lake Palestine.

The reliability of Lake Columbia water is moderate to high. The reservoir has a water right permit for 85,507 acre-feet per year. If the required permitting process specifies additional environmental flow releases, the project yield may be affected, and the amount available to DWU may be reduced. Also, during drought the supplies could be reduced.

Water Quality

The water quality for the Neches Run-of-River strategy is expected to be good. Water quality for Lake Columbia was evaluated, and it was found that there are no drinking water impairments. Mud Creek, where Lake Columbia is located, is currently listed on the TCEQ 303(d) list for bacteria and depressed dissolved oxygen. However, this designation is not expected to impact treatability.

Environmental Considerations

Environmental considerations were investigated in the Dallas Long Range Water Supply Plan and are as identified below.

- **Habitat and Vegetative Cover.** The vegetation near the river ranges from bald-cypress dominated swamps to mixed pine-hardwood stands depending on local river flooding and floodplain topography. River and transmission infrastructure would be located to avoid conflicts with the Neches River National Wildlife Refuge and ecologically significant stream segments upstream of the proposed intake site. There is currently no designated critical habitat in the project area. The proposed pipeline route will cross areas of U.S. Fish and Wildlife Service (USFWS) Priority 1 bottomland hardwoods. A large portion of the pipeline route occurs within forested areas, but it also crosses areas of agricultural use including crops and pasture. Impacts to preferred habitats will be minimized by utilizing the agricultural areas which have been previously disturbed. Wooded riparian areas also commonly occur along and adjacent to stream and river areas that will be affected by the pipeline corridor. The pipeline route would also cross wetland areas which will be disturbed by construction activities. However, pipelines generally have sufficient design flexibility to avoid most impacts or significantly reduce potential impacts to geographically limited environmental habitats. As a result, any impacts to existing habitat are anticipated to be low.

The footprint of Lake Columbia will impact approximately 5,746 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. Impacts associated with the Lake Columbia project are discussed in the Region I Water Plan. Environmental impacts of this project for DWU are associated with the pipeline construction and are expected to be minimal.

- **Threatened and Endangered Species.** The project area for the Neches Run-of-River includes 25 species that are federally or state listed as threatened or endangered or are federal candidate species in the counties for which the project is located. No designated areas of critical habitat currently occur within the project area.

  The Lake Columbia pipeline project area includes 29 species that are federally or state listed as threatened or endangered. These species would need to be considered through the design process and could potentially require mitigation measures during project permitting and implementation. However, the pipeline would be sited to avoid specific habitat types to minimize potential impacts to species along the pipeline corridor.

- **Environmental Water Needs.** Implementation and operation of the Upper Neches Project will comply with TCEQ environmental flow standards and will leave adequate flows in the Neches River to sustain a healthy ecosystem.

  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 the Neches Basin to Trinity River Basin, an amendment to the Permit is required to allow interbasin transfers. This amendment may trigger environmental flow compliance in the Neches River Basin. Also, it is likely the federal permitting process would require the review and possible consideration of environmental flow releases.

- **Bays and Estuaries.** The Neches River flows into Sabine Lake and the Sabine Lake Estuary downstream, which experiences an average annual flow of 4.6 million acre-feet per year. Since the Upper Neches Project would only divert 53,800 acre-feet per year from the river, the proposed pipeline would have very limited effects on freshwater inflow to the lake and estuary with long-term average freshwater inflows to the Sabine Lake Estuary being reduced by just over 1.0 percent.

  Lake Columbia project is over 280 river miles upstream from the Neches estuary at Sabine Lake and is therefore expected to have no measurable effect on the freshwater 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.

- **Wetlands.** The proposed pipeline passes through approximately 14 acres of NWI mapped wetlands, including the Neches River and dozens of named creeks and streams in the Neches River Basin. Although a number of NWI-mapped wetlands occur along the proposed pipeline corridor, flexibility in the pipeline siting would be used to minimize or avoid potential impacts to the majority of these areas.

Permitting and Development

The Neches Run-of-River strategy would pose several permitting challenges along with the typical challenges associated with a new project. Similar to other new water projects in Texas, a surface water permit for the channel dam and river diversion from the Neches River would be required from TCEQ and would need to include an inter-basin transfer authorization. In addition to the surface water permit, a Section 404 permit from the USACE for impacts to waters of the U.S. from construction activities would likely be needed for the construction of the diversion facilities and pipeline.

Lake Columbia would require a contract with ANRA and an interbasin transfer permit. ANRA is currently seeking a 404 permit for construction. Currently, the Lake Columbia project is subject to completion of the NEPA process and issuance of a 404 permit from the USACE.

The existing Lake Columbia water right permit would need to be amended to include the interbasin transfer permit. There is a potential that the authorized diversions from Lake Columbia project may be subject to some supply reductions associated with potential environmental flow standards that may be applied during the amendment process.

Cost Analysis

Detailed capital costs for this strategy were provided by the sponsor. For consistency with SB1 planning guidance, the costs were updated to September 2023 dollars using the ENR index. When detailed costs were not available, TWDB costing guidance was followed. Annual costs were also developed following TWDB guidance for debt service and operation and maintenance costs.

The cost estimates for this strategy are included in **Appendix H**.

TABLE G.44 SUMMARY OF COSTS

ENTITY	PROJECT	CAPITAL COST	UNIT COST ($/1,000 GAL)	
			WITH DEBT SERVICE	AFTER DEBT SERVICE
DWU	Neches Run-of-River	$719,027,000	$3.96	$0.59
	Lake Columbia	$685,022,000	$3.30	$0.96

This water management strategy for ANRA was developed to address the total current contracted and potential future customer demand through the construction of Lake Columbia. ANRA holds the water right for the supply source and will be the project sponsor. It was specified in the 20 Dallas Long Range Supply Plan that DWU will be responsible for 70 percent of the dam, reservoir land acquisition, and relocations, and ANRA will be responsible for the remaining 30 percent of the reservoir construction and land acquisition costs. This cost split is subject to change during the potential negotiations between DWU and ANRA. Additionally, these costs differ from the Dallas Long Range Water Supply Plan because a parallel pipeline to the IPL is assumed to be needed since the Neches Run-of-River Strategy is both recommended and is scheduled to be implemented prior to the supplies from Lake Columbia.

When detailed costs were not available, TWDB costing guidance was followed. Annual costs were also developed following TWDB guidance for debt service and operation and maintenance costs. Cost estimates for the Lake Columbia supplies are included in **Appendix H**.

TABLE G.45 SUMMARY OF COSTS

ENTITY	CAPITAL COST	UNIT COST ($/1,000 GAL)	
		WITH DEBT SERVICE	AFTER DEBT SERVICE
DWU	$685,022,000	$3.30	$0.96

Water Management Strategy Evaluation

The Neches Run-of-the-River strategy provides supplemental water for DWU that is located near existing DWU water sources. This strategy assumes existing and planned (IPL) infrastructure can be used to transport this water to DWU service area, which minimizes transmission costs. Also, the use of a small river diversion structure provides fewer environmental impacts than a new reservoir, and the operations with Lake Palestine provide the necessary reliability for the river diversion.

Lake Columbia would provide a new water source near existing water resources for DWU. This makes it easier to operate and maintain as part of the overall DWU system.

The environmental concerns are relatively low for a new reservoir site. However, further study is needed to better understand the potential for impacts to threatened and endangered species.

Also, the yield of the project is subject to future permitting requirements and negotiations with ANRA since the authority holds the water rights.

Water User Group Application

The Neches River Run-of-the-River Diversion strategy was evaluated based on several criteria. 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. Based on consideration of these criteria, the strategy is recommended for DWU by the Region C Regional Water Planning Group.

The Lake Columbia strategy was evaluated on the same criteria and is a project identified by DWU for potential future water supplies. The strategy is recommended for DWU by the Region C Regional Water Planning Group. This strategy is also recommended for other users located in Region I.

G.4.4 Sabine Conjunctive Use

Groundwater Wells	
Potential Sponsor(s):	Dallas Water Utilities
WMS/Project Type:	New Surface Water
Potential Supply Quantity:	67,200 acre-feet per year
Implementation Decade:	2080
Strategy Capital Cost:	$694,882,000
Unit Water Cost ($/kgal)	$6.05 during Debt Service; $1.05 after Debt Service
Application:	Recommended

Off-Channel Reservoir (OCR)	
Potential Sponsor(s):	Dallas Water Utilities
WMS/Project Type:	New Groundwater
Potential Supply Quantity:	30,000 acre-feet per year
Implementation Decade:	2060
Strategy Capital Cost:	$903,296,000
Unit Water Cost ($/kgal)	$3.08 during Debt Service; $1.03 after Debt Service
Application:	Recommended

Strategy Description

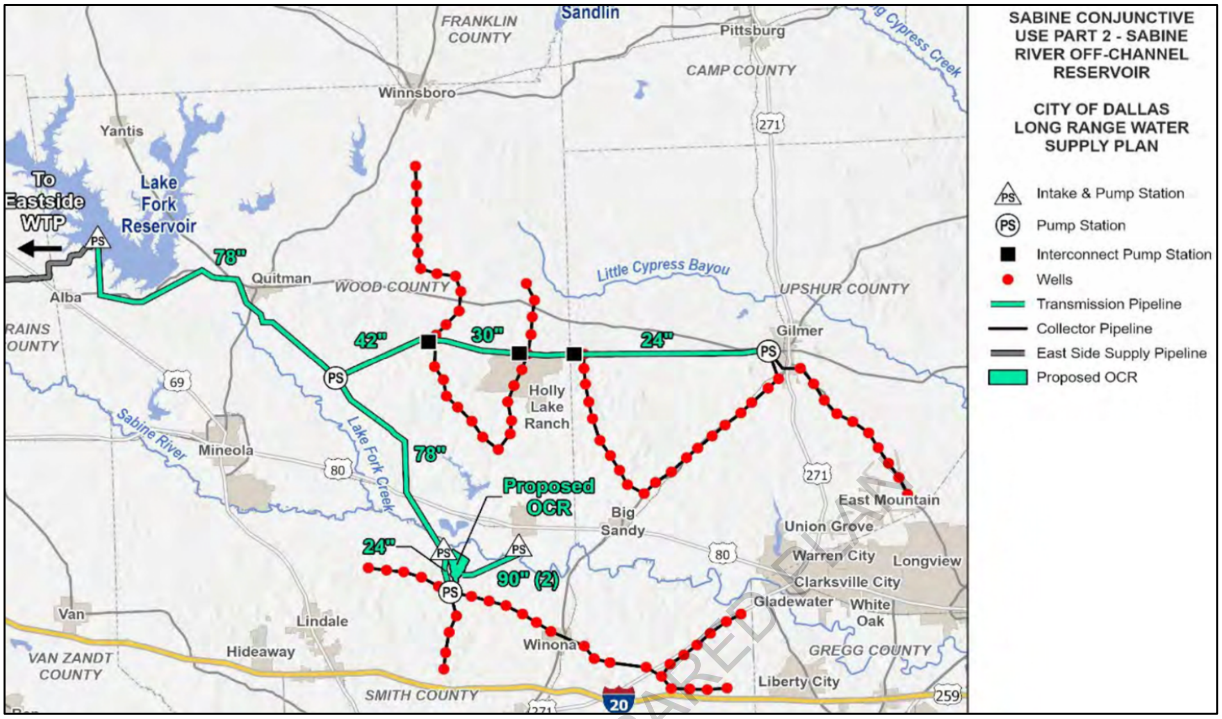
The Sabine Conjunctive Use strategy combines groundwater supplies from the Carrizo-Wilcox and Queen City aquifers with an off-channel reservoir (OCR) in Smith County that impounds surface water diverted from the Sabine River. The combination of the two projects has the potential to provide a significantly larger volume of water to DWU than the yields of stand-alone projects.

The Carrizo-Wilcox and Queen City aquifers cover a large portion of northeast Texas. This strategy evaluates the potential for groundwater development in Smith, Wood, and Upshur Counties in Region D for DWU. Use of these aquifers for other major water providers are discussed separately.

The proposed infrastructure for this strategy is as shown. Where appropriate, the wells would be screened in both the Carrizo-Wilcox and Queen City aquifers to provide the greatest amount of available supply. A series of wellfields and pump stations would be strategically located to transport the water 58 miles to the Lake Fork intake and pump station. From this location, the groundwater would be transported to the DWU Eastside water treatment plant via existing infrastructure.

The OCR allows the project to operate as a conjunctive-use resource utilizing groundwater to supplement the yield of an off-channel reservoir during times of low river flows. The OCR stores streamflow diverted from the Sabine River using a 400 cfs (258 MGD) intake and pump station and two 90-inch diameter short-distance transmission pipelines. Water stored in the OCR is subsequently diverted at a maximum rate of 93 MGD to the Lake Fork pump station through a 78-inch diameter pipeline.

FIGURE G.14 SABINE CONJUNCTIVE USE



Source: 2024 Dallas Long Range Water Supply Plan Draft (Figure 7-17).

Supply Development (Quantity, Reliability, Quality)

<u>Water Quantity</u>

The quantity of water for the groundwater portion of the strategy is 30,000 acre-feet per year. This is most of the potentially available supply from the two aquifers within the target counties. Most of this supply would be from the Queen City Aquifer. There is less than 10,000 acre-feet per year of available supply from the Carrizo-Wilcox Aquifer.

There is no groundwater conservation district (GCD) in Region D. Therefore, the regional water planning group develops the quantities of available groundwater for regional planning purposes. With no GCDs in the targeted counties, there are no pumping regulations or limitations.

For this strategy, the supply available was estimated based on the amount of water that is not being used by others in Region D, as reported in the TWDB database. Additional studies are needed to determine the economically sustainable production from specific well fields. A summary of the potentially available supply for this strategy is shown on **Table G.46**.

TABLE G.46 SUMMARY OF LOCAL GROUNDWATER AVAILABILITY

COUNTY	AQUIFER	2020 SOURCE BALANCE (AC-FT/YR)	2070 SOURCE BALANCE (AC-FT/YR)
Smith	Carrizo-Wilcox	3,203	3,049
Smith	Queen City	11,351	10,595
Upshur	Carrizo-Wilcox	1,588	1,527
Upshur	Queen City	10,298	10,266
Wood	Carrizo-Wilcox	4,008	3,853
Wood	Queen City	3,035	3,016
Total		**33,483**	**32,306**

The primary source of the OCR is surface water and groundwater supplies are used to backup the surface water supplies when surface water becomes limited. This helps meet demands during drought periods and minimizes the use of groundwater when surface water is plentiful. The conjunctive use system provides a firm yield of 104,200 acre-feet per year. If the OCR component and groundwater component are operated independently, they have a combined yield of 97,200 acre-feet per year (87 MGD), with 60 MGD from the OCR and 27 MGD from groundwater. By operating these two components as a system, the combined yield is increased by about 6 MGD or about 7 percent.

<u>**Reliability**</u>

The reliability is expected to be moderately high. However, since groundwater is a property right, there could be competing development that may impact supplies. Securing sufficient groundwater rights would help protect the long-term productivity of the well fields. The OCR site was chosen because of its proximity to the groundwater well fields and provided the largest amount of supply of the OCRs evaluated in this area.

<u>**Water Quality**</u>

Water is generally fresh in both the Carrizo and Queen City aquifers. While there are areas with elevated dissolved solids, the quality tends to improve near the outcrop and in the northern portion of the formation. There are areas within the Queen City Aquifer that contain high iron concentrations and high acidity. Magnesium and iron may also be a concern for the deeper portions of the Carrizo-Wilcox. Water quality testing and compatibility analyses would be needed to assess treatability. The OCR project location is listed as free of impairments by the TCEQ and EPA.

Environmental Considerations

Environmental impacts would be low.

- **Habitat and Vegetative Cover.** Well fields, OCR and transmission pipeline infrastructure were located to avoid conflicts with environmentally sensitive areas in addition to ecologically significant stream sections. Where possible, the pipeline follows existing road rights-of-way or crosses areas of agricultural use.

- **Threatened and Endangered Species.** The project area includes 18 species that are federally or state listed as threatened or endangered or are federal candidate species in the counties for which the project is located. No designated areas of critical habitat currently occur within the project area.
- **Environmental Water Needs.** Implementation and operation of the groundwater project will not impact stream flows as the source of supply is groundwater. For the OCR, Sabine River diversions will periodically reduce Sabine River stream flows during periods of abundant flow. This new division will need to be permitted by TCEQ and, therefore, will comply with applicable TCEQ environmental flow standards.
- **Wetlands.** Impacts to wetlands associated with this project are anticipated to be low for the groundwater wells. Approximately 77 acres of potential wetlands occur in the OCR footprint and would be inundated by the project. A delineation of potential waters of the US would be required during the project development phase to determine impacts. It is likely that coordination with USACE would be required during the Section 404 permitting process, and mitigation would be necessary for these areas.

Permitting and Development

At this time, there are no GCDs and therefore, no groundwater permits are required. If a GCD is formed in one or more of the identified counties, the permitting requirements would be developed at that time. A federal Section 404 permit may be needed to construct the transmission pipeline. This would be confirmed during design. Implementation of the Sabine River diversion and OCR will require permits from both state and federal agencies.

While there are few regulatory requirements with this strategy, there may be public opposition to a large groundwater project that exports the water outside of the county and region.

This strategy could take 5 to 10 years to develop, considering the acquisition of water rights, pilot tests, and final design and construction.

TABLE G.47 SUMMARY OF REQUIRED PERMITS AND POTENTIAL CHALLENGES

PERMIT	REGULATORY ENTITY	POTENTIAL CHALLENGES
Water Right Permit	TCEQ	Will require an inter-basin transfer authorization to transfer water to the Trinity River Basin.
Section 404	USACE	Required for construction in waters of the US.

Cost Analysis

The capital costs for the well field and transmission system were obtained from the Dallas Long Range Water Supply Plan. Annual costs were developed following TWDB guidance for debt service and operation and maintenance costs.

Cost estimates for the strategy supplies are included in **Appendix H.**

TABLE G.48 SUMMARY OF GROUNDWATER COSTS

ENTITY	CAPITAL COST	UNIT COST ($/1,000 GAL)	
		WITH DEBT SERVICE	AFTER DEBT SERVICE
DWU	$694,882,000	$6.05	$1.05

TABLE G.49 SUMMARY OF OCR COSTS

ENTITY	CAPITAL COST	UNIT COST ($/1,000 GAL)	
		WITH DEBT SERVICE	AFTER DEBT SERVICE
DWU	$903,296,000	$3.08	$1.03

Water Management Strategy Evaluation

Groundwater provides a reliable water supply to DWU's portfolio of water resources. This source is less susceptible to drought-related impacts, such as evaporation. The source of water is relatively near existing infrastructure and other DWU resources. The quantity of water is limited, and there may be water quality concerns for mixed supplies (groundwater and surface water). However, these concerns can be addressed through treatment if needed. At this time, it is assumed that no additional treatment is required. There are few development concerns. Further study would be needed to confirm the quantity and quality of the groundwater and verify the sustainability of this source for the long term.

Water User Group Application

The Sabine Conjunctive Use strategy was evaluated for DWU. It is a recommended strategy by the Region C Regional Water Planning Group.

G.5 NTMWD Major Water Management Strategy Technical Memorandums

G.5.1 Expanded Wetland Reuse

Potential Sponsor(s):	NTMWD
WMS/Project Type:	Reuse
Potential Supply Quantity:	33,809 acre-feet per year
Implementation Decade:	2030
Strategy Capital Cost:	$686,489,000
Unit Water Cost ($/kgal):	$5.04 during Debt Service; $0.73 after Debt Service
Application:	Recommended

Strategy Description

The proposed Expanded Wetland Reuse project will treat return flows from wastewater treatment plants owned and operated by NTMWD and the City of Dallas. The return flows will be diverted from the main stem of the Trinity River. The water would then flow through a new or expanded wetland and be conveyed through a new pump station and delivered to Lake Tawakoni. This strategy does not include the cost of an expansion for the Tawakoni Water Treatment Plant.

The return flows for this project come from two sources. The first is through growth in return flows from plants owned and operated by NTMWD that discharge into the East Fork of the Trinity River. It is expected that the quantity of return flows available from this source will exceed the treatment capacity of the existing East Fork Wetland by the year 2030. The second source of water for the project is return flows from Dallas' (DWU) Central and Southside wastewater treatment plants, provided through a swap agreement between DWU and NTMWD. This agreement provides NTMWD return flow from DWU's Central and Southside WWTPs in exchange for NTMWD's Elm Fork return flows into DWU's reservoirs. The return flows available for the pump station and wetland expansion are shown in **Table G.50**. If available, other sources of return flows conveyed through the wetland and Lake Tawakoni would also be consistent with this plan.

Supply Development (Quantity, Reliability, Quality)

<u>**Water Quantity**</u>

Table G.50 shows the quantity of water expected to be produced by the project over the planning period. The water quantity is based on expected growth in return flows in the East Fork and Elm Fork watersheds assuming there are sufficient supplies to support the projected demands. The quantities also consider losses during treatment in the wetland, as well as estimates of water bypassed for environmental purposes in accordance with NTMWD's reuse permits. Actual quantities will be dependent upon the amount of wastewater discharged.

TABLE G.50 SUMMARY OF QUANTITIES (AC-FT/YR)

DESCRIPTION	2030	2040	2050	2060	2070	2080
Elm Fork/ Hubbard Swap	9,499	12,368	11,966	11.966	11,966	11,966
Additional East Fork Reuse	1,166	5,467	12,638	18,080	20,950	21,843
Total	**10,665**	**18,105**	**24,604**	**30,046**	**32,916**	**33,809**

Reliability

The reliability of the reuse supplies is high. There is the potential for the reuse supplies to develop at a faster or slower rate, depending on the volume of return flows.

Water Quality

The water quality is expected to be good. The wetland will filter out excess nutrients and pollutants and trap natural sediment and organic matter, providing higher quality water than diverted from the Trinity River.

Environmental Considerations

This project should have positive environmental impacts, as it improves the water quality of the diverted effluent and the constructed wetland will provide habitat for wildlife. The project assumes that environmental flows in NTMWD's existing authorizations are applied.

Permitting and Development

The proposed project would require a bed and banks authorization for the transport of supplies through Lake Tawakoni. A federal Section 404 permit would be needed to construct the intake pump station, pipelines, and wetland. The project is expected to be online by 2030. There are no known development issues.

Cost Analysis

TWDB costing guidance was followed for transmission costs. The wetland cost is based on the estimate for the TRWD Cedar Creek Reuse Project. Annual costs were developed following TWDB guidance for debt service and operation and maintenance costs. Cost estimates for this project are included in **Appendix H.**

TABLE G.51 SUMMARY OF COSTS

ENTITY	CAPITAL COST	UNIT COST ($/1,000 gal)	
		WITH DEBT SERVICE	AFTER DEBT SERVICE
NTMWD	$686,489,000	$ 5.05	$ 0.73

Water Management Strategy Evaluation

The Expanded Wetland Reuse strategy provides NTMWD with additional water supply in an ecologically sustainable manner. The source water will increase over time as return flows increase, providing a highly reliable supply assuming additional supplies are developed to meet the projected demands. The created wetland also provides increased habitats for wildlife.

Water User Group Application

The Expanded Wetland Reuse strategy is recommended by the Region C for NTMWD members and customers.

G.5.2 Lake O' The Pines

Potential Sponsor(s):	NTWMD
WMS/Project Type:	New Surface Water (Reservoir)
Potential Supply Quantity:	75,000 acre-feet per year
Implementation Decade:	2040
Strategy Capital Cost:	$1,346,000,000
Unit Water Cost ($/kgal):	$4.05 during Debt Service; $1.07 after Debt Service
Application:	Recommended

Strategy Description

Lake O' the Pines is an existing Corps of Engineers reservoir, with Texas water rights held by the Northeast Texas Municipal Water District (NETMWD). The lake is on Cypress Creek in the Cypress Creek Basin in Region D, the Northeast Texas Region. It is about 120 miles from the Metroplex. Some Region C water suppliers have explored the possibility of purchasing supplies in excess of local needs from the Cypress Creek Basin for use in the Metroplex.

NTMWD is currently negotiating with the NETMWD and other entities with contracts in Lake O' the Pines for supply for use in its service area. The firm supply is estimated from the purchase is 75,000 acre-feet per year. The water from the Lake O' the Pines would be transferred to a new water treatment plant in the southeast part of the NTMWD's service area. Based on the most recent information available from Region D, there is approximately 78,000 to 72,000 acre-feet per year of supply from the Lake O' the Pines Reservoir. For planning purposes, this supply amount is shown, however, actual contract amounts may be higher and are consistent with this plan.

Supply Development (Quantity, Reliability, Quality)

Water Quantity

Supply availability is based on the amount of unused water from NETMWD and the contractual supply for manufacturing use in Morris County. The manufacturing facility in Morris County is no longer operational and the supply is proposed to be repurposed for municipal use.

TABLE G.52 SUMMARY OF QUANTITIES (AC-FT/YR)

DESCRIPTION	2030	2040	2050	2060	2070	2080
NTMWD		79,348	77,892	76,427	74,940	73,446

Reliability

The water from this strategy would be moderately to highly reliable. The supply from Lake O' the Pines is based on the firm yield of the reservoir using the Cypress WAM. The supplies shown represent the firm supply, however non-firm supplies may also be purchased. If additional instream flow releases are required, the firm supply may decrease.

Water Quality

The treated water quality is expected to be good. Lake O' the Pines water has low total dissolved solids (TDS) and salts. The average TDS level is approximately 100 mg/L. The reservoir also has slightly higher than average nutrients, including ammonia-nitrogen. Other nutrient values are below the screening levels.

Environmental Considerations

Since the Lake O' the Pines water management strategy obtains water from an existing source, the environmental impacts are expected to be low.

- **Threatened and Endangered Species.** There are 29 state and federal threatened and endangered species potentially impacted by this WMS, based on the species listed in the counties in which this WMS is located.
- **Environmental Water Needs.** The environmental flow needs will be evaluated during the permitting process as required by TCEQ and/or USACE.

Permitting and Development

Development of this source would require contracts between NTMWD and entities contracting for water from Lake O' the Pines that have excess supplies. This strategy would also require an interbasin transfer permit to use the water in the NTMWD service area.

Cost Analysis

For the Region C cost analysis, planning level opinion of costs has been developed using the TWDB's costing tool. In accordance with TWDB Guidance, the analysis of costs for 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 to a future treatment facility. Water treatment plants are costed separately. Cost estimates for this strategy are included in **Appendix H.**

TABLE G.53 SUMMARY OF COSTS

ENTITY	CAPITAL COST	UNIT COST ($/1,000 gal)	
		WITH DEBT SERVICE	AFTER DEBT SERVICE
NTMWD	$1,345,792,000	$4.05	$1.07

Water Management Strategy Evaluation

This strategy provides a reliable freshwater supply at a reasonable cost for NTMWD. The low salinity levels in the water make it amenable for blending with some of NTMWD's other sources, such as Lake Texoma and/or reuse.

Water User Group Application

The Lake O' the Pines strategy is recommended by Region C for NTWMD and customers.

G.6 TRWD Major Water Management Strategy Technical Memorandums

G.6.1 Aquifer Storage and Recovery Demonstration

Potential Sponsor(s):	TRWD
WMS/Project Type:	Aquifer Storage and Recovery
Potential Supply Quantity:	5,000 acre-feet per year during drought
Implementation Decade:	2030
Strategy Capital Cost:	$14,932,000
Unit Water Cost ($/kgal):	$0.98 during Debt Service; $0.49 after Debt Service
Application:	Recommended

Strategy Description

Aquifer Storage and Recovery (ASR) is a water management solution that allows for storing surplus water in local aquifers during periods of excess surface water availability and withdrawing the stored water later during periods of drought or peak demands. TRWD has completed a pilot well near an existing surface water treatment facility and is currently conducting tests. This demonstration study is on-going, and the results are not available.

Conceptually, the ASR project would treat excess surface water at an existing water treatment plant. The treated water would then be stored in the Hosston formation of the Trinity aquifer during low demand winter or spring months and normal to wet years. This concept recognizes that during drought conditions, the ability to store water may be limited. Therefore, this project would likely be operated as part of a system that stores water during wet periods and uses stored water during dry periods.

An ASR system for TRWD would consist of a combination of the following infrastructure elements:

- Wellfield facilities (3 recharge / recovery wells) Wells are approximately 1,500 to 1,700 feet below the ground surface.
- Connection piping at the water treatment plant

Supply Development (Quantity, Reliability, Quality)

Water Quantity

It is assumed that the source of water for this strategy would be excess surface water from water rights owned by TRWD. The project is sized to store up to 5,000 acre-feet per year over a three-to four year period and recover up to 88 percent of this amount over a two-year period. Water would be pumped directly to the water treatment and ASR site from existing raw water transmission systems. The water is fully treated and will not degrade receiving formation groundwater. The water is then recharged into the receiving formation through recharge wells. It is assumed that these facilities are sized to transport and recharge 1,600 acre-feet per year over a 9-month period, with a peaking factor of 1.25. This provides the peak capacity to recover and utilize excess flows over a short period and store sufficient quantities to meet demands during dry periods. The assumed maximum recharge/recovery capacity for each well is 450 gpm.

TABLE G.54 SUMMARY OF QUANTITIES (AC-FT/YR)

DESCRIPTION	2030	2040	2050	2060	2070	2080
TRWD	2,500	2,500	5,000	5,000	5,000	5,000

Reliability

Successful ASR development is highly reliable. TRWD's initial ASR demonstration well is permitted to be able to recover 88 percent of water stored. Challenges to reliability include natural groundwater flow away from the ASR site and the associated drift of the storage bubble, thus reducing available supplies. This migration of stored water is an important consideration in determining the reliability and viability of an ASR project. The potential for migration increases as residence time in the aquifer increases. Also, since withdrawal of groundwater is a property right, competition with other nearby users could reduce the reliability of this water. One way to address the issue of other competing wells is to own the property rights over the storage bubble, which would increase strategy costs. The demonstration well is on property owned by TRA.

Water Quality

Because of the guidelines stipulated in the ASR regulations for Texas, the quality of the recharge water must not degrade the quality of the receiving aquifer, which is generally good. The recovered ASR water would be treated to standards required by the end use. When the injected water is treated to meet drinking water standards prior to storage, the recovered water may only need simple re-disinfection prior to being distributed to end-users.

Environmental Considerations

Environmental impacts are expected to be low. The footprint of an ASR project may be significantly smaller than a surface reservoir project of similar storage capacity and eliminates the need to inundate large areas of land. The transmission system and the ASR facilities can be designed to avoid environmentally sensitive areas. The project will not degrade the quality of the groundwater in the receiving aquifer.

The challenge will be to locate the facilities (transmission, treatment, and wellfield) in areas that are increasingly urban.

Permitting and Development

There is much support for developing ASR projects in Texas, but the principal challenge for development is identifying appropriate receiving formations and aquifer zones that are near areas of water sources and demand. The Texas Legislature has enacted legislation to remove some of the legal and regulatory obstacles that have previously impeded application of this technology. This legislation now allows the water quality of the recharge water to be such that it does not degrade the quality of water in the formation (versus drinking water standards) and permits the recovery of nearly the same amount of recharge water under the new ASR regulations. However, there remains concerns for protection of the water once it is injected for storage. Since groundwater is considered a property right, stored ASR water can become subject to competition for use by other property owners, especially if the natural flow is not restricted.

Recharge wells for ASR projects are regulated by TCEQ's Underground Injection Control (UIC) program and are classified as Class V Injection Wells. Thus, they must be permitted pursuant to Chapter 27, Texas Code, and Chapter 331, Title 30 of the Texas Administrative Code. TRWD has already permitted one demonstration well with TCEQ under this program.

An ASR project requires wells to be registered with the applicable GCD. If a well does not recovery more water than stored, a permit is not needed. TRWD has registered the initial demonstration well with the Northern Trinity GCD (Tarrant County).

Cost Analysis

For the Region C cost analysis, planning level opinions of costs for this strategy have been developed using the TWDB's costing tool. In accordance with TWDB Guidance, the analysis of costs for WMSs includes capital costs, debt service, and annual operating and maintenance expenses over the planning horizon. This strategy assumes that there are no purchased water costs, and water already developed by a sponsor is the source for the ASR project.

Cost estimates for this project are included in **Appendix H.**

TABLE G.55 SUMMARY OF COSTS

ENTITY	CAPITAL COST	UNIT COST ($/1,000 GAL)	
		WITH DEBT SERVICE	AFTER DEBT SERVICE
TRWD	$14,932,000	$0.98	$0.49

Water Management Strategy Evaluation

ASR provides a drought resiliency strategy that has considerable potential for users with sources of excess water. The recovery efficiency is estimated at 88 percent based on the initial TRWD demonstration well permit. Additional testing will determine if the recovery efficiency could be improved for future wells. Care must be taken to limit losses due to the natural movement of groundwater and competition from adjacent landowners.

Further study is needed to address technical uncertainties. Technical operation of the system may pose challenges to infrastructure that may not be used regularly.

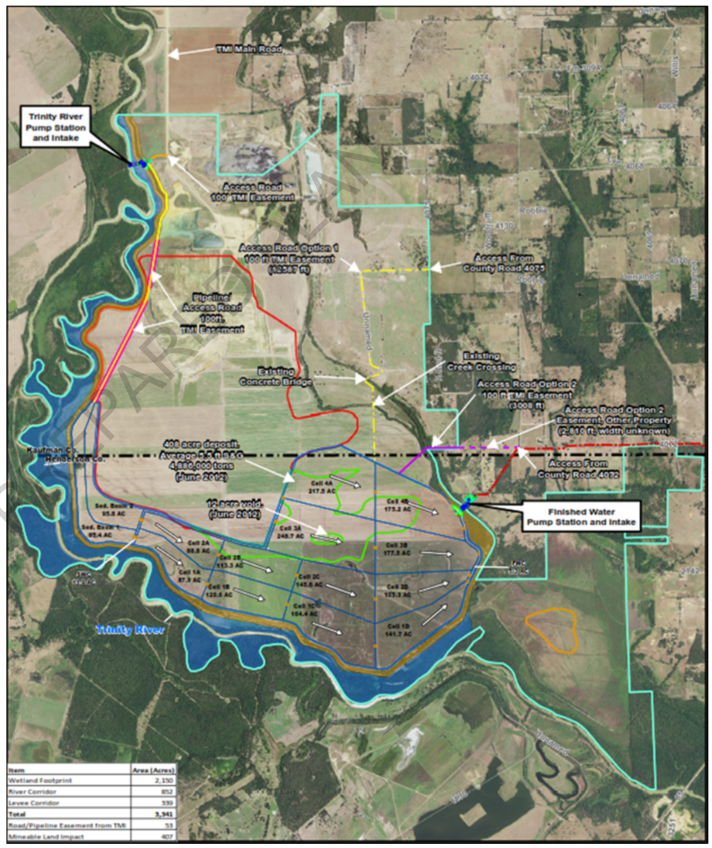
Water User Group Application

The initial demonstration well is currently being implemented and tested by TRWD. This is a recommended strategy for TRWD.

G.6.2 Marty Leonard Wetland (Cedar Creek Wetland Reuse)

Potential Sponsor(s):	Tarrant Regional Water District
WMS/Project Type:	Reuse
Potential Supply Quantity:	88,059 acre-feet per year
Implementation Decade:	2030
Strategy Capital Cost:	$673,381,000
Unit Water Cost ($/kgal):	$2.00 during Debt Service and $0.73 after Debt Service
Application:	Recommended

Strategy Description



The Tarrant Regional Water District (TRWD) has water rights allowing the diversion of return flows of treated wastewater from the Trinity River. To utilize these flows, TRWD has developed a reuse project at Richland-Chambers Reservoir. Treated wastewater is discharged to the Trinity River and its tributaries, flows downstream, is pumped from the Trinity River into the constructed George W. Shannon Wetlands and then pumped into Richland-Chambers Reservoir. The return flows are then diverted from Richland-Chambers Reservoir and transported to the TRWD service area. However, this project can only divert and treat a portion of the permitted reuse supplies. To fully utilize the available reuse, TRWD will develop a similar reuse project at Cedar Creek Reservoir, named the Marty Leonard Wetlands. In November 2014, TRWD's certificates of adjudication for these reuse projects were amended to increase the total permitted reuse supply to 188,524 acre-feet per year. This includes 100,465 acre-feet per year at Richland-Chambers and 88,059 acre- feet per year at Cedar Creek Reservoir. This project is currently in design and is expected to be completed before the 2030 decade.

This strategy addresses the development of a reuse project at Cedar Creek Reservoir, which includes a new diversion structure, constructed wetlands, and infrastructure necessary to deliver the treated return flows into Cedar Creek Reservoir. The wetlands will be constructed adjacent to the Trinity River, east of the City of Ennis. The reuse supplies would then be diverted from the lake and transported by the Integrated Pipeline (see Integrated Pipeline Technical Memorandum).

Supply Development (Quantity, Reliability, Quality)

Supply availability was evaluated by the Region C Consultants with consideration to the maximum return flow available to TRWD for diversion.

Water Quantity

The water quantity for the Marty Leonard wetlands considers available return flows, amount diverted and treated by the Richland Chambers Wetlands (at Richland Chambers Reservoir), and any evaporative losses during treatment in the wetlands. As municipal water demands increase, the available return flows increase. The quantity of supplies available through this strategy is summarized in **Table G.56**. According to these projections, the project will not reach the total permitted amount (88,059 AFY) during the 2080 planning period. However, TRWD intends to divert the return flows from the TRA Central Regional Wastewater System WWTP (see the Reuse from TRA Central WWTP Technical Memorandum) to the Marty Leonard Wetlands, and then reach the total permitted amount (88,059 AFY) by 2060.

TABLE G.56 SUMMARY OF QUANTITIES (AC-FT/YR)

DESCRIPTION	2030	2040	2050	2060	2070	2080
TRWD	10,167	18,085	20,969	29,037	38,956	48,455

Reliability

The reliability of the reuse supplies is high. There is the potential for the reuse supplies to develop at a faster or slower rate, depending on the volume of return flows.

Water Quality

The water quality is expected to be good. The wetlands will filter out excess nutrients and pollutants and trap natural sediment and organic matter, providing higher quality water than diverted from the Trinity River.

Environmental Considerations

There are no significant environmental considerations associated with this strategy. The wetlands will be designed to handle the volume and quality of the return flows appropriately. In addition to their function of improving the water quality of the diversions, the constructed wetlands will provide habitat for wildlife.

During the preliminary design phase of this project, the project team identified several federally listed threatened or endangered species with the potential to occur within the project limits. Field surveys of the project site did not identify any current federally listed or proposed listed species within the project footprint. However, habitat conditions were observed for eight threatened or endangered species including the monarch butterfly (federal candidate), tricolored bat (federal proposed endangered), alligator snapping turtle (federal proposed threatened and state threatened), northern scarlet snake (state threatened), Louisiana Pigtoe (federal proposed threatened and state threatened), Texas Fawnsfoot (federal and state threatened), Texas Heelsplitter (federal proposed endangered and state threatened), and Trinity Pigtoe (state threatened). A mussel survey was performed for the portion of the Trinity River within the project area and no federally listed mussel species were identified during the survey. Completion of coordination with USFWS, as well as other site surveys for species throughout design and prior to construction, may be required.

Permitting and Development

TRWD has already secured water right permits to develop the Marty Leonard Wetlands reuse project. A federal Section 404 permit would be needed to construct the intake pump station, pipelines, and wetlands because of possible impacts to waters of the U.S. TRWD acquired the property for the Marty Leonard Wetlands in 2014 and is in the process of acquiring the site and right-of-way for the finished water pipeline and pump station facilities. The Marty Leonard Wetlands are currently in the design phase of the project at the time of the regional planning effort.

The project is expected to be online by 2030. There are no known development issues.

Cost Analysis

Capital construction costs for this project were obtained from TRWD based on 30% design of pump stations and pipelines and 10% design for wetlands sedimentation basins and cells. Original capital costs were in 2013 dollars and were updated to September 2023 dollars using the ENR index. Costs include additional wetlands needed for full TRA reuse purchases and ultimate TRWD permitted reuse. Annual costs were developed following TWDB guidance for debt service, operation and maintenance costs, and pumping costs.

Cost estimates for this project are included in **Appendix H.**

TABLE G.57 SUMMARY OF COSTS

ENTITY	CAPITAL COST	UNIT COST ($/1,000 GAL)	
		WITH DEBT SERVICE	AFTER DEBT SERVICE
TRWD	$673,381,000	$2.00	$0.73

Water Management Strategy Evaluation

The Marty Leonard Wetlands provides TRWD with a low-cost water supply in an ecologically sustainable manner. The source water will increase over time as demands increase, providing a highly reliable supply. Additionally, the strategy is to pump water out of the reservoirs and to TRWD customers on the same day as it is delivered from the wetlands. This eliminates evaporative losses and will not impact reservoir storage that could otherwise be used. The constructed wetlands also provide increased habitat for wildlife and a source of clean water to Cedar Creek Lake.

Water User Group Application

The Marty Leonard Wetland Reuse Project is sponsored by TRWD and the strategy is recommended for TRWD by the Region C Regional Water Planning Group. The water provided from the Marty Leonard Wetland Reuse Project will be used by TRWD customers.

G.6.3 Reuse from Mary's Creek WRF

Potential Sponsor(s):	Tarrant Regional Water District
WMS/Project Type:	Reuse
Potential Supply Quantity:	25,938 acre-feet per year
Implementation Decade:	2030
Strategy Capital Cost:	$68,938,000
Unit Water Cost ($/kgal):	$0.64 during Debt Service; $0.20 after Debt Service
Application:	Recommended

Strategy Description

The City of Fort Worth is currently designing a new wastewater treatment plant, Mary's Creek Water Reclamation Facility (WRF), that is located in the western parts of the City of Fort Worth. The Mary's Creek WRF is expected to be online by 2028 and will discharge to Mary's Creek which flows into the Clear Fork of the Trinity River. Through a partnership with Fort Worth, TRWD is planning to divert available return flows from Mary's Creek to Eagle Mountain Lake via a pipeline system.

This strategy includes the construction of an intake pump station and 3.5 miles of pipeline. This strategy was assumed to connect to the existing TRWD conveyance system north of TRWD's Eagle Mountain Balancing Reservoir where it will tie into an existing pipeline and be delivered to Eagle Mountain Lake. Land acquisition for this strategy is yet to be complete.

Supply Development (Quantity, Reliability, Quality)

Supply availability was evaluated by the Region C Consultants with consideration of the maximum return flow available to TRWD for diversion.

Water Quantity

The water quantity for this strategy considers available return flows after accounting for anticipated direct reuse by the City of Fort Worth from Mary's Creek WRF. As municipal water demands increase, the available return flows increase. The quantity of supplies available through this strategy is summarized in **Table G.58**. According to these projections, the project will supply the maximum amount of available reuse (25,928 AFY) over the 2080 planning period.

TABLE G.58 SUMMARY OF QUANTITIES (AC-FT/YR)

DESCRIPTION	2030	2040	2050	2060	2070	2080
TRWD	10,405	17,547	17,288	20,168	23,048	25,928

Reliability

The reliability of the reuse supplies is high. There is the potential for the reuse supplies to develop at a faster or slower rate, depending on the volume of return flows.

Water Quality

The water quality is expected to be fair. While the effluent from the Mary's Creek WRF is expected to be very high quality, natural flows in Mary's Creek can contain nutrients, sediment, organic matter, and other pollutants and may degrade the quality, especially following rain events.

Environmental Considerations

No detailed environmental assessments have been conducted for the intake pump station and pipeline route. Site selection and design are on-going. Habitat and vegetation cover and threatened and endangered species could be impacted by this strategy depending on the locations of the intake pump station and route of the pipeline. However, these facilities will be located to minimize impacts where possible.

Permitting and Development

TRWD does not have water rights for the use of return flows in Eagle Mountain Lake and would require an amendment to the existing Eagle Mountain Lake water rights for the bed and banks permit. A Section 404 permit may be required for the construction of this project depending on location of the intake pump station and route and construction methods of the pipeline.

Cost Analysis

Cost estimates for this project are included in **Appendix H.**

TABLE G.59 SUMMARY OF COSTS

ENTITY	CAPITAL COST	UNIT COST ($/1,000 GAL)	
		WITH DEBT SERVICE	AFTER DEBT SERVICE
TRWD	$68,938,000	$0.64	$0.20

Water Management Strategy Evaluation

The Reuse from Mary's Creek WRF provides TRWD with a low-cost water supply. The source water will increase over time as demands increase, providing a highly reliable supply. Additionally, the source water from this strategy will be pumped out of reservoirs and to TRWD customers on the same day as it is delivered from the Mary's Creek WRF. This eliminates evaporative losses and will not impact reservoir storage that could otherwise be used.

Water User Group Application

This project is sponsored by TRWD and is a recommended strategy for TRWD by the Region C Regional Water Planning Group.

G.6.4 Reuse from TRA Central WWTP

Potential Sponsor(s):	Tarrant Regional Water District
WMS/Project Type:	Reuse
Potential Supply Quantity:	60,000 acre-feet per year
Implementation Decade:	2030
Strategy Capital Cost:	$0 (Capital costs are included with the Marty Leonard Wetlands)
Unit Water Cost ($/kgal):	$0.39 (purchase and pumping costs)
Application:	Recommended

Strategy Description

The Tarrant Regional Water District (TRWD) entered into an agreement with the Trinity Regional Authority (TRA) to purchase a portion of the treated wastewater return flows from the TRA Central Regional Wastewater System (CRWS) Wastewater Treatment Plant (WWTP) for indirect reuse in TRWD's system. In combination with its existing reuse sources, this purchase of return flows will ensure that TRWD has enough available flow to meet its total permitted reuse supply of 188,524 acre-feet per year.

Currently, TRWD does not have a direct way to access the purchased return flows from the TRA CWRS WWTP which are discharged into the Trinity River. Following completion of the Marty Leonard Wetlands, these purchased return flows can be accessed via an intake on the Trinity River, treated in the constructed wetland, pumped to Cedar Creek Reservoir, and ultimately diverted from the reservoir and transported by the Integrated Pipeline (IPL) and Additional Transmission infrastructure to TRWD's customers. It was assumed this project included upgrades to diversion structures, and new wetland cells would be required to treat all-the purchased flows. Amendment to the certificates of adjudication may be required to access the entire quantity of this supply following 2060.

Supply Development (Quantity, Reliability, Quality)

Supply availability was provided to the Region C Consultants following coordination with TRA.

<u>**Water Quantity**</u>

The water quantity for the reuse from the TRA CRWS WWTP is the agreed-upon quantity that TRWD can purchase from TRA and does not include water losses via conveyance along the Trinity River. The quantity of supply available through this strategy is summarized in **Table G.61**. According to these projections, the project will supply a maximum amount of available reuse to be purchased (60,000 AFY) during the 2080 planning period.

TABLE G.60 SUMMARY OF QUANTITIES (AC-FT/YR)

DESCRIPTION	2030	2040	2050	2060	2070	2080
TRWD	25,500	37,000	48,500	60,000	60,000	60,000

Reliability

The reliability of the reuse supplies is high. There is the potential for the reuse supplies to develop at a faster or slower rate, depending on the volume of return flows.

Water Quality

The water quality is expected to be good. Ultimately this reuse supply will be treated by the Marty Leonard Wetlands which will filter out excess nutrients and pollutants and trap natural sediment and organic matter, providing higher quality water than diverted from the Trinity River.

Environmental Considerations

There are no significant environmental considerations associated with this strategy. The wetlands will be designed to handle the volume and quality of the return flows appropriately. In addition to their function of improving the water quality of the diversions, the constructed wetlands will provide habitat for wildlife.

During the preliminary design phase of the Marty Leonard Wetland project (see Marty Leornard Wetland Technical Memorandum), the project team identified several federally listed threatened or endangered species with the potential to occur within the project limits. Field surveys of the project site did not identify any current federally listed or proposed listed species within the project footprint. However, habitat conditions were observed for eight threatened or endangered species including the monarch butterfly (federal candidate), tricolored bat (federal proposed endangered), alligator snapping turtle (federal proposed threatened and state threatened), northern scarlet snake (state threatened), Louisiana Pigtoe (federal proposed threatened and state threatened), Texas Fawnsfoot (federal and state threatened), Texas Heelsplitter (federal proposed endangered and state threatened), and Trinity Pigtoe (state threatened). A mussel survey was performed for the portion of the Trinity River within the project area and no federally listed mussel species were identified during the survey. Completion of coordination with USFWS, as well as other site surveys for species throughout design and prior to construction, may be required.

Permitting and Development

A federal Section 404 permit would be needed to upgrade the intake pump station and pipelines and construct additional wetlands because of possible impacts to waters of the U.S.

TRWD currently has certificates of adjudication for reuse projects that provide a total permitted reuse supply of 188,524 acre-feet per year. Amendment to these water rights may be required to access the entire quantity of this supply following 2060.

Cost Analysis

Capital construction costs associated with upgrades to the Marty Leonard Wetlands for this strategy were included in the capital construction costs associated with the Marty Leonard Wetlands (see the Marty Leonard Wetland Technical Memorandum). Annual costs were developed pumping costs and an assumed purchase of reuse water at $0.30 per 1,000 gal. Actual costs would be negotiated between the buyer and seller.

Cost estimates for this project are included in **Appendix H.**

TABLE G.61 SUMMARY OF COSTS

ENTITY	CAPITAL COST	UNIT COST ($/1,000 GAL)	
		WITH DEBT SERVICE	AFTER DEBT SERVICE
TRWD	$0	$0.39	$0.39

Water Management Strategy Evaluation

The Reuse from TRA Central WWTP provides TRWD with a low-cost water supply in an ecologically sustainable manner. The source water will increase over time as demands increase, providing a highly reliable supply. Additionally, the source water from this strategy will be pumped out of reservoirs and to TRWD customers on the same day as it is delivered from the wetlands. This eliminates evaporative losses and will not impact reservoir storage that could otherwise be used.

Water User Group Application

This strategy is sponsored by both TRA and TRWD and is recommended for TRWD by the Region C Regional Water Planning Group.

G.6.5 Tehuacana Reservoir

Potential Sponsor(s):	Tarrant Regional Water District
WMS/Project Type:	New Surface Water (Reservoir)
Potential Supply Quantity:	22,330 acre-feet per year
Implementation Decade:	2050
Strategy Capital Cost:	$457,095,000
Unit Water Cost ($/kgal):	$3.32 during Debt Service; $0.27 after Debt Service
Application:	Recommended

Strategy Description

Tehuacana Reservoir is a proposed reservoir in Freestone County on Tehuacana Creek within the Trinity River Basin. Tehuacana Creek is a tributary of the Trinity River and lies immediately south and adjacent to Richland Creek on which the existing Richland-Chambers Reservoir is located. Tehuacana Reservoir would connect to Richland-Chambers Reservoir by a 9,000-foot channel and be operated as an integrated extension of that reservoir. The project would have a firm yield of 26,400 acre-feet per year and a safe yield of 22,330 acre-feet per year. The reservoir would store approximately 338,000 acre-feet and inundate approximately 15,000 acres. The existing spillway for Richland-Chambers Reservoir was designed to provide enough discharge capacity to accommodate the increased flood flows from Tehuacana Reservoir for the probable maximum flood event at the time of design. Therefore, it is assumed that the dam for Tehuacana Reservoir can be constructed without a spillway and can function as merely increased storage for the Richland-Chambers-Tehuacana Reservoir. Supplies derived from Tehuacana would be transported from the expanded reservoir utilizing existing and proposed TRWD transmission facilities.

The strategy includes a zoned earthen embankment with a maximum height of 81 feet, a 9,000-foot channel at elevation 290 feet connecting to Richland-Chambers Reservoir and a booster pump station to access the full yield of Tehuacana down to elevation 270 feet. Depending upon the sequencing of strategy implementation, some or all the water from Tehuacana can be conveyed through the IPL. However, by 2050 a new pipeline will be needed to transport the supplies from TRWD strategies, including Lake Tehuacana. The new pipeline could be built within the IPL right of way and designed to carry Tehuacana yield as well as supply sources from southeast of Dallas/Fort Worth.

Supply Development (Quantity, Reliability, Quality)

The supply available for Tehuacana Reservoir was developed using the Trinity Basin Water Availability Model (WAM), modified for Region C strategy evaluation. This model includes the adopted environmental flow standards for the Trinity Basin. It also includes an estimate of the environmental flows at the reservoir site based on scaling the SB3 standards (using naturalized flows and drainage area ratios) from the Trinity River near Oakwood (USGS 0806500), shown in **Table G.62**. The scaling is based on methods recommended by TCEQ (Wood, 2013).

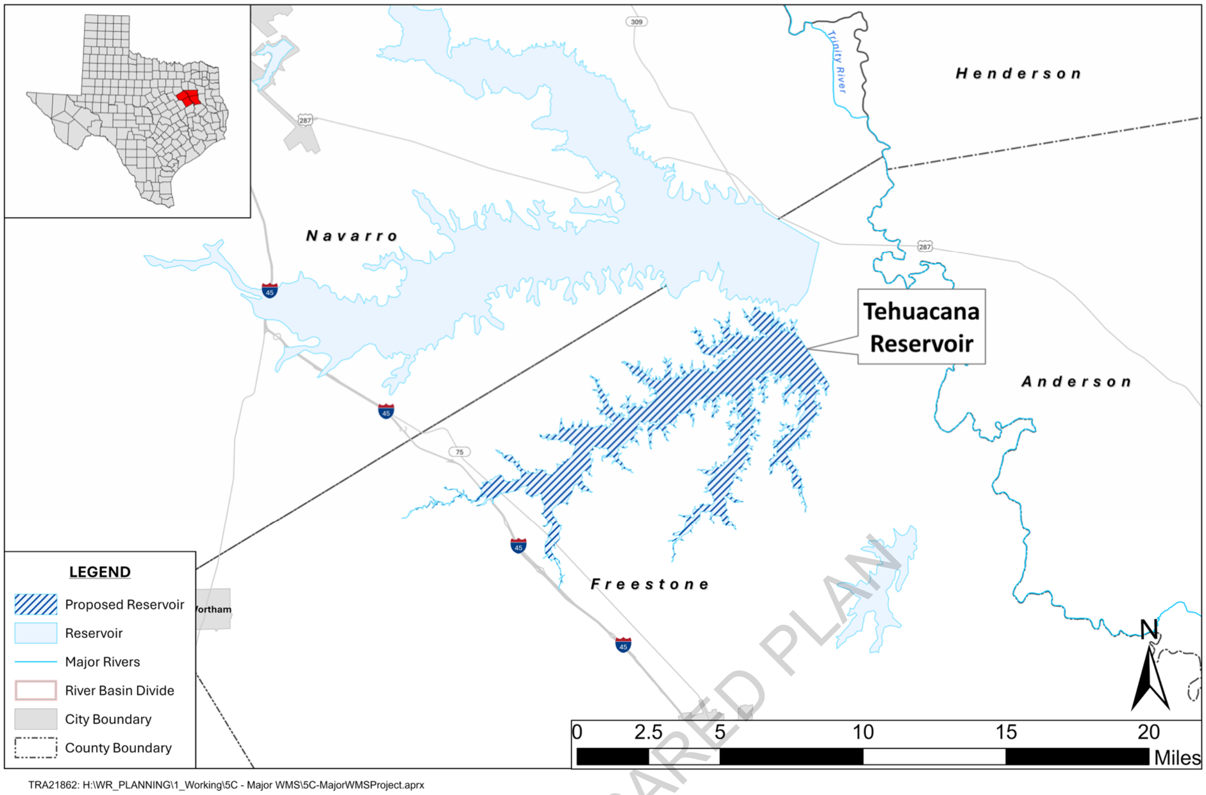


TABLE G.62 ENVIRONMENTAL FLOW CRITERIA FOR TEHUACANA RESERVOIR

SEASON	SUBSISTENCE	BASE	PULSE (2 PER SEASON)
Winter	3 cfs	9 cfs	Trigger: 104 cfs Volume: 500 af Duration: 4 days
Spring	4 cfs	12 cfs	Trigger: 243 cfs Volume: 3,285 af Duration: 8 days
Summer	2 cfs	7 cfs	Trigger: 87 cfs Volume: 639 af Duration: 4 days
Fall	3 cfs	7 cfs	Trigger: 87 cfs Volume: 639 af Duration: 4 days

<u>Water Quantity</u>

Tehuacana Reservoir was analyzed as a stand-alone project junior to all existing Trinity Basin priority rights. TRWD uses safe yield for its reliable supply estimates. The stand-alone safe yield of Tehuacana Reservoir is 22,330 acre-feet per year, which includes environmental flow releases as shown in **Table G.62**. However, if other new water rights are granted in the Trinity River Basin prior to obtaining a water right for this project, the yield of the reservoir could be affected. The yield has already been reduced from previous estimates due to new water rights and the incorporation of the environmental flow standards.

The project may offer more benefit to the TRWD system than indicated by the safe yield. The additional storage may provide more opportunities to use water from the TRWD Richlands reuse project and the TRWD Excess Flows permit. Additional studies will be required to evaluate this benefit.

Reliability

The reliability of Lake Tehuacana is expected to be moderately high. The use of safe yield provides a buffer if there is a new drought of record.

Water Quality

The water quality is expected to be adequate with composition like Richland-Chambers Reservoir.

Environmental Considerations

The reservoir is a new source of surface water, therefore environmental impacts have the potential to be greater than other strategies utilizing existing sources.

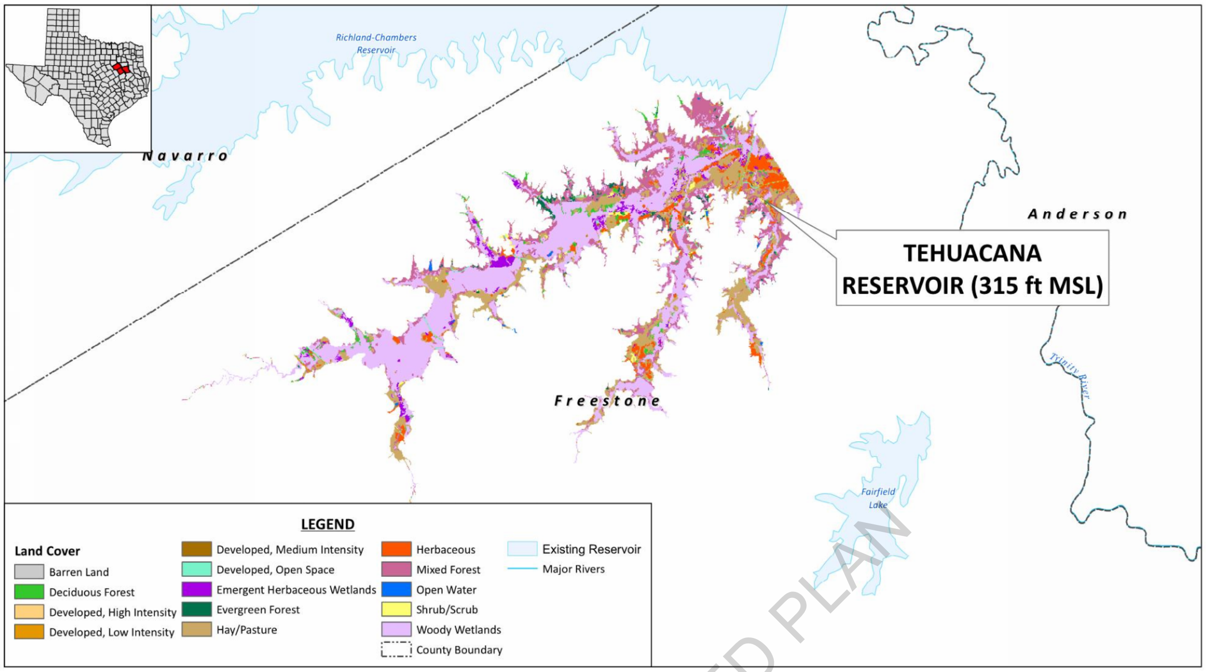
- **Habitat and Vegetative Cover.** Tehuacana Reservoir would inundate about 15,000 acres adjacent to Richland-Chambers Reservoir. Most of the reservoir site is classified as upland deciduous forest and grassland. Less than 3 percent is presently classified as marsh or open water. There are about 1,200 acres of bottomland hardwood forest, which is concentrated near the dam site (see **Figure G.15**). There are no priority bottomland hardwoods within the site, but the Tehuacana Reservoir site is also located immediately upstream of two Priority 5 bottomland hardwood preservation sites identified as Tehuacana Creek and Boone Fields (USFWS, 1985). The vegetative cover as reported in the TWDB Reservoir Site Protection Study is shown on **Table G.63**.

TABLE G.63 VEGETATIVE LAND COVER

LANDCOVER CLASSIFICATION	ACREAGE[A]	PERCENT
Bottomland Hardwood Forest	1,213	8.2%
Marsh	285	1.9%
Evergreen Forest	65	0.4%
Upland Deciduous Forest	8,605	58.0%
Grassland	2,992	20.1%
Shrubland	427	2.9%
Agricultural Land	1,136	7.7%
Open Water	122	0.8%
Total	**14,845**	**100.0%**

[a]Acreage based on approximate GIS coverage rather than calculated elevation-area-capacity relationship.

FIGURE G.15 LAND COVER FOR TEHUACANA RESERVOIR



- **Threatened and Endangered Species.** The reservoir is located just upstream of a segment of the Trinity River identified with the Texas heelsplitter freshwater mussels. There are nine federally listed threatened or endangered species and 11 other state-listed species in the one county affected by this project.

Permitting and Development

Developing this site will require obtaining a new water right and a federal Section 404 permit to construct the dam and reservoir. Part of the Tehuacana Reservoir site is underlain by lignite, which has impeded development in the past. However, most of the lignite has been mined and is no longer used locally. With these changes, the economic feasibility of obtaining the land for this project improves.

This project has been in TRWD's water supply planning since prior to the design, permitting and construction of the Richland-Chambers Reservoir which commenced in the late 1970's.

Cost Analysis

Detailed cost estimates for this strategy were provided by the sponsor where available. These costs are more detailed estimates developed during planning and/or design. For consistency with SB1 planning guidance, the costs were updated to September 2023 dollars using the ENR index. When detailed costs were not available, TWDB costing guidance was followed. Annual costs were also developed following TWDB guidance. Transmission costs and costs for the new, parallel pipeline are not currently included in this strategy cost estimate, but are included as a separate project cost since this infrastructure will be associated with other supply sources.

Cost estimates for this project are included in **Appendix H**.

TABLE G.64 SUMMARY OF COSTS

ENTITY	CAPITAL COST	UNIT COST ($/1,000 GAL)	
		WITH DEBT SERVICE	AFTER DEBT SERVICE
TRWD	$457,095,000	$3.32	$0.27

Water Management Strategy Evaluation

Lake Tehuacana would provide a new water source near existing water resources for TRWD. This makes it easier to operate and maintain as part of the TRWD East Texas Reservoir System. There also would be cost savings with construction of the dam since a new spillway is not needed.

The environmental concerns are relatively low for a new reservoir site. However, further study is needed to better understand the potential for impacts to threatened and endangered species. The lignite deposits in the lake site have historically posed some obstacles in development but based on current development and expected future demand for these resources, it was assumed that the lignite deposits have minimal impact to the reservoir development and cost. The yield of the project is subject to potential new water rights granted in the Trinity River Basin.

This project, as currently proposed, would provide a reliable supply for a moderate cost and potentially low environmental impacts.

Water User Group Application

The Tehuacana Reservoir strategy is a recommended strategy for TRWD.

G.6.6 Eastern Study Area Carrizo-Wilcox Groundwater

Potential Sponsor(s):	TRWD
WMS/Project Type:	New Groundwater
Potential Supply Quantity:	32,000 acre-feet per year
Implementation Decade:	2050
Strategy Capital Cost:	$356,209,000
Unit Water Cost ($/kgal):	$3.75 during Debt Service and $1.89 after Debt Service
Application:	Recommended

Strategy Description

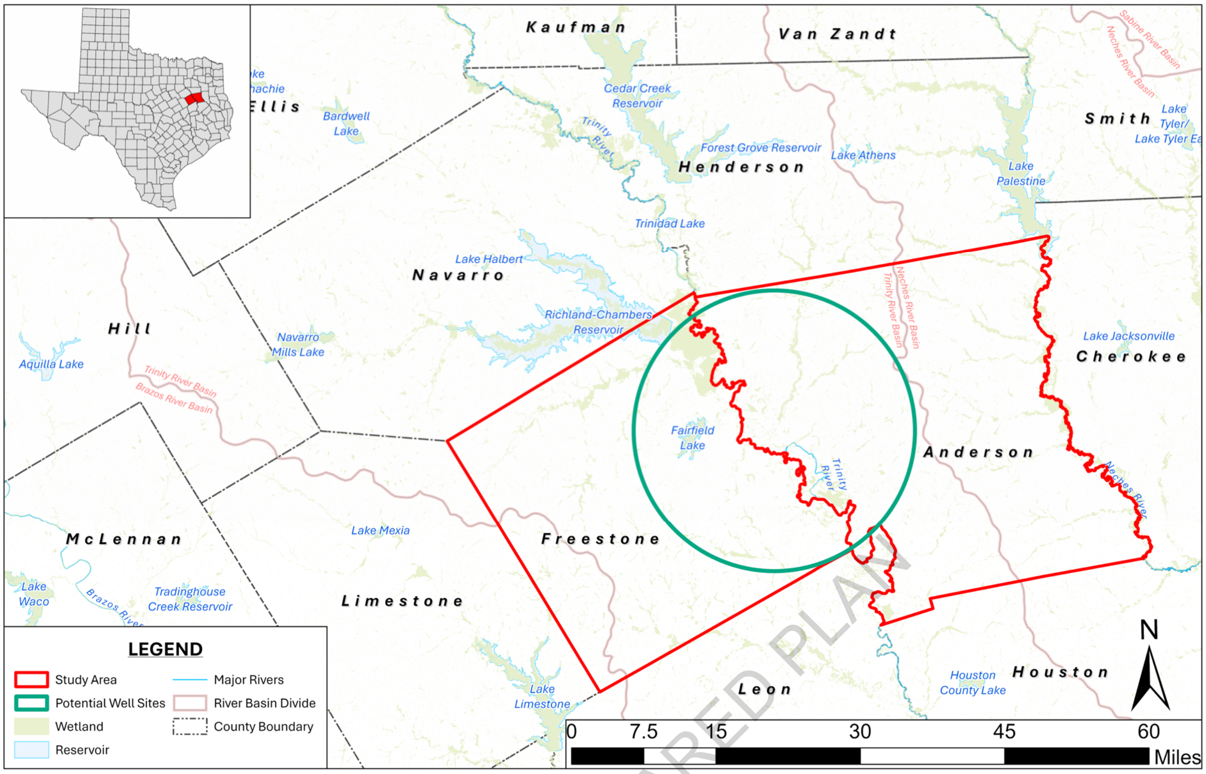
This strategy proposes to develop groundwater from the Carrizo-Wilcox and Queen City aquifers in Freestone and Anderson Counties. The groundwater would be transported approximately 28 miles to the Integrated Pipeline (IPL) near Cedar Creek Reservoir or a new parallel pipeline. This pipeline would then be used to move the groundwater to TRWD's service area. This strategy assumes the groundwater is mixed directly in the transmission system with surface water and/or reuse water. Alternatively, TRWD could blend the groundwater in one of its East Texas Reservoirs (Cedar Creek and Richland Chambers) prior to transporting to its service area.

This groundwater supply would supplement TRWD's existing water sources and provide diversity to its existing portfolio. As a supplemental supply, TRWD may choose to operate the well system on a continual basis or seasonally to provide water during the higher demand periods. This strategy assumes the wells are operated continuously on an average annual basis.

The infrastructure required for this strategy includes 39 wells (most likely distributed over multiple well fields), well field piping, ground storage, pump station, and 28 miles of 36- to 54-inch diameter transmission pipeline. The proposed water management strategy includes costs for sites E1A, E4, and E1B.

Supply Development (Quantity, Reliability, Quality)

A preliminary study was conducted by TRWD to assess the potential available supply within the designated target area. The study evaluated two different potential operation scenarios this project. The Average Scenario assumes that up to 32,000 acre-feet per year could be developed from the targeted area, with the project operating year-round at a fairly steady level of production. The Peak Scenario assumes that the project would operate only for four months per year during high demand periods, with delivery at a higher rate. Operating this way, the Peak Scenario could deliver 21,000 acre-feet per year. Further study would be needed to confirm the long-term reliable supply for either scenario.



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Water Quantity

For regional water planning purposes, the amount of available water for this strategy is limited by the Modeled Available Groundwater (MAG) and current users. The total amount of water available from both Freestone and Anderson counties is estimated at 26,800 acre-feet per year.

Reliability

The reliability is moderate. Previous studies indicate groundwater is available, but the long-term sustainability is unknown. Even with regulatory management of these aquifers, the aquifers are subject to recharge and pumpage from other users, both within the GCD and adjacent areas. There are also known water marketers actively pursuing the development of groundwater in eastern Anderson County. This could affect the amount of water that is available to permit.

Water Quality

Water from the Carrizo-Wilcox and Queen City aquifers in Anderson and Freestone Counties is generally fresh water with TDS levels of 200 to 300 mg/l. Some local wells indicate exceedances for nitrates and iron. Both of these constituents can be addressed through treatment and/or blending. Further study and testing would be needed to confirm compatibility for blending with the surface water sources.

Environmental Considerations

Environmental considerations were investigated in the Study of Impaired Groundwater Availability and Quality Report (Intera, 2016) produced for TRWD and Wichita Falls and are as identified below.

- **Wildlife Management Areas (WMA).** There are three wildlife management areas (WMA) designated within the target area for groundwater development. These WMAs include the Gus Engeling WMA in northwest Anderson County, Big Lake Bottom WMA in southwest Anderson County, and the Richland Creek WMA, which lies between Richland-Chambers Reservoir and the Trinity River. A groundwater development project would be sited outside these areas and is not expected to affect the WMAs, and the pipeline would be routed to avoid these areas.
- **Rivers and Other Environmental Sensitive Areas**. As conceived for this strategy, the pipeline to move water from Freestone County would need to cross the Trinity River. This strategy proposes to tunnel under the river to avoid impacting waters of the U.S. Where possible, the pipeline would be routed to avoid environmentally sensitive areas.
- **Threatened and Endangered Species.** There are 11 federally listed and 18 state-listed threatened and endangered species potentially occurring in the counties affected by this project (Anderson, Freestone, and Henderson Counties). None of these species are expected to be permanently impacted by this project.

Permitting and Development

Groundwater in Texas is a property right, which can be purchased with the land or acquired through a lease or severing of the water right from the property. In some counties, groundwater is managed by groundwater conservation districts (GCD). This project falls under two GCDs: Mid-East Texas GCD in Freestone County and Neches and Trinity Valleys GCD in Anderson County.

Development of a well field would require groundwater permits. The amount of water that could be permitted under the current Modeled Available Groundwater (MAG) value is near the proposed total quantity for this strategy. This leaves little water available to new in-county users and poses some uncertainty on whether the full 32,000 acre-feet per year can be permitted. While GCDs can permit above the MAG, the aquifer is to be managed to the Desired Future Conditions (DFC). Since the MAGs are a modeled representation of the available supply from the aquifer while complying with the DFC, there is some uncertainty on whether the full 32,000 acre-feet per year can be permitted without changes to the DFCs.

The construction of groundwater project is proposed to be online by 2050. This time frame allows for negotiations with sellers, water testing, design and construction of the infrastructure. This timeline also allows time if the DFCs have to be amended and/or the permit application is protested. The next update of the DFCs is scheduled for 2026.

Large-scale groundwater export proposals could face public opposition, especially if it is perceived to affect neighboring wells. Further study is likely to address these potential concerns.

Cost Analysis

Detailed costs were provided by TRWD and updated using the TWDB unit cost tables and ENR indexing, where appropriate. Annual costs were also developed following TWDB guidance for debt service and operation and maintenance costs.

Cost estimates for these supplies are included in **Appendix H**.

TABLE G.65 SUMMARY OF COSTS

ENTITY	CAPITAL COST	UNIT COST ($/1,000 GAL)	
		WITH DEBT SERVICE	AFTER DEBT SERVICE
TRWD (Average)	$356,209,000	$3.75	$1.89

Water Management Strategy Evaluation

This strategy provides a new water source that provides a higher level of resistance to future droughts than current surface water sources. The proposed groundwater well fields are located near TRWD's existing water sources, and existing infrastructure can be used to transport the water to TRWD's service area. The quality of the water is generally good and likely would not require extensive treatment.

The amount of water is limited and due to limitations of the formations, numerous wells would be required to develop this supply. Over time, the permitted amount of diversion can be adjusted by the GCD as part of its management objectives. This may affect the long-term reliability of this supply.

Water User Group Application

This 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 suitability of the strategy to the WUGs served.

Based on consideration of these criteria, the strategy is recommended for TRWD by the Region C Regional Water Planning Group.

G.7 UTRWD Major Water Management Strategy Technical Memorandums

G.7.1 Lake Ralph Rall Indirect Reuse

Potential Sponsor(s):	UTRWD
WMS/Project Type:	Reuse
Potential Supply Quantity:	20,007 acre-feet per year
Implementation Decade:	2030
Strategy Capital Cost:	$0
Unit Water Cost ($/kgal):	$0.00 during Debt Service; $0.00 after Debt Service
Application:	Recommended

Strategy Description

Lake Ralph Hall is a new reservoir currently being constructed on the North fork of the Sulphur River in Fannin County. Construction of the reservoir began in June of 2021 with plans to deliver water by 2026. This project is sponsored by the Upper Trinity Regional Water District (UTRWD). UTRWD has a water right permit to impound and divert 45,000 acre-feet per year from Lake Ralph Hall. UTRWD will be seeking a state water right to reuse return flows from water originating from the project, providing an additional 20,007 acre-feet per year by 2080. The source of this reuse water will be various UTRWD WWTPs in the Lewisville Lake Basin, based on the amount of effluent that originates from Lake Ralph Hall. This reclaimed water would augment UTRWD's supply. There are no additional transmission facilities needed to utilize this Ralph Hall reuse.

Supply Development (Quantity, Reliability, Quality)

Water Quantity

For this strategy, it was assumed that UTRWD would obtain authorization for the reuse of wastewater discharges originating from the use of Lake Ralph Hall water. This reuse is limited to the actual amount discharged. Based on the projected use of the lake, the amount of reuse is estimated to be 20,204 acre-feet per year by 2030 which slightly reduces to 20,007 acre-feet per year by 2080 due to lake sedimentation. This assumes that approximately 30% up to 50% by 2050 of the diverted water from the lake is returned as treated wastewater and is available for reuse by UTRWD. It is important to note that the reuse quantities shown in the Region C Plan are based on the drought of record amount in the Water Availability Model for Lake Ralph Hall and may be less than amount in the permit application. The total quantity of supplies available through this strategy is summarized in **Table G.66.**

TABLE G.66 SUMMARY OF QUANTITIES (AC-FT/YR)

DESCRIPTION	2030	2040	2050	2060	2070	2080
UTRWD	12,174	16,204	20,204	20,120	20,046	20,007

Reliability

The reliability of the supplies from the Lake Ralph Hall return flows is high. This additional source of raw water will help the UTRWD system to accommodate periodic downtimes for maintenance and/or repairs on system infrastructure.

Water Quality

Water quality is expected to be good and similar in composition to the North Sulphur River and Lewisville Lake.

Environmental Considerations

Indirect reuse projects will reduce the volume of flow in natural waterways in certain areas, but only to the extent that they remove flows returned by upstream wastewater treatment plants. No naturalized stream flow (naturally occurring runoff from precipitation) will be removed from waterways as part of this project. No additional infrastructure needs to be constructed for UTRWD to access this supply.

Permitting and Development

UTRWD has been granted a state water right to impound, divert, and use water associated with the Lake Ralph Hall project. Additional authorizations will be needed for reuse of the water. UTRWD also has an interbasin transfer permit to move the water from the Sulphur River Basin to the Trinity River Basin. Lake Ralph Hall is expected to be constructed and supplying water by 2030. The development of the reuse supplies from Lake Ralph Hall source water will occur over time beginning as early as 2030.

Cost Analysis

No costs were associated with this project since no infrastructure to convey return flows from UTRWD WWTPs in the Lewisville Lake Basin is required.

TABLE G.67 SUMMARY OF COSTS

Entity	Capital Cost	Unit Cost ($/1,000 gal)	
		With Debt Service	After Debt Service
UTRWD – Ralph Hall Indirect Reuse	$0	N/A	N/A

Water Management Strategy Evaluation

The Lake Ralph Hall indirect reuse project provides UTRWD with a long-term reliable supply. The reuse provides an environmentally friendly, low-cost source of additional water to UTRWD.

Water User Group Application

The sponsor of this strategy is UTRWD, and the strategy provides supplies for UTRWD for their customers. This is a recommended strategy for UTRWD.

G.8 Other Major Water Management Strategy Technical Memorandums

G.8.1 GTUA Additional Texoma Supplies

Potential Sponsor(s):	GTUA with Participating Entities
WMS/Project Type:	Existing Surface Water (Infrastructure) + Reallocation
Potential Supply Quantity:	37,950 acre-feet per year (34 MGD)
Implementation Decade:	2040 (Phase 1), 2050 (Phase 2)
Strategy Capital Cost:	$ 1.6 billion
Unit Water Cost ($/kgal):	$ 13.50 during Debt Service and $6.46 after Debt Service
Application:	Recommended

The Greater Texoma Utility Authority (GTUA) currently holds water rights in Lake Texoma for up to 83,200 acre-feet per year (ac-ft/yr). Fourteen different entities have contracts in place with GTUA allowing them to use a portion of the permitted Lake Texoma water supply. **Table G.68** lists the entities with contractual rights to the permitted water supply along with the storage and yield volumes allocated to each. Currently, only the cities of Sherman and Denison and the RRA are accessing water from Lake Texoma.

TABLE G.68 TREATED WATER SUPPLIES FOR PARTICIPATING ENTITIES (ACRE-FEET)

Entity	Storage (ac-ft)	Yield (ac-ft/yr)
Collinsville	1,000	1,130
Denison	10,800	12,204
Gainesville	10,800	12,204
Mustang SUD	3,000	3,390
Lindsay	1,500	1,695
Northwest Grayson County WCID#1	600	678
Pottsboro[1]	5,000	5,650
RRA Preston Shores System	2,450	2,510
Sherman	33,400	37,209
Southmayd	500	565
Two Way SUD	2,000	2,260
Whitesboro	2,000	2,260
Lake Kiowa	750	848
Woodbine	750	848
Total	**74,550**	**83,451**

These entities secured the Lake Texoma water rights to ensure the availability of water. Many of the current water right holders will not need this water during the 2026 planning period. However, if growth occurs faster than projected in this plan, these entities will work with GTUA to fully develop and use the rights listed above. This GTUA Regional Water System addresses water needs for several current water right holders and the City of Celina.

Strategy Description

A regional water system strategy was developed for communities in northern Denton and Grayson counties. Several of the entities in this area hold water rights in Lake Texoma but currently do not have access to this resource. The source water for the regional system comes from three distinct strategies: 1) utilizing existing contracts and water rights in Lake Texoma, 2) brackish groundwater in Grayson County, and 3) reallocation of storage in Lake Texoma for new supply. The regional system would be developed in two phases with Phase 1 using the existing supplies in Lake Texoma and the brackish groundwater. Phase 2 would use the water from reallocation.

GTUA would act as the regional water provider and provide both the treatment and delivery system for the water users. This strategy also includes a new intake and pump station on Lake Texoma, and a new desalination plant to treat the brackish surface water from Lake Texoma and the brackish groundwater. The brine waste from the treatment system would be transported and discharged to Lake Texoma. A conceptual transmission is shown in **Figure G.16**. Where possible the transmission pipelines generally follow existing highways or county roads to minimize right-of-way impacts.

This strategy includes:

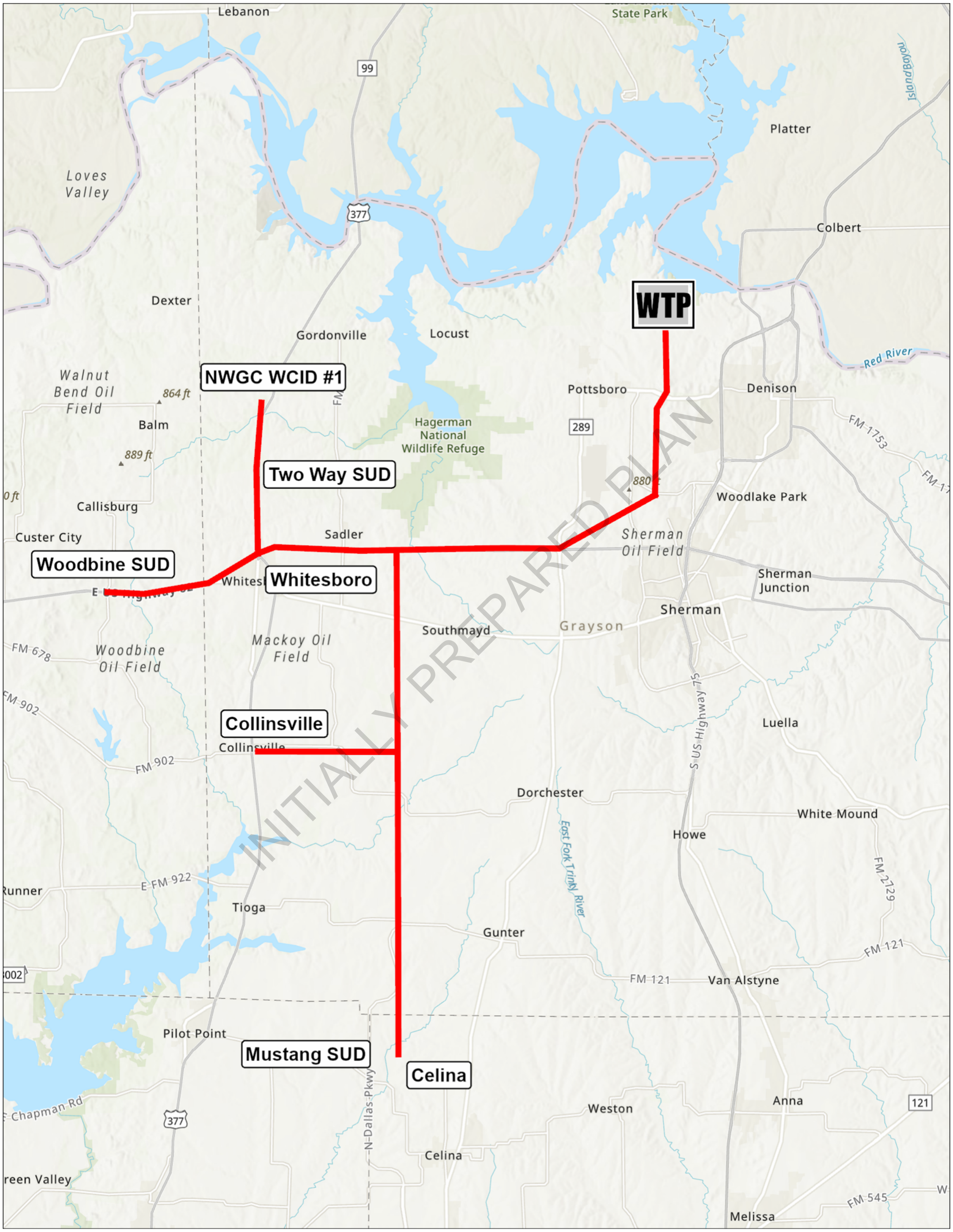
- New desalination plant
- New Lake Texoma intake and pump station (sized for ultimate capacity)
- New raw water transmission line between the intake pump station and the water treatment plant
- Brine discharge pipeline (sized for ultimate capacity)
- Treated water distribution system

Supply Development (Quantity, Reliability, Quality)

The GTUA was designated as a cooperating local sponsor to negotiate with the U.S. Army Corps of Engineers for purchase of water from Lake Texoma on behalf of the cities in the area. The GTUA has an existing water right for 83,200 acre-feet per year from Lake Texoma. Some of this water right is currently being used by several participants, but others have not perfected their rights. Phase 1 of this strategy assumes approximately 8,300 acre-feet of existing water rights are used to serve the participants in the regional system. Several of the participating entities have water rights from Lake Texoma as shown in **Table G.69**.

For those without surface water rights, brackish groundwater would provide the Phase 1 supply from a new groundwater well field. There are available brackish groundwater resources within the Trinity and Woodbine Aquifers located within a reasonable distance to the proposed GTUA WTP. Based on a preliminary desktop investigation, a potentially feasible brackish groundwater well field location could be located near the City of Knollwood, just north of US Highway 82. The well field could support up to 9,400 acre-feet per year. For the Phase 1 supplies, approximately 8,400 acre-feet per year would be developed. It is assumed this quantity is separate and in addition to the freshwater supplies reported in the Modeled Available Groundwater (MAG) value.

FIGURE G.16 GTUA REGIONAL WATER SYSTEM



The proposed well field would include 12 lower Antlers Sand wells with an average flow rate of 500 gallons per minute (gpm). Due to well spacing requirements set by the Red River Groundwater Conservation District (GCD) it is estimated that water rights would be needed over approximately 1,300 to 1,500 acres of land to develop the proposed wellfield. Brackish groundwater from each well would be pumped to a central collection point and then transported to the proposed GTUA WTP.

To provide water for Phase 2 supply, GTUA would seek to reallocate up to 50,000 acre-feet per year of storage from other uses to water supply and then would contract with the USACE for the 25,000 acre-feet of Texas' share of storage. The annual yield available from the 25,000 acre-feet of storage is estimated to be 28,000 acre-feet per year based on previous modeling. After losses due to the brackish desalination treatment process, this strategy would provide 23,800 acre-feet/year of new supplies.

The proposed distribution of treated water supply through the regional system is shown in the table below.

TABLE G.69 TREATED WATER SUPPLIES FOR PARTICIPATING ENTITIES (AC-FT/YR)

ENTITY	CURRENT WATER RIGHT YIELD	PHASE 1 SUPPLY[1]	PHASE 2 SUPPLY
Celina	0	7,450[2]	19,000
Collinsville	1,130	500	0
Mustang SUD	3,390[3]	2,000	4,800
Northwest Grayson County	678	500	0
Two-Way SUD	2,260	1,500	0
Whitesboro	2,260	1,500	0
Woodbine	848	700	0
	13,924	**14,150**	**23,800**

1. Phase 1 supply is treated water. It is assumed that 15 percent of the diverted water is lost during the treatment process.
2. Primary source of supply is from brackish groundwater.
3. Mustang SUD currently receives some of its Texoma supplies through Sherman

Water Quantity

As shown in **Table G.69**, Phase 1 is planned for a treated water supply of 14,150 acre-feet per year and Phase 2 for 23,800 acre-feet per year. The total raw water for Phase 1 is 16,650 acre-feet per year and 28,000 acre-feet per year for Phase 2. The estimated total brine discharge for both phases is 6,700 acre-feet per year.

Reliability

The reliability of Lake Texoma water is high. This strategy proposes to use only a portion of GTUA's existing water rights. Based on water availability modeling Lake Texoma has sufficient supplies to provide for the existing water rights and proposed reallocation. The reliability of the brackish groundwater is expected to be moderate to high. The Antlers Sand of the Trinity Aquifer is estimated to contain large volumes of brackish groundwater available for long term supply. Site specific investigations will be required to determine the long-term reliability of the proposed well field location.

Water Quality

Both Lake Texoma and the groundwater have elevated levels of salts and dissolved solids. This strategy proposes to treat the water through reverse osmosis for municipal use. The treated water would have high water quality.

Environmental Considerations

Environmental concerns about the raw water sources (Lake Texoma and brackish groundwater) are expected to be low. The potential for environmental impacts of this project is associated with the new intake on Lake Texoma, brine discharge, transmission systems, and the new desalination water treatment plant. Impacts of increased demand on Lake Texoma would also occur but are expected to be minimal.

- **Vegetative Cover.** No detailed studies have been conducted of the vegetative cover for this alternative. The intake would be sited to minimize impacts along the Lake Texoma shoreline. The location of the proposed distribution system generally lies within urban and rural areas and pipelines follow road rights-of-way. If needed, the proposed pipelines could be routed to avoid highly sensitive environmental areas. The groundwater well field would generally be located in undeveloped areas and the well sites could be placed to avoid environmentally sensitive areas.
- **Threatened and endangered species**. There are four threatened or endangered federal species that are known to occur or have the potential to occur within Denton and Grayson counties. It is expected that implementation of this alternative would have low to no potential to negatively impact the species.
- **Other.** The presence of zebra mussels in Lake Texoma presents additional operational considerations for entities planning on using this source. The brine discharge to Lake Texoma could impact water quality at the discharge location but would have minimal impact on the overall water quality of Lake Texoma.

Permitting and Development

There are existing permits for a portion of the Texoma water proposed for treatment and distribution. For the Phase 2 supplies, the USACE would need to approve the reallocation of 50,000 ac-ft of storage from flood pool for water supply use. Then GTUA would need to obtain a storage agreement from USACE for the 25,000 ac-ft of reallocated storage belonging to Texas. GTUA would also need to obtain a water use permit from TCEQ to divert the estimated 28,000 ac-ft/yr of annual yield assumed to be available for this strategy. The new intake and pump station would need a Section 404 permit from the USACE.

For the proposed wellfield GTUA would need to obtain groundwater permits from the Red River GCD to develop this future supply. The strategy must abide by the regulations of the GCD including pumping limitations and well spacing rules for the project area. It is uncertain if the brackish groundwater is subject to the MAGs. For planning purposes, it is assumed that the MAG does not include brackish groundwater.

Cost Analysis

Cost estimates were developed for the GTUA Regional Water Supply System, including the brackish groundwater well field and surface water systems. These costs are shown in **Table G.70** for each implementation phase. Cost estimates for the strategy supplies are included in **Appendix H.**

TABLE G.70 SUMMARY OF COSTS

ENTITY	CAPITAL COST	UNIT COST ($/1,000 GAL)	
		WITH DEBT SERVICE	AFTER DEBT SERVICE
Phase One	$779,925,000	$15.26	$6.14
Phase Two	$827,790,000	$12.45	$6.65
TOTAL	**$1,607,714,000**	**$13.50**	**$6.46**

Water Management Strategy Evaluation

Each of the proposed sources of water for the proposed GTUA regional system are within Grayson County, near the proposed new water treatment plant. Lake Texoma provides a proven reliable source of additional supplies with limited impacts. Further study is needed on the reliability of the brackish groundwater, but it is expected to provide the quantities in this strategy. This strategy would enable several of the participating entities to begin using water that has been contracted. However, this strategy would provide water that is more expensive than current supplies for many of the users due to the advanced treatment required. However, alternative sources of water are limited and would require long pipelines to convey the water.

Due to the water needs in the area, this strategy supports a regional concept. To make the regional system effective, it requires commitment from the participants and a sponsor for the operation, maintenance, and administration of the system. For purposes of this study, it is assumed that GTUA will fill that role.

Water User Group Application

The GTUA Regional Water System Supply 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 suitability of the strategy to the WUGs served.

Based on consideration of these criteria, the strategy is recommended for GTUA and the identified participants by the Region C Regional Water Planning Group.

G.8.2 Parker County Regional Water System

Potential Sponsor(s):	New Water Provider with Participating Entities - Trinity River Basin
WMS/Project Type:	Existing Surface Water (Infrastructure)
Potential Supply Quantity:	22,000 acre-feet per year (19.6 MGD)
Implementation Decade:	2050
Strategy Capital Cost:	$593 million
Unit Water Cost ($/kgal):	$7.40 during Debt Service and $2.90 after Debt Service
Application:	Recommended

Potential Sponsor(s):	New Water Provider with Participating Entities - Brazos River Basin
WMS/Project Type:	Existing Surface Water (Infrastructure)
Potential Supply Quantity:	5,259 acre-feet per year
Implementation Decade:	2040
Strategy Capital Cost:	$ 270 million
Unit Water Cost ($/kgal):	$17.93 during Debt Service and $9.37 after Debt Service
Application:	Alternative

Strategy Description

The County Commissioners in Parker County are currently seeking to form a regional water district to provide water to the fast-growing rural areas in Parker County. Parker County is split between the Trinity River Basin and the Brazos River Basin, with the Trinity River Basin to the east and the Brazos Basin in the western part of the county. Water to the Trinity River Basin portion of the county would be supplied through TRWD. Water to the Brazos River Basin would need to be supplied through entities in the Brazos River Basin, such as Brazos River Authority (BRA) and/or Mineral Wells. However, none of these entities have agreed to provide water to Parker County beyond limited additional supplies to Parker County SUD from BRA. If a source of water can be found for the Brazos River Basin portion of the county, the new water district would serve both basins through two distinct water systems.

Once the district is formed, the phasing and details of the regional system will be developed. For the Region C Water Plan, two conceptual distribution systems are shown. The eastern system assumes water from TRWD would be diverted from Eagle Mountain Lake and transported to a new regional water treatment plant in northeast Parker County. This Trinity Basin regional system will deliver water to County-Other in eastern Parker County. Walnut Creek SUD could be served by this system or a potential future regional water district in Wise County. The 2026 Region C Plan shows Walnut Creek SUD receiving water directly from TRWD. The western system would serve County-Other in the Brazos Basin, and possibly Parker County SUD and North Rural WSC.

This strategy includes:

<u>Trinity Basin System</u>

- New intake and pump station on Eagle Mountain Lake
- New Regional Water Treatment Plant
- Transmission infrastructure (pipelines and booster pump stations)

Brazos Basin System

- New channel dam, intake and pump station on Brazos River
- New Regional Desalination Treatment Plant
- Transmission infrastructure (pipelines and booster pump stations)

Supply Development (Quantity, Reliability, Quality)

TRWD is willing to serve the rural communities in Parker County within the Trinity River Basin, provided there are limited points of contact due to the challenges of serving many small users. The new regional water district provides a single point of contact. TRWD has sufficient water for the regional water system with the development of new water supplies. The reliability and quality of the supply is good. The total quantity for the Trinity Basin distribution system is 22,000 acre-feet per year.

BRA is currently serving Parker County SUD in the Brazos River Basin. BRA is not willing to provide additional water within its system operations permit for the basin as this time. Other entities in the Brazos River Basin also have not committed to supplying water to Parker County. As a result of the uncertainty of the future source of water, this strategy is conceived as a potential strategy that could be developed if agreements can be reached for water supply. These future agreements could be developed through the new regional water district or Parker County SUD. For planning purposes, Region C is showing the sponsor of the project as the regional water district. The BRA water has moderate to high reliability because it is backed up by upstream reservoirs in the BRA system. The water has elevated salts and will require desalination for potable use.

The distribution of supplies by water user group is shown in **Table G.71**.

TABLE G.71 SUMMARY OF QUANTITIES (AC-FT/YR)

ENTITY	2030	2040	2050	2060	2070	2080
Trinity River Basin						
Parker County-Other	0	0	8,500	13,000	18,000	22,000
Brazos River Basin						
Parker County-Other, Brazos Basin	0	1,000	2,000	3,000	3,000	3,000
Parker County SUD	0	0	73	547	1268	2259
Total Brazos Basin	**0**	**1,000**	**2,073**	**3,547**	**4,268**	**5,259**

Environmental Considerations

Eagle Mountain Reservoir is an existing source of water, therefore environmental impacts associated with the Trinity Basin system are limited. The potential for environmental impacts of this project is associated with the new infrastructure (water treatment plant and transmission system). Impacts of increased demand on the TRWD West Fork system would also occur but are expected to be mitigated with the development of new supplies.

The source of water for the Brazos Basin system is the Brazos River. Parker County SUD has an existing intake on the river that could potentially be used and/or expanded. For this strategy we are assuming a new channel dam and intake. This intake and associated infrastructure for the project would be located to minimize environmental.

- **Vegetative Cover.** No detailed studies for the new intakes and pipeline alignments have been conducted. It is assumed that the proposed infrastructure would be sited to avoid highly sensitive environmental areas and minimize impacts.
- **Threatened and endangered species**. There are four threatened or endangered federal species that are known to occur or have the potential to occur within Parker County. It is expected that implementation of this strategy would have low potential to negatively impact these species.
- **Other.** The brine discharge from the desalination plant may increase the salt levels in the receiving stream. It is assumed that the resulting water quality with the discharge is within the stream's water quality criteria.

Permitting and Development

Permits for new sources of water from TRWD would be acquired by TRWD and are discussed under the respective strategy. This strategy would need to acquire a Section 404 permit for a new intake at Eagle Mountain Lake. The TRWD water right for Eagle Mountain Lake may need to be amended to show a new diversion point.

BRA has the necessary permits for the water from the Brazos River. A Section 404 permit from the USACE is needed to construct a new channel dam and intake on the Brazos River. A wastewater discharge permit is also required for the discharge of the brine from the desalination treatment plant.

The Texas Legislature also will need to pass legislation creating a new water district.

Cost Analysis

Cost estimates for the Parker County Regional Water Supply System were developed using the UCM and follow SB1 planning guidance

Cost estimates for the strategy supplies are included in **Appendix H.**

TABLE G.72 SUMMARY OF COSTS

SYSTEM	CAPITAL COST	UNIT COST ($/1,000 GAL)	
		WITH DEBT SERVICE	AFTER DEBT SERVICE
Trinity Basin System	$593,307,000	$7.40	$2.90
Brazos Basin System	$269,795,000	$17.93	$9.37

Water Management Strategy Evaluation

This strategy provides a reliable source of additional supplies to eastern Parker County (Trinity River Basin) with limited impacts. The new regional water district provides a mechanism to develop surface water to address the growing population in Parker County and reduce its reliance on groundwater. To make the regional system effective, it requires commitment from the participants and a sponsor for the operation, maintenance, and administration of the system. For purposes of this study, it is assumed that the new regional water district will fill that role.

There is limited water available to the Brazos River Basin portion of Parker County and groundwater is also limited. Water sources in this area tend to be brackish and require advanced treatment for potable supplies. As a result, the costs are high at nearly $18 per thousand gallons during debt service. A new regional water district could potentially negotiate with local providers to develop additional supplies to western Parker County.

Water User Group Application

The Parker County Regional Water System Supply 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 suitability of the strategy to the WUGs served.

Based on consideration of these criteria, the eastern Regional Water System is recommended for Parker County-Other in the Trinity River Basin. The western system is an alternative strategy for Parker County SUD and Parker County-Other, Brazos Basin, until agreements with water providers are reached.

G.8.3 Wise County Regional Water System

Potential Sponsor(s):	New Regional Water Provider with Participating Entities
WMS/Project Type:	Existing Surface Water (Infrastructure)
Potential Supply Quantity:	27,463 acre-feet per year
Implementation Decade:	2040
Strategy Capital Cost:	$681 million
Unit Water Cost ($/kgal):	$6.92 during Debt Service and $2.79 after Debt Service
Application:	Recommended

Strategy Description

Several entities in Wise County are currently seeking to form a regional water district that would initially serve southeastern Wise County and expand to the greater county areas. In 2023 the cities of Aurora, Boyd, Paradise, Rhome, Newark, and New Fairview formed the Wise County Coalition of Mayors to work together to solve common issues. The initial concept of the regional water provider came from this group and has garnered support from others including the City of Bridgeport and Walnut Creek SUD.

Several of these entities have current contracts with TRWD, which would be the primary source of water for the regional water district. The phasing and details of the regional system will be developed once the district is formed. The Region C Water Plan considers a conceptual distribution system. This system assumes water from TRWD would be obtained from the western part of TRWD's system and transported to a new regional water treatment plant in southeast Wise County. The location and source of TRWD water will be negotiated with TRWD. This initial phase of the regional system will deliver water to entities in eastern Wise County, including the cities of Boyd, Rhome, Newark, and New Fairview and rural users in County-Other. A future western system could serve Bridgeport, Runaway Bay, Paradise and other rural customers. Walnut Creek SUD could be served by the Wise County regional water district or a potential future regional water district in Parker County. The 2026 Region C Plan shows Walnut Creek SUD receiving water directly from TRWD.

This strategy includes:

- New intake and pump station on Eagle Mountain Lake
- New Regional Water Treatment Plant
- Transmission infrastructure (pipelines and booster pump stations)

Supply Development (Quantity, Reliability, Quality)

TRWD has existing contracts with some of the participating entities in this strategy. TRWD is also willing to serve the rural communities in Wise County provided there are limited points of contact due to the challenges of serving many small users. TRWD has sufficient water for the regional water with the development of new water supplies. The reliability and quality of the supply is good. The total quantity for the initial distribution phase is 27,463 acre-feet per year. The distribution of supplies by water user group is shown in **Table G.73**. The actual distributions and delivery systems may differ from this conceptual design used for regional water planning.

TABLE G.73 SUMMARY OF QUANTITIES (AC-FT/YR)

ENTITY	2030	2040	2050	2060	2070	2080
Boyd	15	77	185	282	374	434
Rhome	173	173	173	173	173	173
County-Other through Rhome	80	76	71	64	60	56
Newark	6	40	111	217	380	517
Wise County-Other[a]	0	2,961	7,867	14,702	21,489	26,283
Total	**274**	**3,327**	**8,407**	**15,438**	**22,476**	**27,463**

[a]New Fairview is included in County – Other, Wise County.

Environmental Considerations

The reservoir is an existing source of water, therefore environmental impacts are limited. The potential for environmental impacts of this project is associated with the new infrastructure (water treatment plant and transmission system). Impacts of increased demand on the TRWD West Fork system would also occur but are expected to be mitigated with the development of new supplies.

- **Vegetative Cover.** No detailed studies for the new intake and pipeline alignment have been conducted. It is assumed that the proposed infrastructure would be sited to avoid highly sensitive environmental areas and minimize impacts.
- **Threatened and endangered species**. There are three threatened or endangered federal species that are known to occur or have the potential to occur within Wise County. It is expected that implementation of this strategy would have low to no potential to negatively impact the species.
- **Other.** None.

Permitting and Development

Permits for new sources of water from TRWD would be acquired by TRWD and are discussed under the respective strategy. This strategy may require a 404 permit for the transmission system and possibly a new intake on one or more of TRWD's reservoirs. If a new intake is needed, the associated TRWD water right may need to be amended to show a new diversion point. Also, the Texas Legislature will need to pass legislation creating a new water district.

Cost Analysis

Cost estimates for the Wise County Regional Water Supply System were developed using the UCM and follow SB1 planning guidance

Cost estimates for the strategy supplies are included in **Appendix H.**

TABLE G.74 SUMMARY OF COSTS

ENTITY	CAPITAL COST	UNIT COST ($/1,000 GAL)	
		WITH DEBT SERVICE	AFTER DEBT SERVICE
Regional Water Provider	$680,554,000	$6.92	$2.79

Water Management Strategy Evaluation

This strategy provides a reliable source of additional supplies with limited impacts to eastern Wise County. This strategy addresses the growing population in Wise County and recognizes that continued groundwater development is unsustainable. Developing the system requires commitment from the participants and a sponsor for the operation, maintenance, and administration of the system. For purposes of this study, it is assumed that the new regional water district will fill that role.

Water User Group Application

The Wise County Regional Water System 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 suitability of the strategy to the WUGs served.

Based on consideration of these criteria, the strategy is recommended for Boyd, Rhome, Newark, and Wise County-Other (including New Fairview).

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Appendix H

Cost Estimates

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H REGIONAL WATER PLANNING AREA COST ESTIMATES

SECTION OUTLINE

As part of the 2026 Regional Water Plans, cost estimates are to be developed for each of the recommended and alternate water management strategies. In accordance with the Texas Water Development Board guidance, the costs for water management strategies are reported in September 2023 dollars. The methodology used to develop the 2026 costs is described in the following sections. When detailed costs were provided by the sponsor, these costs were used, and where necessary, the costs were adjusted to September 2023 dollars using the Engineering News Record (ENR) Index for construction.

H.1 Introduction

1. The evaluation of water management strategies requires developing cost estimates. Guidance for cost estimates may be found in the TWDB's "Second Amended General Guidelines for Sixth Cycle of Regional Water Plan Development (Exhibit C)", Section 2.5. Costs are to be reported in September 2023 dollars.
2. Standard unit costs for installed pipe, pump stations, standard treatment facilities, and well fields were developed and/or updated using the costing tool provided by the TWDB. The unit costs do not include engineering, contingency, financial and legal services, costs for land and rights-of-way, permits, environmental and archeological studies, or mitigation. The costs for these items are determined separately in the cost tables.
3. The information presented in this section is intended to be 'rule-of-thumb' guidance. Specific situations may call for alteration of the procedures and costs. Note that the costs in this memorandum provide a planning-level estimate for comparison purposes.
4. It is important that when comparing alternatives, the cost estimates be similar and include similar items. If an existing reliable cost estimate is available for a project, it should be used where appropriate. All cost estimates must meet the requirements set forth in the TWDB's "Second Amended General Guidelines for Sixth Cycle of Regional Water Plan Development (Exhibit C)".
5. The cost estimates have two components:
   - Initial Capital Costs: Including total construction cost of facilities, engineering and legal contingencies, environmental and archaeology studies and mitigation, land acquisition and surveying, and interest incurred during construction (3.5% annual interest rate less a 0.5% rate of return on investment of unspent funds).

- Average Annual Costs: Including annual operation and maintenance costs, pumping energy costs, purchase of water and debt service.

TWDB does not require the consultant to determine life cycle or present value analysis. For most situations, annual costs are sufficient for comparison purposes, and a life-cycle analysis is not required.

H.2 Assumptions for Capital Costs

The unit cost and factors shown in **TABLE H.1** through **TABLE H.6** were developed directly from the TWDB Costing Tool. These costs are the basis of the capital costs developed for this plan. If applicable, other capital costs should include:

- Engineering, contingencies, financial, and legal services
- Permitting and mitigation activities, including, but not limited to archeological/historic resources, environmental and biological analyses, mitigation activities (evaluation, land acquisition, implementation, monitoring), and other activities.
- Land purchase costs not associated with mitigation.
- Easement costs. For pipelines, this includes a permanent easement plus a temporary construction easement as well as rights to enter easements for maintenance
- Purchases of water rights.

H.3 Conveyance Systems

Standard pipeline costs used for these cost estimates are shown in **TABLE H.1** Pump station costs are based on required Horsepower capacity of capacity (MGD) and are listed in **Table H.2**. The power capacity is to be determined from the hydraulic analyses included in the TWDB costing tool (or detailed analysis if available). Pipelines and pump stations are to be sized for peak pumping capacity.

- Pump efficiency is assumed to be 70 percent.
- Peaking factor of 2 times the average demand is to be used for strategies when the water is pumped directly to a water treatment plant. (or historical peaking factor, if available)
- A lower peaking factor can be used if there are additional water sources and/or the water is transported to a terminal storage facility (typically, 1.2 to 1.5).
- The target flow velocity in pipes is 5 to 6 fps and the Hazen-Williams Factor is assumed to be 120.
- Ground storage is to be provided at each booster pump station along the transmission line unless there is a more detailed design. Large quantities of water should use a ring dike or terminal storage rather than storage tanks.
- Ground storage tanks should provide sufficient storage for 2.5 to 4 hours of pumping at peak capacity. Costs for ground storage are shown in **TABLE H.3**. Covered storage tanks are used for all strategies transporting treated water or groundwater.

H.4 Water Treatment Plants

Water treatment plants are to be sized for peak day capacity (assume peaking factor of 2 if no specific data is available). Costs estimated include six different treatment levels of varying degree. These levels are groundwater chlorine disinfection, iron and manganese removal, simple filtration, construction of a new conventional treatment plant, expansion of a conventional treatment plant, brackish desalination, and seawater desalination. Costs are also based upon a TDS factor that will increase or decrease the cost of treatment accordingly. These costs are summarized in **TABLE H.4** All treatment plants are to be sized for finished water capacity.

For brackish desalination of surface water, both conventional surface water treatment and brackish desalination treatment are needed. Pending the initial water quality, some of the desalinated water can be blended back with the conventionally treated water to reduce the size of the desalination system.

Direct Reuse
Direct reuse refers to the introduction of reclaimed water directly from a water reclamation plant to a distribution system. The following assumptions were made for direct potable and non-potable reuse strategies.

Direct Potable Reuse
Direct potable reuse (DRP) is the use of reclaimed water that is transported directly from a wastewater treatment plant to a drinking water system. In the most recent version of the TWDB costing tool, cost estimation tables for advanced water treatment facilities (AWTF) were added for direct potable reuse strategies. These costs were adapted from TWDB DPR Resource Document Table 5-1. There are two AWTF schemes listed for direct potable reuse. The primary difference between the two is the use of RO, which is included in Scheme 1 but not in Scheme 2. In order to utilize Scheme 2, nitrogen must be removed at the WWTP.

Direct Non-Potable Reuse
Non-potable reuse is the use of reclaimed water that is used directly for non-potable beneficial uses such as landscape irrigation. The TWDB costing tool currently does not have a direct non-potable reuse treatment plant improvements option. Therefore, the following assumptions were made.

- It was assumed that the cost of an iron and manganese removal plant would be an appropriate approximation of the improvements that would be needed at the Wastewater Treatment Plant. This cost was further refined by assuming that only upgrades to an existing facility would be required and not the construction of an entirely new plant.
- Approximately two miles of a 6-inch pipeline were also included in the cost estimates for the transport of the treated water to the destination. Since reuse is still relatively new, there is a lack of piping infrastructure for reuse water. It was also assumed that the pump station was included in the WWTP improvements.

Treatment Losses
Treatment losses should be accounted for in sizing and costing advanced treatment systems. These losses will vary depending upon the water quality of the source water. Generally, slightly brackish water will have losses in the 15 to 20 percent range, while the losses assumed for seawater desalination are 50 percent of the raw water. Conventional treatment losses are not included in the strategy evaluations. For some providers that only provide wholesale water, such as NTMWD, treatment losses are considered as part of the demands.

H.5 New Groundwater Wells

Cost estimates required for water management strategies that include additional wells or well fields were determined through the TWDB costing tool (unless a more detailed design was available). The associated costs are shown in Table 5. The costing tool differentiated the wells based on purpose. The categories were Public Supply, Irrigation, and Aquifer Storage and Recovery (ASR). These cost relationships are "rule-of-thumb" in nature and are only appropriate in the broad context of the cost evaluations for the RWP process.

The cost relationships assume construction methods required for public water supply wells, including carbon steel surface casing and pipe-based, stainless steel, and wire-wrap screens. The cost estimates assume that wells would be gravel-packed in the screen sections and the surface casing cemented to their total depth. Estimates include the cost of drilling, completion, well development, well testing, pump, motor, motor controls, column pipe, installation and mobilization. The cost relationships do not include engineering, contingency, financial and legal services, land costs, or permits. A more detailed cost analysis should be completed prior to developing a project.

The costs associated with conveyance systems for multi-well systems can vary widely based on the distance between wells, terrain characteristics, well production, and distance to the treatment facility. These costs should be estimated using standard engineering approaches and site-specific information. For planning purposes, these costs were estimated using the TWDB costing tool's assumptions for conveyance. It is important to note that conveyance costs were not included for point-of-use water user groups such as mining.

H.6 Other Costs

1. Engineering, contingency, construction management, financial and legal costs are to be estimated at 30 percent of construction cost for pipelines and 35 percent of construction costs for pump stations, treatment facilities and reservoir projects. (This is in accordance with TWDB guidance.)
2. Permitting and mitigation for transmission and treatment projects are to be estimated at $25,000 per mile. For reservoirs, mitigation and permitting costs are assumed to be equal to the land purchase cost unless site-specific data is available.
3. Right-of-way (ROW) costs for transmission lines are estimated through costs provided by the Texas A&M University Real Estate Center (https://www.recenter.tamu.edu/data/rural-land/), which gives current land costs based on county. The ROW width is assumed to be 20 ft. If a small pipeline follows existing rights-of-ways (such as highways), no additional right-of-way cost may be assumed. Large pipelines will require ROW costs regardless of routing.

Interest during construction is the total of interest accrued at the end of the construction period using a 3 percent annual interest rate on total borrowed funds, less a 0.5 percent rate of return on investment of unspent funds. This is calculated assuming that the total estimated project cost (excluding interest during construction) would be drawn down at a constant rate per month during the construction period. Factors were determined for different lengths of time for project construction.

H.7 Assumptions for Annual Costs

Annual costs are to be estimated using the following assumptions:

- Debt service for all non-reservoir infrastructure (transmission and treatment facilities) is to be annualized over 30 years unless otherwise justified. For reservoirs, this period is 40 years, but not longer than the life of the project. [Note: uniform amortization periods should be used when evaluating similar projects for an entity.]
- Annual interest rate for debt service is 3.5 percent for both reservoir and non-reservoir projects.
- Generic water purchase costs are to be used based on typical regional costs, unless specified by a water provider. Treated water is estimated at $4.00 (per 1,000 gallons) and delivered raw water at $1.50 (per 1,000 gallons). In-situ raw water, in-situ groundwater, and indirect reuse is estimated at $0.30 (per 1,000 gallons).
- Operation and Maintenance costs are to be calculated based on the construction cost of the capital improvement. Engineering, permitting, etc., should not be included as a basis for this calculation. Per the "Second Amended General Guidelines for Sixth Cycle of Regional Water Plan Development (Exhibit C)", O&M should be calculated at:
    - 1 percent of the construction costs for pipelines
    - 1.5 percent for dams
    - 2.5 percent of the construction costs for pump stations
    - O&M Costs for the varying levels of water treatment plant and AWTF improvements were developed by the TWDB.
- Pumping costs are to be estimated using an electricity rate of $0.09 per Kilowatt Hour. If local data is available, this can be used.
- Power connection costs for pump stations are estimated to be $200 per HP.

TABLE H.1 PIPELINE COSTS

DIAMETER	SOIL		ROCK	
	RURAL	URBAN	RURAL	URBAN
(INCHES)	($/FOOT)	($/FOOT)	($/FOOT)	($/FOOT)
6	141	212	153	236
8	165	248	198	287
10	189	284	244	337
12	214	321	289	388
14	238	356	335	436
16	262	393	381	484
18	286	430	427	532
20	310	465	470	582
24	358	538	562	678
30	432	646	698	823
36	590	1014	846	1204
42	750	1380	993	1586
48	909	1748	1141	1967
54	1020	1961	1289	2348
60	1130	2173	1436	2729
66	1242	2389	1584	3110
72	1353	2602	1731	3491
78	1464	2815	1879	3872
84	1639	3152	2073	4226
90	1789	3440	2236	4522
96	1939	3729	2403	4828
102	2089	4017	2571	5139
108	2239	4306	2741	5454
114	2389	4595	2911	5769
120	2539	4883	3082	6090
132	2840	5461	3425	6733
144	3140	6038	3770	7380

TABLE H.2 PUMP STATION COSTS

HORSEPOWER	BOOSTER PS COST ($-MILLIONS)	INTAKE PS COST ($-MILLIONS)
0	$0.00	$0.00
5	$3.51	$0.58
10	$3.63	$0.62
20	$3.89	$0.71
25	$4.02	$0.75
50	$4.66	$0.95
100	$5.94	$1.37
200	$8.50	$2.21
300	$11.05	$3.05
400	$13.61	$3.88

HORSEPOWER	BOOSTER PS COST ($-MILLIONS)	INTAKE PS COST ($-MILLIONS)
500	$16.17	$4.72
600	$18.74	$5.56
700	$21.30	$6.40
800	$23.86	$7.23
900	$26.42	$8.07
1,000	$28.98	$8.91
2,000	$54.58	$17.27
3,000	$56.59	$25.63
4,000	$58.62	$33.99
5,000	$60.64	$42.36
6,000	$62.65	$44.01
7,000	$64.68	$45.66
8,000	$66.70	$47.31
9,000	$68.71	$48.96
10,000	$70.73	$50.61
20,000	$89.86	$67.09
30,000	$108.98	$83.58
40,000	$128.10	$100.05
50,000	$147.22	$116.53
60,000	$166.34	$133.02
70,000	$185.46	$149.50

TABLE H.3 GROUND STORAGE TANKS

TANK VOLUME (MG)	WITH ROOF	WITHOUT ROOF
0.5	$1,404,011	$852,945
1	$1,784,442	$1,128,898
1.5	$2,164,873	$1,404,851
2	$2,545,304	$1,680,954
2.5	$2,925,735	$1,956,907
3	$3,306,166	$2,233,010
3.5	$3,686,597	$2,508,963
4	$4,067,028	$2,784,915
5	$4,827,890	$3,336,971
6	$5,588,752	$3,889,027
7	$6,349,614	$4,441,083
8	$7,110,476	$4,993,139
10	$8,632,200	$6,498,937
12	$10,153,924	$8,004,735
14	$11,675,648	$9,510,684

Costs assume steel tanks smaller than 1 MG, concrete tanks 1 MG and larger

TABLE H.4 CONVENTIONAL WATER TREATMENT PLANT COSTS

CAPACITY (MGD)	LEVEL 0 CHLORINE DISINFECTION (GW)	LEVEL 1 IRON & MANGANESE REMOVAL	LEVEL 2 SIMPLE FILTRATION	LEVEL 3 (NEW) CONVENTIONAL TREATMENT	LEVEL 3 (EXP) CONVENTIONAL TREATMENT	LEVEL 4 BRACKISH DESALINATION	LEVEL 5 SEAWATER DESALINATION
	CAPITAL COST	CAPITAL COST	CAPITAL COST	CAPITAL COST	CAPITAL COST	CAPITAL COST	CAPITAL COST
0	$0	$0	$0	$0	$0	$0	$0
0.1	$30,707	$348,017	$1,596,785	$2,129,047	$2,129,047	$2,316,216	$3,418,758
1	$102,358	$1,402,305	$5,598,984	$21,331,413	$7,523,315	$23,133,206	$22,887,255
10	$685,799	$5,824,172	$45,815,453	$71,845,099	$28,813,784	$77,902,062	$153,148,079
50	$3,418,758	$16,899,310	$128,244,371	$231,226,782	$104,036,698	$250,711,071	$578,251,199
75	$5,128,137	$24,381,682	$179,996,590	$330,186,522	$165,400,335	$358,019,424	$808,126,856
100	$6,847,752	$29,878,308	$231,748,808	$427,477,826	$200,488,667	$463,503,757	$1,024,747,147
150	$10,266,510	$45,713,095	$335,253,244	$618,651,913	$300,727,882	$670,795,431	$1,432,121,857
200	$13,685,268	$52,642,733	$438,757,681	$806,601,721	$370,894,309	$874,593,479	$1,816,005,400

Plant is sized for finished peak day capacity.

TABLE H.5 WATER WELL COSTS

WELL DEPTH (FT)	PUBLIC SUPPLY WELL COSTS					
	WELL CAPACITY (MGD)					
	100	175	350	700	1000	1800
150	$203,302	$308,626	$453,985	$667,043	$806,153	$1,010,256
300	$271,968	$388,528	$540,560	$760,986	$909,620	$1,126,561
500	$352,104	$485,660	$641,915	$909,028	$1,082,999	$1,311,028
700	$424,953	$573,078	$754,694	$1,044,083	$1,238,791	$1,487,701
1000	$558,509	$733,346	$937,703	$1,290,820	$1,527,758	$1,793,668
1500	$781,912	$1,002,888	$1,239,383	$1,703,778	$2,005,182	$2,299,176
2000	$1,005,314	$1,270,000	$1,532,046	$2,116,736	$2,485,121	$2,806,901
Irrigation Well Costs						
150	$97,133	$149,922	$255,499	$293,508	$371,635	$536,338
300	$128,805	$192,153	$312,511	$369,524	$468,768	$654,585
500	$160,480	$240,718	$373,747	$451,874	$574,345	$791,837
700	$185,817	$276,615	$426,535	$521,557	$667,255	$910,084
1000	$242,830	$356,855	$536,338	$665,143	$850,960	$1,142,355
1500	$339,963	$494,107	$717,932	$903,749	$1,155,025	$1,526,661
2000	$434,983	$627,134	$899,526	$1,140,245	$1,461,202	$1,913,077
ASR Well Costs						
150	$264,293	$401,214	$590,181	$867,156	$1,047,999	$1,313,333
300	$353,559	$505,086	$702,728	$989,282	$1,182,506	$1,464,529
500	$457,736	$631,358	$834,489	$1,181,737	$1,407,899	$1,704,337
700	$552,438	$745,001	$981,102	$1,357,307	$1,610,428	$1,934,012
1000	$726,062	$953,350	$1,219,014	$1,678,066	$1,986,085	$2,331,768
1500	$1,016,486	$1,303,754	$1,611,198	$2,214,911	$2,606,737	$2,988,929
2000	$1,306,909	$1,651,000	$1,991,660	$2,751,757	$3,230,657	$3,648,971

TABLE H.6 LAND PURCHASE COSTS

COUNTY	LAND COST $/ACRE	COUNTY	LAND COST $/ACRE
Collin	$10,805	**Jack**	$3,150
Cooke	$12,470	**Kaufman**	$10,805
Dallas	$10,805	**Navarro**	$7,389
Denton	$10,805	**Parker**	$10,805
Ellis	$10,805	**Rockwall**	$13,795
Fannin	$12,470	**Tarrant**	$13,795
Freestone	$7,389	**Wise**	$13,795
Grayson	$12,470		
Henderson	$5,995		

For Appendix H List of Tables

TABLE H.11A CONSERVATION SAVINGS AND COSTS FOR ALL MUNICIPAL CONSERVATION STRATEGIES COMBINED

ENTITY NAME	SAVINGS VOLUMES IN ACRE-FEET PER YEAR						UNIT COSTS IN DOLLARS PER ACRE-FOOT						ANNUAL COSTS IN DOLLARS						CAPITAL COST
	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	
Ables Springs SUD	3	6	8	11	14	17	$1,372	$855	$712	$560	$487	$416	$4,569	$4,760	$5,506	$6,157	$6,909	$7,254	$66,908
Addison	295	450	509	546	595	653	$68	$74	$47	$45	$42	$40	$20,143	$33,127	$23,868	$24,576	$25,230	$25,951	$2,709,005
Aledo	26	40	58	75	94	110	$832	$583	$501	$446	$400	$363	$21,639	$23,313	$29,039	$33,439	$37,622	$39,955	$341,818
Allen	213	575	549	584	649	729	$205	$101	$86	$81	$73	$65	$43,750	$58,054	$47,500	$47,500	$47,500	$47,500	$4,178,644
Alvord	7	13	18	22	27	34	$1,214	$804	$677	$617	$560	$494	$8,499	$10,448	$12,188	$13,584	$15,122	$16,810	$233,925
AMC Creekside	4	7	8	10	14	17	$1,896	$1,346	$1,397	$1,288	$1,187	$1,115	$7,584	$9,422	$11,175	$12,876	$16,616	$18,950	$12,124
Anna	301	789	1,032	1,246	1,469	1,574	$347	$196	$164	$154	$145	$143	$104,409	$154,475	$168,939	$191,583	$213,688	$225,500	$945,222
Annetta	8	15	18	23	29	36	$1,117	$710	$687	$612	$544	$486	$8,934	$10,649	$12,362	$14,074	$15,789	$17,501	$14,851
Argyle WSC	82	140	412	648	716	755	$508	$375	$209	$154	$137	$139	$41,627	$52,540	$86,287	$99,705	$98,151	$104,751	$487,244
Arledge Ridge WSC	4	7	8	9	10	12	$998	$613	$556	$508	$471	$405	$3,991	$4,290	$4,446	$4,573	$4,712	$4,862	$624,127
Arlington	2,638	3,772	4,401	4,894	5,592	5,938	$102	$80	$70	$66	$62	$60	$268,346	$300,758	$308,392	$323,652	$344,539	$354,778	$12,680,661
Athens	58	99	296	431	541	595	$775	$535	$289	$232	$189	$186	$44,906	$53,091	$85,425	$99,853	$102,470	$110,490	$616,575
Aubrey	17	47	203	335	398	377	$1,342	$927	$455	$337	$333	$351	$22,807	$43,588	$92,259	$113,052	$132,404	$132,404	$255,604
Avalon Water Supply & Sewer Service	2	4	5	5	7	8	$1,488	$824	$728	$796	$622	$596	$2,976	$3,297	$3,642	$3,980	$4,356	$4,769	$39,375
Azle	48	79	201	259	297	340	$1,000	$690	$392	$328	$273	$255	$47,980	$54,546	$78,645	$85,000	$81,038	$86,612	$247,741
B And B WSC	6	9	11	13	15	18	$895	$654	$574	$516	$477	$424	$5,371	$5,886	$6,313	$6,713	$7,151	$7,631	$26,766
Balch Springs	109	141	172	203	241	263	$435	$430	$313	$285	$262	$252	$47,421	$60,800	$53,609	$57,855	$63,275	$66,100	$231,708
Bear Creek SUD	31	290	288	283	312	274	$580	$137	$110	$117	$113	$129	$17,971	$39,635	$31,640	$33,204	$35,316	$35,316	$222,737
Becker Jiba WSC	7	16	25	34	45	57	$1,761	$1,206	$1,041	$899	$792	$712	$12,324	$19,295	$26,027	$30,565	$35,658	$40,562	$30,956
Bedford	344	489	516	599	606	629	$128	$116	$91	$81	$80	$77	$43,907	$56,861	$46,853	$48,600	$48,600	$48,600	$295,475
Bells	4	5	6	7	9	10	$1,256	$1,090	$968	$875	$719	$686	$5,023	$5,450	$5,807	$6,122	$6,471	$6,855	$15,987
Benbrook Water Authority	288	422	491	555	619	684	$294	$237	$192	$179	$168	$159	$84,744	$100,132	$94,357	$99,135	$103,917	$108,696	$895,180
Black Rock WSC	7	12	17	22	30	37	$646	$468	$397	$360	$345	$322	$4,524	$5,611	$6,749	$7,911	$10,336	$11,925	$539,946
Blackland WSC	18	26	31	41	48	57	$840	$604	$524	$459	$421	$382	$15,117	$15,700	$16,251	$18,800	$20,220	$21,747	$272,228
Blooming Grove	4	5	6	7	8	10	$776	$642	$576	$526	$496	$427	$3,103	$3,212	$3,457	$3,683	$3,966	$4,266	$14,432
Blue Mound	4	5	7	8	9	12	$1,900	$1,676	$1,289	$1,191	$1,120	$891	$7,601	$8,379	$9,024	$9,528	$10,083	$10,693	$3,637
Blue Ridge	5	9	14	18	24	32	$956	$685	$553	$518	$461	$405	$4,778	$6,163	$7,737	$9,316	$11,055	$12,974	$25,024
Bois D Arc MUD	6	9	11	12	14	16	$1,422	$993	$834	$777	$678	$605	$8,579	$8,984	$9,227	$9,379	$9,545	$9,728	$113,838
Bolivar WSC	32	54	73	182	258	328	$1,174	$828	$702	$418	$339	$301	$37,559	$44,691	$51,243	$76,019	$87,496	$98,440	$512,062
Bonham	39	70	222	347	483	600	$1,092	$727	$395	$311	$251	$236	$42,580	$50,887	$87,751	$108,144	$121,099	$141,877	$351,151
Boyd	5	8	12	17	22	28	$860	$674	$607	$529	$483	$418	$4,299	$5,393	$7,285	$8,994	$10,622	$11,711	$11,500
Bridgeport	18	27	31	35	39	42	$895	$611	$544	$487	$443	$417	$16,105	$16,497	$16,864	$17,060	$17,281	$17,529	$5,864
Buena Vista-Bethel SUD	37	65	90	120	153	190	$618	$425	$370	$327	$325	$296	$22,852	$27,611	$33,334	$39,191	$49,734	$56,296	$219,108
Butler WSC	4	5	6	5	6	6	$629	$498	$409	$476	$384	$369	$2,514	$2,490	$2,454	$2,382	$2,301	$2,211	$15,281
Callisburg WSC	2	4	4	5	6	6	$2,336	$1,217	$1,238	$996	$836	$841	$4,671	$4,867	$4,952	$4,982	$5,014	$5,047	$8,696
Carrollton	907	1,220	1,433	1,643	1,858	1,880	$107	$92	$75	$69	$64	$64	$97,261	$112,790	$107,504	$113,082	$118,986	$119,392	$610,707
Cedar Hill	408	566	687	794	912	1,041	$158	$141	$107	$98	$91	$86	$64,668	$79,885	$73,216	$78,118	$83,414	$89,138	$1,129,020
Celina	622	2,181	4,094	3,626	4,709	5,860	$225	$100	$76	$89	$81	$75	$140,002	$217,826	$312,211	$323,212	$379,482	$441,521	$1,754,463
Chatfield WSC	6	9	12	13	16	18	$1,552	$1,111	$881	$852	$727	$680	$9,310	$10,002	$10,573	$11,077	$11,635	$12,245	$182,952
Chico	7	11	12	13	15	16	$838	$534	$489	$451	$391	$367	$5,869	$5,869	$5,869	$5,869	$5,869	$5,869	$12,881
Cockrell Hill	5	5	7	8	9	11	$505	$474	$326	$279	$241	$191	$2,526	$2,370	$2,285	$2,231	$2,172	$2,106	$39,883
College Mound SUD	11	18	30	175	310	398	$1,224	$821	$627	$277	$239	$198	$13,463	$14,783	$18,817	$48,464	$74,052	$78,652	$278,158
Colleyville	381	449	485	520	556	592	$70	$59	$55	$51	$48	$45	$26,550	$26,550	$26,550	$26,550	$26,550	$26,550	$2,769,434
Collinsville	5	8	10	12	13	16	$1,493	$1,024	$880	$779	$765	$663	$7,467	$8,191	$8,796	$9,346	$9,947	$10,606	$27,181
Combine WSC	3	4	6	8	12	15	$841	$714	$542	$460	$347	$312	$2,522	$2,856	$3,253	$3,683	$4,159	$4,686	$23,263
Community WSC	11	19	22	27	31	37	$1,046	$678	$638	$554	$516	$521	$11,502	$12,882	$14,036	$14,967	$15,993	$19,282	$46,707
Copeville WSC	12	27	51	64	163	211	$942	$664	$503	$441	$305	$254	$11,306	$17,925	$25,646	$28,207	$49,716	$53,465	$307,225
Coppell	403	471	513	554	594	630	$94	$80	$74	$69	$64	$61	$37,988	$37,883	$37,974	$38,046	$38,150	$38,150	$2,185,542
Corbet WSC	4	7	7	8	9	12	$1,747	$1,069	$1,127	$1,031	$960	$756	$6,988	$7,484	$7,892	$8,248	$8,640	$9,076	$183,698
Corinth	258	377	581	569	596	586	$348	$280	$192	$200	$197	$200	$89,886	$105,543	$111,273	$113,766	$117,400	$117,400	$1,407,053
Corsicana	288	408	459	503	554	610	$300	$248	$205	$194	$182	$171	$86,416	$101,303	$94,338	$97,436	$100,850	$104,611	$328,812
County-Other, Collin	2	6	10	16	23	31	$0	$294	$220	$164	$133	$113	$0	$1,762	$2,197	$2,631	$3,066	$3,500	$93,599
County-Other, Cooke	3	5	8	11	14	18	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$123,071
County-Other, Dallas	9	22	41	65	93	128	$106	$72	$31	$24	$20	$16	$952	$1,582	$1,260	$1,540	$1,820	$2,100	$70,691
County-Other, Denton	25	73	144	238	387	535	$1,482	$793	$538	$413	$335	$281	$37,049	$57,879	$77,506	$98,338	$129,584	$150,416	$1,050,771
County-Other, Ellis	3	5	9	13	17	22	$0	$0	$0	$212	$172	$140	$0	$0	$0	$2,758	$2,919	$3,080	$122,636
County-Other, Fannin	1	3	4	6	8	11	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$57,531
County-Other, Freestone	1	2	3	3	4	5	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$44,095
County-Other, Grayson	6	10	15	20	27	33	$751	$427	$259	$204	$166	$138	$4,507	$4,273	$3,880	$4,088	$4,480	$4,550	$231,906
County-Other, Henderson	3	7	13	16	20	22	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$229,796
County-Other, Jack	2	3	4	5	6	7	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$70,073
County-Other, Kaufman	6	12	24	36	59	79	$902	$515	$311	$243	$190	$162	$5,411	$6,176	$7,459	$8,732	$11,220	$12,801	$227,522
County-Other, Navarro	3	5	9	13	18	23	$0	$0	$302	$226	$183	$152	$0	$0	$2,722	$2,937	$3,290	$3,500	$111,723
County-Other, Parker	35	104	223	398	655	929	$1,423	$759	$514	$393	$318	$267	$49,811	$78,923	$114,718	$156,514	$208,600	$248,500	$1,537,899
County-Other, Rockwall	1	2	5	8	16	24	$0	$0	$0	$0	$128	$106	$0	$0	$0	$0	$2,045	$2,553	$68,027
County-Other, Tarrant	36	87	158	251	363	496	$603	$362	$257	$201	$166	$141	$21,723	$31,523	$40,600	$50,400	$60,200	$70,000	$1,282,877
County-Other, Wise	29	76	161	286	478	672	$1,305	$756	$524	$407	$332	$281	$37,837	$57,433	$84,294	$116,446	$158,900	$189,000	$1,037,799
Crandall	18	56	277	523	743	850	$862	$575	$248	$171	$136	$137	$15,517	$32,178	$68,612	$89,522	$101,211	$116,381	$168,942
Crescent Heights WSC	3	4	5	5	7	8	$1,727	$1,333	$1,179	$1,198	$871	$776	$5,181	$5,333	$5,896	$5,992	$6,095	$6,207	$31,363
Cross Timbers WSC	42	78	109	139	362	569	$820	$552	$478	$436	$245	$184	$34,445	$43,087	$52,103	$60,553	$88,686	$104,894	$207,696
Crowley	114	204	254	289	332	380	$193	$177	$111	$105	$98	$92	$21,933	$36,174	$28,203	$30,303	$32,605	$35,129	$219,412

TABLE H.11A CONSERVATION SAVINGS AND COSTS FOR ALL MUNICIPAL CONSERVATION STRATEGIES COMBINED

ENTITY NAME	SAVINGS VOLUMES IN ACRE-FEET PER YEAR						UNIT COSTS IN DOLLARS PER ACRE-FOOT						ANNUAL COSTS IN DOLLARS						CAPITAL COST
	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	
Culleoka WSC	27	45	60	75	172	223	$1,447	$993	$872	$781	$486	$446	$39,074	$44,666	$52,341	$58,553	$83,794	$99,372	$292,732
Dallas	10,468	13,623	15,748	17,825	19,973	22,236	$77	$63	$56	$52	$48	$46	$805,373	$853,016	$882,418	$924,331	$968,673	$1,015,382	$27,680,184
Dalworthington Gardens	12	15	18	21	24	27	$254	$205	$138	$118	$104	$92	$3,045	$3,068	$2,484	$2,485	$2,489	$2,493	$26,062
Dawson	2	4	4	5	5	6	$1,238	$626	$632	$503	$502	$418	$2,475	$2,502	$2,526	$2,517	$2,511	$2,505	$28,886
Decatur	57	101	150	400	611	716	$538	$367	$323	$191	$149	$125	$30,660	$37,022	$48,441	$76,513	$91,369	$89,748	$517,835
Denison	608	1,155	1,481	1,795	2,226	2,413	$234	$156	$130	$120	$110	$109	$142,429	$180,821	$192,019	$215,154	$245,319	$262,058	$362,616
Denton	1,431	3,069	4,241	5,215	6,495	7,659	$204	$119	$99	$93	$86	$83	$291,709	$365,098	$419,163	$482,395	$560,789	$637,441	$6,807,856
Denton County FWSD 1-A	180	414	428	416	427	430	$374	$227	$205	$213	$211	$209	$67,311	$94,269	$87,767	$88,618	$89,856	$89,856	$609,918
Denton County FWSD 10	31	43	47	50	54	58	$718	$518	$461	$433	$401	$373	$22,255	$22,255	$21,653	$21,653	$21,653	$21,653	$50,687
Denton County FWSD 11-C	9	20	33	46	61	133	$2,153	$1,493	$1,211	$1,099	$1,008	$692	$19,380	$29,855	$39,952	$50,538	$61,483	$92,307	$192,433
Denton County FWSD 7	99	136	148	159	170	181	$440	$336	$305	$284	$265	$249	$43,532	$45,719	$45,117	$45,117	$45,117	$45,117	$425,699
Desert WSC	6	9	11	13	15	18	$892	$657	$573	$513	$472	$418	$5,352	$5,916	$6,308	$6,675	$7,078	$7,527	$87,521
Desoto	402	537	592	634	683	738	$228	$200	$166	$158	$149	$141	$91,575	$107,374	$98,389	$99,994	$101,762	$103,712	$1,273,247
Dogwood Estates Water	4	4	6	6	7	8	$872	$855	$603	$609	$527	$466	$3,487	$3,419	$3,615	$3,651	$3,689	$3,727	$13,577
Dorchester	4	7	7	8	9	10	$945	$554	$565	$498	$447	$407	$3,781	$3,877	$3,953	$3,983	$4,024	$4,073	$27,756
Duncanville	213	276	305	322	340	360	$178	$181	$133	$126	$119	$113	$37,912	$50,110	$40,439	$40,547	$40,547	$40,547	$861,395
East Cedar Creek FWSD	163	221	234	252	272	293	$416	$370	$307	$290	$272	$257	$67,885	$82,026	$71,848	$72,882	$74,027	$75,289	$1,400,029
East Fork SUD	106	195	267	318	357	409	$315	$252	$164	$154	$150	$143	$33,389	$49,134	$43,897	$49,084	$53,566	$58,517	$231,525
East Garrett WSC	5	9	14	18	25	31	$1,039	$725	$569	$524	$497	$465	$5,194	$6,525	$7,968	$9,433	$12,425	$14,426	$37,169
Edgecliff	8	10	12	14	17	19	$568	$455	$329	$282	$232	$208	$4,547	$4,547	$3,945	$3,945	$3,945	$3,945	$65,810
Elmo WSC	4	5	8	10	13	16	$1,657	$1,544	$1,138	$1,065	$951	$891	$6,626	$7,718	$9,106	$10,649	$12,364	$14,262	$26,659
Ennis	176	239	269	296	328	361	$416	$365	$296	$280	$264	$251	$73,180	$87,139	$79,670	$83,008	$86,765	$90,420	$486,367
Euless	348	408	441	474	506	539	$141	$120	$111	$103	$97	$91	$48,992	$48,992	$48,992	$48,992	$48,992	$48,992	$1,591,405
Eustace	6	9	10	12	13	16	$1,455	$1,059	$935	$804	$767	$646	$8,730	$9,531	$9,351	$9,645	$9,974	$10,339	$25,558
Everman	5	7	8	10	12	14	$912	$652	$570	$456	$380	$326	$4,561	$4,561	$4,561	$4,561	$4,561	$4,561	$21,367
Fairfield	18	25	28	30	30	30	$761	$532	$461	$403	$376	$349	$13,704	$13,295	$12,906	$12,087	$11,273	$10,464	$93,968
Fairview	38	68	389	435	415	418	$229	$158	$79	$71	$48	$48	$8,714	$10,742	$30,652	$30,652	$20,098	$20,098	$602,504
Farmers Branch	374	542	606	648	700	763	$87	$84	$60	$57	$54	$51	$32,679	$45,655	$36,389	$37,141	$37,972	$38,885	$320,576
Farmersville	10	42	317	421	436	457	$655	$367	$156	$128	$110	$115	$6,546	$15,432	$49,388	$53,841	$48,123	$52,488	$381,022
Fate	199	503	777	1,024	1,293	1,590	$173	$114	$78	$73	$69	$67	$34,384	$57,162	$60,711	$74,552	$89,760	$106,480	$222,333
Ferris	12	16	20	22	26	30	$773	$612	$486	$465	$415	$381	$9,281	$9,785	$9,726	$10,225	$10,790	$11,421	$17,996
Flower Mound	839	1,806	2,506	2,185	2,087	2,095	$83	$53	$40	$46	$48	$48	$69,915	$94,980	$99,752	$99,788	$99,833	$99,833	$518,990
Forest Hill	14	22	30	39	110	137	$1,110	$777	$612	$496	$348	$291	$15,541	$17,085	$18,361	$19,357	$38,286	$39,949	$197,734
Forney	152	317	444	546	606	564	$182	$140	$91	$84	$82	$88	$27,708	$44,386	$40,404	$45,872	$49,597	$49,597	$891,846
Forney Lake WSC	67	216	259	304	309	320	$412	$237	$201	$148	$149	$146	$27,596	$51,227	$52,095	$45,134	$45,847	$46,559	$185,458
Fort Worth	1,810	5,336	5,499	7,151	8,896	10,804	$155	$64	$62	$52	$45	$40	$281,129	$343,979	$342,828	$369,443	$398,378	$429,655	$27,500,873
Frisco	635	2,420	2,101	2,053	2,185	2,405	$138	$46	$49	$50	$47	$42	$87,505	$112,158	$102,012	$102,012	$102,012	$102,012	$22,773,608
Frognot WSC	4	7	9	13	16	20	$1,504	$1,064	$1,008	$822	$780	$722	$6,071	$7,536	$9,152	$10,802	$12,591	$14,586	$166,806
Gainesville	55	158	180	202	232	262	$1,173	$531	$468	$382	$357	$338	$64,541	$84,034	$84,385	$77,021	$82,785	$88,467	$299,488
Garland	340	688	880	1,039	1,132	1,239	$220	$130	$93	$81	$74	$68	$74,894	$89,774	$81,791	$83,669	$84,045	$84,045	$5,567,989
Gastonia Scurry SUD	20	29	48	246	469	563	$885	$702	$545	$260	$184	$160	$17,700	$20,358	$26,147	$63,743	$86,271	$90,300	$286,329
Glenn Heights	97	156	193	225	262	301	$310	$290	$195	$182	$170	$161	$30,105	$45,258	$37,671	$40,969	$44,594	$48,580	$302,188
Grand Prairie	293	657	990	1,054	1,212	1,272	$230	$127	$80	$77	$69	$66	$67,406	$83,564	$79,461	$81,128	$83,417	$83,417	$3,579,553
Grapevine	156	218	280	342	405	467	$167	$119	$93	$76	$64	$56	$26,009	$26,009	$26,009	$26,009	$26,009	$26,009	$396,473
Gunter	6	9	12	15	18	22	$927	$714	$596	$523	$479	$430	$5,559	$6,425	$7,146	$7,851	$8,619	$9,454	$40,772
Hackberry	42	78	113	157	203	258	$510	$383	$343	$309	$286	$265	$21,410	$29,900	$38,790	$48,476	$58,000	$68,422	$181,390
Haltom City	45	62	80	98	115	133	$556	$403	$313	$255	$217	$188	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$615,129
Haslet	53	89	140	176	210	228	$140	$111	$100	$98	$89	$82	$7,411	$9,905	$14,013	$17,267	$18,670	$18,670	$1,642,035
Heath	80	150	517	588	546	535	$449	$309	$151	$135	$126	$129	$35,905	$46,343	$77,967	$79,522	$68,968	$68,968	$1,160,686
High Point WSC	89	278	450	623	799	991	$871	$439	$332	$298	$281	$270	$77,523	$121,984	$149,032	$185,832	$224,649	$267,178	$246,377
Highland Park	76	111	124	138	152	166	$337	$231	$207	$186	$169	$154	$25,624	$25,624	$25,624	$25,624	$25,624	$25,624	$540,235
Highland Village	67	104	119	132	145	158	$642	$440	$388	$350	$319	$292	$43,031	$45,751	$46,213	$46,213	$46,213	$46,213	$1,034,241
Honey Grove	5	8	9	10	11	12	$1,026	$657	$584	$525	$478	$438	$5,129	$5,254	$5,254	$5,254	$5,254	$5,254	$13,851
Horseshoe Bend Water System	4	5	8	11	17	24	$957	$858	$669	$632	$550	$507	$3,828	$4,290	$5,352	$6,953	$9,354	$12,166	$15,197
Howe	8	13	18	22	27	34	$1,663	$1,222	$1,003	$918	$835	$738	$13,304	$15,890	$18,057	$20,204	$22,540	$25,080	$17,332
Hudson Oaks	45	65	73	82	93	103	$395	$283	$250	$230	$211	$197	$17,777	$18,370	$18,254	$18,846	$19,633	$20,247	$236,328
Hurst	57	79	103	125	148	171	$379	$273	$210	$173	$146	$127	$21,592	$21,558	$21,588	$21,611	$21,645	$21,645	$304,567
Hutchins	24	35	44	54	62	73	$508	$386	$309	$259	$233	$204	$12,193	$13,511	$13,610	$14,011	$14,435	$14,901	$213,425
Irving	500	928	1,051	1,219	1,410	1,608	$160	$102	$80	$69	$60	$52	$80,224	$94,498	$83,992	$84,042	$84,092	$84,092	$705,501
Italy	5	7	7	8	9	10	$1,111	$795	$796	$693	$613	$549	$5,556	$5,564	$5,570	$5,540	$5,513	$5,491	$19,318
Jacksboro	15	21	24	28	33	38	$693	$487	$439	$393	$360	$322	$10,388	$10,233	$10,541	$11,003	$11,872	$12,220	$34,537
Josephine	11	36	68	90	287	317	$565	$394	$302	$253	$152	$137	$6,400	$14,013	$20,474	$22,749	$43,539	$43,577	$303,320
Justin	23	45	72	113	371	668	$966	$685	$567	$491	$255	$177	$22,229	$30,806	$40,805	$55,526	$94,581	$118,292	$353,453
Kaufman	10	16	30	47	66	203	$526	$370	$275	$216	$181	$157	$5,259	$5,926	$8,256	$10,160	$11,940	$31,934	$158,334
Kaufman County Development District 1	17	26	46	78	132	171	$632	$493	$428	$389	$375	$341	$10,737	$12,822	$19,688	$30,358	$49,535	$58,379	$25,193
Kaufman County MUD 11	14	24	34	47	66	84	$1,015	$697	$607	$553	$491	$480	$14,213	$16,730	$20,643	$26,005	$32,374	$40,309	$75,747
Kaufman County MUD 14	45	59	65	71	77	82	$499	$380	$336	$308	$284	$266	$22,440	$22,440	$21,838	$21,838	$21,838	$21,838	$228,350
Keller	107	174	206	244	285	327	$236	$208	$124	$104	$90	$78	$25,283	$36,048	$25,494	$25,494	$25,494	$25,494	$2,639,472
Kemp	5	8	9	10	12	14	$933	$603	$559	$521	$453	$406	$4,663	$4,827	$5,028	$5,213	$5,434	$5,687	$21,215
Kennedale	30	58	88	299	455	525	$410	$296	$243	$152	$113	$88	$12,294	$17,162	$21,408	$45,347	$51,450	$46,324	$209,158
Kentuckytown WSC	6	11	12	15	17	20	$1,345	$802	$787	$667	$625	$565	$8,072	$8,823	$9,446	$10,007	$10,625	$11,303	$27,384

TABLE H.11A CONSERVATION SAVINGS AND COSTS FOR ALL MUNICIPAL CONSERVATION STRATEGIES COMBINED

ENTITY NAME	SAVINGS VOLUMES IN ACRE-FEET PER YEAR						UNIT COSTS IN DOLLARS PER ACRE-FOOT						ANNUAL COSTS IN DOLLARS						CAPITAL COST
	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	
Kerens	4	4	4	5	4	4	$1,069	$994	$925	$689	$802	$746	$4,277	$3,977	$3,700	$3,444	$3,207	$2,985	$11,913
Krum	29	56	88	135	382	624	$787	$539	$446	$434	$249	$189	$22,834	$30,164	$39,263	$58,547	$95,179	$117,727	$434,014
Ladonia	2	4	6	10	14	16	$1,161	$715	$669	$579	$506	$443	$2,322	$2,859	$4,015	$5,793	$7,083	$7,083	$6,782
Lake Cities Municipal Utility Authority	61	202	241	241	245	250	$959	$437	$377	$337	$333	$326	$58,522	$88,072	$90,891	$81,149	$81,635	$81,635	$241,693
Lake Kiowa SUD	22	33	36	41	46	50	$405	$284	$248	$220	$198	$184	$8,908	$9,357	$8,942	$9,021	$9,110	$9,206	$26,593
Lake Worth	14	21	28	34	42	48	$479	$347	$253	$219	$185	$168	$6,711	$7,282	$7,086	$7,433	$7,772	$8,073	$35,079
Lakeside	15	21	23	25	27	29	$498	$356	$298	$275	$254	$237	$7,466	$7,466	$6,864	$6,864	$6,864	$6,864	$67,999
Lancaster	269	352	391	421	455	492	$202	$193	$150	$142	$133	$125	$54,266	$67,780	$58,790	$59,692	$60,605	$61,571	$1,160,254
Lancaster MUD 1	7	12	16	17	19	22	$1,129	$884	$689	$685	$648	$593	$7,903	$10,612	$11,031	$11,642	$12,314	$13,057	$12,803
Leonard	7	11	15	19	25	32	$1,128	$772	$668	$615	$556	$519	$7,897	$8,496	$10,023	$11,676	$13,889	$16,611	$428,986
Lewisville	686	816	1,011	1,070	1,157	1,205	$119	$113	$86	$82	$77	$74	$81,654	$92,640	$86,888	$87,896	$89,363	$89,363	$1,240,985
Lindsay	4	5	6	7	8	8	$1,239	$1,013	$853	$731	$639	$639	$4,955	$5,063	$5,115	$5,115	$5,112	$5,112	$75,703
Little Elm	50	65	110	142	163	172	$457	$341	$209	$167	$148	$141	$22,871	$22,140	$23,027	$23,766	$24,250	$24,250	$1,094,015
Log Cabin	2	3	4	5	5	7	$1,007	$671	$588	$477	$484	$352	$2,013	$2,013	$2,352	$2,385	$2,422	$2,462	$8,494
Lucas	27	43	57	69	82	94	$286	$202	$156	$129	$108	$95	$7,735	$8,696	$8,883	$8,883	$8,883	$8,883	$1,834,002
Luella SUD	5	7	8	9	10	10	$1,535	$1,096	$959	$853	$767	$767	$7,674	$7,674	$7,674	$7,674	$7,674	$7,674	$47,568
M E N WSC	10	16	20	24	29	34	$1,044	$750	$665	$608	$551	$515	$10,437	$12,002	$13,295	$14,583	$15,988	$17,520	$44,638
Mabank	50	73	83	91	99	111	$717	$520	$459	$427	$396	$361	$35,577	$37,730	$38,214	$38,760	$39,426	$40,199	$411,976
Malakoff	5	8	9	10	11	12	$1,371	$907	$844	$770	$710	$660	$6,855	$7,252	$7,598	$7,701	$7,807	$7,925	$52,192
Mansfield	1,045	1,447	2,313	4,067	3,569	3,437	$76	$66	$43	$33	$38	$40	$79,118	$94,989	$100,091	$134,014	$135,965	$138,146	$7,053,582
Markout WSC	10	16	26	41	60	91	$833	$615	$590	$536	$487	$427	$8,330	$9,844	$15,341	$21,974	$29,225	$38,876	$47,031
McKinney	407	1,287	2,521	3,714	3,018	2,825	$168	$68	$37	$30	$37	$39	$68,249	$87,526	$92,689	$111,223	$111,223	$111,223	$8,361,720
Melissa	80	491	789	1,007	1,000	865	$284	$80	$44	$39	$42	$49	$22,690	$39,374	$34,420	$39,720	$42,268	$42,268	$238,762
Mesquite	200	342	580	833	1,090	1,295	$270	$194	$104	$79	$66	$59	$54,020	$66,315	$60,502	$65,883	$71,526	$76,336	$2,373,931
Midlothian	357	557	742	902	1,068	1,198	$278	$216	$170	$155	$143	$135	$99,072	$120,321	$126,171	$140,094	$152,529	$162,298	$1,676,240
Milligan WSC	3	5	7	10	14	18	$784	$494	$412	$335	$277	$239	$2,351	$2,468	$2,885	$3,352	$3,876	$4,310	$31,629
Mount Zion WSC	3	5	6	8	10	12	$495	$306	$264	$204	$168	$145	$1,484	$1,531	$1,584	$1,631	$1,684	$1,745	$36,276
Mountain Peak SUD	374	765	1,059	1,344	1,669	2,047	$231	$162	$128	$119	$111	$102	$86,537	$124,118	$135,865	$159,459	$184,471	$209,060	$1,482,820
Mountain Springs WSC	6	9	10	11	13	14	$954	$644	$587	$536	$455	$424	$5,725	$5,798	$5,872	$5,891	$5,910	$5,932	$27,846
Muenster	6	9	11	12	13	14	$1,017	$678	$555	$508	$469	$436	$6,101	$6,101	$6,101	$6,101	$6,101	$6,101	$131,748
Murphy	210	258	339	417	492	541	$138	$156	$94	$84	$77	$74	$29,073	$40,203	$31,974	$34,971	$38,031	$40,278	$696,261
Mustang SUD	930	2,183	3,183	4,046	4,626	5,124	$300	$176	$151	$143	$142	$141	$278,563	$384,881	$479,425	$577,837	$656,657	$724,457	$759,375
Nash Forreston WSC	5	8	10	14	19	23	$1,463	$1,075	$940	$772	$723	$680	$7,316	$8,603	$9,403	$10,810	$13,738	$15,640	$26,404
Navarro Mills WSC	5	8	10	12	13	16	$1,588	$1,063	$897	$782	$756	$645	$7,993	$8,557	$9,025	$9,433	$9,880	$10,375	$364,823
Nevada SUD	5	9	16	94	261	321	$804	$565	$485	$288	$136	$95	$4,020	$5,081	$7,759	$27,041	$35,547	$30,609	$185,984
Newark	2	4	7	12	19	26	$1,824	$1,139	$924	$777	$723	$671	$3,648	$4,554	$6,468	$9,324	$13,728	$17,455	$3,031
North Collin SUD	10	15	26	39	52	68	$845	$630	$439	$359	$313	$277	$8,446	$9,455	$11,409	$14,008	$16,265	$18,842	$89,028
North Farmersville WSC	1	3	5	6	7	8	$1,395	$550	$429	$417	$404	$372	$1,395	$1,650	$2,145	$2,502	$2,826	$2,976	$7,376
North Kaufman WSC	4	8	12	17	22	31	$2,416	$1,578	$1,366	$1,217	$1,155	$983	$9,664	$12,623	$16,393	$20,681	$25,407	$30,488	$27,036
North Richland Hills	116	236	274	317	374	408	$280	$188	$125	$109	$93	$86	$32,530	$44,463	$34,263	$34,543	$34,950	$34,950	$2,835,769
Northlake	191	315	516	646	767	830	$144	$135	$74	$68	$65	$64	$27,572	$42,516	$38,364	$43,928	$49,552	$53,518	$226,829
Northwest Grayson County WCID 1	4	5	7	8	11	12	$1,452	$1,289	$996	$933	$728	$716	$5,809	$6,444	$6,972	$7,464	$8,003	$8,591	$14,028
Oak Ridge South Gale WSC	5	7	7	8	9	10	$1,586	$1,158	$1,178	$1,036	$927	$841	$7,930	$8,104	$8,246	$8,287	$8,341	$8,412	$7,577
Ovilla	19	33	48	66	90	120	$430	$306	$241	$208	$187	$174	$8,178	$10,096	$11,579	$13,697	$16,850	$20,860	$220,710
Palmer	6	10	13	16	21	27	$1,449	$1,026	$874	$817	$712	$701	$8,692	$10,260	$11,356	$13,065	$14,947	$18,925	$30,467
Paloma Creek North	49	61	65	69	73	77	$427	$343	$312	$294	$278	$264	$20,911	$20,911	$20,309	$20,309	$20,309	$20,309	$32,571
Paloma Creek South	59	77	83	89	96	102	$542	$415	$378	$353	$327	$308	$31,981	$31,981	$31,379	$31,379	$31,379	$31,379	$137,634
Pantego	12	17	20	22	24	26	$625	$441	$375	$341	$313	$288	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$18,184
Parker	34	56	101	145	165	185	$211	$163	$142	$132	$116	$103	$7,157	$9,120	$14,309	$19,079	$19,079	$19,079	$375,603
Parker County SUD	18	36	56	174	299	420	$1,602	$1,075	$903	$491	$391	$321	$28,837	$38,694	$50,550	$85,204	$116,956	$135,174	$722,999
Pelican Bay	4	7	12	17	25	36	$2,083	$1,582	$1,385	$1,306	$1,187	$1,081	$8,330	$11,077	$16,622	$22,195	$29,669	$38,920	$12,123
Pilot Point	16	30	59	204	247	235	$1,098	$849	$725	$385	$337	$311	$17,575	$25,470	$42,753	$78,524	$83,407	$72,853	$183,489
Pink Hill WSC	5	7	9	10	13	14	$1,259	$992	$832	$799	$656	$652	$6,294	$6,945	$7,486	$7,987	$8,534	$9,133	$69,522
Plano	605	884	1,763	1,971	2,017	2,179	$133	$103	$49	$45	$44	$41	$80,463	$91,411	$86,933	$88,917	$88,917	$88,917	$5,451,148
Pleasant Grove WSC	2	4	5	5	6	6	$2,106	$1,131	$987	$967	$787	$767	$4,211	$4,524	$4,936	$4,835	$4,723	$4,601	$8,511
Point Enterprise WSC	3	5	5	6	6	6	$1,263	$834	$823	$617	$617	$617	$3,941	$3,873	$3,780	$3,736	$3,671	$3,605	$14,062
Ponder	16	30	43	57	76	99	$1,081	$760	$651	$594	$530	$481	$17,299	$22,792	$27,975	$33,854	$40,318	$47,613	$73,134
Pottsboro	11	18	22	26	30	33	$919	$688	$601	$537	$492	$475	$10,113	$12,376	$13,212	$13,950	$14,763	$15,660	$18,942
Princeton	228	971	1,292	1,326	1,392	1,311	$337	$164	$151	$163	$169	$179	$76,854	$159,160	$195,451	$216,756	$234,834	$234,834	$759,291
Prosper	120	479	808	727	782	704	$219	$82	$40	$45	$43	$48	$26,319	$39,328	$31,937	$32,719	$33,858	$33,858	$339,329
Providence Village WCID	25	33	36	39	42	45	$1,026	$777	$695	$642	$596	$556	$25,639	$25,639	$25,037	$25,037	$25,037	$25,037	$41,140
R C H WSC	23	37	54	83	113	149	$797	$560	$527	$464	$417	$378	$18,342	$20,717	$28,477	$38,492	$47,115	$56,369	$58,218
Red Oak	27	46	64	198	283	340	$501	$376	$318	$211	$165	$121	$13,531	$17,281	$20,344	$41,798	$46,712	$41,057	$213,492
Reno (Parker)	5	9	12	17	21	26	$2,382	$1,602	$1,437	$1,190	$1,119	$1,042	$11,910	$14,420	$17,245	$20,224	$23,498	$27,103	$19,224
Rhome	7	13	22	36	58	88	$930	$641	$553	$549	$499	$438	$6,512	$8,330	$12,166	$19,753	$28,948	$38,533	$38,908
Rice Water Supply and Sewer Service	22	38	52	66	83	189	$1,369	$946	$800	$728	$662	$429	$30,121	$35,943	$41,612	$48,027	$54,974	$81,246	$252,456
Richardson	242	430	643	746	788	864	$173	$125	$70	$62	$59	$54	$41,879	$53,763	$45,267	$46,250	$46,250	$46,250	$2,224,231
Richland Hills	10	18	27	36	45	56	$661	$438	$334	$274	$244	$211	$6,614	$7,890	$9,025	$9,876	$10,964	$11,803	$35,611
River Oaks	16	23	27	30	33	36	$1,392	$965	$828	$749	$686	$629	$22,265	$22,200	$22,344	$22,461	$22,627	$22,627	$32,724
Roanoke	71	90	105	120	136	149	$230	$196	$165	$146	$131	$120	$16,339	$17,650	$17,322	$17,539	$17,856	$17,856	$513,361
Rockett SUD	202	349	462	555	714	828	$613	$439	$351	$323	$287	$273	$123,769	$153,202	$162,281	$179,040	$205,268	$226,541	$612,349

TABLE H.11A CONSERVATION SAVINGS AND COSTS FOR ALL MUNICIPAL CONSERVATION STRATEGIES COMBINED

ENTITY NAME	SAVINGS VOLUMES IN ACRE-FEET PER YEAR						UNIT COSTS IN DOLLARS PER ACRE-FOOT						ANNUAL COSTS IN DOLLARS						CAPITAL COST
	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	
Rockwall	84	338	692	1,093	910	778	$313	$118	$51	$39	$48	$56	$26,269	$39,944	$34,998	$42,519	$43,674	$43,674	$2,535,355
Rose Hill SUD	3	5	9	12	16	20	$1,150	$831	$544	$468	$387	$342	$3,450	$4,153	$4,893	$5,617	$6,198	$6,840	$53,260
Rowlett	97	185	378	418	456	447	$330	$235	$96	$90	$85	$87	$31,969	$43,538	$36,295	$37,718	$38,774	$38,774	$381,047
Royse City	270	1,019	1,333	1,323	1,470	1,370	$237	$119	$106	$116	$116	$125	$64,177	$121,718	$141,405	$153,813	$170,521	$170,719	$948,773
Runaway Bay	13	25	32	45	59	80	$465	$294	$280	$243	$226	$204	$6,047	$7,356	$8,960	$10,929	$13,344	$16,306	$31,363
Sachse	44	96	174	184	195	194	$394	$298	$113	$110	$106	$107	$17,315	$28,653	$19,686	$20,281	$20,673	$20,673	$248,498
Saginaw	33	72	79	89	102	114	$529	$403	$237	$211	$185	$165	$17,469	$29,134	$18,688	$18,773	$18,898	$18,898	$520,835
Sanger	28	51	69	118	188	254	$1,078	$722	$635	$561	$412	$307	$30,190	$36,838	$43,833	$66,332	$77,454	$77,904	$290,439
Sansom Park	13	20	24	28	32	38	$1,506	$1,079	$942	$854	$791	$707	$19,580	$21,575	$22,619	$23,904	$25,322	$26,881	$59,835
Sardis Lone Elm WSC	255	506	678	673	643	642	$296	$201	$154	$160	$168	$168	$75,363	$101,903	$104,394	$107,935	$107,935	$107,935	$297,081
Savoy	1	3	3	3	4	4	$2,133	$704	$706	$698	$517	$509	$2,133	$2,112	$2,118	$2,094	$2,067	$2,034	$6,296
Seagoville	86	116	130	142	152	166	$416	$427	$308	$291	$278	$261	$35,739	$49,587	$40,182	$41,212	$42,282	$43,366	$346,776
Seis Lagos UD	5	7	10	12	16	18	$333	$231	$169	$146	$112	$100	$1,667	$1,614	$1,691	$1,757	$1,795	$1,799	$5,683
Sherman	517	750	854	948	1,054	1,172	$248	$196	$167	$155	$145	$136	$127,985	$147,089	$142,340	$147,439	$153,058	$159,248	$729,443
South Ellis County WSC	11	19	24	30	39	48	$403	$277	$257	$235	$206	$190	$4,432	$5,268	$6,161	$7,062	$8,050	$9,141	$67,282
South Freestone County WSC	5	7	9	9	9	10	$1,470	$1,097	$902	$877	$850	$738	$7,350	$7,682	$8,118	$7,897	$7,650	$7,377	$225,326
South Grayson SUD	12	21	26	31	39	47	$1,431	$944	$839	$785	$694	$641	$17,172	$19,826	$21,815	$24,321	$27,077	$30,110	$62,045
Southern Oaks Water Supply	4	6	10	11	12	13	$852	$698	$496	$459	$428	$401	$3,409	$4,189	$4,960	$5,046	$5,130	$5,219	$21,295
Southlake	122	379	472	546	628	709	$161	$84	$47	$42	$38	$35	$19,681	$31,849	$22,293	$23,179	$24,067	$24,900	$4,487,588
Southmayd	2	3	3	3	4	4	$1,446	$992	$1,014	$1,024	$777	$788	$2,892	$2,976	$3,041	$3,071	$3,106	$3,150	$16,625
Southwest Fannin County SUD	15	25	29	35	42	48	$1,545	$1,151	$1,043	$909	$803	$731	$23,180	$28,785	$30,247	$31,809	$33,711	$35,083	$1,423,076
Springtown	22	42	70	96	122	146	$685	$537	$458	$409	$368	$337	$15,076	$22,536	$32,064	$39,262	$44,855	$49,166	$197,124
Starr WSC	4	7	8	10	11	12	$1,652	$1,025	$956	$807	$776	$753	$6,607	$7,173	$7,650	$8,069	$8,532	$9,041	$38,681
Sunnyvale	25	44	67	85	103	119	$250	$175	$134	$109	$91	$79	$6,238	$7,702	$8,945	$9,284	$9,407	$9,407	$369,984
Talty SUD	35	57	96	376	696	771	$929	$628	$530	$236	$156	$144	$32,519	$35,823	$50,833	$88,668	$108,814	$111,151	$221,222
Teague	11	13	14	15	15	16	$876	$679	$552	$499	$480	$432	$9,634	$8,831	$7,731	$7,481	$7,206	$6,906	$24,406
Terra Southwest	6	10	14	19	22	29	$1,756	$1,316	$1,216	$1,061	$1,073	$944	$10,536	$13,157	$17,029	$20,154	$23,597	$27,389	$25,126
Terrell	146	223	324	399	507	583	$166	$168	$97	$89	$81	$77	$24,250	$37,397	$31,499	$35,598	$41,007	$44,761	$530,568
The Colony	280	481	588	561	564	583	$219	$167	$131	$137	$136	$132	$61,422	$80,532	$76,720	$76,720	$76,720	$76,720	$308,355
Tioga	5	8	9	12	15	18	$1,021	$751	$753	$627	$556	$513	$5,104	$6,011	$6,773	$7,524	$8,338	$9,228	$78,915
Tom Bean	4	5	6	7	7	8	$827	$662	$551	$473	$473	$414	$3,308	$3,308	$3,308	$3,308	$3,308	$3,308	$51,166
Trenton	2	4	5	5	6	6	$1,197	$643	$533	$548	$470	$485	$2,394	$2,571	$2,667	$2,739	$2,820	$2,910	$11,769
Trinidad	3	4	5	5	6	8	$1,122	$854	$704	$716	$607	$464	$3,365	$3,414	$3,520	$3,580	$3,642	$3,711	$12,667
Trophy Club MUD 1	45	64	84	103	124	145	$208	$149	$115	$95	$80	$69	$9,352	$9,520	$9,659	$9,774	$9,900	$10,037	$574,321
Two Way SUD	15	24	31	37	45	51	$1,116	$831	$764	$699	$637	$596	$16,739	$19,940	$23,685	$25,857	$28,668	$30,420	$73,626
University Park	138	200	225	250	275	300	$460	$317	$282	$254	$231	$212	$63,484	$63,484	$63,484	$63,484	$63,484	$63,484	$216,676
Van Alstyne	17	52	137	208	285	331	$1,361	$933	$549	$471	$423	$415	$23,139	$48,514	$75,243	$97,957	$120,663	$137,426	$88,276
Verona SUD	8	15	21	28	36	45	$1,173	$784	$689	$691	$631	$587	$9,384	$11,757	$14,461	$19,344	$22,714	$26,428	$42,492
Walnut Creek SUD	174	253	447	760	1,104	1,421	$457	$376	$268	$216	$190	$179	$79,492	$95,108	$119,904	$164,321	$209,450	$254,110	$577,185
Watauga	23	32	41	50	59	68	$667	$480	$374	$307	$260	$226	$15,348	$15,348	$15,348	$15,348	$15,348	$15,348	$470,836
Waxahachie	393	700	924	1,137	1,378	1,649	$291	$202	$160	$145	$133	$123	$114,529	$141,284	$147,466	$164,377	$182,980	$203,450	$2,104,611
Weatherford	150	375	534	678	834	1,009	$621	$306	$214	$184	$163	$147	$93,115	$114,751	$114,123	$124,543	$136,019	$148,660	$364,863
West Cedar Creek MUD	21	28	35	39	43	49	$784	$556	$474	$431	$397	$353	$16,468	$15,556	$16,585	$16,816	$17,055	$17,307	$109,900
West Leonard WSC	5	9	12	14	17	20	$1,281	$854	$703	$657	$590	$547	$6,516	$7,799	$8,565	$9,345	$10,181	$11,119	$31,363
West Wise SUD	9	15	17	20	24	26	$1,255	$824	$783	$702	$618	$605	$11,295	$12,359	$13,315	$14,041	$14,839	$15,718	$199,997
Westlake	77	123	165	209	259	320	$50	$39	$30	$27	$25	$23	$3,817	$4,794	$5,007	$5,676	$6,409	$7,215	$31,037
Westminster SUD	7	13	20	26	33	41	$883	$589	$524	$476	$439	$409	$6,180	$7,655	$10,489	$12,382	$14,471	$16,766	$63,283
Westover Hills	21	25	28	31	34	38	$64	$54	$27	$24	$22	$20	$1,346	$1,344	$745	$747	$751	$751	$14,205
Westworth Village	5	7	10	13	15	17	$779	$567	$358	$289	$263	$241	$3,896	$3,972	$3,579	$3,761	$3,939	$4,101	$19,433
White Settlement	85	117	136	154	174	195	$236	$278	$173	$161	$149	$139	$20,036	$32,567	$23,645	$24,797	$25,885	$27,085	$378,800
White Shed WSC	5	7	8	9	10	12	$1,332	$996	$895	$809	$741	$629	$6,659	$6,974	$7,160	$7,277	$7,405	$7,546	$209,571
Whitesboro	11	16	20	23	27	32	$1,225	$916	$782	$717	$647	$579	$13,472	$14,651	$15,637	$16,502	$17,458	$18,514	$22,730
Whitewright	7	12	15	17	20	24	$933	$595	$508	$473	$426	$377	$6,533	$7,135	$7,614	$8,047	$8,515	$9,038	$15,682
Willow Park	23	40	56	74	94	117	$1,118	$768	$640	$568	$512	$468	$25,703	$30,723	$35,838	$42,024	$48,083	$54,724	$53,514
Wilmer	16	25	30	34	40	46	$1,151	$831	$734	$670	$590	$533	$18,410	$20,775	$22,032	$22,778	$23,599	$24,503	$122,574
Woodbine WSC	13	20	22	25	28	30	$1,475	$996	$920	$814	$730	$686	$19,181	$19,910	$20,240	$20,341	$20,447	$20,567	$96,180
Wortham	2	3	3	3	4	4	$1,388	$841	$724	$700	$505	$483	$2,775	$2,523	$2,172	$2,100	$2,019	$1,932	$27,962
Wylie	58	80	130	161	173	190	$414	$298	$189	$156	$145	$132	$24,017	$23,828	$24,668	$25,147	$25,147	$25,147	$831,324
Wylie Northeast SUD	37	60	192	239	236	232	$613	$481	$279	$236	$198	$202	$22,689	$28,840	$53,469	$56,396	$46,831	$46,831	$836,072
TOTAL	***39,879***	***70,968***	***93,390***	***111,865***	***129,006***	***144,587***	***$212***	***$149***	***$123***	***$116***	***$112***	***$107***	***$8,449,806***	***$10,591,345***	***$11,502,946***	***$12,961,228***	***$14,398,907***	***$15,537,209***	***$232,707,027***
Note: Savings presented above represent total savings for WUG as a whole, regardless of regional splits. Both savings and costs include the total costs from water use reduction strategies as well as water loss mitigation strategies. Residual savings are not included in the totals above.																			

TABLE H.11B CONSERVATION RESIDUAL SAVINGS

ENTITY NAME	SAVINGS VOLUMES IN ACRE-FEET PER YEAR					
	2030	2040	2050	2060	2070	2080
Addison	10	23	25	26	27	28
Allen	767	856	856	856	856	856
Anna	49	101	128	151	176	189
Argyle WSC	12	22	29	36	41	46
Athens	3	8	10	12	15	17
Azle	3	7	8	9	10	11
Balch Springs	4	8	8	9	10	10
Bear Creek SUD	132	241	275	300	330	330
Benbrook Water Authority	41	58	64	69	74	79
Blue Ridge	3	4	5	6	8	9
Bonham	2	6	8	11	15	18
Carrollton	32	68	72	76	80	81
Cedar Hill	13	29	31	34	37	39
Celina	17	60	100	104	128	155
Colleyville	123	149	149	149	149	149
Coppell	14	28	28	28	29	29
Corinth	16	26	32	34	36	36
Corsicana	8	17	18	18	19	20
Crandall	0	3	10	14	20	24
Crowley	10	17	20	22	24	27
Dalworthington Gardens	1	1	1	1	1	1
Denison	15	38	45	52	62	67
Denton	39	101	125	148	177	206
Denton County FWSD 7	4	8	8	8	8	8
Desoto	13	27	28	28	29	29
Duncanville	20	31	32	32	32	32
East Fork SUD	4	9	10	12	13	14
Ennis	5	10	10	11	11	12
Euless	40	56	56	56	56	56
Everman	1	1	1	1	1	1
Fairview	6	15	18	18	18	18
Farmers Branch	50	80	88	92	96	102
Farmersville	1	6	13	14	16	18
Fate	6	16	22	28	35	43
Flower Mound	30	74	90	90	90	90
Forest Hill	2	4	5	5	5	6
Fort Worth	6,517	7,703	7,920	8,535	9,204	9,926
Frisco	2,384	2,996	3,012	3,012	3,012	3,012
Gainesville	3	7	7	7	8	9
Garland	1,275	1,427	1,489	1,535	1,544	1,544
Glenn Heights	7	12	13	15	17	19
Grand Prairie	1,099	1,274	1,431	1,472	1,528	1,528
Grapevine	585	608	608	608	608	608
Heath	5	13	17	17	17	17

TABLE H.11B CONSERVATION RESIDUAL SAVINGS

ENTITY NAME	SAVINGS VOLUMES IN ACRE-FEET PER YEAR					
	2030	2040	2050	2060	2070	2080
Highland Park	124	124	124	124	124	124
Highland Village	5	10	10	10	10	10
Hurst	212	219	220	220	221	221
Hutchins	0	0	0	3	6	6
Irving	1,853	1,971	1,972	1,974	1,976	1,976
Josephine	0	1	1	1	1	1
Kaufman	0	0	3	6	8	9
Keller	402	424	424	424	424	424
Lake Cities Municipal Utility Authority	3	7	8	8	8	8
Lancaster	31	47	48	50	50	51
Little Elm	184	183	193	201	207	207
Mansfield	37	79	97	135	137	139
McKinney	1,527	1,875	2,400	3,018	3,018	3,018
Melissa	297	459	616	766	837	837
Mesquite	752	811	900	1,013	1,141	1,248
Midlothian	44	65	79	92	105	116
Murphy	6	12	14	15	17	18
Mustang SUD	20	58	77	97	112	125
Nevada SUD	22	28	41	89	160	214
North Collin SUD	0	0	0	1	1	1
North Richland Hills	435	482	491	496	506	506
Parker	31	45	63	74	74	74
Plano	2,266	2,366	2,605	2,684	2,684	2,684
Princeton	6	27	37	41	44	44
Red Oak	3	4	5	6	7	9
Richardson	905	982	1,048	1,079	1,079	1,079
Richland Hills	1	2	2	2	3	3
River Oaks	1	1	1	1	1	1
Roanoke	9	10	10	10	11	11
Rockwall	316	401	534	713	740	740
Rowlett	361	393	457	484	505	505
Sachse	165	182	206	216	221	221
Saginaw	124	141	142	143	145	145
Sanger	47	61	75	96	122	154
Sardis Lone Elm WSC	7	17	21	22	22	22
Seagoville	3	6	6	6	7	7
Sherman	14	31	33	34	36	39
Southlake	440	492	525	554	583	610
Sunnyvale	0	5	11	12	12	12
Talty SUD	2	5	8	11	16	19
Terrell	5	12	14	17	20	22
The Colony	10	22	25	25	25	25
Trophy Club MUD 1	168	178	181	183	186	189
University Park	235	244	244	244	244	244

TABLE H.11B CONSERVATION RESIDUAL SAVINGS

ENTITY NAME	SAVINGS VOLUMES IN ACRE-FEET PER YEAR					
	2030	2040	2050	2060	2070	2080
Watauga	91	95	95	95	95	95
Waxahachie	19	40	49	58	68	80
Westover Hills	4	4	4	4	4	4
White Settlement	7	12	13	15	15	16
Wylie	217	222	233	239	239	239
TOTAL	***24,782***	***29,103***	***31,291***	***33,572***	***34,949***	***36,072***

Note: Residual savings come from conservation measures that have already been implemented, so there are no future costs.
Savings presented above represent total savings for WUG as a whole, regardless of regional splits.

TABLE H.11C CONSERVATION SAVINGS AND COSTS FOR MUNICIPAL WATER USE REDUCTION STRATEGIES

ENTITY NAME	SAVINGS VOLUMES IN ACRE-FEET PER YEAR						UNIT COSTS IN DOLLARS PER ACRE-FOOT						ANNUAL COSTS IN DOLLARS						CAPITAL COST
	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	
Ables Springs SUD	3	6	8	11	14	17	$1,372	$855	$712	$560	$487	$416	$4,569	$4,760	$5,506	$6,157	$6,909	$7,254	$0
Addison	295	450	509	546	595	653	$68	$74	$47	$45	$42	$40	$20,143	$33,127	$23,868	$24,576	$25,230	$25,951	$150,000
Aledo	26	40	58	75	94	110	$832	$583	$501	$446	$400	$363	$21,639	$23,313	$29,039	$33,439	$37,622	$39,955	$0
Allen	213	575	549	584	649	729	$205	$101	$86	$81	$73	$65	$43,750	$58,054	$47,500	$47,500	$47,500	$47,500	$150,000
Alvord	7	13	18	22	27	34	$1,214	$804	$677	$617	$560	$494	$8,499	$10,448	$12,188	$13,584	$15,122	$16,810	$0
AMC Creekside	4	7	8	10	14	17	$1,896	$1,346	$1,397	$1,288	$1,187	$1,115	$7,584	$9,422	$11,175	$12,876	$16,616	$18,950	$0
Anna	301	789	1,032	1,246	1,469	1,574	$347	$196	$164	$154	$145	$143	$104,409	$154,475	$168,939	$191,583	$213,688	$225,500	$150,000
Annetta	8	15	18	23	29	36	$1,117	$710	$687	$612	$544	$486	$8,934	$10,649	$12,362	$14,074	$15,789	$17,501	$0
Argyle WSC	82	140	412	648	716	755	$508	$375	$209	$154	$137	$139	$41,627	$52,540	$86,287	$99,705	$98,151	$104,751	$158,560
Arledge Ridge WSC	4	7	8	9	10	12	$998	$613	$556	$508	$471	$405	$3,991	$4,290	$4,446	$4,573	$4,712	$4,862	$0
Arlington	2,638	3,772	4,401	4,894	5,592	5,938	$102	$80	$70	$66	$62	$60	$268,346	$300,758	$308,392	$323,652	$344,539	$354,778	$150,000
Athens	58	99	296	431	541	595	$775	$535	$289	$232	$189	$186	$44,906	$53,091	$85,425	$99,853	$102,470	$110,490	$159,519
Aubrey	17	47	203	335	398	377	$1,342	$927	$455	$337	$333	$351	$22,807	$43,588	$92,259	$113,052	$132,404	$132,404	$150,000
Avalon Water Supply & Sewer Service	2	4	5	5	7	8	$1,488	$824	$728	$796	$622	$596	$2,976	$3,297	$3,642	$3,980	$4,356	$4,769	$0
Azle	48	79	201	259	297	340	$1,000	$690	$392	$328	$273	$255	$47,980	$54,546	$78,645	$85,000	$81,038	$86,612	$150,000
B And B WSC	6	9	11	13	15	18	$895	$654	$574	$516	$477	$424	$5,371	$5,886	$6,313	$6,713	$7,151	$7,631	$0
Balch Springs	109	141	172	203	241	263	$435	$430	$313	$285	$262	$252	$47,421	$60,800	$53,609	$57,855	$63,275	$66,100	$159,728
Bear Creek SUD	31	290	288	283	312	274	$580	$137	$110	$117	$113	$129	$17,971	$39,635	$31,640	$33,204	$35,316	$35,316	$150,000
Becker Jiba WSC	7	16	25	34	45	57	$1,761	$1,206	$1,041	$899	$792	$712	$12,324	$19,295	$26,027	$30,565	$35,658	$40,562	$0
Bedford	344	489	516	599	606	629	$128	$116	$91	$81	$80	$77	$43,907	$56,861	$46,853	$48,600	$48,600	$48,600	$150,000
Bells	4	5	6	7	9	10	$1,256	$1,090	$968	$875	$719	$686	$5,023	$5,450	$5,807	$6,122	$6,471	$6,855	$0
Benbrook Water Authority	288	422	491	555	619	684	$294	$237	$192	$179	$168	$159	$84,744	$100,132	$94,357	$99,135	$103,917	$108,696	$150,000
Black Rock WSC	7	12	17	22	30	37	$646	$468	$397	$360	$345	$322	$4,524	$5,611	$6,749	$7,911	$10,336	$11,925	$0
Blackland WSC	18	26	31	41	48	57	$840	$604	$524	$459	$421	$382	$15,117	$15,700	$16,251	$18,800	$20,220	$21,747	$8,560
Blooming Grove	4	5	6	7	8	10	$776	$642	$576	$526	$496	$427	$3,103	$3,212	$3,457	$3,683	$3,966	$4,266	$0
Blue Mound	4	5	7	8	9	12	$1,900	$1,676	$1,289	$1,191	$1,120	$891	$7,601	$8,379	$9,024	$9,528	$10,083	$10,693	$0
Blue Ridge	5	9	14	18	24	32	$956	$685	$553	$518	$461	$405	$4,778	$6,163	$7,737	$9,316	$11,055	$12,974	$0
Bois D Arc MUD	6	9	11	12	14	16	$1,422	$993	$834	$777	$678	$605	$8,579	$8,984	$9,227	$9,379	$9,545	$9,728	$0
Bolivar WSC	32	54	73	182	258	328	$1,174	$828	$702	$418	$339	$301	$37,559	$44,691	$51,243	$76,019	$87,496	$98,440	$158,560
Bonham	39	70	222	347	483	600	$1,092	$727	$395	$311	$251	$236	$42,580	$50,887	$87,751	$108,144	$121,099	$141,877	$158,560
Boyd	5	8	12	17	22	28	$860	$674	$607	$529	$483	$418	$4,299	$5,393	$7,285	$8,994	$10,622	$11,711	$0
Bridgeport	18	27	31	35	39	42	$895	$611	$544	$487	$443	$417	$16,105	$16,497	$16,864	$17,060	$17,281	$17,529	$0
Buena Vista-Bethel SUD	37	65	90	120	153	190	$618	$425	$370	$327	$325	$296	$22,852	$27,611	$33,334	$39,191	$49,734	$56,296	$8,560
Butler WSC	4	5	6	5	6	6	$629	$498	$409	$476	$384	$369	$2,514	$2,490	$2,454	$2,382	$2,301	$2,211	$0
Callisburg WSC	2	4	4	5	6	6	$2,336	$1,217	$1,238	$996	$836	$841	$4,671	$4,867	$4,952	$4,982	$5,014	$5,047	$0
Carrollton	907	1,220	1,433	1,643	1,858	1,880	$107	$92	$75	$69	$64	$64	$97,261	$112,790	$107,504	$113,082	$118,986	$119,392	$150,000
Cedar Hill	408	566	687	794	912	1,041	$158	$141	$107	$98	$91	$86	$64,668	$79,885	$73,216	$78,118	$83,414	$89,138	$167,119
Celina	622	2,181	4,094	3,626	4,709	5,860	$225	$100	$76	$89	$81	$75	$140,002	$217,826	$312,211	$323,212	$379,482	$441,521	$150,000
Chatfield WSC	6	9	12	13	16	18	$1,552	$1,111	$881	$852	$727	$680	$9,310	$10,002	$10,573	$11,077	$11,635	$12,245	$0
Chico	7	11	12	13	15	16	$838	$534	$489	$451	$391	$367	$5,869	$5,869	$5,869	$5,869	$5,869	$5,869	$0
Cockrell Hill	5	5	7	8	9	11	$505	$474	$326	$279	$241	$191	$2,526	$2,370	$2,285	$2,231	$2,172	$2,106	$0
College Mound SUD	11	18	30	175	310	398	$1,224	$821	$627	$277	$239	$198	$13,463	$14,783	$18,817	$48,464	$74,052	$78,652	$158,560
Colleyville	381	449	485	520	556	592	$70	$59	$55	$51	$48	$45	$26,550	$26,550	$26,550	$26,550	$26,550	$26,550	$150,000
Collinsville	5	8	10	12	13	16	$1,493	$1,024	$880	$779	$765	$663	$7,467	$8,191	$8,796	$9,346	$9,947	$10,606	$0
Combine WSC	3	4	6	8	12	15	$841	$714	$542	$460	$347	$312	$2,522	$2,856	$3,253	$3,683	$4,159	$4,686	$0
Community WSC	11	19	22	27	31	37	$1,046	$678	$638	$554	$516	$521	$11,502	$12,882	$14,036	$14,967	$15,993	$19,282	$0
Copeville WSC	12	27	51	64	163	211	$942	$664	$503	$441	$305	$254	$11,306	$17,925	$25,646	$28,207	$49,716	$53,465	$158,560
Coppell	403	471	513	554	594	630	$94	$80	$74	$69	$64	$61	$37,988	$37,883	$37,974	$38,046	$38,150	$38,150	$150,000
Corbet WSC	4	7	7	8	9	12	$1,747	$1,069	$1,127	$1,031	$960	$756	$6,988	$7,484	$7,892	$8,248	$8,640	$9,076	$0
Corinth	258	377	581	569	596	586	$348	$280	$192	$200	$197	$200	$89,886	$105,543	$111,273	$113,766	$117,400	$117,400	$159,989
Corsicana	288	408	459	503	554	610	$300	$248	$205	$194	$182	$171	$86,416	$101,303	$94,338	$97,436	$100,850	$104,611	$150,000
County-Other, Collin	2	6	10	16	23	31	$0	$294	$220	$164	$133	$113	$0	$1,762	$2,197	$2,631	$3,066	$3,500	$0
County-Other, Cooke	3	5	8	11	14	18	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
County-Other, Dallas	9	22	41	65	93	128	$106	$72	$31	$24	$20	$16	$952	$1,582	$1,260	$1,540	$1,820	$2,100	$8,560
County-Other, Denton	25	73	144	238	387	535	$1,482	$793	$538	$413	$335	$281	$37,049	$57,879	$77,506	$98,338	$129,584	$150,416	$17,119
County-Other, Ellis	3	5	9	13	17	22	$0	$0	$0	$212	$172	$140	$0	$0	$0	$2,758	$2,919	$3,080	$0
County-Other, Fannin	1	3	4	6	8	11	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
County-Other, Freestone	1	2	3	3	4	5	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
County-Other, Grayson	6	10	15	20	27	33	$751	$427	$259	$204	$166	$138	$4,507	$4,273	$3,880	$4,088	$4,480	$4,550	$8,560
County-Other, Henderson	3	7	13	16	20	22	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
County-Other, Jack	2	3	4	5	6	7	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
County-Other, Kaufman	6	12	24	36	59	79	$902	$515	$311	$243	$190	$162	$5,411	$6,176	$7,459	$8,732	$11,220	$12,801	$8,560
County-Other, Navarro	3	5	9	13	18	23	$0	$0	$302	$226	$183	$152	$0	$0	$2,722	$2,937	$3,290	$3,500	$0
County-Other, Parker	35	104	223	398	655	929	$1,423	$759	$514	$393	$318	$267	$49,811	$78,923	$114,718	$156,514	$208,600	$248,500	$17,119
County-Other, Rockwall	1	2	5	8	16	24	$0	$0	$0	$0	$128	$106	$0	$0	$0	$0	$2,045	$2,553	$0
County-Other, Tarrant	36	87	158	251	363	496	$603	$362	$257	$201	$166	$141	$21,723	$31,523	$40,600	$50,400	$60,200	$70,000	$10,271
County-Other, Wise	29	76	161	286	478	672	$1,305	$756	$524	$407	$332	$281	$37,837	$57,433	$84,294	$116,446	$158,900	$189,000	$17,119

TABLE H.11C CONSERVATION SAVINGS AND COSTS FOR MUNICIPAL WATER USE REDUCTION STRATEGIES

ENTITY NAME	SAVINGS VOLUMES IN ACRE-FEET PER YEAR						UNIT COSTS IN DOLLARS PER ACRE-FOOT						ANNUAL COSTS IN DOLLARS						CAPITAL COST
	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	
Crandall	18	56	277	523	743	850	$862	$575	$248	$171	$136	$137	$15,517	$32,178	$68,612	$89,522	$101,211	$116,381	$150,000
Crescent Heights WSC	3	4	5	5	7	8	$1,727	$1,333	$1,179	$1,198	$871	$776	$5,181	$5,333	$5,896	$5,992	$6,095	$6,207	$0
Cross Timbers WSC	42	78	109	139	362	569	$820	$552	$478	$436	$245	$184	$34,445	$43,087	$52,103	$60,553	$88,686	$104,894	$158,560
Crowley	114	204	254	289	332	380	$193	$177	$111	$105	$98	$92	$21,933	$36,174	$28,203	$30,303	$32,605	$35,129	$149,706
Culleoka WSC	27	45	60	75	172	223	$1,447	$993	$872	$781	$486	$446	$39,074	$44,666	$52,341	$58,553	$83,794	$99,372	$158,560
Dallas	10,468	13,623	15,748	17,825	19,973	22,236	$77	$63	$56	$52	$48	$46	$805,373	$853,016	$882,418	$924,331	$968,673	$1,015,382	$150,000
Dalworthington Gardens	12	15	18	21	24	27	$254	$205	$138	$118	$104	$92	$3,045	$3,068	$2,484	$2,485	$2,489	$2,493	$8,560
Dawson	2	4	4	5	5	6	$1,238	$626	$632	$503	$502	$418	$2,475	$2,502	$2,526	$2,517	$2,511	$2,505	$0
Decatur	57	101	150	400	611	716	$538	$367	$323	$191	$149	$125	$30,660	$37,022	$48,441	$76,513	$91,369	$89,748	$150,000
Denison	608	1,155	1,481	1,795	2,226	2,413	$234	$156	$130	$120	$110	$109	$142,429	$180,821	$192,019	$215,154	$245,319	$262,058	$165,619
Denton	1,431	3,069	4,241	5,215	6,495	7,659	$204	$119	$99	$93	$86	$83	$291,709	$365,098	$419,163	$482,395	$560,789	$637,441	$150,000
Denton County FWSD 1-A	180	414	428	416	427	430	$374	$227	$205	$213	$211	$209	$67,311	$94,269	$87,767	$88,618	$89,856	$89,856	$150,000
Denton County FWSD 10	31	43	47	50	54	58	$718	$518	$461	$433	$401	$373	$22,255	$22,255	$21,653	$21,653	$21,653	$21,653	$8,560
Denton County FWSD 11-C	9	20	33	46	61	133	$2,153	$1,493	$1,211	$1,099	$1,008	$692	$19,380	$29,855	$39,952	$50,538	$61,483	$92,307	$158,560
Denton County FWSD 7	99	136	148	159	170	181	$440	$336	$305	$284	$265	$249	$43,532	$45,719	$45,117	$45,117	$45,117	$45,117	$8,560
Desert WSC	6	9	11	13	15	18	$892	$657	$573	$513	$472	$418	$5,352	$5,916	$6,308	$6,675	$7,078	$7,527	$0
Desoto	402	537	592	634	683	738	$228	$200	$166	$158	$149	$141	$91,575	$107,374	$98,389	$99,994	$101,762	$103,712	$167,119
Dogwood Estates Water	4	4	6	6	7	8	$872	$855	$603	$609	$527	$466	$3,487	$3,419	$3,615	$3,651	$3,689	$3,727	$0
Dorchester	4	7	7	8	9	10	$945	$554	$565	$498	$447	$407	$3,781	$3,877	$3,953	$3,983	$4,024	$4,073	$0
Duncanville	213	276	305	322	340	360	$178	$181	$133	$126	$119	$113	$37,912	$50,110	$40,439	$40,547	$40,547	$40,547	$150,000
East Cedar Creek FWSD	163	221	234	252	272	293	$416	$370	$307	$290	$272	$257	$67,885	$82,026	$71,848	$72,882	$74,027	$75,289	$150,000
East Fork SUD	106	195	267	318	357	409	$315	$252	$164	$154	$150	$143	$33,389	$49,134	$43,897	$49,084	$53,566	$58,517	$158,560
East Garrett WSC	5	9	14	18	25	31	$1,039	$725	$569	$524	$497	$465	$5,194	$6,525	$7,968	$9,433	$12,425	$14,426	$0
Edgecliff	8	10	12	14	17	19	$568	$455	$329	$282	$232	$208	$4,547	$4,547	$3,945	$3,945	$3,945	$3,945	$8,560
Elmo WSC	4	5	8	10	13	16	$1,657	$1,544	$1,138	$1,065	$951	$891	$6,626	$7,718	$9,106	$10,649	$12,364	$14,262	$0
Ennis	176	239	269	296	328	361	$416	$365	$296	$280	$264	$251	$73,180	$87,139	$79,670	$83,008	$86,765	$90,420	$158,560
Euless	348	408	441	474	506	539	$141	$120	$111	$103	$97	$91	$48,992	$48,992	$48,992	$48,992	$48,992	$48,992	$150,000
Eustace	6	9	10	12	13	16	$1,455	$1,059	$935	$804	$767	$646	$8,730	$9,531	$9,351	$9,645	$9,974	$10,339	$0
Everman	5	7	8	10	12	14	$912	$652	$570	$456	$380	$326	$4,561	$4,561	$4,561	$4,561	$4,561	$4,561	$0
Fairfield	18	25	28	30	30	30	$761	$532	$461	$403	$376	$349	$13,704	$13,295	$12,906	$12,087	$11,273	$10,464	$0
Fairview	38	68	389	435	415	418	$229	$158	$79	$71	$48	$48	$8,714	$10,742	$30,652	$30,652	$20,098	$20,098	$150,000
Farmers Branch	374	542	606	648	700	763	$87	$84	$60	$57	$54	$51	$32,679	$45,655	$36,389	$37,141	$37,972	$38,885	$150,000
Farmersville	10	42	317	421	436	457	$655	$367	$156	$128	$110	$115	$6,546	$15,432	$49,388	$53,841	$48,123	$52,488	$158,560
Fate	199	503	777	1,024	1,293	1,590	$173	$114	$78	$73	$69	$67	$34,384	$57,162	$60,711	$74,552	$89,760	$106,480	$158,764
Ferris	12	16	20	22	26	30	$773	$612	$486	$465	$415	$381	$9,281	$9,785	$9,726	$10,225	$10,790	$11,421	$8,560
Flower Mound	839	1,806	2,506	2,185	2,087	2,095	$83	$53	$40	$46	$48	$48	$69,915	$94,980	$99,752	$99,788	$99,833	$99,833	$150,000
Forest Hill	14	22	30	39	110	137	$1,110	$777	$612	$496	$348	$291	$15,541	$17,085	$18,361	$19,357	$38,286	$39,949	$150,000
Forney	152	317	444	546	606	564	$182	$140	$91	$84	$82	$88	$27,708	$44,386	$40,404	$45,872	$49,597	$49,597	$150,000
Forney Lake WSC	67	216	259	304	309	320	$412	$237	$201	$148	$149	$146	$27,596	$51,227	$52,095	$45,134	$45,847	$46,559	$158,560
Fort Worth	1,810	5,336	5,499	7,151	8,896	10,804	$155	$64	$62	$52	$45	$40	$281,129	$343,979	$342,828	$369,443	$398,378	$429,655	$150,000
Frisco	635	2,420	2,101	2,053	2,185	2,405	$138	$46	$49	$50	$47	$42	$87,505	$112,158	$102,012	$102,012	$102,012	$102,012	$150,000
Frognot WSC	4	7	9	13	16	20	$1,504	$1,064	$1,008	$822	$780	$722	$6,071	$7,536	$9,152	$10,802	$12,591	$14,586	$0
Gainesville	55	158	180	202	232	262	$1,173	$531	$468	$382	$357	$338	$64,541	$84,034	$84,385	$77,021	$82,785	$88,467	$158,560
Garland	340	688	880	1,039	1,132	1,239	$220	$130	$93	$81	$74	$68	$74,894	$89,774	$81,791	$83,669	$84,045	$84,045	$150,000
Gastonia Scurry SUD	20	29	48	246	469	563	$885	$702	$545	$260	$184	$160	$17,700	$20,358	$26,147	$63,743	$86,271	$90,300	$158,560
Glenn Heights	97	156	193	225	262	301	$310	$290	$195	$182	$170	$161	$30,105	$45,258	$37,671	$40,969	$44,594	$48,580	$158,560
Grand Prairie	293	657	990	1,054	1,212	1,272	$230	$127	$80	$77	$69	$66	$67,406	$83,564	$79,461	$81,128	$83,417	$83,417	$150,000
Grapevine	156	218	280	342	405	467	$167	$119	$93	$76	$64	$56	$26,009	$26,009	$26,009	$26,009	$26,009	$26,009	$150,000
Gunter	6	9	12	15	18	22	$927	$714	$596	$523	$479	$430	$5,559	$6,425	$7,146	$7,851	$8,619	$9,454	$0
Hackberry	42	78	113	157	203	258	$510	$383	$343	$309	$286	$265	$21,410	$29,900	$38,790	$48,476	$58,000	$68,422	$8,560
Haltom City	45	62	80	98	115	133	$556	$403	$313	$255	$217	$188	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$150,000
Haslet	53	89	140	176	210	228	$140	$111	$100	$98	$89	$82	$7,411	$9,905	$14,013	$17,267	$18,670	$18,670	$8,560
Heath	80	150	517	588	546	535	$449	$309	$151	$135	$126	$129	$35,905	$46,343	$77,967	$79,522	$68,968	$68,968	$150,000
High Point WSC	89	278	450	623	799	991	$871	$439	$332	$298	$281	$270	$77,523	$121,984	$149,032	$185,832	$224,649	$267,178	$158,560
Highland Park	76	111	124	138	152	166	$337	$231	$207	$186	$169	$154	$25,624	$25,624	$25,624	$25,624	$25,624	$25,624	$0
Highland Village	67	104	119	132	145	158	$642	$440	$388	$350	$319	$292	$43,031	$45,751	$46,213	$46,213	$46,213	$46,213	$0
Honey Grove	5	8	9	10	11	12	$1,026	$657	$584	$525	$478	$438	$5,129	$5,254	$5,254	$5,254	$5,254	$5,254	$0
Horseshoe Bend Water System	4	5	8	11	17	24	$957	$858	$669	$632	$550	$507	$3,828	$4,290	$5,352	$6,953	$9,354	$12,166	$0
Howe	8	13	18	22	27	34	$1,663	$1,222	$1,003	$918	$835	$738	$13,304	$15,890	$18,057	$20,204	$22,540	$25,080	$0
Hudson Oaks	45	65	73	82	93	103	$395	$283	$250	$230	$211	$197	$17,777	$18,370	$18,254	$18,846	$19,633	$20,247	$8,560
Hurst	57	79	103	125	148	171	$379	$273	$210	$173	$146	$127	$21,592	$21,558	$21,588	$21,611	$21,645	$21,645	$150,000
Hutchins	24	35	44	54	62	73	$508	$386	$309	$259	$233	$204	$12,193	$13,511	$13,610	$14,011	$14,435	$14,901	$8,560
Irving	500	928	1,051	1,219	1,410	1,608	$160	$102	$80	$69	$60	$52	$80,224	$94,498	$83,992	$84,042	$84,092	$84,092	$150,000
Italy	5	7	7	8	9	10	$1,111	$795	$796	$693	$613	$549	$5,556	$5,564	$5,570	$5,540	$5,513	$5,491	$0
Jacksboro	15	21	24	28	33	38	$693	$487	$439	$393	$360	$322	$10,388	$10,233	$10,541	$11,003	$11,872	$12,220	$0
Josephine	11	36	68	90	287	317	$565	$394	$302	$253	$152	$137	$6,400	$14,013	$20,474	$22,749	$43,539	$43,577	$161,534
Justin	23	45	72	113	371	668	$966	$685	$567	$491	$255	$177	$22,229	$30,806	$40,805	$55,526	$94,581	$118,292	$158,560

TABLE H.11C CONSERVATION SAVINGS AND COSTS FOR MUNICIPAL WATER USE REDUCTION STRATEGIES

ENTITY NAME	SAVINGS VOLUMES IN ACRE-FEET PER YEAR						UNIT COSTS IN DOLLARS PER ACRE-FOOT						ANNUAL COSTS IN DOLLARS						CAPITAL COST
	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	
Kaufman	10	16	30	47	66	203	$526	$370	$275	$216	$181	$157	$5,259	$5,926	$8,256	$10,160	$11,940	$31,934	$150,000
Kaufman County Development District 1	17	26	46	78	132	171	$632	$493	$428	$389	$375	$341	$10,737	$12,822	$19,688	$30,358	$49,535	$58,379	$0
Kaufman County MUD 11	14	24	34	47	66	84	$1,015	$697	$607	$553	$491	$480	$14,213	$16,730	$20,643	$26,005	$32,374	$40,309	$8,560
Kaufman County MUD 14	45	59	65	71	77	82	$499	$380	$336	$308	$284	$266	$22,440	$22,440	$21,838	$21,838	$21,838	$21,838	$8,560
Keller	107	174	206	244	285	327	$236	$208	$124	$104	$90	$78	$25,283	$36,048	$25,494	$25,494	$25,494	$25,494	$150,000
Kemp	5	8	9	10	12	14	$933	$603	$559	$521	$453	$406	$4,663	$4,827	$5,028	$5,213	$5,434	$5,687	$0
Kennedale	30	58	88	299	455	525	$410	$296	$243	$152	$113	$88	$12,294	$17,162	$21,408	$45,347	$51,450	$46,324	$158,560
Kentuckytown WSC	6	11	12	15	17	20	$1,345	$802	$787	$667	$625	$565	$8,072	$8,823	$9,446	$10,007	$10,625	$11,303	$0
Kerens	4	4	4	5	4	4	$1,069	$994	$925	$689	$802	$746	$4,277	$3,977	$3,700	$3,444	$3,207	$2,985	$0
Krum	29	56	88	135	382	624	$787	$539	$446	$434	$249	$189	$22,834	$30,164	$39,263	$58,547	$95,179	$117,727	$158,560
Ladonia	2	4	6	10	14	16	$1,161	$715	$669	$579	$506	$443	$2,322	$2,859	$4,015	$5,793	$7,083	$7,083	$0
Lake Cities Municipal Utility Authority	61	202	241	241	245	250	$959	$437	$377	$337	$333	$326	$58,522	$88,072	$90,891	$81,149	$81,635	$81,635	$158,560
Lake Kiowa SUD	22	33	36	41	46	50	$405	$284	$248	$220	$198	$184	$8,908	$9,357	$8,942	$9,021	$9,110	$9,206	$8,560
Lake Worth	14	21	28	34	42	48	$479	$347	$253	$219	$185	$168	$6,711	$7,282	$7,086	$7,433	$7,772	$8,073	$8,560
Lakeside	15	21	23	25	27	29	$498	$356	$298	$275	$254	$237	$7,466	$7,466	$6,864	$6,864	$6,864	$6,864	$8,560
Lancaster	269	352	391	421	455	492	$202	$193	$150	$142	$133	$125	$54,266	$67,780	$58,790	$59,692	$60,605	$61,571	$150,000
Lancaster MUD 1	7	12	16	17	19	22	$1,129	$884	$689	$685	$648	$593	$7,903	$10,612	$11,031	$11,642	$12,314	$13,057	$8,560
Leonard	7	11	15	19	25	32	$1,128	$772	$668	$615	$556	$519	$7,897	$8,496	$10,023	$11,676	$13,889	$16,611	$0
Lewisville	686	816	1,011	1,070	1,157	1,205	$119	$113	$86	$82	$77	$74	$81,654	$92,640	$86,888	$87,896	$89,363	$89,363	$150,000
Lindsay	4	5	6	7	8	8	$1,239	$1,013	$853	$731	$639	$639	$4,955	$5,063	$5,115	$5,115	$5,112	$5,112	$0
Little Elm	50	65	110	142	163	172	$457	$341	$209	$167	$148	$141	$22,871	$22,140	$23,027	$23,766	$24,250	$24,250	$150,000
Log Cabin	2	3	4	5	5	7	$1,007	$671	$588	$477	$484	$352	$2,013	$2,013	$2,352	$2,385	$2,422	$2,462	$0
Lucas	27	43	57	69	82	94	$286	$202	$156	$129	$108	$95	$7,735	$8,696	$8,883	$8,883	$8,883	$8,883	$0
Luella SUD	5	7	8	9	10	10	$1,535	$1,096	$959	$853	$767	$767	$7,674	$7,674	$7,674	$7,674	$7,674	$7,674	$0
M E N WSC	10	16	20	24	29	34	$1,044	$750	$665	$608	$551	$515	$10,437	$12,002	$13,295	$14,583	$15,988	$17,520	$0
Mabank	50	73	83	91	99	111	$717	$520	$459	$427	$396	$361	$35,577	$37,730	$38,214	$38,760	$39,426	$40,199	$8,493
Malakoff	5	8	9	10	11	12	$1,371	$907	$844	$770	$710	$660	$6,855	$7,252	$7,598	$7,701	$7,807	$7,925	$0
Mansfield	1,045	1,447	2,313	4,067	3,569	3,437	$76	$66	$43	$33	$38	$40	$79,118	$94,989	$100,091	$134,014	$135,965	$138,146	$146,708
Markout WSC	10	16	26	41	60	91	$833	$615	$590	$536	$487	$427	$8,330	$9,844	$15,341	$21,974	$29,225	$38,876	$0
McKinney	407	1,287	2,521	3,714	3,018	2,825	$168	$68	$37	$30	$37	$39	$68,249	$87,526	$92,689	$111,223	$111,223	$111,223	$150,000
Melissa	80	491	789	1,007	1,000	865	$284	$80	$44	$39	$42	$49	$22,690	$39,374	$34,420	$39,720	$42,268	$42,268	$150,000
Mesquite	200	342	580	833	1,090	1,295	$270	$194	$104	$79	$66	$59	$54,020	$66,315	$60,502	$65,883	$71,526	$76,336	$150,000
Midlothian	357	557	742	902	1,068	1,198	$278	$216	$170	$155	$143	$135	$99,072	$120,321	$126,171	$140,094	$152,529	$162,298	$150,000
Milligan WSC	3	5	7	10	14	18	$784	$494	$412	$335	$277	$239	$2,351	$2,468	$2,885	$3,352	$3,876	$4,310	$0
Mount Zion WSC	3	5	6	8	10	12	$495	$306	$264	$204	$168	$145	$1,484	$1,531	$1,584	$1,631	$1,684	$1,745	$0
Mountain Peak SUD	374	765	1,059	1,344	1,669	2,047	$231	$162	$128	$119	$111	$102	$86,537	$124,118	$135,865	$159,459	$184,471	$209,060	$150,465
Mountain Springs WSC	6	9	10	11	13	14	$954	$644	$587	$536	$455	$424	$5,725	$5,798	$5,872	$5,891	$5,910	$5,932	$0
Muenster	6	9	11	12	13	14	$1,017	$678	$555	$508	$469	$436	$6,101	$6,101	$6,101	$6,101	$6,101	$6,101	$0
Murphy	210	258	339	417	492	541	$138	$156	$94	$84	$77	$74	$29,073	$40,203	$31,974	$34,971	$38,031	$40,278	$158,560
Mustang SUD	930	2,183	3,183	4,046	4,626	5,124	$300	$176	$151	$143	$142	$141	$278,563	$384,881	$479,425	$577,837	$656,657	$724,457	$167,119
Nash Forreston WSC	5	8	10	14	19	23	$1,463	$1,075	$940	$772	$723	$680	$7,316	$8,603	$9,403	$10,810	$13,738	$15,640	$8,560
Navarro Mills WSC	5	8	10	12	13	16	$1,588	$1,063	$897	$782	$756	$645	$7,993	$8,557	$9,025	$9,433	$9,880	$10,375	$0
Nevada SUD	5	9	16	94	261	321	$804	$565	$485	$288	$136	$95	$4,020	$5,081	$7,759	$27,041	$35,547	$30,609	$150,000
Newark	2	4	7	12	19	26	$1,824	$1,139	$924	$777	$723	$671	$3,648	$4,554	$6,468	$9,324	$13,728	$17,455	$0
North Collin SUD	10	15	26	39	52	68	$845	$630	$439	$359	$313	$277	$8,446	$9,455	$11,409	$14,008	$16,265	$18,842	$8,560
North Farmersville WSC	1	3	5	6	7	8	$1,395	$550	$429	$417	$404	$372	$1,395	$1,650	$2,145	$2,502	$2,826	$2,976	$0
North Kaufman WSC	4	8	12	17	22	31	$2,416	$1,578	$1,366	$1,217	$1,155	$983	$9,664	$12,623	$16,393	$20,681	$25,407	$30,488	$0
North Richland Hills	116	236	274	317	374	408	$280	$188	$125	$109	$93	$86	$32,530	$44,463	$34,263	$34,543	$34,950	$34,950	$150,000
Northlake	191	315	516	646	767	830	$144	$135	$74	$68	$65	$64	$27,572	$42,516	$38,364	$43,928	$49,552	$53,518	$150,000
Northwest Grayson County WCID 1	4	5	7	8	11	12	$1,452	$1,289	$996	$933	$728	$716	$5,809	$6,444	$6,972	$7,464	$8,003	$8,591	$0
Oak Ridge South Gale WSC	5	7	7	8	9	10	$1,586	$1,158	$1,178	$1,036	$927	$841	$7,930	$8,104	$8,246	$8,287	$8,341	$8,412	$0
Ovilla	19	33	48	66	90	120	$430	$306	$241	$208	$187	$174	$8,178	$10,096	$11,579	$13,697	$16,850	$20,860	$8,560
Palmer	6	10	13	16	21	27	$1,449	$1,026	$874	$817	$712	$701	$8,692	$10,260	$11,356	$13,065	$14,947	$18,925	$8,560
Paloma Creek North	49	61	65	69	73	77	$427	$343	$312	$294	$278	$264	$20,911	$20,911	$20,309	$20,309	$20,309	$20,309	$8,560
Paloma Creek South	59	77	83	89	96	102	$542	$415	$378	$353	$327	$308	$31,981	$31,981	$31,379	$31,379	$31,379	$31,379	$8,560
Pantego	12	17	20	22	24	26	$625	$441	$375	$341	$313	$288	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$0
Parker	34	56	101	145	165	185	$211	$163	$142	$132	$116	$103	$7,157	$9,120	$14,309	$19,079	$19,079	$19,079	$0
Parker County SUD	18	36	56	174	299	420	$1,602	$1,075	$903	$491	$391	$321	$28,837	$38,694	$50,550	$85,204	$116,956	$135,174	$158,560
Pelican Bay	4	7	12	17	25	36	$2,083	$1,582	$1,385	$1,306	$1,187	$1,081	$8,330	$11,077	$16,622	$22,195	$29,669	$38,920	$0
Pilot Point	16	30	59	204	247	235	$1,098	$849	$725	$385	$337	$311	$17,575	$25,470	$42,753	$78,524	$83,407	$72,853	$150,000
Pink Hill WSC	5	7	9	10	13	14	$1,259	$992	$832	$799	$656	$652	$6,294	$6,945	$7,486	$7,987	$8,534	$9,133	$0
Plano	605	884	1,763	1,971	2,017	2,179	$133	$103	$49	$45	$44	$41	$80,463	$91,411	$86,933	$88,917	$88,917	$88,917	$150,000
Pleasant Grove WSC	2	4	5	5	6	6	$2,106	$1,131	$987	$967	$787	$767	$4,211	$4,524	$4,936	$4,835	$4,723	$4,601	$0
Point Enterprise WSC	3	5	5	6	6	6	$1,263	$834	$823	$617	$617	$617	$3,941	$3,873	$3,780	$3,736	$3,671	$3,605	$0
Ponder	16	30	43	57	76	99	$1,081	$760	$651	$594	$530	$481	$17,299	$22,792	$27,975	$33,854	$40,318	$47,613	$8,560
Pottsboro	11	18	22	26	30	33	$919	$688	$601	$537	$492	$475	$10,113	$12,376	$13,212	$13,950	$14,763	$15,660	$0
Princeton	228	971	1,292	1,326	1,392	1,311	$337	$164	$151	$163	$169	$179	$76,854	$159,160	$195,451	$216,756	$234,834	$234,834	$166,682

TABLE H.11C CONSERVATION SAVINGS AND COSTS FOR MUNICIPAL WATER USE REDUCTION STRATEGIES

ENTITY NAME	SAVINGS VOLUMES IN ACRE-FEET PER YEAR						UNIT COSTS IN DOLLARS PER ACRE-FOOT						ANNUAL COSTS IN DOLLARS						CAPITAL COST
	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	
Prosper	120	479	808	727	782	704	$219	$82	$40	$45	$43	$48	$26,319	$39,328	$31,937	$32,719	$33,858	$33,858	$150,000
Providence Village WCID	25	33	36	39	42	45	$1,026	$777	$695	$642	$596	$556	$25,639	$25,639	$25,037	$25,037	$25,037	$25,037	$8,560
R C H WSC	23	37	54	83	113	149	$797	$560	$527	$464	$417	$378	$18,342	$20,717	$28,477	$38,492	$47,115	$56,369	$8,560
Red Oak	27	46	64	198	283	340	$501	$376	$318	$211	$165	$121	$13,531	$17,281	$20,344	$41,798	$46,712	$41,057	$158,560
Reno (Parker)	5	9	12	17	21	26	$2,382	$1,602	$1,437	$1,190	$1,119	$1,042	$11,910	$14,420	$17,245	$20,224	$23,498	$27,103	$0
Rhome	7	13	22	36	58	88	$930	$641	$553	$549	$499	$438	$6,512	$8,330	$12,166	$19,753	$28,948	$38,533	$0
Rice Water Supply and Sewer Service	22	38	52	66	83	189	$1,369	$946	$800	$728	$662	$429	$30,121	$35,943	$41,612	$48,027	$54,974	$81,246	$158,560
Richardson	242	430	643	746	788	864	$173	$125	$70	$62	$59	$54	$41,879	$53,763	$45,267	$46,250	$46,250	$46,250	$150,000
Richland Hills	10	18	27	36	45	56	$661	$438	$334	$274	$244	$211	$6,614	$7,890	$9,025	$9,876	$10,964	$11,803	$0
River Oaks	16	23	27	30	33	36	$1,392	$965	$828	$749	$686	$629	$22,265	$22,200	$22,344	$22,461	$22,627	$22,627	$0
Roanoke	71	90	105	120	136	149	$230	$196	$165	$146	$131	$120	$16,339	$17,650	$17,322	$17,539	$17,856	$17,856	$8,560
Rockett SUD	202	349	462	555	714	828	$613	$439	$351	$323	$287	$273	$123,769	$153,202	$162,281	$179,040	$205,268	$226,541	$163,137
Rockwall	84	338	692	1,093	910	778	$313	$118	$51	$39	$48	$56	$26,269	$39,944	$34,998	$42,519	$43,674	$43,674	$150,000
Rose Hill SUD	3	5	9	12	16	20	$1,150	$831	$544	$468	$387	$342	$3,450	$4,153	$4,893	$5,617	$6,198	$6,840	$0
Rowlett	97	185	378	418	456	447	$330	$235	$96	$90	$85	$87	$31,969	$43,538	$36,295	$37,718	$38,774	$38,774	$150,000
Royse City	270	1,019	1,333	1,323	1,470	1,370	$237	$119	$106	$116	$116	$125	$64,177	$121,718	$141,405	$153,813	$170,521	$170,719	$165,980
Runaway Bay	13	25	32	45	59	80	$465	$294	$280	$243	$226	$204	$6,047	$7,356	$8,960	$10,929	$13,344	$16,306	$0
Sachse	44	96	174	184	195	194	$394	$298	$113	$110	$106	$107	$17,315	$28,653	$19,686	$20,281	$20,673	$20,673	$150,000
Saginaw	33	72	79	89	102	114	$529	$403	$237	$211	$185	$165	$17,469	$29,134	$18,688	$18,773	$18,898	$18,898	$150,000
Sanger	28	51	69	118	188	254	$1,078	$722	$635	$561	$412	$307	$30,190	$36,838	$43,833	$66,332	$77,454	$77,904	$150,000
Sansom Park	13	20	24	28	32	38	$1,506	$1,079	$942	$854	$791	$707	$19,580	$21,575	$22,619	$23,904	$25,322	$26,881	$8,560
Sardis Lone Elm WSC	255	506	678	673	643	642	$296	$201	$154	$160	$168	$168	$75,363	$101,903	$104,394	$107,935	$107,935	$107,935	$158,560
Savoy	1	3	3	3	4	4	$2,133	$704	$706	$698	$517	$509	$2,133	$2,112	$2,118	$2,094	$2,067	$2,034	$0
Seagoville	86	116	130	142	152	166	$416	$427	$308	$291	$278	$261	$35,739	$49,587	$40,182	$41,212	$42,282	$43,366	$158,560
Seis Lagos UD	5	7	10	12	16	18	$333	$231	$169	$146	$112	$100	$1,667	$1,614	$1,691	$1,757	$1,795	$1,799	$0
Sherman	517	750	854	948	1,054	1,172	$248	$196	$167	$155	$145	$136	$127,985	$147,089	$142,340	$147,439	$153,058	$159,248	$150,000
South Ellis County WSC	11	19	24	30	39	48	$403	$277	$257	$235	$206	$190	$4,432	$5,268	$6,161	$7,062	$8,050	$9,141	$0
South Freestone County WSC	5	7	9	9	9	10	$1,470	$1,097	$902	$877	$850	$738	$7,350	$7,682	$8,118	$7,897	$7,650	$7,377	$0
South Grayson SUD	12	21	26	31	39	47	$1,431	$944	$839	$785	$694	$641	$17,172	$19,826	$21,815	$24,321	$27,077	$30,110	$8,560
Southern Oaks Water Supply	4	6	10	11	12	13	$852	$698	$496	$459	$428	$401	$3,409	$4,189	$4,960	$5,046	$5,130	$5,219	$8,560
Southlake	122	379	472	546	628	709	$161	$84	$47	$42	$38	$35	$19,681	$31,849	$22,293	$23,179	$24,067	$24,900	$150,000
Southmayd	2	3	3	3	4	4	$1,446	$992	$1,014	$1,024	$777	$788	$2,892	$2,976	$3,041	$3,071	$3,106	$3,150	$0
Southwest Fannin County SUD	15	25	29	35	42	48	$1,545	$1,151	$1,043	$909	$803	$731	$23,180	$28,785	$30,247	$31,809	$33,711	$35,083	$0
Springtown	22	42	70	96	122	146	$685	$537	$458	$409	$368	$337	$15,076	$22,536	$32,064	$39,262	$44,855	$49,166	$0
Starr WSC	4	7	8	10	11	12	$1,652	$1,025	$956	$807	$776	$753	$6,607	$7,173	$7,650	$8,069	$8,532	$9,041	$0
Sunnyvale	25	44	67	85	103	119	$250	$175	$134	$109	$91	$79	$6,238	$7,702	$8,945	$9,284	$9,407	$9,407	$0
Talty SUD	35	57	96	376	696	771	$929	$628	$530	$236	$156	$144	$32,519	$35,823	$50,833	$88,668	$108,814	$111,151	$150,000
Teague	11	13	14	15	15	16	$876	$679	$552	$499	$480	$432	$9,634	$8,831	$7,731	$7,481	$7,206	$6,906	$0
Terra Southwest	6	10	14	19	22	29	$1,756	$1,316	$1,216	$1,061	$1,073	$944	$10,536	$13,157	$17,029	$20,154	$23,597	$27,389	$8,560
Terrell	146	223	324	399	507	583	$166	$168	$97	$89	$81	$77	$24,250	$37,397	$31,499	$35,598	$41,007	$44,761	$150,000
The Colony	280	481	588	561	564	583	$219	$167	$131	$137	$136	$132	$61,422	$80,532	$76,720	$76,720	$76,720	$76,720	$150,000
Tioga	5	8	9	12	15	18	$1,021	$751	$753	$627	$556	$513	$5,104	$6,011	$6,773	$7,524	$8,338	$9,228	$0
Tom Bean	4	5	6	7	7	8	$827	$662	$551	$473	$473	$414	$3,308	$3,308	$3,308	$3,308	$3,308	$3,308	$0
Trenton	2	4	5	5	6	6	$1,197	$643	$533	$548	$470	$485	$2,394	$2,571	$2,667	$2,739	$2,820	$2,910	$0
Trinidad	3	4	5	5	6	8	$1,122	$854	$704	$716	$607	$464	$3,365	$3,414	$3,520	$3,580	$3,642	$3,711	$0
Trophy Club MUD 1	45	64	84	103	124	145	$208	$149	$115	$95	$80	$69	$9,352	$9,520	$9,659	$9,774	$9,900	$10,037	$0
Two Way SUD	15	24	31	37	45	51	$1,116	$831	$764	$699	$637	$596	$16,739	$19,940	$23,685	$25,857	$28,668	$30,420	$0
University Park	138	200	225	250	275	300	$460	$317	$282	$254	$231	$212	$63,484	$63,484	$63,484	$63,484	$63,484	$63,484	$150,000
Van Alstyne	17	52	137	208	285	331	$1,361	$933	$549	$471	$423	$415	$23,139	$48,514	$75,243	$97,957	$120,663	$137,426	$0
Verona SUD	8	15	21	28	36	45	$1,173	$784	$689	$691	$631	$587	$9,384	$11,757	$14,461	$19,344	$22,714	$26,428	$0
Walnut Creek SUD	174	253	447	760	1,104	1,421	$457	$376	$268	$216	$190	$179	$79,492	$95,108	$119,904	$164,321	$209,450	$254,110	$158,560
Watauga	23	32	41	50	59	68	$667	$480	$374	$307	$260	$226	$15,348	$15,348	$15,348	$15,348	$15,348	$15,348	$150,000
Waxahachie	393	700	924	1,137	1,378	1,649	$291	$202	$160	$145	$133	$123	$114,529	$141,284	$147,466	$164,377	$182,980	$203,450	$150,000
Weatherford	150	375	534	678	834	1,009	$621	$306	$214	$184	$163	$147	$93,115	$114,751	$114,123	$124,543	$136,019	$148,660	$150,000
West Cedar Creek MUD	21	28	35	39	43	49	$784	$556	$474	$431	$397	$353	$16,468	$15,556	$16,585	$16,816	$17,055	$17,307	$8,560
West Leonard WSC	5	9	12	14	17	20	$1,281	$854	$703	$657	$590	$547	$6,516	$7,799	$8,565	$9,345	$10,181	$11,119	$0
West Wise SUD	9	15	17	20	24	26	$1,255	$824	$783	$702	$618	$605	$11,295	$12,359	$13,315	$14,041	$14,839	$15,718	$0
Westlake	77	123	165	209	259	320	$50	$39	$30	$27	$25	$23	$3,817	$4,794	$5,007	$5,676	$6,409	$7,215	$8,560
Westminster SUD	7	13	20	26	33	41	$883	$589	$524	$476	$439	$409	$6,180	$7,655	$10,489	$12,382	$14,471	$16,766	$0
Westover Hills	21	25	28	31	34	38	$64	$54	$27	$24	$22	$20	$1,346	$1,344	$745	$747	$751	$751	$8,560
Westworth Village	5	7	10	13	15	17	$779	$567	$358	$289	$263	$241	$3,896	$3,972	$3,579	$3,761	$3,939	$4,101	$8,560
White Settlement	85	117	136	154	174	195	$236	$278	$173	$161	$149	$139	$20,036	$32,567	$23,645	$24,797	$25,885	$27,085	$150,000
White Shed WSC	5	7	8	9	10	12	$1,332	$996	$895	$809	$741	$629	$6,659	$6,974	$7,160	$7,277	$7,405	$7,546	$0
Whitesboro	11	16	20	23	27	32	$1,225	$916	$782	$717	$647	$579	$13,472	$14,651	$15,637	$16,502	$17,458	$18,514	$0
Whitewright	7	12	15	17	20	24	$933	$595	$508	$473	$426	$377	$6,533	$7,135	$7,614	$8,047	$8,515	$9,038	$0
Willow Park	23	40	56	74	94	117	$1,118	$768	$640	$568	$512	$468	$25,703	$30,723	$35,838	$42,024	$48,083	$54,724	$8,560
Wilmer	16	25	30	34	40	46	$1,151	$831	$734	$670	$590	$533	$18,410	$20,775	$22,032	$22,778	$23,599	$24,503	$0
Woodbine WSC	13	20	22	25	28	30	$1,475	$996	$920	$814	$730	$686	$19,181	$19,910	$20,240	$20,341	$20,447	$20,567	$0

TABLE H.11C CONSERVATION SAVINGS AND COSTS FOR MUNICIPAL WATER USE REDUCTION STRATEGIES

ENTITY NAME	SAVINGS VOLUMES IN ACRE-FEET PER YEAR						UNIT COSTS IN DOLLARS PER ACRE-FOOT						ANNUAL COSTS IN DOLLARS						CAPITAL COST
	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	
Wortham	2	3	3	3	4	4	$1,388	$841	$724	$700	$505	$483	$2,775	$2,523	$2,172	$2,100	$2,019	$1,932	$0
Wylie	58	80	130	161	173	190	$414	$298	$189	$156	$145	$132	$24,017	$23,828	$24,668	$25,147	$25,147	$25,147	$150,000
Wylie Northeast SUD	37	60	192	239	236	232	$613	$481	$279	$236	$198	$202	$22,689	$28,840	$53,469	$56,396	$46,831	$46,831	$158,560
TOTAL	***39,879***	***70,968***	***93,390***	***111,865***	***129,006***	***144,587***	***$212***	***$149***	***$123***	***$116***	***$112***	***$107***	***$8,449,806***	***$10,591,345***	***$11,502,946***	***$12,961,228***	***$14,398,907***	***$15,537,209***	***$17,452,829***
Note: Savings presented above represent total savings for WUG as a whole, regardless of regional splits. The capital cost presented here reflects the adoption of the new ordinances, which does not require loan services.																			

TABLE H.11D CONSERVATION SAVINGS AND COSTS FOR WATER LOSS MITIGATION STRATEGIES

ENTITY NAME	SAVINGS VOLUMES IN ACRE-FEET PER YEAR						UNIT COSTS IN DOLLARS PER ACRE-FOOT						ANNUAL COSTS IN DOLLARS						CAPITAL COST
	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	
Ables Springs SUD	2	2	3	3	3	4	$2,424	$2,337	$300	$300	$300	$300	$5,373	$5,401	$808	$900	$1,009	$1,060	$66,908
Addison	42	92	129	134	139	144	$4,635	$2,274	$309	$309	$309	$309	$192,911	$208,351	$39,995	$41,337	$42,816	$44,441	$2,559,005
Aledo	20	64	105	119	136	146	$1,563	$727	$351	$351	$351	$351	$31,015	$46,501	$36,710	$41,907	$47,755	$51,292	$341,818
Allen	225	755	1,006	1,006	1,006	1,006	$1,588	$705	$330	$330	$330	$330	$357,747	$532,283	$331,765	$331,765	$331,765	$331,765	$4,028,644
Alvord	2	3	3	3	4	4	$8,290	$6,767	$300	$300	$300	$300	$17,077	$17,223	$894	$999	$1,113	$1,241	$233,925
AMC Creekside	1	1	1	2	2	2	$1,243	$1,055	$300	$300	$300	$300	$1,125	$1,192	$404	$467	$537	$612	$12,124
Anna	108	524	884	1,052	1,217	1,305	$853	$442	$335	$335	$335	$335	$92,194	$231,541	$296,458	$352,902	$408,015	$437,449	$795,222
Annetta	2	3	3	4	4	4	$770	$694	$300	$300	$300	$300	$1,712	$1,841	$929	$1,061	$1,193	$1,325	$14,851
Argyle WSC	13	17	23	28	32	35	$2,030	$1,638	$300	$300	$300	$300	$27,138	$28,314	$6,875	$8,496	$9,687	$10,562	$328,684
Arledge Ridge WSC	1	1	1	1	1	1	$38,486	$35,715	$300	$300	$300	$300	$44,259	$44,286	$386	$398	$411	$425	$624,127
Arlington	373	1,125	1,598	1,677	1,786	1,839	$2,662	$1,084	$300	$300	$300	$300	$993,644	$1,219,248	$479,523	$503,248	$535,727	$551,649	$12,530,661
Athens	61	217	382	460	556	614	$931	$550	$402	$402	$402	$402	$56,596	$119,516	$153,410	$185,078	$223,356	$246,733	$457,056
Aubrey	5	8	14	19	23	23	$1,866	$1,201	$300	$300	$300	$300	$8,854	$9,905	$4,250	$5,780	$6,951	$6,951	$105,604
Avalon Water Supply & Sewer Service	3	8	12	14	15	17	$1,402	$630	$300	$300	$300	$300	$3,524	$5,292	$3,732	$4,103	$4,523	$4,993	$39,375
Azle	12	14	16	18	19	21	$851	$781	$300	$300	$300	$300	$10,623	$11,167	$4,815	$5,294	$5,820	$6,399	$97,741
B And B WSC	2	2	2	2	2	2	$1,527	$1,418	$300	$300	$300	$300	$2,344	$2,389	$545	$581	$620	$663	$26,766
Balch Springs	14	15	17	18	20	21	$655	$634	$300	$300	$300	$300	$9,346	$9,614	$4,974	$5,421	$5,990	$6,287	$71,980
Bear Creek SUD	16	28	32	35	38	38	$619	$483	$300	$300	$300	$300	$9,928	$13,515	$9,602	$10,457	$11,463	$11,463	$72,737
Becker Jiba WSC	2	3	4	5	6	7	$1,417	$1,013	$300	$300	$300	$300	$2,763	$3,095	$1,242	$1,467	$1,718	$1,994	$30,956
Bedford	49	52	53	56	56	56	$510	$496	$300	$300	$300	$300	$24,835	$25,903	$15,921	$16,730	$16,730	$16,730	$145,475
Bells	1	1	1	1	1	1	$1,557	$1,460	$300	$300	$300	$300	$1,393	$1,416	$311	$329	$348	$369	$15,987
Benbrook Water Authority	54	173	248	265	283	300	$1,278	$602	$300	$300	$300	$300	$68,516	$104,456	$74,501	$79,635	$84,770	$89,905	$745,180
Black Rock WSC	2	2	3	3	4	5	$20,616	$16,501	$300	$300	$300	$300	$38,552	$38,695	$854	$1,007	$1,175	$1,361	$539,946
Blackland WSC	5	5	5	6	6	7	$4,351	$4,206	$300	$300	$300	$300	$19,926	$19,977	$1,536	$1,782	$1,919	$2,064	$263,668
Blooming Grove	1	1	1	1	1	1	$1,495	$1,454	$300	$300	$300	$300	$1,270	$1,279	$287	$306	$332	$359	$14,432
Blue Mound	1	1	1	1	1	1	$562	$539	$300	$300	$300	$300	$548	$577	$347	$366	$387	$413	$3,637
Blue Ridge	1	2	2	3	3	4	$1,567	$1,273	$300	$300	$300	$300	$2,178	$2,304	$689	$834	$995	$1,172	$25,024
Bois D Arc MUD	2	2	2	2	2	2	$4,951	$4,755	$300	$300	$300	$300	$8,526	$8,549	$555	$564	$574	$586	$113,838
Bolivar WSC	24	86	135	156	185	222	$1,353	$590	$300	$300	$300	$300	$31,959	$50,637	$40,513	$46,674	$55,415	$66,515	$353,502
Bonham	53	195	369	487	644	784	$646	$463	$393	$393	$393	$393	$34,572	$90,174	$145,027	$191,265	$253,246	$307,961	$192,591
Boyd	1	2	2	3	3	3	$974	$831	$300	$300	$300	$300	$1,169	$1,267	$626	$779	$924	$1,022	$11,500
Bridgeport	5	5	5	5	5	5	$384	$382	$300	$300	$300	$300	$1,892	$1,922	$1,544	$1,562	$1,583	$1,605	$5,864
Buena Vista-Bethel SUD	96	350	558	649	749	859	$583	$471	$429	$429	$429	$429	$56,054	$165,094	$239,067	$278,182	$321,167	$368,527	$210,548
Butler WSC	1	1	1	1	1	1	$1,495	$1,515	$300	$300	$300	$300	$1,345	$1,341	$263	$255	$246	$237	$15,281
Callisburg WSC	1	1	1	1	1	1	$1,168	$1,138	$300	$300	$300	$300	$823	$831	$224	$225	$227	$228	$8,696
Carrollton	128	135	143	152	161	161	$553	$540	$300	$300	$300	$300	$70,919	$73,004	$42,972	$45,495	$48,165	$48,350	$460,707
Cedar Hill	365	1,192	1,735	1,875	2,027	2,190	$628	$500	$443	$443	$443	$443	$229,605	$595,978	$768,897	$830,939	$898,019	$970,504	$961,901
Celina	443	2,317	5,151	5,376	6,637	8,027	$681	$475	$426	$426	$426	$426	$301,696	$1,100,528	$2,195,556	$2,291,439	$2,828,991	$3,421,592	$1,604,463
Chatfield WSC	2	2	2	2	2	2	$7,784	$7,296	$300	$300	$300	$300	$13,389	$13,425	$584	$612	$644	$678	$182,952
Chico	2	2	2	2	2	2	$758	$759	$300	$300	$300	$300	$1,500	$1,499	$593	$593	$593	$593	$12,881
Cockrell Hill	16	44	57	56	54	52	$600	$486	$423	$423	$423	$423	$9,517	$21,557	$24,081	$23,519	$22,854	$22,138	$39,883
College Mound SUD	6	7	10	15	20	26	$1,604	$1,473	$300	$300	$300	$300	$10,352	$10,568	$2,912	$4,503	$6,143	$7,781	$119,598
Colleyville	54	154	205	205	205	205	$3,721	$1,496	$300	$300	$300	$300	$200,469	$230,535	$61,639	$61,639	$61,639	$61,639	$2,619,434
Collinsville	1	2	2	2	2	2	$1,666	$1,550	$300	$300	$300	$300	$2,333	$2,372	$494	$527	$561	$599	$27,181
Combine WSC	2	2	2	2	3	3	$1,292	$1,178	$300	$300	$300	$300	$2,132	$2,196	$639	$725	$822	$927	$23,263
Community WSC	33	110	161	172	184	197	$552	$482	$453	$453	$453	$453	$18,181	$53,262	$72,710	$77,610	$83,097	$88,977	$46,707
Copeville WSC	5	7	11	12	13	15	$2,547	$1,727	$300	$300	$300	$300	$11,857	$12,659	$3,233	$3,548	$3,962	$4,377	$148,665
Coppell	57	94	126	126	126	126	$2,814	$1,823	$300	$300	$300	$300	$160,311	$171,442	$37,735	$37,822	$37,941	$37,941	$2,035,542
Corbet WSC	1	1	1	1	1	1	$12,551	$11,789	$300	$300	$300	$300	$13,242	$13,263	$357	$374	$392	$413	$183,698
Corinth	24	31	52	54	56	56	$3,893	$3,099	$300	$300	$300	$300	$95,071	$97,148	$15,610	$16,061	$16,720	$16,720	$1,247,064
Corsicana	31	33	35	37	39	40	$702	$676	$300	$300	$300	$300	$21,979	$22,613	$10,580	$11,052	$11,574	$12,147	$178,812
County-Other, Collin	3	4	5	6	7	7	$2,607	$2,047	$300	$300	$300	$300	$7,442	$7,717	$1,409	$1,688	$1,967	$2,246	$93,599
County-Other, Cooke	4	4	4	4	4	4	$2,570	$2,506	$300	$300	$300	$300	$9,804	$9,837	$1,214	$1,250	$1,296	$1,334	$123,071
County-Other, Dallas	10	14	18	22	26	31	$729	$607	$300	$300	$300	$300	$7,427	$8,648	$5,498	$6,719	$7,941	$9,162	$62,131
County-Other, Denton	31	48	66	84	110	128	$2,677	$1,809	$300	$300	$300	$300	$81,907	$87,189	$19,776	$25,091	$33,065	$38,379	$1,033,652
County-Other, Ellis	4	4	4	5	5	5	$2,535	$2,397	$300	$300	$300	$300	$9,787	$9,863	$1,316	$1,397	$1,479	$1,560	$122,636
County-Other, Fannin	2	2	2	2	3	3	$2,304	$2,294	$300	$300	$300	$300	$4,654	$4,657	$645	$687	$755	$794	$57,531
County-Other, Freestone	2	1	1	1	1	1	$2,203	$2,389	$300	$300	$300	$300	$3,592	$3,548	$381	$387	$389	$386	$44,095
County-Other, Grayson	7	6	7	7	8	8	$2,591	$2,752	$300	$300	$300	$300	$17,773	$17,638	$2,033	$2,142	$2,348	$2,384	$223,346
County-Other, Henderson	6	6	6	6	6	6	$2,964	$2,845	$300	$300	$300	$300	$17,989	$18,075	$1,900	$1,895	$1,833	$1,715	$229,796
County-Other, Jack	2	2	2	2	2	2	$2,329	$2,439	$300	$300	$300	$300	$5,659	$5,622	$644	$612	$579	$548	$70,073
County-Other, Kaufman	7	8	11	13	17	19	$2,410	$2,129	$300	$300	$300	$300	$17,596	$17,934	$3,381	$3,959	$5,087	$5,804	$218,962
County-Other, Navarro	4	4	4	5	5	5	$2,380	$2,298	$300	$300	$300	$300	$8,995	$9,041	$1,265	$1,365	$1,529	$1,626	$111,723
County-Other, Parker	44	70	103	141	187	223	$2,740	$1,833	$300	$300	$300	$300	$120,157	$127,939	$30,903	$42,162	$56,195	$66,942	$1,520,780
County-Other, Rockwall	2	2	3	3	5	6	$2,607	$3,099	$300	$300	$300	$300	$5,409	$5,299	$765	$882	$1,368	$1,709	$68,027
County-Other, Tarrant	34	49	65	81	97	112	$2,949	$2,111	$300	$300	$300	$300	$99,682	$104,374	$19,551	$24,270	$28,989	$33,708	$1,272,606
County-Other, Wise	30	46	70	96	131	156	$2,664	$1,849	$300	$300	$300	$300	$80,929	$85,727	$20,855	$28,809	$39,312	$46,758	$1,020,680

TABLE H.11D CONSERVATION SAVINGS AND COSTS FOR WATER LOSS MITIGATION STRATEGIES

ENTITY NAME	SAVINGS VOLUMES IN ACRE-FEET PER YEAR						UNIT COSTS IN DOLLARS PER ACRE-FOOT						ANNUAL COSTS IN DOLLARS						CAPITAL COST
	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	
Crandall	5	11	18	26	36	44	$569	$426	$300	$300	$300	$300	$2,821	$4,514	$5,322	$7,730	$10,916	$13,088	$18,942
Crescent Heights WSC	1	1	1	1	1	1	$3,242	$3,166	$300	$300	$300	$300	$2,432	$2,438	$257	$261	$266	$270	$31,363
Cross Timbers WSC	11	13	16	19	22	27	$629	$563	$300	$300	$300	$300	$6,612	$7,408	$4,797	$5,657	$6,677	$8,154	$49,136
Crowley	16	19	22	24	26	29	$603	$556	$300	$300	$300	$300	$9,756	$10,644	$6,494	$7,103	$7,773	$8,594	$69,707
Culleoka WSC	7	8	9	10	12	13	$1,735	$1,556	$300	$300	$300	$300	$11,414	$11,695	$2,718	$3,081	$3,468	$3,831	$134,172
Dallas	4,757	14,881	20,783	21,770	22,814	23,914	$834	$557	$427	$427	$427	$427	$3,968,730	$8,292,375	$8,875,653	$9,297,238	$9,743,238	$10,213,047	$27,530,184
Dalworthington Gardens	5	5	5	5	5	5	$573	$571	$300	$300	$300	$300	$2,583	$2,593	$1,373	$1,373	$1,376	$1,379	$17,502
Dawson	1	1	1	1	1	1	$3,334	$3,311	$300	$300	$300	$300	$2,233	$2,235	$206	$204	$204	$203	$28,886
Decatur	14	17	23	28	36	42	$2,091	$1,811	$300	$300	$300	$300	$30,216	$31,020	$6,932	$8,546	$10,818	$12,542	$367,835
Denison	59	75	90	104	124	134	$534	$484	$300	$300	$300	$300	$31,651	$36,476	$26,954	$31,344	$37,068	$40,245	$196,997
Denton	158	544	899	1,068	1,278	1,483	$3,267	$1,161	$300	$300	$300	$300	$515,813	$631,769	$269,637	$320,402	$383,348	$444,889	$6,657,856
Denton County FWSD 1-A	20	27	29	29	30	30	$1,927	$1,510	$300	$300	$300	$300	$38,329	$40,382	$8,576	$8,691	$8,861	$8,861	$459,918
Denton County FWSD 10	6	6	6	6	6	6	$812	$813	$300	$300	$300	$300	$4,701	$4,697	$1,733	$1,733	$1,733	$1,733	$42,127
Denton County FWSD 11-C	2	3	4	5	6	8	$1,613	$1,138	$300	$300	$300	$300	$2,928	$3,237	$1,179	$1,509	$1,872	$2,273	$33,873
Denton County FWSD 7	16	17	17	17	17	17	$2,138	$2,043	$300	$300	$300	$300	$34,141	$34,401	$5,051	$5,051	$5,051	$5,051	$417,139
Desert WSC	6	21	30	32	34	36	$1,279	$607	$316	$316	$316	$316	$8,181	$12,853	$9,546	$10,140	$10,760	$11,461	$87,521
Desoto	50	54	55	56	58	59	$1,842	$1,751	$300	$300	$300	$300	$92,968	$93,922	$16,632	$16,943	$17,285	$17,663	$1,106,128
Dogwood Estates Water	1	1	1	1	1	1	$1,392	$1,424	$300	$300	$300	$300	$1,218	$1,210	$272	$275	$278	$281	$13,577
Dorchester	15	45	62	62	63	64	$565	$475	$432	$432	$432	$432	$8,328	$21,595	$26,649	$26,878	$27,223	$27,568	$27,756
Duncanville	135	423	579	581	581	581	$783	$530	$411	$411	$411	$411	$105,503	$224,171	$238,327	$239,062	$239,062	$239,062	$711,395
East Cedar Creek FWSD	31	99	133	136	139	142	$3,129	$1,191	$300	$300	$300	$300	$97,281	$117,556	$39,782	$40,665	$41,631	$42,712	$1,250,029
East Fork SUD	15	17	21	24	26	29	$649	$594	$300	$300	$300	$300	$9,544	$10,370	$6,215	$7,071	$7,809	$8,628	$72,965
East Garrett WSC	17	64	105	125	147	171	$577	$462	$421	$421	$421	$421	$9,699	$29,563	$44,207	$52,581	$61,832	$72,056	$37,169
Edgecliff	3	3	3	3	3	3	$1,567	$1,571	$300	$300	$300	$300	$4,982	$4,979	$951	$951	$951	$951	$57,250
Elmo WSC	1	1	1	2	2	2	$2,274	$1,997	$300	$300	$300	$300	$2,161	$2,207	$395	$464	$540	$624	$26,659
Ennis	103	323	453	473	496	521	$652	$500	$428	$428	$428	$428	$67,204	$161,567	$194,160	$202,700	$212,380	$223,198	$327,807
Euless	49	49	49	49	49	49	$2,361	$2,370	$300	$300	$300	$300	$116,179	$116,120	$14,702	$14,702	$14,702	$14,702	$1,441,405
Eustace	2	2	2	2	2	2	$1,417	$1,325	$300	$300	$300	$300	$2,281	$2,325	$516	$534	$552	$573	$25,558
Everman	3	3	3	3	3	3	$853	$857	$300	$300	$300	$300	$2,319	$2,313	$810	$810	$810	$810	$21,367
Fairfield	5	5	5	4	4	4	$1,613	$1,659	$300	$300	$300	$300	$8,122	$8,071	$1,416	$1,325	$1,233	$1,143	$93,968
Fairview	112	423	693	693	693	693	$723	$513	$438	$438	$438	$438	$80,856	$217,411	$303,812	$303,812	$303,812	$303,812	$452,504
Farmers Branch	53	58	60	62	63	65	$526	$508	$300	$300	$300	$300	$27,905	$29,306	$18,075	$18,528	$19,025	$19,574	$170,576
Farmersville	4	26	69	78	89	98	$4,732	$902	$300	$300	$300	$300	$16,712	$23,457	$20,618	$23,461	$26,561	$29,339	$222,462
Fate	22	32	44	56	70	85	$502	$440	$300	$300	$300	$300	$11,112	$14,037	$13,128	$16,898	$21,038	$25,592	$63,569
Ferris	36	113	159	168	177	188	$462	$449	$444	$444	$444	$444	$16,432	$50,664	$70,659	$74,384	$78,643	$83,300	$9,436
Flower Mound	119	148	180	180	180	180	$519	$475	$300	$300	$300	$300	$61,588	$70,502	$54,030	$54,053	$54,081	$54,081	$368,990
Forest Hill	8	9	9	10	11	11	$721	$683	$300	$300	$300	$300	$5,751	$5,991	$2,843	$3,006	$3,186	$3,384	$47,734
Forney	32	122	202	239	265	265	$1,938	$726	$300	$300	$300	$300	$61,759	$88,928	$60,633	$71,590	$79,588	$79,588	$741,846
Forney Lake WSC	15	18	18	20	20	21	$424	$408	$300	$300	$300	$300	$6,484	$7,161	$5,483	$5,958	$6,078	$6,197	$26,898
Fort Worth	2,087	7,398	10,105	10,980	11,831	12,766	$1,248	$586	$325	$325	$325	$325	$2,603,484	$4,332,113	$3,288,553	$3,573,341	$3,850,044	$4,154,417	$27,350,873
Frisco	381	867	1,161	1,161	1,161	1,161	$4,473	$2,137	$300	$300	$300	$300	$1,706,262	$1,851,781	$348,365	$348,365	$348,365	$348,365	$22,623,608
Frognot WSC	1	1	2	2	2	3	$11,314	$9,136	$300	$300	$300	$300	$12,056	$12,135	$489	$579	$677	$788	$166,806
Gainesville	14	14	14	15	16	17	$1,024	$1,005	$300	$300	$300	$300	$14,027	$14,134	$4,277	$4,472	$4,826	$5,175	$140,928
Garland	204	219	229	236	238	238	$2,168	$2,037	$300	$300	$300	$300	$442,434	$447,042	$68,724	$70,842	$71,265	$71,265	$5,417,989
Gastonia Scurry SUD	7	8	11	19	28	34	$1,557	$1,379	$300	$300	$300	$300	$11,135	$11,489	$3,353	$5,645	$8,355	$10,257	$127,769
Glenn Heights	67	234	352	389	429	474	$570	$462	$419	$419	$419	$419	$38,197	$108,073	$147,322	$162,842	$179,824	$198,552	$143,628
Grand Prairie	524	1,754	2,627	2,702	2,805	2,805	$793	$471	$333	$333	$333	$333	$415,911	$825,096	$874,621	$899,509	$933,653	$933,653	$3,429,553
Grapevine	94	93	93	93	93	93	$485	$486	$300	$300	$300	$300	$45,457	$45,379	$28,037	$28,037	$28,037	$28,037	$246,473
Gunter	2	2	2	2	2	3	$2,181	$1,921	$300	$300	$300	$300	$3,326	$3,400	$593	$654	$720	$792	$40,772
Hackberry	7	10	13	16	20	24	$1,995	$1,501	$300	$300	$300	$300	$14,313	$15,198	$3,972	$4,923	$5,972	$7,125	$172,830
Haltom City	27	27	27	27	27	27	$1,527	$1,534	$300	$300	$300	$300	$40,730	$40,682	$7,955	$7,955	$7,955	$7,955	$465,129
Haslet	13	18	23	25	27	27	$9,230	$6,843	$300	$300	$300	$300	$118,794	$120,203	$6,944	$7,556	$8,235	$8,235	$1,633,475
Heath	32	125	222	227	227	227	$2,605	$916	$349	$349	$349	$349	$82,121	$114,921	$77,477	$79,382	$79,382	$79,382	$1,010,686
High Point WSC	9	14	21	28	36	45	$961	$732	$300	$300	$300	$300	$8,984	$10,472	$6,206	$8,390	$10,788	$13,422	$87,817
Highland Park	21	21	21	21	21	21	$2,135	$2,137	$300	$300	$300	$300	$44,227	$44,220	$6,209	$6,209	$6,209	$6,209	$540,235
Highland Village	18	20	27	27	27	27	$4,269	$3,898	$300	$300	$300	$300	$78,271	$78,838	$8,179	$8,179	$8,179	$8,179	$1,034,241
Honey Grove	21	64	85	85	85	85	$505	$474	$458	$458	$458	$458	$10,530	$30,259	$39,046	$39,046	$39,046	$39,046	$13,851
Horseshoe Bend Water System	1	1	1	2	2	3	$1,495	$1,364	$300	$300	$300	$300	$1,338	$1,371	$383	$503	$684	$896	$15,197
Howe	33	117	179	200	224	249	$484	$458	$447	$447	$447	$447	$15,913	$53,755	$79,844	$89,506	$99,973	$111,379	$17,332
Hudson Oaks	9	10	10	10	11	11	$2,012	$1,957	$300	$300	$300	$300	$18,834	$18,927	$2,981	$3,080	$3,210	$3,312	$227,768
Hurst	34	34	34	34	34	34	$620	$622	$300	$300	$300	$300	$21,063	$20,997	$10,142	$10,157	$10,181	$10,181	$154,567
Hutchins	9	10	11	11	11	12	$1,866	$1,715	$300	$300	$300	$300	$17,176	$17,470	$3,222	$3,321	$3,429	$3,548	$204,865
Irving	300	318	318	319	319	319	$430	$423	$300	$300	$300	$300	$129,225	$134,511	$95,499	$95,573	$95,649	$95,649	$555,501
Italy	1	1	1	1	1	1	$1,392	$1,396	$300	$300	$300	$300	$1,733	$1,731	$372	$371	$369	$368	$19,318
Jacksboro	54	159	218	228	246	254	$516	$486	$470	$470	$470	$470	$27,780	$77,131	$102,682	$107,302	$115,902	$119,496	$34,537
Josephine	6	13	19	21	23	23	$2,004	$1,083	$300	$300	$300	$300	$11,733	$13,799	$5,556	$6,214	$6,950	$6,950	$141,786
Justin	10	41	77	109	152	213	$1,687	$631	$300	$300	$300	$300	$16,678	$26,143	$23,229	$32,572	$45,655	$63,994	$194,893

TABLE H.11D CONSERVATION SAVINGS AND COSTS FOR WATER LOSS MITIGATION STRATEGIES

ENTITY NAME	SAVINGS VOLUMES IN ACRE-FEET PER YEAR						UNIT COSTS IN DOLLARS PER ACRE-FOOT						ANNUAL COSTS IN DOLLARS						CAPITAL COST
	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	
Kaufman	6	7	10	13	15	18	$394	$383	$300	$300	$300	$300	$2,464	$2,698	$3,036	$3,837	$4,586	$5,348	$8,334
Kaufman County Development District 1	37	118	244	378	561	649	$488	$456	$441	$441	$441	$441	$18,178	$53,924	$107,603	$166,770	$247,399	$286,046	$25,193
Kaufman County MUD 11	4	4	5	7	8	9	$1,613	$1,408	$300	$300	$300	$300	$5,807	$6,007	$1,644	$2,078	$2,547	$2,823	$67,187
Kaufman County MUD 14	9	9	9	9	9	9	$2,105	$2,107	$300	$300	$300	$300	$18,036	$18,033	$2,568	$2,568	$2,568	$2,568	$219,790
Keller	97	294	392	392	392	392	$2,141	$924	$328	$328	$328	$328	$206,820	$271,464	$128,402	$128,402	$128,402	$128,402	$2,489,472
Kemp	1	1	2	2	2	2	$1,362	$1,329	$300	$300	$300	$300	$1,914	$1,928	$455	$473	$494	$518	$21,215
Kennedale	9	13	16	20	25	28	$684	$584	$300	$300	$300	$300	$6,338	$7,315	$4,916	$6,140	$7,388	$8,535	$50,598
Kentuckytown WSC	2	2	2	2	2	2	$1,417	$1,325	$300	$300	$300	$300	$2,444	$2,491	$606	$642	$684	$728	$27,384
Kerens	1	1	1	1	1	1	$1,292	$1,382	$300	$300	$300	$300	$1,092	$1,071	$215	$200	$185	$171	$11,913
Krum	53	211	375	500	667	890	$776	$501	$409	$409	$409	$409	$41,006	$105,685	$153,522	$204,788	$273,143	$364,357	$275,454
Ladonia	9	32	62	92	113	113	$421	$382	$367	$367	$367	$367	$3,698	$12,368	$22,792	$33,582	$41,509	$41,509	$6,782
Lake Cities Municipal Utility Authority	12	15	15	15	16	16	$785	$702	$300	$300	$300	$300	$9,466	$10,219	$4,575	$4,623	$4,653	$4,653	$83,133
Lake Kiowa SUD	5	5	5	5	5	5	$569	$556	$300	$300	$300	$300	$2,682	$2,758	$1,523	$1,536	$1,553	$1,569	$18,033
Lake Worth	6	7	7	8	8	8	$596	$572	$300	$300	$300	$300	$3,754	$3,924	$2,186	$2,294	$2,399	$2,493	$26,519
Lakeside	3	3	3	3	3	3	$1,735	$1,737	$300	$300	$300	$300	$5,057	$5,055	$873	$873	$873	$873	$59,439
Lancaster	82	260	358	364	370	378	$1,196	$603	$330	$330	$330	$330	$98,174	$156,952	$118,008	$120,022	$122,254	$124,706	$1,010,254
Lancaster MUD 1	1	2	2	2	2	2	$517	$475	$300	$300	$300	$300	$711	$810	$564	$597	$632	$671	$4,243
Leonard	5	15	23	27	32	39	$6,954	$2,362	$300	$300	$300	$300	$31,545	$34,576	$6,936	$8,116	$9,693	$11,641	$428,986
Lewisville	547	1,643	2,342	2,374	2,420	2,420	$596	$503	$456	$456	$456	$456	$326,058	$826,229	$1,068,199	$1,082,639	$1,103,708	$1,103,708	$1,090,985
Lindsay	1	3	4	4	4	4	$5,232	$2,077	$300	$300	$300	$300	$5,651	$6,226	$1,215	$1,215	$1,215	$1,215	$75,703
Little Elm	32	91	128	134	137	137	$2,380	$1,030	$300	$300	$300	$300	$76,000	$93,724	$38,437	$40,127	$41,235	$41,235	$944,015
Log Cabin	1	1	1	1	1	1	$1,348	$1,348	$300	$300	$300	$300	$769	$769	$179	$182	$185	$188	$8,494
Lucas	16	18	19	19	19	19	$8,300	$7,311	$300	$300	$300	$300	$133,881	$134,564	$5,657	$5,657	$5,657	$5,657	$1,834,002
Luella SUD	1	1	1	1	1	1	$2,734	$2,743	$300	$300	$300	$300	$3,759	$3,758	$411	$411	$411	$411	$47,568
M E N WSC	3	3	3	4	4	4	$1,527	$1,366	$300	$300	$300	$300	$3,909	$4,024	$981	$1,077	$1,184	$1,299	$44,638
Mabank	45	140	186	189	192	198	$937	$502	$300	$300	$300	$300	$41,756	$70,476	$55,945	$56,680	$57,613	$59,391	$403,483
Malakoff	6	20	28	28	28	29	$942	$539	$353	$353	$353	$353	$5,869	$10,629	$9,732	$9,862	$10,025	$10,155	$52,192
Mansfield	148	466	754	1,052	1,075	1,087	$3,585	$1,342	$300	$300	$300	$300	$530,354	$625,829	$226,131	$315,494	$322,422	$326,011	$6,906,874
Markout WSC	3	3	4	6	8	11	$1,613	$1,409	$300	$300	$300	$300	$4,065	$4,205	$1,250	$1,800	$2,403	$3,206	$47,031
McKinney	342	1,212	2,069	2,602	2,602	2,602	$1,988	$777	$300	$300	$300	$300	$680,462	$941,435	$620,625	$780,692	$780,692	$780,692	$8,211,720
Melissa	48	71	95	118	129	129	$431	$388	$300	$300	$300	$300	$20,503	$27,430	$28,454	$35,333	$38,642	$38,642	$88,762
Mesquite	603	1,876	2,776	3,126	3,518	3,852	$678	$502	$419	$419	$419	$419	$409,072	$942,063	$1,162,267	$1,308,910	$1,472,891	$1,612,649	$2,223,931
Midlothian	93	319	508	586	666	730	$1,504	$689	$353	$353	$353	$353	$140,320	$220,091	$179,357	$206,691	$235,228	$257,635	$1,526,240
Milligan WSC	2	2	2	3	3	4	$1,450	$1,402	$300	$300	$300	$300	$2,806	$2,831	$711	$830	$962	$1,071	$31,629
Mount Zion WSC	2	2	2	2	2	2	$1,567	$1,530	$300	$300	$300	$300	$3,157	$3,175	$645	$665	$687	$714	$36,276
Mountain Peak SUD	276	1,091	1,851	2,255	2,732	3,225	$781	$528	$442	$442	$442	$442	$215,783	$575,793	$818,079	$996,672	$1,207,354	$1,425,578	$1,332,355
Mountain Springs WSC	2	2	2	2	2	2	$1,495	$1,484	$300	$300	$300	$300	$2,451	$2,456	$504	$506	$507	$509	$27,846
Muenster	2	2	2	2	2	2	$5,493	$5,523	$300	$300	$300	$300	$9,805	$9,802	$533	$533	$533	$533	$131,748
Murphy	24	25	27	30	33	36	$1,866	$1,840	$300	$300	$300	$300	$45,081	$45,204	$8,142	$9,026	$9,987	$10,692	$537,701
Mustang SUD	82	116	155	193	224	250	$810	$660	$300	$300	$300	$300	$66,194	$76,440	$46,391	$57,917	$67,148	$75,089	$592,256
Nash Forreston WSC	1	1	2	2	2	2	$1,392	$1,216	$300	$300	$300	$300	$1,601	$1,667	$486	$561	$644	$734	$17,844
Navarro Mills WSC	1	2	2	2	2	2	$17,948	$16,802	$300	$300	$300	$300	$26,106	$26,136	$492	$517	$541	$570	$364,823
Nevada SUD	3	4	5	11	20	27	$1,206	$1,018	$300	$300	$300	$300	$3,370	$3,589	$1,572	$3,320	$5,927	$7,965	$35,984
Newark	1	1	1	2	3	3	$626	$557	$300	$300	$300	$300	$410	$462	$360	$527	$783	$999	$3,031
North Collin SUD	5	6	7	9	10	12	$1,348	$1,231	$300	$300	$300	$300	$7,282	$7,486	$2,228	$2,675	$3,117	$3,633	$80,468
North Farmersville WSC	0	1	1	1	1	1	$1,348	$1,187	$300	$300	$300	$300	$667	$694	$228	$266	$300	$317	$7,376
North Kaufman WSC	5	18	31	40	49	59	$715	$405	$300	$300	$300	$300	$3,277	$7,323	$9,432	$11,944	$14,693	$17,750	$27,036
North Richland Hills	94	301	408	414	421	421	$2,303	$927	$300	$300	$300	$300	$217,271	$279,392	$122,548	$124,123	$126,414	$126,414	$2,685,769
Northlake	26	29	36	42	49	53	$507	$487	$300	$300	$300	$300	$13,239	$14,080	$10,766	$12,647	$14,552	$15,968	$76,829
Northwest Grayson County WCID 1	1	1	1	1	1	1	$1,292	$1,193	$300	$300	$300	$300	$1,286	$1,319	$360	$386	$416	$447	$14,028
Oak Ridge South Gale WSC	1	1	1	1	1	1	$752	$746	$300	$300	$300	$300	$887	$892	$366	$368	$371	$374	$7,577
Ovilla	22	83	136	161	188	218	$1,059	$565	$386	$386	$386	$386	$23,485	$47,109	$52,391	$62,033	$72,640	$84,318	$212,150
Palmer	1	2	2	2	3	3	$1,417	$1,237	$300	$300	$300	$300	$1,955	$2,035	$584	$674	$773	$882	$21,907
Paloma Creek North	6	6	6	6	6	6	$582	$583	$300	$300	$300	$300	$3,486	$3,480	$1,791	$1,791	$1,791	$1,791	$24,011
Paloma Creek South	51	154	205	205	205	205	$591	$473	$414	$414	$414	$414	$30,364	$72,720	$84,851	$84,851	$84,851	$84,851	$129,074
Pantego	3	3	3	3	3	3	$680	$681	$300	$300	$300	$300	$2,289	$2,286	$1,007	$1,007	$1,007	$1,007	$18,184
Parker	15	19	26	30	30	30	$2,114	$1,723	$300	$300	$300	$300	$30,797	$31,999	$7,689	$8,937	$8,937	$8,937	$375,603
Parker County SUD	5	6	9	12	16	21	$8,777	$6,549	$300	$300	$300	$300	$41,120	$41,621	$2,583	$3,474	$4,751	$6,428	$564,439
Pelican Bay	1	1	2	2	3	4	$1,157	$939	$300	$300	$300	$300	$1,151	$1,253	$537	$719	$965	$1,293	$12,123
Pilot Point	4	5	9	13	14	14	$858	$734	$300	$300	$300	$300	$3,622	$3,984	$2,807	$4,026	$4,346	$4,346	$33,489
Pink Hill WSC	1	1	1	2	2	2	$4,277	$3,897	$300	$300	$300	$300	$5,261	$5,300	$441	$471	$504	$542	$69,522
Plano	1,848	5,566	8,172	8,418	8,418	8,418	$654	$519	$452	$452	$452	$452	$1,207,547	$2,886,837	$3,691,061	$3,801,865	$3,801,865	$3,801,865	$5,301,148
Pleasant Grove WSC	1	1	1	1	1	1	$1,168	$1,109	$300	$300	$300	$300	$806	$821	$243	$239	$233	$227	$8,511
Point Enterprise WSC	1	1	1	1	1	1	$1,392	$1,418	$300	$300	$300	$300	$1,261	$1,255	$261	$257	$253	$249	$14,062
Ponder	3	5	6	7	8	10	$1,613	$1,287	$300	$300	$300	$300	$5,582	$5,925	$1,746	$2,117	$2,525	$2,973	$64,574
Pottsboro	3	3	3	4	4	4	$747	$712	$300	$300	$300	$300	$2,227	$2,303	$1,038	$1,098	$1,163	$1,235	$18,942
Princeton	25	54	73	82	89	89	$1,940	$1,073	$300	$300	$300	$300	$49,324	$57,871	$21,932	$24,486	$26,654	$26,654	$592,609

TABLE H.11D CONSERVATION SAVINGS AND COSTS FOR WATER LOSS MITIGATION STRATEGIES

ENTITY NAME	SAVINGS VOLUMES IN ACRE-FEET PER YEAR						UNIT COSTS IN DOLLARS PER ACRE-FOOT						ANNUAL COSTS IN DOLLARS						CAPITAL COST
	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	
Prosper	72	84	101	105	111	111	$486	$458	$300	$300	$300	$300	$34,815	$38,580	$30,168	$31,382	$33,150	$33,150	$189,329
Providence Village WCID	5	5	5	5	5	5	$804	$807	$300	$300	$300	$300	$3,656	$3,648	$1,356	$1,356	$1,356	$1,356	$32,580
R C H WSC	6	7	9	11	14	17	$893	$823	$300	$300	$300	$300	$5,263	$5,498	$2,558	$3,413	$4,163	$5,076	$49,658
Red Oak	9	11	13	16	18	21	$741	$655	$300	$300	$300	$300	$6,495	$7,131	$3,968	$4,679	$5,460	$6,320	$54,932
Reno (Parker)	1	2	2	2	3	3	$1,243	$1,075	$300	$300	$300	$300	$1,783	$1,876	$629	$740	$860	$995	$19,224
Rhome	2	2	4	5	8	10	$1,722	$1,406	$300	$300	$300	$300	$3,315	$3,480	$1,097	$1,592	$2,343	$3,125	$38,908
Rice Water Supply and Sewer Service	6	7	8	9	11	12	$1,495	$1,304	$300	$300	$300	$300	$8,266	$8,581	$2,339	$2,732	$3,182	$3,695	$93,896
Richardson	797	2,491	3,544	3,651	3,651	3,651	$636	$511	$453	$453	$453	$453	$506,531	$1,273,500	$1,604,132	$1,652,305	$1,652,305	$1,652,305	$2,074,231
Richland Hills	6	7	8	9	9	10	$694	$658	$300	$300	$300	$300	$4,415	$4,606	$2,264	$2,552	$2,810	$3,095	$35,611
River Oaks	4	4	4	4	4	4	$822	$827	$300	$300	$300	$300	$3,626	$3,614	$1,320	$1,328	$1,337	$1,337	$32,724
Roanoke	20	19	19	20	20	20	$2,114	$2,164	$300	$300	$300	$300	$41,391	$41,233	$5,838	$5,936	$6,078	$6,078	$504,801
Rockett SUD	64	229	366	420	506	575	$791	$438	$300	$300	$300	$300	$50,924	$100,403	$109,741	$126,128	$151,778	$172,584	$449,212
Rockwall	50	99	176	234	243	243	$3,627	$1,997	$300	$300	$300	$300	$182,970	$197,501	$52,687	$70,302	$73,006	$73,006	$2,385,355
Rose Hill SUD	2	2	3	3	4	4	$2,128	$1,823	$300	$300	$300	$300	$4,362	$4,485	$872	$1,002	$1,107	$1,223	$53,260
Rowlett	58	60	70	74	78	78	$582	$569	$300	$300	$300	$300	$33,582	$34,404	$21,080	$22,340	$23,276	$23,276	$231,047
Royse City	29	56	74	80	90	90	$2,173	$1,291	$300	$300	$300	$300	$63,898	$71,746	$22,109	$24,042	$27,077	$26,997	$782,793
Runaway Bay	3	4	5	6	8	9	$953	$832	$300	$300	$300	$300	$3,221	$3,450	$1,524	$1,871	$2,294	$2,814	$31,363
Sachse	26	28	32	33	34	34	$564	$548	$300	$300	$300	$300	$14,805	$15,329	$9,522	$9,945	$10,223	$10,223	$98,498
Saginaw	20	22	22	22	22	22	$1,613	$1,501	$300	$300	$300	$300	$32,053	$32,608	$6,573	$6,618	$6,684	$6,684	$370,835
Sanger	8	9	11	15	19	24	$1,613	$1,350	$300	$300	$300	$300	$12,139	$12,704	$3,428	$4,458	$5,631	$7,110	$140,439
Sansom Park	3	4	4	4	4	5	$1,417	$1,315	$300	$300	$300	$300	$4,577	$4,674	$1,151	$1,217	$1,290	$1,371	$51,275
Sardis Lone Elm WSC	28	34	41	43	43	43	$652	$586	$300	$300	$300	$300	$18,047	$19,984	$12,363	$12,915	$12,915	$12,915	$138,521
Savoy	0	0	0	0	0	0	$1,243	$1,253	$300	$300	$300	$300	$584	$583	$140	$138	$137	$134	$6,296
Seagoville	11	12	13	13	13	14	$1,495	$1,396	$300	$300	$300	$300	$16,569	$16,867	$3,794	$3,894	$4,004	$4,124	$188,216
Seis Lagos UD	3	3	3	3	4	4	$422	$426	$300	$300	$300	$300	$1,384	$1,349	$998	$1,037	$1,061	$1,064	$5,683
Sherman	393	1,279	1,820	1,920	2,031	2,153	$554	$482	$450	$450	$450	$450	$217,736	$616,450	$819,122	$864,328	$914,181	$969,057	$579,443
South Ellis County WSC	3	3	4	5	5	6	$1,970	$1,692	$300	$300	$300	$300	$5,585	$5,754	$1,203	$1,386	$1,590	$1,812	$67,282
South Freestone County WSC	1	1	1	1	1	1	$12,983	$12,496	$300	$300	$300	$300	$16,229	$16,244	$413	$401	$387	$374	$225,326
South Grayson SUD	3	4	4	5	5	6	$1,495	$1,334	$300	$300	$300	$300	$4,708	$4,855	$1,242	$1,386	$1,545	$1,721	$53,485
Southern Oaks Water Supply	1	1	1	1	1	1	$1,495	$1,224	$300	$300	$300	$300	$1,121	$1,187	$368	$374	$381	$389	$12,735
Southlake	83	277	394	416	438	459	$4,035	$1,444	$344	$344	$344	$344	$333,684	$400,761	$135,878	$143,382	$150,902	$157,948	$4,337,588
Southmayd	2	8	10	10	11	11	$772	$453	$300	$300	$300	$300	$1,914	$3,467	$3,120	$3,149	$3,207	$3,236	$16,625
Southwest Fannin County SUD	4	4	5	5	5	5	$24,781	$22,625	$300	$300	$300	$300	$101,356	$101,475	$1,415	$1,476	$1,544	$1,616	$1,423,076
Springtown	36	143	264	322	374	413	$780	$490	$393	$393	$393	$393	$27,986	$70,190	$103,994	$126,732	$147,082	$162,464	$197,124
Starr WSC	1	1	1	1	1	2	$2,667	$2,486	$300	$300	$300	$300	$3,067	$3,095	$399	$422	$447	$474	$38,681
Sunnyvale	15	19	22	23	24	24	$2,030	$1,677	$300	$300	$300	$300	$30,547	$31,705	$6,732	$7,020	$7,125	$7,125	$369,984
Talty SUD	10	11	16	23	32	37	$815	$763	$300	$300	$300	$300	$7,930	$8,260	$4,788	$6,875	$9,482	$11,150	$71,222
Teague	43	118	137	132	127	122	$475	$450	$435	$435	$435	$435	$20,496	$53,058	$59,701	$57,611	$55,390	$53,039	$24,406
Terra Southwest	1	1	2	2	3	3	$1,292	$1,085	$300	$300	$300	$300	$1,518	$1,611	$546	$648	$761	$884	$16,566
Terrell	200	683	1,117	1,298	1,537	1,724	$583	$488	$449	$449	$449	$449	$116,605	$333,471	$501,365	$582,749	$690,160	$774,069	$380,568
The Colony	38	45	50	50	50	50	$592	$549	$300	$300	$300	$300	$22,599	$24,551	$14,982	$14,982	$14,982	$14,982	$158,355
Tioga	1	2	3	4	4	5	$5,006	$2,771	$300	$300	$300	$300	$5,907	$6,227	$1,018	$1,137	$1,263	$1,401	$78,915
Tom Bean	4	13	18	18	18	18	$1,114	$581	$313	$313	$313	$313	$5,011	$7,811	$5,615	$5,615	$5,615	$5,615	$51,166
Trenton	1	1	1	1	1	1	$1,450	$1,375	$300	$300	$300	$300	$1,044	$1,059	$240	$246	$254	$261	$11,769
Trinidad	10	31	43	43	44	45	$512	$453	$424	$424	$424	$424	$5,181	$13,923	$18,023	$18,347	$18,671	$19,103	$12,667
Trophy Club MUD 1	89	273	369	374	380	386	$884	$580	$432	$432	$432	$432	$78,911	$158,058	$159,440	$161,557	$163,875	$166,422	$574,321
Two Way SUD	4	4	5	5	6	6	$1,613	$1,547	$300	$300	$300	$300	$6,364	$6,427	$1,484	$1,622	$1,800	$1,911	$73,626
University Park	38	38	38	38	38	38	$425	$425	$300	$300	$300	$300	$15,968	$15,944	$11,253	$11,253	$11,253	$11,253	$66,676
Van Alstyne	5	9	15	18	23	27	$1,613	$981	$300	$300	$300	$300	$7,630	$8,949	$4,358	$5,351	$7,011	$8,241	$88,276
Verona SUD	2	3	3	4	5	6	$1,653	$1,377	$300	$300	$300	$300	$3,653	$3,822	$1,028	$1,224	$1,442	$1,680	$42,492
Walnut Creek SUD	19	21	29	43	60	77	$1,850	$1,730	$300	$300	$300	$300	$35,155	$35,636	$8,583	$12,861	$17,940	$22,964	$418,625
Watauga	36	107	143	143	143	143	$929	$511	$300	$300	$300	$300	$33,344	$54,718	$42,858	$42,858	$42,858	$42,858	$320,836
Waxahachie	43	53	64	76	88	101	$3,478	$2,880	$300	$300	$300	$300	$150,510	$153,523	$19,310	$22,661	$26,346	$30,401	$1,954,611
Weatherford	41	49	58	67	77	89	$669	$610	$300	$300	$300	$300	$27,425	$29,758	$17,322	$20,136	$23,237	$26,651	$214,863
West Cedar Creek MUD	5	5	6	6	6	6	$1,613	$1,695	$300	$300	$300	$300	$8,759	$8,663	$1,704	$1,728	$1,752	$1,779	$101,340
West Leonard WSC	1	2	2	2	2	3	$1,781	$1,541	$300	$300	$300	$300	$2,654	$2,740	$592	$647	$702	$774	$31,363
West Wise SUD	2	3	3	3	3	3	$6,151	$5,661	$300	$300	$300	$300	$14,794	$14,860	$849	$897	$948	$1,005	$199,997
Westlake	18	23	28	31	35	40	$390	$369	$300	$300	$300	$300	$6,860	$8,498	$8,282	$9,407	$10,635	$11,985	$22,477
Westminster SUD	16	59	97	115	134	156	$653	$447	$372	$372	$372	$372	$10,339	$26,463	$35,951	$42,613	$49,964	$58,062	$63,283
Westover Hills	5	5	5	5	5	5	$386	$387	$300	$300	$300	$300	$1,776	$1,771	$1,380	$1,383	$1,391	$1,391	$5,645
Westworth Village	2	2	2	3	3	3	$646	$639	$300	$300	$300	$300	$1,428	$1,442	$719	$756	$792	$825	$10,873
White Settlement	51	167	239	253	268	284	$696	$474	$377	$377	$377	$377	$35,150	$78,874	$90,210	$95,291	$100,880	$107,040	$228,800
White Shed WSC	1	1	1	1	1	1	$12,337	$11,820	$300	$300	$300	$300	$15,113	$15,130	$395	$401	$408	$416	$209,571
Whitesboro	3	3	3	3	4	4	$860	$817	$300	$300	$300	$300	$2,456	$2,528	$992	$1,049	$1,110	$1,178	$22,730
Whitewright	2	2	2	3	3	3	$834	$789	$300	$300	$300	$300	$1,723	$1,780	$723	$767	$813	$864	$15,682
Willow Park	6	7	9	10	12	14	$815	$730	$300	$300	$300	$300	$5,005	$5,370	$2,625	$3,066	$3,552	$4,086	$44,954
Wilmer	4	13	19	20	20	21	$2,419	$940	$300	$300	$300	$300	$9,845	$12,670	$5,725	$5,925	$6,138	$6,374	$122,574
Woodbine WSC	4	4	4	4	4	4	$2,201	$2,141	$300	$300	$300	$300	$7,835	$7,870	$1,121	$1,127	$1,133	$1,140	$96,180

TABLE H.11D CONSERVATION SAVINGS AND COSTS FOR WATER LOSS MITIGATION STRATEGIES

ENTITY NAME	SAVINGS VOLUMES IN ACRE-FEET PER YEAR						UNIT COSTS IN DOLLARS PER ACRE-FOOT						ANNUAL COSTS IN DOLLARS						CAPITAL COST
	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	
Wortham	1	1	1	0	0	0	$3,374	$3,692	$300	$300	$300	$300	$2,159	$2,141	$150	$144	$138	$134	$27,962
Wylie	35	34	36	37	37	37	$1,683	$1,704	$300	$300	$300	$300	$58,341	$58,184	$10,736	$11,058	$11,058	$11,058	$681,324
Wylie Northeast SUD	9	11	14	15	15	15	$5,451	$4,485	$300	$300	$300	$300	$50,447	$51,087	$4,211	$4,509	$4,629	$4,629	$677,512
TOTAL	***19,736***	***58,576***	***85,736***	***92,357***	***99,378***	***106,017***	***$1,151***	***$650***	***$393***	***$392***	***$392***	***$392***	***$22,718,853***	***$38,087,852***	***$33,722,520***	***$36,211,443***	***$38,954,943***	***$41,572,384***	***$215,254,205***
Note: Savings presented above represent total savings for WUG as a whole, regardless of regional splits. The capital cost presented here reflect the main replacement cost, which is likely required loan services.																			

TABLE H.12 NEW WATER TREATMENT PLANTS

ENTITY	WATER MANAGEMENT STRATEGY	COUNTY	ONLINE DATE	PLANT SIZE (MGD)	CAPITAL COST	UNIT COST ($/1000 GAL)		ANNUAL COST
						WITH DEBT SERVICE	AFTER DEBT SERVICE	
Corsicana	New 8 MGD WTP, Halbert-Richland Chambers	Navarro	2030	8.00	$87,223,000	$12.36	$5.87	$9,033,000
Walnut Creek SUD	New 15 MGD WTP-Eagle Mountain	Parker	2060	15.00	$132,171,000	$5.05	$2.38	$13,610,000
Fairfield	Purchase Water from TRWD with New 2 MGD WTP	Freestone	2030	3.00	$94,581,000	$16.86	$6.22	$8,150,000

TABLE H.13 WATER TREATMENT PLANT EXPANSIONS

ENTITY	WATER MANAGEMENT STRATEGY	COUNTY	ONLINE DATE	PLANT SIZE (MGD)	CAPITAL COST	UNIT COST ($/1000 GAL)		ANNUAL COST
						WITH DEBT SERVICE	AFTER DEBT SERVICE	
Recommended WMSs								
Arlington	8 MGD WTP Expansion	Tarrant	2070	8.00	$34,750,000	$2.46	$1.16	$3,591,000
Azle	4 MGD WTP Expansion	Tarrant	2030	4.00	$54,940,000	$8.33	$4.24	$6,085,000
Benbrook	3 MGD WTP Expansion	Tarrant	2050	3.00	$17,668,000	$3.42	$1.67	$1,877,000
Bridgeport	2 MGD WTP Expansion	Wise	2060	2.00	$14,250,000	$4.20	$2.08	$1,534,000
Bridgeport	1 MGD WTP Expansion	Wise	2070	1.00	$10,833,000	$6.51	$3.29	$1,191,000
Corsicana	8 MGD WTP Expansion, Halbert-Richland Chambers-1	Navarro	2050	8.00	$34,694,000	$2.46	$1.16	$3,588,000
Corsicana	8 MGD WTP Expansion, Halbert-Richland Chambers-2	Navarro	2080	8.00	$34,694,000	$2.46	$1.16	$3,588,000
Denison	12 MGD Desalination WTP Expansion	Grayson	2030	12.00	$192,477,000	$11.84	$7.07	$25,953,000
Denison	21 MGD Desalination WTP Expansion	Grayson	2040	21.00	$282,557,000	$9.97	$5.97	$38,260,000
Denton	30 MGD WTP Plant Expansion	Denton	2040	30.00	$218,234,000	$4.10	$1.94	$22,474,000
Denton	20 MGD WTP Plant Expansion 1	Denton	2060	20.00	$160,826,000	$4.53	$2.14	$16,562,000
Denton	23 MGD WTP Plant Expansion 2	Denton	2070	23.00	$178,047,000	$4.36	$2.06	$18,336,000
Ennis	1 MGD WTP Expansion	Ellis	2070	1.00	$10,828,000	$6.51	$3.29	$1,191,000
Fort Worth	35 MGD WTP-Eagle Mountain	Tarrant	2030	35.00	$247,056,000	$3.98	$1.88	$25,435,000
Fort Worth	20 MGD WTP Expansion-Westside 1	Tarrant	2030	20.00	$155,983,000	$4.46	$2.14	$16,299,000
Fort Worth	20 MGD WTP Expansion-Westside 2	Tarrant	2040	20.00	$155,983,000	$4.46	$2.14	$16,299,000
Fort Worth	30 MGD WTP Expansion-Eagle Mountain	Tarrant	2040	30.00	$218,335,000	$4.10	$1.94	$22,479,000
Fort Worth	50 MGD WTP Expansion-Rolling Hills	Tarrant	2050	50.00	$343,387,000	$3.82	$1.77	$34,856,000
Fort Worth	50 MGD WTP Expansion-General 1	Tarrant	2060	50.00	$343,387,000	$3.82	$1.77	$34,856,000
Fort Worth	50 MGD WTP Expansion-General 2	Tarrant	2070	50.00	$343,387,000	$3.82	$1.77	$34,856,000
Fort Worth	50 MGD WTP Expansion-General 3	Tarrant	2080	50.00	$343,387,000	$3.82	$1.77	$34,856,000
Gainesville	6 MGD WTP Expansion	Cooke	2030	6.00	$71,102,000	$6.77	$3.24	$7,418,000
Lewisville	3 MGD WTP Expansion	Denton	2030	3.00	$46,846,000	$8.23	$4.03	$4,992,000
Mabank	2 MGD WTP Expansion	Kaufman	2030	2.00	$38,763,000	$11.45	$5.68	$4,184,000
Mansfield	20 MGD WTP Expansion	Tarrant	2030	20.00	$68,774,000	$1.94	$0.91	$7,072,000
Mansfield	28 MGD WTP Expansion	Tarrant	2060	28.00	$90,527,000	$1.85	$0.87	$9,308,000
Mansfield	30 MGD WTP Expansion	Tarrant	2050	30.00	$95,968,000	$1.80	$0.85	$9,868,000
Midlothian	12 MGD Expansion - Auger WTP	Ellis	2060	12.00	$45,178,000	$1.06	$0.52	$4,657,000
Parker County SUD	3.5 MGD WTP Desal Expansion-BRA supply	Parker	2050	3.50	$90,989,000	$17.25	$10.53	$12,696,000
Rockett Special Utility District	7 MGD WTP Expansion at Sokoll	Ellis	2030	7.00	$79,172,000	$6.43	$3.07	$8,227,000
Runaway Bay	2 MGD WTP Expansion	Wise	2030	2.00	$38,770,000	$11.45	$5.68	$4,184,000
Sherman	10 MGD Desal WTP Expansion	Grayson	2030	10.00	$181,496,000	$13.31	$6.66	$25,583,000
Sherman	20 MGD Desal WTP Expansion	Grayson	2040	20.00	$220,555,000	$8.52	$4.49	$32,772,000
Walnut Creek SUD	10 MGD WTP Expansion	Parker	2030	10.00	$103,449,000	$5.83	$2.75	$10,654,000
Waxahachie	15 MGD Expansion WTP-1	Ellis	2030	15.00	$132,121,000	$4.97	$2.34	$13,608,000
Waxahachie	15 MGD Expansion WTP-2	Ellis	2050	15.00	$132,121,000	$4.98	$2.35	$13,608,000
Weatherford	8 MGD WTP Expansion	Parker	2030	8.00	$87,279,000	$6.18	$2.94	$9,037,000
Weatherford	10 MGD WTP Expansion	Parker	2040	10.00	$103,449,000	$5.83	$2.75	$10,654,000
Weatherford	6 MGD WTP Expansion	Parker	2080	6.00	$27,916,000	$2.65	$1.27	$2,906,000
West Wise SUD	1 MGD WTP Expansion	Wise	2030	1.00	$10,833,000	$6.51	$3.29	$1,191,000
Wise County WSD	6 MGD WTP Expansion	Wise	2030	6.00	$71,112,000	$7.72	$3.70	$7,418,000
Alternative WMSs								
Corsicana	Alternative - Navarro Mills WTP Expansion and Pipeline Replacement	Navarro	2050	10.00	$194,881,000	$7.63	$1.83	$13,933,000

TABLE H.14 NEW WELLS

ENTITY	PROJECT NAME	COUNTY	PROJECT YIELD (AF/Y)	ONLINE DATE	CAPITAL COST	UNIT COST ($/1000 GAL)		ANNUAL COST
						WITH DEBT SERVICE	AFTER DEBT SERVICE	
Municipal Wells								
Annetta	New Well(s) in Trinity Aquifer	Parker	100	2030	$3,827,000	$9.73	$1.47	$317,000
Arledge Ridge WSC	New Well(s) in Woodbine Aquifer	Fannin	50	2030	$4,298,000	$20.93	$2.39	$341,000
Aubrey	New Well(s) in Trinity Aquifer	Denton	500	2030	$7,142,000	$3.91	$0.82	$637,000
Bells	New Well(s) in Woodbine Aquifer	Grayson	45	2030	$3,371,000	$15.01	$1.79	$269,000
Black Rock WSC	New Well(s) in Trinity Aquifer	Denton	450	2040	$4,943,000	$2.87	$0.50	$421,000
Bolivar WSC	New Well(s) in Trinity Aquifer	Denton	250	2030	$4,601,000	$4.79	$0.81	$390,000
Buena Vista-Bethel SUD	New Well(s) in Trinity Aquifer	Ellis	546	2030	$6,796,000	$3.51	$0.83	$625,000
Collinsville	New Well(s) in Trinity Aquifer	Grayson	40	2030	$4,057,000	$24.70	$2.76	$322,000
County-Other, Collin	New Well(s) in Trinity Aquifer	Collin	850	2040	$9,523,000	$3.18	$0.76	$881,000
County-Other, Denton	New Well(s) in Trinity Aquifer	Denton	7700	2040	$25,948,000	$1.12	$0.40	$2,822,000
County-Other, Denton	New Well(s) in Woodbine Aquifer	Denton	1500	2040	$10,054,000	$2.07	$0.63	$1,013,000
County-Other, Parker	New Well(s) in Trinity Aquifer	Parker	4000	2030	$14,728,000	$1.00	$0.20	$1,299,000
County-Other, Wise	New Well(s) in Trinity Aquifer	Wise	3400	2030	$18,838,000	$1.88	$0.68	$2,079,000
Cross Timbers WSC	New Well(s) in Trinity Aquifer	Denton	350	2030	$5,339,000	$3.98	$0.68	$454,000
Ladonia	New Well(s) in Trinity Aquifer	Fannin	40	2050	$4,876,000	$29.53	$3.22	$385,000
Mustang SUD	New Well(s) in Trinity Aquifer	Denton	100	2030	$3,924,000	$9.82	$1.35	$320,000
Northwest Grayson County WCID 1	New Well(s) in Trinity Aquifer	Grayson	40	2030	$4,303,000	$19.14	$2.23	$343,000
Pelican Bay	New Well(s) in Trinity Aquifer	Tarrant	50	2030	$2,731,000	$10.68	$1.60	$174,000
Pilot Point	New Well(s) in Trinity Aquifer	Denton	200	2030	$5,859,000	$7.39	$1.07	$482,000
Terra Southwest	New Well(s) in Trinity Aquifer	Denton	200	2030	$4,057,000	$5.28	$0.91	$344,000
Trenton	New Well(s) in Woodbine Aquifer	Fannin	50	2030	$4,561,000	$22.22	$2.52	$362,000
Two Way SUD	New Well(s) in Trinity Aquifer	Grayson	10780	2050	$9,683,000	$0.35	$0.15	$1,213,000
Whitesboro	New Well(s) in Trinity Aquifer	Grayson	500	2050	$5,401,000	$2.85	$0.52	$465,000
Non-Municipal Wells								
Irrigation, Fannin	New Well(s) in Trinity Aquifer	Fannin	350	2030	$5,278,000	$3.69	$0.44	$421,000
Mining, Kaufman	New Well(s) in Nacatoch Aquifer	Kaufman	39	2050	$2,686,000	$16.52	$1.65	$210,000

Table H.15

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Gulf of Mexico Desalination*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (267.8 MGD)	$213,966,000
Transmission Pipeline (108-132 in. dia., 296 miles)	$5,048,213,000
Transmission Pump Station(s) & Storage Tank(s)	$207,306,000
Storage Tanks (Other Than at Booster Pump Stations)	$64,963,000
Two Water Treatment Plants (250 MGD and 535 MGD)	$4,265,754,000
Integration, Relocations, Backup Generator & Other	$16,727,000
TOTAL COST OF FACILITIES	**$9,816,929,000**
Engineering:	
- Planning (3%)	$294,508,000
- Design (7%)	$687,185,000
- Construction Engineering (1%)	$98,169,000
Legal Assistance (2%)	$196,339,000
Fiscal Services (2%)	$196,339,000
Pipeline Contingency (15%)	$757,232,000
All Other Facilities Contingency (20%)	$953,743,000
Environmental & Archaeology Studies and Mitigation	$10,652,000
Land Acquisition and Surveying (4521 acres)	$27,529,000
Interest During Construction (3.5% for 5 years with a 0.5% ROI)	$2,118,777,000
TOTAL COST OF PROJECT	**$15,157,402,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$824,128,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$51,727,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$9,462,000
Water Treatment Plant	$474,594,000
Pumping Energy Costs (274421573 kW-hr @ 0.09 $/kW-hr)	$24,698,000
TOTAL ANNUAL COST	**$1,384,609,000**
Available Project Yield (acft/yr)	200,000
Annual Cost of Water ($ per acft), based on PF=1.5	$6,923
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.5	$2,802
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.5	$21.24
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.5	$8.60
Note: One or more cost element has been calculated externally	
CLV	*9/24/2024*

Table H.16

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Dredging - Generic Strategy A*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Lake Bridgeport Example	$1,995,435,013
AVERAGE COST OF DREDGING	**$1,995,435,000**
Interest During Construction (12 months)	$69,840,000
TOTAL COST OF PROJECT	**$2,065,275,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$112,292,000
Operation and Maintenance	
TOTAL ANNUAL COST	**$112,292,000**
Available Project Yield (acft/yr)	2,500
Annual Cost of Water ($ per acft), based on PF=0	$44,917
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$44,917
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$137.82
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$137.82
HAC	*2/19/2025*

Table H.17

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Aquifer Storage Recovery (ASR) - Generic Strategy*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (178.5 MGD)	$140,890,000
Transmission Pipeline (102 in. dia., 99.3 miles)	$1,950,317,000
Transmission Pump Station(s) & Storage Tank(s)	$56,028,000
Well Fields (Wells, Pumps, and Piping)	$190,182,000
Water Treatment Plant (180 MGD)	$731,422,000
Integration, Relocations, Backup Generator & Other	$5,475,000
Engineering:	
- Planning (3%)	$92,229,000
- Design (7%)	$215,202,000
- Construction Engineering (1%)	$30,743,000
Legal Assistance (2%)	$61,486,000
Fiscal Services (2%)	$61,486,000
Pipeline Contingency (15%)	$292,548,000
All Other Facilities Contingency (20%)	$224,799,000
Environmental & Archaeology Studies and Mitigation	$5,605,000
Land Acquisition and Surveying (1021 acres)	$15,320,000
Interest During Construction (3.5% for 4 years with a 0.5% ROI)	$529,586,000
TOTAL COST OF PROJECT	**$4,603,318,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$250,289,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$21,460,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$4,923,000
Water Treatment Plant	$51,200,000
Pumping Energy Costs (353794110 kW-hr @ 0.09 $/kW-hr)	$31,841,000
TOTAL ANNUAL COST	**$359,713,000**
Available Project Yield (acft/yr)	50,000
Annual Cost of Water ($ per acft), based on PF=2	$7,194
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$2,188
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$22.08
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$6.72
CLV	*9/25/2024*

Table H.18

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Wholesale Providers - Small Generic ASR*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (0 MGD)	$1,149,000
Transmission Pipeline (14 in. dia., 1 miles)	$1,881,000
Well Fields (Wells, Pumps, and Piping)	$4,676,000
Integration, Relocations, Backup Generator & Other	$19,000
TOTAL COST OF FACILITIES	**$7,725,000**
Engineering:	
- Design (7%)	$541,000
- Construction Engineering (1%)	$77,000
Legal Assistance (2%)	$155,000
Fiscal Services (2%)	$155,000
Pipeline Contingency (15%)	$282,000
All Other Facilities Contingency (20%)	$1,169,000
Environmental & Archaeology Studies and Mitigation	$104,000
Land Acquisition and Surveying (9 acres)	$106,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$686,000
TOTAL COST OF PROJECT	**$11,232,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$611,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$66,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$29,000
Pumping Energy Costs (4144114 kW-hr @ 0.09 $/kW-hr)	$373,000
TOTAL ANNUAL COST	**$1,079,000**
Available Project Yield (acft/yr)	2,500
Annual Cost of Water ($ per acft), based on PF=1.1	$432
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.1	$187
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.1	$1.32
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.1	$0.57
CLV	*9/25/2024*

Table H.19

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Joint Toledo Bend - TWRD, NTMWD, DWU, and UTRWD* *Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023*					
Item	*Estimated Costs for Facilities*	*TRWD Share*	*NTMWD Share*	*DWU Share*	*UTRWD Share*
CAPITAL COST					
Terminal Storage	$359,317,000	$125,830,000	$85,583,000	$105,113,000	$42,791,000
Primary Pump Stations	$681,883,000	$229,186,000	$159,840,000	$168,030,000	$124,827,000
Transmission Pipeline	$6,908,688,000	$2,125,347,000	$1,802,706,000	$1,841,720,000	$1,138,915,000
Transmission Pump Station(s) & Storage Tank(s)	$114,664,000	$32,761,000	$32,761,000	$32,761,000	$16,381,000
Integration, Relocations, Backup Generator & Other	$37,685,000	$13,335,000	$8,644,000	$10,228,000	$5,478,000
TOTAL COST OF FACILITIES	**$7,742,920,000**	**$2,400,629,000**	**$2,003,951,000**	**$2,052,739,000**	**$1,285,601,000**
Engineering:					
- Planning (3%)	$243,068,000	$75,794,000	$62,686,000	$64,736,000	$39,852,000
- Design (7%)	$567,158,000	$176,852,000	$146,268,000	$151,050,000	$92,988,000
- Construction Engineering (1%)	$81,020,000	$25,264,000	$20,895,000	$21,578,000	$13,283,000
Legal Assistance (2%)	$162,045,000	$50,529,000	$41,791,000	$43,157,000	$26,568,000
Fiscal Services (2%)	$162,045,000	$50,529,000	$41,791,000	$43,157,000	$26,568,000
Pipeline Contingency (15%)	$1,036,303,000	$318,802,000	$270,406,000	$276,258,000	$170,837,000
All Other Facilities Contingency (20%)	$238,709,000	$80,222,000	$57,365,000	$63,226,000	$37,896,000
Environmental & Archaeology Studies and Mitigation	$18,172,000	$5,855,000	$4,479,000	$4,659,000	$3,179,000
Land Acquisition and Surveying	$53,067,000	$17,632,000	$12,474,000	$12,417,000	$10,544,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$1,039,730,000	$324,476,000	$267,902,000	$276,715,000	$170,637,000
TOTAL COST OF PROJECT	**$11,344,237,000**	**$3,526,584,000**	**$2,930,008,000**	**$3,009,692,000**	**$1,877,953,000**
ANNUAL COST					
Debt Service (3.5 percent, 30 years)	$606,999,000	$188,295,000	$156,984,000	$160,775,000	$100,945,000
Operation and Maintenance					
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$69,678,000	$21,448,000	$18,175,000	$18,581,000	$11,474,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$19,379,000	$6,396,000	$4,662,000	$4,867,000	$3,454,000
Pumping Energy Costs (145121129 kW-hr @ 0.09 $/kW-hr)	$55,641,000	$19,688,000	$12,763,000	$15,101,000	$8,089,000
Purchase of Water (350000 acft/yr @ 98 $/acft)	$34,300,000	$9,800,000	$9,800,000	$9,800,000	$4,900,000
TOTAL ANNUAL COST	**$816,656,000**	**$256,378,000**	**$209,678,000**	**$218,091,000**	**$132,509,000**
Available Project Yield (acft/yr), based on PF=1.5	350,000	100,000	100,000	100,000	50,000
Annual Cost of Water ($ per acft), based on PF=1.5	$2,333	$2,564	$2,097	$2,181	$2,650
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.5	$527	$592	$467	$499	$571
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.5	$7.16	$7.87	$6.43	$6.69	$8.13
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.5	$1.62	$1.82	$1.43	$1.53	$1.75
Note: One or more cost element has been calculated externally					
HAC					*2/19/2025*

Table H.20

Cost Estimate Summary
Sulphur River Basin Reservoir and Transmission System Alternatives
September 2023 Prices

TRWD, NTMWD, UTRWD, & Local Users - High Yield Marvin Nichols (328)

Item	*Estimated Costs for Facilities*	*TRWD Share*	*DWU Share*	*NTMWD Share*	*UTRWD Share*	*Irving Share*
PROJECT COST						
Dam and Reservoir	$543,416,000	$252,145,024	$0	$252,145,024	$39,125,952	$0
Land Acquisition and Surveying	$472,858,000	$219,406,112	$0	$219,406,112	$34,045,776	$0
Conflicts	$191,493,000	$88,852,752	$0	$88,852,752	$13,787,496	$0
Environmental & Archeology Studies and Mitigation	$952,136,511	$441,791,341	$0	$441,791,341	$68,553,829	$0
Permitting	$75,000,000	$34,800,000	$0	$34,800,000	$5,400,000	$0
Pipeline Segment 1: MN Intake LPS to Lake Chapman Split/BPS #1	$1,001,601,000	$470,372,115	$0	$470,372,115	$60,856,770	$0
MNR Intake LPS	$374,285,000	$175,771,816	$0	$175,771,816	$22,741,367	$0
Pipeline Segment 2: BPS #1/Lake Chapman Split to Leonard TSR Split	$684,806,000	$331,674,969	$0	$331,674,969	$21,456,063	$0
BPS #1/Lake Chapman Split and Storage Reservoir	$291,533,000	$141,199,403	$0	$141,199,403	$9,134,193	$0
Pipeline Segment 3: Leonard TSR Split to BPS #2	$145,063,000	$136,249,046	$0	$0	$8,813,954	$0
Pipeline Segment 4: BPS #2 to Lake Ralph Hall TSR Split	$577,446,000	$542,360,673	$0	$0	$35,085,327	$0
BPS #2 and Storage Reservoir	$117,591,000	$110,446,230	$0	$0	$7,144,770	$0
Pipeline Segment 5: Lake Ralph Hall TSR Split to Trinity River/Ray Roberts Split	$49,033,000	$49,033,000	$0	$0	$0	$0
Pipeline Segment 6: Trinity River/Ray Roberts Split to BPS #3	$137,653,000	$137,653,000	$0	$0	$0	$0
BPS #3 and Storage Reservoir	$178,028,000	$178,028,000	$0	$0	$0	$0
Pipeline Segment 7: BPS #3 to Lake Bridgeport	$546,049,000	$546,049,000	$0	$0	$0	$0
Discharge Structure 5: Lake Bridgeport	$3,438,000	$3,438,000	$0	$0	$0	$0
Pipeline Segment 8: Leonard TSR Split to Leonard TSR	$0	$0	$0	$0	$0	$0
Discharge Structure 2 and new TSR near Leonard	$94,239,000	$0	$0	$94,239,000	$0	$0
Pipeline Segment 10: BPS #1/Lake Chapman Split to Chapman Lake Outfall	$3,764,000	$0	$0	$0	$3,764,000	$0
Discharge Structure 1: Chapman Lake Outfall	$161,000	$0	$0	$0	$161,000	$0
Pipeline Segment 11: Lake Ralph Hall TSR Split to Lake Ralph Hall TSR	$34,831,000	$0	$0	$0	$34,831,000	$0
Discharge Structure 3: Lake Ralph Hall TSR	$161,000	$0	$0	$0	$161,000	$0
TOTAL COST OF PROJECT	**$6,474,585,000**	**$3,859,270,000**	**$0**	**$2,250,253,000**	**$365,062,000**	**$0**
Interest During Construction (3.5% for 4 years with a 0.5% ROI)	$583,041,000	$388,119,000	$0	$166,847,000	$28,075,000	$0
Reservoir Interest During Construction (3.5% for 4 years with a 0.5% ROI)	$307,345,000	$142,608,000	$0	$142,608,000	$22,129,000	$0
TOTAL COST OF PROJECT WITH INTEREST DURING CONSTRUCTION	**$7,364,971,000**	**$4,389,997,000**	**$0**	**$2,559,708,000**	**$415,266,000**	**$0**
ANNUAL COST						
Debt Service (3.5 percent, 30 years)	$262,217,000	$174,553,000	$0	$75,038,000	$12,626,000	$0
Reservoir Debt Service (3.5 percent, 40 years)	$119,047,000	$55,238,000	$0	$55,238,000	$8,571,000	$0
Operation and Maintenance						
Pipelines (1% of Facilities + 20%) and Pump Stations (2.5% of Facilities + 20%)	$51,156,000	$33,346,000	$0	$15,466,000	$2,344,000	$0
Dam and Reservoir (1.5% of Facilities + 20%)	$7,246,000	$3,362,144	$0	$3,362,144	$521,712	$0
Pumping Energy Costs (0.10 $/kW-hr)	$42,035,000	$25,558,000	$0	$14,813,000	$1,664,000	$0
TOTAL ANNUAL COST	**$481,701,000**	**$292,057,000**	**$0**	**$163,917,000**	**$25,727,000**	**$0**
Available Project Yield (acft/yr)	320,000	148,474		148,474	23,052	
Annual Cost of Water until Amortized ($ per acft)	$1,505	$1,967		$1,104	$1,116	
Annual Cost of Water until Amortized ($ per 1,000 gallons)	$4.62	$6.04		$3.39	$3.42	
Annual Cost of Water after Amortization ($ per acft)	$314	$419		$227	$197	
Annual Cost of Water after Amortization ($ per 1,000 gallons)	$0.96	$1.29		$0.70	$0.60	

3/19/2025

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Table H.21

Cost Estimate Summary
Sulphur River Basin Reservoir and Transmission System Alternatives
September 2023 Prices

TRWD, DWU, NTMWD, UTRWD, Irving, & Local Users - High Yield Marvin Nichols (328)

Item	*Estimated Costs for Facilities*	*TRWD Share*	*DWU Share*	*NTMWD Share*	*UTRWD Share*	*Irving Share*
PROJECT COST						
Dam and Reservoir	$543,416,000	$174,979,952	$126,615,928	$174,979,952	$39,125,952	$27,714,216
Land Acquisition and Surveying	$472,858,000	$152,260,276	$110,175,914	$152,260,276	$34,045,776	$24,115,758
Conflicts	$191,493,000	$61,660,746	$44,617,869	$61,660,746	$13,787,496	$9,766,143
Environmental & Archeology Studies and Mitigation	$952,136,511	$306,587,957	$221,847,807	$306,587,957	$68,553,829	$48,558,962
Permitting	$75,000,000	$24,150,000	$17,475,000	$24,150,000	$5,400,000	$3,825,000
Pipeline Segment 1: MN Intake LPS to Lake Chapman Split/BPS #1	$1,001,601,000	$329,265,464	$238,257,308	$329,265,464	$61,353,813	$43,458,951
MNR Intake LPS	$371,096,000	$121,993,785	$88,275,006	$121,993,785	$22,731,761	$16,101,664
Pipeline Segment 2: BPS #1/Lake Chapman Split to Leonard TSR Split	$684,806,000	$243,117,455	$175,920,395	$243,117,455	$22,650,695	$0
BPS #1/Lake Chapman Split and Storage Reservoir	$277,634,000	$98,564,662	$71,321,634	$98,564,662	$9,183,043	$0
Pipeline Segment 3: Leonard TSR Split to BPS #2	$145,063,000	$79,846,643	$57,777,229	$0	$7,439,128	$0
Pipeline Segment 4: BPS #2 to Lake Ralph Hall TSR Split	$577,446,000	$317,842,072	$229,991,313	$0	$29,612,615	$0
BPS #2 and Storage Reservoir	$154,895,000	$85,258,444	$61,693,222	$0	$7,943,333	$0
Pipeline Segment 5: Lake Ralph Hall TSR Split to Trinity River/Ray Roberts Split	$53,113,000	$30,815,110	$22,297,890	$0	$0	$0
Pipeline Segment 6: Trinity River/Ray Roberts Split to BPS #3	$108,188,000	$108,188,000	$0	$0	$0	$0
BPS #3 and Storage Reservoir	$134,051,000	$134,051,000	$0	$0	$0	$0
Pipeline Segment 7: BPS #3 to Lake Bridgeport	$444,995,000	$444,995,000	$0	$0	$0	$0
Discharge Structure 5: Lake Bridgeport	$1,772,000	$1,772,000	$0	$0	$0	$0
Pipeline Segment 8: Leonard TSR Split to Leonard TSR	$41,958,000	$0	$0	$41,958,000	$0	$0
Discharge Structure 2 and new TSR near Leonard	$92,573,000	$0	$0	$92,573,000	$0	$0
Pipeline Segment 9: Trinity River/Ray Roberts Split to Lake Ray Roberts	$18,792,000	$0	$18,792,000	$0	$0	$0
Discharge Structure 4: Trinity River/Ray Roberts	$1,037,000	$0	$1,037,000	$0	$0	$0
Pipeline Segment 10: BPS #1/Lake Chapman Split to Chapman Lake Outfall	$5,740,000	$0	$0	$0	$2,375,172	$3,364,828
Discharge Structure 1: Chapman Lake Outfall	$245,000	$0	$0	$0	$101,379	$143,621
Pipeline Segment 11: Lake Ralph Hall TSR Split to Lake Ralph Hall TSR	$34,831,000	$0	$0	$0	$34,831,000	$0
Discharge Structure 3: Lake Ralph Hall TSR	$161,000	$0	$0	$0	$161,000	$0
TOTAL COST OF PROJECT	**$6,384,901,000**	**$2,715,349,000**	**$1,486,096,000**	**$1,647,111,000**	**$359,296,000**	**$177,049,000**
Interest During Construction (3.5% for 4 years with a 0.5% ROI)	$570,708,000	$274,450,000	$132,757,000	$127,546,000	$27,282,000	$8,673,000
Reservoir Interest During Construction (3.5% for 4 years with a 0.5% ROI)	$307,345,000	$98,965,000	$71,611,000	$98,965,000	$22,129,000	$15,675,000
TOTAL COST OF PROJECT WITH INTEREST DURING CONSTRUCTION	**$7,262,954,000**	**$3,088,764,000**	**$1,690,464,000**	**$1,873,622,000**	**$408,707,000**	**$201,397,000**
ANNUAL COST						
Debt Service (3.5 percent, 30 years)	$256,672,000	$123,432,000	$59,706,000	$57,363,000	$12,270,000	$3,901,000
Reservoir Debt Service (3.5 percent, 40 years)	$119,046,000	$38,333,000	$27,738,000	$38,333,000	$8,571,000	$6,071,000
Operation and Maintenance						
Pipelines (1% of Facilities + 20%) and Pump Stations (2.5% of Facilities + 20%)	$50,025,000	$23,720,000	$11,595,000	$11,627,000	$2,304,000	$779,000
Dam and Reservoir (1.5% of Facilities + 20%)	$7,246,000	$2,333,212	$1,688,318	$2,333,212	$521,712	$369,546
Pumping Energy Costs (0.10 $/kW-hr)	$40,200,000	$18,174,000	$9,291,000	$10,304,000	$1,707,000	$724,000
TOTAL ANNUAL COST	**$473,189,000**	**$205,992,000**	**$110,018,000**	**$119,960,000**	**$25,374,000**	**$11,845,000**
Available Project Yield (acft/yr)	320,160	103,092	74,597	103,092	23,052	16,328
Annual Cost of Water until Amortized ($ per acft)	$1,478	$1,998	$1,475	$1,164	$1,101	$725
Annual Cost of Water until Amortized ($ per 1,000 gallons)	$4.54	$6.13	$4.53	$3.57	$3.38	$2.23
Annual Cost of Water after Amortization ($ per acft)	$304	$429	$303	$235	$197	$115
Annual Cost of Water after Amortization ($ per 1,000 gallons)	$0.93	$1.32	$0.93	$0.72	$0.60	$0.35

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Table H.22

Cost Estimate Summary Water Supply Project Option September 2023 Prices TRWD and NTMWD - Wright Patman Reallocation - Rec. Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023			
Item	***Estimated Costs for Facilities***	***TRWD Share***	***NTMWD Share***
CAPITAL COST			
Dam and Reservoir	$20,971,000	$10,485,500	$10,485,500
Terminal Storage	$296,567,000	$222,425,000	$74,142,000
Intake Pump Stations	$91,712,000	$45,856,000	$45,856,000
Transmission Pipelines	$2,201,757,000	$1,485,444,000	$716,313,000
Transmission Pump Station(s) & Storage Tank(s)	$213,596,000	$155,063,000	$58,533,000
Integration, Relocations, Backup Generator & Other	$119,036,000	$62,678,000	$56,358,000
TOTAL COST OF FACILITIES	**$2,943,639,000**	**$1,981,951,500**	**$961,687,500**
Engineering:			
- Planning (3%)	$88,309,000	$57,234,000	$31,075,000
- Design (7%)	$206,055,000	$133,547,000	$72,508,000
- Construction Engineering (1%)	$29,436,000	$19,078,000	$10,358,000
Legal Assistance (2%)	$58,873,000	$38,156,000	$20,717,000
Fiscal Services (2%)	$58,873,000	$38,156,000	$20,717,000
Pipeline Contingency (15%)	$330,264,000	$222,817,000	$107,447,000
All Other Facilities Contingency (20%)	$148,376,000	$84,473,000	$63,903,000
Environmental & Archaeology Studies and Mitigation	$300,681,000	$151,858,000	$148,823,000
Land Acquisition and Surveying (2034 acres)	$47,908,000	$27,530,000	$20,378,000
Interest During Construction (3.5% for 4 years with a 0.5% ROI)	$547,615,000	$372,715,000	$174,900,000
TOTAL COST OF PROJECT	**$4,760,029,000**	**$3,127,515,500**	**$1,632,513,500**
ANNUAL COST			
Debt Service (3.5 percent, 30 years)	$212,476,000	$152,983,000	$59,493,000
Reservoir Debt Service (3.5 percent, 40 years)	$39,904,000	$19,952,000	$19,952,000
Operation and Maintenance			
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$23,208,000	$16,710,000	$6,498,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$7,633,000	$3,816,500	$3,816,500
Dam and Reservoir (1.5% of Cost of Facilities)	$4,763,000	$2,381,500	$2,381,500
Pumping Energy Costs (235655083 kW-hr @ 0.09 $/kW-hr)	$21,209,000	$15,270,000	$5,939,000
TOTAL ANNUAL COST	**$309,193,000**	**$211,113,000**	**$98,080,000**
Available Project Yield (acft/yr)	125,000	62,500	62,500
Annual Cost of Water ($ per acft), based on PF=1.5	$2,474	$3,378	$1,569
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.5	$455	$611	$298
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.5	$7.59	$10.36	$4.82
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.5	$1.39	$1.87	$0.91

Note: One or more cost element has been calculated externally

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Table H.23

Item	Estimated Costs for Facilities	TRWD Share	DWU Share	NTMWD Share	UTRWD Share	Irving Share
Cost Estimate Summary						
TRWD, DWU, NTMWD, UTRWD, and Irving - Wright Patman Reallocation - Alt.						
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023						
CAPITAL COST						
Dam and Reservoir	$20,971,000	$6,752,800	$4,886,000	$6,752,800	$1,509,900	$1,069,500
Terminal Storage	$296,567,000	$165,646,000	$66,213,000	$50,695,000	$10,796,000	$3,217,000
Intake Pump Stations	$95,438,000	$31,374,200	$22,702,500	$31,374,200	$5,846,100	$4,141,000
Transmission Pipelines	$2,222,244,000	$1,038,247,000	$517,452,600	$507,895,300	$109,669,700	$48,979,400
Transmission Pump Station(s) & Storage Tank(s)	$210,810,000	$111,250,000	$49,576,000	$39,268,000	$8,176,000	$2,540,000
Integration, Relocations, Backup Generator & Other	$119,688,000	$41,163,000	$27,688,000	$36,647,000	$8,561,000	$5,629,000
TOTAL COST OF FACILITIES	**$2,965,718,000**	**$1,394,433,000**	**$688,518,100**	**$672,632,300**	**$144,558,700**	**$65,575,900**
Engineering:						
- Planning (3%)	$88,972,000	$41,833,000	$20,656,000	$20,179,000	$4,337,000	$1,967,000
- Design (7%)	$207,600,000	$97,610,300	$48,196,300	$47,084,000	$10,119,100	$4,590,300
- Construction Engineering (1%)	$29,657,000	$13,944,000	$6,885,000	$6,726,000	$1,446,000	$656,000
Legal Assistance (2%)	$59,314,000	$27,888,700	$13,770,000	$13,452,600	$2,891,200	$1,311,500
Fiscal Services (2%)	$59,314,000	$27,888,700	$13,770,000	$13,452,600	$2,891,200	$1,311,500
Pipeline Contingency (15%)	$333,337,000	$155,737,000	$77,618,000	$76,185,000	$16,450,000	$7,347,000
All Other Facilities Contingency (20%)	$148,694,000	$71,237,000	$34,213,000	$32,947,000	$6,978,000	$3,319,000
Environmental & Archaeology Studies and Mitigation	$300,993,000	$98,179,000	$70,036,000	$96,011,000	$21,644,000	$15,123,000
Land Acquisition and Surveying (2034 acres)	$48,618,000	$27,180,800	$7,367,100	$10,181,100	$2,276,500	$1,612,500
Interest During Construction (3.5% for 4 years with a 0.5% ROI)	$549,042,000	$255,577,300	$121,954,000	$119,938,100	$37,837,000	$13,735,000
TOTAL COST OF PROJECT	**$4,791,259,000**	**$2,211,508,800**	**$1,102,983,500**	**$1,108,788,700**	**$251,428,700**	**$116,548,700**
ANNUAL COST						
Debt Service (3.5 percent, 30 years)	$214,589,000	$106,584,000	$47,157,400	$42,046,700	$14,644,000	$4,156,000
Reservoir Debt Service (3.5 percent, 40 years)	$39,904,000	$12,849,100	$9,297,700	$12,849,000	$2,873,100	$2,035,000
Operation and Maintenance						
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$23,419,000	$11,632,000	$5,146,600	$4,588,800	$1,598,000	$453,600
Intakes and Pump Stations (2.5% of Cost of Facilities)	$7,656,000	$4,276,000	$1,709,000	$1,309,000	$279,000	$83,000
Dam and Reservoir (1.5% of Cost of Facilities)	$4,763,000	$1,533,700	$1,109,800	$1,533,700	$342,900	$242,900
Pumping Energy Costs (238611598 kW-hr @ 0.09 $/kW-hr)	$22,172,000	$11,013,000	$4,873,000	$4,344,000	$1,513,000	$429,000
TOTAL ANNUAL COST	**$312,503,000**	**$147,887,800**	**$69,293,500**	**$66,671,200**	**$21,250,000**	**$7,399,500**
Available Project Yield (acft/yr)	125,000	40,250	29,125	40,250	9,000	6,375
Annual Cost of Water ($ per acft)	$2,500	$3,674	$2,379	$1,656	$2,361	$1,161
Annual Cost of Water After Debt Service ($ per acft)	$464	$707	$441	$293	$415	$190
Annual Cost of Water ($ per 1,000 gallons)	$7.67	$11.27	$7.30	$5.08	$7.24	$3.56
Annual Cost of Water After Debt Service ($ per 1,000 gallons)	$1.42	$2.17	$1.35	$0.90	$1.27	$0.58

Note: One or more cost element has been calculated externally

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Table H.24

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *DWU and UTRWD - Joint Red River OCR*			
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023			
Item	***Estimated Costs for Facilities***	***DWU Share***	***UTRWD Share***
CAPITAL COST			
Off-Channel Storage/Ring Dike (Conservation Pool 32000 acft, 800 acres)	$180,643,000	$151,318,000	$29,325,000
Intake Pump Stations (103.1 MGD)	$171,741,000	$143,861,000	$27,880,000
Transmission Pipeline (78-84 in. dia., 99.8 miles)	$968,152,000	$810,984,000	$157,168,000
Transmission Pump Station(s) & Storage Tank(s)	$55,127,000	$46,178,000	$8,949,000
Integration, Relocations, Backup Generator & Other	$9,745,000	$8,163,000	$1,582,000
TOTAL COST OF FACILITIES	**$1,385,408,000**	**$1,160,504,000**	**$224,904,000**
Engineering:			
- Planning (3%)	$41,562,000	$34,815,000	$6,747,000
- Design (7%)	$96,979,000	$81,236,000	$15,743,000
- Construction Engineering (1%)	$13,854,000	$11,605,000	$2,249,000
Legal Assistance (2%)	$27,708,000	$23,210,000	$4,498,000
Fiscal Services (2%)		$23,210,000	$4,498,000
Pipeline Contingency (15%)	$145,223,000	$121,648,000	$23,575,000
All Other Facilities Contingency (20%)	$83,451,000	$69,904,000	$13,547,000
Environmental & Archaeology Studies and Mitigation	$13,838,000	$11,592,000	$2,246,000
Land Acquisition and Surveying (3286 acres)	$44,300,000	$37,108,000	$7,192,000
Interest During Construction (3.5% for 3 years with a 0.5% ROI)	$182,354,000	$152,751,000	$29,603,000
TOTAL COST OF PROJECT	**$2,062,385,000**	**$1,727,583,000**	**$334,802,000**
ANNUAL COST			
Debt Service (3.5 percent, 20 years)	$124,043,000	$103,906,000	$20,137,000
Reservoir Debt Service (3.5 percent, 40 years)	$13,565,000	$11,363,000	$2,202,000
Operation and Maintenance			
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$9,779,000	$8,191,000	$1,588,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$5,672,000	$4,751,000	$921,000
Dam and Reservoir (1.5% of Cost of Facilities)	$2,710,000	$2,270,000	$440,000
Water Treatment Plant	$4,191,000	$3,511,000	$680,000
Pumping Energy Costs (117213772 kW-hr @ 0.09 $/kW-hr)	$10,549,000	$8,836,000	$1,713,000
Sediment Basin Dredging	$2,710,000	$2,270,000	$440,000
TOTAL ANNUAL COST	**$173,219,000**	**$145,098,000**	**$28,121,000**
Available Project Yield (acft/yr)	92,400	77,400	15,000
Annual Cost of Water ($ per acft), based on PF=1.25	$1,875	$1,875	$1,875
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.25	$385	$385	$385
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.25	$5.75	$5.75	$5.75
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.25	$1.18	$1.18	$1.18
Costs are from Draft Dallas Long Range Water Supply Plan, 2024			
CZG			*2/19/2025*

Table H.25

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *TRWD - Aquifer Storage and Recovery Pilot*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Well Fields (Wells, Pumps, and Piping)	$4,571,000
Integration, Relocations, Backup Generator & Other	$5,810,000
TOTAL COST OF FACILITIES	**$10,381,000**
Engineering:	
- Planning (3%)	$311,000
- Design (7%)	$727,000
- Construction Engineering (1%)	$104,000
Legal Assistance (2%)	$208,000
Fiscal Services (2%)	$208,000
All Other Facilities Contingency (20%)	$2,076,000
Environmental & Archaeology Studies and Mitigation	$5,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$912,000
TOTAL COST OF PROJECT	**$14,932,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$812,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$104,000
Pumping Energy Costs (7644443 kW-hr @ 0.09 $/kW-hr)	$688,000
TOTAL ANNUAL COST	**$1,604,000**
Available Project Yield (acft/yr)	5,000
Annual Cost of Water ($ per acft), based on PF=1	$321
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$158
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$0.98
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.49
Note: One or more cost element has been calculated externally	
ADB	*9/19/2024*

Table H.26

Water Supply Project Option TRWD - Marty Leonard Wetlands (Cedar Creek Wetland)	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.5 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Pump Stations and Intake Facilities	$142,404,000
Raw Water Pipeline, Finishied Water Pipeline, and Balancing Reservoir	$108,521,000
Cedar Creek Wetlands Sedimentation Basins and Wetland Cells	$193,600,000
TOTAL COST OF FACILITIES	**$444,525,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$150,158,000
Environmental & Archaeology Studies and Mitigation	$21,000,000
Land Acquisition and Surveying	$16,600,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$41,098,000
TOTAL COST OF PROJECT	**$673,381,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$36,613,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$3,021,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$3,560,000
Pumping Energy Costs (kW-hr @ 0.09 $/kW-hr)	$14,307,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$57,501,000**
Available Project Yield (acft/yr)	88,059
Annual Cost of Water ($ per acft)	$652.98
Annual Cost of Water After Debt Service ($ per acft)	$237.20
Annual Cost of Water ($ per 1,000 gallons)	$2.00
Annual Cost of Water After Debt Service ($ per 1,000 gallons)	$0.73

Table H.27

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *TRWD - Mary's Creek Reuse*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (0 MGD)	$15,950,000
Transmission Pipeline (42 in. dia., 3.5 miles)	$12,768,000
Integration, Relocations, Backup Generator & Other	$19,315,000
TOTAL COST OF FACILITIES	**$48,033,000**
Engineering:	
- Planning (3%)	$1,441,000
- Design (7%)	$3,362,000
- Construction Engineering (1%)	$480,000
Legal Assistance (2%)	$961,000
Fiscal Services (2%)	$961,000
Pipeline Contingency (15%)	$1,915,000
All Other Facilities Contingency (20%)	$7,053,000
Environmental & Archaeology Studies and Mitigation	$243,000
Land Acquisition and Surveying (18 acres)	$281,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$4,208,000
TOTAL COST OF PROJECT	**$68,938,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$3,748,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$321,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$399,000
Pumping Energy Costs (10334419 kW-hr @ 0.09 $/kW-hr)	$930,000
TOTAL ANNUAL COST	**$5,398,000**
Available Project Yield (acft/yr)	25,928
Annual Cost of Water ($ per acft), based on PF=2	$208
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$64
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$0.64
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.20
Note: One or more cost element has been calculated externally	
CJM - Plummer	*12/12/2024*

Table H.28

Water Supply Project Option *TRWD - Cedar Creek Wetland Expansion (Reuse from TRA Central RWS)*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.5 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
TOTAL COST OF FACILITIES	**$0**
TOTAL COST OF PROJECT	**$0**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$0
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (kW-hr @ 0.09 $/kW-hr)	$1,848,000
Purchase of Water (60,000 acft/yr @ $97.76 $/acft)	$5,865,000
TOTAL ANNUAL COST	**$7,713,000**
Available Project Yield (acft/yr)	60,000
Annual Cost of Water ($ per acft)	$128.55
Annual Cost of Water After Debt Service ($ per acft)	$128.55
Annual Cost of Water ($ per 1,000 gallons)	$0.39
Annual Cost of Water After Debt Service ($ per 1,000 gallons)	$0.39

Table H.29

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *TRWD - Tehuacana Reservoir*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, 15000 acres)	$80,358,000
Integration, Relocations, Backup Generator & Other	$72,684,000
TOTAL COST OF FACILITIES	**$153,042,000**
Engineering:	
- Planning (3%)	$4,591,000
- Design (7%)	$10,713,000
- Construction Engineering (1%)	$1,530,000
Legal Assistance (2%)	$3,061,000
Fiscal Services (2%)	$3,061,000
All Other Facilities Contingency (20%)	$30,608,000
Environmental & Archaeology Studies and Mitigation	$110,855,000
Land Acquisition and Surveying (15000 acres)	$111,735,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$27,899,000
TOTAL COST OF PROJECT	**$457,095,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$5,683,000
Reservoir Debt Service (3.5 percent, 40 years)	$16,510,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$727,000
Dam and Reservoir (1.5% of Cost of Facilities)	$1,205,000
TOTAL ANNUAL COST	**$24,125,000**
Available Project Yield (acft/yr)	22,330
Annual Cost of Water ($ per acft), based on PF=0	$1,080
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$87
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$3.32
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.27
Note: One or more cost element has been calculated externally	
ADB	*9/20/2024*

Table H.30

Cost Estimate Summary *TRWD - Groundwater Fields E1B, 4, & 1A - Section 16 (Average Scenario)*	
September 2023 Dollars	
Item	*Estimated Costs for Facilities*
CAPITAL COST	
Transmission Pipeline Rural Segment E1B - E4 (36 in dia., 4.2 miles)	$14,663,000
Transmission Pipeline Rural Segment E4 - E1A (42 in dia., 8.3 miles)	$37,722,000
Transmission Pipeline Rural Segment E1A - Section 16 (54 in dia., 18.8 miles)	$116,190,000
E1A Pump Station (2854 HP)	$24,917,000
Well Field E1B	$19,758,000
Well Field E4	$12,969,000
Well Field E1A	$22,365,000
Ground Storage Tank (3MG)	$3,306,000
TOTAL COST OF FACILITIES	**$251,890,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$79,568,000
Environmental & Archaeology Studies and Mitigation	$1,798,000
Land Acquisition and Surveying	$1,213,000
Interest During Construction (2 years)	$21,740,000
TOTAL COST OF PROJECT	**$356,209,000**
ANNUAL COST	
Debt Service (3.5% for 30 years)	$19,368,000
Electricity ($0.08 per kWh)	$3,790,000
Pump Station & Pipeline Operation & Maintenance	$3,719,000
Raw Water Purchase ($1.50/1,000 gal)	$12,219,000
TOTAL ANNUAL COST	**$39,096,000**
Available Project Yield (acft/yr)	32,000
Annual Cost of Water ($ per acft)	$1,222
Annual Cost of Water After Debt Service ($ per acft)	$617
Annual Cost of Water ($ per 1,000 gallons)	$3.75
Annual Cost of Water After Debt Service ($ per 1,000 gallons)	$1.89
KW	

Table H.31

Cost Estimate Summary *Water Supply Project* *TRWD and DWU - IPL*			
Based on Costs Provided by Sponsors			
Item	***Estimated Costs for Facilities***	***TRWD Portion***	***DWU Portion***
CAPITAL COST			
JRC1 Richland-Chambers Reservoir Pump Station (250 MGD) and Transmission Pipeline Segment 16	$480,000,000	$480,000,000	$0
JB2 Booster Pump Station (347 MGD)	$223,000,000	$127,429,000	$95,571,000
JB3 Booster Pump Station Expansion (347 MGD)	$43,000,000	$24,571,000	$18,429,000
JB4 Booster Pump Station (197 MGD)	$233,000,000	$233,000,000	$0
Transmission Pipeline Segment Section 9	$462,000,000	$462,000,000	$0
TOTAL COST OF PROJECT	**$1,441,000,000**	**$1,327,000,000**	**$114,000,000**

Table H.32

Cost Estimate Summary ***Water Supply Project Option*** ***September 2023 Prices*** ***TRWD - Additional Transmission***	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Terminal Storage (Conservation Pool 500 acft, 45 acres)	$99,983,000
Intake Pump Stations (44.7 MGD)	$95,313,000
Transmission Pipeline (54-72 in. dia., 105.8 miles)	$631,490,000
Transmission Pump Station(s) & Storage Tank(s)	$77,830,000
Integration, Relocations, Backup Generator & Other	$6,252,000
TOTAL COST OF FACILITIES	**$910,868,000**
- Planning (3%)	$27,326,000
- Design (7%)	$63,761,000
- Construction Engineering (1%)	$9,109,000
Legal Assistance (2%)	$18,217,000
Fiscal Services (2%)	$18,217,000
Pipeline Contingency (15%)	$94,723,000
All Other Facilities Contingency (20%)	$55,876,000
Environmental & Archaeology Studies and Mitigation	$5,120,000
Land Acquisition and Surveying (846 acres)	$1,981,000
Interest During Construction (3.5% for 3 years with a 0.5% ROI)	$117,508,000
TOTAL COST OF PROJECT	**$1,322,706,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$63,658,000
Reservoir Debt Service (3.5 percent, 30 years)	$8,259,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$6,377,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$4,329,000
Dam and Reservoir (1.5% of Cost of Facilities)	$1,500,000
Pumping Energy Costs (102564729 kW-hr @ 0.09 $/kW-hr)	$9,231,000
TOTAL ANNUAL COST	**$93,354,000**
Available Project Yield (acft/yr)	77,400
Annual Cost of Water ($ per acft), based on PF=1.25	$1,206
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.25	$277
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.25	$3.70
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.25	$0.85
CZG	*12/20/2024*

Table H.33

Cost Estimate Summary Water Supply Project Option September 2023 Prices TRWD - WMS # 19 Groundwater	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 277.68 for September 2023	
Item	***Estimated Costs for WMS # 19 Groundwater***
CAPITAL COST	
Pump Stations (56.2 MGD)	$68,251,000
Transmission Pipeline (54 in. dia., 57.9 miles)	$338,199,000
Well Fields (Wells, Pumps, and Piping)	$140,620,000
Integration, Relocations, Backup Generator & Other	$1,093,000
TOTAL COST OF FACILITIES	**$614,260,000**
- Planning (3%)	$18,395,000
- Design (7%)	$42,922,000
- Construction Engineering (1%)	$6,132,000
Legal Assistance (2%)	$12,263,000
Fiscal Services (2%)	$12,263,000
Pipeline Contingency (15%)	$50,730,000
All Other Facilities Contingency (20%)	$54,994,000
Environmental & Archaeology Studies and Mitigation	$6,051,000
Land Acquisition and Surveying (823 acres)	$5,429,000
TOTAL COST OF PROJECT	**$823,439,000**
ANNUAL COST	
Debt Service (4 percent, 30 years)	$47,556,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$4,841,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$3,227,000
Pumping Energy Costs (51965633 kW-hr @ 0.09 $/kW-hr)	$4,677,000
Purchase of Water (42000 acft/yr @ 97.7553 $/acft)	$4,106,000
TOTAL ANNUAL COST	**$64,407,000**
Available Project Yield (acft/yr)	42,000
Annual Cost of Water ($ per acft), based on PF=1.5	$1,534
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.5	$401
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.5	$4.71
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.5	$1.23
Lissa Gregg	*11/22/2024*

Table H.34

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *DWU - Ellis1C OCR (5b) from SE intake to Joe Pool*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Off-Channel Storage/Ring Dike (Conservation Pool 300000 acft, 4337 acres)	$282,129,000
Intake Pump Stations (127.5 MGD)	$127,285,000
Transmission Pipeline (72-90 in. dia., 38.3 miles)	$642,549,000
Transmission Pump Station(s) & Storage Tank(s)	$75,339,000
Integration, Relocations, Backup Generator & Other	$15,652,000
TOTAL COST OF FACILITIES	**$1,142,954,000**
Engineering:	
- Planning (3%)	$34,289,000
- Design (7%)	$80,007,000
- Construction Engineering (1%)	$11,430,000
Legal Assistance (2%)	$22,859,000
Fiscal Services (2%)	$22,859,000
Pipeline Contingency (15%)	$96,274,000
All Other Facilities Contingency (20%)	$100,225,000
Environmental & Archaeology Studies and Mitigation	$48,977,000
Land Acquisition and Surveying (4584 acres)	$50,910,000
Interest During Construction (3.5% for 3 years with a 0.5% ROI)	$156,315,000
TOTAL COST OF PROJECT	**$1,767,099,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$87,010,000
Reservoir Debt Service (3.5 percent, 40 years)	$24,487,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$6,796,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$4,529,000
Dam and Reservoir (1.5% of Cost of Facilities)	$4,232,000
Pumping Energy Costs (124098746 kW-hr @ 0.09 $/kW-hr)	$11,169,000
TOTAL ANNUAL COST	**$138,223,000**
Available Project Yield (acft/yr)	114,337
Annual Cost of Water ($ per acft), based on PF=1.25	$1,209
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.25	$234
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.25	$3.71
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.25	$0.72
Note: One or more cost element has been calculated externally	
P Newell Updated by C Nellis	*5/20/2024*

Table H.35

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *DWU - Connect to Bachman*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Transmission Pipeline (None)	$385,192,000
TOTAL COST OF FACILITIES	**$385,192,000**
Engineering:	$59,702,000
Legal Assistance (2%)	$6,401,000
Fiscal Services (1%)	$3,853,000
Pipeline Contingency (15%)	$57,779,000
Environmental & Archaeology Studies and Mitigation	$1,434,000
Land Acquisition and Surveying	$27,810,000
Interest During Construction (3% for 3 years with a 0.5% ROI)	$44,730,000
TOTAL COST OF PROJECT	**$586,902,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$41,194,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$3,852,000
TOTAL ANNUAL COST	**$45,046,000**
Available Project Yield (acft/yr)	114,337
Annual Cost of Water ($ per acft), based on PF=0	$394
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$33.69
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$1.21
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.10
Note: One or more cost element has been calculated externally	

Table H.36

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *DWU - UNWSP - East Route (E3) - Scenario 1 (SW)*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$13,201,000
Intake Pump Stations (91.4 MGD)	$69,929,000
Transmission Pipeline (66-72 in. dia., 42.3 miles)	$370,378,000
Transmission Pump Station(s) & Storage Tank(s)	$55,850,000
Integration, Relocations, Backup Generator & Other	$2,283,000
TOTAL COST OF FACILITIES	**$511,641,000**
Engineering:	
- Planning (3%)	$15,349,000
- Design (7%)	$35,815,000
- Construction Engineering (1%)	$5,116,000
Legal Assistance (2%)	$10,233,000
Fiscal Services (2%)	$10,233,000
Pipeline Contingency (15%)	$55,557,000
All Other Facilities Contingency (20%)	$28,253,000
Environmental & Archaeology Studies and Mitigation	$1,329,000
Land Acquisition and Surveying (266 acres)	$1,756,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$43,745,000
TOTAL COST OF PROJECT	**$719,027,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$50,431,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$3,806,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$2,945,000
Dam and Reservoir (1.5% of Cost of Facilities)	$198,000
Pumping Energy Costs (37458554 kW-hr @ 0.09 $/kW-hr)	$3,371,000
Delivery through IPL ($180,000 per MGD)	$8,646,000
TOTAL ANNUAL COST	**$69,397,000**
Available Project Yield (acft/yr)	53,800
Annual Cost of Water ($ per acft), based on PF=1.9027	$1,290
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.9027	$192
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.9027	$3.96
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.9027	$0.59
P Newell Updated by C Nellis and C Burton	*8/28/2024*

Table H.37

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Dallas LRWSP Groundwater Level 2 - Rte2*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (8.5 MGD)	$12,030,000
Transmission Pipeline (18-78 in. dia., 57.7 miles)	$263,637,000
Transmission Pump Station(s) & Storage Tank(s)	$58,396,000
Well Fields (Wells, Pumps, and Piping)	$150,872,000
TOTAL COST OF FACILITIES	**$484,935,000**
Engineering:	
- Planning (3%)	$14,133,000
- Design (7%)	$32,978,000
- Construction Engineering (1%)	$4,711,000
Legal Assistance (2%)	$9,422,000
Fiscal Services (2%)	$9,422,000
Pipeline Contingency (15%)	$37,472,000
All Other Facilities Contingency (20%)	$44,260,000
Environmental & Archaeology Studies and Mitigation	$8,484,000
Land Acquisition and Surveying (1010 acres)	$6,654,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$42,411,000
TOTAL COST OF PROJECT	**$694,882,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$48,893,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$4,129,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$1,454,000
Pumping Energy Costs (26618908 kW-hr @ 0.09 $/kW-hr)	$2,396,000
Delivery through Eastside Supply Pipeline ($ 60000/MGD)	$2,269,000
TOTAL ANNUAL COST	**$59,141,000**
Available Project Yield (acft/yr)	30,000
Annual Cost of Water ($ per acft), based on PF=0	$1,971
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$342
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$6.05
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$1.05
P Newell Updated By C Burton	*9/25/2024*

Table H.38

Cost Estimate Summary Water Supply Project Option September 2023 Prices Dallas LRWSP Groundwater -- Conjunctive Use	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	**Estimated Costs for Facilities**
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$13,201,000
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$401,621,000
Intake Pump Stations (63.1 MGD)	$130,022,000
Transmission Pipeline (24-90 in. dia., 7.5 miles)	$77,546,000
TOTAL COST OF FACILITIES	**$622,390,000**
Engineering:	
- Planning (3%)	$18,672,000
- Design (7%)	$43,567,000
- Construction Engineering (1%)	$6,224,000
Legal Assistance (2%)	$12,448,000
Fiscal Services (2%)	$12,448,000
Pipeline Contingency (15%)	$11,597,000
All Other Facilities Contingency (20%)	$109,015,000
Environmental & Archaeology Studies and Mitigation	$6,801,000
Land Acquisition and Surveying (380 acres)	$5,002,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$55,132,000
TOTAL COST OF PROJECT	**$903,296,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$22,211,000
Reservoir Debt Service (3.5 percent, 40 years)	$27,517,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$775,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$3,251,000
Dam and Reservoir (1.5% of Cost of Facilities)	$6,222,000
Pumping Energy Costs (99254469 kW-hr @ 0.09 $/kW-hr)	$8,933,000
Delivery through Eastside Supply Pipeline ($ 60000/ MGD)	$5,612,107
TOTAL ANNUAL COST	**$74,521,107**
Available Project Yield (acft/yr)	74,200
Annual Cost of Water ($ per acft), based on PF=0	$1,004
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$334
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$3.08
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$1.03
Note: One or more cost element has been calculated externally	
Z Stein Updated By C Burton	*9/25/2024*

Table H.39

DWU - System Improvements		
Amount	268,403	AF/Y
OWNER:	DWU	

Project	**Capital Budget (Includes Engineering and Contingency)**
2030 Projects	
Pipelines	
Southwest Pipeline Phase 1	$113,000,000
Southwest Pipeline Phase 2	$200,000,000
Southwest Pipeline Phase 3	$230,000,000
All Other Facilities	
Lake June PS Phase 1 (Reservoirs)	$70,000,000
Bachman WTP; High-Rate Treatment Trains and Filters	$240,000,000
Wintergreen Pump Station - Initial Stage	$80,000,000
Wintergreen Pump Station - Final Buildout	$26,000,000
Pipeline Total	**$543,000,000**
All Other Facilities Total	**$416,000,000**
Interest During Construction (3% for 1 years with a 0.5% ROI)	**$26,372,500**
Total, 2030 Projects	**$985,373,000**
Annual Costs for 2030 Projects	
Debt Service (3.5% interest, 30 year bonds)	$53,576,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$5,430,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$4,400,000
Dam and Reservoir (1.5% of Cost of Facilities)	$1,050,000
WTP Operations	$16,800,000
Total Pre-Amortization	**$81,256,000**
Total After Amortization	**$27,680,000**

Continued	
2040 Projects	
Pipelines	
72-inch Treated Water Pipeline; Bachman WTP to Elm Fork WTP	$90,000,000
All Other Facilities	
Elm Fork WTP; Water Quality Improvements Program (CMAR delivery)	$491,000,000
New 150MGD Western WTP	$891,280,000
Lake June PS Phase 2	$170,000,000
Pipeline Total	**$90,000,000**
All Other Facilities Total	**$1,552,280,000**
Interest During Construction (3% for 1 years with a 0.5% ROI)	**$45,162,700**
Total, 2040 Projects	**$1,687,443,000**
Annual Costs for 2040 Projects	
Debt Service (3.5% interest, 30 year bonds)	$91,749,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$900,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$4,250,000
Water Treatment Plant Operation	$96,759,600
Total Pre-Amortization	**$193,658,600**
Total After Amortization	**$101,909,600**
2050 Projects	
144-in Pipeline; Tawakoni Interconnect to Balancing Reservoir and on to East Side WTP	$390,000,000
East Side WTP; Stage V Filters	$55,000,000
New 240MGD Eastern WTP	$1,378,772,000
Pipeline Total	**$390,000,000**
All Other Facilities Total	**$1,433,772,000**
Interest During Construction (3% for 1 years with a 0.5% ROI)	$50,153,730
Total, 2050 Projects	**$1,873,926,000**
Annual Costs for 2050 Projects	
Debt Service (3.5% interest, 30 year bonds)	$101,888,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$3,900,000
Water Treatment Plant Operation	$100,364,040
Total Pre-Amortization	**$206,152,040**
Total After Amortization	**$104,264,040**

Continued	
2070 Projects	
Western WTP Expansion	$289,462,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$7,960,205
Total, 2070 Projects	**$297,422,000**
Annual Costs for 2070 Projects	
Debt Service (3.5% interest, 30 year bonds)	$16,171,000
Operation and Maintenance	
Water Treatment Plant Operation	$20,262,340
Total During Amortization	**$36,433,340**
Total After Amortization	**$20,262,340**
2080 Projects	
Expand Eastern WTP	$376,295,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$10,348,113
Total, 2080 Projects	**$386,643,000**
Annual Costs for 2080 Projects	
Debt Service (3.5% interest, 30 year bonds)	$21,022,000
Operation and Maintenance	
Water Treatment Plant Operation	$26,340,650
Total During Amortization	**$47,362,650**
Total After Amortization	**$26,340,650**
TOTAL CAPITAL COST	**$5,230,807,000**
UNIT COSTS (During Amortization)	
Per Acre-Foot	**$2,105**
Per 1,000 Gallons	**$6.46**
UNIT COSTS (After Amortization)	
Per Acre-Foot	**$1,045**
Per 1,000 Gallons	**$3.21**

Table H.40

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *DWU - Red River Diversion*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Off-Channel Storage/Ring Dike (Conservation Pool 32000 acft, 800 acres)	$180,643,000
Intake Pump Stations (103.1 MGD)	$171,741,000
Transmission Pipeline (78-84 in. dia., 99.8 miles)	$968,152,000
Transmission Pump Station(s) & Storage Tank(s)	$55,127,000
Integration, Relocations, Backup Generator & Other	$9,745,000
TOTAL COST OF FACILITIES	**$1,385,408,000**
- Planning (3%)	$41,562,000
- Design (7%)	$96,979,000
- Construction Engineering (1%)	$13,854,000
Legal Assistance (2%)	$27,708,000
Fiscal Services (2%)	$27,708,000
Pipeline Contingency (15%)	$145,223,000
All Other Facilities Contingency (20%)	$83,451,000
Environmental & Archaeology Studies and Mitigation	$13,838,000
Land Acquisition and Surveying (3286 acres)	$44,300,000
Interest During Construction (3.5% for 3 years with a 0.5% ROI)	$182,354,000
TOTAL COST OF PROJECT	**$2,062,385,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$124,043,000
Reservoir Debt Service (3.5 percent, 40 years)	$13,565,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$9,779,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$5,672,000
Dam and Reservoir (1.5% of Cost of Facilities)	$2,710,000
Water Treatment Plant	$4,191,000
Pumping Energy Costs (117213772 kW-hr @ 0.09 $/kW-hr)	$10,549,000
Sediment Basin Dredging	$2,710,000
TOTAL ANNUAL COST	**$173,219,000**
Available Project Yield (acft/yr)	92,400
Annual Cost of Water ($ per acft), based on PF=1.25	$1,875
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.25	$385
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.25	$5.75
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.25	$1.18
Note: One or more cost element has been calculated externally	
Z Stein Updated by C Nellis	*5/23/2024*

Table H.41

Cost Estimate Summary Water Supply Project Option September 2023 Prices DWU - Lake Texoma	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (181.1 MGD)	$196,547,000
Transmission Pipeline (30-90 in. dia., 96.7 miles)	$1,083,333,000
Transmission Pump Station(s) & Storage Tank(s)	$13,245,000
Two Water Treatment Plants (90.6 MGD and 181.1 MGD)	$1,167,105,000
Integration, Relocations, Backup Generator & Other	$6,450,000
TOTAL COST OF FACILITIES	**$2,466,680,000**
- Planning (3%)	$74,000,000
- Design (7%)	$172,668,000
- Construction Engineering (1%)	$24,667,000
Legal Assistance (2%)	$49,334,000
Fiscal Services (2%)	$49,334,000
Pipeline Contingency (15%)	$162,500,000
All Other Facilities Contingency (20%)	$276,669,000
Environmental & Archaeology Studies and Mitigation	$3,667,000
Land Acquisition and Surveying (1914 acres)	$10,693,000
Interest During Construction (3.5% for 5 years with a 0.5% ROI)	$533,612,000
TOTAL COST OF PROJECT	**$3,823,824,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$268,595,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$10,922,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$5,185,000
Water Treatment Plant	$132,404,000
Pumping Energy Costs (105818823 kW-hr @ 0.09 $/kW-hr)	$9,524,000
Purchase of Water (146000 acft/yr @ 31.0599602177554 $/acft)	$4,535,000
TOTAL ANNUAL COST	**$431,165,000**
Available Project Yield (acft/yr)	146,000
Annual Cost of Water ($ per acft), based on PF=1.25	$2,953
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.25	$1,113
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.25	$9.06
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.25	$3.42
Note: One or more cost element has been calculated externally	
L Starosta Updated by C Nellis	*5/28/2024*

Table H.42

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *ANRA - Lake Columbia*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool 195500 acft, 11500 acres)	$45,860,000
Intake Pump Stations (52.6 MGD)	$65,870,000
Transmission Pipeline (54 in. dia., 19.9 miles)	$150,239,000
Integration, Relocations, Backup Generator & Other	$98,596,000
TOTAL COST OF FACILITIES	**$360,565,000**
Engineering:	
- Planning (3%)	$10,817,000
- Design (7%)	$25,240,000
- Construction Engineering (1%)	$3,606,000
Legal Assistance (2%)	$7,211,000
Fiscal Services (2%)	$7,211,000
Pipeline Contingency (15%)	$22,536,000
All Other Facilities Contingency (20%)	$42,065,000
Environmental & Archaeology Studies and Mitigation	$113,731,000
Land Acquisition and Surveying (11988 acres)	$31,402,000
Interest During Construction (3.5% for 3 years with a 0.5% ROI)	$60,638,000
TOTAL COST OF PROJECT	**$685,022,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$32,334,000
Reservoir Debt Service (3.5 percent, 40 years)	$10,443,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$2,488,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$1,647,000
Dam and Reservoir (1.5% of Cost of Facilities)	$688,000
Pumping Energy Costs (40470671 kW-hr @ 0.09 $/kW-hr)	$3,642,000
Delivery through IPL (50 MGD @ 180000 $/MGD)	$8,992,000
TOTAL ANNUAL COST	**$60,234,000**
Available Project Yield (acft/yr)	56,000
Annual Cost of Water ($ per acft), based on PF=1	$1,076
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$312
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$3.30
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.96
Note: One or more cost element has been calculated externally	
Z Stein Updated By C Nellis, C Burton	*9/26/2024*

Table H.43

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *DWU - Dallas LRWSP - Interstate Water Strategy: Little River (Millwood Lake) to LRR*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Channel Dam	$12,609,000
Intake Pump Stations (281.2 MGD)	$84,853,000
Transmission Pipeline (132 in. dia., 206.5 miles)	$4,778,645,000
Transmission Pump Station(s) & Storage Tank(s)	$229,304,000
Integration, Relocations, Backup Generator & Other	$34,332,000
TOTAL COST OF FACILITIES	**$5,139,743,000**
Engineering:	
- Planning (3%)	$154,192,000
- Design (7%)	$359,782,000
- Construction Engineering (1%)	$51,397,000
Legal Assistance (2%)	$102,795,000
Fiscal Services (2%)	$102,795,000
Pipeline Contingency (15%)	$716,797,000
All Other Facilities Contingency (20%)	$72,220,000
Environmental & Archaeology Studies and Mitigation	$6,220,000
Land Acquisition and Surveying (2523 acres)	$3,373,000
Interest During Construction (3.5% for 3 years with a 0.5% ROI)	$651,299,000
TOTAL COST OF PROJECT	**$7,360,613,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$515,837,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$48,130,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$7,854,000
Dam and Reservoir (1.5% of Cost of Facilities)	$189,000
Pumping Energy Costs (481225500 kW-hr @ 0.09 $/kW-hr)	$43,310,000
TOTAL ANNUAL COST	**$615,320,000**
Available Project Yield (acft/yr)	300,000
Annual Cost of Water ($ per acft), based on PF=1.05	$2,051
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.05	$332
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.05	$6.29
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.05	$1.02
Note: One or more cost element has been calculated externally	
Charley Burton	*5/31/2024*

Table H.44

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *DWU - Dallas LRWSP - Interstate Water Strategy: Kiamichi to LRR*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Channel Dam	$12,609,000
Intake Pump Stations (281.2 MGD)	$91,466,000
Transmission Pipeline (132 in. dia., 124.5 miles)	$2,702,120,000
Transmission Pump Station(s) & Storage Tank(s)	$139,846,000
Integration, Relocations, Backup Generator & Other	$24,996,000
TOTAL COST OF FACILITIES	**$2,971,037,000**
Engineering:	
- Planning (3%)	$89,131,000
- Design (7%)	$207,973,000
- Construction Engineering (1%)	$29,710,000
Legal Assistance (2%)	$59,421,000
Fiscal Services (2%)	$59,421,000
Pipeline Contingency (15%)	$405,318,000
All Other Facilities Contingency (20%)	$53,784,000
Environmental & Archaeology Studies and Mitigation	$3,752,000
Land Acquisition and Surveying (1524 acres)	$2,193,000
Interest During Construction (3.5% for 3 years with a 0.5% ROI)	$376,521,000
TOTAL COST OF PROJECT	**$4,258,261,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$298,209,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$27,271,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$5,783,000
Dam and Reservoir (1.5% of Cost of Facilities)	$189,000
Pumping Energy Costs (328059406 kW-hr @ 0.09 $/kW-hr)	$29,525,000
TOTAL ANNUAL COST	**$360,977,000**
Available Project Yield (acft/yr)	300,000
Annual Cost of Water ($ per acft), based on PF=1.05	$1,203
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.05	$209
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.05	$3.69
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.05	$0.64
Note: One or more cost element has been calculated externally	
Charley Burton	*5/30/2024*

Table H.45

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *NTWMD - Texoma Blend Phase I*			
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023			
Item	***Estimated Cost (Project Total)***	***Estimated Cost (NTMWD)***	***Estimated Cost (Sherman)***
CAPITAL COST			
Terminal Storage (Conservation Pool 200 acft, 15 acres)	$12,150,000	$12,150,000	$0
Intake Pump Stations (0 MGD)	$55,409,000	$44,327,000	$11,082,000
Transmission Pipeline (84 in. dia., 35.1 miles)	$321,878,000	$273,291,000	$48,587,000
Integration, Relocations, Backup Generator & Other	$1,808,000	$1,446,000	$362,000
TOTAL COST OF FACILITIES	**$391,245,000**	**$331,214,000**	**$60,031,000**
Engineering:			
- Planning (3%)	$11,737,000	$9,936,000	$1,801,000
- Design (7%)	$27,387,000	$23,185,000	$4,202,000
- Construction Engineering (1%)	$3,912,000	$3,312,000	$600,000
Legal Assistance (2%)	$7,825,000	$6,624,000	$1,201,000
Fiscal Services (2%)	$7,825,000	$6,624,000	$1,201,000
Pipeline Contingency (15%)	$48,282,000	$40,994,000	$7,288,000
All Other Facilities Contingency (20%)	$13,874,000	$11,585,000	$2,289,000
Environmental & Archaeology Studies and Mitigation	$1,241,000	$1,082,000	$159,000
Land Acquisition and Surveying (233 acres)	$3,108,000	$2,676,000	$432,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$33,569,000	$28,421,000	$5,148,000
TOTAL COST OF PROJECT	**$550,005,000**	**$465,653,000**	**$84,352,000**
ANNUAL COST			
Debt Service (3.5 percent, 30 years)	$28,933,000	$24,496,000	$4,437,000
Reservoir Debt Service (3.5 percent, 40 years)	$837,000	$837,000	$0
Operation and Maintenance			
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$3,237,000	$2,748,000	$489,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$1,385,000	$1,108,000	$277,000
Dam and Reservoir (1.5% of Cost of Facilities)	$182,000	$182,000	$0
Pumping Energy Costs (29665313 kW-hr @ 0.09 $/kW-hr)	$2,670,000	$2,136,000	$534,000
TOTAL ANNUAL COST	**$37,244,000**	**$31,507,000**	**$5,737,000**
Available Project Yield (acft/yr)		39,309	11,385
Annual Cost of Water ($ per acft), based on PF=2		$802	$504
Annual Cost of Water After Debt Service ($ per acft), based on PF=2		$157	$114
Annual Cost of Water ($ per 1,000 gallons), based on PF=2		$2.46	$1.55
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2		$0.48	$0.35
HAC			*11/11/2024*

Table H.46

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *NTMWD - Additional Measures to Access Full Lake Lavon Yield*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (0 MGD)	$155,326,000
Transmission Pipeline (None)	$24,659,000
TOTAL COST OF FACILITIES	**$179,985,000**
Engineering:	
- Planning (3%)	$5,400,000
- Design (7%)	$12,599,000
- Construction Engineering (1%)	$1,800,000
Legal Assistance (2%)	$3,600,000
Fiscal Services (2%)	$3,600,000
Pipeline Contingency (15%)	$3,699,000
All Other Facilities Contingency (20%)	$31,065,000
Environmental & Archaeology Studies and Mitigation	$2,322,000
Land Acquisition and Surveying (0 acres)	$914,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$19,421,000
Credit for Replacement Capacity in lieu of Rehabilitation	($55,057,000)
TOTAL COST OF PROJECT	**$209,348,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$11,383,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$247,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$3,883,000
TOTAL ANNUAL COST	**$15,513,000**
Available Project Yield (acft/yr)	12,667
Annual Cost of Water ($ per acft), based on PF=0	$1,225
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$326
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$3.76
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$1.00
Note: One or more cost element has been calculated externally	
HAC	*11/12/2024*

Table H.47

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *NTMWD - Expanded Wetland Reuse*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (47.8 MGD)	$31,786,000
Transmission Pipeline (48-54 in. dia., 52.2 miles)	$327,845,000
Intake Pump Stations (45.3 MGD)	$64,373,000
Constructed Wetlands (690 ac.)	$26,292,000
Backup Generator	$1,394,000
TOTAL COST OF FACILITIES	**$451,690,000**
Engineering:	
- Planning (3%)	$13,551,000
- Design (7%)	$31,618,000
- Construction Engineering (1%)	$4,517,000
Legal Assistance (2%)	$9,034,000
Fiscal Services (2%)	$9,034,000
Pipeline Contingency (15%)	$49,177,000
All Other Facilities Contingency (20%)	$24,769,000
Environmental & Archaeology Studies and Mitigation	$20,072,000
Land Acquisition and Surveying (391 acres)	$12,040,000
Interest During Construction (3.5% for 3 years with a 0.5% ROI)	$60,987,000
TOTAL COST OF PROJECT	**$686,489,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$46,309,000
Reservoir Debt Service (3.5 percent, 40 years)	$1,326,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$3,555,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$2,404,000
Pumping Energy Costs (22862206 kW-hr @ 0.09 $/kW-hr)	$2,058,000
TOTAL ANNUAL COST	**$55,652,000**
Available Project Yield (acft/yr)	33,809
Annual Cost of Water ($ per acft), based on PF=1.5	$1,646
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.5	$237
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.5	$5.05
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.5	$0.73
Note: One or more cost element has been calculated externally	
HAC	*12/10/2024*

Table H.48

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *NTWMD - Sabine Creek Reuse*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Permitting	$500,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$17,000
TOTAL COST OF PROJECT	**$517,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$36,000
TOTAL ANNUAL COST	**$36,000**
Available Project Yield (acft/yr)	10,649
Annual Cost of Water ($ per acft), based on PF=0	$3
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$0
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$0.01
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.00
HAC	*12/11/2024*

Table H.49

Cost Estimate Summary ***Water Supply Project Option*** ***September 2023 Prices*** ***NTWMD - Additional Lavon Watershed Reuse***	
Cost based on ENR CCI 13485.67 for September 2023 and ***a PPI of 278.502 for September 2023***	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Permtting	$500,000
TOTAL COST OF PROJECT	**$517,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$36,000
TOTAL ANNUAL COST	**$36,000**
Available Project Yield (acft/yr)	45,045
Annual Cost of Water ($ per acft), based on PF=0	$1
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$0
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$0.0025
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.00
HAC	*12/11/2024*

Table H.50

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *NTMWD - Lake O' the Pines*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Terminal Storage (Conservation Pool 308 acft, 25 acres)	$33,543,000
Intake Pump Stations (100.4 MGD)	$87,452,000
Transmission Pipeline (72 in. dia., 96.9 miles)	$777,902,000
Transmission Pump Station(s) & Storage Tank(s)	$52,490,000
Integration, Relocations, Backup Generator & Other	$4,710,000
TOTAL COST OF FACILITIES	**$956,097,000**
Engineering:	
- Planning (3%)	$28,683,000
- Design (7%)	$66,927,000
- Construction Engineering (1%)	$9,561,000
Legal Assistance (2%)	$19,122,000
Fiscal Services (2%)	$19,122,000
Pipeline Contingency (15%)	$116,685,000
All Other Facilities Contingency (20%)	$35,639,000
Environmental & Archaeology Studies and Mitigation	$3,701,000
Land Acquisition and Surveying (1234 acres)	$8,117,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$82,138,000
TOTAL COST OF PROJECT	**$1,345,792,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$70,515,000
Reservoir Debt Service (3.5 percent, 40 years)	$2,288,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$7,826,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$3,499,000
Dam and Reservoir (1.5% of Cost of Facilities)	$503,000
Pumping Energy Costs (77279159 kW-hr @ 0.09 $/kW-hr)	$6,955,000
Purchase of Water (75000 acft/yr @ 97.7553 $/acft)	$7,332,000
TOTAL ANNUAL COST	**$98,918,000**
Available Project Yield (acft/yr)	75,000
Annual Cost of Water ($ per acft), based on PF=1.5	$1,319
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.5	$348
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.5	$4.05
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.5	$1.07
Note: One or more cost element has been calculated externally	
HAC	*11/11/2024*

Table H.51

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *NTMWD - Texoma Blend Phase II*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Terminal Storage (Conservation Pool 400 acft, 35 acres)	$41,435,000
Intake Pump Stations (100.4 MGD)	$104,222,000
Transmission Pipeline (48-72 in. dia., 91.4 miles)	$537,097,000
Integration, Relocations, Backup Generator & Other	$1,357,000
TOTAL COST OF FACILITIES	**$684,111,000**
Engineering:	
- Planning (3%)	$20,523,000
- Design (7%)	$47,888,000
- Construction Engineering (1%)	$6,841,000
Legal Assistance (2%)	$13,682,000
Fiscal Services (2%)	$13,682,000
Pipeline Contingency (15%)	$80,565,000
All Other Facilities Contingency (20%)	$29,403,000
Environmental & Archaeology Studies and Mitigation	$3,615,000
Land Acquisition and Surveying (634 acres)	$8,475,000
Interest During Construction (3.5% for 3 years with a 0.5% ROI)	$88,608,000
TOTAL COST OF PROJECT	**$997,393,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$50,787,000
Reservoir Debt Service (3.5 percent, 40 years)	$2,965,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$5,385,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$2,606,000
Pumping Energy Costs (22264968 kW-hr @ 0.09 $/kW-hr)	$2,004,000
TOTAL ANNUAL COST	**$64,369,000**
Available Project Yield (acft/yr)	75,000
Annual Cost of Water ($ per acft), based on PF=1.5	$858
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.5	$142
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.5	$2.63
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.5	$0.43
HAC	*11/11/2024*

Table H.52

NTMWD - Treatment & Treated Water Distribution Improvements		
Probable Amount	519,504	AF/Y
OWNER:	NTMWD	
Construction Costs (Including Engineering and Contingencies)		**Cost**
2030-2040 Projects		
Water Distribution System Improvements - Pipelines		$428,895,562
Water Distribution System Improvements - Pump Stations		$201,006,567
WTP Construction and Expansion		$233,000,703
Storage Tanks		
Other		$81,449,501
Subtotal		**$944,352,332**
Interest During Construction (3% for 1 years with a 0.5% ROI)		$25,969,689
Total 2030-2040 Projects		**$970,322,000**
Annual Costs for 2030-2040 Projects		
Debt Service (3.5% interest, 30 year bonds)		$52,758,000
Facility Operation and Maintenance		$10,114,657
WTP Operation and Maintenance		$37,767,469
Total During Amortization		**$100,640,127**
Total After Amortization		**$47,882,127**
2040-2050 Projects		
Water Distribution System Improvements - Pipelines		$240,228,000
Water Distribution System Improvements - Pump Stations		$177,168,000
WTP Construction and Expansion		$2,130,233,900
Storage Tanks		
Other		$10,212,000
Subtotal		**$2,557,841,900**
Interest During Construction (3% for 1 years with a 0.5% ROI)		$70,340,652

Total 2040-2050 Projects	**$2,628,183,000**
Annual Costs for 2040-2050 Projects	
Debt Service (3.5% interest, 30 year bonds)	$142,898,000
Facility Operation and Maintenance	$6,831,480
WTP Operation and Maintenance	$126,451,766
Total During Amortization	**$276,181,246**
Total After Amortization	**$133,283,246**
2050-2060 Projects	
WTP Construction and Expansion	$221,007,000
Subtotal	**$221,007,000**
Interest During Construction (3% for 1 years with a 0.5% ROI)	$6,077,693
Total 2050-2060 Projects	**$227,085,000**
Annual Costs for 2050-2060 Projects	
Debt Service (3.5% interest, 30 year bonds)	$12,347,000
WTP Operation and Maintenance	$10,719,000
Total During Amortization	**$23,066,000**
Total After Amortization	**$10,719,000**
2060-2070 Projects	
WTP Construction and Expansion	$836,185,000
Subtotal	**$836,185,000**
Interest During Construction (3% for 1 years with a 0.5% ROI)	$22,995,088
Total 2060-2070 Projects	**$859,180,000**
Annual Costs for 2060 Projects	
Debt Service (3.5% interest, 30 year bonds)	$46,715,000

WTP Operation and Maintenance	$40,629,000
Total During Amortization	**$87,344,000**
Total After Amortization	**$40,629,000**
TOTAL CAPITAL COST	**$4,684,770,000**
ANNUAL COSTS	
Debt Service (3.5% for 30 years)	$254,717,000
Electricity ($0.09 per kWh)	$0
Operation and Maintenance	$232,513,372
Total Annual Costs	**$487,230,372**
UNIT COSTS (During Amortization)	
Per Acre-Foot	**$938**
Per 1,000 Gallons	**$2.88**
UNIT COSTS (After Amortization)	
Per Acre-Foot	**$448**
Per 1,000 Gallons	**$1.37**

Table H.53

Cost Estimate Summary Water Supply Project Option September 2023 Prices NTMWD - Fannin County Water Supply Project	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (6.4 MGD)	$9,581,000
Transmission Pipeline (8-24 in. dia., 73.1 miles)	$134,195,000
Storage Tanks (Other Than at Booster Pump Stations)	$5,308,000
Integration, Relocations, Backup Generator & Other	$115,000
TOTAL COST OF FACILITIES	**$149,199,000**
Engineering:	
- Planning (3%)	$4,476,000
- Design (7%)	$10,444,000
- Construction Engineering (1%)	$1,492,000
Legal Assistance (2%)	$2,984,000
Fiscal Services (2%)	$2,984,000
Pipeline Contingency (15%)	$20,129,000
All Other Facilities Contingency (20%)	$3,001,000
Environmental & Archaeology Studies and Mitigation	$2,405,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$13,144,000
TOTAL COST OF PROJECT	**$215,353,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$11,709,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$1,396,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$240,000
Pumping Energy Costs (1879990 kW-hr @ 0.09 $/kW-hr)	$169,000
Purchase of Water (4816 acft/yr @ 1303.404 $/acft)	$6,277,000
TOTAL ANNUAL COST	**$19,791,000**
Available Project Yield (acft/yr)	4,816
Annual Cost of Water ($ per acft), based on PF=2	$4,109
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$1,678
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$12.61
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$5.15
HAC	*11/19/2024*

Table H.54

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *NTMWD - Lake Texoma Desalination at Leonard WTP*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Terminal Storage (Conservation Pool 350 acft, 30 acres)	$18,573,000
Intake Pump Stations (53.6 MGD)	$56,343,000
Transmission Pipeline (24-54 in. dia., 59.6 miles)	$272,787,000
Two Water Treatment Plants (60 MGD and 36 MGD)	$464,267,000
Integration, Relocations, Backup Generator & Other	$1,074,000
TOTAL COST OF FACILITIES	**$813,044,000**
Engineering:	
- Planning (3%)	$24,391,000
- Design (7%)	$56,913,000
- Construction Engineering (1%)	$8,130,000
Legal Assistance (2%)	$16,261,000
Fiscal Services (2%)	$16,261,000
Pipeline Contingency (15%)	$40,918,000
All Other Facilities Contingency (20%)	$108,051,000
Environmental & Archaeology Studies and Mitigation	$2,164,000
Land Acquisition and Surveying (522 acres)	$6,327,000
Interest During Construction (3.5% for 3 years with a 0.5% ROI)	$106,516,000
TOTAL COST OF PROJECT	**$1,198,976,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$82,367,000
Reservoir Debt Service (3.5 percent, 40 years)	$1,327,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$2,739,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$1,409,000
Dam and Reservoir (1.5% of Cost of Facilities)	$279,000
Water Treatment Plant	$55,158,000
Pumping Energy Costs (17626689 kW-hr @ 0.09 $/kW-hr)	$1,586,000
TOTAL ANNUAL COST	**$144,865,000**
Available Project Yield (acft/yr)	33,630
Annual Cost of Water ($ per acft), based on PF=2	$4,308
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$1,819
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$13.22
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$5.58
HAC	*11/11/2024*

Table H.55

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *NTMWD - Fresh Groundwater Site B*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Primary Pump Station (56.2 MGD)	$50,086,000
Transmission Pipeline (54 in. dia., 90.8 miles)	$578,096,000
Transmission Pump Station(s) & Storage Tank(s)	$46,761,000
Well Fields (Wells, Pumps, and Piping)	$142,410,000
Storage Tanks (Other Than at Booster Pump Stations)	$35,027,000
Integration, Relocations, Backup Generator & Other	$2,051,000
TOTAL COST OF FACILITIES	**$854,431,000**
Engineering:	
- Planning (3%)	$25,633,000
- Design (7%)	$59,810,000
- Construction Engineering (1%)	$8,544,000
Legal Assistance (2%)	$17,089,000
Fiscal Services (2%)	$17,089,000
Pipeline Contingency (15%)	$86,714,000
All Other Facilities Contingency (20%)	$55,267,000
Environmental & Archaeology Studies and Mitigation	$7,885,000
Land Acquisition and Surveying (1462 acres)	$9,638,000
Interest During Construction (3.5% for 3 years with a 0.5% ROI)	$111,355,000
TOTAL COST OF PROJECT	**$1,253,455,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$68,152,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$7,598,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$2,366,000
Pumping Energy Costs (33653823 kW-hr @ 0.09 $/kW-hr)	$3,029,000
Purchase of Water (42000 acft/yr @ 97.7553 $/acft)	$4,106,000
TOTAL ANNUAL COST	**$85,251,000**
Available Project Yield (acft/yr)	42,000
Annual Cost of Water ($ per acft), based on PF=1.5	$2,030
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.5	$407
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.5	$6.23
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.5	$1.25
Holt Chambers	*11/5/2024*

Table H.56

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *NTMWD or UTRWD - George Parkhouse II (North)*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool 330871 acft, 15356 acres)	$361,646,000
Terminal Storage (Conservation Pool 621 acft, 35 acres)	$30,173,000
Intake Pump Stations (126.5 MGD)	$95,707,000
Transmission Pipeline (84 in. dia., 52.9 miles)	$525,796,000
Integration, Relocations, Backup Generator & Other	$4,306,000
TOTAL COST OF FACILITIES	**$1,017,628,000**
Engineering:	
- Planning (3%)	$30,529,000
- Design (7%)	$71,234,000
- Construction Engineering (1%)	$10,176,000
Legal Assistance (2%)	$20,353,000
Fiscal Services (2%)	$20,353,000
Pipeline Contingency (15%)	$78,869,000
All Other Facilities Contingency (20%)	$98,366,000
Environmental & Archaeology Studies and Mitigation	$101,871,000
Land Acquisition and Surveying (16037 acres)	$110,039,000
Interest During Construction (3.5% for 4 years with a 0.5% ROI)	$202,725,000
TOTAL COST OF PROJECT	**$1,762,143,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$50,936,000
Reservoir Debt Service (3.5 percent, 40 years)	$38,648,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$5,301,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$2,393,000
Dam and Reservoir (1.5% of Cost of Facilities)	$5,877,000
Pumping Energy Costs (70647930 kW-hr @ 0.09 $/kW-hr)	$6,358,000
TOTAL ANNUAL COST	**$109,513,000**
Available Project Yield (acft/yr)	94,460
Annual Cost of Water ($ per acft), based on PF=1.5	$1,159
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.5	$211
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.5	$3.56
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.5	$0.65
Note: One or more cost element has been calculated externally	
Holt Chambers	*11/5/2024*

Table H.57

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *NTMWD - George Parkhouse I (South)*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool 651712 acft, 28855 acres)	$314,808,000
Terminal Storage (Conservation Pool 756 acft, 62 acres)	$35,949,000
Intake Pump Stations (153.9 MGD)	$103,376,000
Transmission Pipeline (90 in. dia., 53 miles)	$571,804,000
Integration, Relocations, Backup Generator & Other	$4,961,000
TOTAL COST OF FACILITIES	**$1,030,898,000**
Engineering:	
- Planning (3%)	$30,927,000
- Design (7%)	$72,163,000
- Construction Engineering (1%)	$10,309,000
Legal Assistance (2%)	$20,618,000
Fiscal Services (2%)	$20,618,000
Pipeline Contingency (15%)	$85,771,000
All Other Facilities Contingency (20%)	$91,819,000
Environmental & Archaeology Studies and Mitigation	$189,956,000
Land Acquisition and Surveying (29564 acres)	$195,868,000
Interest During Construction (3.5% for 4 years with a 0.5% ROI)	$227,364,000
TOTAL COST OF PROJECT	**$1,976,311,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$55,113,000
Reservoir Debt Service (3.5 percent, 40 years)	$45,079,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$5,768,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$2,584,000
Dam and Reservoir (1.5% of Cost of Facilities)	$5,261,000
Water Treatment Plant	$0
Pumping Energy Costs (81391597 kW-hr @ 0.09 $/kW-hr)	$7,325,000
TOTAL ANNUAL COST	**$121,130,000**
Available Project Yield (acft/yr)	114,960
Annual Cost of Water ($ per acft), based on PF=1.5	$1,054
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.5	$182
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.5	$3.23
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.5	$0.56
Note: One or more cost element has been calculated externally	
Holt Chambers	*11/5/2024*

Table H.58

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *NTMWD - Aquifer Storage & Recovery*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Pump Stations	$2,000,000
Well Fields (Wells, Pumps, and Piping)	$164,042,000
Two Water Treatment Plants (23.6 MGD and 23.6 MGD)	$56,005,000
TOTAL COST OF FACILITIES	**$222,047,000**
- Planning (3%)	$6,661,000
- Design (7%)	$15,543,000
- Construction Engineering (1%)	$2,220,000
Legal Assistance (2%)	$4,441,000
Fiscal Services (2%)	$4,441,000
All Other Facilities Contingency (20%)	$44,409,000
Environmental & Archaeology Studies and Mitigation	$1,628,000
Land Acquisition and Surveying (54 acres)	$1,352,000
Interest During Construction (3.5% for 3 years with a 0.5% ROI)	$29,518,000
TOTAL COST OF PROJECT	**$332,260,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$18,065,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$5,906,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$234,000
Water Treatment Costs for ASR Water	$10,549,000
O&M for Additional Water Treatment Capacity	$3,807,000
Pumping Energy Costs (52491695 kW-hr @ 0.09 $/kW-hr)	$4,724,000
TOTAL ANNUAL COST	**$43,285,000**
Available Project Yield (acft/yr)	26,456
Annual Cost of Water ($ per acft), based on PF=1	$1,636
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$953
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$5.02
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$2.93
Note: One or more cost element has been calculated externally	
HAC	*11/12/2024*

Table H.59

Cost Estimate Summary	
Water Supply Project Option	
September 2023 Prices	
NTMWD - Oklahoma OCR	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Off-Channel Storage/Ring Dike (Conservation Pool 10000 acft, 419 acres)	$24,525,000
Terminal Storage (Conservation Pool 411 acft, 33 acres)	$21,188,000
Intake Pump Stations (66.9 MGD)	$71,029,000
Transmission Pipeline (60 in. dia., 80.3 miles)	$560,060,000
Transmission Pump Station(s) & Storage Tank(s)	$49,293,000
Integration, Relocations, Backup Generator & Other	$2,991,000
TOTAL COST OF FACILITIES	**$729,086,000**
Engineering:	
- Planning (3%)	$21,873,000
- Design (7%)	$51,036,000
- Construction Engineering (1%)	$7,291,000
Legal Assistance (2%)	$14,582,000
Fiscal Services (2%)	$14,582,000
Pipeline Contingency (15%)	$84,009,000
All Other Facilities Contingency (20%)	$33,805,000
Environmental & Archaeology Studies and Mitigation	$7,486,000
Land Acquisition and Surveying (1347 acres)	$15,809,000
Interest During Construction (3.5% for 3 years with a 0.5% ROI)	$95,508,000
TOTAL COST OF PROJECT	**$1,075,067,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$54,176,000
Reservoir Debt Service (3.5 percent, 40 years)	$3,684,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$5,646,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$2,970,000
Dam and Reservoir (1.5% of Cost of Facilities)	$686,000
Pumping Energy Costs (49072694 kW-hr @ 0.09 $/kW-hr)	$4,417,000
TOTAL ANNUAL COST	**$71,579,000**
Available Project Yield (acft/yr)	50,000
Annual Cost of Water ($ per acft), based on PF=1.5	$1,432
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.5	$274
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.5	$4.39
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.5	$0.84
HAC	*11/5/2024*

Table H.60

Cost Estimate Summary **Water Supply Project Option** **September 2023 Prices** **Fort Worth, Haslet, Roanoke, and Westlake - Alliance Corridor**	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (8.7 MGD)	$7,353,000
Transmission Pipeline (20-24 in. dia., 6.6 miles)	$10,690,000
Water Treatment Plant (0 MGD)	$538,000
Integration, Relocations, Backup Generator & Other	$271,000
TOTAL COST OF FACILITIES	**$23,743,000**
Engineering:	
- Planning (3%)	$712,000
- Design (7%)	$1,662,000
- Construction Engineering (1%)	$237,000
Legal Assistance (2%)	$475,000
Fiscal Services (2%)	$475,000
Pipeline Contingency (15%)	$1,603,000
All Other Facilities Contingency (20%)	$2,611,000
Environmental & Archaeology Studies and Mitigation	$404,000
Land Acquisition and Surveying (31 acres)	$470,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$2,106,000
TOTAL COST OF PROJECT	**$34,498,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$1,876,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$126,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$264,000
Water Treatment Plant	$72,000
Pumping Energy Costs (4441636 kW-hr @ 0.09 $/kW-hr)	$400,000
TOTAL ANNUAL COST	**$2,738,000**
Available Project Yield (acft/yr)	7,840
Annual Cost of Water ($ per acft), based on PF=1.25	$349
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.25	$110
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.25	$1.07
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.25	$0.34
Note: One or more cost element has been calculated externally	
AH	*11/22/2024*

Table H.61

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Fort Worth - Village Creek Future Direct Reuse*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (0 MGD)	$1,699,000
Transmission Pipeline (14 in. dia., 15 miles)	$18,865,000
Transmission Pump Station(s) & Storage Tank(s)	$5,785,000
Water Treatment Plant (0 MGD)	$5,464,000
Integration, Relocations, Backup Generator & Other	$1,557,000
TOTAL COST OF FACILITIES	**$33,370,000**
Engineering:	
- Planning (3%)	$1,001,000
- Design (7%)	$2,336,000
- Construction Engineering (1%)	$334,000
Legal Assistance (2%)	$667,000
Fiscal Services (2%)	$667,000
Pipeline Contingency (15%)	$2,830,000
All Other Facilities Contingency (20%)	$2,901,000
Environmental & Archaeology Studies and Mitigation	$588,000
Land Acquisition and Surveying (46 acres)	$704,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$2,951,000
TOTAL COST OF PROJECT	**$48,349,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$2,629,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$229,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$126,000
Water Treatment Plant	$285,000
Pumping Energy Costs (3766800 kW-hr @ 0.09 $/kW-hr)	$339,000
TOTAL ANNUAL COST	**$3,608,000**
Available Project Yield (acft/yr)	2,442
Annual Cost of Water ($ per acft), based on PF=1.25	$1,477
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.25	$401
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.25	$4.53
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.25	$1.23
Note: One or more cost element has been calculated externally	
AH	*11/22/2024*

Table H.62

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Fort Worth - Mary's Creek WRF Future Direct Reuse*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (0 MGD)	$14,970,000
Transmission Pipeline (30 in. dia., 7.8 miles)	$15,248,000
Storage Tanks (Other Than at Booster Pump Stations)	$2,968,000
Integration, Relocations, Backup Generator & Other	$12,386,000
TOTAL COST OF FACILITIES	**$45,572,000**
Engineering:	
- Planning (3%)	$1,367,000
- Design (7%)	$3,190,000
- Construction Engineering (1%)	$456,000
Legal Assistance (2%)	$911,000
Fiscal Services (2%)	$911,000
Pipeline Contingency (15%)	$2,287,000
All Other Facilities Contingency (20%)	$6,065,000
Environmental & Archaeology Studies and Mitigation	$329,000
Land Acquisition and Surveying (23 acres)	$1,029,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$4,038,000
TOTAL COST OF PROJECT	**$66,155,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$3,597,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$306,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$374,000
Pumping Energy Costs (11011334 kW-hr @ 0.09 $/kW-hr)	$991,000
TOTAL ANNUAL COST	**$5,268,000**
Available Project Yield (acft/yr)	6,278
Annual Cost of Water ($ per acft), based on PF=2	$839
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$266
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$2.57
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.82
Note: One or more cost element has been calculated externally	
CJM - Plummer	*12/27/2024*

Table H.63

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *UTRWD - Additional Direct Reuse*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (0 MGD)	$2,874,000
Transmission Pipeline (18 in. dia., 10 miles)	$24,495,000
Transmission Pump Station(s) & Storage Tank(s)	$4,201,000
Integration, Relocations, Backup Generator & Other	$84,000
TOTAL COST OF FACILITIES	**$31,654,000**
Engineering:	
- Planning (3%)	$950,000
- Design (7%)	$2,216,000
- Construction Engineering (1%)	$317,000
Legal Assistance (2%)	$633,000
Fiscal Services (2%)	$633,000
Pipeline Contingency (15%)	$3,674,000
All Other Facilities Contingency (20%)	$1,432,000
Environmental & Archaeology Studies and Mitigation	$408,000
Land Acquisition and Surveying (71 acres)	$839,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$2,780,000
TOTAL COST OF PROJECT	**$45,536,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$2,476,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$259,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$144,000
Pumping Energy Costs (1377324 kW-hr @ 0.09 $/kW-hr)	$124,000
TOTAL ANNUAL COST	**$3,003,000**
Available Project Yield (acft/yr)	2,240
Annual Cost of Water ($ per acft), based on PF=2	$1,341
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$235
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$4.11
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.72
AH	*11/22/2024*

Table H.64

UTRWD - Treatment and Distribution System Improvements		
Amount	127,922	AF/Y
OWNER:	UTRWD	

Project	**Capital Budget (Including Engineering and Contingencies)**
2030 Projects	
Pipelines	
Lake Ralph Hall Terminal Storage Raw Water Pipeline	$25,000,000
RTWS Lake Lewisville Parallel Pipeline	$50,000,000
Southwest Pipeline Phase 4	$30,000,000
Parallel Pipeline Harpool RTWP	$95,000,000
Parallel Southwest Pipeline Phase 3	$40,000,000
Parallel Harpool Raw Water Pipeline	$80,000,000
Parallel Phased Pipelines	$80,000,000
Parallel Southwest Pipeline Phase 3	$70,000,000
Southwest Pipeline Phase 5	$80,000,000
All Other Facilities	
Lake Ralph Hall Terminal Storage	$65,000,000
Relocate Booster Pump Station	$21,000,000
New 90 MGD WTP	$559,741,000
Pipeline Total	**$550,000,000**
All Other Facilities Total	**$645,741,000**
Interest During Construction (3% for 1 years with a 0.5% ROI)	**$32,882,878**
Total, 2030 Projects	**$1,228,624,000**
Annual Costs for 2030 Projects	
Debt Service (3.5% interest, 30 year bonds)	$66,802,000
Power (Estimated)	$3,000,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$5,500,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$525,000
Dam and Reservoir (1.5% of Cost of Facilities)	$975,000
Water Treatment Plant Operation	$27,199,000
Total Pre-Amortization	**$104,001,000**
Total After Amortization	**$37,199,000**

Continued	
2040 Projects	
Pipelines	
Southwest Pipeline Phase 6	$85,000,000
Harpool RWTP North Transmission Main, Phase 2	$45,000,000
RTWS Storage Tanks and Pipeline	$100,000,000
Ray Roberts Intake and Pipeline to Harpool RWTP	$200,000,000
TxDOT Widening, Treated Water Pipelines Relocations	$110,250,000
TxDOT Widening, Raw Water Pipeline Relocation	$92,250,000
Lake Ralph Hall Pipeline and Pumping Improvements	$200,000,000
Southwest Pipeline Phase 7	$45,000,000
All Other Facilities	
Harpool RWTP High Service Pumping Phase 2	$45,000,000
Taylor RWTP Expansion, Phase 4	$220,000,000
NE Pump Station and Storage Tanks	$80,000,000
Harpool RWTP Phased Treatment Expansion, Phase 3	$300,000,000
RTWS General Treatment & Pumping Improvements	$55,000,000
Pump Station Improvements and Ground Storage Tanks	$100,000,000
75 MGD WTP Expansion	$238,711,000
Pipeline Total	**$877,500,000**
All Other Facilities Total	**$1,038,711,000**
Interest During Construction (3% for 1 years with a 0.5% ROI)	**$52,695,803**
Total, 2040 Projects	**$1,968,907,000**

Continued	
Annual Costs for 2040 Projects	
Debt Service (3.5% interest, 30 year bonds)	$107,052,000
Power (Estimated)	$3,489,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$8,775,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$7,000,000
Water Treatment Plant Operation	$46,663,000
Total Pre-Amortization	**$172,979,000**
Total After Amortization	**$62,438,000**
2060 Projects	
75 MGD WTP Expansion	$238,711,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$6,564,553
Total, 2060 Projects	**$245,276,000**
Annual Costs for 2060 Projects	
Debt Service (3.5% interest, 30 year bonds)	$13,336,000
Water Treatment Plant Operation	$11,578,000
Total During Amortization	**$24,914,000**
Total After Amortization	**$11,578,000**
TOTAL CAPITAL COST	**$3,442,807,000**
UNIT COSTS (During Amortization)	
Per Acre-Foot	**$2,360**
Per 1,000 Gallons	**$7.24**
UNIT COSTS (After Amortization)	
Per Acre-Foot	**$869**
Per 1,000 Gallons	**$2.67**

Table H.65

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *UTRWD - Lake Texoma Blend with Sulphur Basin Water*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Terminal Storage (Conservation Pool 357 acft, 12 acres)	$18,873,000
Intake Pump Stations (44.6 MGD)	$61,637,000
Transmission Pipeline (54 in. dia., 63.1 miles)	$478,287,000
Integration, Relocations, Backup Generator & Other	$361,000
TOTAL COST OF FACILITIES	**$559,158,000**
Engineering:	
- Planning (3%)	$16,775,000
- Design (7%)	$39,141,000
- Construction Engineering (1%)	$5,592,000
Legal Assistance (2%)	$11,183,000
Fiscal Services (2%)	$11,183,000
Pipeline Contingency (15%)	$71,743,000
All Other Facilities Contingency (20%)	$16,174,000
Environmental & Archaeology Studies and Mitigation	$2,078,000
Land Acquisition and Surveying (400 acres)	$4,737,000
Interest During Construction (3.5% for 3 years with a 0.5% ROI)	$71,933,000
TOTAL COST OF PROJECT	**$809,697,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$42,488,000
Reservoir Debt Service (3.5 percent, 40 years)	$1,323,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$4,786,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$1,541,000
Dam and Reservoir (1.5% of Cost of Facilities)	$283,000
Pumping Energy Costs (5929862 kW-hr @ 0.09 $/kW-hr)	$534,000
Purchase of Water (25000 acft/yr @ 97.76 $/acft)	$2,444,000
TOTAL ANNUAL COST	**$53,399,000**
Available Project Yield (acft/yr)	25,000
Annual Cost of Water ($ per acft), based on PF=2	$2,136
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$384
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$6.55
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$1.18
CLV	*9/24/2024*

Table H.66

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *UTRWD - Oklahoma Water From Hugo to Lake Lewisville via Lake Chapman*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (61.4 MGD)	$60,638,000
Transmission Pipeline (60 in. dia., 56 miles)	$336,196,000
Transmission Pump Station(s) & Storage Tank(s)	$45,190,000
Integration, Relocations, Backup Generator & Other	$2,233,000
TOTAL COST OF FACILITIES	**$444,257,000**
Engineering:	
- Planning (3%)	$13,328,000
- Design (7%)	$31,098,000
- Construction Engineering (1%)	$4,443,000
Legal Assistance (2%)	$8,885,000
Fiscal Services (2%)	$8,885,000
Pipeline Contingency (15%)	$50,429,000
All Other Facilities Contingency (20%)	$21,612,000
Environmental & Archaeology Studies and Mitigation	$1,764,000
Land Acquisition and Surveying (349 acres)	$3,242,000
Interest During Construction (3.5% for 3 years with a 0.5% ROI)	$57,325,000
TOTAL COST OF PROJECT	**$645,268,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$35,084,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$3,441,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$2,503,000
Pumping Energy Costs (36640730 kW-hr @ 0.09 $/kW-hr)	$3,298,000
Purchase of Water (55000 acft/yr @ 97.76 $/acft)	$5,377,000
TOTAL ANNUAL COST	**$49,703,000**
Available Project Yield (acft/yr)	55,000
Annual Cost of Water ($ per acft), based on PF=1.25	$904
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.25	$266
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.25	$2.77
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.25	$0.82
CLV	*9/24/2024*

Table H.67

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *UTRWD - Groundwater - Carizzo-Wilcox, East Texas*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (13.4 MGD)	$43,553,000
Transmission Pump Station(s) & Storage Tank(s)	$33,118,000
Well Fields (Wells, Pumps, and Piping)	$30,575,000
Storage Tanks (Other Than at Booster Pump Stations)	$23,351,000
Integration, Relocations, Backup Generator & Other	$701,000
TOTAL COST OF FACILITIES	**$131,298,000**
Engineering:	
- Planning (3%)	$3,939,000
- Design (7%)	$9,191,000
- Construction Engineering (1%)	$1,313,000
Legal Assistance (2%)	$2,626,000
Fiscal Services (2%)	$2,626,000
All Other Facilities Contingency (20%)	$26,260,000
Environmental & Archaeology Studies and Mitigation	$6,605,000
Land Acquisition and Surveying (1010 acres)	$6,657,000
Interest During Construction (3.5% for 3 years with a 0.5% ROI)	$18,576,000
TOTAL COST OF PROJECT	**$209,091,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$11,369,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$600,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$1,781,000
Pumping Energy Costs (11502644 kW-hr @ 0.09 $/kW-hr)	$1,035,000
Purchase of Water (10000 acft/yr @ 97.7553 $/acft)	$978,000
TOTAL ANNUAL COST	**$15,763,000**
Available Project Yield (acft/yr)	10,000
Annual Cost of Water ($ per acft), based on PF=1.5	$1,576
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.5	$439
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.5	$4.84
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.5	$1.35
SFK	*12/30/2024*

Table H.68

Cost Estimate Summary Water Supply Project Option September 2023 Prices NTMWD or UTRWD - George Parkhouse II (North)	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool 330871 acft, 15356 acres)	$361,646,000
Terminal Storage (Conservation Pool 621 acft, 35 acres)	$30,173,000
Intake Pump Stations (126.5 MGD)	$99,453,000
Transmission Pipeline (84 in. dia., 56.1 miles)	$555,470,000
Integration, Relocations, Backup Generator & Other	$3,869,000
TOTAL COST OF FACILITIES	**$1,050,611,000**
Engineering:	
- Planning (3%)	$31,518,000
- Design (7%)	$73,543,000
- Construction Engineering (1%)	$10,506,000
Legal Assistance (2%)	$21,012,000
Fiscal Services (2%)	$21,012,000
Pipeline Contingency (15%)	$83,320,000
All Other Facilities Contingency (20%)	$99,028,000
Environmental & Archaeology Studies and Mitigation	$101,966,000
Land Acquisition and Surveying (16075 acres)	$110,569,000
Interest During Construction (3.5% for 4 years with a 0.5% ROI)	$208,402,000
TOTAL COST OF PROJECT	**$1,811,487,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$53,619,000
Reservoir Debt Service (3.5 percent, 40 years)	$38,648,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$5,593,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$2,486,000
Dam and Reservoir (1.5% of Cost of Facilities)	$5,877,000
Pumping Energy Costs (63474689 kW-hr @ 0.09 $/kW-hr)	$5,713,000
TOTAL ANNUAL COST	**$111,936,000**
Available Project Yield (acft/yr)	94,460
Annual Cost of Water ($ per acft), based on PF=1.5	$1,185
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.5	$208
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.5	$3.64
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.5	$0.64
Note: One or more cost element has been calculated externally	
Holt Chambers	*11/5/2024*

Table H.69

Cost Estimate Summary Water Supply Project Option September 2023 Prices NTMWD and UTRWD - George Parkhouse I (South)	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool 651712 acft, 28855 acres)	$314,808,000
Terminal Storage (Conservation Pool 495 acft, 40 acres)	$24,782,000
Intake Pump Stations (153.9 MGD)	$99,753,000
Transmission Pipeline (84-90 in. dia., 53 miles)	$507,697,000
Integration, Relocations, Backup Generator & Other	$4,746,000
TOTAL COST OF FACILITIES	**$951,786,000**
Engineering:	
- Planning (3%)	$28,554,000
- Design (7%)	$66,625,000
- Construction Engineering (1%)	$9,518,000
Legal Assistance (2%)	$19,036,000
Fiscal Services (2%)	$19,036,000
Pipeline Contingency (15%)	$76,155,000
All Other Facilities Contingency (20%)	$88,818,000
Environmental & Archaeology Studies and Mitigation	$189,680,000
Land Acquisition and Surveying (29542 acres)	$198,673,000
Interest During Construction (3.5% for 4 years with a 0.5% ROI)	$214,225,000
TOTAL COST OF PROJECT	**$1,862,106,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$49,863,000
Reservoir Debt Service (3.5 percent, 40 years)	$44,253,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$5,124,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$2,494,000
Dam and Reservoir (1.5% of Cost of Facilities)	$5,094,000
Pumping Energy Costs (77862997 kW-hr @ 0.09 $/kW-hr)	$7,008,000
TOTAL ANNUAL COST	**$113,836,000**
Available Project Yield (acft/yr)	114,960
Annual Cost of Water ($ per acft), based on PF=1.5	$990
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.5	$172
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.5	$3.04
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.5	$0.53
Note: One or more cost element has been calculated externally	
Holt Chambers	*11/5/2024*

Table H.70

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *GTUA - Regional Water System*			
Item	***Estimated Costs for Facilities***		
CAPITAL COST	**Total**	**Phase 1**	**Phase 2**
Texoma Intake and Pump Station (58 MGD)	$59,538,000	$32,332,000	$27,206,000
Texoma pipeline to WTP (60 in. dia.)	$18,982,000	$18,982,000	$0
Conventional Surface Water Treatment Plant (58 MGD)	$262,894,000	$91,800,000	$171,094,000
Advanced Surface Water Treatment (37 MGD)	$198,085,000	$90,500,000	$107,585,000
Advanced Groundwater Treatment (8 MGD)	$68,121,000	$68,121,000	$0
Brine Discharge Pipeline (24 in dia)	$2,611,000	$2,611,000	$0
Distribution pipelines	$309,875,000	$131,778,000	$178,097,000
Booster pump stations	$73,792,000	$35,357,000	$38,435,000
Ground Storage at WTP (Groundwater)	$7,110,500	$7,110,500	$0
Ground Storage at WTP (Surface water)	$43,117,000	$8,858,000	$34,259,000
Brackish Groundwater Well field	$29,721,000	$29,721,000	$0
Ground Storage at well field	$7,110,500	$7,110,500	$0
Groundwater Transmission to WTP	$29,015,000	$29,015,000	$0
Integration, Relocations, Backup Generator & Other	$1,371,000	$511,000	$860,000
Purchase of Storage in Texoma	$12,500,000	0	$12,500,000
TOTAL COST OF FACILITIES	**$1,123,843,000**	**$553,807,000**	**$570,036,000**
Engineering:			
- Planning (3%)	$33,715,000	$16,614,000	$17,101,000
- Design (7%)	$78,669,000	$38,766,000	$39,903,000
- Construction Engineering (1%)	$11,238,000	$5,538,000	$5,700,000
Legal Assistance (2%)	$22,477,000	$11,076,000	$11,401,000
Fiscal Services (2%)	$22,477,000	$11,076,000	$11,401,000
Pipeline Contingency (15%)	$54,072,000	$27,358,000	$26,715,000
All Other Facilities Contingency (20%)	$150,172,000	$74,284,000	$75,888,000
Environmental & Archaeology Studies and Mitigation	$5,664,000	$2,112,000	$3,552,000
Land Acquisition and Surveying	$6,134,000	$2,287,000	$3,847,000
Interest during Construction	$99,253,000	$37,007,000	$62,246,000
TOTAL COST OF PROJECT	**$1,607,714,000**	**$779,925,000**	**$827,790,000**
ANNUAL COST			
Debt Service (3.5% for 30 years)	$87,414,000	$42,406,000	$45,008,000
Operation and Maintenance			
Pipelines, Wells, Storage (1% of Cost)	$4,475,000	$2,352,000	$2,124,000
Intakes and pump stations (2.5% of Cost)	$3,333,000	$1,692,000	$1,641,000
Water Treatment Plant	$18,403,000	$3,781,000	$14,622,000
Advanced Water Treatment Facility	$50,287,000	$18,750,000	$31,537,000
Pumping Energy Costs	$2,629,000	$980,000	$1,649,000
Purchase of groundwater ($98/ac-ft)	$818,000	$818,000	$0
TOTAL ANNUAL COST	$167,359,000	$70,779,000	$96,581,000
Available Project Yield (acft/yr)	37,950	14,150	23,800
Annual Cost of Water ($ per acft)	$4,410	$5,002	$4,058
Annual Cost of Water After Debt Service ($ per acft)	$2,107	$2,005	$2,167
Annual Cost of Water ($ per 1,000 gallons)	$13.53	$15.35	$12.45
Annual Cost of Water After Debt Service ($ per 1,000 gallons)	$6.47	$6.15	$6.65

Table H.71

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *GTUA - Collin-Grayson Municipal Alliance Parallel Water Transmission System*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Melissa to Anna (36 in dia., 4.4 miles)	$13,579,000
Transmission Pump Station(s) & Storage Tank(s)	$11,309,000
Anna to Weston (42 in dia., 7 miles)	$27,758,000
Transmission Pump Station(s) & Storage Tank(s)	$18,527,000
McKinney to Melissa (48 in dia., 12.5 miles)	$45,550,000
Primary Pump Stations (38 MGD)	$21,664,000
Transmission Pump Station(s) & Storage Tank(s)	$3,914,000
Integration, Relocations, Backup Generator & Other	$396,000
TOTAL COST OF FACILITIES	**$142,697,000**
Engineering:	
- Planning (3%)	$4,281,000
- Design (7%)	$9,989,000
- Construction Engineering (1%)	$1,427,000
Legal Assistance (2%)	$2,854,000
Fiscal Services (2%)	$2,854,000
Pipeline Contingency (15%)	$13,033,000
All Other Facilities Contingency (20%)	$11,162,000
Environmental & Archaeology Studies and Mitigation	$878,000
Land Acquisition and Surveying (122 acres)	$1,447,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$6,196,000
TOTAL COST OF PROJECT	**$196,818,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$13,848,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$970,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$1,142,000
Pumping Energy Costs (6500950 kW-hr @ 0.09 $/kW-hr)	$585,000
Purchase of Water (21278 acft/yr @ 1303.404 $/acft)	$27,734,000
TOTAL ANNUAL COST	**$44,279,000**
Available Project Yield (acft/yr)	21,278
Annual Cost of Water ($ per acft), based on PF=2	$2,081
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$1,430
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$6.39
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$4.39
CLV	*9/23/2024*

Table H.72

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Blue Ridge - Connect to and Purchase Water from NTMWD*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	*Estimated Costs for Facilities*
CAPITAL COST	
Pump Stations	$808,000
Transmission Pipeline (6 in. dia., 2.5 miles)	$1,754,000
Storage Tanks (Other Than at Booster Pump Stations)	$1,784,000
Integration, Relocations, Backup Generator & Other	$630,000
TOTAL COST OF FACILITIES	**$6,856,000**
Engineering:	
- Planning (3%)	$206,000
- Design (7%)	$480,000
- Construction Engineering (1%)	$69,000
Legal Assistance (2%)	$137,000
Fiscal Services (2%)	$137,000
Pipeline Contingency (15%)	$263,000
All Other Facilities Contingency (20%)	$1,021,000
Environmental & Archaeology Studies and Mitigation	$204,000
Land Acquisition and Surveying (18 acres)	$214,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$624,000
TOTAL COST OF PROJECT	**$10,211,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$555,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$52,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$40,000
Pumping Energy Costs (48513 kW-hr @ 0.09 $/kW-hr)	$4,000
TOTAL ANNUAL COST	**$651,000**
Available Project Yield (acft/yr)	359
Annual Cost of Water ($ per acft), based on PF=2	$1,813
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$267
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$5.56
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.82
ADB	*11/16/2024*

Table H.73

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *East Fork SUD - Increase Delivery Infrastructure from NTMWD*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Pump Stations	$1,238,000
Transmission Pipeline (16 in. dia., 0 miles)	$2,047,000
Storage Tanks (Other Than at Booster Pump Stations)	$2,647,000
Integration, Relocations, Backup Generator & Other	$12,000
TOTAL COST OF FACILITIES	**$5,944,000**
- Planning (3%)	$178,000
- Design (7%)	$416,000
- Construction Engineering (1%)	$59,000
Legal Assistance (2%)	$119,000
Fiscal Services (2%)	$119,000
Pipeline Contingency (15%)	$307,000
All Other Facilities Contingency (20%)	$779,000
Environmental & Archaeology Studies and Mitigation	$54,000
Land Acquisition and Surveying (5 acres)	$59,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$523,000
TOTAL COST OF PROJECT	**$8,557,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$465,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$47,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$31,000
Pumping Energy Costs (195029 kW-hr @ 0.09 $/kW-hr)	$18,000
TOTAL ANNUAL COST	**$561,000**
Available Project Yield (acft/yr)	2,310
Annual Cost of Water ($ per acft), based on PF=2	$243
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$42
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$0.75
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.13
Note: One or more cost element has been calculated externally	
ADB	*11/16/2024*

Table H.74

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Frisco - Additional Reuse*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Pump Stations	$5,202,000
Transmission Pipeline (None)	$48,077,000
Integration, Relocations, Backup Generator & Other	$15,727,000
TOTAL COST OF FACILITIES	**$69,006,000**
Engineering:	
- Planning (3%)	$2,070,000
- Design (7%)	$4,830,000
- Construction Engineering (1%)	$690,000
Legal Assistance (2%)	$1,380,000
Fiscal Services (2%)	$1,380,000
Pipeline Contingency (15%)	$7,212,000
All Other Facilities Contingency (20%)	$4,186,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$5,900,000
TOTAL COST OF PROJECT	**$96,654,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$5,255,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$638,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$130,000
TOTAL ANNUAL COST	**$6,023,000**
Available Project Yield (acft/yr)	500
Annual Cost of Water ($ per acft), based on PF=0	$12,046
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$1,536
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$36.96
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$4.71
Note: One or more cost element has been calculated externally	
AH	*11/22/2024*

Table H.75

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Frisco - Infrastructure Improvements*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Transmission Pipeline	$8,840,000
TOTAL COST OF FACILITIES	**$8,840,000**
Engineering:	
- Planning (3%)	$265,000
- Design (7%)	$619,000
- Construction Engineering (1%)	$88,000
Legal Assistance (2%)	$177,000
Fiscal Services (2%)	$177,000
Pipeline Contingency (15%)	$1,326,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$374,000
TOTAL COST OF PROJECT	**$11,866,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$645,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$88,000
TOTAL ANNUAL COST	**$733,000**
Available Project Yield (acft/yr)	34,686
Annual Cost of Water ($ per acft), based on PF=0	$21
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$3
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$0.06
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.01
Note: One or more cost element has been calculated externally	
HAC	*2/18/2025*

Table H.76

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Melissa - Additional Delivery Infrastructure from NTMWD*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Pump Stations	$4,876,000
Transmission Pipeline (30 in. dia., 1 miles)	$2,359,000
Integration, Relocations, Backup Generator & Other	$83,000
TOTAL COST OF FACILITIES	**$7,318,000**
Engineering:	
- Planning (3%)	$220,000
- Design (7%)	$512,000
- Construction Engineering (1%)	$73,000
Legal Assistance (2%)	$146,000
Fiscal Services (2%)	$146,000
Pipeline Contingency (15%)	$354,000
All Other Facilities Contingency (20%)	$992,000
Environmental & Archaeology Studies and Mitigation	$85,000
Land Acquisition and Surveying (8 acres)	$89,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$646,000
TOTAL COST OF PROJECT	**$10,581,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$575,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$24,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$122,000
Pumping Energy Costs (1359090 kW-hr @ 0.09 $/kW-hr)	$122,000
TOTAL ANNUAL COST	**$843,000**
Available Project Yield (acft/yr)	8,190
Annual Cost of Water ($ per acft), based on PF=2	$103
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$33
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$0.32
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.10
HAC	*2/18/2025*

Table H.77

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Melissa - Increase Delivery Infrastructure from NTMWD through McKinney*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Integration, Relocations, Backup Generator & Other	$2,327,000
TOTAL COST OF FACILITIES	**$2,327,000**
Engineering:	
- Planning (3%)	$70,000
- Design (7%)	$163,000
- Construction Engineering (1%)	$23,000
Legal Assistance (2%)	$47,000
Fiscal Services (2%)	$47,000
All Other Facilities Contingency (20%)	$465,000
Environmental & Archaeology Studies and Mitigation	$54,000
Land Acquisition and Surveying (5 acres)	$62,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$212,000
TOTAL COST OF PROJECT	**$3,470,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$189,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$23,000
Pumping Energy Costs (19334 kW-hr @ 0.09 $/kW-hr)	$2,000
TOTAL ANNUAL COST	**$214,000**
Available Project Yield (acft/yr)	229
Annual Cost of Water ($ per acft), based on PF=2	$934
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$109
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$2.87
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.33
Note: One or more cost element has been calculated externally	
ADB	*11/16/2024*

Table H.78

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Parker - Increase Delivery Infrastructure from NTMWD*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Pump Stations	$2,459,000
Transmission Pipeline (14 in. dia., 3.2 miles)	$4,012,000
Transmission Pump Station(s) & Storage Tank(s)	$1,697,000
Integration, Relocations, Backup Generator & Other	$23,000
TOTAL COST OF FACILITIES	**$8,191,000**
Engineering:	
- Planning (3%)	$246,000
- Design (7%)	$573,000
- Construction Engineering (1%)	$82,000
Legal Assistance (2%)	$164,000
Fiscal Services (2%)	$164,000
Pipeline Contingency (15%)	$602,000
All Other Facilities Contingency (20%)	$836,000
Environmental & Archaeology Studies and Mitigation	$150,000
Land Acquisition and Surveying (13 acres)	$151,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$726,000
TOTAL COST OF PROJECT	**$11,885,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$646,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$40,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$104,000
Pumping Energy Costs (385230 kW-hr @ 0.09 $/kW-hr)	$35,000
TOTAL ANNUAL COST	**$825,000**
Available Project Yield (acft/yr)	2,064
Annual Cost of Water ($ per acft), based on PF=2	$400
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$87
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$1.23
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.27
Note: One or more cost element has been calculated externally	
ADB	*11/16/2024*

Table H.79

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Wylie Northeast SUD - Increase Delivery Infrastructure from NTMWD*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Storage Tanks (Other Than at Booster Pump Stations)	$2,682,000
Integration, Relocations, Backup Generator & Other	$2,305,000
TOTAL COST OF FACILITIES	**$4,987,000**
Engineering:	
- Planning (3%)	$150,000
- Design (7%)	$349,000
- Construction Engineering (1%)	$50,000
Legal Assistance (2%)	$100,000
Fiscal Services (2%)	$100,000
All Other Facilities Contingency (20%)	$997,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$438,000
TOTAL COST OF PROJECT	**$7,171,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$390,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$23,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$67,000
TOTAL ANNUAL COST	**$480,000**
Available Project Yield (acft/yr)	1,234
Annual Cost of Water ($ per acft), based on PF=2	$389
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$73
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$1.19
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.22
Note: One or more cost element has been calculated externally	
ADB	*11/16/2024*

Table H.80

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Gainesville - Direct Reuse*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Pump Stations	$666,000
Transmission Pipeline (6 in. dia., 3 miles)	$3,622,000
Integration, Relocations, Backup Generator & Other	$1,000
TOTAL COST OF FACILITIES	**$4,289,000**
Engineering:	
- Planning (3%)	$129,000
- Design (7%)	$300,000
- Construction Engineering (1%)	$43,000
Legal Assistance (2%)	$86,000
Fiscal Services (2%)	$86,000
Pipeline Contingency (15%)	$543,000
All Other Facilities Contingency (20%)	$133,000
Environmental & Archaeology Studies and Mitigation	$152,000
Land Acquisition and Surveying (23 acres)	$318,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$396,000
TOTAL COST OF PROJECT	**$6,475,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$352,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$36,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$17,000
Pumping Energy Costs (16561 kW-hr @ 0.09 $/kW-hr)	$1,000
TOTAL ANNUAL COST	**$406,000**
Available Project Yield (acft/yr)	70
Annual Cost of Water ($ per acft), based on PF=2	$5,800
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$771
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$17.80
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$2.37
AH	*11/22/2024*

Table H.81

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Gainesville - Increase Delivery Infrastructure*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Transmission Pipeline (18 in. dia., 94.4 miles)	$116,030,000
Transmission Pump Station(s) & Storage Tank(s)	$22,274,000
Integration, Relocations, Backup Generator & Other	$172,000
TOTAL COST OF FACILITIES	**$138,476,000**
- Design (7%)	$9,693,000
- Construction Engineering (1%)	$1,385,000
Legal Assistance (2%)	$2,770,000
Fiscal Services (2%)	$2,770,000
Pipeline Contingency (15%)	$17,405,000
All Other Facilities Contingency (20%)	$4,489,000
Environmental & Archaeology Studies and Mitigation	$3,082,000
Land Acquisition and Surveying (333 acres)	$4,571,000
Interest During Construction (3.5% for 3 years with a 0.5% ROI)	$18,408,000
TOTAL COST OF PROJECT	**$207,203,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$11,266,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$1,206,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$446,000
Pumping Energy Costs (2820727 kW-hr @ 0.09 $/kW-hr)	$254,000
TOTAL ANNUAL COST	**$13,172,000**
Available Project Yield (acft/yr)	3,318
Annual Cost of Water ($ per acft), based on PF=2	$3,970
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$574
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$12.18
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$1.76
ADB	*11/16/2024*

Table H.82

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Muenster - Connect to and Purchase Water from Gainesville*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Transmission Pipeline (6-8 in. dia., 11.5 miles)	$9,009,000
Integration, Relocations, Backup Generator & Other	$6,000
TOTAL COST OF FACILITIES	**$9,015,000**
Engineering:	
- Planning (3%)	$270,000
- Design (7%)	$631,000
- Construction Engineering (1%)	$90,000
Legal Assistance (2%)	$180,000
Fiscal Services (2%)	$180,000
Pipeline Contingency (15%)	$1,351,000
All Other Facilities Contingency (20%)	$1,000
Environmental & Archaeology Studies and Mitigation	$470,000
Land Acquisition and Surveying (38 acres)	$520,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$827,000
TOTAL COST OF PROJECT	**$13,535,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$736,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$90,000
Pumping Energy Costs (103070 kW-hr @ 0.09 $/kW-hr)	$9,000
Purchase of Water (280 acft/yr @ 1473 $/acft)	$412,000
TOTAL ANNUAL COST	**$1,247,000**
Available Project Yield (acft/yr)	280
Annual Cost of Water ($ per acft), based on PF=2	$4,454
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$1,825
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$13.67
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$5.60
ADB	*11/16/2024*

Table H.83

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Muenster - Develop Muenster Lake Supply*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (0.5 MGD)	$4,181,000
Transmission Pipeline (6 in. dia., 2 miles)	$1,494,000
Water Treatment Plant (0.5 MGD)	$10,663,000
Integration, Relocations, Backup Generator & Other	$3,000
TOTAL COST OF FACILITIES	**$16,341,000**
Engineering:	
- Planning (3%)	$490,000
- Design (7%)	$1,144,000
- Construction Engineering (1%)	$163,000
Legal Assistance (2%)	$327,000
Fiscal Services (2%)	$327,000
Pipeline Contingency (15%)	$224,000
All Other Facilities Contingency (20%)	$2,969,000
Environmental & Archaeology Studies and Mitigation	$125,000
Land Acquisition and Surveying (10 acres)	$139,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$1,447,000
TOTAL COST OF PROJECT	**$23,696,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$1,288,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$15,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$105,000
Water Treatment Plant	$877,000
Pumping Energy Costs (48391 kW-hr @ 0.09 $/kW-hr)	$4,000
TOTAL ANNUAL COST	**$2,289,000**
Available Project Yield (acft/yr)	280
Annual Cost of Water ($ per acft), based on PF=2	$8,175
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$3,575
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$25.08
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$10.97
ADB	*11/18/2024*

Table H.84

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Grand Prairie - Connect to Arlington*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Pump Stations	$2,439,000
Transmission Pipeline (20 in. dia., 2.5 miles)	$5,649,000
Integration, Relocations, Backup Generator & Other	$29,000
TOTAL COST OF FACILITIES	**$8,117,000**
Engineering:	
- Planning (3%)	$244,000
- Design (7%)	$568,000
- Construction Engineering (1%)	$81,000
Legal Assistance (2%)	$162,000
Fiscal Services (2%)	$162,000
Pipeline Contingency (15%)	$847,000
All Other Facilities Contingency (20%)	$494,000
Environmental & Archaeology Studies and Mitigation	$144,000
Land Acquisition and Surveying (20 acres)	$306,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$724,000
TOTAL COST OF PROJECT	**$11,849,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$644,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$57,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$61,000
Pumping Energy Costs (483075 kW-hr @ 0.09 $/kW-hr)	$43,000
TOTAL ANNUAL COST	**$805,000**
Available Project Yield (acft/yr)	2,031
Annual Cost of Water ($ per acft), based on PF=2	$396
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$79
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$1.22
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.24
Note: One or more cost element has been calculated externally	
ADB	*11/18/2024*

Table H.85

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Grand Prairie - Increase Infrastructure from DWU*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (7.5 MGD)	$19,866,000
Transmission Pipeline (24 in. dia., 15 miles)	$42,647,000
Integration, Relocations, Backup Generator & Other	$76,000
TOTAL COST OF FACILITIES	**$62,589,000**
Engineering:	
- Planning (3%)	$1,878,000
- Design (7%)	$4,381,000
- Construction Engineering (1%)	$626,000
Legal Assistance (2%)	$1,252,000
Fiscal Services (2%)	$1,252,000
Pipeline Contingency (15%)	$6,397,000
All Other Facilities Contingency (20%)	$3,988,000
Environmental & Archaeology Studies and Mitigation	$519,000
Land Acquisition and Surveying (96 acres)	$1,455,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$5,482,000
TOTAL COST OF PROJECT	**$89,819,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$4,884,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$427,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$497,000
Pumping Energy Costs (1251344 kW-hr @ 0.09 $/kW-hr)	$113,000
TOTAL ANNUAL COST	**$5,921,000**
Available Project Yield (acft/yr)	4,188
Annual Cost of Water ($ per acft), based on PF=2	$1,414
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$248
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$4.34
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.76
ADB	*11/18/2024*

Table H.86

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Irving - Main Stem Balancing Reservoir*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Pump Stations	$14,080,000
Transmission Pipeline (None)	$100,931,000
TOTAL COST OF FACILITIES	**$115,011,000**
Engineering:	
- Planning (3%)	$3,450,000
- Design (7%)	$8,051,000
- Construction Engineering (1%)	$1,150,000
Legal Assistance (2%)	$2,300,000
Fiscal Services (2%)	$2,300,000
Pipeline Contingency (15%)	$15,140,000
All Other Facilities Contingency (20%)	$2,816,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$9,765,000
TOTAL COST OF PROJECT	**$159,983,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$8,698,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$1,009,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$352,000
Pumping Energy Costs (18144444 kW-hr @ 0.09 $/kW-hr)	$1,633,000
Purchase of Water (25000 acft/yr @ 162.93 $/acft)	$4,073,000
TOTAL ANNUAL COST	**$15,765,000**
Available Project Yield (acft/yr)	25,000
Annual Cost of Water ($ per acft), based on PF=0	$631
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$283
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$1.93
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.87
Note: One or more cost element has been calculated externally	
AH	*11/22/2024*

Table H.87

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Irving - TRA Central Reuse Project*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Pump Stations	$23,436,000
Transmission Pipeline (42 in. dia., 8.3 miles)	$57,012,000
Advanced Water Treatment Facility (25 MGD)	$114,743,000
Integration, Relocations, Backup Generator & Other	$352,000
TOTAL COST OF FACILITIES	**$195,543,000**
Engineering:	
- Planning (3%)	$5,866,000
- Design (7%)	$13,688,000
- Construction Engineering (1%)	$1,955,000
Legal Assistance (2%)	$3,911,000
Fiscal Services (2%)	$3,911,000
Pipeline Contingency (15%)	$8,552,000
All Other Facilities Contingency (20%)	$27,706,000
Environmental & Archaeology Studies and Mitigation	$2,749,000
Land Acquisition and Surveying (14 acres)	$3,119,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$8,678,000
TOTAL COST OF PROJECT	**$275,678,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$19,397,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$574,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$586,000
Advanced Water Treatment Facility	$10,717,000
Pumping Energy Costs (5780963 kW-hr @ 0.09 $/kW-hr)	$520,000
Purchase of Water (27539 acft/yr @ 97.7553 $/acft)	$2,692,000
TOTAL ANNUAL COST	**$34,486,000**
Available Project Yield (acft/yr)	27,539
Annual Cost of Water ($ per acft), based on PF=1	$1,252
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$548
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$3.84
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$1.68
Note: One or more cost element has been calculated externally	
Courtney Corso	*1/21/2025*

Table H.88

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Irving - Water Purchase from TRA Tarrant County Water Supply Project*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Pump Stations	$20,780,000
Transmission Pipeline (54 in. dia., 12.5 miles)	$120,703,000
Integration, Relocations, Backup Generator & Other	$277,000
TOTAL COST OF FACILITIES	**$141,760,000**
- Design (7%)	$9,923,000
- Construction Engineering (1%)	$1,418,000
Legal Assistance (2%)	$2,835,000
Fiscal Services (2%)	$2,835,000
Pipeline Contingency (15%)	$18,105,000
All Other Facilities Contingency (20%)	$4,211,000
Environmental & Archaeology Studies and Mitigation	$376,000
Land Acquisition and Surveying (81 acres)	$16,720,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$6,580,000
TOTAL COST OF PROJECT	**$209,016,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$14,707,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$1,210,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$520,000
Pumping Energy Costs (4539271 kW-hr @ 0.09 $/kW-hr)	$409,000
Purchase of Water (27539 acft/yr @ 1205.6487 $/acft)	$33,202,000
TOTAL ANNUAL COST	**$50,048,000**
Available Project Yield (acft/yr)	27,539
Annual Cost of Water ($ per acft), based on PF=2	$1,817
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$1,283
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$5.58
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$3.94
Courtney Corso	*1/22/2025*

Table H.89

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Irving - Oklahoma Lake Hugo*	
Cost based on ENR CCI 13485.67 for September 2023 and *PPI of 278.502 for September 2023*	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Lake Hugo Pump Station	
26.8 MGD Lake Hugo Pump Station and Intake (3,050 HP)	$20,207,000
Mobilization (5%)	$1,010,000
Pipeline	
Hugo to Paris 42-inch Pipeline and Appurtenances	$35,192,000
Trench Safety	$158,000
ROW Clearing	$1,804,000
Paris to Lake Chapman 42-inch Pipeline and Appurtenances	$59,856,000
Trench Safety	$269,000
ROW Clearing	$3,068,000
26.8 MGD Discharge Structure	$126,000
Mobilization (5%)	$5,024,000
Lake Chapman Phase I Facilities	
Existing Lake Chapman Pump Station Expansion (Addition of 55MGD Pump)	$1,395,500
Mobilization (5%)	$70,000
Transmission Infrastructure	
55 MG Chapman BPS Reservoir (6 hours of storage)	$15,656,000
220 MGD Chapman Booster Pump Station (21,500 HP)	$56,579,000
24 MG Merit Balancing Reservoir to Supplement Ex. 12 MG Reservoir (2.6 hours of storage)	$8,193,000
Mobilization (5%)	$4,021,000
Lake Chapman Phase II Facilities	
Upgrade of Existing Princeton Booster Pump Station	$27,413,000
Mobilization (5%)	$1,371,000
TOTAL COST OF FACILITIES	**$241,412,500**
Engineering:	
- Planning (3%)	$7,242,375
- Design (7%)	$16,898,875
- Construction Engineering (1%)	$2,414,125
Legal Assistance (2%)	$4,828,250
Fiscal Services (2%)	$4,828,250
Pipeline Contingency (15%)	$15,824,550
All Other Facilities Contingency (20%)	$27,183,100
Environmental & Archaeology Studies and Mitigation	$1,975,000
Land Acquisition and Surveying	$8,430,000
Interest During Construction (3.5% for 1 year with a 0.5%ROI)	$10,759,000
TOTAL COST OF PROJECT	**$341,796,025**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$18,584,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$1,293,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$2,802,000
Pumping Energy Costs (kW-hr @ 0.09 $/kW-hr)	$6,097,000
TOTAL ANNUAL COST	**$28,776,000**
Available Project Yield (acft/yr)	25,000
Annual Cost of Water ($ per acft)	$1,151.04
Annual Cost of Water After Debt Service ($ per acft)	$407.68
Annual Cost of Water ($ per 1,000 gallons)	$3.53
Annual Cost of Water After Debt Service ($ per 1,000 gallons)	$1.25

**Some of the capital costs could possibly be split with other potential participants.*

Table H.90

Cost Estimate Summary Water Supply Project Option September 2023 Prices Irving - Direct Potable Reuse	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (18.1 MGD)	$27,741,000
Transmission Pipeline (36-42 in. dia., 5.3 miles)	$23,005,000
Water Treatment Plant (20 MGD)	$111,691,000
Advanced Water Treatment Facility (20 MGD)	$147,218,000
Integration, Relocations, Backup Generator & Other	$519,000
TOTAL COST OF FACILITIES	**$310,174,000**
- Design (7%)	$21,712,000
- Construction Engineering (1%)	$3,102,000
Legal Assistance (2%)	$6,203,000
Fiscal Services (2%)	$6,203,000
Pipeline Contingency (15%)	$3,451,000
All Other Facilities Contingency (20%)	$57,434,000
Environmental & Archaeology Studies and Mitigation	$4,159,000
Land Acquisition and Surveying (62 acres)	$11,479,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$14,080,000
TOTAL COST OF PROJECT	**$447,302,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$31,473,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$235,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$694,000
Water Treatment Plant	$7,818,000
Advanced Water Treatment Facility	$17,841,000
Pumping Energy Costs (8511065 kW-hr @ 0.09 $/kW-hr)	$766,000
Purchase of Water (27539 acft/yr @ 97.7553 $/acft)	$2,692,000
TOTAL ANNUAL COST	**$61,519,000**
Available Project Yield (acft/yr)	19,277
Annual Cost of Water ($ per acft), based on PF=1	$3,191
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$1,559
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$9.79
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$4.78
Courtney Corso	*1/29/2025*

Table H.91

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Rowlett - Increase Delivery Infrastructure from NTMWD*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Transmission Pump Station(s) & Storage Tank(s)	$2,866,000
Integration, Relocations, Backup Generator & Other	$706,000
TOTAL COST OF FACILITIES	**$3,572,000**
Engineering:	
- Planning (3%)	$107,000
- Design (7%)	$250,000
- Construction Engineering (1%)	$36,000
Legal Assistance (2%)	$71,000
Fiscal Services (2%)	$71,000
All Other Facilities Contingency (20%)	$714,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$314,000
TOTAL COST OF PROJECT	**$5,135,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$279,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$7,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$72,000
TOTAL ANNUAL COST	**$358,000**
Available Project Yield (acft/yr)	6,421
Annual Cost of Water ($ per acft), based on PF=2	$56
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$12
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$0.17
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.04
Note: One or more cost element has been calculated externally	
ADB	*11/18/2024*

Table H.92

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Sunnyvale - Increase Delivery Infrastructure from NTWMD*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (0 MGD)	$1,785,000
Transmission Pipeline (14 in. dia., 1.8 miles)	$2,301,000
Integration, Relocations, Backup Generator & Other	$14,000
TOTAL COST OF FACILITIES	**$4,100,000**
Engineering:	
- Planning (3%)	$123,000
- Design (7%)	$287,000
- Construction Engineering (1%)	$41,000
Legal Assistance (2%)	$82,000
Fiscal Services (2%)	$82,000
Pipeline Contingency (15%)	$345,000
All Other Facilities Contingency (20%)	$360,000
Environmental & Archaeology Studies and Mitigation	$109,000
Land Acquisition and Surveying (9 acres)	$112,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$367,000
TOTAL COST OF PROJECT	**$6,008,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$327,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$23,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$45,000
Pumping Energy Costs (230375 kW-hr @ 0.09 $/kW-hr)	$21,000
TOTAL ANNUAL COST	**$416,000**
Available Project Yield (acft/yr)	2,126
Annual Cost of Water ($ per acft), based on PF=2	$196
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$42
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$0.60
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.13
ADB	*8/7/2024*

Table H.93

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Wilmer - Connect to and Purchase Water from DWU*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Transmission Pipeline (6 in. dia., 0 miles)	$14,791,000
Storage Tanks (Other Than at Booster Pump Stations)	$1,898,000
Integration, Relocations, Backup Generator & Other	$5,000
TOTAL COST OF FACILITIES	**$16,694,000**
Engineering:	
- Planning (3%)	$501,000
- Design (7%)	$1,169,000
- Construction Engineering (1%)	$167,000
Legal Assistance (2%)	$334,000
Fiscal Services (2%)	$334,000
Pipeline Contingency (15%)	$2,219,000
All Other Facilities Contingency (20%)	$381,000
Environmental & Archaeology Studies and Mitigation	$76,000
Land Acquisition and Surveying (7 acres)	$83,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$1,428,000
TOTAL COST OF PROJECT	**$23,386,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$1,271,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$167,000
Pumping Energy Costs (85441 kW-hr @ 0.09 $/kW-hr)	$8,000
TOTAL ANNUAL COST	**$1,446,000**
Available Project Yield (acft/yr)	1,012
Annual Cost of Water ($ per acft), based on PF=2	$1,429
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$173
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$4.38
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.53
Note: One or more cost element has been calculated externally	
ADB	*11/18/2024*

Table H.94

Cost Estimate Summary Water Supply Project Option September 2023 Prices Wilmer - Connect to and Purchase Water from Lancaster	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	**Estimated Costs for Facilities**
CAPITAL COST	
Transmission Pipeline (6 in. dia., 0 miles)	$1,936,000
Storage Tanks (Other Than at Booster Pump Stations)	$2,728,000
Integration, Relocations, Backup Generator & Other	$1,000
TOTAL COST OF FACILITIES	**$4,665,000**
Engineering:	
- Planning (3%)	$140,000
- Design (7%)	$327,000
- Construction Engineering (1%)	$47,000
Legal Assistance (2%)	$93,000
Fiscal Services (2%)	$93,000
Pipeline Contingency (15%)	$290,000
All Other Facilities Contingency (20%)	$546,000
Environmental & Archaeology Studies and Mitigation	$76,000
Land Acquisition and Surveying (7 acres)	$83,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$414,000
TOTAL COST OF PROJECT	**$6,774,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$368,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$47,000
Pumping Energy Costs (17645 kW-hr @ 0.09 $/kW-hr)	$2,000
TOTAL ANNUAL COST	**$417,000**
Available Project Yield (acft/yr)	209
Annual Cost of Water ($ per acft), based on PF=2	$1,995
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$234
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$6.12
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.72
Note: One or more cost element has been calculated externally	
ADB	*11/18/2024*

Table H.95

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Mustang SUD - Direct Potable Reuse*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (0 MGD)	$3,658,000
Transmission Pipeline (16 in. dia., 6.2 miles)	$8,509,000
Water Treatment Plant (5 MGD)	$16,986,000
Integration, Relocations, Backup Generator & Other	$26,000
TOTAL COST OF FACILITIES	**$29,179,000**
Engineering:	
- Planning (3%)	$875,000
- Design (7%)	$2,042,000
- Construction Engineering (1%)	$292,000
Legal Assistance (2%)	$584,000
Fiscal Services (2%)	$584,000
Pipeline Contingency (15%)	$1,276,000
All Other Facilities Contingency (20%)	$4,134,000
Environmental & Archaeology Studies and Mitigation	$266,000
Land Acquisition and Surveying (22 acres)	$267,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$2,568,000
TOTAL COST OF PROJECT	**$42,067,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$2,287,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$85,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$91,000
Water Treatment Plant	$1,231,000
Pumping Energy Costs (427516 kW-hr @ 0.09 $/kW-hr)	$38,000
TOTAL ANNUAL COST	**$3,732,000**
Available Project Yield (acft/yr)	2,803
Annual Cost of Water ($ per acft), based on PF=2	$1,331
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$516
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$4.09
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$1.58
HAC	*2/17/2025*

Table H.96

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Mustang SUD - Connect to and Purchase Water from Denton*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (0 MGD)	$5,788,000
Transmission Pipeline (24 in. dia., 8.3 miles)	$15,691,000
Integration, Relocations, Backup Generator & Other	$57,000
TOTAL COST OF FACILITIES	**$21,536,000**
Engineering:	
- Planning (3%)	$646,000
- Design (7%)	$1,508,000
- Construction Engineering (1%)	$215,000
Legal Assistance (2%)	$431,000
Fiscal Services (2%)	$431,000
Pipeline Contingency (15%)	$2,354,000
All Other Facilities Contingency (20%)	$1,169,000
Environmental & Archaeology Studies and Mitigation	$303,000
Land Acquisition and Surveying (25 acres)	$298,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$1,878,000
TOTAL COST OF PROJECT	**$30,769,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$1,673,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$157,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$145,000
Pumping Energy Costs (933995 kW-hr @ 0.09 $/kW-hr)	$84,000
TOTAL ANNUAL COST	**$2,059,000**
Available Project Yield (acft/yr)	5,605
Annual Cost of Water ($ per acft), based on PF=2	$367
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$69
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$1.13
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.21
HAC	*2/18/2025*

Table H.97

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Cross Timbers WSC - Infrastructure Improvements*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Transmission Pipeline (None)	$4,941,000
Storage Tanks (Other Than at Booster Pump Stations)	$2,415,000
TOTAL COST OF FACILITIES	**$7,356,000**
Engineering:	
- Planning (3%)	$221,000
- Design (7%)	$515,000
- Construction Engineering (1%)	$74,000
Legal Assistance (2%)	$147,000
Fiscal Services (2%)	$147,000
Pipeline Contingency (15%)	$741,000
All Other Facilities Contingency (20%)	$483,000
Environmental & Archaeology Studies and Mitigation	$22,000
Land Acquisition and Surveying (2 acres)	$24,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$633,000
TOTAL COST OF PROJECT	**$10,363,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$563,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$74,000
TOTAL ANNUAL COST	**$637,000**
Available Project Yield (acft/yr)	2,117
Annual Cost of Water ($ per acft), based on PF=0	$301
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$35
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$0.92
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.11
Note: One or more cost element has been calculated externally	
ADB	*11/18/2024*

Table H.98

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Denton - Additional Indirect Reuse with Storage*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Terminal Storage (Conservation Pool 500 acft, 40 acres)	$24,996,000
Intake Pump Stations (9.2 MGD)	$8,018,000
Transmission Pipeline (24 in. dia., 8.5 miles)	$27,072,000
Integration, Relocations, Backup Generator & Other	$235,000
TOTAL COST OF FACILITIES	**$60,321,000**
Engineering:	
- Planning (3%)	$1,810,000
- Design (7%)	$4,223,000
- Construction Engineering (1%)	$603,000
Legal Assistance (2%)	$1,206,000
Fiscal Services (2%)	$1,206,000
Pipeline Contingency (15%)	$4,061,000
All Other Facilities Contingency (20%)	$6,650,000
Environmental & Archaeology Studies and Mitigation	$688,000
Land Acquisition and Surveying (45 acres)	$435,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$5,279,000
TOTAL COST OF PROJECT	**$86,482,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$2,698,000
Reservoir Debt Service (3.5 percent, 40 years)	$1,726,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$273,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$200,000
Dam and Reservoir (1.5% of Cost of Facilities)	$375,000
Pumping Energy Costs (3858857 kW-hr @ 0.09 $/kW-hr)	$347,000
TOTAL ANNUAL COST	**$5,619,000**
Available Project Yield (acft/yr)	8,286
Annual Cost of Water ($ per acft), based on PF=1.25	$678
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.25	$144
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.25	$2.08
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.25	$0.44
CZG	*1/28/2025*

Table H.99

Cost Estimate Summary ***Water Supply Project Option*** ***September 2023 Prices*** ***Denton - Direct Potable Reuse***	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (10 MGD)	$8,670,000
Transmission Pipeline (24 in. dia., 17.6 miles)	$55,746,000
Advanced Water Treatment Facility (10 MGD)	$74,005,000
Integration, Relocations, Backup Generator & Other	$71,000
TOTAL COST OF FACILITIES	**$138,492,000**
Engineering:	
- Planning (3%)	$4,155,000
- Design (7%)	$9,694,000
- Construction Engineering (1%)	$1,385,000
Legal Assistance (2%)	$2,770,000
Fiscal Services (2%)	$2,770,000
Pipeline Contingency (15%)	$8,362,000
All Other Facilities Contingency (20%)	$16,549,000
Environmental & Archaeology Studies and Mitigation	$581,000
Land Acquisition and Surveying (49 acres)	$519,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$12,044,000
TOTAL COST OF PROJECT	**$197,321,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$10,729,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$558,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$217,000
Advanced Water Treatment Facility	$10,000,000
Pumping Energy Costs (1159708 kW-hr @ 0.09 $/kW-hr)	$104,000
TOTAL ANNUAL COST	**$21,608,000**
Available Project Yield (acft/yr)	5,605
Annual Cost of Water ($ per acft), based on PF=2	$3,855
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$1,941
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$11.83
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$5.96
CZG	*1/28/2025*

Table H.100

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Denton - Purchase Water from DWU*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (58.8 MGD)	$43,991,000
Transmission Pipeline (54 in. dia., 22.4 miles)	$131,990,000
Integration, Relocations, Backup Generator & Other	$595,000
TOTAL COST OF FACILITIES	**$176,576,000**
Engineering:	
- Planning (3%)	$5,297,000
- Design (7%)	$12,360,000
- Construction Engineering (1%)	$1,766,000
Legal Assistance (2%)	$3,532,000
Fiscal Services (2%)	$3,532,000
Pipeline Contingency (15%)	$19,798,000
All Other Facilities Contingency (20%)	$8,917,000
Environmental & Archaeology Studies and Mitigation	$725,000
Land Acquisition and Surveying (54 acres)	$645,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$15,155,000
TOTAL COST OF PROJECT	**$248,303,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$13,501,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$1,326,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$1,100,000
Pumping Energy Costs (9768796 kW-hr @ 0.09 $/kW-hr)	$879,000
Purchase of Water (32930 acft/yr @ 97.76 $/acft)	$3,219,000
TOTAL ANNUAL COST	**$20,025,000**
Available Project Yield (acft/yr)	32,930
Annual Cost of Water ($ per acft), based on PF=2	$608
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$198
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$1.87
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.61
CZG	*1/28/2025*

Table H.101

Cost Estimate Summary Water Supply Project Option September 2023 Prices Hackberry - Additional Water from NTMWD	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (0 MGD)	$1,853,000
Transmission Pipeline (14 in. dia., 2.3 miles)	$3,966,000
Integration, Relocations, Backup Generator & Other	$15,000
TOTAL COST OF FACILITIES	**$5,834,000**
Engineering:	
- Planning (3%)	$175,000
- Design (7%)	$408,000
- Construction Engineering (1%)	$58,000
Legal Assistance (2%)	$117,000
Fiscal Services (2%)	$117,000
Pipeline Contingency (15%)	$595,000
All Other Facilities Contingency (20%)	$374,000
Environmental & Archaeology Studies and Mitigation	$123,000
Land Acquisition and Surveying (11 acres)	$125,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$516,000
TOTAL COST OF PROJECT	**$8,442,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$459,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$40,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$46,000
Pumping Energy Costs (250585 kW-hr @ 0.09 $/kW-hr)	$23,000
TOTAL ANNUAL COST	**$568,000**
Available Project Yield (acft/yr)	1,999
Annual Cost of Water ($ per acft), based on PF=2	$284
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$55
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$0.87
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.17
ADB	*8/6/2024*

Table H.102

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Flower Mound - Long Prairie & Lakeside Business District Reuse*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (0 MGD)	$3,657,000
Transmission Pipeline (24 in. dia., 12 miles)	$20,886,000
Storage Tanks (Other Than at Booster Pump Stations)	$3,569,000
Integration, Relocations, Backup Generator & Other	$34,000
TOTAL COST OF FACILITIES	**$28,146,000**
Engineering:	
- Planning (3%)	$844,000
- Design (7%)	$1,970,000
- Construction Engineering (1%)	$281,000
Legal Assistance (2%)	$563,000
Fiscal Services (2%)	$563,000
Pipeline Contingency (15%)	$3,133,000
All Other Facilities Contingency (20%)	$1,452,000
Environmental & Archaeology Studies and Mitigation	$436,000
Land Acquisition and Surveying (36 acres)	$429,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$2,459,000
TOTAL COST OF PROJECT	**$40,276,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$2,190,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$245,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$91,000
Pumping Energy Costs (553210 kW-hr @ 0.09 $/kW-hr)	$50,000
TOTAL ANNUAL COST	**$2,576,000**
Available Project Yield (acft/yr)	4,066
Annual Cost of Water ($ per acft), based on PF=2	$634
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$95
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$1.94
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.29
Plummer	*12/17/2024*

Table H.103

Cost Estimate Summary Water Supply Project Option September 2023 Prices Ponder - Connect to Denton	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Pump Stations	$1,873,000
Transmission Pipeline (10 in. dia., 19.5 miles)	$152,000
Transmission Pump Station(s) & Storage Tank(s)	$5,988,000
Integration, Relocations, Backup Generator & Other	$20,000
TOTAL COST OF FACILITIES	**$8,033,000**
Engineering:	
- Planning (3%)	$241,000
- Design (7%)	$562,000
- Construction Engineering (1%)	$80,000
Legal Assistance (2%)	$161,000
Fiscal Services (2%)	$161,000
Pipeline Contingency (15%)	$23,000
All Other Facilities Contingency (20%)	$1,576,000
Environmental & Archaeology Studies and Mitigation	$746,000
Land Acquisition and Surveying (62 acres)	$739,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$801,000
TOTAL COST OF PROJECT	**$13,123,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$714,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$25,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$139,000
Pumping Energy Costs (330076 kW-hr @ 0.09 $/kW-hr)	$30,000
TOTAL ANNUAL COST	**$908,000**
Available Project Yield (acft/yr)	991
Annual Cost of Water ($ per acft), based on PF=2	$916
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$196
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$2.81
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.60
HAC	*2/13/2025*

Table H.104

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Ferris - Increase Delivery Infrastructure from Rockett SUD*	
Cost based on ENR CCI 13485.67 for September 2023 and *a PPI of 278.502 for September 2023*	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Pump Stations	$648,000
Transmission Pipeline (6 in. dia., 2 miles)	$1,380,000
Integration, Relocations, Backup Generator & Other	$1,000
TOTAL COST OF FACILITIES	**$2,029,000**
Engineering:	
- Planning (3%)	$61,000
- Design (7%)	$142,000
- Construction Engineering (1%)	$20,000
Legal Assistance (2%)	$41,000
Fiscal Services (2%)	$41,000
Pipeline Contingency (15%)	$207,000
All Other Facilities Contingency (20%)	$130,000
Environmental & Archaeology Studies and Mitigation	$114,000
Land Acquisition and Surveying (10 acres)	$117,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$189,000
TOTAL COST OF PROJECT	**$3,091,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$168,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$14,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$16,000
Pumping Energy Costs (10899 kW-hr @ 0.09 $/kW-hr)	$1,000
TOTAL ANNUAL COST	**$199,000**
Available Project Yield (acft/yr)	111
Annual Cost of Water ($ per acft), based on PF=2	$1,793
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$279
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$5.50
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.86
CJM - Plummer	*11/21/2024*

Table H.105

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Midlothian - Tayman Expansion*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 277.68 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Transmission Pipeline (24 in. dia., 2.5 miles)	$6,421,000
Transmission Pump Station(s) & Storage Tank(s)	$11,281,000
Water Treatment Plant (8.5 MGD)	$25,265,000
Integration, Relocations, Backup Generator & Other	$2,610,000
TOTAL COST OF FACILITIES	**$45,577,000**
- Planning (3%)	$1,367,000
- Design (7%)	$3,190,000
- Construction Engineering (1%)	$456,000
Legal Assistance (2%)	$912,000
Fiscal Services (2%)	$912,000
Pipeline Contingency (15%)	$963,000
All Other Facilities Contingency (20%)	$7,831,000
Environmental & Archaeology Studies and Mitigation	$176,000
Land Acquisition and Surveying (20 acres)	$184,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$1,493,000
TOTAL COST OF PROJECT	**$63,061,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$3,337,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$90,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$282,000
Water Treatment Plant	$1,806,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (1505217 kW-hr @ 0.09 $/kW-hr)	$135,000
TOTAL ANNUAL COST	**$5,650,000**
Available Project Yield (acft/yr)	0
Annual Cost of Water ($ per acft), based on PF=4	$0
Annual Cost of Water After Debt Service ($ per acft), based on PF=4	$0
Annual Cost of Water ($ per 1,000 gallons), based on PF=4	$0.00
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=4	$0.00
Note: One or more cost element has been calculated externally	

Table H.106

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Palmer - Increase Delivery Infrastructure from Rockett SUD*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Pump Stations	$793,000
Transmission Pipeline (6 in. dia., 12.5 miles)	$8,591,000
Transmission Pump Station(s) & Storage Tank(s)	$3,620,000
Integration, Relocations, Backup Generator & Other	$4,000
TOTAL COST OF FACILITIES	**$13,008,000**
Engineering:	
- Planning (3%)	$390,000
- Design (7%)	$911,000
- Construction Engineering (1%)	$130,000
Legal Assistance (2%)	$260,000
Fiscal Services (2%)	$260,000
Pipeline Contingency (15%)	$1,289,000
All Other Facilities Contingency (20%)	$883,000
Environmental & Archaeology Studies and Mitigation	$537,000
Land Acquisition and Surveying (45 acres)	$538,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$1,184,000
TOTAL COST OF PROJECT	**$19,390,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$1,054,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$107,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$58,000
Pumping Energy Costs (71475 kW-hr @ 0.09 $/kW-hr)	$6,000
TOTAL ANNUAL COST	**$1,225,000**
Available Project Yield (acft/yr)	229
Annual Cost of Water ($ per acft), based on PF=2	$5,349
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$747
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$16.41
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$2.29
CJM - Plummer	*11/21/2024*

Table H.107

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Ovilla - Increase Delivery Infrastructure from DWU*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Pump Stations	$1,649,000
Transmission Pipeline (10 in. dia., 1 miles)	$1,000,000
Integration, Relocations, Backup Generator & Other	$16,000
TOTAL COST OF FACILITIES	**$2,665,000**
Engineering:	
- Planning (3%)	$80,000
- Design (7%)	$187,000
- Construction Engineering (1%)	$27,000
Legal Assistance (2%)	$53,000
Fiscal Services (2%)	$53,000
Pipeline Contingency (15%)	$150,000
All Other Facilities Contingency (20%)	$333,000
Environmental & Archaeology Studies and Mitigation	$84,000
Land Acquisition and Surveying (7 acres)	$88,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$242,000
TOTAL COST OF PROJECT	**$3,962,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$215,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$10,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$41,000
Pumping Energy Costs (268464 kW-hr @ 0.09 $/kW-hr)	$24,000
TOTAL ANNUAL COST	**$290,000**
Available Project Yield (acft/yr)	1,241
Annual Cost of Water ($ per acft), based on PF=2	$234
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$60
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$0.72
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.19
CJM - Plummer	*11/21/2024*

Table H.108

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Sardis-Lone Elm WSC - Direct Connection to TRWD

Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Intake Pump Stations (4.8 MGD)	$7,327,000
Transmission Pipeline (16 in. dia., 5 miles)	$6,354,000
Integration, Relocations, Backup Generator & Other	$26,000
TOTAL COST OF FACILITIES	**$16,975,000**
Engineering:	
- Planning (3%)	$509,000
- Design (7%)	$1,188,000
- Construction Engineering (1%)	$170,000
Legal Assistance (2%)	$339,000
Fiscal Services (2%)	$339,000
Pipeline Contingency (15%)	$953,000
All Other Facilities Contingency (20%)	$2,124,000
Environmental & Archaeology Studies and Mitigation	$284,000
Land Acquisition and Surveying (25 acres)	$291,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$1,507,000
TOTAL COST OF PROJECT	**$24,679,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$1,342,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$78,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$230,000
Water Treatment Plant	$4,668,000
Pumping Energy Costs (422240 kW-hr @ 0.09 $/kW-hr)	$38,000
TOTAL ANNUAL COST	**$6,356,000**
Available Project Yield (acft/yr)	2,694
Annual Cost of Water ($ per acft), based on PF=2	$2,359
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$1,861
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$7.24
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$5.71
AH	*11/22/2024*

Table H.109

Cost Estimate Summary Water Supply Project Option September 2023 Prices Waxahachie - Phase I Delivery Infrastructure to Customers in South Ellis County	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Transmission Pipeline (14-42 in. dia., 13.2 miles)	$20,629,000
Transmission Pump Station(s) & Storage Tank(s)	$8,047,000
Integration, Relocations, Backup Generator & Other	$221,000
TOTAL COST OF FACILITIES	**$28,897,000**
Engineering:	
- Planning (3%)	$867,000
- Design (7%)	$2,023,000
- Construction Engineering (1%)	$289,000
Legal Assistance (2%)	$578,000
Fiscal Services (2%)	$578,000
Pipeline Contingency (15%)	$3,094,000
All Other Facilities Contingency (20%)	$1,654,000
Environmental & Archaeology Studies and Mitigation	$451,000
Land Acquisition and Surveying (37 acres)	$441,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$2,527,000
TOTAL COST OF PROJECT	**$41,399,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$2,251,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$233,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$141,000
Pumping Energy Costs (3618356 kW-hr @ 0.09 $/kW-hr)	$326,000
TOTAL ANNUAL COST	**$2,951,000**
Available Project Yield (acft/yr)	16,794
Annual Cost of Water ($ per acft), based on PF=2	$176
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$42
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$0.54
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.13
Note: One or more cost element has been calculated externally	
AH	*11/22/2024*

Table H.110

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Bois D Arc - Connect to and Purchase Water from NTWMD*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Pump Stations	$798,000
Transmission Pipeline (6 in. dia., 7 miles)	$4,839,000
Integration, Relocations, Backup Generator & Other	$1,000
TOTAL COST OF FACILITIES	**$5,638,000**
Engineering:	
- Planning (3%)	$169,000
- Design (7%)	$395,000
- Construction Engineering (1%)	$56,000
Legal Assistance (2%)	$113,000
Fiscal Services (2%)	$113,000
Pipeline Contingency (15%)	$726,000
All Other Facilities Contingency (20%)	$160,000
Environmental & Archaeology Studies and Mitigation	$274,000
Land Acquisition and Surveying (22 acres)	$303,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$517,000
TOTAL COST OF PROJECT	**$8,464,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$460,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$48,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$20,000
Pumping Energy Costs (11227 kW-hr @ 0.09 $/kW-hr)	$1,000
TOTAL ANNUAL COST	**$529,000**
Available Project Yield (acft/yr)	207
Annual Cost of Water ($ per acft), based on PF=2	$2,556
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$333
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$7.84
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$1.02
ADB	*8/6/2024*

Table H.111

Item	Estimated Costs for Facilities
Cost Estimate Summary	
Water Supply Project Option	
September 2023 Prices	
Ladonia - Connect to and Purchase Water from UTRWD (Lake Ralph Hall)	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
CAPITAL COST	
Intake Pump Stations (0.3 MGD)	$3,651,000
Transmission Pipeline (6 in. dia., 1 miles)	$687,000
Storage Tanks (Other Than at Booster Pump Stations)	$1,784,000
Water Treatment Plant (1 MGD)	$21,331,000
Integration, Relocations, Backup Generator & Other	$1,000
TOTAL COST OF FACILITIES	**$27,454,000**
Engineering:	
- Planning (3%)	$824,000
- Design (7%)	$1,922,000
- Construction Engineering (1%)	$275,000
Legal Assistance (2%)	$549,000
Fiscal Services (2%)	$549,000
Pipeline Contingency (15%)	$103,000
All Other Facilities Contingency (20%)	$5,354,000
Environmental & Archaeology Studies and Mitigation	$124,000
Land Acquisition and Surveying (10 acres)	$136,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$2,424,000
TOTAL COST OF PROJECT	**$39,714,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$2,159,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$25,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$91,000
Water Treatment Plant	$1,707,000
Pumping Energy Costs (18493 kW-hr @ 0.09 $/kW-hr)	$2,000
Purchase of Water (150 acft/yr @ 488.72 $/acft)	$73,000
TOTAL ANNUAL COST	**$4,057,000**
Available Project Yield (acft/yr)	150
Annual Cost of Water ($ per acft), based on PF=2	$27,047
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$12,653
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$82.99
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$38.83
ADB	*11/18/2024*

Table H.112

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Leonard - Water System Improvements*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Transmission Pipeline (84 in. dia., 1.5 miles)	$11,939,000
Transmission Pump Station(s) & Storage Tank(s)	$1,101,000
Well Fields (Wells, Pumps, and Piping)	$1,926,000
Water Treatment Plant (0.5 MGD)	$63,000
Integration, Relocations, Backup Generator & Other	$3,000
TOTAL COST OF FACILITIES	**$15,032,000**
Engineering:	
- Planning (3%)	$451,000
- Design (7%)	$1,052,000
- Construction Engineering (1%)	$150,000
Legal Assistance (2%)	$301,000
Fiscal Services (2%)	$301,000
Pipeline Contingency (15%)	$1,791,000
All Other Facilities Contingency (20%)	$619,000
Environmental & Archaeology Studies and Mitigation	$109,000
Land Acquisition and Surveying (8 acres)	$104,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$1,295,000
TOTAL COST OF PROJECT	**$21,205,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$1,153,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$150,000
Water Treatment Plant	$38,000
Pumping Energy Costs (48377 kW-hr @ 0.09 $/kW-hr)	$4,000
TOTAL ANNUAL COST	**$1,345,000**
Available Project Yield (acft/yr)	573
Annual Cost of Water ($ per acft), based on PF=2	$2,347
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$335
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$7.20
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$1.03
ADB	*11/18/2024*

Table H.113

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Fairfield - Purchase Water from TRWD with New 3 MGD WTP*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (1.8 MGD)	$6,682,000
Transmission Pipeline (10 in. dia., 16.7 miles)	$16,699,000
Transmission Pump Station(s) & Storage Tank(s)	$8,322,000
Water Treatment Plant (2 MGD)	$26,944,000
Integration, Relocations, Backup Generator & Other	$41,000
TOTAL COST OF FACILITIES	**$58,688,000**
Engineering:	
- Planning (3%)	$1,761,000
- Design (7%)	$4,108,000
- Construction Engineering (1%)	$587,000
Legal Assistance (2%)	$1,174,000
Fiscal Services (2%)	$1,174,000
Pipeline Contingency (15%)	$2,505,000
All Other Facilities Contingency (20%)	$8,398,000
Environmental & Archaeology Studies and Mitigation	$656,000
Land Acquisition and Surveying (61 acres)	$500,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$5,171,000
TOTAL COST OF PROJECT	**$84,722,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$4,606,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$202,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$288,000
Water Treatment Plant	$2,076,000
Pumping Energy Costs (680662 kW-hr @ 0.09 $/kW-hr)	$61,000
TOTAL ANNUAL COST	**$7,233,000**
Available Project Yield (acft/yr)	984
Annual Cost of Water ($ per acft), based on PF=2	$7,351
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$2,670
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$22.55
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$8.19
CJM - Plummer	*11/21/2024*

Table H.114

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Denison - Expand Raw Water Delivery from Lake Texoma*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (32.4 MGD)	$30,544,000
Transmission Pipeline (48 in. dia., 1.5 miles)	$6,800,000
Water Treatment Plant (0 MGD)	$1,565,000
Integration, Relocations, Backup Generator & Other	$11,463,000
TOTAL COST OF FACILITIES	**$50,372,000**
Engineering:	
- Planning (3%)	$1,511,000
- Design (7%)	$3,526,000
- Construction Engineering (1%)	$504,000
Legal Assistance (2%)	$1,007,000
Fiscal Services (2%)	$1,007,000
Pipeline Contingency (15%)	$1,020,000
All Other Facilities Contingency (20%)	$8,714,000
Environmental & Archaeology Studies and Mitigation	$109,000
Land Acquisition and Surveying (9 acres)	$120,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$4,413,000
TOTAL COST OF PROJECT	**$72,303,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$3,931,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$183,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$764,000
Pumping Energy Costs (2872023 kW-hr @ 0.09 $/kW-hr)	$258,000
TOTAL ANNUAL COST	**$5,136,000**
Available Project Yield (acft/yr)	18,152
Annual Cost of Water ($ per acft), based on PF=2	$283
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$66
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$0.87
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.20
Note: One or more cost element has been calculated externally	
HAC	*2/16/2025*

Table H.115

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Van Alstyne - Water System Improvements*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Primary Pump Stations (8 MGD)	$4,984,000
Storage Tanks (Other Than at Booster Pump Stations)	$1,267,000
Integration, Relocations, Backup Generator & Other	$56,000
TOTAL COST OF FACILITIES	**$6,307,000**
Engineering:	
- Planning (3%)	$189,000
- Design (7%)	$441,000
- Construction Engineering (1%)	$63,000
Legal Assistance (2%)	$126,000
Fiscal Services (2%)	$126,000
All Other Facilities Contingency (20%)	$1,261,000
Environmental & Archaeology Studies and Mitigation	$87,000
Land Acquisition and Surveying (19 acres)	$96,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$566,000
TOTAL COST OF PROJECT	**$9,262,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$504,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$13,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$125,000
Pumping Energy Costs (915352 kW-hr @ 0.09 $/kW-hr)	$82,000
TOTAL ANNUAL COST	**$724,000**
Available Project Yield (acft/yr)	4,464
Annual Cost of Water ($ per acft), based on PF=2	$162
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$49
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$0.50
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.15
HAC	*2/16/2025*

Table H.116

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Grayson County Manufacturing - Direct Reuse from Sherman*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Pump Stations	$936,000
Transmission Pipeline (10 in. dia., 10 miles)	$9,997,000
Advanced Water Treatment Facility (0.5 MGD)	$5,701,000
Integration, Relocations, Backup Generator & Other	$14,000
TOTAL COST OF FACILITIES	**$16,648,000**
Engineering:	
- Planning (3%)	$499,000
- Design (7%)	$1,165,000
- Construction Engineering (1%)	$166,000
Legal Assistance (2%)	$333,000
Fiscal Services (2%)	$333,000
Pipeline Contingency (15%)	$1,500,000
All Other Facilities Contingency (20%)	$1,330,000
Environmental & Archaeology Studies and Mitigation	$362,000
Land Acquisition and Surveying (29 acres)	$401,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$1,478,000
TOTAL COST OF PROJECT	**$24,215,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$1,317,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$100,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$23,000
Advanced Water Treatment Facility	$389,000
Pumping Energy Costs (224618 kW-hr @ 0.09 $/kW-hr)	$20,000
TOTAL ANNUAL COST	**$1,849,000**
Available Project Yield (acft/yr)	561
Annual Cost of Water ($ per acft), based on PF=1	$3,296
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$948
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$10.11
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$2.91
CMC	*2/9/2025*

Table H.117

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Sherman - 5-MGD Pump Station Expansion (2040)*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Pump Station Expansion	$1,049,000
TOTAL COST OF FACILITIES	**$1,049,000**
Engineering:	
- Planning (3%)	$31,000
- Design (7%)	$73,000
- Construction Engineering (1%)	$10,000
Legal Assistance (2%)	$21,000
Fiscal Services (2%)	$21,000
All Other Facilities Contingency (20%)	$210,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$46,000
TOTAL COST OF PROJECT	**$1,461,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$79,000
Operation and Maintenance	
Intakes and Pump Stations (2.5% of Cost of Facilities)	$26,000
Pumping Energy Costs (2,866,667 kW-hr @ 0.09 $/kW-hr)	$258,000
TOTAL ANNUAL COST	**$363,000**
Available Project Yield (acft/yr)	6,352
Annual Cost of Water ($ per acft), based on PF=1.5	$57
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.5	$45
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.5	$0.18
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.5	$0.14
CMC	*2/7/2025*

Table H.118

Cost Estimate Summary Water Supply Project Option September 2023 Prices Sherman - Indirect Reuse	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Pump Station (6.1 MGD)	$4,844,000
Transmission Pipeline (24 in. dia., 16.5 miles)	$32,101,000
Integration, Relocations, Backup Generator & Other	$175,000
TOTAL COST OF FACILITIES	**$37,120,000**
- Planning (3%)	$1,114,000
- Design (7%)	$2,598,000
- Construction Engineering (1%)	$371,000
Legal Assistance (2%)	$742,000
Fiscal Services (2%)	$742,000
Pipeline Contingency (15%)	$4,815,000
All Other Facilities Contingency (20%)	$1,004,000
Environmental & Archaeology Studies and Mitigation	$495,000
Land Acquisition and Surveying (105 acres)	$1,372,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$1,638,000
TOTAL COST OF PROJECT	**$52,011,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$3,660,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$323,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$121,000
Pumping Energy Costs (2870552 kW-hr @ 0.09 $/kW-hr)	$258,000
TOTAL ANNUAL COST	**$4,362,000**
Available Project Yield (acft/yr)	5,530
Annual Cost of Water ($ per acft), based on PF=1	$789
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$127
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$2.42
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.39
CMC	*2/8/2025*

Table H.119

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Jack County Other - Connect to Walnut Creek SUD*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations	$504,000
Transmission Pipeline (6 in. dia., 10 miles)	$6,873,000
Transmission Pump Station(s) & Storage Tank(s)	$1,534,000
Integration, Relocations, Backup Generator & Other	$1,000
TOTAL COST OF FACILITIES	**$8,912,000**
Engineering:	
- Planning (3%)	$267,000
- Design (7%)	$624,000
- Construction Engineering (1%)	$89,000
Legal Assistance (2%)	$178,000
Fiscal Services (2%)	$178,000
Pipeline Contingency (15%)	$1,031,000
All Other Facilities Contingency (20%)	$408,000
Environmental & Archaeology Studies and Mitigation	$332,000
Land Acquisition and Surveying (34 acres)	$119,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$789,000
TOTAL COST OF PROJECT	**$12,927,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$703,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$79,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$25,000
Pumping Energy Costs (21618 kW-hr @ 0.09 $/kW-hr)	$2,000
TOTAL ANNUAL COST	**$809,000**
Available Project Yield (acft/yr)	49
Annual Cost of Water ($ per acft), based on PF=2	$16,510
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$2,163
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$50.66
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$6.64
ADB	*8/6/2024*

Table H.120

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *College Mound WSC - Increase Delivery Insfrastructure from Terrell*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations	$1,875,000
Transmission Pipeline (14 in. dia., 8.3 miles)	$9,598,000
Transmission Pump Station(s) & Storage Tank(s)	$6,276,000
Integration, Relocations, Backup Generator & Other	$43,000
TOTAL COST OF FACILITIES	**$17,792,000**
Engineering:	
- Planning (3%)	$534,000
- Design (7%)	$1,245,000
- Construction Engineering (1%)	$178,000
Legal Assistance (2%)	$356,000
Fiscal Services (2%)	$356,000
Pipeline Contingency (15%)	$1,440,000
All Other Facilities Contingency (20%)	$1,639,000
Environmental & Archaeology Studies and Mitigation	$411,000
Land Acquisition and Surveying (35 acres)	$417,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$1,584,000
TOTAL COST OF PROJECT	**$25,952,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$1,411,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$122,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$139,000
Pumping Energy Costs (709466 kW-hr @ 0.09 $/kW-hr)	$64,000
TOTAL ANNUAL COST	**$1,736,000**
Available Project Yield (acft/yr)	2,036
Annual Cost of Water ($ per acft), based on PF=2	$853
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$160
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$2.62
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.49
ADB	*8/6/2024*

Table H.121

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Forney - Increase Delivery Infrastructure from NTMWD (Pump Station)*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations	$15,760,000
TOTAL COST OF FACILITIES	**$15,760,000**
- Design (7%)	$1,103,000
- Construction Engineering (1%)	$158,000
Legal Assistance (2%)	$315,000
Fiscal Services (2%)	$315,000
All Other Facilities Contingency (20%)	$3,152,000
TOTAL COST OF PROJECT	**$21,276,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$1,157,000
Operation and Maintenance	
Intakes and Pump Stations (2.5% of Cost of Facilities)	$394,000
Pumping Energy Costs (3620292 kW-hr @ 0.09 $/kW-hr)	$326,000
TOTAL ANNUAL COST	**$1,877,000**
Available Project Yield (acft/yr)	11,770
Annual Cost of Water ($ per acft), based on PF=1	$159
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$61
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$0.49
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.19
Note: One or more cost element has been calculated externally	
ADB	*12/2/2024*

Table H.122

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Mabank - Increase Delivery Infrastructure from TRWD (Cedar Creek Lake)*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (1.2 MGD)	$4,131,000
Transmission Pipeline (8 in. dia., 0 miles)	$15,000
Integration, Relocations, Backup Generator & Other	$4,000
TOTAL COST OF FACILITIES	**$4,150,000**
Engineering:	
- Planning (3%)	$125,000
- Design (7%)	$291,000
- Construction Engineering (1%)	$42,000
Legal Assistance (2%)	$83,000
Fiscal Services (2%)	$83,000
Pipeline Contingency (15%)	$2,000
All Other Facilities Contingency (20%)	$827,000
Environmental & Archaeology Studies and Mitigation	$55,000
Land Acquisition and Surveying (5 acres)	$60,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$372,000
TOTAL COST OF PROJECT	**$6,090,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$331,000
Operation and Maintenance	
Intakes and Pump Stations (2.5% of Cost of Facilities)	$103,000
Pumping Energy Costs (69493 kW-hr @ 0.09 $/kW-hr)	$6,000
TOTAL ANNUAL COST	**$440,000**
Available Project Yield (acft/yr)	697
Annual Cost of Water ($ per acft), based on PF=2	$631
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$156
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$1.94
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.48
ADB	*8/7/2024*

Table H.123

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Terrell - Infrastructure Improvements*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Transmission Pipeline (16 in. dia., 4.7 miles)	$5,949,000
Integration, Relocations, Backup Generator & Other	$1,101,000
TOTAL COST OF FACILITIES	**$7,050,000**
Engineering:	
- Planning (3%)	$212,000
- Design (7%)	$494,000
- Construction Engineering (1%)	$71,000
Legal Assistance (2%)	$141,000
Fiscal Services (2%)	$141,000
Pipeline Contingency (15%)	$892,000
All Other Facilities Contingency (20%)	$220,000
Environmental & Archaeology Studies and Mitigation	$141,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$609,000
TOTAL COST OF PROJECT	**$9,971,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$542,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$71,000
TOTAL ANNUAL COST	**$613,000**
Available Project Yield (acft/yr)	7,531
Annual Cost of Water ($ per acft), based on PF=1	$81
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$9
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$0.25
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.03
Note: One or more cost element has been calculated externally	
ADB	*12/2/2024*

Table H.124

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Kaufman County Other - Water from TRWD with new delivery and treatment facilities (0.5 MGD)*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (0.2 MGD)	$717,000
Transmission Pipeline (6 in. dia., 10 miles)	$7,471,000
Water Treatment Plant (0.5 MGD)	$10,663,000
Integration, Relocations, Backup Generator & Other	$2,000
TOTAL COST OF FACILITIES	**$18,853,000**
- Planning (3%)	$566,000
- Design (7%)	$1,320,000
- Construction Engineering (1%)	$189,000
Legal Assistance (2%)	$377,000
Fiscal Services (2%)	$377,000
Pipeline Contingency (15%)	$1,121,000
All Other Facilities Contingency (20%)	$2,276,000
Environmental & Archaeology Studies and Mitigation	$357,000
Land Acquisition and Surveying (29 acres)	$351,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$1,677,000
TOTAL COST OF PROJECT	**$27,464,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$1,493,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$75,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$18,000
Water Treatment Plant	$877,000
Pumping Energy Costs (28986 kW-hr @ 0.09 $/kW-hr)	$3,000
TOTAL ANNUAL COST	**$2,466,000**
Available Project Yield (acft/yr)	95
Annual Cost of Water ($ per acft), based on PF=2	$25,958
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$10,242
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$79.65
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$31.43
Note: One or more cost element has been calculated externally	
ADB	*8/6/2024*

Table H.125

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *M E N WSC - Increase Delivery Infrastructure from Corsicana*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (0.3 MGD)	$734,000
Transmission Pipeline (6 in. dia., 2 miles)	$1,375,000
Storage Tanks (Other Than at Booster Pump Stations)	$1,784,000
Integration, Relocations, Backup Generator & Other	$396,000
TOTAL COST OF FACILITIES	**$4,289,000**
Engineering:	
- Planning (3%)	$129,000
- Design (7%)	$300,000
- Construction Engineering (1%)	$43,000
Legal Assistance (2%)	$86,000
Fiscal Services (2%)	$86,000
Pipeline Contingency (15%)	$206,000
All Other Facilities Contingency (20%)	$583,000
Environmental & Archaeology Studies and Mitigation	$112,000
Land Acquisition and Surveying (12 acres)	$96,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$386,000
TOTAL COST OF PROJECT	**$6,316,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$343,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$36,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$18,000
Pumping Energy Costs (34737 kW-hr @ 0.09 $/kW-hr)	$3,000
TOTAL ANNUAL COST	**$400,000**
Available Project Yield (acft/yr)	163
Annual Cost of Water ($ per acft), based on PF=2	$2,454
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$350
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$7.53
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$1.07
Note: One or more cost element has been calculated externally	
CJM - Plummer	*12/12/2024*

Table H.126

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Annetta - Connect to and Purchase Water from Weatherford (TRWD)*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Pump Stations	$701,000
Integration, Relocations, Backup Generator & Other	$2,000
TOTAL COST OF FACILITIES	**$703,000**
Engineering:	
- Planning (3%)	$21,000
- Design (7%)	$49,000
- Construction Engineering (1%)	$7,000
Legal Assistance (2%)	$14,000
Fiscal Services (2%)	$14,000
All Other Facilities Contingency (20%)	$141,000
Environmental & Archaeology Studies and Mitigation	$262,000
Land Acquisition and Surveying (21 acres)	$313,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$100,000
TOTAL COST OF PROJECT	**$1,624,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$88,000
Operation and Maintenance	
Intakes and Pump Stations (2.5% of Cost of Facilities)	$18,000
Pumping Energy Costs (24812 kW-hr @ 0.09 $/kW-hr)	$2,000
TOTAL ANNUAL COST	**$108,000**
Available Project Yield (acft/yr)	100
Annual Cost of Water ($ per acft), based on PF=2	$1,080
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$200
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$3.31
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.61
ADB	*10/7/2024*

Table H.127

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Aledo - Parallel Pipe & Pump Station Expansions from TRWD (Fort Worth)*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Transmission Pipeline (8-20 in. dia., 10.8 miles)	$13,922,000
Transmission Pump Station(s) & Storage Tank(s)	$1,891,000
Integration, Relocations, Backup Generator & Other	$3,000
TOTAL COST OF FACILITIES	**$15,816,000**
Engineering:	
- Planning (3%)	$474,000
- Design (7%)	$1,107,000
- Construction Engineering (1%)	$158,000
Legal Assistance (2%)	$316,000
Fiscal Services (2%)	$316,000
Pipeline Contingency (15%)	$2,088,000
All Other Facilities Contingency (20%)	$379,000
Environmental & Archaeology Studies and Mitigation	$393,000
Land Acquisition and Surveying (9 acres)	$142,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$1,378,000
TOTAL COST OF PROJECT	**$22,567,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$1,227,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$139,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$47,000
Pumping Energy Costs (23984 kW-hr @ 0.09 $/kW-hr)	$2,000
TOTAL ANNUAL COST	**$1,415,000**
Available Project Yield (acft/yr)	621
Annual Cost of Water ($ per acft), based on PF=2	$2,279
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$303
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$6.99
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.93
Note: One or more cost element has been calculated externally	
ADB	*12/2/2024*

Table H.128

Cost Estimate Summary Water Supply Project Option September 2023 Prices Springtown - Increase Delivery Infrastructure, Surface Water Treatment Plant & Supply Project	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	**Estimated Costs for Facilities**
CAPITAL COST	
Pump Stations	$646,000
Water Treatment Plant	$2,972,000
TOTAL COST OF FACILITIES	**$3,618,000**
Engineering:	
- Planning (3%)	$109,000
- Design (7%)	$253,000
- Construction Engineering (1%)	$36,000
Legal Assistance (2%)	$72,000
Fiscal Services (2%)	$72,000
All Other Facilities Contingency (20%)	$724,000
Environmental & Archaeology Studies and Mitigation	$7,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$318,000
TOTAL COST OF PROJECT	**$5,209,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$283,000
Operation and Maintenance	
Intakes and Pump Stations (2.5% of Cost of Facilities)	$16,000
TOTAL ANNUAL COST	**$299,000**
Available Project Yield (acft/yr)	1,214
Annual Cost of Water ($ per acft), based on PF=1	$246
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$13
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$0.76
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.04
Note: One or more cost element has been calculated externally	
ADB	12/2/2024

Table H.129

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Walnut Creek SUD - Infrastructure to deliver to customers*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Pump Stations	$13,829,000
Transmission Pipeline (36 in. dia., 1.8 miles)	$5,486,000
Integration, Relocations, Backup Generator & Other	$268,000
TOTAL COST OF FACILITIES	**$19,583,000**
Engineering:	
- Planning (3%)	$588,000
- Design (7%)	$1,371,000
- Construction Engineering (1%)	$196,000
Legal Assistance (2%)	$392,000
Fiscal Services (2%)	$392,000
Pipeline Contingency (15%)	$823,000
All Other Facilities Contingency (20%)	$2,819,000
Environmental & Archaeology Studies and Mitigation	$122,000
Land Acquisition and Surveying (9 acres)	$141,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$1,718,000
TOTAL COST OF PROJECT	**$28,145,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$1,530,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$58,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$346,000
Pumping Energy Costs (4397335 kW-hr @ 0.09 $/kW-hr)	$396,000
TOTAL ANNUAL COST	**$2,330,000**
Available Project Yield (acft/yr)	13,878
Annual Cost of Water ($ per acft), based on PF=2	$168
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$58
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$0.52
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.18
HAC	*2/18/2025*

Table H.130

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Weatherford - Increase Capacity of Lake Benbrook Pump Station*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Pump Stations	$14,470,000
TOTAL COST OF FACILITIES	**$14,470,000**
Engineering:	
- Planning (3%)	$434,000
- Design (7%)	$1,013,000
- Construction Engineering (1%)	$145,000
Legal Assistance (2%)	$289,000
Fiscal Services (2%)	$289,000
All Other Facilities Contingency (20%)	$2,894,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$1,270,000
TOTAL COST OF PROJECT	**$20,804,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$1,131,000
Operation and Maintenance	
Intakes and Pump Stations (2.5% of Cost of Facilities)	$362,000
TOTAL ANNUAL COST	**$1,493,000**
Available Project Yield (acft/yr)	1,682
Annual Cost of Water ($ per acft), based on PF=0	$888
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$215
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$2.72
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.66
Note: One or more cost element has been calculated externally	
ADB	*10/7/2024*

Table H.131

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Weatherford - Increase Capacity of Lake Benbrook Pump Station*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Transmission Pipeline (36 in. dia., 0.7 miles)	$3,258,000
TOTAL COST OF FACILITIES	**$3,258,000**
Engineering:	
- Planning (3%)	$98,000
- Design (7%)	$228,000
- Construction Engineering (1%)	$33,000
Legal Assistance (2%)	$65,000
Fiscal Services (2%)	$65,000
Pipeline Contingency (15%)	$489,000
Environmental & Archaeology Studies and Mitigation	$20,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$277,000
TOTAL COST OF PROJECT	**$4,533,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$246,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$33,000
TOTAL ANNUAL COST	**$279,000**
Available Project Yield (acft/yr)	4,939
Annual Cost of Water ($ per acft), based on PF=0	$56
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$7
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$0.17
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.02
Note: One or more cost element has been calculated externally	
ADB	*10/7/2024*

Table H.132

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Willow Park - Connect to and Purchase Water from Fort Worth (TRWD)*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Pump Stations	$1,066,000
Transmission Pipeline (10 in. dia., 3.9 miles)	$3,929,000
Integration, Relocations, Backup Generator & Other	$2,000
TOTAL COST OF FACILITIES	**$4,997,000**
Engineering:	
- Planning (3%)	$150,000
- Design (7%)	$350,000
- Construction Engineering (1%)	$50,000
Legal Assistance (2%)	$100,000
Fiscal Services (2%)	$100,000
Pipeline Contingency (15%)	$589,000
All Other Facilities Contingency (20%)	$214,000
Environmental & Archaeology Studies and Mitigation	$187,000
Land Acquisition and Surveying (15 acres)	$220,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$453,000
TOTAL COST OF PROJECT	**$7,410,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$403,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$39,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$27,000
Pumping Energy Costs (38538 kW-hr @ 0.09 $/kW-hr)	$3,000
TOTAL ANNUAL COST	**$472,000**
Available Project Yield (acft/yr)	798
Annual Cost of Water ($ per acft), based on PF=2	$591
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$86
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$1.81
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.27
ADB	*8/7/2024*

Table H.133

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
New Regional Water Provider - Parker County Regional System - Brazos Basin

Cost based on ENR CCI 13485.67 for September 2023 and
a PPI of 278.502 for September 2023

Item	***Estimated Costs for Facilities***
Intake Pump Stations (2.7 MGD)	$35,478,000
Transmission Pipeline (14-30 in. dia., 20.1 miles)	$30,767,000
Two Water Treatment Plants (10 MGD and 5 MGD)	$120,011,000
Integration, Relocations, Backup Generator & Other	$235,000
TOTAL COST OF FACILITIES	**$186,491,000**
- Planning (3%)	$5,595,000
- Design (7%)	$13,054,000
- Construction Engineering (1%)	$1,865,000
Legal Assistance (2%)	$3,730,000
Fiscal Services (2%)	$3,730,000
Pipeline Contingency (15%)	$4,615,000
All Other Facilities Contingency (20%)	$31,145,000
Environmental & Archaeology Studies and Mitigation	$913,000
Land Acquisition and Surveying (144 acres)	$2,190,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$16,467,000
TOTAL COST OF PROJECT	**$269,795,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$14,669,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$310,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$887,000
Water Treatment Plant	$14,006,000
Pumping Energy Costs (3848611 kW-hr @ 0.09 $/kW-hr)	$346,000
Purchase of Water (5259 acft/yr @ 97.7553 $/acft)	$514,000
TOTAL ANNUAL COST	**$30,732,000**
Available Project Yield (acft/yr)	5,259
Annual Cost of Water ($ per acft), based on PF=2	$5,844
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$3,054
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$17.93
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$9.37
SFK	*1/21/2025*

Table H.134

Water Supply Project Option New Regional Water Provider - Parker County Regional System - Trinity Basin	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations	$97,764,000
Transmission Pipelines	$122,105,000
Water Treatment Plant (40 MGD)	$191,381,000
Integration, Relocations, Backup Generator & Other	$1,080,000
TOTAL COST OF FACILITIES	**$412,330,000**
Engineering:	
- Planning (3%)	$12,369,000
- Design (7%)	$28,863,000
- Construction Engineering (1%)	$4,123,000
Legal Assistance (2%)	$8,246,000
Fiscal Services (2%)	$8,246,000
Pipeline Contingency (15%)	$18,316,000
All Other Facilities Contingency (20%)	$58,045,000
Environmental & Archaeology Studies and Mitigation	$1,913,000
Land Acquisition and Surveying	$4,643,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$36,213,000
TOTAL COST OF PROJECT	**$593,307,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$32,259,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$1,231,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$2,444,000
Water Treatment Plant	$13,397,000
Pumping Energy Costs	$1,595,000
Purchase of Water (22000 acft/yr @ 97.7553 $/acft)	$2,151,000
TOTAL ANNUAL COST	**$53,077,000**
Available Project Yield (acft/yr)	22,000
Annual Cost of Water ($ per acft), based on PF=2	$2,413
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$946
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$7.40
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$2.90
HAC	*1/20/2025*

Table H.135

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Parker County SUD - New 3.5 MGD Water Treatment Plant*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Two Water Treatment Plants (3.5 MGD and 1.8 MGD)	$63,228,000
TOTAL COST OF FACILITIES	**$63,228,000**
Engineering:	
- Planning (3%)	$1,897,000
- Design (7%)	$4,426,000
- Construction Engineering (1%)	$632,000
Legal Assistance (2%)	$1,265,000
Fiscal Services (2%)	$1,265,000
All Other Facilities Contingency (20%)	$12,646,000
Environmental & Archaeology Studies and Mitigation	$36,000
Land Acquisition and Surveying (3 acres)	$40,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$5,554,000
TOTAL COST OF PROJECT	**$90,989,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$4,947,000
Operation and Maintenance	
Water Treatment Plant	$7,749,000
TOTAL ANNUAL COST	**$12,696,000**
Available Project Yield (acft/yr)	2,259
Annual Cost of Water ($ per acft), based on PF=2	$5,620
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$3,430
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$17.25
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$10.53
ADB	*8/2/2024*

Table H.136

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Blackland WSC - Connect to and Purchase Water from NTMWD*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Station	$127,000
Transmission Pipeline (8 in. dia., 6.3 miles)	$5,070,000
Transmission Pump Station(s) & Storage Tank(s)	$4,162,000
Storage Tanks (Other Than at Booster Pump Stations)	$1,129,000
Integration, Relocations, Backup Generator & Other	$662,000
TOTAL COST OF FACILITIES	**$11,150,000**
Engineering:	
- Planning (3%)	$335,000
- Design (7%)	$781,000
- Construction Engineering (1%)	$112,000
Legal Assistance (2%)	$223,000
Fiscal Services (2%)	$223,000
Pipeline Contingency (15%)	$761,000
All Other Facilities Contingency (20%)	$1,216,000
Environmental & Archaeology Studies and Mitigation	$374,000
Land Acquisition and Surveying (32 acres)	$384,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$1,012,000
TOTAL COST OF PROJECT	**$16,571,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$901,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$91,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$52,000
Pumping Energy Costs (205219 kW-hr @ 0.09 $/kW-hr)	$18,000
TOTAL ANNUAL COST	**$1,062,000**
Available Project Yield (acft/yr)	597
Annual Cost of Water ($ per acft), based on PF=2	$1,779
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$270
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$5.46
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.83
Note: One or more cost element has been calculated externally	
ADB	*12/2/2024*

Table H.137

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Fate - Increase Delivery Infrastructure from NTMWD*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (0 MGD)	$3,143,000
Transmission Pipeline (24 in. dia., 0.5 miles)	$1,022,000
Integration, Relocations, Backup Generator & Other	$46,000
TOTAL COST OF FACILITIES	**$4,211,000**
Engineering:	
- Planning (3%)	$126,000
- Design (7%)	$295,000
- Construction Engineering (1%)	$42,000
Legal Assistance (2%)	$84,000
Fiscal Services (2%)	$84,000
Pipeline Contingency (15%)	$153,000
All Other Facilities Contingency (20%)	$638,000
Environmental & Archaeology Studies and Mitigation	$70,000
Land Acquisition and Surveying (6 acres)	$75,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$376,000
TOTAL COST OF PROJECT	**$6,154,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$335,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$11,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$79,000
Pumping Energy Costs (752545 kW-hr @ 0.09 $/kW-hr)	$68,000
TOTAL ANNUAL COST	**$493,000**
Available Project Yield (acft/yr)	6,474
Annual Cost of Water ($ per acft), based on PF=2	$76
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$24
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$0.23
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.07
ADB	*8/6/2024*

Table H.138

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Rockwall - Increase Delivery Infrastructure to Purchase Additional Water from NTMWD*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Station	$11,749,000
Transmission Pipeline (36 in. dia., 10.5 miles)	$32,861,000
Integration, Relocations, Backup Generator & Other	$125,000
TOTAL COST OF FACILITIES	**$44,735,000**
Engineering:	
- Planning (3%)	$1,342,000
- Design (7%)	$3,131,000
- Construction Engineering (1%)	$447,000
Legal Assistance (2%)	$895,000
Fiscal Services (2%)	$895,000
Pipeline Contingency (15%)	$4,929,000
All Other Facilities Contingency (20%)	$2,375,000
Environmental & Archaeology Studies and Mitigation	$370,000
Land Acquisition and Surveying (56 acres)	$667,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$3,887,000
TOTAL COST OF PROJECT	**$63,673,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$3,462,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$330,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$294,000
Pumping Energy Costs (2052275 kW-hr @ 0.09 $/kW-hr)	$185,000
TOTAL ANNUAL COST	**$4,271,000**
Available Project Yield (acft/yr)	13,235
Annual Cost of Water ($ per acft), based on PF=2	$323
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$61
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$0.99
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.19
ADB	*8/6/2024*

Table H.139

Arlington - Parallel Raw Water Pipeline	
Item	***Estimated Costs for Facilities***
Raw Water Pipeline (60-inch parallel pipeline)	$16,500,000
TOTAL COST OF FACILITIES	**$16,500,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	**$1,113,750**
TOTAL COST OF PROJECT	**$17,614,000**
ANNUAL COST	
Debt Service (3.5% interest, 30 year bonds)	$958,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$165,000
TOTAL ANNUAL COST	**$1,123,000**

Table H.140

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Crowley - Increase Delivery Infrastructure from Ft Worth*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (0 MGD)	$2,494,000
Transmission Pipeline (16 in. dia., 1.4 miles)	$2,967,000
Integration, Relocations, Backup Generator & Other	$28,000
TOTAL COST OF FACILITIES	**$5,489,000**
Engineering:	
- Planning (3%)	$165,000
- Design (7%)	$384,000
- Construction Engineering (1%)	$55,000
Legal Assistance (2%)	$110,000
Fiscal Services (2%)	$110,000
Pipeline Contingency (15%)	$445,000
All Other Facilities Contingency (20%)	$504,000
Environmental & Archaeology Studies and Mitigation	$112,000
Land Acquisition and Surveying (8 acres)	$128,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$488,000
TOTAL COST OF PROJECT	**$7,990,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$434,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$30,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$62,000
Pumping Energy Costs (465794 kW-hr @ 0.09 $/kW-hr)	$42,000
TOTAL ANNUAL COST	**$568,000**
Available Project Yield (acft/yr)	3,026
Annual Cost of Water ($ per acft), based on PF=2	$188
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$44
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$0.58
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.14
ADB	*8/6/2024*

Table H.141

Cost Estimate Summary Water Supply Project Option September 2023 Prices Kennedale - Connect to and Purchase Water from Arlington (TRWD)	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	**Estimated Costs for Facilities**
CAPITAL COST	
Intake Pump Stations (0 MGD)	$839,000
Transmission Pipeline (6 in. dia., 2 miles)	$2,065,000
Integration, Relocations, Backup Generator & Other	$5,000
TOTAL COST OF FACILITIES	**$4,824,000**
Engineering:	
- Planning (3%)	$145,000
- Design (7%)	$338,000
- Construction Engineering (1%)	$48,000
Legal Assistance (2%)	$96,000
Fiscal Services (2%)	$96,000
Pipeline Contingency (15%)	$310,000
All Other Facilities Contingency (20%)	$552,000
Environmental & Archaeology Studies and Mitigation	$198,000
Land Acquisition and Surveying (15 acres)	$226,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$445,000
TOTAL COST OF PROJECT	**$7,278,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$396,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$31,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$42,000
Pumping Energy Costs (74272 kW-hr @ 0.09 $/kW-hr)	$7,000
TOTAL ANNUAL COST	**$476,000**
Available Project Yield (acft/yr)	385
Annual Cost of Water ($ per acft), based on PF=2	$1,236
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$208
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$3.79
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.64
ADB	*8/7/2024*

Table H.142

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Kennedale - Increase Delivery Infrastructure from Ft Worth*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Station	$1,425,000
Transmission Pipeline (10 in. dia., 5 miles)	$6,898,000
Integration, Relocations, Backup Generator & Other	$14,000
TOTAL COST OF FACILITIES	**$10,933,000**
Engineering:	
- Planning (3%)	$328,000
- Design (7%)	$765,000
- Construction Engineering (1%)	$109,000
Legal Assistance (2%)	$219,000
Fiscal Services (2%)	$219,000
Pipeline Contingency (15%)	$1,035,000
All Other Facilities Contingency (20%)	$807,000
Environmental & Archaeology Studies and Mitigation	$288,000
Land Acquisition and Surveying (22 acres)	$336,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$978,000
TOTAL COST OF PROJECT	**$16,017,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$871,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$81,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$71,000
Pumping Energy Costs (236139 kW-hr @ 0.09 $/kW-hr)	$21,000
TOTAL ANNUAL COST	**$1,044,000**
Available Project Yield (acft/yr)	1,087
Annual Cost of Water ($ per acft), based on PF=2	$960
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$159
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$2.95
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.49
ADB	*8/6/2024*

Table H.143

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Pantego - Connect to and Purchase Water from Arlington (TRWD)*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Station	$231,000
Transmission Pipeline (6 in. dia., 2.2 miles)	$2,283,000
TOTAL COST OF FACILITIES	**$2,514,000**
Engineering:	
- Planning (3%)	$75,000
- Design (7%)	$176,000
- Construction Engineering (1%)	$25,000
Legal Assistance (2%)	$50,000
Fiscal Services (2%)	$50,000
Pipeline Contingency (15%)	$342,000
All Other Facilities Contingency (20%)	$46,000
Environmental & Archaeology Studies and Mitigation	$136,000
Land Acquisition and Surveying (10 acres)	$158,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$233,000
TOTAL COST OF PROJECT	**$3,805,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$207,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$23,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$6,000
TOTAL ANNUAL COST	**$236,000**
Available Project Yield (acft/yr)	33
Annual Cost of Water ($ per acft), based on PF=2	$7,152
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$879
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$21.94
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$2.70
ADB	*8/7/2024*

Table H.144

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Pantego - Connect to and Purchase Water from Fort Worth (TRWD)*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Station	$362,000
Transmission Pipeline (6 in. dia., 3.7 miles)	$3,846,000
TOTAL COST OF FACILITIES	**$4,208,000**
Engineering:	
- Planning (3%)	$126,000
- Design (7%)	$295,000
- Construction Engineering (1%)	$42,000
Legal Assistance (2%)	$84,000
Fiscal Services (2%)	$84,000
Pipeline Contingency (15%)	$577,000
All Other Facilities Contingency (20%)	$72,000
Environmental & Archaeology Studies and Mitigation	$181,000
Land Acquisition and Surveying (14 acres)	$213,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$383,000
TOTAL COST OF PROJECT	**$6,265,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$341,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$38,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$9,000
Pumping Energy Costs (7112 kW-hr @ 0.09 $/kW-hr)	$1,000
TOTAL ANNUAL COST	**$389,000**
Available Project Yield (acft/yr)	34
Annual Cost of Water ($ per acft), based on PF=2	$11,441
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$1,412
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$35.11
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$4.33
ADB	*8/7/2024*

Table H.145

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Pelican Bay - Connect to and Purchase Water from Azle (TRWD)*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations	$875,000
Transmission Pipeline (6 in. dia., 5.6 miles)	$5,780,000
Integration, Relocations, Backup Generator & Other	$6,600
TOTAL COST OF FACILITIES	**$10,478,600**
Engineering:	
- Planning (3%)	$314,000
- Design (7%)	$734,000
- Construction Engineering (1%)	$105,000
Legal Assistance (2%)	$210,000
Fiscal Services (2%)	$210,000
Pipeline Contingency (15%)	$867,000
All Other Facilities Contingency (20%)	$940,000
Environmental & Archaeology Studies and Mitigation	$376,000
Land Acquisition and Surveying (29 acres)	$434,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$954,000
TOTAL COST OF PROJECT	**$15,622,600**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$849,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$79,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$64,000
Pumping Energy Costs (108162 kW-hr @ 0.09 $/kW-hr)	$9,700
TOTAL ANNUAL COST	**$1,001,700**
Available Project Yield (acft/yr)	345
Annual Cost of Water ($ per acft), based on PF=2	$2,903
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$443
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$8.91
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$1.36
ADB	*8/7/2024*

Table H.146

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Southlake - Increase Delivery Infrastructure from Ft Worth*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Station	$6,060,000
Transmission Pipeline (24 in. dia., 4.5 miles)	$12,879,000
Integration, Relocations, Backup Generator & Other	$69,000
TOTAL COST OF FACILITIES	**$19,008,000**
Engineering:	
- Planning (3%)	$570,000
- Design (7%)	$1,331,000
- Construction Engineering (1%)	$190,000
Legal Assistance (2%)	$380,000
Fiscal Services (2%)	$380,000
Pipeline Contingency (15%)	$1,932,000
All Other Facilities Contingency (20%)	$1,226,000
Environmental & Archaeology Studies and Mitigation	$205,000
Land Acquisition and Surveying (16 acres)	$243,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$1,656,000
TOTAL COST OF PROJECT	**$27,121,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$1,475,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$129,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$152,000
Pumping Energy Costs (1129537 kW-hr @ 0.09 $/kW-hr)	$102,000
TOTAL ANNUAL COST	**$1,858,000**
Available Project Yield (acft/yr)	6,623
Annual Cost of Water ($ per acft), based on PF=2	$281
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$58
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$0.86
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.18
ADB	*8/7/2024*

Table H.147

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Infrastructure from Fort Worth*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (0 MGD)	$3,054,000
Transmission Pipeline (42 in. dia., 1.2 miles)	$2,535,000
Storage Tanks (Other Than at Booster Pump Stations)	$4,116,000
Integration, Relocations, Backup Generator & Other	$374,000
TOTAL COST OF FACILITIES	**$10,079,000**
Engineering:	
- Planning (3%)	$302,000
- Design (7%)	$706,000
- Construction Engineering (1%)	$101,000
Legal Assistance (2%)	$202,000
Fiscal Services (2%)	$202,000
Pipeline Contingency (15%)	$380,000
All Other Facilities Contingency (20%)	$1,509,000
Environmental & Archaeology Studies and Mitigation	$36,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$879,000
TOTAL COST OF PROJECT	**$14,396,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$783,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$70,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$76,000
TOTAL ANNUAL COST	**$929,000**
Available Project Yield (acft/yr)	5,712
Annual Cost of Water ($ per acft), based on PF=2	$163
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$26
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$0.50
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.08
Note: One or more cost element has been calculated externally	
ADB	*11/18/2024*

Table H.148

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *County-Other, Tarrant - Connect to Euless for DFW Airport (Alternative)*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (0 MGD)	$2,792,000
Transmission Pipeline (14 in. dia., 3 miles)	$6,095,000
Storage Tanks (Other Than at Booster Pump Stations)	$1,784,000
Integration, Relocations, Backup Generator & Other	$34,000
TOTAL COST OF FACILITIES	**$10,705,000**
Engineering:	
- Planning (3%)	$321,000
- Design (7%)	$749,000
- Construction Engineering (1%)	$107,000
Legal Assistance (2%)	$214,000
Fiscal Services (2%)	$214,000
Pipeline Contingency (15%)	$914,000
All Other Facilities Contingency (20%)	$922,000
Environmental & Archaeology Studies and Mitigation	$187,000
Land Acquisition and Surveying (14 acres)	$217,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$946,000
TOTAL COST OF PROJECT	**$15,496,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$843,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$79,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$70,000
Pumping Energy Costs (557007 kW-hr @ 0.09 $/kW-hr)	$50,000
Purchase of Water (2000 acft/yr @ 977.55 $/acft)	$1,955,000
TOTAL ANNUAL COST	**$2,997,000**
Available Project Yield (acft/yr)	2,000
Annual Cost of Water ($ per acft), based on PF=2	$1,499
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$1,077
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$4.60
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$3.30
ADB	*12/2/2024*

Table H.149

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Alvord - Connect to and Purchase Water from West Wise SUD (TRWD)*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (0 MGD)	$1,017,000
Transmission Pipeline (8 in. dia., 10.1 miles)	$8,090,000
Transmission Pump Station(s) & Storage Tank(s)	$6,204,000
Integration, Relocations, Backup Generator & Other	$16,000
TOTAL COST OF FACILITIES	**$15,327,000**
Engineering:	
- Planning (3%)	$460,000
- Design (7%)	$1,073,000
- Construction Engineering (1%)	$153,000
Legal Assistance (2%)	$307,000
Fiscal Services (2%)	$307,000
Pipeline Contingency (15%)	$1,214,000
All Other Facilities Contingency (20%)	$1,447,000
Environmental & Archaeology Studies and Mitigation	$579,000
Land Acquisition and Surveying (44 acres)	$675,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$1,401,000
TOTAL COST OF PROJECT	**$22,943,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$1,247,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$114,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$98,000
Pumping Energy Costs (265350 kW-hr @ 0.09 $/kW-hr)	$24,000
TOTAL ANNUAL COST	**$1,483,000**
Available Project Yield (acft/yr)	571
Annual Cost of Water ($ per acft), based on PF=2	$2,597
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$413
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$7.97
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$1.27
ADB	*8/7/2024*

Table H.150

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Chico - Increase Delivery Infrastructure from West Wise SUD*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (0 MGD)	$685,000
Transmission Pipeline (6 in. dia., 7 miles)	$5,235,000
Integration, Relocations, Backup Generator & Other	$1,000
TOTAL COST OF FACILITIES	**$5,921,000**
Engineering:	
- Planning (3%)	$178,000
- Design (7%)	$414,000
- Construction Engineering (1%)	$59,000
Legal Assistance (2%)	$118,000
Fiscal Services (2%)	$118,000
Pipeline Contingency (15%)	$785,000
All Other Facilities Contingency (20%)	$137,000
Environmental & Archaeology Studies and Mitigation	$279,000
Land Acquisition and Surveying (22 acres)	$334,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$543,000
TOTAL COST OF PROJECT	**$8,886,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$483,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$52,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$17,000
Pumping Energy Costs (21398 kW-hr @ 0.09 $/kW-hr)	$2,000
TOTAL ANNUAL COST	**$554,000**
Available Project Yield (acft/yr)	80
Annual Cost of Water ($ per acft), based on PF=2	$6,925
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$888
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$21.25
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$2.72
ADB	*8/6/2024*

Table H.151

Cost Estimate Summary Water Supply Project Option September 2023 Prices Decatur - WTP Expansion and Infrastructure Improvements	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (1.5 MGD)	$5,587,000
Transmission Pump Station(s) & Storage Tank(s)	$16,706,000
Water Treatment Plant (1.5 MGD)	$8,706,000
Integration, Relocations, Backup Generator & Other	$46,000
TOTAL COST OF FACILITIES	**$31,045,000**
Engineering:	
- Planning (3%)	$931,000
- Design (7%)	$2,173,000
- Construction Engineering (1%)	$310,000
Legal Assistance (2%)	$621,000
Fiscal Services (2%)	$621,000
All Other Facilities Contingency (20%)	$6,209,000
Environmental & Archaeology Studies and Mitigation	$955,000
Land Acquisition and Surveying (72 acres)	$1,100,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$2,858,000
TOTAL COST OF PROJECT	**$46,823,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$2,546,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$80,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$358,000
Water Treatment Plant	$680,000
Pumping Energy Costs (755073 kW-hr @ 0.09 $/kW-hr)	$68,000
TOTAL ANNUAL COST	**$3,732,000**
Available Project Yield (acft/yr)	841
Annual Cost of Water ($ per acft), based on PF=2	$4,438
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$1,410
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$13.62
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$4.33
HAC	*2/12/2025*

Table H.152

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Newark - Connect to and Purchase Water from Rhome (from Walnut Creek SUD from TRWD)*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Transmission Pipeline (8 in. dia., 4 miles)	$3,216,000
TOTAL COST OF FACILITIES	**$3,943,000**
Engineering:	
- Planning (3%)	$118,000
- Design (7%)	$276,000
- Construction Engineering (1%)	$39,000
Legal Assistance (2%)	$79,000
Fiscal Services (2%)	$79,000
Pipeline Contingency (15%)	$482,000
Environmental & Archaeology Studies and Mitigation	$189,000
Land Acquisition and Surveying (15 acres)	$224,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$363,000
TOTAL COST OF PROJECT	**$5,937,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$323,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$32,000
TOTAL ANNUAL COST	**$373,000**
Available Project Yield (acft/yr)	517
Annual Cost of Water ($ per acft), based on PF=2	$721
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$97
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$2.21
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.30
ADB	*8/7/2024*

Table H.153

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Runaway Bay - Increase Capacity of Lake Intake*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Intake Pump Stations (1.4 MGD)	$6,348,000
TOTAL COST OF FACILITIES	**$6,348,000**
Engineering:	
- Planning (3%)	$190,000
- Design (7%)	$444,000
- Construction Engineering (1%)	$63,000
Legal Assistance (2%)	$127,000
Fiscal Services (2%)	$127,000
All Other Facilities Contingency (20%)	$1,270,000
Environmental & Archaeology Studies and Mitigation	$3,000
Interest During Construction (3.5% for 0.5 years with a 0.5% ROI)	$140,000
TOTAL COST OF PROJECT	**$8,712,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$474,000
Operation and Maintenance	
Intakes and Pump Stations (2.5% of Cost of Facilities)	$159,000
TOTAL ANNUAL COST	**$633,000**
Available Project Yield (acft/yr)	758
Annual Cost of Water ($ per acft), based on PF=2	$835
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$210
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$2.56
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.64
Note: One or more cost element has been calculated externally	
ADB	*11/16/2024*

Table H.154

New Regional Water Provider - Wise County Regional System	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Transmission Pipeline	$125,155,569
Transmission Pump Station(s) & Storage Tank(s)	$108,060,051
Advanced Water Treatment Facility (MGD)	$221,291,892
TOTAL COST OF FACILITIES	**$454,507,512**
Engineering:	
- Design (7%)	$13,669,167
- Construction Engineering (1%)	$31,894,361
Legal Assistance (2%)	$4,556,070
Fiscal Services (2%)	$9,113,097
Pipeline Contingency (15%)	$9,113,097
All Other Facilities Contingency (20%)	$16,209,153
Land Acquisition and Surveying (136 acres)	$1,762,990
Interest During Construction (0% for 0.005 years with a 3.5% ROI)	$4,090,910
TOTAL COST OF PROJECT	**$544,916,358**
ANNUAL COST	
Debt Service (0 percent, years)	$35,412,139
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (3.5% of Cost of Facilities)	$1,075,705
Intakes and Pump Stations (1% of Cost of Facilities)	$3,096,002
Water Treatment Plant	$15,490,538
Pumping Energy Costs (1520097 kW-hr @ 0 $/kW-hr)	$1,658,538
Purchase of Water (0 acft/yr @ 0.09 $/acft)	$2,569,634
TOTAL ANNUAL COST	**$59,302,556**
Available Project Yield (acft/yr)	26,283
Annual Cost of Water ($ per acft), based on PF=	$2,256
Annual Cost of Water After Debt Service ($ per acft), based on PF=	$909
Annual Cost of Water ($ per 1,000 gallons), based on PF=	$6.92
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=	$2.79
HAC	*1/20/2025*

Table H.155

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *County-Other, Wise - Alternative TRWD through Justin (New Fairview)*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
CAPITAL COST	
Transmission Pipeline (12 in. dia., 3.6 miles)	$3,760,000
Storage Tanks (Other Than at Booster Pump Stations)	$6,522,000
Integration, Relocations, Backup Generator & Other	$14,000
TOTAL COST OF FACILITIES	**$10,296,000**
Engineering:	
- Planning (3%)	$309,000
- Design (7%)	$721,000
- Construction Engineering (1%)	$103,000
Legal Assistance (2%)	$206,000
Fiscal Services (2%)	$206,000
Pipeline Contingency (15%)	$564,000
All Other Facilities Contingency (20%)	$1,307,000
Environmental & Archaeology Studies and Mitigation	$302,000
Land Acquisition and Surveying (36 acres)	$545,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$947,000
TOTAL COST OF PROJECT	**$15,506,000**
ANNUAL COST	
Debt Service (3.5 percent, 30 years)	$843,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$103,000
Pumping Energy Costs (234443 kW-hr @ 0.09 $/kW-hr)	$21,000
TOTAL ANNUAL COST	**$967,000**
Available Project Yield (acft/yr)	1,500
Annual Cost of Water ($ per acft), based on PF=2	$645
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$83
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$1.98
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.25
HAC	*2/17/2025*

Appendix I

Water Conservation Savings

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APPENDIX I CONSERVATION MEASURES AND GPCD GOALS

CHAPTER OUTLINE

This appendix presents information on water conservation strategies (costs and savings) and per capita water use goals. The *2026 Region C Water Plan* recommends Water Conservation measures for municipal, irrigation, and mining water user groups (WUGs). The purpose of this appendix is to document the criteria for recommending strategies in the Water Conservation Package for a WUG, and to document assumptions made in projecting water savings and opinions of probable costs for these strategies. **Section I.2** describes conservation measures mandated by state or federal law and already included within demand projections. **Sections I.3** to **I.12** describe conservation measures chosen for Region C WUGs and recommended as strategies. The last section of this appendix contains the goals for per capita water use by water user group as required by TWDB.

I.1 Relationship of Water Conservation and Water Demand Projections

Water demand projections for regional water planning are based on per capita water usage during the base year, which is the most recent very dry year with high water usage. For most Region C WUGs, the base year is 2011. To obtain the initial water demand projection for a given decade, the base year per capita water use is multiplied by the projected population for that decade.

I.1.1 Passive Water Conservation

Passive water conservation measures do not require actions from a WUG to realize the savings. The Texas Water Development Board (TWDB) has projected water savings that are expected to result from passive water conservation measures, including low-flow plumbing fixture rules, efficient new residential clothes washer standards, and efficient new residential dishwasher standards. The final water demand projections presented in **Chapter 2** are the initial water demand projections minus the projected water savings from passive measures. Therefore, the projected water savings from passive measures are built into the Region C water demand projections.

The projected passive water savings are presented in **TABLE I.1** as "Water Savings Implicit in Water Demand Projections."

I.1.2 Active Water Conservation Through the Base Year

Active water conservation measures require actions from a WUG to realize the savings. Although significant water conservation occurred from active measures in Region C prior to and during the base year, the associated water savings have not been enumerated. Instead, all water conservation savings that occurred through the base year are assumed to be implicit in the base year per capita water use and are therefore built into the water demand projections.

I.1.3 Active Water Conservation Since the Base Year (Residual Savings)

Region C WUGs have continued to implement active water conservation measures since the base year. The associated water savings from the previously implemented water conservation measures, i.e., residual savings, have reduced water demand in Region C, but this demand reduction is not reflected in the Region C water demand projections. These savings are "residual" because they continue to accrue over time, even after the initial conservation actions have been taken. For measures with sufficient available data, this demand reduction is quantified in **TABLE I.1** as "Demand Reduction Since Base Year (Already Implemented)." No future costs are shown in **TABLE I.2** for this demand reduction, because the costs have already been incurred. This is analogous to how existing water supplies are handled in the Region C Water Plan.

I.1.4 Active Water Conservation During the Planning Period

Recommended water management strategies include active water conservation measures that are projected to save water during the planning period. The projected water savings from active water conservation measures are presented in **TABLE I.1** as "Water Savings from Recommended Water Management Strategies," and projected costs are projected in **TABLE I.2**.

TABLE I.1 SUMMARY OF PROJECTED MUNICIPAL WATER SAVINGS BY CONSERVATION MEASURE FOR REGION C WUGS

	2030	2040	2050	2060	2070	2080
Water Savings Implicit in Water Demand Projections						
Low Flow Plumbing Fixture Rules [a]	45,894	59,171	66,097	72,498	78,699	83,811
Efficient New Residential Clothes Washer Standards [a]						
Efficient New Residential Dishwasher Standards [a]						
Water Savings Implicit in Water Demand Projections	***45,894***	***59,171***	***66,097***	***72,498***	***78,699***	***83,811***
Demand Reduction Since Base Year (Already Implemented, but not reflected in demand projections)						
Public and School Education [b]	0	0	0	0	0	0
Price Elasticity/Rate Structure Impact	0	0	0	0	0	0
Water Waste Ordinance	376	500	568	628	680	717

Time-of-Day Irrigation Restriction	134	189	220	242	270	291
Water Conservation Coordinator	1,025	2,352	2,695	2,959	3,145	3,288
Twice Weekly Irrigation Restriction	23,245	26,056	27,770	29,686	30,784	31,704
Landscape Ordinance for New Development	0	0	0	0	0	0
Water Loss Mitigation Strategy	0	0	0	0	0	0
Water Savings from Demand Reduction Since Base Year	***24,780***	***29,097***	***31,253***	***33,515***	***34,879***	***36,000***
Water Savings from Recommended Water Management Strategies						
Public and School Education	11,509	14,992	17,239	19,125	21,121	22,932
Price Elasticity/Rate Structure Impact	5,917	13,420	22,427	32,682	44,023	56,049
Water Waste Ordinance	1,008	1,488	1,872	2,181	2,492	2,722
Time-of-Day Irrigation Restriction	242	355	451	519	585	634
Water Conservation Coordinator	42	128	226	319	390	462
Twice Weekly Irrigation Restriction	20,995	26,482	30,938	34,787	38,701	41,796
Landscape Ordinance for New Development	0	13,764	19,725	21,553	20,881	19,042
Water Loss Mitigation Strategy	19,667	58,336	85,340	91,767	98,646	105,173
Water Savings from Recommended Water Management Strategies	59,377	128,958	178,179	202,876	226,769	248,737
Total Projected Water Savings	**130,051**	**217,226**	**275,529**	**308,889**	**340,347**	**368,548**

a. Water savings estimated by Texas Water Development Board.

b. Little information is available regarding WUGs that implemented enhanced public and school education programs during this time. In addition, it is very difficult to accurately measure water savings from these programs. For these reasons, no estimate of water savings since the base year was made.

Totals may not match the sums of individual entries exactly due to differences in rounding the numbers.

TABLE I.2 SUMMARY OF PROJECTED UNIT COST BY MUNICIPAL CONSERVATION MEASURE

	Unit Cost ($/ac-ft)					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Future Costs Implicit in Water Demand Projections						
Low Flow Plumbing Fixture Rules Efficient New Residential Clothes Washer Standards Efficient New Residential Dishwasher Standards	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Future Savings Implicit in Water Demand Projections	***$0.00***	***$0.00***	***$0.00***	***$0.00***	***$0.00***	***$0.00***
Future Cost for Demand Reduction Since Base Year (Already Implemented, but not reflected in demand projections) [a]						
Public and School Education	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Price Elasticity/Rate Structure Impact	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Water Waste Ordinance	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00

Time-of-Day Irrigation Restriction	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Water Conservation Coordinator	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Twice Weekly Irrigation Restriction	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Landscape Ordinance for New Development	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Water Loss Mitigation Strategy	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Future Cost for Demand Reduction Since Base Year	***$0.00***	***$0.00***	***$0.00***	***$0.00***	***$0.00***	***$0.00***
Future Cost for Recommended Water Management Strategies						
Public and School Education	$529	$462	$455	$449	$443	$438
Price Elasticity/Rate Structure Impact	$0	$0	$0	$0	$0	$0
Water Waste Ordinance	$518	$466	$438	$454	$476	$493
Time-of-Day Irrigation Restriction	$1,714	$1,540	$1,553	$1,629	$1,792	$1,894
Water Conservation Coordinator	$326	$326	$326	$326	$326	$326
Twice Weekly Irrigation Restriction	$65.66	$60.34	$61.02	$61.73	$62.37	$62.74
Landscape Ordinance for New development	$0	$53	$7	$10	$9	$6
Water Loss Mitigation Strategy	$1,150	$650	$393	$392	$392	$392
Future Cost for Recommended Water Management Strategies [b]	**$521**	**$364**	**$231**	**$219**	**$212**	**$207**

a. No costs are included in the Region C Water Plan for demand reduction due to measures that have already been implemented. This is analogous to how existing supplies are handled in the Region C Water Plan.

b. The future cost of recommended water management strategies is determined by calculating the weighted average of the expected savings and costs of individual conservation measures.

I.2 Public and School Education

Most utilities in Region C have some kind of public and school education program. However, the levels of effort put into these programs, the budgets for these programs, and the water savings from these programs are highly variable. Although this measure does not define how a utility should conduct its public and school education program, it assumes that participating utilities will operate their programs at a high (or "enhanced") level, committing resources as necessary to achieve significant water savings.

This measure incorporates elements of Best Management Practices (BMPs) 6.1 Public Information, 6.2 School Education, and 6.3 Public Outreach & Education [1].

I.2.1 Applicability

The enhanced public and school education program measure was evaluated for municipal WUGs that have an identified sponsor for the public and school education program.

I.2.2 Projected Water Savings

Water savings from public and school education are difficult to measure. Public and school education results in indirect savings through enhancement of other water conservation measures and direct savings from changes in customer behavior. In this memorandum, the indirect savings from public education will be attributed to the other water conservation measures with which they are associated. Therefore, the potential water savings from public and school education will be the direct savings from changes in customer behavior.

Water Savings Through the Base Year

Tarrant Regional Water District (TRWD), North Texas Municipal Water District (NTMWD), and Dallas Water Utilities (DWU) began operating enhanced public education programs before the base year. Water savings from enhanced public and school education through the base year are built into the water demand projections.

Water Savings Since the Base Year

Little information is available regarding WUGs that implemented enhanced public and school education programs during this time. In addition, it is very difficult to accurately measure water savings from these programs. For these reasons, no estimate of water savings since the base year was made.

Projected Water Savings During the Planning Period

It has been assumed that the direct customers of TRWD, NTMWD, and DWU will achieve an additional savings of 0.5 percent of municipal water demand during the planning period (**TABLE I.3**). For other WUGs, the projected water savings in a given decade is estimated to be from 1 to 2 percent of municipal water demand, with savings increasing according to **TABLE I.3.** WUGs that implement this program by 2020 are projected to achieve 2 percent water savings by 2030.

TABLE I.3 PROJECTED PERCENTAGE SAVINGS BY DECADE FOR ENHANCED PUBLIC AND SCHOOL EDUCATION

WUGS	2030	2040	2050	2060	2070	2080
Customers of TRWD, NTWMD, and/or DWU	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Other WUGs	1.5%	2.0%	2.0%	2.0%	2.0%	2.0%

It is assumed that the savings from public and school education last one year [(2)] and that the program must be renewed each year to maintain and increase the estimated savings.

I.2.3 Additional Data Requirements

WUGs that have implemented enhanced public and school education programs since the base year need to be identified. No additional data are needed to project water savings from enhanced public and school education during the planning period.

I.2.4 Reliability

Water savings from enhanced public and school education are difficult to measure and depend on customer behavior. For these reasons, the reliability of the estimated water savings is low. Enhanced public and school education reinforces and builds on previously delivered conservation messages; therefore, it is important that the enhanced public and school education program be continued from year to year in order to increase the reliability of the savings.

I.2.5 Opinion of Probable Cost

Actual spending per resident can be difficult to track, because media markets overlap many cities. For example, Dallas Water Utilities planned to budget about $1.38 million in fiscal year 2018-2019 for its public awareness program and its environmental education initiative [(3)]. Based on the retail customer population, this corresponds to $1.07 per resident. However, the associated media buys also reached wholesale customers. When the wholesale customer population is taken into account, the per capita spending was $0.58.

Based on this information, the cost of enhanced public and school education is expected to be about $1.00 per resident for the largest WUGs. It is anticipated that smaller cities would have to spend up to $3.00 per resident per year to deliver effective water conservation messages [(3)].

The opinion of probable annual cost for each WUG to which this measure applies was derived using population projections. For a given WUG and given year, the probable unit cost was calculated as the probable annual cost divided by projected water savings.

These costs have been associated with the WUGs that benefit from the programs, regardless of whether the funding comes from the WUG itself or from a wholesale supplier.

I.3 Price Elasticity/Rate Structure Impact

Price increases or changes in rate structure impact water consumption. This measure incorporates elements of BMP 3.1 Water Conservation Pricing [(3)].

I.3.1 Applicability

The impact of real increases in water prices was evaluated for all municipal WUGs. Although many WUGs in Region C already have conservation-oriented rate structures, this measure is also assumed to account for rate structure changes.

I.3.2 Projected Water Savings

The change in water demand due to a real increase in the water price is called the price elasticity of water demand. A price elasticity of -0.20 indicates that a 1.0 percent increase in water rates will cause a -0.2 percent change in water usage.

Water Savings Through the Base Year

Water savings from price elasticity/rate structure impacts through the base year are built into the water demand projections.

Water Savings Since the Base Year

Water savings from price elasticity/rate structure impacts since the base year were not calculated due to lack of information.

Projected Water Savings During the Planning Period

Historical price elasticities depend upon economic and other conditions that may not persist in the future, and no projections of future price elasticities were identified. Therefore, a long-term price elasticity of -0.20 is recommended for projecting the impact of increasing water prices in Region C [3]. It has also been assumed that real water prices will increase by 20 percent over the planning period and that half of the potential impact of increasing water prices will be offset by increasing income.

The projected water savings for each WUG is one half of the long-term price elasticity multiplied by the change in real water price multiplied by the municipal water demand. It was assumed that real water prices will increase linearly during planning period, for a total 20 percent increase by 2070 (**TABLE I.4**). By the end of the planning period, increasing water prices are projected to cause a 2 percent reduction in total water demand.

TABLE I.4 PROJECTED REAL WATER PRICE INCREASES DURING THE PLANNING PERIOD

2030	2040	2050	2060	2070	2080
3.3%	6.7%	10.0%	13.3%	16.6%	20%

I.3.3 Additional Data Requirements and Reliability

Customer participation is highly reliable for this measure, since changes in water prices automatically affect all water customers. However, the projected water savings are based on broad, general assumptions, and the reliability of the above projections is medium.

The reliability of the above projections could be increased if detailed projections of real treated water prices and real income were available. This would require projections of raw water costs, treatment costs, distribution costs, and administrative costs for each WUG.

I.3.4 Opinion of Probable Cost

The projected water savings due to real increases in water price will be realized at no cost to the WUGs.

I.4 Water Waste Ordinance

Many Region C WUGs have prohibited water waste. This measure incorporates elements of BMP 9.1 Prohibition on Wasting Water [3].

I.4.1 Applicability

Water waste prohibition was evaluated for municipal WUGs without a current water waste prohibition/ordinance.

It has been assumed that WUGs that lack ordinance-making authority will be able to implement a water waste prohibition through other means, such as the utilities' operation standards, water conservation plans, and terms of service.

I.4.2 Projected Water Savings

The projected water savings for each WUG is the product of the following parameters:

- Potential water savings (as a percentage of irrigation water demand)
- Municipal water demand
- Percent seasonal water demand
- Percent automatic irrigation
- Compliance rate
- Implementation schedule percentage

The projected savings are based on use of rain sensors that shut off automatic irrigation systems when it is raining or when it has rained recently (depending on the type of sensor). It is estimated that the percentage of watering cycles missed during a drought year is approximately equal to the minimum annual percentage of days with ½-inch rainfall events. The projected water savings from an irrigation water waste prohibition is 3.3 percent of irrigation water use for accounts that have automatic irrigation systems.

The percentage of customers that have automatic irrigation systems varies considerably across the region and is unknown in most cases. In the July 2004 RCWPG survey, 52 out of 129 total responses provided an estimate of the percentage of customers that have automatic irrigation systems.

In cases where no information was available, assumptions were made based on the whether the WUG is located in a rural, suburban, or urban area, the pace of recent development and the degree of projected growth. Based on these factors, the current percentages of customers with automatic irrigation systems were assumed to be 5, 20, or 50 percent, and the percentages of future connections with automatic irrigation systems were assumed to be 5, 50, or 80 percent.

It is anticipated that it will take ten years of implementation to realize full compliance with the water waste prohibition. However, anecdotal evidence indicates that there is some fraction of rain sensors that will be out of order. Therefore, "full compliance" is projected to be 90 percent participation.

The estimated potential water savings has been based on a requirement for rain sensors for automatic irrigation systems. As discussed previously, a water waste prohibition may address numerous other sources of waste, but it is not possible to predict what the ordinance for an individual WUG might prohibit. The potential water savings from other sources of water waste have not been estimated.

It is anticipated that the customer will replace the rain sensor at the end of its useful life at his or her own expense to maintain compliance with the water waste prohibition and that the projected water savings will be permanent.

Water Savings Through the Base Year

Water savings from water waste prohibition through the base year are built into the water demand projections.

Water Savings Since the Base Year

WUGs that have implemented a water waste prohibition since the base year were identified through previous surveys and comparison of historical and current water conservation plans. For these WUGs, water savings since the base year were estimated as described above.

Projected Water Savings During the Planning Period

For WUGs that have not implemented a water waste prohibition, projected water savings were estimated as described above. Where no implementation information was available, it was assumed that the WUG will implement a water waste prohibition in the future.

I.4.3 Additional Data Requirements

The status of whether a WUG has implemented a water waste prohibition is known for WUGs that comprise 85 percent of 2080 municipal water demand. Additional information is necessary to refine the projected water savings for the remainder of the WUGs.

In addition, the percentage of customer accounts that have automatic irrigation systems is unknown for most WUGs. Additional data would improve the reliability of the assumptions stated in **Section I.4 2**.

I.4.4 Reliability

For an individual automatic irrigation system with a rain sensor in working order, the reliability of the potential water savings should be high. However, for an entire WUG to realize its projected savings, there must be enforcement of the water waste prohibition to ensure that the projected number of rain sensors are installed, and automatic irrigation system owners must keep the rain sensor in working order. In addition, there are uncertainties associated with the estimates of the market penetration of automatic irrigation systems. Due to uncertainties described above, the reliability of the projected savings is medium.

I.4.5 Opinion of Probable Cost

The primary costs for this measure include adoption of an ordinance and enforcement of the prohibition. For a given WUG and given year, the probable unit cost was calculated as the probable annual cost divided by projected water savings.

It has been assumed that the probable cost to pass an ordinance in a city of up to 25,000 people is $8,560 and that the cost to pass an ordinance in a city of more than 50,000 people is $17,119. To obtain an opinion of probable annual costs, the ordinance cost was assumed to be paid in equal sums within the first decade and enforcement costs were assumed to be $0.35 per resident per year. Ordinance costs are based on the costs from the 2006 RWP and inflated it based on the CPI index. For a given WUG and given year, the probable unit cost was calculated as the probable annual cost divided by projected water savings.

I.5 Time-Of-Day Irrigation Restriction

Time-of-day irrigation restriction ordinances have been passed for a number of WUGs in Region C, although in varying forms. Some ordinances specify time-of-day restrictions (no automatic irrigation watering from 10am through 6pm) throughout the year, while some choose only the warmer months (e.g., April through October). The exact times allowed throughout a day also vary across the Region. Almost all WUGs allow hand irrigation regardless of time of day or year.

I.5.1 Applicability

The time-of-day irrigation restriction was evaluated for municipal WUGs without an existing time-of-day irrigation restriction.

It has been assumed that WUGs that lack ordinance-making authority will be able to implement a time-of-day irrigation restriction through other means, such as the utilities' operation standards, water conservation plans, and terms of service.

I.5.2 Projected Water Savings

Sprinkler evaporation losses depend on relative humidity, air temperature, wind speed, nozzle diameter, and nozzle pressure [4]. Using long-term, monthly average weather data from the Dallas-Fort Worth International Airport weather station and assuming 5/16-inch nozzle diameter and 50 psi nozzle pressure, annual sprinkler evaporation losses were estimated to be 6.9 percent of irrigation water applied for irrigation between 10am and 6 pm and 4.0 percent if irrigation is restricted to 6pm to 10am. For each WUG, it was assumed that one-third of customers that have automatic irrigation systems would have to change their irrigation time in response to this restriction. For these customers, the estimated water savings is 2.9 percent of seasonal water demands. Seasonal water demands are calculated as the difference between monthly water usage and winter usage. Seasonal water demands are attributable largely to landscape irrigation, although cooling water usage and other factors may also contribute.

It is anticipated that it will take ten years of implementation to realize full compliance with the time-of-day irrigation restriction. However, some customers will continue to irrigate from 10am to 6pm. Therefore, "full compliance" is projected to be 90 percent participation.

Water Savings Through the Base Year

Water savings from a time-of-day irrigation restriction through the base year are built into the water demand projections.

Water Savings Since the Base Year

WUGs that have implemented a time-of-day irrigation restriction since the base year were identified through previous surveys and comparison of historical and current water conservation plans. For these WUGs, water savings since the base year were estimated as described above.

Projected Water Savings During the Planning Period

For WUGs that have not implemented a time-of-day irrigation restriction, projected water savings were estimated as described above. Where no implementation information was available, it was assumed that the WUG will implement a time-of-day irrigation restriction in the future.

I.5.3 Additional Data Requirements

Additional WUG surveys would help refine the number and type of ordinances currently enforced and the percentages of customers that have automatic irrigation systems.

I.5.4 Reliability

Customer participation is related to knowledge of the restriction and enforcement, which varies by WUG. It is also not possible to predict the exact irrigation restrictions that each WUG would adopt. In addition, amounts of water used in irrigation are dependent on weather patterns which cannot be predicted throughout the planning periods. Due to these unknowns the reliability of the savings estimate is medium.

I.5.5 Opinion of Probable Cost

No ordinance cost is considered as an ordinance is not needed for this strategy. For a given WUG and given year, the probable unit cost was calculated as the probable annual cost divided by projected water savings. The per capita enforcement cost was assumed to be $0.35 per year.

I.6 Water Conservation Coordinator

A water conservation coordinator "coordinates water utility staff, data from various departments, and other resources as necessary for the purpose of developing, implementing, and evaluating the effectiveness of the utility's water conservation plan [(3)]." Coordination will make other water conservation measures more effective.

I.6.1 Applicability

Beginning September 1, 2017, House Bill 1648 required all retail public utilities with 3,300 service connection or more to designate a water conservation coordinator that is responsible for implementing the water conservation plan.

The water conservation coordinator measure was evaluated for municipal WUGs with population greater than 10,000, assuming 3.3 people per household.

I.6.2 Projected Water Savings

Water Savings Through the Base Year

Water savings for WUGs that had a water conservation coordinator prior to or during the base year are built into the water demand projections.

Water Savings Since the Base Year

It was assumed that other WUGs that currently have 3,300 connections or more have already appointed a water conservation coordinator, as required by HB 1648. Savings from coordination of the water conservation program are projected to be 0.25 percent of municipal water demand.

Projected Water Savings During the Planning Period

It was assumed that WUGs that currently have fewer than 3,300 connections will appoint a water conservation coordinator as they meet this threshold. Savings from coordination of the water conservation program are projected to be 0.25 percent of municipal water demand.

No savings were projected for the County Other WUGs, since these are comprised of multiple utilities for which the number of connections is unknown and likely to be small.

I.6.3 Additional Data Requirements

Additional WUG surveys would help identify WUGs that have and have not appointed water conservation coordinators.

I.6.4 Reliability

The savings from this measure are uncertain and difficult to measure, since they result from improved effectiveness of the overall water conservation program. In addition, the savings depend on the level of effort by the water conservation coordinator. Due to these unknowns the reliability of the savings estimate is low.

I.6.5 Opinion of Probable Cost

Since the level of effort required of a water conservation coordinator is undefined and will likely vary among the various WUGs, a unit cost of $1.00 per thousand gallons of water savings was assigned to this measure. This cost was judged to be reasonably reflective of general water conservation savings, but it should be refined as more information becomes available.

I.7 Twice Weekly Irrigation Restriction

Historically, twice weekly irrigation restrictions have been used as drought response measures in Region C. In recent years, however, a number of WUGs in Region C have implemented permanent twice weekly irrigation restrictions, although in varying forms. Some ordinances limit irrigation to two times per week year-round, while others also restrict irrigation to once per week during the winter months.

I.7.1 Applicability

The twice weekly irrigation restriction was evaluated as a water management strategy for municipal WUGs with the following characteristics:

- Population greater than 20,000 and
- No existing twice weekly irrigation restriction.

It has been assumed that WUGs that lack ordinance-making authority will be able to implement a twice weekly irrigation restriction through other means, such as the utilities' operation standards, water conservation plans, and terms of service.

I.7.2 Projected Water Savings

Water savings from a twice weekly irrigation restriction are difficult to measure and typically require statistical analysis to account for changes in weather and other factors that influence water use. Although this restriction has been used as a drought response measure in Region C for many years, the corresponding water savings have not been widely studied. In addition, a permanent restriction of this type is relatively new in Texas and the U.S., so there are limited data available regarding permanent water savings.

Tarrant Regional Water District implemented Stage 1 drought response measures, primarily consisting of twice-weekly irrigation limits, from August 29, 2011 through May 3, 2012. An analysis of water use in the service area of their four major customers indicated that the water savings during this period were about 8.5 percent of the water that would have been delivered without the Stage 1 drought response measures [(5)].

For a permanent twice weekly irrigation restriction, reported savings for Texas cities as a percentage of municipal water demand are [(6)]:

- 1 to 9 percent (Fort Worth, 2013-2016)
- 7 percent (Dallas, 2012)
- 7 percent (Austin, 2009)

More recent unpublished data for major water providers in Region C indicate water savings of 1 to 4 percent of municipal water demand for permanent twice weekly irrigation restriction. Two major water providers submitted water conservation plans that project water savings from twice weekly watering restrictions at 1.5 to 2 percent of municipal water demand.

The effectiveness of a twice weekly irrigation restriction depends on public education and customer behavior. Customers have apparently been willing to comply with a twice weekly irrigation restriction as a drought measure, although the water savings data are limited. As a permanent measure, water savings may have eroded somewhat in recent years. Also, it is not clear what impact implementing a twice weekly irrigation restriction as a permanent measure will have on water savings during drought conditions.

Due to the limited data, it has been assumed that a permanent twice weekly irrigation restriction will result in savings of 3 percent of municipal water demand. It is anticipated that it will take ten years of implementation to realize the full water savings.

Water Savings Through the Base Year

No water savings from this measure are built into the water demand projections, because no Region C WUGs had implemented this measure by the base year.

Water Savings Since the Base Year

WUGs that have implemented a time-of-day irrigation restriction since the base year were identified from current water conservation plans and from the SWCQP. For these WUGs, water savings since the base year were estimated as described above.

Projected Water Savings During the Planning Period

For WUGs that have not implemented a twice weekly irrigation restriction, projected water savings were estimated as described above. Where no implementation information was available, it was assumed that the WUG will implement a time-of-day irrigation restriction in the future.

I.7.3 Additional Data Requirements

Additional data should be collected on water savings realized from implementation of a permanent twice weekly irrigation restriction, particularly during drought periods. This will help refine the water savings estimate.

I.7.4 Reliability

Customer participation is related to knowledge of the restriction and enforcement, which varies by WUG. It is also not possible to predict the exact irrigation restrictions that each WUG would adopt. In addition, amounts of water used in irrigation are dependent on weather patterns which cannot be predicted throughout the planning periods. Due to these unknowns the reliability of the savings estimate is medium.

I.7.5 Opinion of Probable Cost

No ordinance cost is considered as an ordinance is not needed. For a given WUG and given year, the probable unit cost was calculated as the probable annual cost divided by projected water savings. The per capita enforcement cost is assumed to be $0.35 per year.

I.8 Landscape Ordinance for New Development

The Landscape Ordinance for New Development is a newly recommended measure in the 2026 Region C Regional Water Plan. This measure allows WUGs to design restrictions that best suit their service areas. Therefore, the Region C Regional Water Planning Group has not prescribed any specific recommendations.

I.8.1 Applicability

Landscape Ordinance for New Development was evaluated for municipal WUGs with a population greater than 20,000 and no similar existing ordinance.

It has been assumed that WUGs that lack ordinance-making authority will be able to implement a landscape ordinance through other means, such as including it in the terms of service.

I.8.2 Projected Water Savings

Using water use survey data, a per capita irrigation demand (GPCD) was estimated for each WUG by multiplying the total GPCD by the outdoor water use percentage. It was assumed that, for new customers, the irrigation GPCD will be reduced by 20 percent from adopting the landscape ordinance. The resulting savings will reflect the total savings from these new populations and their associated outdoor demand reduction. A decay factor of 50% per decade was applied to account for changes in landscaping practices over time.

Water Savings Through the Base Year

Water savings through the base year from existing landscape ordinances are already built into the water demand projection.

Water Savings Since the Base Year

Water savings from landscape ordinances since the base year are highly variable and are not estimated due to the lack of information.

Projected Water Savings During the Planning Period

As this measure is a newly added strategy with the potential for more stringent and cost-effective ordinances than what the WUGs are currently implementing,[1] it is assumed that any given WUG will be able to implement this strategy and achieve potential savings. For WUGs with a current population greater than 20,000, the savings will be realized beyond 2030, assuming it will take at least a few years for WUGs to implement and start seeing savings after the RWP adoption. For WUGs projected to surpass 20,000 in population, it is assumed that 50% of the savings will be realized upon reaching the threshold, with full savings achieved within the following decade.

I.8.3 Reliability

The reliability of the potential water savings will be high for a landscape ordinance based on the compliance being checked as part of the new building/construction permit.

[1] Local Government Code (Section 551.006) directs all municipalities with a population over 20,000 to adopt ordinances relating to irrigation. This requirement ensures that irrigation systems are designed, installed, and operated according to specific standards and specifications.

I.8.4 Opinion of Probable Cost

The primary costs for this measure include adoption of an ordinance. There is no ongoing enforcement cost associated with the landscape ordinance. For a given WUG and given year, the probable unit cost was calculated as the probable annual cost divided by projected water savings.

It has been assumed that the probable cost to pass a complicated ordinance such as landscape ordinance in a city is $150,000. This cost includes:

- **Consultant/Legal Support –** Assistance with drafting, reviewing, and finalizing the ordinance.
- **Public Outreach & Engagement** – Stakeholder meetings, public workshops, and outreach materials.
- **Staff Time & Training** – Staff efforts for research, coordination, and enforcement training.
- **Economic & Environmental Analysis** – Assessments of water savings, costs, and compliance impacts.
- **IT & Administrative Updates** – Modifications to permitting systems and documentation.
- **Miscellaneous/Contingency** – Unexpected costs, revisions, or additional reviews.

To obtain an opinion of probable annual costs, the ordinance cost was assumed to be paid in equal sums within the first decade of implementation.

I.9 Water Loss Mitigation Strategy

Most utilities in Region C have some kind of water loss control program. However, the levels of effort put into these programs, the budgets for these programs, and the water savings from these programs are highly variable. Although this measure does not define how a utility should conduct its water loss control program, it assumes that participating utilities will operate their programs at a high (or "enhanced") level, committing resources as necessary to achieve significant water savings.

The Water Loss Mitigation Strategy consists of:

- Water audits, pressure control, and leak detection and repair (including Automated Metering Infrastructure), and
- Water main replacement

This measure incorporates elements of BMP 4.2 System Water Audit and Water Loss Control [(3)].

I.9.1 Applicability

Retail public utilities that supply potable water to more than 3,300 connections or receive financial assistance from the TWDB must file a system water loss audit with the TWDB by May 1 each year. Other retail public utilities that supply potable water must file a system water loss audit with the TWDB every five years (the next due date is May 1, 2026) [(7)]. The water loss mitigation strategy is considered a best management practice and applicable to all WUGs.

I.9.2 Projected Water Savings

Water Savings Through the Base Year

Water savings through the base year from water loss mitigation are already built into the water demand projection.

Water Savings Since the Base Year

Water savings from water loss mitigation since the base year are highly variable and are not estimated due to the lack of information.

Projected Water Savings During the Planning Period

For a given WUG, the projected water savings from the water loss mitigation strategy is calculated as the difference between the WUG's real water loss and the TWDB water loss thresholds. These thresholds, as shown in **TABLE I.5,** were approved by the TWDB in February 2023**.** The implementation schedule is shown in **TABLE I.6**. To ensure a conservative estimate, a cap of 30% of the demand projection has been applied to the calculated savings.

TABLE I.5 WATER LOSS MITIGATION TARGETS

SERVICE CONNECTIONS PER MILE OF MAIN	REAL WATER LOSS TARGET (GALLONS PER CONNECTION PER DAY)
Less than 32	30
32 or more	57

TABLE I.6 WATER LOSS MITIGATION IMPLEMENTATION SCHEDULE

2030	2040	2050	2060	2070	2080
25%	75%	100%	100%	100%	100%

To maintain the target water loss levels, it is assumed that entities will invest appropriate resources in leak detection and management programs during the planning horizon. This ongoing effort is critical to sustaining the projected savings.

Water savings from the main replacement were estimated at 0.5% of the total water demand for each WUG. It is assumed that main replacements begin in 2030 with a capital cost and debt service. The length of mains expected to be replaced is based on the water loss per mile and the total length of the distribution system in miles.

I.9.3 Additional Data Requirements

Some WUGs did not report their water loss to the TWDB. In addition, some water loss accounting quantities are difficult to estimate (e.g., fire fighting, main flushing, etc.). As more utilities report and refine their system water audit data, the overall estimate of potential water savings from this measure should be refined.

I.9.4 Reliability

The projected water savings are based on reported water loss data, which increases the reliability of the estimates. However, water loss as a percentage of total produced and/or purchased water can vary widely from year to year, even if the total system water loss does not change. Therefore, the reliability of the potential water savings is medium.

I.9.5 Opinion of Probable Cost

The following assumptions are utilized in the water loss mitigation cost estimates.

- Capital Cost:
  - The unit cost of main replacement is derived from the TWDB UCM model for an 8-inch PVC pipe: $198 per linear foot in rural rocky areas and $287 per linear foot in urban rocky areas. The costs reflect the September 2023 dollars.
  - An interest rate of 3.5% and a 20-year term are assumed.
- Annual O&M Cost: Leak Detection and Management Program
  To achieve and maintain the projected water loss reduction, entities are expected to spend $300 per acre-foot per year (ac-ft/yr) to achieve up to a 34.7% reduction in water loss from their baseline year and $600/ac-ft/yr to achieve additional savings beyond the 34.7% reduction. These cost estimates are based on a 2022 water loss study that analyzed data from over 800 utilities in California, Texas, and Georgia.[8] The study found it is economically efficient for a median utility to reduce water losses by 34.7% at a cost of $277/ac-ft/yr. Adjusted for inflation, the rounded cost of $300/ac-ft/yr was adopted. Achieving savings beyond 34.7% is expected to be significantly more challenging, warranting a doubled cost factor to reflect the increased difficulty and expense.

I.10 Reuse of Treated Wastewater EffluentReuse is a significant water conservation measure in Region C. Reuse strategies were evaluated on a case-by-case basis, and reuse water supplies are described in Chapter 5B.

I.11 Golf Course Conservation

I.11.1 Applicability

The golf course conservation measure was evaluated for irrigation WUGs that have a projected water need.

I.11.2 Potential Water Savings

It has been assumed that where the measure is implemented, the potential water savings for the golf course conservation program is 15 percent of golf course water demand and that the potential water savings will last indefinitely (the golf course will continue to maintain and implement the conservation program at its own expense). Assumed participation rates for implementation by 2020 are shown in **TABLE I.7.**

TABLE I.7 ASSUMED PARTICIPATION RATES IN THE GOLF COURSE CONSERVATION PROGRAM

2030	2040	2050	2060	2070	2080
20%	40%	50%	60%	70%	80%

I.11.3 Additional Data Requirements

No additional data are required to estimate potential water savings from a golf course conservation program.

I.11.4 Reliability

The effectiveness of this measure depends on the degree of participation of golf courses. In addition, the estimate of potential water savings is not based on course-specific data. Therefore, the reliability of the potential water savings for the golf course conservation program is low.

I.11.5 Opinion of Probable Cost

Implementation alternatives include voluntary implementation for self-supplied golf courses, rebates for courses supplied by a municipal WUG, and ordinances if supplied by a city. The opinion of probable cost assumes that a municipal WUG offers a rebate to a golf course to implement a conservation program.

The opinion of probable cost for rebates is $305 per acre-foot of savings, including the rebate, marketing, and overhead. The cost for a single rebate is amortized at 3.5 percent interest over 15 years, the expected life of the associated measure. The opinion of probable annual cost is the sum of amortized costs for all rebates given in the previous 15 years. For a given WUG and given year, the probable unit cost was calculated as the probable annual cost divided by projected water savings.

I.12 Mining Conservation Applicability

Mining water conservation was evaluated for those counties with a projected need (Kaufman, Navarro, Parker, Tarrant, and Wise Counties).

I.12.1 Potential Water Savings

Water savings for Mining Conservation was assumed to equal the projected water needs. Savings would be achieved through on-site recycling of process water.

I.12.2 Additional Data Requirements

To better estimate the potential water savings and costs for mining conservation methods, data are needed on the types of mining activities in each county, their relative water uses, and their water quality needs.

I.12.3 Reliability

Since few data are available on types of mining activities in each county, their relative water uses, and their water quality needs, the reliability of the potential water savings for mining conservation is low.

I.12.4 Opinion of Probable Cost

The opinion of probable cost for Mining Conservation is based on the cost from the 2016 Region C Water Plan adjusted to September 2023 dollars.

I.13 GPCD Goals by WUG

As required by TWDB, GPCD goals for each WUG in included below in **TABLE I.8**. These calculations are based on the formula:

GPCD Goals = (Water Demand Projections - Recommended Conservation Water Management Strategies - Demand Reduction Since Base Year)/WUG Population

TABLE I.8 GPCD GOALS FOR MUNICIPAL WATER USER GROUPS

WUG NAME	BASELINE GPCD	GPCD GOAL					
		2030	2040	2050	2060	2070	2080
Ables Springs SUD	60	59	59	59	59	58	58
Addison	369	348	340	338	337	336	335
Aledo	165	155	149	146	145	145	144
Allen	187	174	168	167	166	166	165
Alvord	126	119	118	117	117	117	116
AMC Creekside	60	58	58	58	58	57	57
Anna	142	129	119	117	117	117	117
Annetta	129	122	120	120	120	119	119
Argyle WSC	178	167	164	156	152	152	153
Arledge Ridge WSC	155	147	145	145	144	144	143
Arlington	155	144	141	139	139	138	138
Athens	183	170	159	148	145	145	145
Aubrey	107	100	99	94	93	93	93
Avalon Water Supply & Sewer Service	114	106	99	97	97	96	96
Azle	141	133	131	126	125	125	124
B And B WSC	151	143	141	141	140	140	139
Balch Springs	94	86	84	84	83	83	83

WUG NAME	BASELINE GPCD	GPCD GOAL					
		2030	2040	2050	2060	2070	2080
Bear Creek SUD	107	97	92	93	94	93	94
Becker Jiba WSC	83	77	76	75	75	75	74
Bedford	171	159	157	157	156	156	155
Bells	96	89	88	88	88	87	87
Benbrook Water Authority	207	190	182	179	178	177	177
Black Rock WSC	219	209	207	206	205	204	204
Blackland WSC	181	172	170	170	169	168	168
Blooming Grove	151	142	141	141	140	140	139
Blue Mound	69	63	62	62	62	62	61
Blue Ridge	154	145	143	143	142	142	141
Bois D Arc MUD	105	98	97	96	96	96	95
Bolivar WSC	127	118	113	111	107	105	104
Bonham	144	132	123	114	112	112	111
Boyd	150	142	140	140	139	139	138
Bridgeport	156	148	146	145	145	144	144
Buena Vista-Bethel SUD	249	228	202	189	188	187	186
Butler WSC	196	186	184	183	184	183	183
Callisburg WSC	82	76	75	75	74	74	74
Carrollton	167	155	153	152	152	151	151
Cedar Hill	180	162	148	141	140	139	139
Celina	187	169	148	140	143	142	142
Chatfield WSC	97	90	89	89	88	88	88
Chico	177	168	166	166	165	164	164
Cockrell Hill	134	125	116	112	111	111	110
College Mound SUD	92	90	89	89	85	84	84
Colleyville	348	326	319	316	315	314	313
Collinsville	99	92	91	91	90	90	90
Combine WSC	86	81	80	80	80	79	79
Community WSC	136	122	106	99	98	98	97
Copeville WSC	112	106	105	104	104	100	99
Coppell	237	223	219	218	217	216	216
Corbet WSC	81	75	73	73	73	73	72
Corinth	154	140	137	134	134	134	135
Corsicana	205	190	186	185	185	184	183
County-Other, Collin	141	133	132	132	131	131	130
County-Other, Cooke	119	113	112	112	111	111	111
County-Other, Dallas	1822	1801	1795	1788	1782	1777	1771
County-Other, Denton	112	106	105	105	104	104	104
County-Other, Ellis	110	105	104	104	104	103	103
County-Other, Fannin	100	94	93	93	93	92	92
County-Other, Freestone	93	87	85	85	85	85	84

WUG NAME	BASELINE GPCD	GPCD GOAL					
		2030	2040	2050	2060	2070	2080
County-Other, Grayson	114	109	108	107	107	107	106
County-Other, Henderson	83	77	77	76	76	76	76
County-Other, Jack	101	95	95	94	94	94	93
County-Other, Kaufman	99	94	93	93	93	92	92
County-Other, Navarro	102	96	96	95	95	95	94
County-Other, Parker	117	112	111	110	110	110	109
County-Other, Rockwall	144	139	138	137	137	136	136
County-Other, Tarrant	206	199	198	197	197	196	195
County-Other, Wise	108	103	102	101	101	101	100
Crandall	163	155	153	144	140	140	141
Crescent Heights WSC	79	73	72	71	71	71	70
Cross Timbers WSC	196	187	184	184	183	175	170
Crowley	133	123	120	120	119	119	118
Culleoka WSC	98	91	90	90	89	86	85
Dallas	202	187	178	174	173	173	172
Dalworthington Gardens	354	342	341	340	339	337	336
Dawson	150	142	140	140	139	139	138
Decatur	244	233	230	230	221	217	217
Denison	237	219	212	211	210	209	209
Denton	162	149	142	140	140	139	139
Denton County FWSD 10	169	160	158	158	157	157	156
Denton County FWSD 11-C	60	58	58	57	57	57	54
Denton County FWSD 1-A	155	143	138	138	139	139	139
Denton County FWSD 7	227	215	212	211	211	210	209
Desert WSC	148	137	130	126	126	125	125
Desoto	155	143	141	141	140	140	139
Dogwood Estates Water	137	129	128	127	127	126	126
Dorchester	159	141	118	108	108	107	106
Duncanville	128	116	109	105	105	105	104
East Cedar Creek FWSD	136	128	124	122	122	121	121
East Fork SUD	110	102	99	98	98	98	97
East Garrett WSC	148	133	115	106	105	105	104
Edgecliff	155	148	147	147	146	146	145
Elmo WSC	77	71	70	70	70	69	69
Ennis	169	152	140	134	134	133	133
Euless	149	138	136	136	135	135	134
Eustace	97	90	89	89	89	89	88
Everman	78	72	72	71	71	71	71
Fairfield	187	178	176	175	175	174	174
Fairview	320	305	288	267	265	266	265
Farmers Branch	265	248	244	243	242	241	240

WUG NAME	BASELINE GPCD	GPCD GOAL					
		2030	2040	2050	2060	2070	2080
Farmersville	108	101	98	90	88	89	90
Fate	158	146	141	139	139	139	138
Ferris	177	155	128	114	113	113	112
Flower Mound	226	212	206	204	206	207	207
Forest Hill	96	90	89	89	89	86	85
Forney	134	124	119	117	117	117	117
Forney Lake WSC	146	138	132	131	130	130	130
Fort Worth	177	164	158	157	156	155	154
Frisco	217	203	198	198	198	198	197
Frognot WSC	94	87	86	86	86	85	85
Gainesville	129	121	116	115	114	114	113
Garland	145	134	132	132	131	131	131
Gastonia Scurry SUD	103	100	100	99	95	93	93
Glenn Heights	100	89	82	78	78	78	77
Grand Prairie	145	133	127	124	124	123	123
Grapevine	315	296	294	293	292	291	289
Gunter	145	137	136	135	134	134	133
Hackberry	217	206	204	203	202	201	200
Haltom City	100	94	93	93	92	92	92
Haslet	357	342	339	338	336	335	334
Heath	292	279	271	255	252	254	255
High Point WSC	82	74	70	69	69	69	69
Highland Park	402	376	372	371	370	368	367
Highland Village	201	192	189	188	188	187	186
Honey Grove	144	126	104	93	92	92	91
Horseshoe Bend Water System	127	119	118	118	117	117	116
Howe	86	74	61	54	54	54	54
Hudson Oaks	308	295	292	291	290	289	288
Hurst	153	142	140	140	139	139	138
Hutchins	202	193	191	191	190	189	188
Irving	193	180	178	178	177	177	176
Italy	119	112	110	110	110	109	109
Jacksboro	195	173	145	132	131	131	130
Josephine	192	185	184	183	183	175	174
Justin	158	149	145	143	143	136	132
Kaufman	151	145	144	143	142	142	137
Kaufman County Development District 1	214	198	178	169	168	167	166
Kaufman County MUD 11	152	144	143	142	142	141	140
Kaufman County MUD 14	246	235	233	232	231	230	230
Keller	229	214	209	206	206	205	204
Kemp	160	152	150	150	149	149	148

WUG NAME	BASELINE GPCD	GPCD GOAL					
		2030	2040	2050	2060	2070	2080
Kennedale	159	151	149	149	142	139	139
Kentuckytown WSC	112	105	103	103	103	102	102
Kerens	107	100	99	99	98	98	98
Krum	199	185	169	162	161	153	149
Ladonia	140	123	101	90	90	89	88
Lake Cities Municipal Utility Authority	126	118	112	110	111	110	110
Lake Kiowa SUD	363	348	344	343	342	340	339
Lake Worth	197	189	187	186	186	185	185
Lakeside	247	235	232	232	231	230	229
Lancaster	153	141	135	133	133	132	132
Lancaster MUD 1	111	104	103	102	102	102	101
Leonard	127	119	114	112	112	112	111
Lewisville	155	141	131	126	125	125	124
Lindsay	117	110	108	107	106	106	106
Little Elm	123	114	111	110	109	109	109
Log Cabin	157	149	147	146	145	145	142
Lucas	255	248	246	245	245	244	243
Luella SUD	95	88	87	87	86	86	86
M E N WSC	127	120	118	118	117	117	117
Mabank	178	166	155	151	150	150	149
Malakoff	105	96	90	87	87	87	86
Mansfield	245	231	225	220	217	219	220
Markout WSC	156	148	147	146	146	145	145
McKinney	196	183	177	173	172	173	174
Melissa	197	185	179	178	178	178	179
Mesquite	134	121	113	109	108	108	107
Midlothian	208	190	181	177	176	176	175
Milligan WSC	108	102	101	100	100	100	99
Mount Zion WSC	178	171	170	169	168	168	167
Mountain Peak SUD	281	254	228	216	215	215	214
Mountain Springs WSC	151	143	141	141	140	139	139
Muenster	154	146	144	143	143	142	142
Murphy	206	192	189	187	186	185	184
Mustang SUD	135	123	118	117	117	117	117
Nash Forreston WSC	102	95	94	94	93	93	92
Navarro Mills WSC	96	89	88	88	87	87	87
Nevada SUD	90	81	81	80	78	76	76
Newark	99	93	91	91	91	90	90
North Collin SUD	132	126	125	124	124	123	123
North Farmersville WSC	195	187	184	183	182	182	182
North Kaufman WSC	62	58	55	53	53	53	53

WUG NAME	BASELINE GPCD	GPCD GOAL					
		2030	2040	2050	2060	2070	2080
North Richland Hills	160	148	144	143	142	142	141
Northlake	182	170	166	163	163	162	162
Northwest Grayson County WCID 1	92	85	85	84	84	83	83
Oak Ridge South Gale WSC	79	73	72	72	72	71	71
Ovilla	214	203	194	190	189	188	187
Palmer	101	94	93	93	92	92	91
Paloma Creek North	186	174	172	171	171	170	169
Paloma Creek South	184	170	158	152	151	151	150
Pantego	232	221	219	218	217	217	216
Parker	382	368	365	364	362	360	359
Parker County SUD	96	90	88	88	84	82	82
Pelican Bay	60	58	58	58	58	57	57
Pilot Point	123	116	114	114	109	107	108
Pink Hill WSC	104	97	96	95	95	95	95
Plano	231	211	198	190	190	190	189
Pleasant Grove WSC	90	84	82	82	82	81	81
Point Enterprise WSC	128	121	119	119	118	118	118
Ponder	133	125	124	123	123	122	121
Pottsboro	152	144	142	141	141	140	140
Princeton	97	88	84	84	85	85	85
Prosper	235	228	223	221	222	222	222
Providence Village WCID	116	109	107	107	106	106	105
R C H WSC	189	181	179	178	177	176	176
Red Oak	134	127	126	125	120	119	118
Reno (Parker)	60	59	58	58	58	58	57
Rhome	155	147	145	144	144	143	142
Rice Water Supply and Sewer Service	108	101	100	99	99	99	95
Richardson	225	205	191	184	183	183	183
Richland Hills	123	117	115	115	114	114	114
River Oaks	102	95	94	93	93	93	92
Roanoke	254	243	241	240	240	239	238
Rockett SUD	106	95	90	88	87	87	87
Rockwall	168	156	152	149	148	149	150
Rose Hill SUD	78	73	72	72	71	71	71
Rowlett	137	126	125	123	123	123	123
Royse City	138	127	120	120	122	122	122
Runaway Bay	326	314	310	309	308	307	306
Sachse	163	152	150	148	148	148	148
Saginaw	123	113	112	111	111	111	110
Sanger	125	114	112	112	111	109	109

WUG NAME	BASELINE GPCD	GPCD GOAL					
		2030	2040	2050	2060	2070	2080
Sansom Park	99	92	91	91	90	90	90
Sardis Lone Elm WSC	241	224	217	215	216	217	217
Savoy	123	116	113	113	113	112	112
Seagoville	99	91	89	89	88	88	88
Seis Lagos UD	253	246	245	244	243	242	241
Sherman	220	197	178	170	169	168	168
South Ellis County WSC	336	324	320	320	319	317	316
South Freestone County WSC	90	84	82	82	82	82	81
South Grayson SUD	110	103	102	102	101	101	101
Southern Oaks Water Supply	165	156	154	153	152	152	151
Southlake	370	350	339	336	335	334	333
Southmayd	101	92	86	83	83	83	83
Southwest Fannin County SUD	91	85	83	83	83	82	82
Springtown	199	185	171	164	163	163	162
Starr WSC	93	86	85	85	84	84	84
Sunnyvale	301	293	290	289	288	287	286
Talty SUD	147	140	138	137	130	126	127
Teague	154	135	112	100	99	99	98
Terra Southwest	71	65	64	64	63	63	63
Terrell	153	136	119	110	110	109	109
The Colony	137	127	124	123	124	123	123
Tioga	123	116	114	114	113	112	112
Tom Bean	169	157	149	144	144	144	143
Trenton	166	158	155	155	155	154	154
Trinidad	130	115	98	89	89	89	88
Trophy Club MUD 1	341	318	305	298	297	296	295
Two Way SUD	121	114	112	112	111	111	111
University Park	266	247	244	243	243	242	241
Van Alstyne	105	98	97	95	94	93	94
Verona SUD	122	115	114	113	113	112	112
Walnut Creek SUD	142	131	128	126	124	124	124
Watauga	104	94	90	89	88	88	88
Waxahachie	164	151	147	146	146	145	145
Weatherford	166	158	154	153	152	151	151
West Cedar Creek MUD	191	186	185	184	184	183	182
West Leonard WSC	120	113	112	111	111	111	110
West Wise SUD	111	104	102	102	101	101	101
Westlake	1033	1002	996	993	989	986	983
Westminster SUD	173	159	144	137	136	136	135
Westover Hills	1218	1174	1168	1165	1161	1157	1152
Westworth Village	131	124	123	122	122	121	121

WUG NAME	BASELINE GPCD	GPCD GOAL					
		2030	2040	2050	2060	2070	2080
White Settlement	110	99	93	90	90	90	89
White Shed WSC	98	91	90	89	89	89	88
Whitesboro	110	103	101	101	101	100	100
Whitewright	165	157	155	154	154	153	152
Willow Park	140	132	131	130	130	129	129
Wilmer	128	120	117	116	116	115	115
Woodbine WSC	96	89	88	88	87	87	87
Wortham	128	121	119	118	118	117	117
Wylie	135	125	124	123	122	122	122
Wylie Northeast SUD	108	101	100	96	95	95	95

Appendix I List of References

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Appendix J

Updated Quantitative Analysis of the Impact of Marvin Nichols Reservoir

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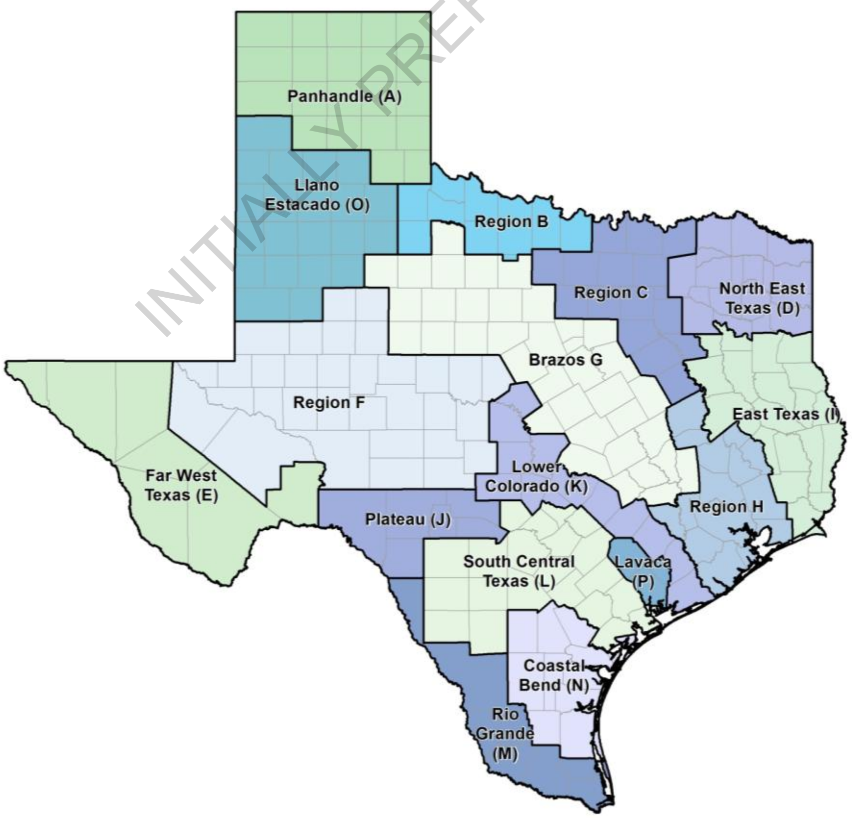
Appendix J Quantitative Analysis of the Impacts of Marvin Nichols Reservoir

J.1 Introduction

In 1997, the Texas Legislature passed Senate Bill One, which initiated a regional water planning process for Texas. The planning process was implemented by the Texas Water Development Board (TWDB), which set up rules governing planning and established 16 water planning regions across the state (See **Figure J.1**) Planning in each region is overseen by a regional water planning group, which develops a water supply plan addressing the future water needs of the region. The 16 regional plans are reviewed and approved by the Texas Water Development Board and assembled into a state water plan.

The water planning process is conducted on a five-year cycle. Regional water plans were approved in 2001, 2006, 2011, 2016, and 2021, and the sixth round of planning is currently underway. State water plans based on the regional plans were developed in 2002, 2007, 2012, 2017, and 2022.

FIGURE J.1 REGIONAL WATER PLANNING AREAS ESTABLISHED BY TEXAS WATER DEVELOPMENT BOARD



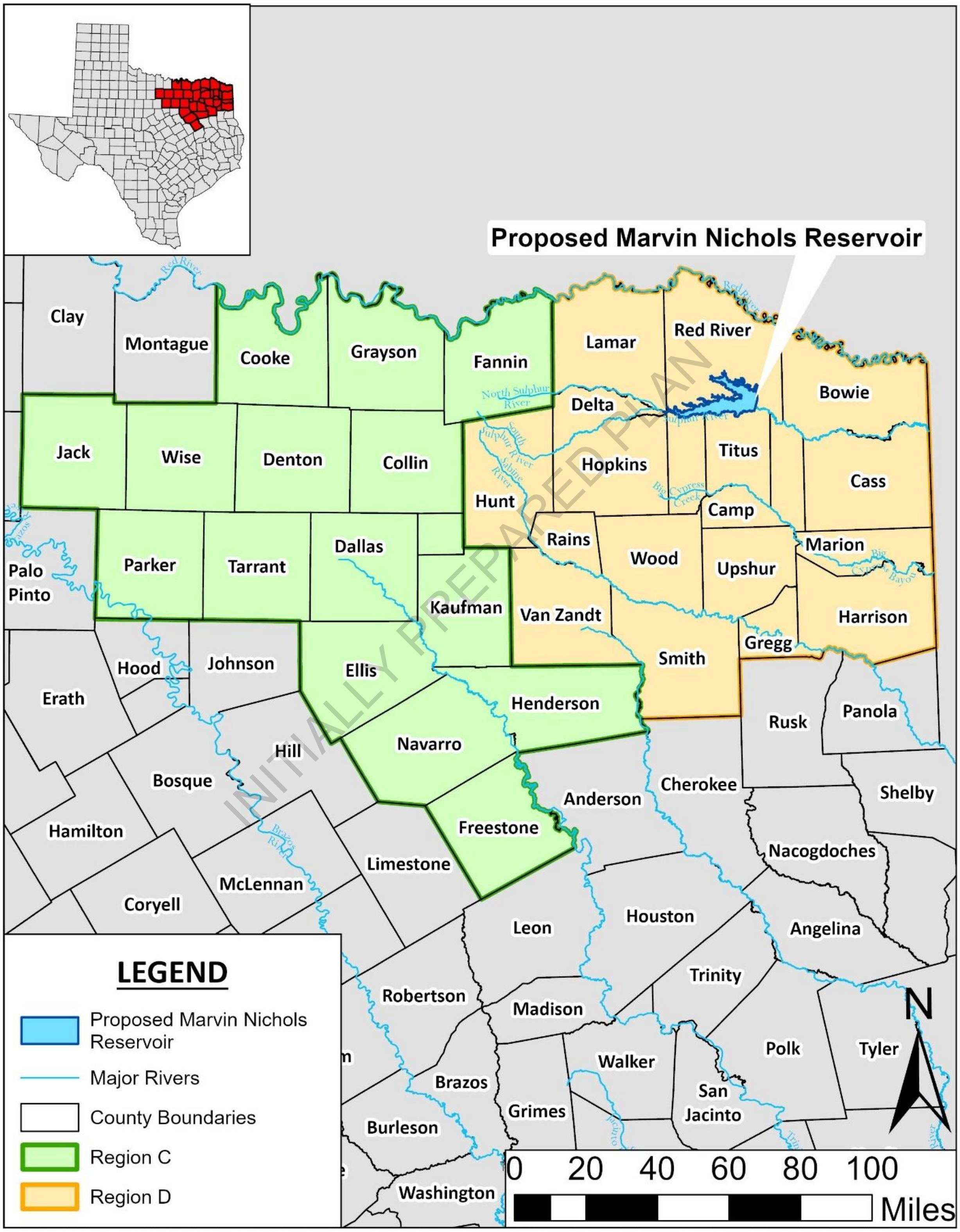
The Region C Regional Water Planning Area includes all or part of 16 counties and includes the Dallas-Fort Worth Metropolitan area. Region C has over a fourth of the state's population and is the most populous of the 16 planning regions. The population of Region C is increasing rapidly. To meet this need, the Region C Water Plan identified multiple strategies to conserve water, utilize existing sources, and develop new water supplies. One of the new sources of water is the Marvin Nichols Reservoir, which is located in adjoining North East Texas Regional Water Planning Group (Region D).**Section J.3** shows the location of Region C, Region D, and the proposed Marvin Nichols Reservoir. The Marvin Nichols Reservoir (elevation 328 msl) would be in Red River, Titus, and Franklin Counties in the Sulphur River Basin. This strategy is recommended for implementation by 2060. A separate Sulphur Basin strategy includes the reallocation of flood storage at the existing Wright Patman Reservoir (raising the conservation storage to 235 msl), which would be implemented by 2080. These strategies, which are in Region D, would be developed to meet needs in Region C.

Technical memoranda for each of these strategies are included in **Appendix G** in the *2026 Region C Water Plan*. This supplement, included as **Appendix J** to the *2026 Region C Water Plan,* focuses on additional information on the proposed Marvin Nichols Reservoir, with emphasis on the quantification and analysis of the impact of Marvin Nichols Reservoir on agricultural and natural resources. Also included is information on the Socio-Economic Assessment of developing the Marvin Nichols Reservoir and the TWDB's socio-economic assessment of impacts to Region C if needs are not met (**Section 1**). (Note: TWDB socio-economic impact analysis for the 2026 Region C Water Plan was not available for the Initially Prepared Plan. This will be included in the Final Plan.)

During the development of the 2016 Region C Water Plan[1], there was an interregional conflict between the Region C and Region D regional water plans regarding the inclusion of the proposed Marvin Nichols Reservoir, requiring TWDB to take action to resolve the interregional conflict.

On August 7, 2014, the TWDB Board met to consider the interregional conflict and requested additional information from Region C. The Board action is reflected in the Interim Order of August 8, 2014, which included the following language:

FIGURE J.2 LOCATION MAP FOR REGION C, REGION D, AND THE PROPOSED MARVIN NICHOLS RESERVOIR

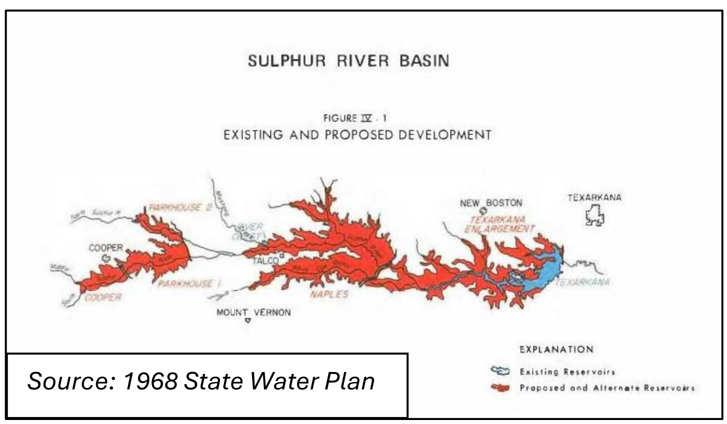


> "Region C is directed to conduct an analysis and quantification of the impacts of the Marvin Nichols Reservoir Water Management Strategy on the agricultural and natural resources of Region D and the State, pursuant to Sections 16.051 and 16.053 of the Texas Water Code and Chapters 357 and 358 of Board rules. Region C should submit this analysis and quantification to the Board by November 3, 2014. Upon receipt of the analysis and quantification, the Executive Administrator and Region D will be given the opportunity to submit a written response to the submission, and the matter will be scheduled for Board consideration. If no submittal is received by the Board on or before November 3, 2014, this matter will set for a Board Meeting to direct the Regions to revise their regional water plans reflecting the removal of the Marvin Nichols Reservoir Water Management Strategy from the 2011 Region C Plan, without prejudice."

The full Interim Order of August 8, 2014, was included as Attachment J-1 to **Appendix J** in the 2016 Region C Water Plan. The original version of this report (August 2014) was submitted to TWDB and provided the information requested by the TWDB Board in the Interim Order of August 8, 2014. This appendix is an update to that report. The information and discussions in this appendix have been modified to include additional information developed since 2014 and is incorporated in the *2026 Region C Water Plan* as **Appendix J**.

Section J.2 of this report provides the analysis and quantification of the impacts of Marvin Nichols Reservoir on natural resources. **Section J.3** provides the analysis and quantification of the impacts of the project on agricultural resources. **Section J.4** discusses potential mitigation requirements for the project and how they might affect impacts on natural and agricultural resources**. Section 1** provides a socio-economic assessment. **Section J.6** provides additional information, and the Attachments include supporting information.

J.2 Background



Source: 1968 State Water Plan

The transfer of water from the Sulphur River Basin in east Texas to users in the greater Metroplex area has been included in every state plan, in some form, since the 1968 State Water Plan. The originally named Naples Reservoir was projected to meet Dallas-Fort Worth's 2020 water needs in the 1968 plan. This first mention of the now proposed Marvin Nichols Reservoir includes the intention to use the reservoir to meet the water need in what is now Region C and has remained in the plan with that intent throughout the years. In the 1990 State Water Plan (when the plan was developed according to river basins) the Sulphur Basin's second largest demand was projected to be exporting water by 2040.

Throughout the continuous development of the Region C Regional Water Plan (2001-2026) the Marvin Nichols Reservoir has been extensively studied and the footprint has changed several times in an effort to reduce the environmental impacts associated with the proposed reservoir. During the first round of regional water planning, representatives of both Region C and Region D met to discuss the proposed development of water supplies in the Sulphur River Basin. It was preferred by the Region D representatives that Region C recommend one large project (Marvin Nichols Reservoir) rather than multiple smaller reservoirs. As a result, the Marvin Nichols Reservoir was included in each Region C Water Plan since the inception of regional water planning. It was after the publication of the 2001 plans that Region D representatives objected to the project and amended the Region D plan to no longer support the reservoir.

Implementation of this project was recommended for 2030 in each regional water plan until the *2016 Region C Water Plan*. For that plan, the original implementation date of 2050 was modified to 2070 as part of the negotiated resolution of the declared conflict. In the 2021 Region C Water Plan the implementation date was changed back to 2050 to meet the projected water needs. Currently, Marvin Nichols Reservoir is recommended to be online by 2060.

J.3 Analysis and Quantification of the Impacts on Natural Resources

J.3.1 Requirements of Texas Water Code and Texas Water Development Board Rules

The requirements for quantitative reporting on the impacts of water management strategies on natural resources are included in the Board rules in Texas Administrative Code §357. Specifically, §357.34(e)(3)(B), requires that the quantitative reporting address impacts on certain specific aspects of natural resources:

- Environmental water needs
- Wildlife habitat
- Cultural resources
- Effect on bays, estuaries, and arms of the Gulf of Mexico

A quantitative reporting of impacts on each of these areas is provided below, as is additional information on threatened and endangered species and mineral resources.

J.3.2 Available Data for Impacts on Natural Resources

Much of the more recent information on the impacts of the proposed Marvin Nichols Reservoir on natural resources came from the *Environmental Evaluation Interim Report – Sulphur River Basin – Comparative Assessment*[2]. *This report was* developed in 2013 for the U.S. Army Corps of Engineers as part of an on-going basin-wide assessment of the Sulphur River Basin. The report includes environmental analyses of Marvin Nichols Reservoir and other potential water supply projects in the Sulphur Basin. In 2024, the sponsors of the project updated the hydrological analysis of the project and the preliminary dam design to reflect the latest published hydrologic data (2019 Sulphur River Basin Water Availability Model[3] and TCEQ Probable Maximum Precipitation data[4]). For the 2026 Region C Water Plan, environmental flow needs were developed using the TWDB-required Consensus Method with the updated hydrology. Vegetative cover types were updated based on recent aerial surveys if there were significant changes since the 2013 study. Other data, including statistics on timber production, prime farmlands, and threatened and endangered species were also updated as part of this plan development. The sources for data are cited in the respective tables.

J.3.3 Impacts on Environmental Water Needs

Texas Administrative Code §357.34(d)(3)(B) includes specific requirements for the evaluation of environmental water needs:

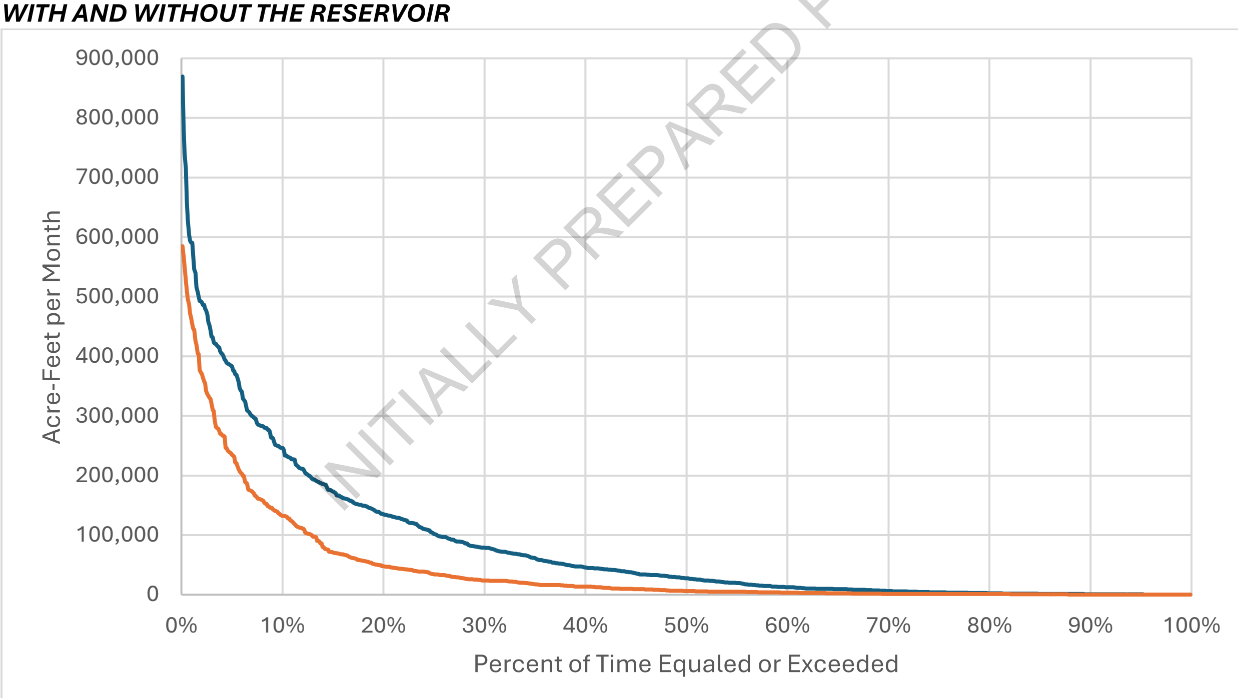
> "Evaluations of effects on environmental flows will include consideration of the Commission's adopted environmental flow standards under 30 TAC Chapter 298 (relating to Environmental Flow Standards for Surface Water). If environmental flow standards have not been established, then environmental information from existing site-specific studies, or in the absence of such information, state environmental planning criteria adopted by the Board for inclusion in the state water plan after coordinating with staff of the Commission and the Texas Parks and Wildlife Department to ensure that water management strategies are adjusted to provide for environmental water needs including instream flows and bays and estuaries inflows."

The Texas Commission on Environmental Quality (TCEQ) has not yet adopted environmental flow standards under 30 TAC Chapter 298 for the Sulphur Basin. As required by TWDB rules, the operation of the proposed reservoir was evaluated using state environmental planning criteria adopted by the Board for inclusion in the state water plan. **Table J.1** and **Figure J.3** summarize the flow-frequency relationship for the Sulphur River immediately below the proposed Marvin Nichols Reservoir with and without the reservoir. It is likely that the detailed studies required for reservoir permitting will result in different streamflow bypass requirements and different impacts on downstream flows. The results in **Table J.1** and **Figure J.3** reflect current TWDB consensus requirements.

TABLE J.1 MONTHLY FLOW FREQUENCY RELATIONSHIP WITH AND WITHOUT MARVIN NICHOLS RESERVOIR

% OF MONTHS FLOW IS EXCEEDED	FLOW IN ACRE-FEET/MONTH	
	WITHOUT MARVIN NICHOLS	WITH MARVIN NICHOLS
5%	366,534	255,222
10%	236,232	131,508
20%	143,577	35,937
30%	88,805	19,741
40%	55,545	11,232
50%	29,145	6,141
60%	15,137	3,384
70%	7,404	1,715
80%	3,310	922
90%	1,135	431
95%	506	252

FIGURE J.3 FLOW-FREQUENCY RELATIONSHIP OF SULPHUR RIVER AT MARVIN NICHOLS DAM SITE WITH AND WITHOUT THE RESERVOIR



J.3.4 Impacts on Wildlife Habitat

The primary impact of the proposed Marvin Nichols Reservoir on wildlife habitat would be the inundation of habitat by the reservoir. This impact was evaluated as part of the *Environmental Evaluation Interim Report – Sulphur River Basin – Comparative Assessment (Sulphur Basin Study)*[2], prepared for the U.S. Army Corps of Engineers. The *Sulphur Basin study* used the existing Texas Parks and Wildlife Ecological Systems Classification data set, which was developed by analysis of color infra-red and multi-spectral satellite imagery. The data set is considered the most recent, readily available data on land cover types in the Sulphur River Basin. The cover types determined from the Ecological Systems Data set were grouped into larger categories based on EPA's Level One National Land Cover Data classifications. U.S. Fish and Wildlife Service National Wetlands Inventory data were used to further refine the classifications.

As part of the update for the 2026 Region C Water Plan, aerial photography was reviewed to identify changes in wildlife habitats. During this review approximately 4,100 acres of forested wetlands and bottomland hardwood forest appeared to have been clear cut and shrubs were now growing on the acreage. This acreage was re-classified from forested wetland and bottomland hardwood forest to shrub wetland. Since there have been no updates to the Texas Parks and Wildlife Ecological Systems Classification data set and no other significant changes were noted during the aerial photography review, no changes were made to the other cover types.

Table J.2 shows the acreage of each cover type within the footprint of the proposed Marvin Nichols Reservoir. For comparison, the area of each cover type in all of Region D is also included. **Attachment J-1** is a map of the cover types in the Marvin Nichols Reservoir site.

Table J.2 also presents the impact of the proposed Marvin Nichols Reservoir on wildlife habitat in terms of the acreage of different types of habitat inundated by the reservoir. The reservoir will affect 4.8 percent of the forested wetlands, 2.2 percent of the bottomland hardwood forests, and 0.4 percent of the upland forests in Region D. Bottomland hardwoods and forested wetlands are often lumped together as bottomland hardwoods, and they are considered particularly important as wildlife habitat. The total of these two types in the proposed Marvin Nichols Reservoir represents 3.4 percent of the bottomland hardwood and forested wetland areas in Region D. The 28,900 acres of bottomlands and forested wetlands that would be inundated by the proposed reservoir represents less than 1 percent of the estimated 5,973,000 acres[5] of bottomland hardwoods in Texas. As a part of permitting for the project, there will be more detailed assessments of the quantity and quality of the wildlife habitat that would be affected by the project, which will aid in the development of mitigation plans.

TABLE J.2 QUANTITATIVE REPORTING ON IMPACTS ON WILDLIFE HABITAT

COVER TYPE	AREA (ACRES)		MARVIN NICHOLS RESERVOIR AREA AS A PERCENT OF REGION D
	MARVIN NICHOLS RESERVOIR	REGION D	
Barren	<1	8,437	0.0%
Bottomland Hardwood Forest	9,289	416,398	2.2%
Forested Wetland	19,622	412,751	4.8%
Grassland/Old Field	18,241	2,843,656	0.6%
Herbaceous Wetland	1,244	32,011	3.9%
Open Water	1,162	211,761	0.5%
Row Crops	706	314,184	0.2%
Shrub Wetland	4,093	19,133	21.4%
Shrubland	444	47,485	0.9%
Upland Forest	11,223	2,869,079	0.4%
Urban	78	158,878	0.0%
Total	**66,103**	**7,333,774**	**0.9%**

J.3.5 Impacts on Cultural Resources

The impacts of Marvin Nichols Reservoir on cultural resources would result from the inundation of cultural resource sites. The *Sulphur Basin Study* collected the following data on potential cultural resource impacts from Marvin Nichols Reservoir site and other proposed reservoir sites in the Sulphur River Basin. No new sites have been identified since 2013.

- Number of known cultural resources
- Presence of known human remains/burials
- Acres of zones of archaeological potential
- Percentage of reservoir footprint with previous cultural resource surveys
- Surveyed site density

Table J.3 is a quantitative reporting of known cultural resources in the Marvin Nichols Reservoir footprint. **Table J.4** is a quantitative reporting of other measures of potential impacts on cultural resources. The data in both tables is taken from *Sulphur Basin Study*.

TABLE J.3 QUANTITATIVE REPORTING OF IMPACTS ON CULTURAL RESOURCES – KNOWN CULTURAL RESOURCES

LIKELY ELIGIBILITY OF SITES FOR THE NATIONAL REGISTER OF HISTORIC PROPERTIES (NRHP)	HISTORIC	PRE-HISTORIC	CADDO	MULTI-COMPONENT	PREHISTORIC MULTI-COMPONENT	TOTAL*
Likely NRHP Eligible	0	20	9	2	3	34
Possibly NRHP Eligible - Fair Chance	0	4	2	0	0	6
Possibly NRHP Eligible - Poor Chance	0	4	1	0	0	5
Not Likely NRHP Eligible	0	15	1	2	0	18

**Total for "Likely NRHP Eligible" is corrected from 31 in Environmental Evaluation Interim Report - Sulphur River Basin - Comparative Assessment*[2].

TABLE J.4 QUANTITATIVE REPORTING OF IMPACTS ON CULTURAL RESOURCES – OTHER FACTORS

MEASUREMENT OF IMPACT ON CULTURAL RESOURCES	VALUE FOR MEASUREMENT
Ratio of High Value Sites to Low Value Sites	1.7*
Number of Known Cemeteries	1 (57 graves)
Acres with High Potential for Archaeological Sites	51,654
Percentage of Project Area Previously Surveyed for Cultural Resources	13%
Number of Acres Surveyed per Site Found in Survey	90.1

*"Ratio of High Value Sites to Low Value Sites" is corrected from 1.6 in *Environmental Evaluation Interim Report - Sulphur River Basin - Comparative Assessment*[2].

In general, impacts on cultural resources are mitigated through coordination with the Corps of Engineers and the Texas State Historical Commission during permitting. Coordination with Indian tribes on archeological issues would also be a part of the permitting process. Mitigation is accomplished by investigating and recording archaeological sites and proper relocation of cemeteries. This process of archaeological mitigation adds to project costs, and it has been considered in costs developed for the proposed Marvin Nichols Reservoir.

J.3.6 Impacts on Bays, Estuaries and Arms of the Gulf of Mexico

The proposed Marvin Nichols Reservoir would not directly affect flows discharging to bays, estuaries and arms of the Gulf of Mexico. The Sulphur River, on which the Marvin Nichols Reservoir would be located, is a tributary of the Red River, which does not flow to any bay, estuary or arm of the Gulf of Mexico in Texas. According to the U.S. Geological Survey, the Red River discharges to the Atchafalaya River, which flows to the Gulf of Mexico in Louisiana[6,7]. Natural discharges from the Atchafalaya to the Gulf of Mexico average 58,000 cubic feet per second, or 42 million acre-feet per year[6,7]. In addition, human diversions of flood flows from the Mississippi River to the Atchafalaya River add about 167,000 cfs, or 121 million acre-feet per year, to the discharge of the Atchafalaya[6,7], making a total discharge of 163 million acre-feet per year.

Assuming full use of Marvin Nichols Reservoir and no return flows, the project would reduce flows by about 473,000 acre-feet per year. This could reduce the discharge from the Atchafalaya River to the Gulf of Mexico in Louisiana by less than 0.4%. The impact of Marvin Nichols Reservoir on bays, estuaries and arms of the Gulf of Mexico would be negligible.

J.3.7 Impacts on Threatened and Endangered Species

The Texas Water Development Board rules do not require reporting on potential impacts to threatened and endangered species. However, Region C does identify the reported presence of threatened and endangered species as part of its environmental assessment in Chapter 5. The U.S. Fish and Wildlife Service maintains lists of federally endangered and threatened species by county. The Texas Parks and Wildlife Department maintains a separate Texas, or State, list of endangered and threatened species by county[8]. Protections for federally listed species differ from those only identified by the state, but both are considered during the permitting process.

Table J.5 summarizes State and Federally listed threatened and endangered species in the counties in which Marvin Nichols Reservoir would be located. The potential impact ranking was based on professional judgement, descriptions of habitat, and scarcity of the habitat in the project vicinity. Proposed federal endangered and threatened, and species listed as Threatened by Similarity of Appearance are not included in this table. Several of the identified species are not expected to be impacted by the reservoir. Confirmation of potential impacts and required mitigation, if needed, will be determined during the permitting process.

TABLE J.5 QUANTITATIVE REPORTING OF POTENTIAL IMPACTS ON ENDANGERED AND THREATENED SPECIES

CLASSIFICATION OF ENDANGERED AND THREATENED SPECIES	POTENTIAL FOR IMPACT DUE TO MARVIN NICHOLS RESERVOIR	NUMBER PRESENT IN COUNTIES WHERE MARVIN NICHOLS RESERVOIR WOULD BE LOCATED
Federal Endangered Species	No Potential to Low Potential	1
	Moderate Potential	0
	High Potential	2
Federal Threatened Species	No Potential to Low Potential	2
	Moderate Potential	1
	High Potential	1
Texas Endangered Species	No Potential to Low Potential	0
	Moderate Potential	1
	High Potential	0
Texas Threatened Species	No Potential to Low Potential	7
	Moderate Potential	1
	High Potential	5

Seven species are federally listed in the counties where Marvin Nichols would be located. Three of these species, Black rail (*Laterallus jamaicensis*), Red-cockaded woodpecker (*Picoides borealis*), and Rufa red knot (*Calidris canutus rufa*), are unlikely to be impacted by the project. The Piping plover (*Charadrius melodus*) has a moderate potential to be impacted. The species with a high potential to be impacted include the Yellow-billed cuckoo (*Coccyzus americanus*), the American burying beetle (*Nicrophorus americanus*), and the Ouachita rock pocketbook (*Arcidens wheeleri*).

There is one endangered and 13 threatened State-listed species within these counties, but only two of these species have moderate potential to be impacted by the reservoir, and five threatened species have high potential. Because there are seven State-listed threatened and endangered species with moderate to high potential to be impacted by Marvin Nichols Reservoir, additional studies may be required to assess the impact on these species, if any, as reservoir development continues. *The Texas Endangered Species Act does not protect wildlife species from indirect or incidental take (e.g., destruction of habitat, unfavorable management practices, etc.). The TPWD has a Memorandum of Understanding with every state agency to conduct a thorough environmental review of state initiated and funded projects, such as highways, reservoirs, land acquisition, and building construction, to determine their potential impact on state endangered or threatened species.*[2]

J.3.8 Impacts on Minerals

In the past, the Region D area has been active with oil and gas production. Over time this production has declined. There are currently 48 active or permitted oil/gas wells in the footprint of the Marvin Nichols Reservoir (28 oil wells, one oil and gas well and 19 permitted locations)[9]. There are also 176 non-active wells (dry holes and plugged wells)[9]. In addition to oil and gas, there has been recent interest in lithium mining. Lithium has been found in a brine formation about 10,000 feet below the ground surface known as the Smackover Formation. Removal of the lithium from the brine is an emerging technology and there are no known active lithium wells in the footprint of the reservoir. Techniques to extract the brine solution include conventional vertical drilling and horizontal drilling (similar to the current fracking activities in the oil and gas industry). At this time, it is unknown whether there will be active lithium production within the Marvin Nichols footprint in the future. If there are lithium deposits within the footprint, these deposits will be treated like other mineral interests.

J.4 Analysis and Quantification of the Impacts on Agricultural Resources

J.4.1 Requirements of Texas Water Code and Texas Water Development Board Rules

The requirements for quantitative reporting on the impacts of water management strategies on agricultural resources are included in the Board rules in Texas Administrative Code §357. Specifically, §357.34(d)(3)(C) requires that the quantitative reporting address impacts on agricultural resources. The rules do not include any more detailed description of what quantitative reporting is required. To respond to this requirement, this report provides the following quantitative reporting on the impacts of the proposed Marvin Nichols Reservoir on agricultural resources:

- Inundation of land potentially useful as agricultural resources
- Loss of timber harvests
- Inundation of prime farmlands.

J.4.2 Available Data for Impacts on Agricultural Resources

Data on impacts to land cover types potentially useful as agricultural resources is based on a land classification developed for the *Environmental Evaluation Interim Report – Sulphur River Basin – Comparative Assessment*. The data available from that report has been adapted by a simplified re-classification that expands the geographic scope of the analysis for purposes of comparison within this study. Data on the loss of timber harvests is developed from data maintained by the Texas A&M Forestry Service. In the early 2000s, two analyses of the proposed Marvin Nichols reservoir's impacts on timber resources were performed, which reached radically different conclusions[10,11]. Both reports consider the impacts of a previous concept for the proposed Marvin Nichols Reservoir that differs in both size and location from the current concept for the reservoir and which is no longer being considered. Because these studies analyze a different project, they are not considered to be relevant for the current analysis. Data on inundation of prime farmlands is developed from prime farmland data maintained by the U.S. Department of Agriculture Natural Resources Conservation Service.

J.4.3 Impacts Due to Inundation of Land Potentially Useful as Agricultural Resources

The development of land cover type information for the proposed Marvin Nichols Reservoir is discussed in **Section J.4.2** and **Appendix G**. Five of the land cover types present in the footprint of the reservoir are potentially useful as agricultural resources. Forested wetlands, bottomland hardwoods, and upland forests might be useful in the growth and harvesting of timber (silvicultural activities). Row crops represent current farming activities. Grassland/old field would potentially include land used for grazing of livestock, although it would also include grassland not currently used for agricultural purposes. **Table J.6** includes information on the area of these land cover types that would be inundated by the Marvin Nichols Reservoir. For consideration of the impacts on agricultural resources of Region D and Texas, the areas of these cover types for Region D are included in the table.

TABLE J.6 QUANTITATIVE REPORTING ON IMPACTS TO AGRICULTURAL RESOURCES - LAND POTENTIALLY USEFUL FOR AGRICULTURE

COVER TYPE		AREA (ACRES)		MARVIN NICHOLS RESERVOIR AREA AS A PERCENT OF REGION D
		Marvin Nichols Reservoir	Region D	
Timberlands	Bottomland Hardwood Forest	9,289	416,398	2.2%
	Forested Wetland	19,622	412,751	4.8%
	Upland Forest	11,223	2,869,079	0.4%
Active/Potential Agricultural and Pasture Lands	Row Crops	706	314,184	0.2%
	Grassland/Old Field	18,241	2,843,656	0.6%
Non-Agricultural Lands	Other Land Cover Types	7,022	477,707	1.5%
	TOTAL	***66,103***	***7,333,774***	*0.9%*

The most significant impacts to agricultural resources relative to the resources of Region D and of Texas are on resources that could potentially be useful to the silviculture industry. These impacts are discussed further (in terms of impacts on timberland and timber sales) in **Section J.3.5**.

J.4.4 Impacts Due to Inundation of Prime Farmland

The U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) maintains data on prime farmland, which is defined as "land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses[12]". Prime farmland is not necessarily currently in agricultural use, but it must be available for agricultural use. For example, prime farmland soils underlying an urban area would not be counted as prime farmland because they are not available for agricultural uses. **Table**

J.7 shows the acreage of prime farmland that would be inundated by the proposed Marvin Nichols Reservoir compared to prime farmland area in Region D and Texas. Marvin Nichols Reservoir would inundate 0.76 percent of the prime farmland in Region D and 0.04 percent of the prime farmland in Texas.

TABLE J.7 QUANTITATIVE REPORTING ON IMPACTS ON AGRICULTURAL RESOURCES – PRIME FARMLAND

COVER TYPE	AREA (ACRES)			MARVIN NICHOLS RESERVOIR AREA AS A PERCENT OF AREA:	
	MARVIN NICHOLS RESERVOIR	REGION D	TEXAS	REGION D	TEXAS
Prime Farmland	594	1,922,937	35,523,540	0.031%	0.002%

J.4.5 Impacts on Timberland and Timber Harvests

Agricultural use of the land that would be inundated by the proposed Marvin Nichols Reservoir includes the production of timber. The Texas A&M Forest Service maintains data on timberland, timber harvest, and the stumpage value of harvests by county. As part of this study, Freese and Nichols contacted the Texas A&M Forest Service to obtain information on the impact of the proposed Marvin Nichols Reservoir on timber resources. Unfortunately, the Texas A&M Forest Service database was not designed to provide information for relatively small areas like the proposed Marvin Nichols Reservoir. The Texas A&M Forest Service indicated that analysis of the data at the county level and above would be most meaningful.

The Texas A&M Forest Service produces annual reports of Harvest Trends for timber products in East Texas, which includes most of the timberland and timber production in Texas. **Figure 1** shows the area covered by the Harvest Trends reports, as well as the location of the proposed Marvin Nichols Reservoir and the boundaries of Region D. Most of Region D (except for the western counties) is covered by the Harvest Trends Reports.

Although information on the impact of active timberland within the proposed reservoir cannot be gathered directly from data maintained by the Texas A&M Forest Service, it is possible to estimate the magnitude of potential impacts by looking at county data. Almost all of the footprint of the proposed Marvin Nichols Reservoir is located in Red River, Titus and Franklin Counties. (There are extremely small areas of the reservoir in Delta and Lamar Counties, but they are contained on the Sulphur River floodway channel and would not have forested land.) The total timberland in these three counties is 523,629 acres. If we treat forested land cover types within the reservoir site as a close approximation of timberland, the proposed Marvin Nichols Reservoir will inundate about 40,134 acres of timberland (**Table J.8**), or about 7.7 percent of the 523,629 acres of timberland in Red River, Titus and Franklin Counties.

Table J.8 provides data on potential timberland in Marvin Nichols Reservoir and timberland in Region D and East Texas[13]. Note that the data for Region D and East Texas include only the area shown in **Figure J.4**[13]. The data for Region D and East Texas were obtained from the Texas A&M Forest Service data set.

FIGURE J.4 REGION D AND AREA COVERED BY HARVEST TRENDS REPORT

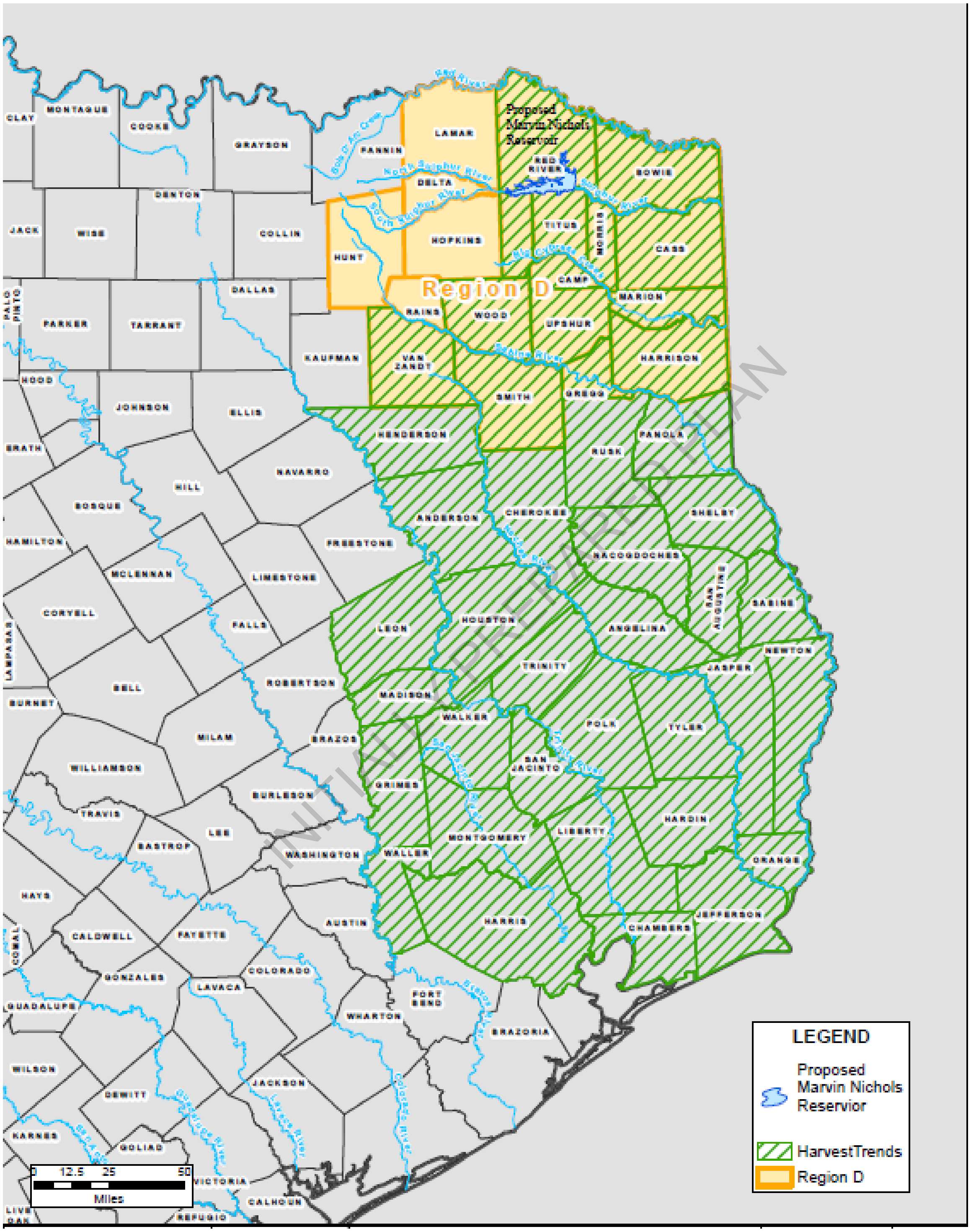


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TABLE J.8 POTENTIAL TIMBERLAND IN MARVIN NICHOLS RESEROIVR

	AREA (ACRES)	PERCENT IN MARVIN NICHOLS
Potential Timberland in Marvin Nichols Reservoir		
Bottomland Hardwoods	9,289	
Forested Wetlands	19,622	
Upland Forest	11,223	
Total Potential Timberland in Marvin Nichols	**40,134**	
TOTAL TIMBERLAND IN RED RIVER, TITUS, & FRANKLIN COUNTIES	***523,629***	***7.7%***
TOTAL TIMBERLAND IN REGION D	***3,520,917***	***1.1%***
TOTAL TIMBERLAND IN EAST TEXAS	***11,906,539***	***0.3%***

Table J.9 is a summary of data on timber sales taken from the Texas A&M Forest Service report *Harvest Trends 2019*[13]. These data are available only on a county-wide basis. Note that the potential timberland inundated by the proposed Marvin Nichols Reservoir is estimated to be 7.7 percent of the timberland in Red River, Titus and Franklin Counties. As a result, the timber harvest volume and stumpage value from the reservoir area is assumed to be about 7.7 percent of the total value for the three counties. (The stumpage value is the value of the timber harvested, not including the costs of processing and delivering the timber.) The estimated stumpage value of the timber harvests in the Marvin Nichols Reservoir pool is less than one percent of the total for Region D and less than 0.2 percent of the total for East Texas.

TABLE J.9 ESIMATED IMPACT OF MARVIN NICHOLS RESERVOIR ON TIMBER HARVEST VALUES

COUNTY	VOLUME HARVESTED (CUBIC FEET)			STUMPAGE VALUE OF THE HARVEST (THOUSAND DOLLARS)
	PINE	HARDWOOD	TOTAL	
Franklin	18,641	67,268	85,909	$85
Red River	7,013,180	3,433,757	10,446,937	$5,533
Titus	132,621	182,502	315,123	$321
TOTAL FOR MARVIN NICHOLS COUNTIES	***7,164,442***	***3,683,527***	***10,847,969***	***$5,939***
Estimated Stumpage Value for Marvin Nichols (7.7% of Total for Counties)				**$457**
TOTAL FOR REGION D (NOT INCLUDING HUNT, LAMAR, DELTA, HOPKINS AND RAINS COUNTIES)[1]	***92,716,340***	***28,570,546***	***121,286,886***	***$67,733***
TOTAL FOR EAST TEXAS	***484,846,271***	***81,328,486***	***566,174,757***	***$331,169***

1. These counties are not listed separately in the Texas A&M Forest Service Report.

J.5 Mitigation and the Effect of Mitigation on Impacts to Natural and Agricultural Resources

Developers of a new reservoir project are often required to provide mitigation for the impacts on natural resources in the form of land set aside, protected from development, and managed to enhance ecological value. Mitigation is generally only required for specific types of resources that would be impacted such as waters of the U.S. and the state, including wetlands. The developer of a project gets mitigation credit for improving the environmental functions of the land used for mitigation. The usual approach is to purchase degraded areas with limited environmental value and improve them through restoration, enhancement and careful management to achieve desired compensatory results at minimum cost.

Table J.10 gives information on historical mitigation requirements for Texas reservoirs constructed or permitted since 1980. Significant changes have taken place to the mitigation process since the 1980s. Mitigation is no longer based strictly on acreage. It now considers the quality of the land being taken out of use as well as the improvements made to the mitigation land. It may be more beneficial to examine more recent examples of reservoir mitigation. The most recently permitted and fully constructed lake is Bois d'Arc Lake in Fannin County. Bois d'Arc Lake was completed in 2021and the lake began operation in 2023. Significant land was acquired for mitigation (approximately 17,000 acres), and the transactions were on a willing buyer-willing seller basis. The total mitigation for Bois d'Arc Lake is equivalent to a 1:1 ratio to the area impacted by construction. Another reservoir, Lake Ralph Hall, was permitted in 2020 and is currently under construction with little to no mitigation requirements. Lands for the reservoir and stream mitigation were also acquired on a willing buyer-willing seller basis.

One of the key differences between recently permitted projects and those permitted decades earlier is the approach to mitigation. No longer are ratios used, but rather habitat value. Also, as previously noted, preferred lands for mitigation are lands that could be improved and developed into new ecological habitats. The potential impacts to the timber industry from mitigation would be much less than claimed by opponents because the preferred land for mitigation would be non-forested. For the Bois d'Arc Lake project, ranch lands are currently being improved, with over 5 million trees planted, to create aquatic and terrestrial habitats on lands that otherwise had limited ecological value.

Mitigation offsets the impact of a project on natural resources by improving the ecological functions of other land. Mitigation would be expected to offset the impacts of the proposed Marvin Nichols Reservoir on natural resources. While most of the lands dedicated to mitigation may not be active agricultural lands, the potential use of these lands in the future for agricultural purposes would be limited and probably not compatible for the purpose of the mitigation.

Mitigation requirements for new reservoirs are generally determined during the permitting process, and the requirements for the proposed Marvin Nichols Reservoir are not yet known. Estimates of mitigation requirements have been developed as part of cost estimates used for the *2026 Region C Water Plan*. For this Plan, the required mitigation acreage is estimated at approximately equivalent to the total acreage of the proposed new reservoir. For the proposed Marvin Nichols Reservoir, the acreage of the reservoir conservation pool and dam is 72,192 acres, and the estimated mitigation requirement is equal to that amount (72,192 acres). Costs for mitigation include the land purchase cost and an equivalent cost to improve the land to meet the mitigation requirements. This is consistent with historical mitigation requirements for reservoirs in Texas. It should be emphasized that this is only an estimate. Actual mitigation requirements and location will be developed as permitting for the proposed reservoir proceeds. As discussed above, mitigation is intended to offset impacts on natural resources but may increase impacts to agricultural resources.

TABLE J.10 MITIGATION REQUIREMENTS FOR TEXAS RESERVOIRS

RESERVOIR	DATE IMPOUNDED	CONSERVATION POOL (ACRES)	USACE MITIGATION (ACRES)	RATIO	MITIGATION SITE
Alan Henry	1993	2,884	3,000	1.04:1	Down Stream
Applewhite	Permitted in 1989	2,500	2,500	1.00:1	Accepted Down Stream
Bois d'Arc Lake	Permitted in 2018	16,641	16,800	1.01:1	Upstream and Down Stream
Cooper (including Flood Pool)	1991	19,200 (22,740)	35,500	1.85:1 (1.56:1)	Next to Reservoir and 50 miles Down Stream
Gilmer	1997	1,010	1,557	1.54:1	
Joe Pool	1986	7,470	0	0.00:1	None
Mitchell County	1993	1,463	0	0.00:1	None
O. H. Ivie	1990	19,149	5,990	0.31:1	Next to Reservoir
Palo Duro	1989	2,413	0	0.00:1	None
Ray Roberts	1986	29,350	0	0.00:1	None
Ralph Hall	NA[1]	7,568	0	0.00:1	None
Richland-Chambers	1987	44,752	13,700	0.31:1	Down Stream

1. Lake Ralph Hall is currently under construction. Permit was issued in 2020.

J.6 Socio-Economic Assessment

In 2014, the Corps of Engineers produced the report Sulphur River Basin – Socio-Economic Assessment[14]. It was estimated that the construction phase of Marvin Nichols Reservoir would produce over 12,000 direct, indirect, and induced jobs, and have an overall positive effect on the economy of $1.47 billion (in 2014 dollars).

An updated socio-economic study was conducted in April 2020 by Clower & Associates for the recommended Marvin Nichols Reservoir strategy. This strategy assumes the full-size reservoir (elevation 328 ft msl) with over 200 miles of transmission to NTMWD, TRWD, and UTRWD. It also looked at construction and operation of the project. All costs are in 2018 dollars, which is consistent with the 2021 regional water planning guidance.

The *Economic, Fiscal and Developmental Impacts of the Proposed Marvin Nichols Reservoir* is included as **Attachment J-2** to this appendix. This study found that the development of the lake and transmission system would result in over 38,000 direct, indirect and induced temporary jobs during construction and 1,800 permanent jobs during operations. The total economic activity would increase by $5.5 billion during construction and $228 million during operations. Much of this increased economic activity would occur in Region D, where the reservoir is located.

Terms

***Employment*:** the number of annual average monthly jobs that would be created, and can be either full-time or part-time.

Labor income*:* represents all forms of employment income, including employee compensation (wages and benefits) and proprietor income.

Value added*:* gross output (sales or receipts and other operating income, plus inventory change) minus intermediate inputs (consumption of goods and services purchased from other industries or imported), which consists of compensation of employees, taxes on production and imports less subsidies, and gross operating surplus.

Output: the value of industry production.

***Direct* employment:** jobs associated with the project itself.

***Indirect* employment:** employment generated from spending by employees of the project.

***Induced* employment:** employment generated from spending by indirect employees.

Table J.11 provides additional detail during construction and **Table J.12** presents the economic summary during operations. It should be noted that these impacts occur over different geographic areas and at different times, pending construction schedules and project component locations. All values represent direct, indirect and induced economic impacts.

TABLE J.11 SOCIO-ECONOMIC IMPACT OF CONSTRUCTING MARVIN NICHOLS RESERVOIR

	CONSTRUCTION			
	Dam (6 years)	Transmission (6 years)	Housing/ Commercial (20 years)	Total
Economic Activity	$1,223,035,000	$3,830,050,000	$497,573,000	$5,550,658,000
Value Added	$545,522,235	$2,355,441,235	$236,857,235	$3,137,820,705
Labor Income	$396,345,000	$1,667,439,000	$168,042,000	$2,231,826,000
Employment	8,266	25,921	4,061	38,248
Indirect State and Local Taxes	$34,018,000	$109,615,000	$15,506,000	$159,139,000

Values represented in 2020 dollars.

TABLE J.12 SOCIO-ECONOMIC IMPACT OF OPERATING MARVIN NICHOLS RESERVOIR

	ANNUAL OPERATIONS			
	Dam	Transmission	Visitor/Resident Spending	Total
Economic Activity	$39,877,000	$81,106,000	$106,906,000	$227,889,000
Value Added	$17,945,000	$46,802,000	$56,608,000	$121,355,000
Labor Income	$12,569,000	$17,701,000	$29,957,000	$60,227,000
Employment	289	216	1,327	1,832
Indirect State and Local Taxes	$1,121,000	$5,065,000	$9,282,000	$15,468,000

Values represented in 2020 dollars.

The 2020 Clower Report also addressed potential socio-economic impacts to the North Texas region if this water supply project is not developed. The report notes that the North Texas region, including most of the communities served by the sponsors of the Marvin Nichols Reservoir, has witnessed an unprecedented economic boom over the past decade with record levels of population growth and job creation. Economic forecasts see this growth continuing for at least the next several decades.

Many of the driving factors for the North Texas growth is the growth of industries and migration of workers to service these industries. Water is a major factor for both residents and industry. If water supplies are limited due to the inability to secure reliable new sources of water, continued growth in North Texas will slow. Industries most likely to slow are those that are most dependent upon water, which include pharmaceutical, aerospace and semiconductor manufacturing, hospitals, and service industries such as hotels and restaurants. The impacts to projected job growth for just these six industries could be substantial with the loss of 136,000 jobs and $19 billion in annual economic activity. This assessment assumes a lack of water for growth. The TWDB looked at the effects a one-year drought would have on Region C.

As part of the 2026 Region C Water Plan, the TWDB evaluated the socio-economic impacts of not meeting water needs in Region C. This report is included in **Appendix L** of the 2026 Plan and summarized in **Chapter 6**. The TWDB analysis is based on the projected needs for all water users in Region C, which reach approximately 1.3 million acre-feet per year by 2080. The analysis assumes that these needs cannot be met in a single year in the decade. Projected needs in other years in the decade are assumed to be met. This approach is predicated on the assumption that the needs are solely drought driven. In Region C, most of the projected water needs are growth related. This means that the impact from not meeting the water need is not limited to a single year in the decade. Previous analyses by the TWDB for Region C (2006 Region C Water Plan) indicate the socio-economic impacts associated with growth could be much higher than estimated using the standard TWDB protocol.

<Findings to be provided in the Final 2026 Region C Water plan.>

J.7 Additional Information

Table J.13 shows the needs for additional water supplies in the Trinity and Sulphur Basins, taken from the Texas Water Development Board database for the 2026 regional water plans[15]. The Texas Water Development Board defines needs as the difference between the supply currently available and the projected demands for a water user group. **Table J.13** shows the sum of net needs by river basin and planning group. For suppliers that have a surplus, needs are set at zero. As the table shows, there is a need for considerable additional water supply in the Trinity Basin, particularly in Region C.

TABLE J.13 NEEDS FOR ADDITIONAL WATER SUPPLY IN THE TRINITY AND SULPHUR BASINS

BASIN	2030	2040	2050	2060	2070	2080
Sulphur	27,134	28,478	29,883	31,351	32,855	34,459
Trinity	245,701	497,110	738,176	960,830	1,158,027	1,329,508

J.8 Appendix J List of References

[1] Freese and Nichols, Inc. 2016 Region C Water Plan. Prepared for the Region C Water Planning Group, 2015.

[2] Freese and Nichols, Inc. Environmental Evaluation Interim Report - Sulphur River Basin - Comparative Assessment. 2013.

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[4] Applied Weather Associates, Probable Maximum Precipitation Study for Texas. Prepared for the Texas Commission on Environmental Quality, 2016.

[5] Texas Parks and Wildlife Department: Texas Wetlands Conservation Plan, Austin, 1997.

[6] U.S. Geological Survey: Open-File Report 87-242, Water Fact Sheet – Largest Rivers in the United States, Washington D.C., May 1990.

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[8] Texas Parks and Wildlife Department. Rare, Threatened, and Endangered Species of Texas. August 2024. https://tpwd.texas.gov/gis/rtest/.

[9] Railroad Commission of Texas. Public GIS Viewer. https://gis.rrc.texas.gov/GISViewer/. Accessed November 2024.

[10] Xu, Ph.d. Weihuan, and Publication 162. The Economic Impact of the Proposed Marvin Nichols I Reservoir to the Northeast Texas Forest Industry. Texas Forest Service, Aug. 2002.

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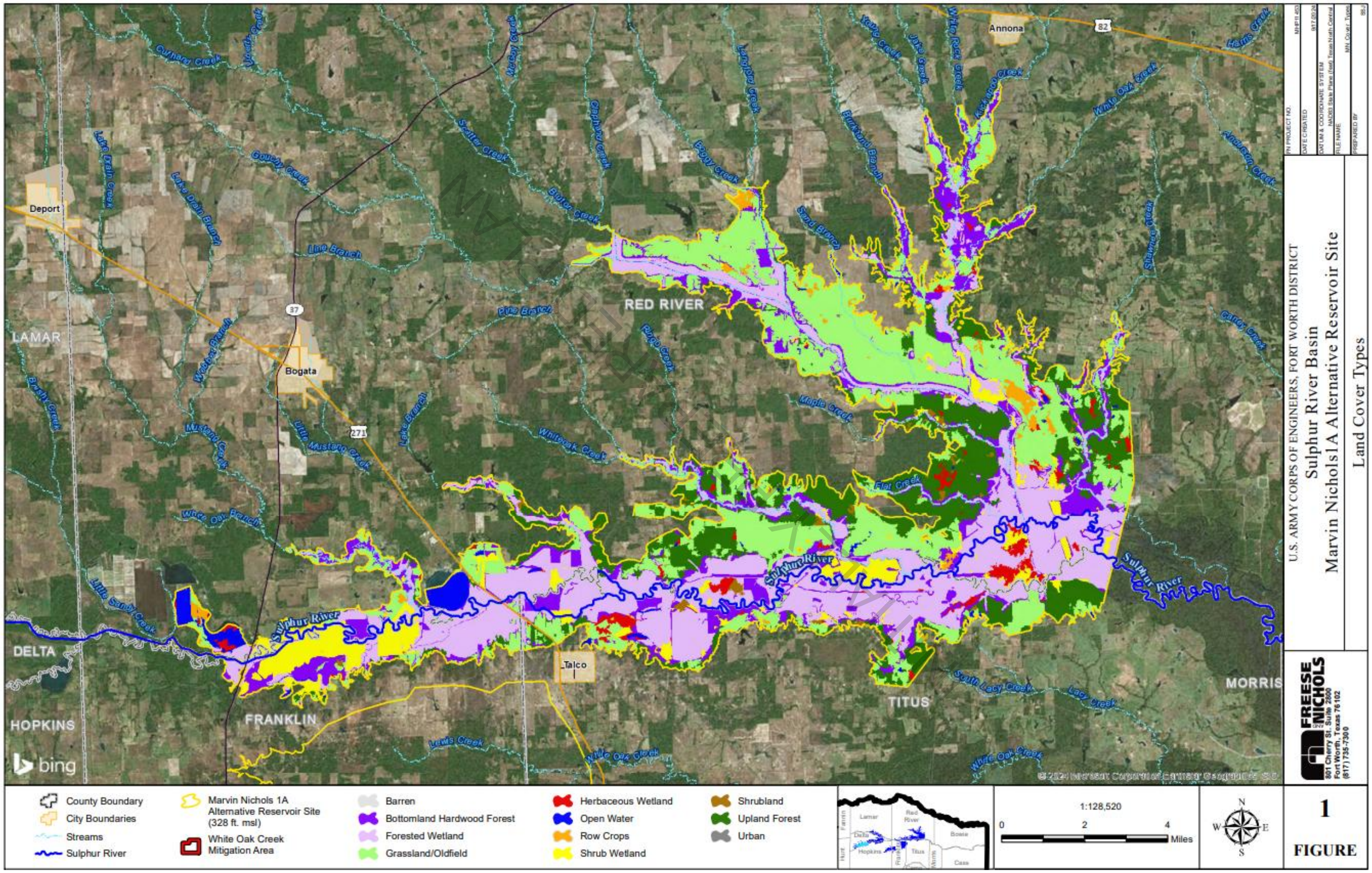
[15] 2026 Regional Water Planning Database (DB27). Texas Water Development Board. Obtained from DB27, January 2025.

Attachment J-1

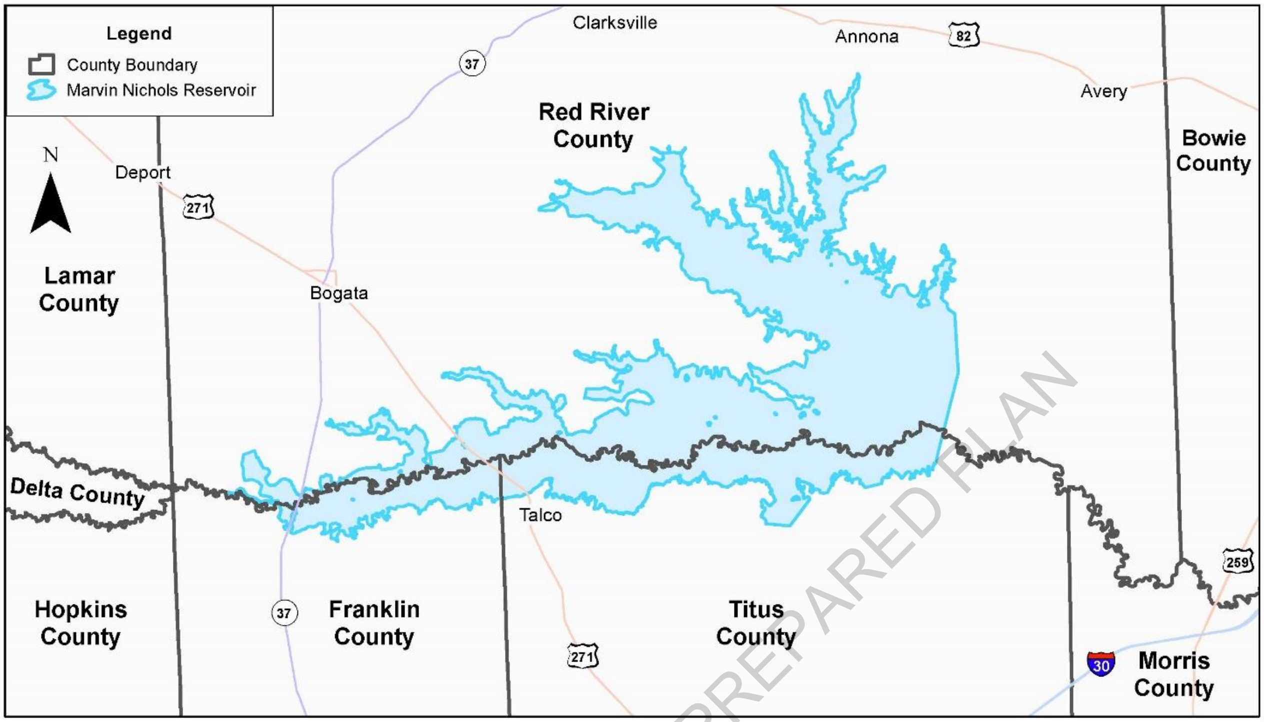
Land Cover Type Figure 4 from the Environmental Evaluation Interim Report – Sulphur River Basin Comparative Assessment


U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT
Sulphur River Basin
Marvin Nichols1A Alternative Reservoir Site
Land Cover Types
FREESE AND NICHOLS
801 Cherry St. Suite 2800
Fort Worth, Texas 76102
(817) 735-7300
1
FIGURE
County Boundary
City Boundaries
Streams
Sulphur River
Marvin Nichols 1A Alternative Reservoir Site (328 ft. msl)
White Oak Creek Mitigation Area
Barren
Bottomland Hardwood Forest
Forested Wetland
Grassland/Oldfield
Herbaceous Wetland
Open Water
Row Crops
Shrub Wetland
Shrubland
Upland Forest
Urban
1:128,520
0
2
4
Miles
N
S
E
W
Deport
Bogata
Talco
Annona
LAMAR
RED RIVER
DELTA
HOPKINS
FRANKLIN
TITUS
MORRIS
Sulphur River
bing

DRAFT

Attachment J-2

Economic, Fiscal and Developmental Impacts of the Proposed Marvin Nichols Reservoir, April 13, 2020



Economic, Fiscal and Developmental Impacts of the Proposed Marvin Nichols Reservoir

Prepared for:

North Texas Municipal Water District
Upper Trinity Regional Water District
Tarrant Regional Water District
Dallas Water Utilities

April 13, 2020

Clower & Associates

Dallas-Fort Worth / Washington DC
(202) 769-6868

Table of Contents

Statement of Report Status: This is a draft report based on initial estimates of development and operating costs associated with the proposed Marvin Nichols Reservoir. Subsequent adjustments in total spending and budget allocations may influence the reported economic impacts.

Clower & Associates is a professional services firm providing economic and public policy analysis and advisory services to clients in the public, private, and non-profit sectors.

Terry L. Clower, Ph.D.—Principal
Bernard L. Weinstein, Ph.D.—Principal
Nicholas Saliba, B.S., B.B.A., B.A.—Senior Research Associate

Executive Summary

The following summarizes the findings of our analysis of the potential economic, fiscal, and developmental impacts that would attend the creation of the proposed Marvin Nichols Reservoir. This new Sulphur River basin lake will cover over 66,000 acres of surface area in Franklin, Red River, and Titus counties of northeast Texas, collectively referred to herein as the "Lake Counties."

Our analysis considers geographical differences in the effective economic study area at differing phases of development and operations of the reservoir. Therefore, the economic impacts of each development phase cannot be considered additive.

- Construction of the dam to impound the proposed Marvin Nichols Reservoir will cost in excess of $760 million, including work conducted to address required environmental mitigation strategies. The effective economic geography for this work includes the counties surrounding the proposed reservoir plus Bowie and Morris counties since it is expected that these counties will supply workers for the construction project. Construction of the dam and related infrastructure will boost local area economic activity by more than $1.2 billion during the multi-year project. This activity will increase gross regional product by over $545 million and support well over 8,200 person years of employment, boosting labor earnings by $396 million. A person-year of employment is one job lasting for one year and is the most accurate way to describe job impacts from projects that last more than one year.

- This proposed water resource development project also includes building a new raw water transmission pipeline from the reservoir to facilities in the Dallas-Fort Worth Metroplex. The related construction activities will occur in Collin, Delta, Denton, Fannin, Franklin, Hopkins, Hunt, Red River, Titus and Wise counties. Total spending for materials, services, and the purchase of right-of-way and other construction and permitting-related activities will exceed $3 billion. Building the water transmission pipeline will temporarily boost regional economic activity by $3.8 billion, increase gross regional product by about $2.4 billion, and support almost 26,000 person-years of employment paying almost $1.7 billion in salaries, wages, and benefits.

- On-going annual expenditures for operations and maintenance of the dam will boost economic activity in nearby counties. We estimate that recurring annual maintenance and operations spending to support the Marvin Nichols Reservoir will increase local economic activity by $39.9 million per year, expressed in constant 2020 dollars, and increase local labor income by $12.6 million through the creation of 289 direct, indirect, and induced jobs.

- Operations and maintenance of the transmission pipeline will spread across a wider region and will include water district employees based in Dallas and Fort Worth. The annual economic impact of maintenance and operations spending for the pipeline and related infrastructure will boost regional economic activity by $81.1 million, increase gross regional product by $46.8 million, and support 216 direct, indirect, and induced jobs paying more than $17.7 million in salaries, wages and benefits.

- Once the lake is impounded, the surrounding counties will attract new investment and spending for commercial and residential properties, as well as spending by visitors who will enjoy lake-based recreational activities. We expect the local area to see 2,000 new residential units constructed, as well as commercial facilities such as campgrounds, lodging venues, marinas, restaurants and similar businesses. Total investment in new residential and commercial properties will boost construction spending by more than $360 million over a 20-year period. This spending will increase local economic activity by more than $497 million, enhance labor income by $168 million, and support over 4,000 person-years of employment. On average that would be about 200 jobs per year, helping to create recurring economic opportunities in Franklin, Red River, and Titus counties.

- The housing that will be built near the new reservoir will include homes for full-time residents as well as vacation homes. New residents will be contributing about $30 million in annual regional spending by year 20. In addition, based on the experience of other Texas lakes, we estimate that annual visitor spending will be about $56 million per year. Combined, this new spending will increase local economic activity by almost $107 million per year, in 2020 dollars, and support more than 1,300 permanent jobs paying about $30 million in annual labor income.

- The presence of the proposed Marvin Nichols Reservoir will enhance the region's attractiveness for business location. As a recreational amenity, the lake will enhance the quality of life features of the region, which is an increasingly important factor in business site location decisions. Industries requiring reliable local water resources will also find new reasons to locate in the area.

- In addition to temporary gains in tax revenues associated with construction and project development activities, local taxing jurisdictions in the Lake Counties will enjoy new property tax revenues from adjacent residential and commercial developments, as well as recurring tax revenue associated with household and visitor spending. By year 20, we project that Lake Counties governments will share about $3.3 million in new property tax revenues and that local school district revenues will increase by over $6.6 million annually. Local jurisdictions' recurring annual revenues from new residents and visitors will be about $6 million per year, assuming visitor-focused commercial enterprises are located within a taxing jurisdiction.

- In addition to creating substantial growth and development opportunities in northeast Texas, building the Marvin Nichols Reservoir is paramount for the Dallas-Fort Worth Metroplex to sustain its competitive economic advantage over the long term. Continued population growth, and the ability to attract new and expanding businesses in key industries, is highly dependent on reliable water supplies.

Table ES1
Temporary Local Economic Impacts of Construction Activities
(2020 dollars)

Description	Impact ($2020, Direct, Indirect, Induced)
Dam Construction Impacted counties: Bowie, Franklin, Morris, Red River, Titus.	
Total Economic Activity (economic transactions)	$ 1,223,035,000
Total Value Added (gross regional product)	$ 545,522,235
Total Labor Income (salaries, wages, benefits)	$ 396,345,000
Total Employment (person-years of employment)	8,266
Indirect State Taxes	$ 18,357,000
Indirect Local Taxes	$ 15,661,000
Pipeline & Pump Station Construction Impacted counties: Collin, Delta, Denton, Fannin, Franklin, Hopkins, Hunt, Red River, Titus, Wise	
Total Economic Activity (economic transactions)	$ 3,830,050,000
Total Value Added (gross regional product)	$ 2,355,441,235
Total Labor Income (salaries, wages, benefits)	$ 1,667,439,000
Total Employment (person-years of employment)	25,921
Indirect State Taxes	$ 52,719,000
Indirect Local Taxes	$ 56,896,000
Housing and Commercial Construction Impacted counties: Franklin, Red River, Titus. Construction period: 20 years.	
Total Economic Activity (economic transactions)	$ 497,573,000
Total Value Added (gross regional product)	$ 236,857,235
Total Labor Income (salaries, wages, benefits)	$ 168,042,000
Total Employment (person-years of employment)	4,061
Indirect State Taxes	$ 7,315,000
Indirect Local Taxes	$ 8,191,000

Sources: Freese & Nichols, IMPLAN, Authors' estimates

Table ES2
Recurring Annual Local Economic Impacts
(2020 dollars)

Description	Impact ($2020, Direct, Indirect, Induced)
Dam Operations Impacted counties: Bowie, Franklin, Morris, Red River, Titus	
Total Economic Activity (economic transactions)	$ 39,877,000
Total Value Added (gross regional product)	$ 17,945,000
Total Labor Income (salaries, wages, benefits)	$ 12,569,000
Total Employment (headcount)	289
Indirect State Taxes	$ 605,000
Indirect Local Taxes	$ 516,000
Pipeline & Pump Station Operations Impacted counties: Collin, Dallas, Delta, Denton, Fannin, Franklin, Hopkins, Hunt, Red River, Tarrant, Titus, Wise.	
Total Economic Activity (economic transactions)	$ 81,106,000
Total Value Added (gross regional product)	$ 46,802,000
Total Labor Income (salaries, wages, benefits)	$ 17,701,000
Total Employment (headcount)	216
Indirect State Taxes	$ 2,477,000
Indirect Local Taxes	$ 2,588,000
Visitor and Resident Spending Impacted counties: Franklin, Red River, Titus	
Total Annual Household Income: New Permanent Residents	$ 58,300,000
Total Annual Household Income: New Weekend Residents (portion while in local area)	$ 8,162,000
Total annual spending: recreational visitors	$ 56,090,000
Total Economic Activity (economic transactions)	$ 106,906,000
Total Value Added (gross regional product)	$ 56,608,000
Total Labor Income (salaries, wages, benefits)	$ 29,957,000
Total Employment (headcount)	1,327
Indirect State Taxes	$ 4,455,000
Indirect Local Taxes	$ 4,827,000

Sources: Freese & Nichols, IMPLAN, Authors' estimates

ES3
Recurring Annual Fiscal Impacts of New Housing Developments and Resident and Recreational Out-of-Area Visitor Spending+

Description	Impact ($2020 Direct, Indirect, Induced)
Total Taxable Value of New Housing (permanent & weekend)	$ 408,000,000
Total Taxable Value of New Commercial Structures	$ 21,350,000
Total Increase in Taxable Land Values Adjacent and Near the Lake	$ 368,151,000
Net New Taxable Value (after removing lake & all mitigation land)	$ 539,794,000
Net# gain in county property tax revenues	$ 3,360,000
Net# gain in school district property tax revenues	$ 6.669.000
Other Local Government Revenue (taxes, fees, other)	$ 6,054,000

+ At buildout. # Net of losses to taxable property value of lake and environmental mitigation areas.
* Value will be impacted by land annexation and business location decisions.
Sources: Freese & Nichols, IMPLAN, Authors' estimates

Section 1: Introduction

The following updates our 2003 analysis of the economic, fiscal and developmental impacts of the proposed Marvin Nichols Reservoir. The proposed reservoir will be located in Franklin, Red River, Titus counties in the Sulphur River basin of northeast Texas about 16 miles north of the city of Mount Pleasant. The project also includes a major investment in new pipeline infrastructure that will cross several counties from Red River County to north central Texas. The creation of a new large reservoir will bring temporary and recurring economic activity to the host regions from the reservoir and related pipeline, and it will also support economic development in localities near the reservoir and for communities gaining access to a new reliable source of water.

We begin our report with an overview of the regional economy in the three counties immediately surrounding the proposed reservoir including Franklin, Red River, and Titus counties, hereinafter referred to as the "Lake Counties." Section 3 describes the methodology used in this analysis. Section 4 presents the findings of our analysis of the temporary economic impacts that will attend the construction of the dam to impound the proposed reservoir, the water transmission pipeline and associated infrastructure. In addition, these temporary impacts include an assessment of the economic benefits from construction spending on new residential and commercial properties as the lake attracts households and business investment to the region. Section 5 discusses how on-going operations of the dam, pipeline, and spending by visitors and new residents around the reservoir will impact area economic activity and revenues for local taxing jurisdictions. Section 6 considers how increasing the availability of reliable water supplies will impact development opportunities in Region C that can create positive economic spillover effects across the state. Finally, Section 7 offers our conclusions.

Section 2: Economic Overview of the Host Counties Region

As noted, the proposed reservoir will cover parts of Franklin, Red River, and Titus counties in northeast Texas. According to the most recent data from the U.S. Census Bureau (five-year estimate 2014-2018), the resident population of this region is 55,684. The population has recently been growing at about 0.3 percent per year, on average, which is less than half the national annual population growth rate of 0.7 percent. The region has slightly higher proportions of the population under the age of 18 and 65+ years of age, which is reflected in the region's labor force participation rate at 59.3 percent versus the national average of 62.3 percent. Median annual household income in the Lake Counties region also trails the U.S. at $45,646 and $60,293, respectively. Unsurprisingly, the poverty rate in the Lake Counties is 2.8 percent higher than the national average of 14.1 percent. However, housing costs are comparably affordable with a median value of owner-occupied dwellings being $97,585, less than half the U.S. median, while the local cost of living is about 13 percent below the national average. Still, total area cost of living adjusted household purchasing power in this region is almost 25 percent below the national average.

While the percentage of working age adults possessing a college degree is lower than the national average, the workforce data suggests there is a good supply of workers with at least basic skills. As of the fourth quarter of 2019, total jobs in the Lake Counties region had grown to 24,743, a 4.9 percent year-over-year increase. The area unemployment rate of 4.2 percent is higher than the national average but has dropped by one-half percent over the past year, as of January 2020.[1] Average wages of the jobs in the Lake Counties was $37,882 in 4Q2019 with a 2.1 increase over the preceding year. Table 1 below shows the ten largest industry sectors by jobs. The regional economy, particularly Franklin and Titus counties, has historically been built around Pilgrim's Pride's poultry processing operations and related agricultural and transportation activities. The region also has a concentration in transportation equipment manufacturing (trailers). Because of a somewhat older population, social services providers and residential care facilities are also important regional employers.

Table 1: Top Ten Industries by Employment, Lake Counties Region (4Q2019)

NAICS	Industry	Jobs	Avg Annual Wages	5-Year Job Change
311	Food Manufacturing	3,860	$41,498	156
611	Educational Services	2,249	$35,193	-156
621	Ambulatory Health Care Services	1,616	$44,852	255
722	Food Services and Drinking Places	1,478	$16,850	163
336	Transportation Equipment Manufacturing	1,071	$56,739	102
112	Animal Production and Aquaculture	1,006	$26,563	50
622	Hospitals	856	$49,495	302
493	Warehousing and Storage	813	$32,382	-29
624	Social Assistance	797	$14,308	500
623	Nursing and Residential Care Facilities	739	$26,487	-133

Source: JobsEQ, Chmura Economics.

Overall, due to the on-going influence of the poultry industry, and a few other key employment sectors, the Lake Counties regional economy is doing relatively well, especially for an area outside a major metropolitan market. But with population growth slowing, the counties that will host the proposed Marvin Nichols Reservoir need to attract new residents and investment. Importantly, over the past several years it has become clear that the region needs to diversify its economic base and bring in new sources of business and household spending. The addition of a major recreational amenity can help attract commercial development and households to the Lake Counties region, bringing new spending and economic opportunity for current and new area residents. In the following sections we provide estimates of the magnitude of this new regional economic activity.

Section 3: Overview of Methodology

In assessing the economic impacts of new spending related to the proposed Marvin Nichols Reservoir, we rely on data provided by Freese and Nichols (FNI), a professional engineering and planning firm, and the IMPLAN economic input-output model.

[1] At the time this report is being written we are just beginning to see the profound, and hopefully short-term, impacts the COVID-19 pandemic is having on U.S. labor markets.

The data provided to Clower and Associates is based on planning data and costs for the recommended strategy developed in accordance with state and regional water supply planning rules administered by the Texas Water Development Board (TWDB). This strategy assumes the Marvin Nichols Reservoir would have a conservation elevation of 328 feet mean sea level, a surface area of about 66,100 acres, and require approximately an equivalent number of acres for mitigation. The sponsors of the recommended project include NTMWD, TRWD and UTRWD. This project is an alternate strategy for Dallas Water Utilities (DWU) and therefore, associated transmission and operations spending by DWU related to water from the Marvin Nichols Reservoir is not included in this study. Land costs for both the reservoir and mitigation lands were obtained from the Lake Counties' tax assessors' offices.

The IMPLAN model is a planning tool that estimates how spending in a given sector of the economy flows through regional industries and households. The IMPLAN model is widely used in academic and professional research. The model provides estimates of direct, indirect and induced impacts of new spending. Direct impacts are those made by the companies, agencies or individuals who are the subject of the study, such as a water district engaging in new resource investments for planning, designing and building the dam and related infrastructure to create a new reservoir. Indirect effects capture the economic activity associated with the supply chain of the business/agency who is doing the spending. In this case, a water district hires a construction contractor who in turn buys materials and supplies, rents equipment, and makes other purchases of goods and services. The equipment rental company purchases equipment, buys parts, and hires an accounting service to prepare their tax filings. The accountant hires bookkeepers, rents office space and pays a janitorial service to clean the office, and so on. The model adjusts the spending to account for items that are not likely to be sourced from local vendors. For example, there are no petroleum refineries in the Lake Counties region, so the money used to purchase fuel for earthmovers would largely "leave" the regional economy. Induced effects are related to employees of all these firms spending a portion of their earnings in the regional economy for goods and services. The model provides estimates of total economic activity (business transactions), value added (gross regional product), employment (headcount jobs), and labor income (salaries, wages, and benefits). IMPLAN models also offer estimates of revenue that is generated by the indirect and induced economic activity for state and local jurisdictions. These revenues include sales and use taxes, property taxes, fees and other sources.

Because the IMPLAN model adjusts for spending that stays in a particular region, it is important to appropriately define the study area. Due to the varying geographic scale of the project components in creating the Marvin Nichols Reservoir, we use multiple study geographies in this research. Table 2 summarizes the geographies used for each research component. By convention, the study region will always include the location of physical activity, such as building the dam or pipeline, but can also be expanded to account for area labor markets.

Table 2: Study Geographies for Economic Modeling

Research Component	Counties	Notes
Dam Construction and Operations	Bowie, Franklin, Morris, Red River, Titus	Because of the location of the dam, we expect that contractors will draw some workers from Morris and Bowie counties.
Pipeline Construction	Collin, Delta, Denton, Fannin, Franklin, Hopkins, Hunt, Red River, Titus, Wise	Reflects the pipeline's path.
Pipeline Operations	Collin, Dallas, Delta, Denton, Fannin, Franklin, Hopkins, Hunt, Red River, Tarrant, Titus, Wise	Pipeline and base location for water district employees.
New Commercial Operations & Households	Franklin, Red River, Titus	Core activities based at the new reservoir.

Source: FNI, Authors' estimates

In addition to geography, we also consider the nature of the spending. Construction spending is temporary by nature. The impacts may be large, but once the dam and pipeline are built, that spending and its related economic impacts cease. The temporary nature of construction spending requires one important change in the way we report job impacts. The construction of the dam and pipeline will take a few years to complete. Therefore, the job impacts from construction and related spending are expressed as person-years of employment, one job lasting for one year. If the employment impact were 500 person years of employment, and the project lasted for 5 years, that would suggest that the average annual employment impact would be 100 jobs. Since we do not know exactly how long the construction of the dam and pipeline will take, we present the jobs impacts as total person-years of employment for the entire project. Other key assumptions used in estimating the economic impacts of specific project components will be described in the relevant sections of this report.

Section 4: Economic Impacts of Construction Activities

Because the effective geography of impact is different across the reservoir development components and stages, we separate the discussion of our findings into three sub-sections: dam construction, pipeline construction, and the building of new commercial and residential properties near the new reservoir.

Dam Construction

Construction of the dam to impound the proposed Marvin Nichols Reservoir will cost in excess of $760 million, including work conducted to prepare required environmental mitigation areas. This spending includes project planning, design work, environmental studies and other outlays. However, to take a conservative approach in considering the potential regional impacts, we have adjusted some spending categories. For this project component we do not include budgeted contingency costs and interest costs during construction. Budgeted contingency costs, while in practice are often actually spent, are not guaranteed spending so we do not include them in our economic impacts. Interest costs are the temporary borrowing costs incurred during construction. At the time of this analysis we do not know what entity or entities will be used for these financial services, so we do not know if any of those costs are relevant to the study area. In addition, we only include a portion of the costs to resolve conflicts and acquire land for the reservoir and mitigation area. Of the costs allocated for resolving conflicts, we assume that no more than 10 percent of these expected expenditures will be spent in the study area. Finally, our assessment of the economic impacts of construction spending include land acquisition costs. Based on data provided by FNI, we allocated land acquisition costs between the dam and pipeline construction projects. We assumed that no more than 50 percent of the monies paid for land acquisition would go to local landowners. We then modeled the reduced land acquisition spending as income to area households that would be spent in the regional economy. Combined, it is likely our exclusion of several categories of expenditure will result in estimates understating the total potential economic impact associated with building the proposed dam and related infrastructure.

Construction of the dam and related infrastructure will boost local area economic activity by more than $1.2 billion during this multi-year project (see Table 3). This activity will increase gross regional product by over $545 million and support well over 8,200 person years of employment, boosting labor earnings by $396 million. Area taxing jurisdictions will share more than $15.6 million in new revenues due to building the proposed dam and related economic activities.

Table 3: Temporary Local Economic Impacts of Dam Construction

Description	Impact ($2020 Direct, Indirect, Induced)
Dam Construction Impacted counties: Bowie, Franklin, Morris, Red River, Titus.	
Total Economic Activity (economic transactions)	$ 1,223,035,000
Total Value Added (gross regional product)	$ 545,522,235
Total Labor Income (salaries, wages, benefits)	$ 396,345,000
Total Employment (person-years of employment)	8,266
Indirect State Taxes	$ 18,357,000
Indirect Local Taxes	$ 15,661,000

Sources: Freese & Nichols, IMPLAN, authors' estimates.

Pipeline Construction

This proposed water resource development project also includes building a new transmission pipeline from the reservoir to facilities in the Dallas-Fort Worth region. The related construction activities will occur in Collin, Delta, Denton, Fannin, Franklin, Hopkins, Hunt, Red River, Titus and Wise counties, which serve as the economic region for this component of our analysis. Total spending for materials, services, and the purchase of right-of-way, combined with other construction and permitting-related spending, will exceed $3 billion. As noted above, we do not include more than 10 percent of projected conflict costs, any of the budgeted financing or contingency costs, and we assume that only half of land and right-of-way acquisition expenses will go to study area households.

Building the water transmission pipeline will temporarily boost regional economic activity by $3.8 billion, increase gross regional product by about $2.4 billion, and support almost 26,000 person-years of employment paying almost $1.7 billion in salaries, wages, and benefits (see Table 4). Local government entities in the study area, combined, will receive an estimated $56.9 million in new revenues from taxes, fees and other government revenue sources.

Table 4: Temporary Local Economic Impacts of Pipeline Construction

Description	Impact ($2020 Direct, Indirect, Induced)
Pipeline & Pump Station Construction Impacted counties: Collin, Delta, Denton, Fannin, Red River, Wise	
Total Economic Activity (economic transactions)	$ 3,830,050,000
Total Value Added (gross regional product)	$ 2,355,441,235
Total Labor Income (salaries, wages, benefits)	$ 1,667,439,000
Total Employment (person-years of employment)	25,921
Indirect State Taxes	$ 52,719,000
Indirect Local Taxes	$ 56,896,000

Sources: Freese & Nichols, IMPLAN, authors' estimates.

New Commercial and Residential Construction

Once the reservoir is impounded and begins to fill, we expect substantial new residential and commercial development to be attracted to the lake. In developing our estimates of total potential housing and commercial property development we referenced multiple studies examining the impacts of reservoirs on their local communities. However, we focused our attention on a recent study[2] that examined the development of properties near several lakes in the "upper highland" area of central Texas. These lakes are Colorado River fed reservoirs including Buchannan, Inks, LBJ, Marble Falls, and Travis. Recognizing there are notable socio-economic and population density variances across these reservoirs, we focused our attention of those lakes that are further away from population centers. We also noted that these reservoirs are much smaller than the proposed Marvin Nichols Reservoir, but we chose not to simply scale-up the development impacts of the Upper Highlands Lakes based on relative surface area. We did use this study to inform our estimates of the value of new commercial and residential properties that we then tailored to the MNR study area.

Importantly, we do not attempt to forecast the specific timing of new commercial and residential property development in the Lake Counties. There are many environmental, socio-economic and regulatory factors that will influence the pace of new development. These include rainfall levels after impoundment, overall economic conditions, the permitting and development of supporting infrastructure, and the strategies employed by local government to plan and manage this potential growth. For purposes of this analysis, we have assumed development will occur over a 20-year

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[2] The study can be accessed at: https://www.co.llano.tx.us/upload/page/0978/docs/Economic%20Impact%20Of%20The%20Upper%20Highland%20Lakes%20Of%20The%20Colorado%20River%20-%20Fall%202012%20(2).pdf

period after reservoir impoundment. We feel we have been conservative in both this timeline and our projections of development potential. We took this conservative approach specifically to show that even with careful management that keeps the pace of development in line with local government capacity to deliver services, there is tremendous economic potential for the Lake Counties region. Moreover, our assessment does not include the value of growth that will likely happen after this initial development period.

We expect the local area will attract 2,000 new residential units as well as commercial facilities such as campgrounds, lodging venues, marinas, restaurants and similar businesses. This new development activity will likely show up as a surge of initial investment, followed by market-driven growth over a twenty-plus year time horizon. The housing units will have an average value, not including land, of about $170,000 per unit, suggesting the Lake Counties will remain relatively affordable compared to the state's major metropolitan areas. Total investment in new residential and commercial properties will boost construction spending by more than $360 million over this extended time period. This spending will increase local economic activity by more than $497 million, enhance labor income by $168 million, and support over 4,000 person-years of employment (see Table 5). On average that would be about 200 jobs per year, creating recurring economic opportunities in Fannin, Red River, and Titus counties. New revenues to local tax jurisdictions related specifically to these construction activities will be $8.1 million.

Table 5: Temporary Local Economic Impacts of New Commercial and Residential Property Construction

Description	Impact ($2020 Direct, Indirect, Induced)
Housing and Commercial Construction Impacted counties: Franklin, Red River, Titus. Construction period: 20 years.	
Total Economic Activity (economic transactions)	$ 497,573,000
Total Value Added (gross regional product)	$ 236,857,235
Total Labor Income (salaries, wages, benefits)	$ 168,042,000
Total Employment (person years of employment)	4,061
Indirect State Taxes	$ 7,315,000
Indirect Local Taxes	$ 8,191,000

Sources: Freese & Nichols, IMPLAN, authors' estimates.

Section 5: Recurring Economic Impacts of Marvin Nichols Reservoir

Recurring economic impacts of the proposed Marvin Nichols Reservoir include four separate types of spending: operations and maintenance of the dam, operations of the water transmission pipeline, household spending by new permanent and weekend residents, and visitor spending by non-residents. As noted previously, the operations of the dam, pipeline and new commercial and household spending will impact different regions.

Dam Operations

As with the construction of the dam, we expect employment and supplier opportunities for dam maintenance and operations to be concentrated in Bowie, Franklin, Morris, Red River and Titus counties. We estimate that recurring annual maintenance and operations spending to support the Marvin Nichols Reservoir will increase local economic activity by $39.9 million per year, expressed in constant 2020 dollars, and boost local labor income by $12.6 million through the creation of 289 direct, indirect, and induced jobs (see Table 6). Tax revenues for local governments will total $516,000 per year.

Table 6: Recurring Annual Local Economic Impacts

Description	Impact ($2020 Direct, Indirect, Induced)
Dam Operations Impacted counties: Bowie, Franklin, Morris, Red River, Titus	
Total Economic Activity (economic transactions)	$ 39,877,000
Total Value Added (gross regional product)	$ 17,945,000
Total Labor Income (salaries, wages, benefits)	$ 12,569,000
Total Employment (headcount) (190 direct jobs)	289
Indirect State Taxes	$ 605,000
Indirect Local Taxes	$ 516,000

Sources: Freese & Nichols, IMPLAN, authors' estimates.

Pipeline Operations

Operations and maintenance expenditures for the pipeline will spread across the counties where the infrastructure is located and will also include Dallas and Tarrant counties, since some of the operations and maintenance work will be performed by employees based at headquarters of the North Texas Municipal Water District and the Tarrant Regional Water District. The annual economic impacts of maintenance and operations spending include boosting regional economic activity by $81.1 million, increasing gross regional product by $46.8 million, and supporting 216 direct, indirect, and induced jobs that will pay more than $17.7 million in salaries, wages and benefits (see Table 7). New tax and other revenues to local jurisdictions will increase by $2.6 million per year.

Table 7: Recurring Annual Local Economic Impacts

Description	Impact ($2020 Direct, Indirect, Induced)
Pipeline & Pump Station Operations Impacted counties: Collin, Dallas, Delta, Denton, Fannin, Franklin, Hopkins, Hunt, Red River, Tarrant, Titus, Wise	
Total Economic Activity (economic transactions)	$ 81,106,000
Total Value Added (gross regional product)	$ 46,802,000
Total Labor Income (salaries, wages, benefits)	$ 17,701,000
Total Employment (headcount) (90 direct jobs)	216
Indirect State Taxes	$ 2,477,000
Indirect Local Taxes	$ 2,588,000

Sources: Freese & Nichols, IMPLAN, authors' estimates.

Household and Visitor Spending

For this component of our analysis we focus on the economic and tax revenue impacts that will occur in the Lake Counties of Franklin, Red River, and Titus. In this preliminary assessment we do not attempt to forecast specific locations for the projected commercial and residential property development, which may prove to be unrelated to the amount of lake shoreline in each county.

The economic impact of new residents is based on household spending in the Lake Counties region. Our key assumptions in this analysis address average household income, the proportion of new households that are permanent versus weekend/vacation residents, and the number of days in residence for weekender households. We have assumed the average household income for new residents will be a little over $58,000 per year, which is higher than that of current residents. Our estimate is based on the level of income needed to afford the type of housing that will likely be built around the lake, acknowledging that some new residents will be retirees who have lower incomes but higher levels of assets. Some owners of vacation properties will have higher income levels but will not have proportionately higher levels of local spending. To illustrate this last point, we would assume that weekend/vacation residents would bring in some retail items like groceries with them, suggesting their proportional local household spending will be lower than permanent residents. We assumed that half of the 2,000 new households added over a 20-year period will be weekend/vacation residents who will spend an average of 51 days per year in-residence.

We modeled the economic impacts of new household spending at the projected 20-year build-out using the household spending module of the IMPLAN model. The model adjusts household consumption for total income, recognizing the relative wealth affects in spending patterns.

Our estimates of visitor spending are further informed by the previously referenced study of the economic impacts of the Upper Highlands lakes in central Texas and data from the Texas Governor's Office of Economic Development and Tourism. Using hotel receipts data from counties with a reservoir in the Upper Highlands, and adjusting for overall development density, we estimated that at full development spending by visitors on lodging near the Marvin Nichols Reservoir will approach $20 million per year. This includes both hotel properties and receipts from vacation homes and AirBNB-type rentals. Using overall tourism spending data, we estimated other categories of visitor outlays including food and beverages, retail purchases, and local travel expenditures, which we modeled as purchases at gas stations for automobiles and boats. Our estimates suggest that at full development, visitors will bring about $56 million in new spending to the Lake Counties region.

When combined with household spending by new permanent and weekend residents, recurring annual economic activity in the Lake Counties region will increase by almost $107 million, boosting gross regional product by $56.6 million, generating almost $30 million in new labor income, and supporting over 1,300 jobs in the local economy (see Table 8). Taxes on the indirect and induced economic activity will add $4.8 million to annual revenues for local taxing jurisdictions.

Table 8: Recurring Annual Local Economic Impacts

Description	Impact ($2020, Direct, Indirect, Induced)
Visitor and Resident Spending Impacted counties: Franklin, Red River, Titus	
Total Annual Household Income: New Permanent Residents	$ 58,300,000
Total Annual Household Income: New Weekend Residents	$ 8,162,000
Total annual spending: recreational visitors	$ 56,090,000
Total Economic Activity (economic transactions)	$ 106,906,000
Total Value Added (gross regional product)	$ 56,608,000
Total Labor Income (salaries, wages, benefits)	$ 29,957,000
Total Employment (headcount)	1,327
Indirect State Taxes	$ 4,455,000
Indirect Local Taxes	$ 4,827,000

Sources: Freese & Nichols, IMPLAN, authors' estimates.

Recurring Revenues for Local Tax Jurisdictions

The combination of new property development, resident household spending, and visitor spending will have an impact on direct tax receipts in addition to the taxes paid on economic activities described in previous sections of this report. What is more, land values, especially for those properties located adjacent to the new reservoir, should increase significantly based on the experiences of other Texas counties not located immediately adjacent to a major metropolitan area. (For example, we did not consider land values around Lake Travis to be relevant to this analysis.) We estimate that the construction of 2,000 new residential units, along with higher land values on residential-sized lots, will increase total taxable values of residential properties in the Lake Counties by $408 million by year 20. In addition, larger properties and those not immediately converted to residential lots will see a substantial increase in value when they become waterfront, water view, or near waterfront properties totaling $368 million. Our estimates include an allowance for homestead exemptions for permanent residents. New taxable commercial property value is estimated to be $21 million.

An important consideration in assessing the increase in area property taxes is accounting for the loss of value associated with the lake's footprint and the required environmental mitigation area. Using data gathered by FNI, and assuming that all the mitigated land will be in the Lake Counties, the creation of Marvin Nichols Reservoir will remove about $257 million in property values. This assumption likely overstates the loss of property value in the Lake Counties area since the final mitigation area may be smaller and located at least partially outside the area. Still, even if we maximize the assumed mitigation related property losses and use conservative projections of development, the net gain in taxable property values at year 20 will be almost $540 million (see Table 9). In assessing the tax revenues that will be generated, we have used an average current tax rate for jurisdictions in the Lake Counties area. We again caution that, in this preliminary assessment, we do not know exactly where the new development will be located within the study area. Based on these valuation assumptions, we expect the Lake Counties to share an additional $3.4 million in annual property tax revenues by year 20. Area school districts will see about $6.7 million in new property taxes each year.

Visitor and household spending will also generate new sales tax revenues in the Lake Counties region. We assume that as commercial and residential development occurs, local jurisdictions will look to expand their effective taxing jurisdictions and/or the counties will use their existing or new authority to tax hotel revenues. Adjusting visitor spending for sales that will likely be taxable, we estimate that annual local sales and hotel occupancy taxes will increase by $1.2 million. Overall, total tax revenues associated with recurring household and visitor spending, in addition to direct property tax payments, will reach $6 million per year as lake properties develop.

Table 9: Recurring Annual Fiscal Impacts

Description	Impact ($2020 Direct, Indirect, Induced)
Total Taxable Value of New Housing (permanent & weekend)	$ 408,000,000
Total Taxable Value of New Commercial Structures	$ 21,350,000
Total Increase in Taxable Land Values Adjacent and Near the Lake	$ 368,151,000
Net New Taxable Value (after removing lake & all mitigation land)	$ 539,794,000
Net# gain in county property tax revenues	$ 3,360,000
Net# gain in school district property tax revenues	$ 6,669,000
Other Local Government Revenue (taxes, fees, other)	$ 6,054,000

+ At 20 years. # Net of lake and environmental mitigation areas. Sources: FNI, IMPLAN, Authors' estimates

Section 6: The Developmental Impacts of the Marvin Nichols Reservoir on Region C and the Consequences of a "No Build" Scenario

In this analysis we examine how increasing the effective water supply by building the Marvin Nichols Reservoir will sustain economic growth and opportunities in North Central Texas and especially in the Dallas-Fort Worth area, a major driver of overall economic growth and resiliency in Texas. In assessing these impacts, it is essential to review how the planning and investment for water resources has allowed Texas to emerge over the past 40 years as a premier state attracting new residents and business investment.

Water and regional economic development

It almost goes without saying that access to clean water is an economic driver. Conversely, scarce water, either in terms of quantity or quality, will become a key limiting factor in regional economic growth. Since North Texas does not have any natural lakes of significant size, reservoirs are constructed to control flooding and to collect and store surface water to meet regional water supply needs. Without question, the huge economic success of the North Texas region over the past 70 years would not have occurred absent access to abundant, available and affordable water supplies for residential and industrial use—accomplished by building an extensive network of reservoirs. The proposed Marvin Nichols Reservoir Project is but an extension of that function.

Gone to Texas

Texas, now America's second largest state with a population more than 29 million, has been America's economic bellwether for the past several decades. No other large state comes close in terms of population growth, job creation, and business formation. Net migration to Texas has totaled nearly 2 million over the past decade and shows no signs of abating. Moreover, for years Texas has ranked first in the nation for corporate relocations and expansions.

According to the U.S. Census Bureau, between July 2018 and July 2019, Texas had the largest numeric growth among the 50 states, adding 367,215 people. By contrast, California—with a population about one-third larger than Texas—added only 50,635. Put differently, **Texas is currently growing seven times faster than California.** Texas grew both from more births than deaths and from a large net gain in movers from within and outside the United States. In percentage terms, Texas' population grew 1.3 percent last year, nearly twice the national rate of 0.7 percent. California's growth rate has been falling for nearly a decade and just equaled the national average last year.

The Census Bureau also recently reported that of the nation's 15 fastest-growing counties in terms of numeric population change, eight are in Texas while California only recorded one. What is more, three of the **top five fastest-growing cities** in numeric terms are found in Texas—San Antonio**, Dallas and Fort Worth**. Indeed, over the past decade Dallas-Fort Worth has added 1.2 million residents, **the most of any U.S. metropolitan area.** Seven of the 15 fastest-growing cities in percentage terms last year are here in Texas. **Last year, Frisco, Texas grew at 8.2 percent, 11 times faster than the national average.**

Unlike in many other states, net-migration into Texas has accounted for a large share of the state's population growth over the past decade. According to the U.S. Bureau of the Census, net-migration to the state has averaged about 200,000 annually over the past decade. California sends more migrants to Texas than to any other state. Of total net out-migration of 521,000 between 2012 and 2016, more than 114,000 Californians relocated to Texas. Cities that had once been popular destinations for young people—in particular, New York, Los Angeles and Chicago—are now losing residents in large numbers. Last year alone, New York City registered a loss of more than 60,000 people, the biggest population decline of any American city. Many of those "out-migrants" chose to relocate to the Dallas area.

Another indicator of Texas' magnetic pull is the inflow of U-Haul vehicles. In 2018, for the third year in a row, Texas led the nation in "net inflow" of trucks and trailers. Locations in Houston, **Dallas-Fort Worth** and Austin saw the **largest influxes of U-Haul traffic**. Illinois, California and Michigan saw the largest "net outflow" of U-Hauls. Most migrants to Texas locate in the state's large metropolitan areas. In 2017, according to an analysis of Census data by Bloomberg, **Dallas-Fort Worth led the nation in net in-migration, with 246 more people moving into the region than out every day.**

Migration to Texas is partly due to a record number of business relocations from other states. Toyota's move from Torrance, California to Plano and PGA America's relocation from Palm Beach Gardens, Florida to Frisco have garnered the most attention. But a steady stream of small and middle-sized companies to the state has also spurred the in-migration of people. According to a recent analysis by Spectrum Location Solutions, Texas is the number one destination for California companies relocating to other states. In 2016 alone, 299 of these departures landed in Texas. The Dallas Regional Chamber reports that 43 of the 123 corporate headquarters that have relocated to Dallas-Fort Worth since 2010 came from California.

Employment trends

Job gains in Texas have been nothing short of remarkable in recent years. Over the past decade, total state employment has jumped by more than two million, or 18.3 percent, compared to a 5.6 percent increase for the nation. No other large state comes close. Indeed, Pennsylvania, Illinois and Ohio actually lost jobs over the decade. Incredibly***, one of every four U.S. jobs created over the past ten years has been in Texas.***

Demographic and employment changes in North Central Texas

Within the state of Texas, Dallas-Fort Worth has been the economic superstar over the past decade. As mentioned above, the North Texas region attracts the largest numbers of immigrants and the lion's share of corporate relocations. This population growth is occurring in cities that touch all three of the region's water districts sponsoring the Marvin Nichols Reservoir Project, North Texas

Municipal Water District (NTMWD), Tarrant Regional Water District (TRWD), and the Upper Trinity Regional Water District (UTRWD) plus Dallas Water Utilities (DWU).

As indicated in Tables 10 & 11, the North Central Texas Region (as defined by the North Central Texas Council of Governments) added about 830,000 residents between 2010 and 2019 for a population gain of 14 percent, or a 1.5 percent compounded average. But many of the cities grew at a much faster pace. Frisco and McKinney were the fastest-growing large cities served by NTMWD, adding 57 percent and 44 percent to their populations over the nine-year period. Plano, the largest municipality in the service area, grew more slowly than the region—mainly because the city is already close to its build-out potential. Frisco is the fastest growing city in America among places with a population of 50,000 or more. Over the past two years, the city's population grew by more than 22,000, or 14 percent. That's a growth rate 11 times faster than the national average. Some of the smaller cities grew at astronomical rates between 2010 and 2019. Melissa and Prosper posted triple-digit percentage gains while Princeton, Forney, and Little Elm grew four to five times faster than the region.

TABLE 10: Fastest Growing North Texas Cities by Count: 2010-2019

	2010	2019	Change	% Change	CAGR*
Fort Worth	741,206	848,860	107,654	14.5%	1.5%
Dallas	1,197,816	1,301,970	104,154	8.7%	0.9%
Frisco	116,989	183,560	66,571	56.9%	5.1%
McKinney	131,117	188,500	57,383	43.8%	4.1%
Plano	259,841	284,070	24,229	9.3%	1.0%
Irving	216,290	240,420	24,130	11.2%	1.2%
Denton	113,383	134,460	21,077	18.6%	1.9%
Arlington	365,438	386,180	20,742	5.7%	0.6%
Little Elm	25,898	44,530	18,632	71.9%	6.2%
Carrollton	119,097	136,170	17,073	14.3%	1.5%
Grand Prairie	175,396	191,720	16,324	9.3%	1.0%
Prosper	9,423	25,630	16,207	172.0%	11.8%
Allen	84,246	99,020	14,774	17.5%	1.8%
Richardson	99,223	113,710	14,487	14.6%	1.5%
Midlothian	18,037	32,100	14,063	78.0%	6.6%
N. Central Texas Region	5,927,539	6,755,320	827,781	14.0%	1.5%

* Compounded Annual Growth Rate Source: North Central Texas Council of Governments

TABLE 11: Fasting Growing North Central Texas Cities by Percent Change: 2010-2019

	2010	2019	Change	% Chng	CAGR
Celina	6,028	17,680	11,652	193.3%	12.7%
Prosper	9,423	25,630	16,207	172.0%	11.8%
McLendon-Chisholm	1,373	3,470	2,097	152.7%	10.9%
Northlake	1,724	4,140	2,416	140.1%	10.2%
Fate	6,434	14,940	8,506	132.2%	9.8%
Melissa	4,695	10,820	6,125	130.5%	9.7%
Annetta	1,288	2,780	1,492	115.8%	8.9%
Josephine	812	1,550	738	90.9%	7.4%
Princeton	6,807	12,680	5,873	86.3%	7.2%
Anna	8,249	15,010	6,761	82.0%	6.9%
Midlothian	18,037	32,100	14,063	78.0%	6.6%
Aubrey	2,595	4,530	1,935	74.6%	6.4%
Lavon	2,219	3,860	1,641	74.0%	6.3%
Little Elm	25,898	44,530	18,632	71.9%	6.2%
Ponder	1,395	2,390	995	71.3%	6.2%

* Compounded Annual Growth Rate   Source: North Central Texas Council of Governments

Employment and business development trends in North Central Texas

As discussed above, Texas led the nation in job growth last year, adding 284,414 positions (2.1 percent) and bringing the state's unemployment rate down to 3.5 percent. For Dallas-Fort Worth, employment jumped by 109,647 (2.9 percent) and the unemployment rate fell to 2.9 percent. Put differently, **with about 24 percent of Texas' population, 38.6 percent of all the job growth in the state occurred in North Central Texas**. Office jobs in the Dallas-Fort Worth Metroplex grew 5.7 percent in 2019, more than in the tech markets of San Francisco and Seattle, and the region is forecast by CBRE to lead again in 2020.

Job growth is being seen in core cities and suburban markets. For example, Frisco has been adding jobs at a rapid clip as many businesses and corporate headquarters have relocated to the city. According to the U.S. Bureau of Labor Statistics, just in the past eight years Frisco's employment jumped from 64,000 to almost 93,000. That's about two-thirds the number of jobs located in downtown Dallas.

The entire North Texas region is becoming one of the most dynamic data center markets in the country. For instance, Compass Datacenters LLC maintains a huge processing facility in Allen. According to Cushman & Wakefield**, Dallas-Fort Worth is now the third-largest data center market in the world** with more than 80 megawatts of capacity currently under construction in North Texas. **Importantly, the availability of reliable water supplies is a key site location consideration in the placement of data centers**.

Logistics—the movement of people and products—is one of the largest industries in the North Central Texas region. In fact, the Dallas-Fort Worth area is the largest transportation and distribution center between the two coasts and employs several hundred thousand people.

Defense-related manufacturing, food processing, and the health care/hospital industry also rank among the largest employers in the region. **Both manufacturing and food processing require huge amounts of water.**

Corporate relocations continue apace in North Texas, with Uber and Charles Schwab perhaps the most notable in recent months. Boeing, Samsung, Fannie Mae, JP Morgan and USAA have recently undertaken expansions or relocations to Plano. Last year, PGA of American and Keurig Dr Pepper announced relocations of their corporate headquarters to Frisco. Frisco is also home to The Star, the huge retail, residential, office, hotel and sports complex developed by the Dallas Cowboys organization that has become a major employment center.

Other indicators point to a robust North Texas economy. Last year, Dallas-Fort Worth was the top homebuilding market in the country with 33,000 new homes. North Texas also leads the nation in overall home sales, up 21 percent over the past year. According to RealPage, North Texas is the leading rental construction market in the country with 43,000 units permitted to date for 2020. At $22.5 billion, Dallas-Fort Worth ranked second nationwide in total construction last year after New York City while the region attracted nearly $10.5 billion in commercial investments.

What may happen to the North Texas economy if Marvin Nichols is not built?

The North Texas region, including most of the communities served by the North Texas Municipal Water District, has witnessed an unprecedented economic boom over the past decade with record levels of population growth and job creation. The Dallas-Fort Worth area also receives more migrants from other states than any other metropolitan region in the U.S. Recent forecasts from the North Central Texas Council of Governments see this growth continuing for at least the next several decades.

By 2040, the region's population is projected to grow to 10.7 million people, or 58 percent. That's an annual average growth rate of almost 3 percent. Employment, currently at 3.9 million, is expected to reach 6.7 million by 2040, a 72 percent increase from today's levels. Because economic development tends to compound where it is already occurring, a sizeable share of Dallas-Fort Worth's population and employment growth will likely occur in the NTMWD, TRWD and UTRWD service areas. However, realizing this growth potential requires new water resources to be brought on-line. Other water development projects, including the new Bois d'Arc Lake and the Integrated Pipeline will help but is clearly not enough.

Another way to consider the potential effects of *not building* the proposed Marvin Nichols Reservoir is to look at the potential contributions of industries that are particularly reliant on water availability. We previously mentioned data centers and food processing as key examples of these kind of industries. Using data available in the IMPLAN model we can identify the industries in the Dallas-Fort Worth region who are especially sensitive to water availability based on the value of their consumption of this resource. Aside from electric power generation and the rapidly growing higher education sector, examples of industries that have notable water requirements include Pharmaceutical Manufacturing, Aerospace Products and Parts Manufacturing, and Semi-

Conductor Manufacturing. In the services sector we include hotels, restaurants and hospitals. Table 12 shows current employment and projected new jobs for these industries in the Dallas-Fort Worth Metropolitan Area. These are some of the industries Texas and Dallas-Fort Worth need to support in order to remain competitive in an increasingly globalized economy. In rough terms, if a lack of available water supply were to disrupt the projected job growth in just the six industries shown in Table 12, the region would lose $19 billion in annual economic activity, expressed in 2020 dollars, and more than 136,000 total jobs.

Table 12: Selected Water Dependent Industries: Dallas-Fort Worth Metropolitan Area

Industry	4Q2019 Jobs	Projected 10-Year Growth
Pharmaceutical Manufacturing	4,580	460
Semiconductors and Related Devices Manufacturing	21,982	456
Aerospace Products & Parts Manufacturing	35,534	350
Hospitals	106,344	14,714
Restaurants	284,486	66,831
Hotels	33,747	3,565

Source: IMPLAN, JobsEQ,

Section 7: Conclusions

The construction of the proposed Marvin Nichols Reservoir is an important component of the state's overall resource management plan **to support economic development across Texas**. The spending for planning and development of the reservoir will boost economic activity in northeast Texas, along the proposed pipeline route, and in Region C creating thousands of job opportunities for local workers. Importantly, the operations of the dam and the creation of a high-quality recreational amenity will bring well over $100 million in new economic activity to the host region and support more than 1,300 direct, indirect and induced jobs. This will help diversify the economic base of the Lake Counties, thereby enhancing regional economic resiliency. Local taxing jurisdictions will receive millions in temporary and recurring revenues, especially as property development occurs around the lake over the next 20 years.

From a broader economic development perspective, bringing additional water resources online is a necessary condition for Texas, and especially North Texas, to remain competitive in the quest for jobs, new residents, and investment. Marvin Nichols, and other water projects planned for the region, must come online in order to support the rapid population and employment growth projected for the next several decades. **In a "no build" scenario for the Marvin Nichols Reservoir, economic development in the North Texas region will be constrained, especially in the fast-growing communities currently served by participating Region C water providers.**

Appendix K

Key Water Quality Parameters

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K. APPENDIX K SELECTION OF KEY WATER QUALITY PARAMETERS AND BASELINE WATER QUALITY CONDITIONS

K.1 Key Water Quality Parameters Selection

Regional Water Planning Groups are charged with selecting key water quality parameters that are important to water uses in the region and assessing impacts of water management strategies on these parameters. This appendix describes the parameter selection process and establishes baseline water quality conditions for the selected parameters.

To provide some basis for selection of parameters and for quantitative comparisons between different water bodies within the region, regulatory standards and screening levels are referenced throughout this memorandum. However, it is not the intent of this memorandum to evaluate regulatory compliance of any water body within the region. These regulatory standards are only used as "yardsticks" for relative comparisons of water quality within the region.

K.1.1 Process of Selecting Key Water Quality Parameters

Selection of key water quality parameters for surface water and groundwater involved a two-stage process. The first stage included a compilation of potential water quality parameters from various sources. These sources are described below:

a) Parameters regulated by the Texas Commission on Environmental Quality (TCEQ) in the Texas Surface Water Quality Standards (TSWQS);
b) Parameters considered for the TCEQ Water Quality Inventory in evaluation of whether water body uses are supported, not supported, or have water quality concerns. The designated water body uses included in the Water Quality Inventory are:
    i. Aquatic life use
    ii. Contact recreation use
    iii. General use
    iv. Fish consumption use
    v. Public water supply use;
c) Parameters that may impact suitability of water for irrigation; and
d) Parameters that may impact treatability of water for municipal or industrial supply.

Categories a and b above were selected to represent environmental water quality parameters, and Categories c and d were selected to be representative of water quality as related to irrigation uses and treatability for municipal or industrial supplies.

For the second stage of the process, key water quality parameters were selected from this compiled list of potential parameters based on general guidelines which were originally established in Appendix P of the 2006 Region C Plan. The general guidelines used to further develop a manageable and meaningful list of key water quality parameters are described below.

a) Selected parameters should be representative of water quality conditions that may be impacted on a regional scale and that are likely to be impacted by multiple water management strategies within the region. Water quality issues associated with localized conditions (such as elevated levels of a toxic material within one water body) will be addressed as necessary within the environmental impact evaluations of the individual water management strategies for each water user group. In addition, water quality parameters that could impact specific advanced treatment processes (e.g., membranes or ozone) will be addressed as necessary during pilot testing and/or preliminary design.

b) Sufficient data must be available for a parameter to include it as a key water quality parameter. If meaningful statistical summaries cannot be carried out on the parameter, it should not be designated as a key water quality parameter.

K.1.2 Selection of Parameters for the 2026 Plan

For this planning cycle, potential key water quality parameters were assessed for the Region C planning area according to the process described above. The only new parameters considered for the 2026 Region C Plan are Per- and Polyfluoroalkyl Substances (PFAS). The U.S. Environmental Protection Agency (USEPA) issued a national, legally enforceable drinking water standard for several PFAS compounds in April 2024. EPA is providing five years for public water supply systems (by 2029) to implement solutions to reduce regulated PFAS to be compliant with the standard. Initial monitoring of PFAS for this new EPA regulation is currently underway. Beginning in 2027 the EPA will require water systems to provide the public with information on levels of PFAS in drinking water associated with the initial monitoring. Because of the lack of publicly available data and the timeline of the implementation of the regulations, no PFAS were included as key water quality parameters in this cycle of planning.

Following the process used in prior planning cycles yielded the same candidate key water quality parameters for surface water as those used in the 2021 Region C Water Plan.

Similarly, following the process in previous planning cycles, key water quality parameters were identified for groundwater based on an evaluation of the parameters regulated by drinking water standards and those known to be potential problems for groundwater in Region C.

The following key water quality parameters were selected to assess impacts from water management strategies for the 2026 Region C Water Plan:

- Surface Water:
  - Ammonia-nitrogen
  - Nitrate-nitrogen
  - Total phosphorous
  - Chlorophyll-a
  - Total dissolved solids (TDS)
  - Chloride
  - Sulfate
- Groundwater
  - TDS
  - Chloride
  - Sulfate

K.2 Baseline Water Quality Conditions

Baseline water quality conditions were evaluated using data obtained from the Texas Surface Water Quality Monitoring Database. Water quality data for reservoirs and streams located within Region C were evaluated, as well as sources located outside of Region C that are currently being considered for use or are in use as raw water sources for the region. Bois D'Arc Lake was not included in the evaluation. At the time of plan development, there were no water quality data available for the lake from the Texas Surface Water Quality Monitoring Database due to it being only recently constructed and filled.

Statistical analyses were conducted to determine the number of data points (count), mean, median, 75th percentile, maximum, and minimum for each water body assessed. Data from 1998 through 2025 for surface water and 1993 to 2023 for groundwater were assessed for each parameter. Statistical summaries for each surface water parameter are presented in Section 3.0 of this document.

To further demonstrate baseline water quality conditions in Region C, each water body was placed in categories based on parameter concentration. The lowest bin (Bin 1) constitutes levels that are less than regulatory or literature levels of concern. The second bin (Bin 2) represents parameter levels that are approaching regulatory standards or levels of concern (nominally 80 percent of regulated standard). The highest bin (Bin 3) represents parameter levels that exceed the stated regulatory standards, levels of concern, or screening criteria. Screening levels for nutrient parameters were based on the TCEQ *2024 Guidance for Assessing and Reporting Surface Water Quality in Texas*. For surface water assessment of TDS, chloride, and sulfate, screening levels were based on National Secondary Drinking Water Standards. For the groundwater TDS, chloride and sulfate assessment, screening limits were based on the State of Texas Secondary Drinking Water Standard.

It is important to note that placement in Bins 2 or 3 does not necessarily indicate a violation of a water quality standard or the need for additional treatment levels. As mentioned earlier, the data presented here are summarized over the entire surface water segment (at all depths and all stations located in the main water body) or the entire aquifer/county area. In many cases, regulatory application of the standard or level of concern is performed on a different group of data than are summarized here (e.g., for lake mixed layer samples only). The bin designations, while derived from regulatory standards, are only provided as a "yardstick" for assessing water quality conditions and as a basis for comparisons between water bodies. The bin designations are not to be used to evaluate whether conditions within a given water body are in compliance with regulatory standards. **Table K.1** and **Table K.2** demonstrate baseline surface water and groundwater quality bins by parameter.

TABLE K.1 DEFINITION OF BASELINE SURFACE WATER QUALITY BINS BY PARAMETER

PARAMETER	STATISTIC USED FOR COMPARISON	LOWER BOUND OF BIN 3	BASIS OF LOWER BOUND, BIN 3	LOWER BOUND OF BIN 2	BASIS OF LOWER BOUND, BIN 2
Total Dissolved Solids	Median	500 mg/L	National Secondary Drinking Water Standard	400 mg/L	80 percent of secondary standard
Chloride	Median	250 mg/L	National Secondary Drinking Water Standard	200 mg/L	80 percent of secondary standard
Sulfate	Median	250 mg/L	National Secondary Drinking Water Standard	200 mg/L	80 percent of secondary standard
Ammonia-Nitrogen (as N)	75th percentile	0.11 mg/L (reservoir) 0.33 mg/L (stream)	TCEQ 2024 Guidance for Assessing and Recording Surface Water Quality in Texas	0.088 mg/L (reservoir) 0.26 mg/L (stream)	80 percent of screening level
Nitrate-Nitrogen (as N)	75th percentile	0.37 mg/L (reservoir) 1.95 mg/L (stream)	TCEQ 2024 Guidance for Assessing and Recording Surface Water Quality in Texas	0.30 mg/L (reservoir) 1.56 mg/L (stream)	80 percent of screening level
Total Phosphorus (as P)	75th percentile	0.20 mg/L (reservoir) 0.69 mg/L (stream)	TCEQ 2024 Guidance for Assessing and Recording Surface Water Quality in Texas	0.16 mg/L (reservoir) 0.55 mg/L (stream)	80 percent of screening level
Chlorophyll-a	75th percentile	26.7 µg/L (reservoir)	TCEQ 2024 Guidance for Assessing and Recording	21.4 µg/L (reservoir) 11.3 µg/L (stream)	80 percent of screening level

		14.1 µg/L (stream)	Surface Water Quality in Texas		

TABLE K.2 DEFINITION OF BASELINE GROUNDWATER QUALITY BINS BY PARAMETER

PARAMETER	STATISTIC USED FOR COMPARISON	LOWER BOUND OF BIN 3	BASIS OF LOWER BOUND, BIN 3	LOWER BOUND OF BIN 2	BASIS OF LOWER BOUND, BIN 2
Total Dissolved Solids	Median	1000 mg/L	State of Texas Secondary Drinking Water Standard	500 mg/L	National Secondary Drinking Water Standard
Chloride	Median	300 mg/L	State of Texas Secondary Drinking Water Standard	250 mg/L	National Secondary Drinking Water Standard
Sulfate	Median	300 mg/L	State of Texas Secondary Drinking Water Standard	250 mg/L	National Secondary Drinking Water Standard

For TDS, chloride and sulfate, the median value is used for comparison with the numerical regulatory standard or level of concern, but for nutrients and chlorophyll-a (parameters subject to the TCEQ secondary screening levels), the 75th percentile is used. This value was used for comparison because the TCEQ secondary screening levels are applied such that a source water is "of concern" when more than 25 percent of the samples taken exceed the numerical screening limit.

K.2.1 Surface Water Baseline Conditions

The following sections summarize the baseline water quality conditions for each key surface water quality parameter. As discussed earlier, this review of baseline conditions is not intended to provide an evaluation of compliance with regulatory standards. When referenced, regulatory standards are only used as a means of making relative comparisons between water bodies.

With respect to nutrients, it should be noted that the impact of nutrients on chlorophyll-a concentrations is site-specific and can vary significantly between water bodies. Therefore, high levels of nutrients are not necessarily indicative of poor water quality in any given water body.

Ammonia Nitrogen

Ammonia Nitrogen levels were measured from 26 reservoirs between 1998 and 2025. Of the 26 reservoirs sampled, seventeen demonstrated 75th percentile ammonia nitrogen concentrations ranging between 0.088 and 0.11 mg/L and fell into Bin 2. There were no lakes with screening levels exceeding 0.11 mg/L that would fall into Bin 3. Eleven other reservoirs fell into Bin 1 with screening levels less than 0.088 mg/L

All twenty streams sampled for ammonia nitrogen fell below screening levels and were categorized as Bin 1.

Nitrate Nitrogen

Twenty-four reservoirs were sampled for nitrate nitrogen concentrations in the Region C planning area. Eight of the 24 reservoirs demonstrated 75th percentile concentrations exceeding the Bin 3 screening criteria of 0.37 mg/L. Four reservoirs were categorized as Bin 2 with 75th percentile concentrations between 0.3 mg/L and 0.37 mg/L. Twelve other reservoirs fell into Bin 1 with screening levels less than 0.3 mg/L.

Of the 16 streams sampled for nitrate nitrogen concentrations, ten fell below screening criteria and were classified into Bin 1 (< 1.56 mg/L). Six streams exceeded the screening criteria of 1.95 mg/L and were placed in Bin 3. Streams categorized as Bin 3 included Elm Fork Trinity River above Ray Roberts Lake (Segment 824), Denton Creek (Segment 825), Upper Trinity River (Segment 805), Lower West Fork Trinity River (Segment 841), Trinity River Above Lake Livingston (Segment 804) and East Fork Trinity River (Segment 819). There were no streams that fell within Bin 2 with concentrations ranging between 1.56 and 1.95 mg/L.

Total Phosphorous

None of the 26 reservoirs sampled for total phosphorous in Region C exhibited 75th percentile concentrations that exceed the TCEQ screening level of 0.20 mg/L to be placed into Bin 3. One reservoir was found to approach screening levels and was placed into Bin 2 (0.16 to 0.20 mg/L). Lake Lavon (Segment 821) demonstrated a 75th percentile concentration of 0.16 mg/L.

Of the 20 streams sampled for total phosphorous concentrations, five streams demonstrated 75th percentile concentrations exceeding the Bin 3 screening criteria of 0.69 mg/L and included East Fork Trinity River (Segment 819), Lower West Fork Trinity River (Segment 841), Upper Trinity River (Segment 805), Clear Fork Trinity River Below Lake Weatherford (Segment 831), and Trinity River Above Lake Livingston (Segment 804). Fifteen out of twenty streams sampled for total phosphorous were below the screening criteria and fell in Bin 1. There were no streams that fell within Bin 2 with concentrations ranging between 0.55 mg/L and 0.69 mg/L.

Chlorophyll-a

Of the 25 reservoirs sampled for chlorophyll-a, 17 fell into Bins 2 or 3, demonstrating 75th percentile concentrations approaching or exceeding screening levels. Five reservoirs fell into Bin 2 with concentrations ranging from 21.4 to 26.7 µg/L, and twelve exceeded 26.7 µg/L and fell into Bin 3. Bin 2 reservoirs included Lake Fork (Segment 512), Grapevine Lake (Segment 826), Lake Waxahachie (Segment 816), Richland-Chambers Reservoir (Segment 836), and Chapman Lake (Segment 307).

Ten out of nineteen streams that were sampled for chlorophyll-a exceeded the screening criteria of 14.1 µg/L and fell into Bin 3. One stream was categorized in Bin 2 (West Fork Trinity River above Bridgeport Reservoir, Segment 812) with a concentration ranging from 3.2 to 32.0 µg/L

Total Dissolved Solids

In general, concentrations of TDS in surface water for sampled water bodies were relatively low. Eight of 46 reservoirs and streams in the area approached or exceeded screening levels for TDS. Three water bodies were categorized into Bin 2 with median concentrations ranging from 400-500 mg/L. Bin 2 water bodies included the Upper Trinity River (Segment 805), Clear Fork Trinity River below Lake Weatherford (Segment 831), and the Lower West Fork Trinity River (Segment 841). Five water bodies demonstrated median concentrations above 500 mg/L and included East Fork Trinity River (Segment 819), Clear Fork Trinity River above Lake Weatherford (Segment 833), Red River above and below Lake Texoma (Segments 202 and 204), and Lake Texoma (Segment 203).

Sulfate

In general, concentrations of sulfate in surface water for sampled water bodies were relatively low. Only two of 44 reservoirs and streams in the area exceeded and approached screening levels for sulfate. Lake Texoma (Segment 203) was categorized into Bin 2 with a median concentration ranging from 200-250 mg/L. Red River Above Lake Texoma (Segment 204) fell into Bin 3 with a median concentration of 545.4 mg/L.

Chloride

In general, concentrations of chloride in surface water for sampled water bodies were relatively low. Three of 46 reservoirs and streams in the area approached or exceeded screening levels for chloride. One water body was categorized in Bin 2 with median concentrations ranging from 200-250 mg/L (Red River Below Lake Texoma, Segment 202). Two water bodies demonstrated median concentrations above 250 mg/L and included Lake Texoma (Segment 203) and Red River above Lake Texoma (Segment 204).

K.2.2 Groundwater Baseline Conditions

Baseline conditions for TDS, chloride and sulfate were summarized using data from 1993-2023. The groundwater quality data summaries are presented in Tables K-10 through K-12.

Total Dissolved Solids

With the exception of the Carrizo-Wilcox and Queen City Aquifers, most groundwater sources in Region C report median TDS concentrations greater than 500 mg/L, the National secondary drinking water standard. The Trinity Aquifer beneath these counties generally reports median concentrations between 500 mg/L and 1,000 mg/L. TDS concentrations in the Woodbine Aquifer are even greater, with the highest median concentrations occurring in the most urban counties and those counties immediately down-gradient (Dallas, Tarrant, Ellis, and Navarro). Although limited, data for the Nacatoch Aquifer indicate that TDS levels are greater than 500 mg/L in Kaufman County and slightly below 500 mg/L in Navarro County.

Sulfate

Median sulfate concentrations are generally below the National secondary drinking water standard of 250 mg/L in all aquifers except the Woodbine. The highest median sulfate concentrations (greater than 300 mg/L) were found in Dallas, Ellis, Tarrant, and Navarro Counties within the Woodbine Aquifer.

Chloride

Median chloride concentrations in all aquifers are well below the National secondary drinking water standard of 250 mg/L. Therefore, all aquifers were classified as Bin 1 for chloride.

K.3 Water Quality Data Summary

K.3.1 Surface Water Quality Data Summary

Tables K.3 through **K.9** summarize surface water quality data by segment and parameter.

TABLE K.3 REGION C SURFACE WATER QUALITY SUMMARY BY SEGMENT AND PARAMETER
DATA COLLECTED 1/1/1998 – 1/31/2025 (SOURCE: TCEQ WATER QUALITY MONITORING DATABASE)

AMMONIA NITROGEN, TOTAL (MG/L AS N)									
SEGMENT NUMBER	SEGMENT DESCRIPTION	WATER BODY TYPE	COUNT	MEDIAN	MEAN	75TH PERCENTILE	MAX	MIN	BIN
203	Lake Texoma	Lake	521	0.10	0.09	0.10	0.50	0.01	2
302	Wright-Patman Lake	Lake	663	0.05	0.07	0.07	0.41	0.02	1
307	Chapman/Cooper Lake	Lake	415	0.10	0.08	0.10	0.31	0.02	2
403	Lake O' the Pines	Lake	529	0.05	0.10	0.09	6.00	0.01	2
504	Toledo Bend Reservoir	Lake	158	0.05	0.08	0.05	2.36	0.00	1
507	Lake Tawakoni	Lake	107	0.05	0.06	0.06	0.80	0.00	1
512	Lake Fork	Lake	153	0.05	0.06	0.05	1.00	0.00	1
605	Lake Palestine	Lake	655	0.05	0.08	0.07	1.13	0.01	1
807	Lake Worth	Lake	461	0.10	0.09	0.10	0.48	0.02	2
809	Eagle Mountain Reservoir	Lake	1346	0.10	0.09	0.10	1.28	0.02	2
811	Bridgeport Reservoir	Lake	848	0.06	0.07	0.10	2.03	0.02	2
815	Bardwell Reservoir	Lake	92	0.05	0.06	0.07	0.43	0.02	1
816	Lake Waxahachie	Lake	83	0.05	0.07	0.07	0.48	0.02	1
817	Navarro Mills Lake	Lake	86	0.05	0.06	0.06	0.20	0.02	1
818	Cedar Creek Reservoir	Lake	1573	0.10	0.10	0.10	2.30	0.02	2
820	Lake Ray Hubbard	Lake	407	0.05	0.07	0.10	0.49	0.02	2
821	Lake Lavon	Lake	1332	0.10	0.13	0.10	2.72	0.03	2

AMMONIA NITROGEN, TOTAL (MG/L AS N)									
SEGMENT NUMBER	SEGMENT DESCRIPTION	WATER BODY TYPE	COUNT	MEDIAN	MEAN	75TH PERCENTILE	MAX	MIN	BIN
823	Lewisville Lake	Lake	265	0.05	0.10	0.10	2.92	0.01	2
826	Grapevine Lake	Lake	388	0.03	0.04	0.05	0.21	0.02	1
827	White Rock Lake	Lake	57	0.05	0.09	0.10	0.72	0.02	2
828	Lake Arlington	Lake	578	0.10	0.09	0.10	1.10	0.02	2
830	Benbrook Lake	Lake	765	0.10	0.11	0.10	2.60	0.02	2
832	Lake Weatherford	Lake	77	0.05	0.06	0.06	0.23	0.02	1
836	Richland-Chambers Reservoir	Lake	1508	0.10	0.12	0.10	3.76	0.02	2
838	Joe Pool Lake	Lake	74	0.02	0.05	0.07	0.31	0.02	1
840	Ray Roberts Lake	Lake	422	0.05	0.09	0.10	1.62	0.02	2
202	Red River Below Lake Texoma	Stream	371	0.05	0.07	0.10	0.67	0.02	1
204	Red River Above Lake Texoma	Stream	202	0.05	0.07	0.10	0.49	0.02	1
303	Sulphur/South Sulphur River	Stream	342	0.05	0.06	0.06	0.43	0.02	1
804	Trinity River Above Lake Livingston	Stream	609	0.07	0.08	0.10	0.47	0.02	1
805	Upper Trinity River	Stream	471	0.08	0.14	0.15	1.95	0.02	1
806	West Fork Trinity River Below Lake Worth	Stream	260	0.10	0.09	0.11	0.87	0.02	1
810	West Fork Trinity River Below Bridgeport Reservoir	Stream	166	0.10	0.12	0.10	1.30	0.02	1
812	West Fork Trinity River Above Bridgeport Reservoir	Stream	73	0.10	0.10	0.10	0.29	0.05	1

AMMONIA NITROGEN, TOTAL (MG/L AS N)									
SEGMENT NUMBER	SEGMENT DESCRIPTION	WATER BODY TYPE	COUNT	MEDIAN	MEAN	75TH PERCENTILE	MAX	MIN	BIN
814	Chambers Creek Above Richland-Chambers Reservoir	Stream	186	0.10	0.09	0.10	0.27	0.02	1
819	East Fork Trinity River	Stream	221	0.10	0.24	0.21	2.59	0.02	1
822	Elm Form Trinity River Below Lewisville Lake	Stream	384	0.08	0.13	0.15	1.42	0.02	1
824	Elm Fork Trinity River Above Ray Roberts Lake	Stream	193	0.06	0.16	0.11	6.74	0.02	1
825	Denton Creek	Stream	56	0.10	0.15	0.11	1.53	0.03	1
829	Clear Fork Trinity River Below Benbrook Lake	Stream	102	0.05	0.06	0.07	0.20	0.02	1
831	Clear Fork Trinity River Below Lake Weatherford	Stream	218	0.10	0.18	0.11	3.50	0.02	1
833	Clear Fork Trinity River Above Lake Weatherford	Stream	15	0.05	0.08	0.14	0.17	0.02	1
835	Chambers Creek Below Richland–Chambers Reservoir	Stream	4	0.05	0.07	0.07	0.14	0.05	1
837	Richland Creek Above Richland–Chambers Reservoir	Stream	61	0.05	0.06	0.05	0.28	0.02	1
839	Elm Fork Trinity River Below Ray Roberts Lake	Stream	25	0.10	0.09	0.10	0.25	0.02	1
841	Lower West Fork Trinity River	Stream	292	0.06	0.11	0.11	1.78	0.02	1

Bin 1: Less than regulatory or literature levels of concern
Bin 2: Approaching regulatory standards or levels of concern
Bin 3: Exceed the stated regulatory standards, levels of concern, or screening criteria

TABLE K.4 REGION C SURFACE WATER QUALITY SUMMARY BY SEGMENT AND PARAMETER
DATA COLLECTED 1/1/1998 – 1/31/2025 (SOURCE: TCEQ WATER QUALITY MONITORING DATABASE)

NITRATE NITROGEN, TOTAL (MG/L AS N)									
SEGMENT NUMBER	SEGMENT DESCRIPTION	WATER BODY TYPE	COUNT	MEDIAN	MEAN	75TH PERCENTILE	MAX	MIN	BIN
203	Lake Texoma	Lake	220	0.1145	0.15	0.25	0.46	0.02	1
302	Wright-Patman Lake	Lake	165	0.05	0.08	0.05	1.64	0.01	1
307	Chapman/Cooper Lake	Lake	262	0.0595	0.16	0.24	0.58	0.01	1
403	Lake O' the Pines	Lake	52	0.05	0.07	0.05	0.56	0.01	1
504	Toledo Bend Reservoir	Lake	2104	0.05	0.07	0.07	3.12	0.02	1
507	Lake Tawakoni	Lake	762	0.08	0.15	0.23	1.99	0.00	1
512	Lake Fork	Lake	755	0.05	0.11	0.15	1.28	0.01	1
605	Lake Palestine	Lake	34	0.33	2.07	2.53	10.70	0.05	3
809	Eagle Mountain Reservoir	Lake	131	0.19	0.24	0.34	0.93	0.01	2
811	Bridgeport Reservoir	Lake	24	0.19	0.24	0.29	0.50	0.14	1
815	Bardwell Reservoir	Lake	42	0.245	0.39	0.55	3.40	0.05	3
816	Lake Waxahachie	Lake	42	0.11	0.25	0.37	1.15	0.01	3
817	Navarro Mills Lake	Lake	6	0.075	1.00	1.92	3.23	0.05	3
818	Cedar Creek Reservoir	Lake	54	0.245	0.29	0.37	0.82	0.01	2
820	Lake Ray Hubbard	Lake	286	0.16	0.30	0.38	4.60	0.00	3
821	Lake Lavon	Lake	1208	0.3115	0.78	0.86	15.50	0.02	3
823	Lewisville Lake	Lake	203	0.16	0.77	0.43	11.95	0.00	3

NITRATE NITROGEN, TOTAL (MG/L AS N)									
SEGMENT NUMBER	SEGMENT DESCRIPTION	WATER BODY TYPE	COUNT	MEDIAN	MEAN	75TH PERCENTILE	MAX	MIN	BIN
826	Grapevine Lake	Lake	178	0.21	0.24	0.37	1.15	0.00	2
828	Lake Arlington	Lake	19	0.3	0.28	0.38	0.78	0.05	3
830	Benbrook Lake	Lake	18	0.24	0.24	0.25	0.32	0.18	1
832	Lake Weatherford	Lake	6	0.05	0.06	0.05	0.09	0.05	1
836	Richland-Chambers Reservoir	Lake	48	0.245	0.28	0.34	0.79	0.01	2
838	Joe Pool Lake	Lake	117	0.14	0.20	0.25	1.29	0.05	1
840	Ray Roberts Lake	Lake	268	0.15	0.34	0.27	5.36	0.00	1
202	Red River Below Lake Texoma	Stream	67	0.06	0.18	0.22	1.06	0.04	1
204	Red River Above Lake Texoma	Stream	22	0.04	0.57	0.84	4.98	0.02	1
303	Sulphur/South Sulphur River	Stream	27	0.08	0.22	0.29	1.44	0.05	1
804	Trinity River Above Lake Livingston	Stream	265	2.65	3.48	5.22	13.65	0.02	3
805	Upper Trinity River	Stream	161	4.13	5.26	8.62	16.14	0.07	3
806	West Fork Trinity River Below Lake Worth	Stream	13	0.23	0.50	0.83	1.40	0.02	1
810	West Fork Trinity River Below Bridgeport Reservoir	Stream	8	0.51	0.54	0.75	1.09	0.05	1
812	West Fork Trinity River Above Bridgeport Reservoir	Stream	6	0.05	0.05	0.05	0.05	0.05	1

NITRATE NITROGEN, TOTAL (MG/L AS N)									
SEGMENT NUMBER	SEGMENT DESCRIPTION	WATER BODY TYPE	COUNT	MEDIAN	MEAN	75TH PERCENTILE	MAX	MIN	BIN
814	Chambers Creek Above Richland-Chambers Reservoir	Stream	5	0.8	0.87	1.24	2.10	0.05	1
819	East Fork Trinity River	Stream	16	9.97	10.19	13.25	17.80	4.90	3
822	Elm Form Trinity River Below Lewisville Lake	Stream	161	0.549	0.59	0.78	1.73	0.00	1
824	Elm Fork Trinity River Above Ray Roberts Lake	Stream	53	1.2	3.33	5.77	12.82	0.13	3
825	Denton Creek	Stream	26	1.02	1.45	2.30	4.33	0.30	3
829	Clear Fork Trinity River Below Benbrook Lake	Stream	8	0.275	0.30	0.34	0.54	0.17	1
839	Elm Fork Trinity River Below Ray Roberts Lake	Stream	24	0.17	0.29	0.29	1.32	0.01	1
841	Lower West Fork Trinity River	Stream	103	8.07	7.23	10.83	15.21	0.15	3

☐ Bin 1: Less than regulatory or literature levels of concern
☐ Bin 2: Approaching regulatory standards or levels of concern
☐ Bin 3: Exceed the stated regulatory standards, levels of concern, or screening criteria

TABLE K.5 PHOSPHOROUS

PHOSPHOROUS TOTAL, WET METHOD (MG/L AS P)									
SEGMENT NUMBER	SEGMENT DESCRIPTION	WATER BODY TYPE	COUNT	MEDIAN	MEAN	75TH PERCENTILE	MAX	MIN	BIN
203	Lake Texoma	Lake	387	0.06	0.06	0.07	0.46	0.02	1
302	Wright-Patman Lake	Lake	667	0.1	0.12	0.15	1.65	0.01	1

PHOSPHOROUS TOTAL, WET METHOD (MG/L AS P)									
SEGMENT NUMBER	SEGMENT DESCRIPTION	WATER BODY TYPE	COUNT	MEDIAN	MEAN	75TH PERCENTILE	MAX	MIN	BIN
307	Chapman/Cooper Lake	Lake	414	0.09	0.10	0.12	0.43	0.02	1
403	Lake O' the Pines	Lake	538	0.06	0.12	0.10	8.34	0.01	1
504	Toledo Bend Reservoir	Lake	1543	0.06	0.07	0.06	0.49	0.06	1
507	Lake Tawakoni	Lake	573	0.06	0.08	0.08	0.28	0.01	1
512	Lake Fork	Lake	658	0.06	0.08	0.07	0.62	0.02	1
605	Lake Palestine	Lake	602	0.06	0.11	0.08	3.96	0.01	1
807	Lake Worth	Lake	478	0.06	0.07	0.09	0.94	0.01	1
809	Eagle Mountain Reservoir	Lake	1373	0.07	0.08	0.10	0.64	0.01	1
811	Bridgeport Reservoir	Lake	877	0.04	0.06	0.06	0.66	0.01	1
815	Bardwell Reservoir	Lake	98	0.05	0.05	0.06	0.34	0.01	1
816	Lake Waxahachie	Lake	83	0.05	0.05	0.06	0.25	0.02	1
817	Navarro Mills Lake	Lake	88	0.06	0.06	0.07	0.25	0.02	1
818	Cedar Creek Reservoir	Lake	1642	0.078	0.10	0.11	1.58	0.01	1
820	Lake Ray Hubbard	Lake	398	0.05	0.06	0.06	1.50	0.01	1
821	Lake Lavon	Lake	1329	0.102	0.17	0.16	5.30	0.02	2
823	Lewisville Lake	Lake	266	0.05	0.11	0.08	2.50	0.01	1
826	Grapevine Lake	Lake	381	0.0449	0.05	0.05	0.58	0.01	1
827	White Rock Lake	Lake	55	0.07	0.07	0.09	0.26	0.02	1
828	Lake Arlington	Lake	615	0.054	0.07	0.08	1.29	0.01	1
830	Benbrook Lake	Lake	788	0.058	0.06	0.08	0.63	0.01	1
832	Lake Weatherford	Lake	77	0.05	0.06	0.06	0.13	0.02	1
836	Richland-Chambers Reservoir	Lake	1521	0.05	0.09	0.09	3.99	0.01	1
838	Joe Pool Lake	Lake	223	0.03	0.05	0.05	0.43	0.01	1
840	Ray Roberts Lake	Lake	408	0.03	0.06	0.05	0.50	0.01	1
202	Red River Below Lake Texoma	Stream	1081	0.17	0.17	0.17	0.17	0.17	1

PHOSPHOROUS TOTAL, WET METHOD (MG/L AS P)									
SEGMENT NUMBER	SEGMENT DESCRIPTION	WATER BODY TYPE	COUNT	MEDIAN	MEAN	75TH PERCENTILE	MAX	MIN	BIN
204	Red River Above Lake Texoma	Stream	189	0.2	0.30	0.35	1.47	0.05	1
303	Sulphur/South Sulphur River	Stream	343	0.13	0.15	0.19	0.75	0.01	1
804	Trinity River Above Lake Livingston	Stream	571	0.72	0.84	1.10	3.30	0.04	3
805	Upper Trinity River	Stream	639	0.97	1.08	1.64	4.17	0.03	3
806	West Fork Trinity River Below Lake Worth	Stream	285	0.078	0.09	0.10	0.70	0.02	1
810	West Fork Trinity River Below Bridgeport Reservoir	Stream	170	0.15	0.25	0.29	2.10	0.01	1
812	West Fork Trinity River Above Bridgeport Reservoir	Stream	75	0.3	0.42	0.46	2.84	0.02	1
814	Chambers Creek Above Richland-Chambers Reservoir	Stream	294	0.12	0.35	0.43	2.85	0.01	1
819	East Fork Trinity River	Stream	203	1.73	1.81	2.59	6.20	0.03	3
822	Elm Form Trinity River Below Lewisville Lake	Stream	358	0.11	0.13	0.15	2.87	0.01	1
824	Elm Fork Trinity River Above Ray Roberts Lake	Stream	183	0.15	0.54	0.42	4.12	0.02	1
825	Denton Creek	Stream	57	0.26	0.32	0.45	1.07	0.04	1
829	Clear Fork Trinity River Below Benbrook Lake	Stream	102	0.06	0.07	0.08	0.59	0.02	1
831	Clear Fork Trinity River Below Lake Weatherford	Stream	269	0.45	0.56	0.81	5.36	0.01	3

PHOSPHOROUS TOTAL, WET METHOD (MG/L AS P)									
SEGMENT NUMBER	SEGMENT DESCRIPTION	WATER BODY TYPE	COUNT	MEDIAN	MEAN	75TH PERCENTILE	MAX	MIN	BIN
833	Clear Fork Trinity River Above Lake Weatherford	Stream	35	0.07	0.09	0.11	0.23	0.01	1
835	Chambers Creek Below Richland–Chambers Reservoir	Stream	4	0.105	0.13	0.18	0.24	0.05	1
837	Richland Creek Above Richland–Chambers Reservoir	Stream	59	0.109	0.14	0.18	0.45	0.02	1
839	Elm Fork Trinity River Below Ray Roberts Lake	Stream	23	0.05	0.05	0.05	0.12	0.01	1
841	Lower West Fork Trinity River	Stream	283	0.81	0.88	1.17	2.66	0.06	3

☐ Bin 1: Less than regulatory or literature levels of concern
☐ Bin 2: Approaching regulatory standards or levels of concern
☐ Bin 3: Exceed the stated regulatory standards, levels of concern, or screening criteria

TABLE K.6 REGION C SURFACE WATER QUALITY SUMMARY BY SEGMENT AND PARAMETER
DATA COLLECTED 1/1/1998 – 1/31/2025 (SOURCE: TCEQ WATER QUALITY MONITORING DATABASE)

CHLOROPHYLL-A, SPECTROPHOTOMETRIC ACID METHOD (µG/L)									
SEGMENT NUMBER	SEGMENT DESCRIPTION	WATER BODY TYPE	COUNT	MEDIAN	MEAN	75TH PERCENTILE	MAX	MIN	BIN
203	Lake Texoma	Lake	351	8.93	11.73	15.55	155.00	2.88	1
302	Wright-Patman Lake	Lake	231	18	26.25	35.20	150.00	1.00	3
307	Chapman/Cooper Lake	Lake	272	14.8	17.48	22.90	130.00	3.00	2

CHLOROPHYLL-A, SPECTROPHOTOMETRIC ACID METHOD (μG/L)									
SEGMENT NUMBER	SEGMENT DESCRIPTION	WATER BODY TYPE	COUNT	MEDIAN	MEAN	75TH PERCENTIL E	MAX	MIN	BIN
403	Lake O' the Pines	Lake	265	10	9.82	11.80	63.40	0.01	1
504	Toledo Bend Reservoir	Lake	555	10	13.57	18.00	204.00	1.00	1
507	Lake Tawakoni	Lake	463	32	35.50	49.00	124.00	1.00	3
512	Lake Fork	Lake	574	16	17.40	22.00	108.00	1.00	2
605	Lake Palestine	Lake	200	15.05	25.38	31.63	237.00	1.00	3
807	Lake Worth	Lake	474	17.4	22.25	31.65	159.30	0.50	3
809	Eagle Mountain Reservoir	Lake	1371	18.9	21.21	28.50	124.60	0.50	3
811	Bridgeport Reservoir	Lake	891	5.3	6.03	7.30	51.60	0.50	1
815	Bardwell Reservoir	Lake	78	15.5	19.09	27.80	59.00	1.00	3
816	Lake Waxahachie	Lake	65	12	15.74	22.00	46.00	1.00	2
817	Navarro Mills Lake	Lake	33	10	8.79	10.70	22.40	0.00	1
818	Cedar Creek Reservoir	Lake	1635	19.6	23.76	32.00	112.30	0.50	3
820	Lake Ray Hubbard	Lake	153	23.5	24.97	34.00	126.00	1.00	3
821	Lake Lavon	Lake	1278	28.25	37.54	51.28	244.00	3.00	3
823	Lewisville Lake	Lake	124	16.5	22.56	27.25	150.10	3.00	3
826	Grapevine Lake	Lake	209	17	17.71	23.30	58.40	3.00	2
828	Lake Arlington	Lake	615	20.3	24.47	34.70	95.40	0.90	3

CHLOROPHYLL-A, SPECTROPHOTOMETRIC ACID METHOD (µG/L)									
SEGMENT NUMBER	SEGMENT DESCRIPTION	WATER BODY TYPE	COUNT	MEDIAN	MEAN	75TH PERCENTILE	MAX	MIN	BIN
830	Benbrook Lake	Lake	811	16.9	20.21	28.95	66.20	0.50	3
832	Lake Weatherford	Lake	17	10	14.72	19.80	35.20	1.00	1
836	Richland-Chambers Reservoir	Lake	1460	12	16.08	22.30	94.70	0.50	2
838	Joe Pool Lake	Lake	168	8.9	12.55	15.25	170.00	0.00	1
840	Ray Roberts Lake	Lake	103	7	8.30	10.75	37.40	3.00	1
202	Red River Below Lake Texoma	Stream	141	10	13.75	18.20	73.40	1.00	3
204	Red River Above Lake Texoma	Stream	26	16.15	26.34	42.65	93.30	1.00	3
303	Sulphur/South Sulphur River	Stream	93	10	10.73	10.40	45.40	1.00	1
804	Trinity River Above Lake Livingston	Stream	541	11	20.51	22.00	238.00	0.01	3
805	Upper Trinity River	Stream	475	11	12.88	16.00	80.00	0.20	3
806	West Fork Trinity River Below Lake Worth	Stream	282	18	21.62	29.55	94.00	0.90	3
810	West Fork Trinity River Below Bridgeport Reservoir	Stream	31	10	10.74	10.70	41.60	1.00	1
812	West Fork Trinity River Above Bridgeport Reservoir	Stream	11	10	12.77	12.50	32.00	3.20	2

CHLOROPHYLL-A, SPECTROPHOTOMETRIC ACID METHOD (µG/L)									
SEGMENT NUMBER	SEGMENT DESCRIPTION	WATER BODY TYPE	COUNT	MEDIAN	MEAN	75TH PERCENTILE	MAX	MIN	BIN
814	Chambers Creek Above Richland-Chambers Reservoir	Stream	13	10	9.55	10.70	19.60	1.33	1
819	East Fork Trinity River	Stream	88	10	12.81	15.30	45.60	3.00	3
822	Elm Form Trinity River Below Lewisville Lake	Stream	255	12	17.62	19.00	100.00	0.20	3
824	Elm Fork Trinity River Above Ray Roberts Lake	Stream	73	10.7	20.30	21.40	163.00	1.00	3
825	Denton Creek	Stream	23	10	8.68	10.00	13.90	1.00	1
829	Clear Fork Trinity River Below Benbrook Lake	Stream	33	10	9.64	10.00	30.00	1.00	1
831	Clear Fork Trinity River Below Lake Weatherford	Stream	83	4	5.97	9.90	38.40	0.20	1
833	Clear Fork Trinity River Above Lake Weatherford	Stream	31	4.27	6.07	10.00	18.10	0.82	1
835	Chambers Creek Below Richland–Chambers Reservoir	Stream	4	10	25.83	25.83	73.30	10.00	3
837	Richland Creek Above Richland–Chambers Reservoir	Stream	7	1.25	3.24	2.81	12.80	1.00	1
841	Lower West Fork Trinity River	Stream	277	10.4	11.85	15.00	58.00	0.90	3

☐Bin 1: Less than regulatory or literature levels of concern
☐Bin 2: Approaching regulatory standards or levels of concern
☐Bin 3: Exceed the stated regulatory standards, levels of concern, or screening criteria

TABLE K.7 REGION C SURFACE WATER QUALITY SUMMARY BY SEGMENT AND PARAMETER
DATA COLLECTED 1/1/1998 – 1/31/2025 (SOURCE: TCEQ WATER QUALITY MONITORING DATABASE)

TOTAL DISSOLVED SOLIDS (MG/L) AS RESIDUE, TOTAL FILTRABLE (DRIED AT 180°)									
SEGMENT NUMBER	SEGMENT DESCRIPTION	WATER BODY TYPE	COUNT	MEDIAN	MEAN	75TH PERCENTILE	MAX	MIN	BIN
203	Lake Texoma	Lake	523	975	949.63	1080.00	1640.00	286.00	3
302	Wright-Patman Lake	Lake	380	136.5	141.78	158.25	536.00	21.00	1
307	Chapman/Cooper Lake	Lake	324	127	131.59	138.00	420.00	88.00	1
403	Lake O' the Pines	Lake	202	106	117.44	123.00	376.00	54.00	1
504	Toledo Bend Reservoir	Lake	3	77	77.67	81.00	85.00	71.00	1
507	Lake Tawakoni	Lake	116	107.5	108.84	118.00	150.00	78.00	1
512	Lake Fork	Lake	60	103	128.68	117.00	1300.00	75.00	1
605	Lake Palestine	Lake	334	129	151.39	172.00	502.00	49.50	1
807	Lake Worth	Lake	481	214	216.72	233.00	451.00	135.00	1
809	Eagle Mountain Reservoir	Lake	1351	215	215.19	234.00	551.00	52.20	1
811	Bridgeport Reservoir	Lake	864	179	183.48	200.00	329.00	78.00	1
815	Bardwell Reservoir	Lake	81	228	230.86	256.00	415.00	75.00	1
816	Lake Waxahachie	Lake	79	184	189.70	211.50	291.00	53.00	1
817	Navarro Mills Lake	Lake	29	201	205.79	226.00	256.00	154.00	1
818	Cedar Creek Reservoir	Lake	1607	122	126.95	138.00	804.00	24.00	1
820	Lake Ray Hubbard	Lake	286	207	221.98	241.50	835.00	118.00	1

TOTAL DISSOLVED SOLIDS (MG/L) AS RESIDUE, TOTAL FILTRABLE (DRIED AT 180°)									
SEGMENT NUMBER	SEGMENT DESCRIPTION	WATER BODY TYPE	COUNT	MEDIAN	MEAN	75TH PERCENTILE	MAX	MIN	BIN
821	Lake Lavon	Lake	1333	222	242.25	266.00	744.00	120.00	1
823	Lewisville Lake	Lake	217	219	272.73	277.00	990.00	67.00	1
826	Grapevine Lake	Lake	272	225.5	234.83	253.00	686.00	92.00	1
827	White Rock Lake	Lake	7	270	247.57	281.00	288.00	184.00	1
828	Lake Arlington	Lake	617	182	199.71	202.00	1573.00	19.00	1
830	Benbrook Lake	Lake	798	197	200.55	213.00	1400.00	119.00	1
832	Lake Weatherford	Lake	32	243.5	240.34	258.25	302.00	166.00	1
836	Richland-Chambers Reservoir	Lake	1466	162	167.56	180.00	498.00	59.10	1
838	Joe Pool Lake	Lake	161	288	329.25	348.00	1095.00	154.00	1
840	Ray Roberts Lake	Lake	291	173	178.26	190.00	344.00	38.00	1
819	East Fork Trinity River	Stream	114	527.5	536.67	635.50	1300.00	214.00	3
841	Lower West Fork Trinity River	Stream	193	435	419.52	488.00	662.00	210.00	2
805	Upper Trinity River	Stream	268	413	390.44	475.25	1080.00	73.00	2
824	Elm Fork Trinity River Above Ray Roberts Lake	Stream	137	388	419.23	480.00	1310.00	144.00	1
814	Chambers Creek Above Richland-Chambers Reservoir	Stream	93	348	389.02	463.00	964.00	162.00	1
825	Denton Creek	Stream	74	255	270.25	315.25	472.00	185.00	1

TOTAL DISSOLVED SOLIDS (MG/L) AS RESIDUE, TOTAL FILTRABLE (DRIED AT 180°)									
SEGMENT NUMBER	SEGMENT DESCRIPTION	WATER BODY TYPE	COUNT	MEDIAN	MEAN	75TH PERCENTILE	MAX	MIN	BIN
806	West Fork Trinity River Below Lake Worth	Stream	26	253	249.35	273.50	326.00	153.00	1
839	Elm Fork Trinity River Below Ray Roberts Lake	Stream	40	181.5	185.13	202.25	241.00	135.00	1
810	West Fork Trinity River Below Bridgeport Reservoir	Stream	50	323	363.66	427.25	788.00	170.00	1
822	Elm Form Trinity River Below Lewisville Lake	Stream	286	252	259.45	286.00	708.00	69.00	1
829	Clear Fork Trinity River Below Benbrook Lake	Stream	52	279	279.79	312.50	690.00	28.00	1
303	Sulphur/South Sulphur River	Stream	164	201	222.24	284.50	620.00	76.00	1
202	Red River Below Lake Texoma	Stream	375	729	749.87	956.00	9380.00	45.00	3
812	West Fork Trinity River Above Bridgeport Reservoir	Stream	20	283	559.40	604.00	3450.00	109.00	1
804	Trinity River Above Lake Livingston	Stream	456	328	332.88	417.00	590.00	71.00	1
204	Red River Above Lake Texoma	Stream	159	2850	2886.95	3755.00	5590.00	610.00	3
831	Clear Fork Trinity River Below Lake Weatherford	Stream	63	422	430.89	467.00	922.00	258.00	2
833	Clear Fork Trinity River Above Lake Weatherford	Stream	15	544	528.00	566.00	610.00	422.00	3

TOTAL DISSOLVED SOLIDS (MG/L) AS RESIDUE, TOTAL FILTRABLE (DRIED AT 180°)									
SEGMENT NUMBER	SEGMENT DESCRIPTION	WATER BODY TYPE	COUNT	MEDIAN	MEAN	75TH PERCENTILE	MAX	MIN	BIN
835	Chambers Creek Below Richland–Chambers Reservoir	Stream	4	232	224.25	243.00	270.00	163.00	1
837	Richland Creek Above Richland–Chambers Reservoir	Stream	30	229	350.15	412.00	1010.00	160.00	1

☐ Bin 1: Less than regulatory or literature levels of concern
☐ Bin 2: Approaching regulatory standards or levels of concern
☐ Bin 3: Exceed the stated regulatory standards, levels of concern, or screening criteria

TABLE K.8 REGION C SURFACE WATER QUALITY SUMMARY BY SEGMENT AND PARAMETER
DATA COLLECTED 1/1/1998 – 1/31/2025 (SOURCE: TCEQ WATER QUALITY MONITORING DATABASE)

SULFATE (MG/L AS SO4)									
SEGMENT NUMBER	SEGMENT DESCRIPTION	WATER BODY TYPE	COUNT	MEDIAN	MEAN	75TH PERCENTILE	MAX	MIN	BIN
203	Lake Texoma	Lake	534	230.5	223.2	262.0	920.0	28.0	2
302	Wright-Patman Lake	Lake	759	15.0	17.0	20.0	89.1	5.0	1
307	Chapman/Cooper Lake	Lake	500	8.0	9.0	10.0	119.0	1.0	1
403	Lake O' the Pines	Lake	540	21.0	23.0	27.0	121.0	1.7	1
504	Toledo Bend Reservoir	Lake	2825	16.0	17.5	20.0	112.0	1.1	1
507	Lake Tawakoni	Lake	902	10.0	10.1	11.0	44.0	1.5	1

SULFATE (MG/L AS SO4)									
SEGMENT NUMBER	SEGMENT DESCRIPTION	WATER BODY TYPE	COUNT	MEDIAN	MEAN	75TH PERCENTILE	MAX	MIN	BIN
512	Lake Fork	Lake	1034	18.0	18.2	21.2	38.0	3.2	1
605	Lake Palestine	Lake	668	23.0	25.2	29.4	80.0	7.0	1
807	Lake Worth	Lake	243	24.1	24.3	28.2	38.5	5.0	1
809	Eagle Mountain Reservoir	Lake	313	25.4	26.5	30.2	64.2	5.0	1
811	Bridgeport Reservoir	Lake	301	14.9	16.9	19.5	50.0	2.8	1
815	Bardwell Reservoir	Lake	165	43.3	44.2	48.3	82.1	11.7	1
816	Lake Waxahachie	Lake	84	22.5	27.1	34.5	58.4	12.0	1
817	Navarro Mills Lake	Lake	195	24.8	26.3	29.3	61.0	9.6	1
818	Cedar Creek Reservoir	Lake	522	19.9	20.4	23.6	73.6	5.0	1
820	Lake Ray Hubbard	Lake	150	40.0	41.2	47.8	98.5	5.0	1
821	Lake Lavon	Lake	1351	33.1	36.9	44.9	140.0	1.0	1
826	Grapevine Lake	Lake	240	35.0	34.4	38.9	52.0	15.9	1
827	White Rock Lake	Lake	57	37.0	38.6	47.0	63.0	18.0	1
828	Lake Arlington	Lake	385	29.1	29.7	32.8	54.0	0.3	1
830	Benbrook Lake	Lake	237	26.9	27.8	29.8	55.7	5.0	1
832	Lake Weatherford	Lake	80	31.0	30.2	34.0	39.0	15.0	1
836	Richland-Chambers Reservoir	Lake	499	27.6	28.6	32.2	94.7	8.6	1

SULFATE (MG/L AS SO4)									
SEGMENT NUMBER	SEGMENT DESCRIPTION	WATER BODY TYPE	COUNT	MEDIAN	MEAN	75TH PERCENTILE	MAX	MIN	BIN
838	Joe Pool Lake	Lake	281	102.3	97.6	109.0	407.0	17.5	1
840	Ray Roberts Lake	Lake	190	14.0	13.8	16.0	19.3	7.0	1
202	Red River Below Lake Texoma	Stream	384	168.0	172.4	228.3	434.0	10.0	1
204	Red River Above Lake Texoma	Stream	195	537.0	545.4	734.5	1200.0	24.0	3
303	Sulphur/South Sulphur River	Stream	380	21.1	34.9	47.3	251.0	1.0	1
804	Trinity River Above Lake Livingston	Stream	544	65.6	64.2	80.4	431.0	5.0	1
805	Upper Trinity River	Stream	484	77.0	73.1	87.9	223.9	13.2	1
806	West Fork Trinity River Below Lake Worth	Stream	211	33.0	35.1	40.4	128.0	6.0	1
810	West Fork Trinity River Below Bridgeport Reservoir	Stream	54	37.5	42.6	50.5	110.0	11.0	1
812	West Fork Trinity River Above Bridgeport Reservoir	Stream	20	11.5	57.7	36.8	506.0	2.0	1
814	Chambers Creek Above Richland-Chambers Reservoir	Stream	213	70.1	86.7	112.1	312.0	2.5	1
819	East Fork Trinity River	Stream	233	100.0	103.0	126.0	365.0	19.8	1
822	Elm Form Trinity River Below Lewisville Lake	Stream	66	53.7	54.9	65.4	114.4	20.2	1

SULFATE (MG/L AS SO4)									
SEGMENT NUMBER	SEGMENT DESCRIPTION	WATER BODY TYPE	COUNT	MEDIAN	MEAN	75TH PERCENTILE	MAX	MIN	BIN
824	Elm Fork Trinity River Above Ray Roberts Lake	Stream	135	40.0	40.5	50.0	96.0	7.0	1
825	Denton Creek	Stream	62	38.0	40.3	47.8	73.0	18.0	1
829	Clear Fork Trinity River Below Benbrook Lake	Stream	105	36.7	38.8	46.0	68.0	9.0	1
831	Clear Fork Trinity River Below Lake Weatherford	Stream	102	50.5	49.4	58.4	95.0	14.0	1
833	Clear Fork Trinity River Above Lake Weatherford	Stream	15	68.0	62.9	71.9	78.0	34.0	1
835	Chambers Creek Below Richland-Chambers Reservoir	Stream	4	34.0	36.0	47.3	54.0	22.0	1
837	Richland Creek Above Richland-Chambers Reservoir	Stream	81	30.0	58.3	78.0	279.0	7.0	1
841	Lower West Fork Trinity River	Stream	252	59.3	58.7	67.7	107.0	13.5	1

☐ Bin 1: Less than regulatory or literature levels of concern
☐ Bin 2: Approaching regulatory standards or levels of concern
☐ Bin 3: Exceed the stated regulatory standards, levels of concern, or screening criteria

TABLE K.9 REGION C SURFACE WATER QUALITY SUMMARY BY SEGMENT AND PARAMETER
DATA COLLECTED 1/1/1998 – 1/31/2025 (SOURCE: TCEQ WATER QUALITY MONITORING DATABASE)

CHLORIDE (MG/L AS CL)									
SEGMENT NUMBER	SEGMENT DESCRIPTION	WATER BODY TYPE	COUNT	MEDIAN	MEAN	75TH PERCENTILE	MAX	MIN	BIN
203	Lake Texoma	Lake	533	312.0	303.8	373.0	603.0	33.5	3
302	Wright-Patman Lake	Lake	755	9.3	10.6	13.0	36.3	1.0	1
307	Chapman/Cooper Lake	Lake	498	4.2	5.0	5.0	172.0	1.0	1
403	Lake O' the Pines	Lake	541	13.1	14.4	16.0	57.0	3.0	1
504	Toledo Bend Reservoir	Lake	2832	15.0	16.8	18.5	161.0	2.2	1
507	Lake Tawakoni	Lake	998	6.0	6.8	8.0	38.0	1.8	1
512	Lake Fork	Lake	1040	14.0	14.1	17.0	48.0	4.3	1
605	Lake Palestine	Lake	656	22.0	25.0	28.0	103.0	5.0	1
807	Lake Worth	Lake	455	30.0	29.3	33.5	52.0	11.1	1
809	Eagle Mountain Reservoir	Lake	1280	31.1	30.9	34.8	64.8	9.1	1
811	Bridgeport Reservoir	Lake	776	19.5	21.2	24.4	174.2	9.8	1
815	Bardwell Reservoir	Lake	165	16.6	17.5	19.6	39.5	10.0	1
816	Lake Waxahachie	Lake	84	12.0	13.4	15.9	28.5	7.0	1
817	Navarro Mills Lake	Lake	194	9.1	10.0	10.8	88.0	1.7	1
818	Cedar Creek Reservoir	Lake	1451	13.4	13.6	15.2	99.7	2.2	1
820	Lake Ray Hubbard	Lake	388	23.5	25.7	29.0	104.3	5.0	1

CHLORIDE (MG/L AS CL)									
SEGMENT NUMBER	SEGMENT DESCRIPTION	WATER BODY TYPE	COUNT	MEDIAN	MEAN	75TH PERCENTILE	MAX	MIN	BIN
821	Lake Lavon	Lake	1361	19.7	23.5	29.4	139.0	1.0	1
823	Lewisville Lake	Lake	248	21.3	29.7	29.5	190.0	4.5	1
826	Grapevine Lake	Lake	373	29.0	31.0	37.0	54.0	11.0	1
827	White Rock Lake	Lake	56	25.0	25.3	31.0	41.0	8.0	1
828	Lake Arlington	Lake	686	16.5	17.2	18.8	62.0	6.0	1
830	Benbrook Lake	Lake	685	22.6	23.0	24.6	186.0	10.9	1
832	Lake Weatherford	Lake	80	32.0	31.8	36.0	47.0	15.5	1
836	Richland-Chambers Reservoir	Lake	1328	10.2	11.8	11.8	119.0	2.5	1
838	Joe Pool Lake	Lake	214	18.6	19.8	21.9	69.0	6.1	1
840	Ray Roberts Lake	Lake	456	14.6	15.1	17.2	48.5	2.5	1
202	Red River Below Lake Texoma	Stream	384	207.5	212.6	296.0	600.0	10.0	2
204	Red River Above Lake Texoma	Stream	194	1060.0	1056.1	1400.0	2190.0	18.0	3
303	Sulphur/South Sulphur River	Stream	383	12.0	17.2	22.8	128.0	1.0	1
804	Trinity River Above Lake Livingston	Stream	515	44.1	47.4	67.1	112.1	5.1	1
805	Upper Trinity River	Stream	416	52.0	55.7	75.7	397.0	9.4	1
806	West Fork Trinity River Below Lake Worth	Stream	179	23.2	25.1	29.8	180.0	5.0	1

CHLORIDE (MG/L AS CL)									
SEGMENT NUMBER	SEGMENT DESCRIPTION	WATER BODY TYPE	COUNT	MEDIAN	MEAN	75TH PERCENTILE	MAX	MIN	BIN
810	West Fork Trinity River Below Bridgeport Reservoir	Stream	165	45.0	57.3	77.9	261.0	3.3	1
812	West Fork Trinity River Above Bridgeport Reservoir	Stream	73	21.7	75.3	88.3	474.0	2.7	1
814	Chambers Creek Above Richland-Chambers Reservoir	Stream	312	28.0	42.5	57.9	325.0	2.8	1
819	East Fork Trinity River	Stream	231	76.0	79.4	99.5	340.0	10.2	1
822	Elm Form Trinity River Below Lewisville Lake	Stream	191	26.1	28.3	32.6	98.0	10.8	1
824	Elm Fork Trinity River Above Ray Roberts Lake	Stream	174	31.0	35.4	45.0	155.0	7.0	1
825	Denton Creek	Stream	78	28.5	31.9	42.5	55.8	15.2	1
829	Clear Fork Trinity River Below Benbrook Lake	Stream	104	23.9	24.7	28.0	61.0	9.5	1
831	Clear Fork Trinity River Below Lake Weatherford	Stream	219	51.0	56.5	74.5	158.0	6.0	1
833	Clear Fork Trinity River Above Lake Weatherford	Stream	15	69.0	68.3	75.9	95.0	40.0	1
835	Chambers Creek Below Richland–Chambers Reservoir	Stream	4	39.5	36.0	51.3	58.0	7.0	1
837	Richland Creek Above Richland–Chambers Reservoir	Stream	81	17.0	39.5	57.0	213.0	2.8	1
839	Elm Fork Trinity River Below Ray Roberts Lake	Stream	40	17.8	17.2	20.0	28.0	11.8	1

CHLORIDE (MG/L AS CL)									
SEGMENT NUMBER	SEGMENT DESCRIPTION	WATER BODY TYPE	COUNT	MEDIAN	MEAN	75TH PERCENTILE	MAX	MIN	BIN
841	Lower West Fork Trinity River	Stream	227	73.5	69.6	88.0	167.0	12.0	1

- Bin 1: Less than regulatory or literature levels of concern
- Bin 2: Approaching regulatory standards or levels of concern
- Bin 3: Exceed the stated regulatory standards, levels of concern, or screening criteria

K.3.2 Groundwater Quality Data Summary

Tables K.10 through **K.12** summarize groundwater water quality data by aquifer and county.

TABLE K.10 REGION C GROUNDWATER QUALITY SUMMARY BY AQUIFER AND COUNTY DATA COLLECTED 1993 – 2023 (SOURCE: TEXAS WATER DEVELOPMENT BOARD GROUNDWATER DATABASE)

TOTAL DISSOLVED SOLIDS (MG/L)								
AQUIFER	COUNTY	COUNT	MEAN	MEDIAN	75TH PERCENTILE	MAX	MIN	BIN
Carrizo-Wilcox	Anderson	111	350.3	292.0	381.5	123.0	1869.0	1
Carrizo-Wilcox	Freestone	63	300.9	280.0	332.2	99.0	632.0	1
Carrizo-Wilcox	Henderson	64	258.5	269.5	303.3	32.0	638.0	1
Carrizo-Wilcox	Navarro	3	406.3	326.0	462.0	295.0	598.0	1
Carrizo-Wilcox	Smith	136	305.6	240.5	343.3	99.0	972.0	1
Carrizo-Wilcox	Upshur	28	440.1	411.5	501.3	148.0	1130.0	1
Carrizo-Wilcox	Wood	43	256.1	244.0	284.5	124.0	926.0	1
Nacatoch	Kaufman	6	876.7	865.0	992.5	730.0	1041.0	2
Nacatoch	Navarro	6	446.8	440.0	459.0	316.0	642.0	1
Queen City	Anderson	23	164.2	150.0	193.0	65.0	278.0	1
Queen City	Freestone	2	107.0	107.0	107.5	106.0	108.0	1
Queen City	Henderson	14	179.0	150.5	168.0	92.0	418.0	1
Queen City	Smith	28	112.3	104.5	136.5	46.0	327.0	1
Queen City	Upshur	28	171.7	89.8	266.8	56.0	521.0	1
Queen City	Wood	12	195.6	184.0	253.8	66.0	355.0	1
Trinity	Collin	46	820.8	757.0	904.0	394.0	1688.0	2
Trinity	Cooke	49	510.8	455.1	563.0	399.0	843.0	1
Trinity	Dallas	64	952.8	821.7	957.0	255.0	4606.0	2
Trinity	Denton	106	631.0	610.0	722.9	408.0	1291.0	2
Trinity	Ellis	62	897.0	731.0	1104.5	634.0	1432.0	2
Trinity	Fannin	19	887.3	891.0	904.0	804.1	932.0	2
Trinity	Grayson	126	669.6	602.0	802.3	268.0	1492.0	2
Trinity	Jack	3	1072.7	1094.0	1268.5	681.0	1443.0	3
Trinity	Kaufman	4	1073.5	1070.0	1085.0	1048.0	1106.0	3
Trinity	Parker	85	504.5	445.0	654.7	97.0	1086.0	1
Trinity	Tarrant	122	746.2	694.0	875.0	316.0	3302.0	2
Trinity	Wise	67	665.6	510.0	761.5	304.0	2186.0	2
Woodbine	Collin	26	648.5	578.5	726.5	318.0	1388.0	2
Woodbine	Cooke	6	595.8	409.5	623.5	184.0	1505.0	1
Woodbine	Dallas	22	1150.4	1226.0	1459.5	436.0	1700.0	3
Woodbine	Denton	19	712.3	697.0	765.3	291.0	1841.0	2
Woodbine	Ellis	36	1370.3	1390.5	1696.6	785.0	2144.0	3

TOTAL DISSOLVED SOLIDS (MG/L)								
AQUIFER	COUNTY	COUNT	MEAN	MEDIAN	75TH PERCENTILE	MAX	MIN	BIN
Woodbine	Fannin	44	811.8	824.5	886.0	408.0	1201.0	2
Woodbine	Grayson	70	597.4	587.0	741.5	186.0	1105.0	2
Woodbine	Navarro	5	1309.2	1556.0	1615.0	192.2	1634.0	3
Woodbine	Tarrant	56	1377.1	745.0	1349.3	163.0	8150.0	3

☐ Bin 1: Less than regulatory or literature levels of concern
☐ Bin 2: Approaching regulatory standards or levels of concern
☐ Bin 3: Exceed the stated regulatory standards, levels of concern, or screening criteria

TABLE K.11 REGION C GROUNDWATER QUALITY SUMMARY BY AQUIFER AND COUNTY DATA COLLECTED 1993 – 2023 (SOURCE: TEXAS WATER DEVELOPMENT BOARD GROUNDWATER DATABASE)

SULFATE (MG/L AS SO4)								
AQUIFER	COUNTY	COUNT	MEAN	MEDIAN	75TH PERCENTILE	MAX	MIN	BIN
Carrizo-Wilcox	Anderson	100	19.8	17.1	27.3	52.0	1.0	1
Carrizo-Wilcox	Freestone	38	23.5	19.1	35.6	63.2	4.2	1
Carrizo-Wilcox	Henderson	49	24.5	25.2	35.0	80.0	1.0	1
Carrizo-Wilcox	Navarro	1	72.5	72.5	72.5	72.5	72.5	1
Carrizo-Wilcox	Smith	115	20.4	14.5	22.2	132.0	1.0	1
Carrizo-Wilcox	Upshur	25	18.2	8.8	30.0	62.0	1.0	1
Carrizo-Wilcox	Wood	32	19.7	16.3	28.3	53.0	1.0	1
Nacatoch	Kaufman	6	228.7	224.0	309.3	320.0	139.0	1
Nacatoch	Navarro	6	37.4	36.7	50.7	81.0	1.0	1
Queen City	Anderson	22	22.9	24.7	29.6	55.4	2.0	1
Queen City	Freestone	2	14.0	14.0	17.5	21.0	7.0	1
Queen City	Henderson	15	20.5	15.3	18.5	73.0	4.0	1
Queen City	Smith	25	15.9	12.0	15.9	97.1	1.0	1
Queen City	Upshur	28	14.9	5.3	16.5	58.4	1.0	1
Queen City	Wood	12	37.0	28.1	55.0	95.0	2.1	1
Trinity	Collin	41	134.5	89.6	126.0	590.0	47.7	1
Trinity	Cooke	45	38.4	32.0	36.0	129.0	24.5	1
Trinity	Dallas	61	245.2	176.0	207.0	2920.0	77.0	1
Trinity	Denton	93	73.8	63.8	91.1	326.0	26.3	1
Trinity	Ellis	56	114.1	95.5	139.8	262.0	65.0	1
Trinity	Fannin	19	127.5	128.0	133.5	144.0	110.0	1
Trinity	Grayson	111	78.5	77.0	98.2	155.0	15.2	1
Trinity	Jack	2	163.1	163.1	202.5	242.0	84.1	1
Trinity	Parker	66	53.1	42.5	71.0	202.0	5.1	1

SULFATE (MG/L AS SO4)								
AQUIFER	COUNTY	COUNT	MEAN	MEDIAN	75TH PERCENTILE	MAX	MIN	BIN
Trinity	Tarrant	107	124.8	99.4	159.5	1430.0	23.2	1
Trinity	Wise	44	65.8	47.8	71.3	207.0	20.9	1
Woodbine	Collin	20	121.0	96.5	135.3	394.0	19.0	1
Woodbine	Cooke	6	123.5	49.2	69.3	522.0	17.7	1
Woodbine	Dallas	21	332.2	348.0	428.0	507.0	36.6	3
Woodbine	Denton	17	131.1	102.0	196.0	347.0	43.0	1
Woodbine	Ellis	36	390.7	388.5	502.0	729.0	137.0	3
Woodbine	Fannin	37	185.4	202.0	213.0	260.0	67.0	1
Woodbine	Grayson	66	97.5	86.9	149.3	330.0	15.2	1
Woodbine	Navarro	5	356.8	436.0	440.0	440.0	47.9	3
Woodbine	Tarrant	19	414.9	101.0	250.0	3300.0	5.4	3

Bin 1: Less than regulatory or literature levels of concern
Bin 2: Approaching regulatory standards or levels of concern
Bin 3: Exceed the stated regulatory standards, levels of concern, or screening criteria

TABLE K.12 REGION C GROUNDWATER QUALITY SUMMARY BY AQUIFER AND COUNTY DATA COLLECTED 1993 – 2023 (SOURCE: TEXAS WATER DEVELOPMENT BOARD GROUNDWATER DATABASE)

CHLORIDE (MG/L AS CL)								
AQUIFER	COUNTY	COUNT	MEAN	MEDIAN	75TH PERCENTILE	MAX	MIN	BIN
Carrizo-Wilcox	Anderson	100	18.8	10.0	20.0	196.0	2.9	1
Carrizo-Wilcox	Freestone	38	24.0	22.9	36.4	46.4	8.9	1
Carrizo-Wilcox	Henderson	49	27.7	15.9	42.2	164.0	2.0	1
Carrizo-Wilcox	Navarro	1	46.9	46.9	46.9	46.9	46.9	1
Carrizo-Wilcox	Smith	115	28.9	10.2	25.3	211.0	1.9	1
Carrizo-Wilcox	Upshur	25	51.7	40.0	83.0	116.0	9.0	1
Carrizo-Wilcox	Wood	32	21.1	12.2	36.8	71.8	3.7	1
Nacatoch	Kaufman	6	95.8	93.5	107.5	119.0	80.1	1
Nacatoch	Navarro	6	28.4	28.3	35.2	57.0	8.6	1
Queen City	Anderson	22	19.5	14.0	28.5	71.3	2.0	1
Queen City	Freestone	2	8.7	8.7	9.1	9.4	8.0	1
Queen City	Henderson	15	29.3	14.9	18.2	127.0	4.5	1
Queen City	Smith	25	7.6	5.9	8.9	25.8	2.0	1
Queen City	Upshur	28	18.2	14.5	20.1	91.3	3.0	1
Queen City	Wood	12	23.6	21.0	23.9	77.0	1.0	1
Trinity	Collin	41	78.7	22.7	44.0	647.0	10.6	1
Trinity	Cooke	45	56.8	16.0	46.3	311.0	2.2	1

CHLORIDE (MG/L AS CL)								
AQUIFER	COUNTY	COUNT	MEAN	MEDIAN	75TH PERCENTILE	MAX	MIN	BIN
Trinity	Dallas	61	92.2	75.0	103.0	340.0	16.5	1
Trinity	Denton	93	88.3	19.7	153.0	532.0	2.7	1
Trinity	Ellis	56	163.0	73.7	213.0	427.0	63.6	1
Trinity	Fannin	19	34.1	35.0	38.3	44.0	4.0	1
Trinity	Grayson	111	68.0	32.9	55.7	571.0	6.8	1
Trinity	Jack	2	124.9	124.9	139.0	153.0	96.8	1
Trinity	Parker	66	40.6	24.3	56.5	297.0	3.7	1
Trinity	Tarrant	107	82.5	40.0	87.0	1822.0	5.6	1
Trinity	Wise	44	145.2	43.5	186.0	678.0	4.2	1
Woodbine	Collin	20	53.9	37.2	66.2	148.0	14.0	1
Woodbine	Cooke	6	126.2	39.2	201.5	369.0	24.6	1
Woodbine	Dallas	21	101.7	86.9	180.0	235.0	12.0	1
Woodbine	Denton	17	60.5	29.6	46.0	371.0	9.0	1
Woodbine	Ellis	36	110.6	76.6	145.3	364.0	31.5	1
Woodbine	Fannin	37	64.7	61.0	78.0	213.0	22.0	1
Woodbine	Grayson	66	34.7	26.0	40.0	180.0	6.0	1
Woodbine	Navarro	5	108.9	120.0	143.0	146.0	16.5	1
Woodbine	Tarrant	19	145.9	43.9	89.2	1700.0	10.0	1

☐ Bin 1: Less than regulatory or literature levels of concern
☐ Bin 2: Approaching regulatory standards or levels of concern
☐ Bin 3: Exceed the stated regulatory standards, levels of concern, or screening criteria

Appendix L

Socioeconomic Impacts

APPENDIX L SOCIOECONOMICS IMPACTS

The Socioeconomics Impacts analysis is currently being conducted by the Texas Water Development Board. This Appendix will be completed for the final plan, after Region C receives the report.

Appendix M

Summary of Drought Responses

						Stage 1		Stage 2		Stage 3	
Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal
Irving	Apr-2019	WUG	DWU	DWU sources, Jim Chapman Lake	3	• Condition 1: Pursuant to the requirements specified in the wholesale treated water purchase contract, notification is received from DWU requesting initiation of the Stage 1 restrictions • Condition 2: Water use exceeds eighty-five percent (85%) of the combined current maximum wholesale flow rate contracted from DWU and Irving Lake Chapman water supply for four (4) consecutive days • Condition 3: Irving's combined water storage account in Jim Chapman Lake and Lewisville Lake is less than sixty-five percent (65%) of Irving's total storage account capacity in Jim Chapman Lake • Condition 4: Short-term deficiencies in the city's distribution system limit supply capabilities • Condition 5: Supply source becomes contaminated • Condition 6: As determined by Director due to drought or reduced water supply	3%	• Condition 1: Pursuant to the requirements specified in the wholesale treated water purchase contract, notification is received from DWU requesting initiation of the Stage 2 restrictions • Condition 2: Water use exceeds 100 percent (100%) of the combined current maximum wholesale flow rate contracted from DWU and Irving Lake Chapman water supply for five (5) consecutive days • Condition 3: Irving's combined water storage account in Jim Chapman Lake and Lewisville Lake is less than 45 percent (45%) of Irving's total storage account capacity in Jim Chapman Lake • Condition 4: Short-term deficiencies in the city's distribution system limit supply capabilities, such as system outage due to the failure or damage of major water system components • Condition 5: Inability to maintain or replenish adequate volumes of water in storage to provide for public health and safety • Condition 6: Supply source becomes contaminated • Condition 7: As determined by Director due to drought or reduced water supply	8%	• Condition 1: Pursuant to the requirements specified in the wholesale treated water purchase contract, notification is received from DWU requesting initiation of the Stage 3 restrictions • Condition 2: Irving's combined water storage account in Jim Chapman Lake and Lewisville Lake is less than 20 percent (20%) of Irving's total storage account capacity in Jim Chapman Lake • Condition 3: Short-term deficiencies in the city's distribution system limit supply capabilities, such as system outage due to the failure or damage of major water system components • Condition 4: Inability to maintain or replenish adequate volumes of water in storage to provide for public health and safety • Condition 5: Supply source becomes contaminated • Condition 6: As determined by Director due to drought or reduced water supply	20%
Dallas (DWU)	Apr-2024	WUG	N/A	Lake Ray Roberts, Lewisville Lake, Grapevine Lake, Elm Fork Channel of the Trinity River, Lake Ray Hubbard, Lake Tawakoni, Lake Fork, Lake Palestine (unconnected), White Rock Lake, Return Flows into Lakes Lewisville, Ray Roberts and Ray Hubbard	3	• Either:(1) the total raw water supply in connected lakes (east and west); or, (2) the western lakes; or, (3) the eastern lakes have dropped below 65% (35% depleted) of DWU's share of the total conservation storage of the lakes; or • Water demand has reached or exceeded 85% of delivery capacity for 4 consecutive days; or • Water demand approaches a reduced delivery capacity for all or part of the system, as determined by DWU; or • Water line breaks or pump or system failures, which impact the ability of DWU to provide treated water service; or • Natural or man-made contamination of the water • supply source(s) occurs	5%	• Either: (1) the total raw water supply in connected lakes (east and west); or, (2) the western lakes; or, (3) the eastern lakes have dropped below 50% (50% depleted) of DWU's share of the total conservation storage of the lakes; or • Water demand has reached or exceeded 90% of delivery capacity for 3 consecutive days; or • Water demand equals a reduced delivery capacity for all or part of the system, as determined by DWU; or • Water line breaks or pump or system failures occur, which impact the ability of DWU to provide treated water service; or • Natural or man-made contamination of the water supply source(s) occurs.	15%	• Either (1) the total raw water supply in connected lakes (east and west) or (2) the western lakes or (3) the eastern lakes have dropped below 35% (65% depleted) of DWU's share of the total conservation storage; or • Water demand has reached or exceeded 95% of delivery capacity for 2 consecutive days; or • Water demand exceeds a reduced delivery capacity for all or part of the system, as determined by DWU; or • Water line breaks or pump or system failures occur, which impact the ability of DWU to provide treated water service; or • Natural or man-made contamination of the water supply source(s) occurs	20%
Denton	Apr-2019	WUG	DWU	Lake Ray Roberts, Lake Lewisville	3	Type A Water Management Condition Total raw water supply in (1) Denton and Dallas connected lakes (east and west); or (2) western connected lakes; or (3) eastern connected lakes drops below 65% of the total conservation storage of the lakes Type B Water Management Condition Water demand reaches or exceeds 85% of delivery capacity for	5%	Type A Water Management Condition Total raw water supply in (1) Denton and Dallas connected lakes (east and west); or (2) western connected lakes; or (3) eastern connected lakes drops below 50% of the total conservation storage Type B Water Management Condition Water demand reaches or exceeds 90% of delivery capacity for 3 consecutive days	15%	Type A Water Management Condition Total raw water supply in (1) Denton and Dallas connected lakes (east and west); or (2) western connected lakes; or (3) eastern connected lakes drops below 35% of the total conservation storage Type B Water Management Condition Water demand reaches or exceeds 95% of delivery capacity for 2	20%

Appendix M-1
Summary of Existing DCPs in Region C

						Stage 1		Stage 2		Stage 3	
Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal
						4 consecutive days Type C Water Management Condition •Water demand approaches a reduced delivery capacity for all or part of the system, as determined by DWU •A major water line breaks, or a pump or system failure occurs, which cause unprecedented loss of capability to provide treated water service •Natural or man-made contamination of the water supply		Type C Water Management Condition •Water demand equals a reduced delivery capacity for all or part of the system, as determined by DWU •A major water line breaks, or a pump or system failure occurs, which cause unprecedented loss of capability to provide treated water service •Natural or man-made contamination of the water supply		consecutive days Type C Water Management Condition •Water demand exceeds a reduced delivery capacity for all or part of the system, as determined by DWU •A major water line breaks, or a pump or system failure occurs, which cause unprecedented loss of capability to provide treated water service •Natural or man-made contamination of the water supply	
North Texas Municipal Water District(NTMWD)	Jan-2024	WWP	N/A	Lake Lavon, Jim Chapman Lake, Lake Texoma, SRA Upper Sabine Basin (Lake Tawakoni, Lake Fork), Lake Bonham, East Fork Raw Water Supply Project (wetland) Wilson Creek Reuse, Direct Reuse for Irrigation (Collin, Kaufman, Rockwall Counties), Main Stem Pump Station (reuse)		• The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 1. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other cause. • The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. • Water demand has exceeded or is expected to exceed 90% of maximum sustainable production or delivery capacity for an extended period. • The combined storage in Lavon and Bois d'Arc Lakes, as published by the TWDB, is less than: 70 percent of the total conservation pool capacity during any of the months of April through October or less than 60 percent of the total conservation pool capacity during any of the months of November through March. • The Sabine River Authority (SRA) has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 1 drought. • NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source may be limited in availability within the next six months.	2%	• The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 2. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other cause. • The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. • Water demand has exceeded or is expected to exceed 95% of maximum sustainable production or delivery capacity for an extended period. • The combined storage in Lavon and Bois d'Arc Lakes, as published by the TWDB, is less than: 55 percent of the total conservation pool capacity during any of the months of April through October or less than 45 percent of the total conservation pool capacity during any of the months of November through March. • The Sabine River Authority (SRA) has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 1 drought. NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source may be limited in availability within the next three months.	5%	• The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 3. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other cause. • The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. • Water demand has exceeded or is expected to exceed maximum sustainable production or delivery capacity for an extended period. • The combined storage in Lavon and Bois d'Arc Lakes, as published by the TWDB, is less than: 30 percent of the total conservation pool capacity during any of the months of April through October or less than 20 percent of the total conservation pool capacity during any of the months of November through March. • The Sabine River Authority (SRA) has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 1 drought. • NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source may be limited in availability.	30%
Garland	Jun-2019	WUG	NTMWD	NTMWD sources	3	(i) The City's wholesale water provider, NTMWD, notifies the Director of delivery or source shortages, requests initiation of Stage 1 of the plan, an the Director concurs (ii) Total daily water demand exceeds 95 percent of the amount that can be delivered to Customers for three consecutive days (iii) Water demand for all or part of the delivery system equals delivery capacity because delivery capacity is inadequate (iv) Supply source becomes contaminated (v) water system is unable to deliver water due to the failure or damage of major water system components • The water system experiences continually falling treated water storage levels that do not refill above 65% overnight.	2%	(i) The City's wholesale water provider, NTMWD, notifies the Director of delivery or source shortages, requests initiation of Stage 2 of the plan, an the Director concurs (ii) Total daily water demand exceeds 98 percent of the amount that can be delivered to Customers for three consecutive days (iii) Water demand for all or part of the delivery system equals delivery capacity because delivery capacity is inadequate (iv) Supply source becomes contaminated (v) water system is unable to deliver water due to the failure or damage of major water system components, or • The water system experiences continually falling treated water storage levels that do not refill above 50 percent overnight.	10%	(i) The City's wholesale water provider, NTMWD, notifies the Director of delivery or source shortages, requests initiation of Stage 2 of the plan, an the Director concurs (ii) Total daily water demand exceeds the amount that can be delivered to Customers (iii) Water demand for all or part of the delivery system seriously exceeds delivery capacity because delivery capacity is inadequate (iv) Supply source becomes contaminated (v) Water supply system is unable to deliver water due to the failure or damage of major water system components, or • The water system experiences continually falling treated water storage levels that do not refill above 20 percent overnight.	

Appendix M-1
Summary of Existing DCPs in Region C

						Stage 1		Stage 2		Stage 3	
Entity	**Plan Date**	**Entity Type**	**Wholesale Water Provider(s)**	**Source(s)**	**No. of Stages**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**
Allen	April-2024	WUG	NTMWD	NTMWD sources	3	•The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 1. •One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other cause. •The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. •Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) •A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. •Water demand has exceeded or is expected to exceed 90% of maximum sustainable production or delivery capacity for an extended period. •The combined storage level, as published by the Texas Water Development Board, in Lavon Lake and Bois d'Arc Lake is less than 70 percent of the conservation pool capacity during the months of April through October OR 60% of conservation pool capacity during the months of November through March. •The Sabine River Authority (SRA) has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in Stage 1 drought. •NTMD has concern that Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, or some other NTMWD source may be limited in availability within the next six (6) months. • • Thecity'swaterdemandexceeds or is expected to exceed 90percentofthe maximum sustainable delivery capacity for an extended period. •The City's water demand for all or part of the delivery capacity is inadequate. •The City's water supply source becomes contaminated. •The City's water supply system is unable to deliver water due to the failure or damage of major water system components. •A portion of the City's service area is experiencing an extreme weather •event or power grid/supply disruptions.	2%	•The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 2. •One or more supply source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other cause. •The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. •Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. •The combined storage level, as published by the Texas Water Development Board, in Lavon Lake and Bois d'Arc Lake is less than 55 percent of the total conservation pool capacity during the months of April through October OR 45 percent of the total conservation pool capacity during the months of November through March. •The Sabine River Authority (SRA) has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 2. •NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station, or some other NTMWD water source maybe delivered to customers for three (3) months. • •The City's water demand exceeds or is expected to exceed 95 percent of the amount that can be delivered to customers for an extended period. •The City's water demand for all or part of the delivery system exceeds delivery capacity because delivery is inadequate. •The City's water supply source becomes contaminated. •The City's water supply is unable to deliver water due to the failure or damage of major water system components. •The City is unable to recover water storage of 75 percent in all storage facilities within a twenty-four hour period. •A portion of the City's service area is experiencing an extreme weather event or power grid/supply disruptions.	5%	•The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 3. •One or more supply source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure, or other cause. •The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. •Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) •A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. •Water demand has exceeded or is expected to exceed maximum sustainable production or delivery capacity for an extended period. •The combined storage level, as published by the Texas Water Development Board, in Lavon Lake and Bois d'Arc Lake is less than 30 percent of the total conservation pool capacity during the months of April through October or less than 20 percent of the total conservation pool capacity during the months of November through March. •The Sabine River Authority (SRA) has indicted that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in Stage 3 drought. •The water supply from Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station, or some other NTMWD source has become limited in availability. • •The City's water demand exceeds the amount that can be delivered to customers. •TheCity'swaterdemandforallorpartofthedelivery system exceeds delivery capacity because delivery capacity is inadequate. •The City's water supply source becomes contaminated. •The City's water supply is unable to deliver water due to the failure or damage of major water system components. •The City is unable to recover water storage of 50 percent in all storage facilities within a twenty-four hour period. •A portion of the City's service area is experiencing an extreme weather event or power grid/supply disruptions.	30%

Appendix M-1
Summary of Existing DCPs in Region C

						Stage 1		Stage 2		Stage 3	
Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal
Copeville SUD	Apr-2019	WUG	NTMWD	NTMWD Sources	3	•The Executive Director, with the concurrence of the NTMWD Board of directors, finds that conditions warrant the declaration of Stage 1. •Water demand is projected to approach the limit of NTMWD's permitted supply. •The storage level in Lavon Lake as published by the Texas Water Development Board (TWDB), is less than 70 percent of the total conservation pool capacity during any of the months of April through October or less than 60 percent of the total conservation pool capacity during any of the months of November through March. •The Sabine River Authority (SRA) has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 1 drought. •NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station, or some other NTMWD water source may be limited in availability within the next six (6) months. •Water demand exceeds 95 percent of the amount that can be delivered by NTMWD to Customers for three (3) consecutive days. •Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. •Supply source is interrupted or unavailable due to •contamination, invasive species, equipment failure, or other cause. •Water supply system is unable to deliver water due to the failure or damage of major water system components. •Part of the system has a shortage in supply or damage to equipment. NTMWD may implement measures for only that portion of the NTMWD system impacted. •Supplier's water demand exceeds 95 percent of the amount that can be delivered to customers for three consecutive days. •Supplier's water demand for all or part of the delivery system equals delivery capacity because delivery capacity is inadequate. •Supply source becomes contaminated. •Supplier's water system is unable to deliver water due to the failure or damage of major water system components. •Supplier's individual plan may be implemented if other criteria dictate.	2%	•The Executive Director, with the concurrence of the NTMWD Board of directors, finds that conditions warrant the declaration of Stage 2. •Water demand is projected to approach the limit of NTMWD's permitted supply. •The storage level in Lavon Lake as published by the Texas Water Development Board (TWDB), is less than 55 percent of the total conservation pool capacity during any of the months of April through October or less than 45 percent of the total conservation pool capacity during any of the months of November through March. •The Sabine River Authority (SRA) has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 2 drought. •NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station, or some other NTMWD water source may be limited in availability within the next three (3) months. •Water demand exceeds 98 percent of the amount that can be delivered by NTMWD to Customers for three (3) consecutive days. •Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. •Supply source is interrupted or unavailable due to •contamination, invasive species, equipment failure, or other cause. •Water supply system is unable to deliver water due to the failure or damage of major water system components. •Part of the system has a shortage in supply or damage to equipment. NTMWD may implement measures for only that portion of the NTMWD system impacted. •Supplier's water demand exceeds 98 percent of the amount that can be delivered to customers for three consecutive days. •Supplier's water demand for all or part of the delivery system equals delivery capacity because delivery capacity is inadequate. •Supply source becomes contaminated. •Supplier's water system is unable to deliver water due to the failure or damage of major water system components. •Supplier's individual plan may be implemented if other criteria dictate.	10%	•The Executive Director, with the concurrence of the NTMWD Board of directors, finds that conditions warrant the declaration of Stage 3. •Water demand is projected to approach the limit of NTMWD's permitted supply. •The storage level in Lavon Lake as published by the Texas Water Development Board (TWDB), is less than 30 percent of the total conservation pool capacity during any of the months of April through October or less than 20 percent of the total conservation pool capacity during any of the months of November through March. •The Sabine River Authority (SRA) has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 3 drought. •The water supply from Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station, or some other NTMWD water source has become limited in availability. •Water demand exceeds the amount that can be delivered to Customers. •Water demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate. •Supply source is interrupted or unavailable due to contamination, invasive species, equipment failure, or other cause. •Water supply system is unable to deliver water due to the •failure or damage of major water system components. •Part of the system has a shortage in supply or damage to equipment. NTMWD may implement measures for only that portion of the NTMWD system impacted. •Supplier's water demand exceeds the amount that can be delivered to customers. •Supplier's water demand for all or part of the delivery system seriously exceeds delivery capacity because delivery capacity is inadequate. •Supply source becomes contaminated. •Supplier's water system is unable to deliver water due to the failure or damage of major water system components. •Supplier's individual plan may be implemented if other criteria dictate.	Designated by NTMWD

Appendix M-1
Summary of Existing DCPs in Region C

Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Stage 1 Trigger	Stage 1 Savings Goal	Stage 2 Trigger	Stage 2 Savings Goal	Stage 3 Trigger	Stage 3 Savings Goal
Rowlett	May-2019	WUG	NTMWD	NTMWD	3	NTMWD has initiated Stage 1, which may be initiated due to one or more of the following: • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 1. • Water demand is projected to approach the limit of NTMWD's permitted supply. • The storage level in Lavon Lake as published by the Texas Water Development Board (TWDB) is less than 70 percent of the total conservation pool capacity during any of the months of April through October or less than 60 percent of the total conservation pool capacity during any of the months of November through March. • The Sabine River Authority (SRA) has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 1 drought. • NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station, or some other NTMWD water source may be limited in availability within the next six (6) months. • Water demand exceeds 95 percent of the amount that can be delivered by NTMWD to Customers for three (3) consecutive days. • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • Supply source is interrupted or unavailable due to contamination, invasive species, equipment failure, or other cause. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • Part of the system has a shortage in supply or damage to equipment. NTMWD may implement measures for only that portion of the NTMWD system impacted. Rowlett can initiate Stage 1 for one or more of the following reasons: • Rowlett's water demand exceeds 95 percent of the amount that can be delivered to customers for three consecutive days. • Rowlett's water demand for all or part of the delivery system equals delivery capacity because delivery capacity is inadequate. • Supply source becomes contaminated. • Rowlett's water system is unable to deliver water due to the failure or damage of major water system components.	2%	NTMWD has initiated Stage 2, which may be initiated due to one or more of the following: • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 2. • Water demand is projected to approach the limit of NTMWD's permitted supply. • The storage level in Lavon Lake, as published by the TWDB is less than 55 percent of the total conservation pool capacity during any of the months of April through October or less than 45 percent of the total conservation pool capacity during any of the months of November through March. • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 2 drought. • NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station, or some other NTMWD water source may be limited in availability within the next three (3) months. • Water demand exceeds 98 percent of the amount that can be delivered to Customers for three (3) consecutive days. • Water demand for all or part of the delivery system equals delivery capacity, because delivery capacity is inadequate. • Supply source is interrupted or unavailable due to contamination, invasive species, equipment failure, or other cause. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • Part of the system has a shortage in supply or damage to equipment. NTMWD may implement measures for only that portion of the system impacted. Rowlett can initiate Stage 2 for one or more of the following reasons: • Rowlett's water demand exceeds 98 percent of the amount that can be delivered to customers for three consecutive days. • Rowlett's water demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate. • Supply source becomes contaminated. • Supply source is interrupted or unavailable due to invasive species. • Rowlett's water supply system is unable to deliver water due to the failure or damage of major water	10%	NTMWD has initiated Stage 3, which may be initiated due to one or more of the following: • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 3. • Water demand is projected to approach or exceed the limit of the permitted supply. • The storage level in Lavon Lake, as published by the TWDB is less than 30 percent of the total conservation pool capacity during any of the months of April through October or less than 20 percent of the total conservation pool capacity during any of the months of November through March. • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 3 drought. • The water supply from Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, or some other NTMWD water source has become limited in availability. • Water demand exceeds the amount that can be delivered to Customers. • Water demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate. • Supply source is interrupted or unavailable due to contamination, invasive species, equipment failure or other cause. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • Part of the system has a shortage in supply or damage to equipment. NTMWD may implement measures for only that portion of the system impacted. Rowlett can initiate Stage 3 for one or more of the following reasons: • Rowlett's water demand exceeds the amount that can be delivered to customers. • Rowlett's water demand for all or part of the delivery system seriously exceeds delivery capacity because the delivery capacity is inadequate. • Supply source becomes contaminated. • Rowlett's water supply system is unable to deliver water due to the failure or damage of major water system components. • The City Manager, with the concurrence of the City Council, finds that conditions warrant the declaration of Stage 3	Designated by NTMWD Director

Appendix M-1
Summary of Existing DCPs in Region C

						Stage 1		Stage 2		Stage 3	
Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal
						• The City Manager, with the concurrence of the City Council, finds that conditions warrant the declaration of Stage 1.		system components. • The City Manager, with the concurrence of the City Council, finds that conditions warrant the declaration of Stage 2.			

Appendix M-1
Summary of Existing DCPs in Region C

Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Stage 1 Trigger	Stage 1 Savings Goal	Stage 2 Trigger	Stage 2 Savings Goal	Stage 3 Trigger	Stage 3 Savings Goal
Wylie	Apr 2024	WUG	NTMWD	NTMWD Sources	3	• The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 1. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other cause. • The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. • Water demand has exceeded or is expected to exceed 90% of maximum sustainable production or delivery capacity for an extended period. • The combined storage level, as published by the Texas Water Development Board, in Lavon Lake and Bois d'Arc Lake, is less than 70 percent of the total conservation pool capacity during the months of April through October or less than 60 percent of the total conservation pool capacity during the months of November through March. • The Sabine River Authority has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in Stage 1 • NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, or some other NTMWD source may be limited in availability within the next six (6) months. • The city's water demand exceeds 85 percent of the amount that can be delivered to customers for (3) three consecutive days. • The city's water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • Water supply system is unable to deliver water due to the failure or damage of major water system components, supply source becomes contaminated, power outage, grid failure, natural disaster, or extreme weather event. • The City Manager or his/her designee determines that it is appropriate to initiate Stage 1. •	2%	• The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 2. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other cause. • The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. • Water demand has exceeded or is expected to exceed 95% of maximum sustainable production or delivery capacity for an extended period. • The combined storage level in Lavon Lake and Bois d'Arc Lake, as published by the TWDB, is less than 55 percent of the total conservation pool capacity during the months of April through October or less than 45 percent of the total conservation pool capacity during the months of November through March. • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 2 drought. • NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station or some other NTMWD source may be limited in availability within the next three (3) months • The city's water demand exceeds 90 percent of the amount that can be delivered to customers for three consecutive days • The city's water demand for all or part of the delivery system equals delivery capacity because delivery capacity is inadequate • Water supply system is unable to deliver water due to the failure or damage of major water system components, supply source becomes contaminated, power outage, grid failure, natural disaster, or extreme weather event. • The City Manager or his/her designee determines that it is appropriate to initiate Stage 2.	5%	• The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 3. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other cause. • The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. • Water demand has exceeded or is expected to exceed maximum sustainable production or delivery capacity for an extended period. • The combined storage level in Lavon Lake and Bois d'Arc Lake, as published by the TWDB, is less than 30 percent of the total conservation pool capacity during the months of April through October or less than 20 percent of the total conservation pool capacity during the months of November through March. • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 3 drought. • The water supply from Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station or some other NTMWD source has become limited in availability • The city's water demand exceeds the amount that can be delivered to customers • The city's water demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate • Water supply system is unable to deliver water due to the failure or damage of major water system components, supply source becomes contaminated, power outage, grid failure, natural disaster, or extreme weather event. • The City Manager or his/her designee determines that it is appropriate to initiate Stage 3.	30%

Appendix M-1
Summary of Existing DCPs in Region C

						Stage 1		Stage 2		Stage 3	
Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal
Bonham WCP	Unknown-2024	WUG	NTMWD	Bonham Lake, NTMWD Sources	3	General Criteria • The City of Bonham Public Works Director, with the concurrence of the City Manager, finds that conditions warrant the declaration of Stage 1. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other cause. • The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. Demand Criteria • Water demand has exceeded or is expected to exceed 90% of maximum sustainable production or delivery capacity for an extended period. Supply Criteria • The water surface elevation in Lake Bonham, as published by the USGS, is less than 562.0'.	5%	General Criteria • The City of Bonham Public Works Director, with the concurrence of the City Manager, finds that conditions warrant the declaration of Stage 2. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other cause. • The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. Demand Criteria • Water demand has exceeded or is expected to exceed 95% of maximum sustainable production or delivery capacity for an extended period. Supply Criteria • The water surface elevation in Lake Bonham, as published by the USGS, is less than 560.0'.	10%	General Criteria • The City of Bonham Public Works Director, with the concurrence of the City Manager, finds that conditions warrant the declaration of Stage 1. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other cause. • The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. Demand Criteria • Water demand has exceeded or is expected to exceed maximum sustainable production or delivery capacity for an extended period. Supply Criteria • The water surface elevation in Lake Bonham, as published by the USGS, is less than 558.0'.	20%
City of Carrollton	Mar 2024	WUG	DWU	Trinity Aquifer, DWU sources	3	• The total raw water supply in connected lakes (east and west); or (2) the western lakes; or, (3) the eastern lakes has dropped below 65% (35% depleted) of DWU's share of the total conservation storage of the lakes • Water demand has reached or exceeded 85% of delivery capacity for 4 consecutive days • Water demand approaches a reduced delivery capacity for all or part of the system, as determined by DWU or the City of Carrollton Water utilities department • Water line breaks or pump/system failures, which impact the ability of DWU or the City of Carrollton Water Utilities department to provide treated water service • Natural or man-made contamination of the water supply source(s) occurs	5%	• The total raw water supply in connected lakes (east and west); or (2) the western lakes; or, (3) the eastern lakes has dropped below 50% (50% depleted) of DWU's share of the total conservation storage of the lakes • Water demand has reached or exceeded 90% of delivery capacity for 3 consecutive days • Water demand equals a reduced delivery capacity for all part of the system, as determined by DWU or the City of Carrollton Water Utilities department • Water line breaks or pump/system failures, which impact the ability of DWU or the City of Carrollton Water Utilities department to provide treated water service • Natural or man-made contamination of the water supply source(s) occurs •	15%	• The total raw water supply in connected lakes (east and west); or (2) the western lakes; or, (3) the eastern lakes has dropped below 35% (65% depleted) of DWU's share of the total conservation storage of the lakes • Water demand has reached or exceeded 95% of delivery capacity for 2 consecutive days • Water demand exceeds a reduced delivery capacity for all part of the system, as determined by DWU or the City of Carrollton Water Utilities department • Water line breaks or pump/system failures, which impact the ability of DWU or the City of Carrollton Water Utilities department to provide treated water service • Natural or man-made contamination of the water supply source(s) occurs	20%

Appendix M-1
Summary of Existing DCPs in Region C

Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Stage 1 Trigger	Stage 1 Savings Goal	Stage 2 Trigger	Stage 2 Savings Goal	Stage 3 Trigger	Stage 3 Savings Goal
College Mound WSC	Apr2024	WUG	NTMWD	NTMWD Sources	3	General Criteria • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 1. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other case • The water Supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions Demand Criteria • Water demand has exceeded or is expected to exceed 90% of maximum sustainable production or delivery capacity for an extended period. Supply Criteria • The combined storage in Lavon and Bois d'Arc Lake as published by the TWDB is less than: 70% of the combined conservation pool capacity during any of the months of April Through October 60% of the combined conservation pool capacity during any of the months of November through March • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 1 drought • NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source may be limited in availability within the next six months.	2%	General Criteria • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 2. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other case • The water Supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions Demand Criteria • Water demand has exceeded or is expected to exceed 95% of maximum sustainable production or delivery capacity for an extended period. Supply Criteria • The combined storage in Lavon and Bois d'Arc Lake as published by the TWDB is less than: 55% of the combined conservation pool capacity during any of the months of April Through October 45% of the combined conservation pool capacity during any of the months of November through March • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 2 drought • NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source may be limited in availability within the next three months.	5%	General Criteria • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 3. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other case • The water Supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions Demand Criteria • Water demand has exceeded or is expected to exceed maximum sustainable production or delivery capacity for an extended period. Supply Criteria • The combined storage in Lavon and Bois d'Arc Lake as published by the TWDB is less than: 30% of the combined conservation pool capacity during any of the months of April Through October 20% of the combined conservation pool capacity during any of the months of November through March • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a drought and have significantly reduced supplies available to NTMWD. • NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source has become limited in availability.	30%
Frisco	Apr-2019	WUG	NTMWD	NTMWD sources	3	1. The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 1. 2. Water demand is projected to approach the limit of NTMWD's permitted supply. 3. The storage level in Lavon Lake as published by the Texas Water Development Board (TWDB) is less than 70 percent of the total conservation pool capacity during any of the months of April through October or less than 60 percent of the total conservation pool capacity during any of the months of November through March. 4. The Sabine River Authority (SRA) has indicated that	2%	1. The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 2. 2. Water demand is projected to approach the limit of NTMWD's permitted supply. 3. The storage level in Lavon Lake as published by the Texas Water Development Board (TWDB) is less than 55 percent of the total conservation pool capacity during any of the months of April through October or less than 45 percent of the total conservation pool capacity during any of the months of November through March. 4. The Sabine River Authority (SRA) has indicated that its	10%	1. The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 3. 2. Water demand is projected to approach the limit of NTMWD's permitted supply. 3. The storage level in Lavon Lake as published by the Texas Water Development Board (TWDB) is less than 30 percent of the total conservation pool capacity during any of the months of April through October or less than 20 percent of the total conservation pool capacity during any of the months of November through March. 4. The Sabine River Authority (SRA) has indicated that its	Designated by NTMWD

Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Stage 1 Trigger	Stage 1 Savings Goal	Stage 2 Trigger	Stage 2 Savings Goal	Stage 3 Trigger	Stage 3 Savings Goal
						its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in Stage 1 drought. 5. NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station, or some other NTMWD water source may be limited in availability within the next six (6) months 6. Water demand exceeds 95 percent of the amount that can be delivered by NTMWD to Customers for three (3) consecutive days. 7. Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. 8. Supply source is interrupted or unavailable due to contamination, invasive species, equipment failure, or other cause. • Water supply system has a shortage in supply or damage to equipment. NTMWD may implement measures for only that portion of the NTMWD system impacted.		Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in Stage 2 drought. 5. NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station, or some other NTMWD water source may be limited in availability within the next three (3) months 6. Water demand exceeds 98 percent of the amount that can be delivered by NTMWD to Customers for three (3) consecutive days. 7. Water demand for all or part of the delivery system equals delivery capacity because delivery capacity is inadequate. 8. Supply source is interrupted or unavailable due to contamination, invasive species, equipment failure, or other cause. • Water supply system has a shortage in supply or damage to equipment. NTMWD may implement measures for only that portion of the NTMWD system impacted.		Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in Stage 3 drought. 5. NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station, or some other NTMWD water source have become limited in availability 6. Water demand exceeds the amount that can be delivered by NTMWD member cities and customers. 7. Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. 8. Supply source is interrupted or unavailable due to contamination, invasive species, equipment failure, or other cause. 9. NTMWD water supply system is unable to deliver water due to the failure or damage of major water system components • Part of the NTMWD system has a shortage in supply or damage to equipment. NTMWD may implement measures for only that portion of the NTMWD system impacted	
Little Elm	Apr-2019	WUG	NTMWD	NTMWD sources	3	• The NTMWD Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 1. • Water demand is projected to approach the limit of NTMWD's permitted supply. • The storage level in Lavon Lake as published by the Texas Water Development Board (TWDB), 3 is less than 70 percent of the total conservation pool capacity during any of the months of April through October or less than 60 percent of the total conservation pool capacity during any of the months of November through March. • The Sabine River Authority (SRA) has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 1 drought. • NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station, or some other NTMWD water source may be limited in availability within the next six (6) months. • Water demand exceeds 95 percent of the amount that can be delivered by NTMWD to Customers for three (3) consecutive days. • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • Supply source is interrupted or unavailable due to contamination, invasive species, equipment failure, or other cause.	2%	• The NTMWD Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 2. • Water demand is projected to approach the limit of NTMWD's permitted supply. • The storage level in Lavon Lake, as published by the TWDB, 3 is less than 55 percent of the total conservation pool capacity during any of the months of April through October or less than 45 percent of the total conservation pool capacity during any of the months of November through March. • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 2 drought. • NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station, or some other NTMWD water source may be limited in availability within the next three (3) months. • Water demand exceeds 98 percent of the amount that can be delivered to Customers for three (3) consecutive days. • Water demand for all or part of the delivery system equals delivery capacity, because delivery capacity is inadequate. • Supply source is interrupted or unavailable due to contamination, invasive species, equipment failure, or other cause. • Water supply system is unable to deliver water due to	10%	• The NTMWD Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 3. • Water demand is projected to approach or exceed the limit of the permitted supply. • The storage level in Lavon Lake, as published by the TWDB, 3 is less than 30 percent of the total conservation pool capacity during any of the months of April through October or less than 20 percent of the total conservation pool capacity during any of the months of November through March. • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 3 drought. • The water supply from Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, or some other NTMWD water source has become limited in availability. • Water demand exceeds the amount that can be delivered to Customers. • Water demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate. • Supply source is interrupted or unavailable due to contamination, invasive species, equipment failure or other cause. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • Part of the system has a shortage in supply or damage	Obtained from NTMWD

						Stage 1		Stage 2		Stage 3	
Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal
						• Water supply system is unable to deliver water due to the failure or damage of major water system components. • Part of the system has a shortage in supply or damage to equipment. NTMWD may implement measures for only that portion of the NTMWD system impacted. • Town of Little Elm water demand exceeds 95 percent of the amount that can be delivered to customers for three consecutive days. • Town of Little Elm water demand for all or part of the delivery system equals delivery capacity because delivery capacity is inadequate. • Supply source becomes contaminated. • Town of Little Elm water system is unable to deliver water due to the failure or damage of major water system components. Town of Little Elm individual plan may be implemented if other criteria dictate. •		the failure or damage of major water system components. • Part of the system has a shortage in supply or damage to equipment. NTMWD may implement measures for only that portion of the system impacted. • Town of Little Elm water demand exceeds 98 percent of the amount that can be delivered to customers for three consecutive days. • Town of Little Elm water demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate. • Supply source becomes contaminated. • Supply source is interrupted or unavailable due to invasive species. • Town of Little Elm water supply system is unable to deliver water due to the failure or damage of major water system components. • Town of Little Elm individual plan may be implemented if other criteria dictate.		to equipment. NTMWD may implement measures for only that portion of the system impacted. • Town of Little Elm water demand exceeds the amount that can be delivered to customers. • Town of Little Elm water demand for all or part of the delivery system seriously exceeds delivery capacity because the delivery capacity is inadequate. • Supply source becomes contaminated. • Town of Little Elm water supply system is unable to deliver water due to the failure or damage of major water system components. • Town of Little Elm individual plan may be implemented if other criteria dictate.	
McKinney	Apr-2024	WUG	NTMWD	NTMWD sources	3	• The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 1. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other cause. • The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. • Water demand has exceeded or is expected to exceed 90% of maximum sustainable production or delivery capacity for an extended period. • The combined storage level in Lavon Lake and Bois d'Arc Lake as published by the Texas Water Development Board (TWDB), is less than 70 percent of the total conservation pool capacity during any of the months of April through October or less than 60 percent of the total conservation pool capacity during any of the months of November through March. • The Sabine River Authority (SRA) has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 1 drought. • NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station, or some other NTMWD water source may	2%	• The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 2. • One or more supply source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other cause. • The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. • Water demand has exceeded or is expected to exceed 95% of maximum sustainable production or delivery capacity for an extended period. • The combined storage level in Lavon Lake and Bois d'Arc Lake, as published by the TWDB, is less than 55 percent of the total conservation pool capacity during any of the months of April through October or less than 45 percent of the total conservation pool capacity during any of the months of November through March. • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 2 drought. • NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station, or some other NTMWD water source may be limited in availability within the next three (3) months. •	5%	• The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 3. • One or more supply source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure, or other cause. • The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. • Water demand has exceeded or is expected to exceed maximum sustainable production or delivery capacity for an extended period. The combined storage level in Lavon Lake and Bois d'Arc Lake, as published by the TWDB, is less than 30 percent of the total conservation pool capacity during any of the months of April through October or less than 20 percent of the total conservation pool capacity during any of the months of November through March. • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 3 drought. • The water supply from Lake Texoma, Jim Chapman Lake, the • East Fork Water Reuse Project, Main Stem Pump Station, or some other NTMWD water source has become limited in availability	30%

Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Stage 1 Trigger	Stage 1 Savings Goal	Stage 2 Trigger	Stage 2 Savings Goal	Stage 3 Trigger	Stage 3 Savings Goal
						be limited in availability within the next six (6) months. •					
Melissa	Apr-2024	WUG	GTUA (NTMWD)	NTMWD sources, Woodbine Aquifer	3	o The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 1. o One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other cause. oThe water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. o Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) o A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. o Water demand has exceeded or is expected to exceed 90% of maximum sustainable production or delivery capacity for an extended period. o The combined storage level in Lavon Lake and Bois d'Arc Lake as published by the Texas Water Development Board (TWDB) is less than 70 percent of the total conservation pool capacity during any of the months of April through October or less than 60 percent of the total conservation pool capacity during any of the months of November through March. o The Sabine River Authority (SRA) has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in Stage 1 drought. • 5. NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station, or some other NTMWD water source may be limited in availability within the next six (6) months	2%	o The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 2. o One or more supply source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other cause. o The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. o Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) o A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. o Water demand has exceeded or is expected to exceed 95% of maximum sustainable production or delivery capacity for an extended period. o The combined storage level in Lavon Lake and Bois d'Arc Lakes published by the Texas Water Development Board (TWDB) is less than 55 percent of the total conservation pool capacity during any of the months of April through October or less than 45 percent of the total conservation pool capacity during any of the months of November through March. o The Sabine River Authority (SRA) has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in Stage 2 drought. o NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station, or some other NTMWD water source may be limited in availability within the next three (3) months • o Water demand exceeds 98 percent of the amount that can be delivered by NTMWD to Customers for three (3) consecutive days.	5%	o The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 3. o One or more supply source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure, or other cause. o The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. o Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) o A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. o Water demand has exceeded or is expected to exceed maximum sustainable production or delivery capacity for an extended period. o The combined storage level in Lavon Lake and Bois d'Arc Lake as published by the Texas Water Development Board (TWDB) is less than 30 percent of the total conservation pool capacity during any of the months of April through October or less than 20 percent of the total conservation pool capacity during any of the months of November through March. o The Sabine River Authority (SRA) has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in Stage 3 drought. • o NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station, or some other NTMWD water source has become limited in availability.	30%
Mesquite	May-2019	WUG	NTMWD	NTMWD Sources	3	• Water demand is projected to approach the limit of the permitted supply • The storage level, as published by the Texas Water Development Board, in Lavon Lake is less than 70 percent of the total conservation pool capacity during the months of April through October or less than 60 percent of the total conservation pool capacity during the months of November through March. • NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, or some other NTMWD source may be limited in availability within the next six (6)	2%	• Water demand is projected to approach the limit of the permitted supply • The water storage in Lavon Lake is less than 55 percent of the total conservation pool capacity during the months of April through October or less than 45 percent of the total conservation pool capacity during the months of November through March. • The Sabine River Authority has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 2. • NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem	10%	• Water demand is projected to approach or exceed the limit of the permitted supply • The storage level, as published by the Texas Water Development Board, in Lavon Lake is less than 30 percent of the total conservation pool capacity during the months of April through October or less than 20 percent of the total conservation pool capacity during the months of November through March. • The Sabine River Authority has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in Stage3. • The supply from Lake Texoma, Jim Chapman Lake, the	Designated by NTMWD

						Stage 1		Stage 2		Stage 3	
Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal
						months. • The Sabine River Authority has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in Stage 1 • Water demand exceeds 95 percent of the amount that can be delivered to customers for (3) three consecutive days. • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • Supply source is interrupted or unavailable due to contamination, invasive species, equipment failure or other causes. • Part of the system has a shortage in supply or damage to the equipment. The District may implement measure for only that portion of the system impacted. • Water supply system is unable to deliver water due to the failure or damage of major water system components • The City's water demand exceeds 90 percent of the amount that can be delivered to customers for three consecutive days • The City's water demand for all or part of the delivery system equals delivery capacity because delivery capacity is inadequate • The City's water supply source becomes contaminated • The City's water supply system is unable to deliver water due to the failure or damage of major water system components • The City's water system experiences overhead water storage levels incapable of filling above 80 percent for three consecutive days		Pump Station or some other NTMWD source may be limited in availability within the next three (3) months • Water demand exceeds 98 percent of the amount that can be delivered to customers for three consecutive days • Water demand for all or part of the delivery system equals delivery capacity because delivery capacity is inadequate • Supply source is interrupted or unavailable due to contamination, invasive species, equipment failure or other cause • Water supply system is unable to deliver water due to the failure or damage of major water system components • Part of the system has a shortage in supply or damage to equipment. NTMWD may implement measures for only that portion of the system impacted. • The City's water demand exceeds 95 percent of the amount that can be delivered to customers for three consecutive days • The City's water demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate • The City's water supply source becomes contaminated • The City's water supply system is unable to deliver water due to the failure or damage of major water system components • The City's water system experiences overhead water storage levels that do no refill above 65 percent for three consecutive days		East Fork Raw Water Reuse Project, the Main Stem Pump Station,, or some other NTMWD source has become limited in availability • Water demand exceeds the amount that can be delivered to customers • Water demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate • Supply source is interrupted or unavailable due to contamination, invasive species, equipment failure or other cause. • Water supply system is unable to deliver water due to the failure or damage of major water system components • Part of the system has a shortage in supply or damage to equipment. The District may implement measures for only that portionof the system impacted. • The City's water demand exceeds the amount that can be delivered to customers • The City's water demand for all or part of the delivery system seriously exceeds delivery capacity because the delivery capacity is inadequate • The City's water supply source becomes contaminated • The City's water supply system is unable to deliver water due to the failure or damage of major water system components • The City's water system experiences water storage levels incapable of filling above 40 percent for three consecutive days	
Murphy	Apr-2024	WUG	NTMWD	NTMWD sources	3	o The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 1 o One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other cause. o The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. o Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) o A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. o Water demand has exceeded or is expected to exceed 90% of maximum sustainable production or delivery capacity for an extended period.	2%	o The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 2 o One or more supply source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other cause. o The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. o Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) o A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. o Water demand has exceeded or is expected to exceed 95% of maximum sustainable production or delivery capacity for an extended period. o The combined storage level in Lavon Lake and Bois d'Arc	5%	o The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 3 o One or more supply source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure, or other cause. o The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. o Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) o A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. o Water demand has exceeded or is expected to exceed maximum sustainable production or delivery capacity for an extended period. o The combined storage level in Lavon Lake and Bois d'Arc Lake, as published by the Texas Water Development Board (TWDB) is less than 30 percent of the total	30%

Appendix M-1
Summary of Existing DCPs in Region C

Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Stage 1 Trigger	Stage 1 Savings Goal	Stage 2 Trigger	Stage 2 Savings Goal	Stage 3 Trigger	Stage 3 Savings Goal
						o The combined storage level in Lavon Lake and Bois d'Arc Lake, as published by the Texas Water Development Board (TWDB) is less than 70 percent of the total conservation pool capacity during any of the months of April through October or less than 60 percent of the total conservation pool capacity during any of the months of November through March o The Sabin River Authority (SRA) has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 1 drought. o NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station, or some other NTMWD water source maybe limited in availability within the next six (6) months •		Lake, as published by the Texas Water Development Board (TWDB) is less than 55 percent of the total conservation pool capacity during any of the months of April through October or less than 45 percent of the total conservation pool capacity during any of the months of November through March o The Sabin River Authority (SRA) has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 2 drought. o NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station, or some other NTMWD water source maybe limited in availability within the next three (3) months •		conservation pool capacity during any of the months of April through October or less than 20 percent of the total conservation pool capacity during any of the months of November through March o The Sabin River Authority (SRA) has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 3 drought. o The water supply from Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station, or some other NTMWD water source has become limited in availability. •	
Plano	Apr-2024	WUG	NTMWD	NTMWD sources	3	(1) The NTMWD Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 1. (2) Plano's water demand exceeds ninety-five (95) percent of the amount that can be delivered to customers for three consecutive days. (3) Plano's water demand for all or part of the water delivery system equals delivery capacity because delivery capacity is inadequate. (4) Plano's supply source becomes contaminated. (5) Plano's water supply system is unable to deliver water due to the failure or damage of major water system components. • Other criteria as determined by the City.	5%	(1) The NTMWD Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 2. (2) Plano's water demand exceeds ninety-eight (98) percent of the amount that can be delivered to customers for three consecutive days. (3) Plano's water demand for all or part of the water delivery system exceeds delivery capacity because delivery capacity is inadequate. (4) Plano's supply source becomes contaminated. (5) Plano's water supply system is unable to deliver water due to the failure or damage of major water system components. • Other criteria as determined by the City Manager.	10%	(1) The NTMWD Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 3. (2) Plano's water demand exceeds the amount that can be delivered to customers. (3) Plano's water demand for all or part of the water delivery system seriously exceeds delivery capacity because the delivery capacity is inadequate. (4) Plano's supply source becomes contaminated. (5) Plano's water supply system is unable to deliver water due to the failure or damage of major water system components. (6) Plano is unable to recover water storage of one hundred (100) percent in all storage facilities within a twenty-four (24) hour period. • (7) Plano's individual Plan may be implemented if other criteria dictate.	Designated by NTMWD
Prosper	Apr-2024	WUG	NTMWD	NTMWD sources	3	o The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 1 o One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other cause. o The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. o Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) o A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. o Water demand has exceeded or is expected to exceed	2%	o The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 2 o One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other cause. o The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. o Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) o A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. o Water demand has exceeded or is expected to exceed	5%	o The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 3 o One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other cause. o The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. o Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) o A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. o Water demand has exceeded or is expected to exceed	30%

						Stage 1		Stage 2		Stage 3	
Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal
						90% of maximum sustainable production or delivery capacity for an extended period. o The combined storage level in Lavon Lake and Bois d'Arc Lake, as published by the Texas Water Development Board (TWDB) is less than 70 percent of the total conservation pool capacity during any of the months of April through October or less than 60 percent of the total conservation pool capacity during any of the months of November through March o The Sabin River Authority (SRA) has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 1 drought. o NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station, or some other NTMWD water source maybe limited in availability within the next six (6) months •		95% of maximum sustainable production or delivery capacity for an extended period. o The combined storage level in Lavon Lake and Bois d'Arc Lake, as published by the Texas Water Development Board (TWDB) is less than 55 percent of the total conservation pool capacity during any of the months of April through October or less than 45 percent of the total conservation pool capacity during any of the months of November through March o The Sabin River Authority (SRA) has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 2 drought. o NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station, or some other NTMWD water source maybe limited in availability within the next three (3) months •		maximum sustainable production or delivery capacity for an extended period. o The combined storage level in Lavon Lake and Bois d'Arc Lake, as published by the Texas Water Development Board (TWDB) is less than 30 percent of the total conservation pool capacity during any of the months of April through October or less than 20 percent of the total conservation pool capacity during any of the months of November through March o The Sabin River Authority (SRA) has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 3 drought. o The water supply from Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station, or some other NTMWD water source has become limited in availability. o Water demand exceeds the amount that can be delivered by NTMWD to customers for three (3) consecutive days •	
Richardson	Apr-2024	WUG	NTMWD	NTMWD sources	3	o The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 1. o One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other cause. o The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. o Part of the system has a shortage of supply or damage to equipment. (The City of Richardson may implement measures for only that portion of the system impacted.) o A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. o Water demand has exceeded or is expected to exceed 90% of maximum sustainable production or delivery capacity for an extended period. o The combined storage level in Lavon Lake and Bois d'Arc Lake, as published by the Texas Water Development Board (TWDB) is less than 70 percent of the total conservation pool capacity during any of the months of April through October or less than 60 percent of the total conservation pool capacity during any of the months of November through March o The Sabin River Authority (SRA) has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 1	2%	o The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 2. o One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other cause. o The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. o Part of the system has a shortage of supply or damage to equipment. (The City of Richardson may implement measures for only that portion of the system impacted.) o A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. o Water demand has exceeded or is expected to exceed 95% of maximum sustainable production or delivery capacity for an extended period. o The combined storage level in Lavon Lake and Bois d'Arc Lake as published by the Texas Water Development Board (TWDB) is less than 55 percent of the total conservation pool capacity during any of the months of April through October or less than 45 percent of the total conservation pool capacity during any of the months of November through March o The Sabin River Authority (SRA) has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 2 drought.	5%	o The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 3. o One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other cause. o The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. o Part of the system has a shortage of supply or damage to equipment. (The City of Richardson may implement measures for only that portion of the system impacted.) o A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. o Water demand has exceeded or is expected to exceed maximum sustainable production or delivery capacity for an extended period. o The combined storage level in Lavon Lake and Bois d'Arc Lake, as published by the Texas Water Development Board (TWDB) is less than 30 percent of the total conservation pool capacity during any of the months of April through October or less than 20 percent of the total conservation pool capacity during any of the months of November through March o The Sabin River Authority (SRA) has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 3 drought.	30%

						Stage 1		Stage 2		Stage 3	
Entity	**Plan Date**	**Entity Type**	**Wholesale Water Provider(s)**	**Source(s)**	**No. of Stages**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**
						drought. o NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station, or some other NTMWD water source maybe limited in availability within the next six (6) months •		o NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station, or some other NTMWD water source maybe limited in availability within the next three (3) months •		o NTMWD's water supply from Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station, or some other NTMWD water source maybe limited in availability •	
Terrell	May-2024	WUG	NTMWD	NTMWD sources	3	• The NTMWD Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 1. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other cause. • The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. • Water demand has exceeded or is expected to exceed 90% of maximum sustainable production or delivery capacity for an extended period. The combined storage level in Lavon Lake and Bois d'Arc Lake, as published by the Texas Water Development Board (TWDB) is less than 70 percent of the total conservation pool capacity during any of the months of April through October or less than 60 percent of the total conservation pool capacity during any of the months of November through March. • The Sabine River Authority has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 1 drought. • NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station or some other NTMWD source may be limited in availability in the next six (6) months. •	2%	• The NTMWD Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage2. • One or more supply source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other cause. • The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. • Water demand has exceeded or is expected to exceed 95% of maximum sustainable production or delivery capacity for an extended period. The combined storage level in Lavon Lake and Bois d'Arc Lake, as published by the TWDB is less than 55 percent of the total conservation pool capacity during any of the months of April through October or less than 45 percent of the total conservation pool capacity during any of the months of November through March. • The Sabine River Authority has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 2 drought. (Measures required by SRA under a Stage 2 drought designation are similar to those under NTMWD's Stage 2.) • NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station or some other NTMWD source may be limited in availability within the next three (3) months. •	5%	• The NTMWD Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage3. • One or more supply source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure, or other cause. • The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. • Water demand has exceeded or is expected to exceed maximum sustainable production or delivery capacity for an extended period. The storage level in Lavon Lake, as published by the TWDB is less than 30 percent of the total conservation pool capacity during any of the months of April through October or less than20 percent of the total conservation pool capacity during any of the months of November through March. • The Sabine River Authority has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 3 Drought. (Measures required by SRA under Stage 3 drought designation are similar to those under NTMWD's Stage 3). • The water supply from Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station or some other NTMWD source has become severely limited in availability. •	30%
City of Corinth	Apr 2024	WUG	UTRWD	UTRWD sources	3	• The total raw water supply in water supply lakes available to UTRWD has dropped below 75% (25% depleted) during the time period form April 1 to October 31 • The total raw water supply in water supply lakes available to Upper Trinity has dropped below 80% (20% depleted) during the time period form November 1 to March 31.	5%	• The total raw water supply in water supply lakes available to UTRWD has dropped below 60% (40% depleted) during the time period form April 1 to October 31 • The total raw water supply in water supply lakes available to Upper Trinity has dropped below 65% (35% depleted) during the time period form November 1 to March 31.	10%	• The total raw water supply in water supply lakes available to UTRWD has dropped below 45% (55% depleted) during the time period form April 1 to October 31 • The total raw water supply in water supply lakes available to Upper Trinity has dropped below 50% (50% depleted) during the time period form November 1 to March 31. • Dallas Water Utilities (a source of raw water to UTRWD)	20%

						Stage 1		Stage 2		Stage 3	
Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal
						• Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 1 and given notice to UTRWD • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of stage 1 • Water demand has reached or exceeded 80% of delivery capacity for three consecutive days. • Water demand is approaching a level that will cause a reduced delivery capacity for all or part of the distribution system, as determined by the City of Corinth. • The water supply system has a significant limitation due to failure of or damage to important water system components.		• Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 2 and given notice to UTRWD • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of stage 2. • Water demand has reached or exceeded 85% of delivery capacity for three consecutive days. • Water demand is approaching a level that is causing a reduced delivery capacity for all or part of the distribution system, as determined by the City of Corinth. • The water supply system is unable to deliver water at normal rates due to failure of or damage to important water system components. • A significant deterioration in the quality of a water supply, being affected by a natural or man-made source.		has initiated Stage 3 and given notice to UTRWD • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of stage 3. • Water demand has reached or exceeded 90% of delivery capacity for three consecutive days. • Water demand exceeds the delivery capacity for all or part of the distribution system, as determined by the City of Corinth. • The water supply system is unable to deliver water in adequate quantities due to failure of or damage to important water system components. • Interruption of one or more water supply sources • Natural or man-made contamination of the water supply source that threatens water availability.	
City of Crandall	May 2024	WUG	NTMWD	NTMWD Sources	3	General Criteria • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 1. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other case • The water Supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions Demand Criteria • Water demand has exceeded or is expected to exceed 90% of maximum sustainable production or delivery capacity for an extended period. Supply Criteria • The combined storage in Lavon and Bois d'Arc Lake as published by the TWDB is less than: 70% of the combined conservation pool capacity during any of the months of April Through October 60% of the combined conservation pool capacity during any of the months of November through March • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork)	2%	General Criteria • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 2. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other case • The water Supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions Demand Criteria • Water demand has exceeded or is expected to exceed 95% of maximum sustainable production or delivery capacity for an extended period. Supply Criteria • The combined storage in Lavon and Bois d'Arc Lake as published by the TWDB is less than: 55% of the combined conservation pool capacity during any of the months of April Through October 45% of the combined conservation pool capacity during any of the months of November through March • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork)	5%	General Criteria • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 3. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other case • The water Supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions Demand Criteria • Water demand has exceeded or is expected to exceed maximum sustainable production or delivery capacity for an extended period. Supply Criteria • The combined storage in Lavon and Bois d'Arc Lake as published by the TWDB is less than: 30% of the combined conservation pool capacity during any of the months of April Through October 20% of the combined conservation pool capacity during any of the months of November through March • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a drought and have significantly reduced supplies	30%

Appendix M-1
Summary of Existing DCPs in Region C

Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Stage 1 Trigger	Stage 1 Savings Goal	Stage 2 Trigger	Stage 2 Savings Goal	Stage 3 Trigger	Stage 3 Savings Goal
						are in a Stage 1 drought NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source may be limited in availability within the next six months.		are in a Stage 2 drought NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source may be limited in availability within the next three months.		available to NTMWD. NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source has become limited in availability.	
Denton County FWSD 6	May 2024	WUG	UTRWD	UTRWD sources	3	• The total raw water supply in water supply lakes available to UTRWD has dropped below 75% (25% depleted) during the time period form April 1 to October 31 • The total raw water supply in water supply lakes available to Upper Trinity has dropped below 80% (20% depleted) during the time period form November 1 to March 31. • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 1 and given notice to UTRWD • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of stage 1 • Water demand has reached or exceeded 80% of delivery capacity for three consecutive days. • Water demand is approaching a level that will cause a reduced delivery capacity for all or part of the distribution system, as determined by District 6 • The water supply system has a significant limitation due to failure of or damage to important water system components.	5%	• The total raw water supply in water supply lakes available to UTRWD has dropped below 60% (40% depleted) during the time period form April 1 to October 31 • The total raw water supply in water supply lakes available to Upper Trinity has dropped below 65% (35% depleted) during the time period form November 1 to March 31. • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 2 and given notice to UTRWD • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of stage 2. • Water demand has reached or exceeded 85% of delivery capacity for three consecutive days. • Water demand is approaching a level that is causing a reduced delivery capacity for all or part of the distribution system, as determined by District 6 • The water supply system is unable to deliver water at normal rates due to failure of or damage to important water system components. • A significant deterioration in the quality of a water supply, being affected by a natural or man-made source.	10%	• The total raw water supply in water supply lakes available to UTRWD has dropped below 45% (55% depleted) during the time period form April 1 to October 31 • The total raw water supply in water supply lakes available to Upper Trinity has dropped below 50% (50% depleted) during the time period form November 1 to March 31. • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 3 and given notice to UTRWD • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of stage 3. • Water demand has reached or exceeded 90% of delivery capacity for three consecutive days. • Water demand exceeds the delivery capacity for all or part of the distribution system, as determined by District 6 • The water supply system is unable to deliver water in adequate quantities due to failure of or damage to important water system components. • Interruption of one or more water supply sources • Natural or man-made contamination of the water supply source that threatens water availability.	20%
Denton County FWSD 7	Apr 2024	WUG	UTRWD	UTRWD sources	3	• The total raw water supply in water supply lakes available to UTRWD has dropped below 75% (25% depleted) during the time period form April 1 to October 31 • The total raw water supply in water supply lakes available to Upper Trinity has dropped below 80% (20% depleted) during the time period form November 1 to March 31. • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 1 and given notice to UTRWD • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of stage 1 • Water demand has reached or exceeded 80% of delivery capacity for three consecutive days. • Water demand is approaching a level that will cause a reduced delivery capacity for all or part of the distribution system, as determined by District 7 • The water supply system has a significant limitation due to failure of or damage to important water system	5%	• The total raw water supply in water supply lakes available to UTRWD has dropped below 60% (40% depleted) during the time period form April 1 to October 31 • The total raw water supply in water supply lakes available to Upper Trinity has dropped below 65% (35% depleted) during the time period form November 1 to March 31. • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 2 and given notice to UTRWD • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of stage 2. • Water demand has reached or exceeded 85% of delivery capacity for three consecutive days. • Water demand is approaching a level that is causing a reduced delivery capacity for all or part of the distribution system, as determined by District 7 • The water supply system is unable to deliver water at normal rates due to failure of or damage to	10%	• The total raw water supply in water supply lakes available to UTRWD has dropped below 45% (55% depleted) during the time period form April 1 to October 31 • The total raw water supply in water supply lakes available to Upper Trinity has dropped below 50% (50% depleted) during the time period form November 1 to March 31. • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 3 and given notice to UTRWD • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of stage 3. • Water demand has reached or exceeded 90% of delivery capacity for three consecutive days. • Water demand exceeds the delivery capacity for all or part of the distribution system, as determined by District 7 • The water supply system is unable to deliver water in adequate quantities due to failure of or damage to important water system components. • Interruption of one or more water supply sources • Natural or man-made contamination of the water supply	20%

Appendix M-1
Summary of Existing DCPs in Region C

Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Stage 1 Trigger	Stage 1 Savings Goal	Stage 2 Trigger	Stage 2 Savings Goal	Stage 3 Trigger	Stage 3 Savings Goal
						components.		important water system components. • A significant deterioration in the quality of a water supply, being affected by a natural or man-made source.		source that threatens water availability.	
Denton County FWSD 8A	May 2024	WUG	UTRWD	UTRWD sources	3	• The total raw water supply in water supply lakes available to UTRWD has dropped below 75% (25% depleted) during the time period form April 1 to October 31 • The total raw water supply in water supply lakes available to Upper Trinity has dropped below 80% (20% depleted) during the time period form November 1 to March 31. • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 1 and given notice to UTRWD • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of stage 1 • Water demand has reached or exceeded 80% of delivery capacity for three consecutive days. • Water demand is approaching a level that will cause a reduced delivery capacity for all or part of the distribution system, as determined by District 8-A • The water supply system has a significant limitation due to failure of or damage to important water system components.	5%	• The total raw water supply in water supply lakes available to UTRWD has dropped below 60% (40% depleted) during the time period form April 1 to October 31 • The total raw water supply in water supply lakes available to Upper Trinity has dropped below 65% (35% depleted) during the time period form November 1 to March 31. • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 2 and given notice to UTRWD • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of stage 2. • Water demand has reached or exceeded 85% of delivery capacity for three consecutive days. • Water demand is approaching a level that is causing a reduced delivery capacity for all or part of the distribution system, as determined by District 8-A • The water supply system is unable to deliver water at normal rates due to failure of or damage to important water system components. A significant deterioration in the quality of a water supply, being affected by a natural or man-made source.	10%	• The total raw water supply in water supply lakes available to UTRWD has dropped below 45% (55% depleted) during the time period form April 1 to October 31 • The total raw water supply in water supply lakes available to Upper Trinity has dropped below 50% (50% depleted) during the time period form November 1 to March 31. • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 3 and given notice to UTRWD • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of stage 3. • Water demand has reached or exceeded 90% of delivery capacity for three consecutive days. • Water demand exceeds the delivery capacity for all or part of the distribution system, as determined by District 8-A • The water supply system is unable to deliver water in adequate quantities due to failure of or damage to important water system components. • Interruption of one or more water supply sources • Natural or man-made contamination of the water supply source that threatens water availability.	20%
Denton County FWSD 8B	May 2024	WUG	UTRWD	UTRWD sources	3	• The total raw water supply in water supply lakes available to UTRWD has dropped below 75% (25% depleted) during the time period form April 1 to October 31 • The total raw water supply in water supply lakes available to Upper Trinity has dropped below 80% (20% depleted) during the time period form November 1 to March 31. • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 1 and given notice to UTRWD • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of stage 1 • Water demand has reached or exceeded 80% of delivery capacity for three consecutive days. • Water demand is approaching a level that will cause a reduced delivery capacity for all or part of the distribution system, as determined by district 8-B • The water supply system has a significant limitation due to failure of or damage to important water system components.	5%	• The total raw water supply in water supply lakes available to UTRWD has dropped below 60% (40% depleted) during the time period form April 1 to October 31 • The total raw water supply in water supply lakes available to Upper Trinity has dropped below 65% (35% depleted) during the time period form November 1 to March 31. • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 2 and given notice to UTRWD • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of stage 2. • Water demand has reached or exceeded 85% of delivery capacity for three consecutive days. • Water demand is approaching a level that is causing a reduced delivery capacity for all or part of the distribution system, as determined by district 8-B • The water supply system is unable to deliver water at normal rates due to failure of or damage to important water system components. • A significant deterioration in the quality of a water	10%	• The total raw water supply in water supply lakes available to UTRWD has dropped below 45% (55% depleted) during the time period form April 1 to October 31 • The total raw water supply in water supply lakes available to Upper Trinity has dropped below 50% (50% depleted) during the time period form November 1 to March 31. • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 3 and given notice to UTRWD • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of stage 3. • Water demand has reached or exceeded 90% of delivery capacity for three consecutive days. • Water demand exceeds the delivery capacity for all or part of the distribution system, as determined by district 8-B • The water supply system is unable to deliver water in adequate quantities due to failure of or damage to important water system components. • Interruption of one or more water supply sources • Natural or man-made contamination of the water supply source that threatens water availability.	20%

						Stage 1		Stage 2		Stage 3	
Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal
								supply, being affected by a natural or man-made source.			
Denton County FWSD 11A	May 2024	WUG	UTRWD	UTRWD sources	3	• The total raw water supply in water supply lakes available to UTRWD has dropped below 75% (25% depleted) during the time period form April 1 to October 31 • The total raw water supply in water supply lakes available to Upper Trinity has dropped below 80% (20% depleted) during the time period form November 1 to March 31. • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 1 and given notice to UTRWD • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of stage 1 • Water demand has reached or exceeded 80% of delivery capacity for three consecutive days. • Water demand is approaching a level that will cause a reduced delivery capacity for all or part of the distribution system, as determined by District 11-A • The water supply system has a significant limitation due to failure of or damage to important water system components.	5%	• The total raw water supply in water supply lakes available to UTRWD has dropped below 60% (40% depleted) during the time period form April 1 to October 31 • The total raw water supply in water supply lakes available to Upper Trinity has dropped below 65% (35% depleted) during the time period form November 1 to March 31. • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 2 and given notice to UTRWD • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of stage 2. • Water demand has reached or exceeded 85% of delivery capacity for three consecutive days. • Water demand is approaching a level that is causing a reduced delivery capacity for all or part of the distribution system, as determined by District 11-A. • The water supply system is unable to deliver water at normal rates due to failure of or damage to important water system components. • A significant deterioration in the quality of a water supply, being affected by a natural or man-made source.	10%	• The total raw water supply in water supply lakes available to UTRWD has dropped below 45% (55% depleted) during the time period form April 1 to October 31 • The total raw water supply in water supply lakes available to Upper Trinity has dropped below 50% (50% depleted) during the time period form November 1 to March 31. • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 3 and given notice to UTRWD • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of stage 3. • Water demand has reached or exceeded 90% of delivery capacity for three consecutive days. • Water demand exceeds the delivery capacity for all or part of the distribution system, as determined by District 11-A. • The water supply system is unable to deliver water in adequate quantities due to failure of or damage to important water system components. • Interruption of one or more water supply sources • Natural or man-made contamination of the water supply source that threatens water availability.	20%
Denton County FWSD 11B	May 2024	WUG	UTRWD	UTRWD sources	3	• The total raw water supply in water supply lakes available to UTRWD has dropped below 75% (25% depleted) during the time period form April 1 to October 31 • The total raw water supply in water supply lakes available to Upper Trinity has dropped below 80% (20% depleted) during the time period form November 1 to March 31. • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 1 and given notice to UTRWD • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of stage 1 • Water demand has reached or exceeded 80% of delivery capacity for three consecutive days. • Water demand is approaching a level that will cause a reduced delivery capacity for all or part of the distribution system, as determined by District 11-B. • The water supply system has a significant limitation due to failure of or damage to important water system components.	5%	• The total raw water supply in water supply lakes available to UTRWD has dropped below 60% (40% depleted) during the time period form April 1 to October 31 • The total raw water supply in water supply lakes available to Upper Trinity has dropped below 65% (35% depleted) during the time period form November 1 to March 31. • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 2 and given notice to UTRWD • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of stage 2. • Water demand has reached or exceeded 85% of delivery capacity for three consecutive days. • Water demand is approaching a level that is causing a reduced delivery capacity for all or part of the distribution system, as determined by District 11-B. • The water supply system is unable to deliver water at normal rates due to failure of or damage to important water system components.	10%	• The total raw water supply in water supply lakes available to UTRWD has dropped below 45% (55% depleted) during the time period form April 1 to October 31 • The total raw water supply in water supply lakes available to Upper Trinity has dropped below 50% (50% depleted) during the time period form November 1 to March 31. • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 3 and given notice to UTRWD • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of stage 3. • Water demand has reached or exceeded 90% of delivery capacity for three consecutive days. • Water demand exceeds the delivery capacity for all or part of the distribution system, as determined by District 11-B. • The water supply system is unable to deliver water in adequate quantities due to failure of or damage to important water system components. • Interruption of one or more water supply sources • Natural or man-made contamination of the water supply	20%

						Stage 1		Stage 2		Stage 3	
Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal
								• A significant deterioration in the quality of a water supply, being affected by a natural or man-made source.		source that threatens water availability. •	
Denton County FWSD 11C	May 2024	WUG	UTRWD	UTRWD sources	3	• The total raw water supply in water supply lakes available to UTRWD has dropped below 75% (25% depleted) during the time period form April 1 to October 31 • The total raw water supply in water supply lakes available to Upper Trinity has dropped below 80% (20% depleted) during the time period form November 1 to March 31. • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 1 and given notice to UTRWD • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of stage 1 • Water demand has reached or exceeded 80% of delivery capacity for three consecutive days. • Water demand is approaching a level that will cause a reduced delivery capacity for all or part of the distribution system, as determined by District 11-C. • The water supply system has a significant limitation due to failure of or damage to important water system components.	5%	• The total raw water supply in water supply lakes available to UTRWD has dropped below 60% (40% depleted) during the time period form April 1 to October 31 • The total raw water supply in water supply lakes available to Upper Trinity has dropped below 65% (35% depleted) during the time period form November 1 to March 31. • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 2 and given notice to UTRWD • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of stage 2. • Water demand has reached or exceeded 85% of delivery capacity for three consecutive days. • Water demand is approaching a level that is causing a reduced delivery capacity for all or part of the distribution system, as determined by District 11-C. • The water supply system is unable to deliver water at normal rates due to failure of or damage to important water system components. • A significant deterioration in the quality of a water supply, being affected by a natural or man-made source.	10%	• The total raw water supply in water supply lakes available to UTRWD has dropped below 45% (55% depleted) during the time period form April 1 to October 31 • The total raw water supply in water supply lakes available to Upper Trinity has dropped below 50% (50% depleted) during the time period form November 1 to March 31. • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 3 and given notice to UTRWD • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of stage 3. • Water demand has reached or exceeded 90% of delivery capacity for three consecutive days. • Water demand exceeds the delivery capacity for all or part of the distribution system, as determined by District 11-C. • The water supply system is unable to deliver water in adequate quantities due to failure of or damage to important water system components. • Interruption of one or more water supply sources • Natural or man-made contamination of the water supply source that threatens water availability.	20%
Elm Ridge WCID	Mar 2024	WUG	UTRWD	UTRWD sources	3	• The total raw water supply in water supply lakes available to UTRWD has dropped below 75% (25% depleted) during the time period form April 1 to October 31 • The total raw water supply in water supply lakes available to Upper Trinity has dropped below 80% (20% depleted) during the time period form November 1 to March 31. • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 1 and given notice to UTRWD • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of stage 1 • Water demand has reached or exceeded 80% of delivery capacity for three consecutive days. • Water demand is approaching a level that will cause a reduced delivery capacity for all or part of the distribution system, as determined by the District • The water supply system has a significant limitation due to failure of or damage to important water system components.	5%	• The total raw water supply in water supply lakes available to UTRWD has dropped below 60% (40% depleted) during the time period form April 1 to October 31 • The total raw water supply in water supply lakes available to Upper Trinity has dropped below 65% (35% depleted) during the time period form November 1 to March 31. • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 2 and given notice to UTRWD • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of stage 2. • Water demand has reached or exceeded 85% of delivery capacity for three consecutive days. • Water demand is approaching a level that is causing a reduced delivery capacity for all or part of the distribution system, as determined by the District • The water supply system is unable to deliver water at normal rates due to failure of or damage to important water system components.	10%	• The total raw water supply in water supply lakes available to UTRWD has dropped below 45% (55% depleted) during the time period form April 1 to October 31 • The total raw water supply in water supply lakes available to Upper Trinity has dropped below 50% (50% depleted) during the time period form November 1 to March 31. • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 3 and given notice to UTRWD • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of stage 3. • Water demand has reached or exceeded 90% of delivery capacity for three consecutive days. • Water demand exceeds the delivery capacity for all or part of the distribution system, as determined by the District • The water supply system is unable to deliver water in adequate quantities due to failure of or damage to important water system components. • Interruption of one or more water supply sources • Natural or man-made contamination of the water supply	20%

						Stage 1		Stage 2		Stage 3	
Entity	**Plan Date**	**Entity Type**	**Wholesale Water Provider(s)**	**Source(s)**	**No. of Stages**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**
								• A significant deterioration in the quality of a water supply, being affected by a natural or man-made source.		source that threatens water availability.	
City of Forney	Mar 2024	WWP	NTMWD	NTMWD Sources	3	General Criteria • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 1. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other case • The water Supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions Demand Criteria • Water demand has exceeded or is expected to exceed 90% of maximum sustainable production or delivery capacity for an extended period. Supply Criteria • The combined storage in Lavon and Bois d'Arc Lake as published by the TWDB is less than: 70% of the combined conservation pool capacity during any of the months of April Through October 60% of the combined conservation pool capacity during any of the months of November through March • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 1 drought • NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source may be limited in availability within the next six months.	2%	General Criteria • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 2. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other case • The water Supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions Demand Criteria • Water demand has exceeded or is expected to exceed 95% of maximum sustainable production or delivery capacity for an extended period. Supply Criteria • The combined storage in Lavon and Bois d'Arc Lake as published by the TWDB is less than: 55% of the combined conservation pool capacity during any of the months of April Through October 45% of the combined conservation pool capacity during any of the months of November through March • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 2 drought • NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source may be limited in availability within the next three months.	5%	General Criteria • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 3. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other case • The water Supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions Demand Criteria • Water demand has exceeded or is expected to exceed maximum sustainable production or delivery capacity for an extended period. Supply Criteria • The combined storage in Lavon and Bois d'Arc Lake as published by the TWDB is less than: 30% of the combined conservation pool capacity during any of the months of April Through October 20% of the combined conservation pool capacity during any of the months of November through March • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a drought and have significantly reduced supplies available to NTMWD. • NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source has become limited in availability.	30%
Cross Timbers WSC	Apr 2017	WUG	UTRWD	UTRWD Sources and Trinity aquifer	N/A	No Triggers available					

Appendix M-1
Summary of Existing DCPs in Region C

						Stage 1		Stage 2		Stage 3	
Entity	**Plan Date**	**Entity Type**	**Wholesale Water Provider(s)**	**Source(s)**	**No. of Stages**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**
East Fork SUD	Apr 2024	WUG	NTMWD	NTMWD Sources	3	General Criteria • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 1. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other case • The water Supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions Demand Criteria • Water demand has exceeded or is expected to exceed 90% of maximum sustainable production or delivery capacity for an extended period. Supply Criteria • The combined storage in Lavon and Bois d'Arc Lake as published by the TWDB is less than: 70% of the combined conservation pool capacity during any of the months of April Through October 60% of the combined conservation pool capacity during any of the months of November through March • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 1 drought • NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source may be limited in availability within the next six months.	2%	General Criteria • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 2. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other case • The water Supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions Demand Criteria • Water demand has exceeded or is expected to exceed 95% of maximum sustainable production or delivery capacity for an extended period. Supply Criteria • The combined storage in Lavon and Bois d'Arc Lake as published by the TWDB is less than: 55% of the combined conservation pool capacity during any of the months of April Through October 45% of the combined conservation pool capacity during any of the months of November through March • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 2 drought • NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source may be limited in availability within the next three months.	5%	General Criteria • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 3. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other case • The water Supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions Demand Criteria • Water demand has exceeded or is expected to exceed maximum sustainable production or delivery capacity for an extended period. Supply Criteria • The combined storage in Lavon and Bois d'Arc Lake as published by the TWDB is less than: 30% of the combined conservation pool capacity during any of the months of April Through October 20% of the combined conservation pool capacity during any of the months of November through March • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a drought and have significantly reduced supplies available to NTMWD. • NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source has become limited in availability.	30%
Parker County SUD	May 2022	WUG	N/A	Mineral Wells, Brazos River Authority, and Trinity Aquifer	3	• Water stored in Lake Palo Pinto is equal to or less than 13,780 acre-feet or 860 ft. MSL (50% of storage capacity) and more than 6,279 acre feet or 854 ft. MSL. • Water consumption has reached 80 percent of daily maximum supply for three (3) consecutive days. • Water supply is reduced to a level that is only 20 percent greater than the average consumption for the previous month. • There is an extended period (at least eight (8) weeks) of low rainfall and daily use has 20 percent above the	20 %	• Water stored in Lake Palo Pinto is equal to or less than 6,279 acre-feet or 854 ft. MSL 25% of storage capacity) and more than 3,392 acre feet or 849 ft. MSL. • Water consumption has reached 90 percent of the amount available for three consecutive days. • The water level in any of the water storage tanks cannot be replenished for three (3) consecutive days. • Requirements for termination – Stage II of the Plan may be rescinded when all the conditions listed as triggering events have ceased to exist for a period of	25%	• Failure of a major component of the system or an event which reduces the minimum residual pressure in the system below 20 psi for a period of 24 hours or longer. • Water consumption of 95 percent or more of the maximum available for three (3) days. • Water consumption of 100 percent of the maximum available and the water storage levels in the system drop for one 24-hour period. • Natural or man-made contamination of the water supply source(s). • The declaration of a state of disaster due to drought	30%

						Stage 1		Stage 2		Stage 3	
Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal
						use for the same period during the previous year. • Any mechanical failure of pumping equipment which will require more than 24 hours repair when no water shortage conditions exist. • Requirements for termination – Stage I of the Plan may be rescinded when all the conditions listed as triggering events have ceased to exist for a period of 10 consecutive days. Upon termination of Stage I, Stage 0 becomes operative. The District will notify its customers of the termination of Stage I.		10 consecutive days. Upon termination of Stage II, Stage I becomes operative.		conditions in a county or counties by the District. • Reduction of wholesale water supply due to drought conditions. • Other unforeseen events which could cause imminent health or safety risks to the public.	

Gastonia Scurry SUD	Unknown-2024	WUG	N/A	Mineral Wells, Brazos River Authority, and Trinity Aquifer	3	General Criteria • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 1. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other case • The water Supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions Demand Criteria • Water demand has exceeded or is expected to exceed 90% of maximum sustainable production or delivery capacity for an extended period. Supply Criteria • The combined storage in Lavon and Bois d'Arc Lake as published by the TWDB is less than: 70% of the combined conservation pool capacity during any of the months of April Through October 60% of the combined conservation pool capacity during any of the months of November through March • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 1 drought • NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source may be limited in availability within the next six months.	2%	General Criteria • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 2. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other case • The water Supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions Demand Criteria • Water demand has exceeded or is expected to exceed 95% of maximum sustainable production or delivery capacity for an extended period. Supply Criteria • The combined storage in Lavon and Bois d'Arc Lake as published by the TWDB is less than: 55% of the combined conservation pool capacity during any of the months of April Through October 45% of the combined conservation pool capacity during any of the months of November through March • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 2 drought • NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source may be limited in availability within the next three months.	5%	General Criteria • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 3. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other case • The water Supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions Demand Criteria • Water demand has exceeded or is expected to exceed maximum sustainable production or delivery capacity for an extended period. Supply Criteria • The combined storage in Lavon and Bois d'Arc Lake as published by the TWDB is less than: 30% of the combined conservation pool capacity during any of the months of April Through October 20% of the combined conservation pool capacity during any of the months of November through March • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a drought and have significantly reduced supplies available to NTMWD. • NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source has become limited in availability.	30%

Appendix M-1
Summary of Existing DCPs in Region C

						Stage 1		Stage 2		Stage 3	
Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal
Grand Prairie	May 2024	WUG	DWU	DWU sources, Fort worth, Midlothian, and Mansfield	3	• Pursuant to requirements specified in the wholesale treated water purchase contracts with any wholesale water supplier, notification is received from such supplier requesting initiation of water restrictions. • Combined storage falls below 200 fallows per capita at the beginning of a 24- demand period. • Water demand exceeds ninety percent (90%) of the current maximum flow rate contracted with DWU for three (3) consecutive days. • Other situations that limit distribution of water, as determined by the Director, such as: Short or long-term equipment failure or failure to maintain 35 psi pressure at up to 500 service locations or up to 10 fire hydrants in localized areas Short term deficiencies within an entire pressure district. Power failure or restrictions. Short term disruptions of major water supply lines.	5%	• Pursuant to requirements specified in the wholesale treated water purchase contracts with any wholesale water supplier, notification is received from one or more wholesale suppliers requesting initiation of water restrictions. • Total water supply reduced by ten percent (10%) on a continuous basis during high water usage months • Combined storage falls below 150 fallows per capita at the beginning of a 24- demand period. • Water demand exceeds one hundred percent (100%) of the current maximum flow rate contracted from wholesale water suppliers for five (5) consecutive days. • Failure to maintain 35 psi pressure in any pressure plane • Water use exceeds one hundred and three percent (103%) of the current maximum flow rate contracted from either wholesale water supplier for three (3) consecutive days. • Short term in the City's distribution system limit supply capabilities such as system outage due to the failure or damage of major water system components.	5%	• Pursuant to requirements specified in the wholesale purchase contract, notification is received from either wholesale water supplier requesting initiation of water restrictions. • Total water supply reduced by twenty percent (20%) on a continuous basis during high water usage months. • Combined storage falls below 140 gallons per capita at the beginning of a 24-hour demand period. • Stage 2 restrictions fail to alleviate continued potable water storage depletion • Long term deficiencies in supply within an entire pressure district • Failure to maintain 25 psi pressure in any portion of the distribution system. • Any unanticipated situations that limit distribution of water, as determined by the Director. • Power failure or restrictions.	10%
Kaufman	May-2024	WUG	NTMWD	NTMWD Sources		• The total raw water supply in the water supply lakes available to Upper Trinity has dropped below 75% (25% depleted) during the time period from April 1 to October 31 • The total raw water supply in the water supply lakes available to Upper Trinity has dropped below 80% (20% depleted) during the time period from November 1 to march 31 • Dalas Water Utilities has initiated Stage 1 and given notice to Upper Trinity • Water demand has reached or exceeded 80% of delivery capacity for three consecutive days • Water demand is approaching a level that will cause a reduced delivery capacity for all or part of the transmission system as determined by Upper Trinity. • The General Manager, with the concurrence of the Upper Trinity Board of Directors finds that conditions warrant the declaration of stage 1.	5%	• The total raw water supply in the water supply lakes available to Upper Trinity has dropped below 60% (40% depleted) during the time period from April 1 to October 31 • The total raw water supply in the water supply lakes available to Upper Trinity has dropped below 65% (35% depleted) during the time period from November 1 to march 31 • Dalas Water Utilities has initiated Stage 2 and given notice to Upper Trinity • Water demand has reached or exceeded 85% of delivery capacity for three consecutive days • Water demand has reached a level that is causing a reduced delivery capacity for all or part of the transmission system as determined by Upper Trinity. • The transmission system is unable to deliver water at normal rates due to failure of or damage to, major water system components. • A significant deterioration in the quality of a water supply, being affected by a natural or man-made source. • The General Manager, with the concurrence of the Upper Trinity Board of Directors finds that conditions warrant the declaration of stage 2.	10%	• The total raw water supply in the water supply lakes available to Upper Trinity has dropped below 45% (55% depleted) during the time period from April 1 to October 31 • The total raw water supply in the water supply lakes available to Upper Trinity has dropped below 50% (50% depleted) during the time period from November 1 to march 31 • Dalas Water Utilities has initiated Stage 3 and given notice to Upper Trinity • Water demand has reached or exceeded 90% of delivery capacity for three consecutive days • Water demand exceeds the delivery capacity for all or part of the transmission system, as determined by Upper Trinity. • The transmission system is unable to deliver water in adequate quantities due to failure of, or damage to, major water system components • Interruption of one or more water supply sources • Natural or man-made contamination of an Upper Trinity water supply source(s) that threatens after availability • The General Manager, with the concurrence of the Upper Trinity Board of Directors, finds that conditions warrant the declaration of Stage 3.	20%

Appendix M-1
Summary of Existing DCPs in Region C

						Stage 1		Stage 2		Stage 3	
Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal
City of Lantana	Mar 2024	WUG	UTRWD	UTRWD sources	3	• The total raw water supply in water supply lakes available to WTRWD has dropped below 75% (25% depleted) during the time period from April 1 to October 31 • The total raw water supply in the water supply lakes available to Upper Trinity has dropped below 80% (20% depleted) during this time period from November 1 to March 31 • Dallas Water Utilities has initiated Stage 1 and given notice to UTRWD • UTRWD with concurrence of Board of Directors finds that conditions warrant the declaration of stage 1 • Water demand has reached or exceeded [80%] of delivery capacity for three consecutive days • Water demands is approaching a level that will cause a reduced delivery capacity for all or part of the distribution system as determined by District 7 • The water supply system has a significant limitation due to failure of or damage to major water system components.	5%	• The total raw water supply in water supply lakes available to WTRWD has dropped below 60% (40% depleted) during the time period from April 1 to October 31 • The total raw water supply in the water supply lakes available to Upper Trinity has dropped below 65% (35% depleted) during this time period from November 1 to March 31 • Dallas Water Utilities has initiated Stage 2 and given notice to UTRWD • UTRWD with concurrence of Board of Directors finds that conditions warrant the declaration of stage 2 • Water demand has reached or exceeded [85%] of delivery capacity for three consecutive days • Water demands has reached a level that is causing a reduced delivery capacity for all or part of the distribution system as determined by District 7 • The water supply system is unable to deliver water at normal rates due to failure of or damage to major water system components • A significant deterioration in the quality of a water supply, being affected by a natural or man-made source	10%	• The total raw water supply in water supply lakes available to WTRWD has dropped below 45% (55% depleted) during the time period from April 1 to October 31 • The total raw water supply in the water supply lakes available to Upper Trinity has dropped below 50% (50% depleted) during this time period from November 1 to March 31 • Dallas Water Utilities has initiated Stage 3 and given notice to UTRWD • UTRWD with concurrence of Board of Directors finds that conditions warrant the declaration of stage 3 • Water demand has reached or exceeded [90%] of delivery capacity for three consecutive days • Water demands exceeds the delivery capacity for all or part of the distribution system as determined by District 7 • Water Supply system is unable to deliver water in adequate quantities due to failure of or damage to major water system components • Interruption of one or more water supply sources • Natural or man-made contamination of the water supply source that threatens water availability.	20%
City of Lewisville	Jan 2024	WWP	DWU	DWU sources	3	• No available triggers	5%	• No available triggers	15%	• No available triggers	20%
City of Lucas	Apr 2024	WUG	NTMWD	NTMWD Sources	3	General Criteria • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 1. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other case • The water Supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions Demand Criteria • Water demand has exceeded or is expected to exceed 90% of maximum sustainable production or delivery capacity for an extended period. Supply Criteria • The combined storage in Lavon and Bois d'Arc Lake as published by the TWDB is less than:	2%	General Criteria • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 2. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other case • The water Supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions Demand Criteria • Water demand has exceeded or is expected to exceed 95% of maximum sustainable production or delivery capacity for an extended period. Supply Criteria • The combined storage in Lavon and Bois d'Arc Lake as published by the TWDB is less than:	5%	General Criteria • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 3. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other case • The water Supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions Demand Criteria • Water demand has exceeded or is expected to exceed maximum sustainable production or delivery capacity for an extended period. Supply Criteria • The combined storage in Lavon and Bois d'Arc Lake as published by the TWDB is less than:	30%

						Stage 1		Stage 2		Stage 3	
Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal
						70% of the combined conservation pool capacity during any of the months of April Through October 60% of the combined conservation pool capacity during any of the months of November through March • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 1 drought • NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source may be limited in availability within the next six months.		55% of the combined conservation pool capacity during any of the months of April Through October 45% of the combined conservation pool capacity during any of the months of November through March • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 2 drought • NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source may be limited in availability within the next three months.		30% of the combined conservation pool capacity during any of the months of April Through October 20% of the combined conservation pool capacity during any of the months of November through March • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a drought and have significantly reduced supplies available to NTMWD. • NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source has become limited in availability.	
City of Mansfield	Apr 2024	WWP	Tarrant Regional Water District	Tarrant Regional Water District sources	3	• Total raw water supply in TRWD western and eastern division reservoirs drops below 75% (25% depleted) of conservation storage. • Water demand for all or part of the TRWD delivery system exceeds delivery capacity because delivery capacity is inadequate. Water demand has exceeded or is expected to exceed 80% of maximum sustainable production of delivery capacity for an extended period. • Water demand is projected to approach the limit of TRWD's permitted supply • TRWD's supply source becomes contaminated • TRWD's water supply system is unable to deliver water due to the failure or damage of major water system components. • The TRWD General Manager, with the concurrence of the TRWD Board of Directors, finds that conditions warrant the declaration of a Stage 1 drought. • The city of Mansfield's demand exceeds the amount that can be delivered to customers • City's water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • City's water treatment or distribution system becomes contaminated • City's water supply system is unable to deliver water due to the failure or damage of major water system components. • City's plan may be implemented if other criteria dictate.	5%	• Total raw water supply in TRWD western and eastern division reservoirs drops below 60% (40% depleted) of conservation storage. • Water demand has exceeded or is expected to exceed 85% of maximum sustainable production of delivery capacity for an extended period. • Water demand is projected to approach the limit of TRWD's permitted supply. • TRWD's supply source becomes contaminated. • TRWD's water supply system is unable to deliver water due to the failure or damage of major water system components. • The TRWD General Manager, with the concurrence of the TRWD Board of Directors, finds that conditions warrant the declaration of a Stage 2 drought. • The city of Mansfield's demand exceeds the amount that can be delivered to customers for 1 day. • City's water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • City's water treatment or distribution system becomes contaminated • City's water supply system is unable to deliver water due to the failure or damage of major water system components. • City's plan may be implemented if other criteria dictate.	10%	• Total raw water supply in TRWD western and eastern division reservoirs drops below 45% (40% depleted) of conservation storage. • Water demand has exceeded or is expected to exceed 90% of maximum sustainable production of delivery capacity for an extended period. • Water demand is projected to approach the limit of TRWD's permitted supply. • TRWD's supply source becomes contaminated. • TRWD's water supply system is unable to deliver water due to the failure or damage of major water system components. • The TRWD General Manager, with the concurrence of the TRWD Board of Directors, finds that conditions warrant the declaration of a Stage 3 drought. • The city of Mansfield's demand exceeds the amount that can be delivered to customers for 2 consecutive day. • City's water demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate. • Natural or man-made contamination of the water supplier's treatment or distribution system. • City's water supply system is unable to deliver water due to the failure or damage of major water system components. • City's plan may be implemented if other criteria dictate.	20%
Mustang SUD	May 2024	WWP	UTRWD	UTRWD Sources	3	• The total raw water supply in water supply lakes available to UTRWD has dropped below 75% (25% depleted) during the time period form April 1 to October 31 • The total raw water supply in water supply lakes	5%	• The total raw water supply in water supply lakes available to UTRWD has dropped below 60% (40% depleted) during the time period form April 1 to October 31 • The total raw water supply in water supply lakes	10%	• The total raw water supply in water supply lakes available to UTRWD has dropped below 45% (55% depleted) during the time period form April 1 to October 31 • The total raw water supply in water supply lakes available to Upper Trinity has dropped below 50% (50%	20%

Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Stage 1 Trigger	Stage 1 Savings Goal	Stage 2 Trigger	Stage 2 Savings Goal	Stage 3 Trigger	Stage 3 Savings Goal
						available to Upper Trinity has dropped below 80% (20% depleted) during the time period form November 1 to March 31. • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 1 and given notice to UTRWD • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of stage 1 • Water demand has reached or exceeded 80% of delivery capacity for three consecutive days. • Water demand is approaching a level that will cause a reduced delivery capacity for all or part of the distribution system, as determined by District 11-C. • The water supply system has a significant limitation due to failure of or damage to important water system components.		available to Upper Trinity has dropped below 65% (35% depleted) during the time period form November 1 to March 31. • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 2 and given notice to UTRWD • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of stage 2. • Water demand has reached or exceeded 85% of delivery capacity for three consecutive days. • Water demand is approaching a level that is causing a reduced delivery capacity for all or part of the distribution system, as determined by District 11-C. • The water supply system is unable to deliver water at normal rates due to failure of or damage to important water system components. • A significant deterioration in the quality of a water supply, being affected by a natural or man-made source.		depleted) during the time period form November 1 to March 31. • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 3 and given notice to UTRWD • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of stage 3. • Water demand has reached or exceeded 90% of delivery capacity for three consecutive days. • Water demand exceeds the delivery capacity for all or part of the distribution system, as determined by District 11-C. • The water supply system is unable to deliver water in adequate quantities due to failure of or damage to important water system components. • Interruption of one or more water supply sources • Natural or man-made contamination of the water supply source that threatens water availability.	
Point Enterprise WSC	Dec 2023	WUG	N/A	Carrizo-Wilcox Aquifer	3	• Water consumption has reached 80 percent of daily maximum supply for three (3) consecutive days. • Water supply is reduced to a level that is only 20 percent greater than the average consumption for the previous month. • There is an extended period (at least eight (8) weeks) of low rainfall and daily use has risen 20 percent above the use for the same period during the previous year.	N/A	• Water consumption has reached 90 percent of the amount available for three consecutive days. • The water level in any of the water storage tanks cannot be replenished for three consecutive days.	N/A	• Failure of a major component of the system or an event which reduces the minimum residual pressure in the system below 20 psi for a period of 24 hours or longer. • Water consumption of 95 percent or more of the maximum available for three (3) consecutive days. • Water consumption of 100 percent of the maximum available and the water storage levels in the system drop for one 24-hour period. • Natural or man-made contamination of the water supply source(s). • The declaration of a state of disaster due to drought conditions in a county or counties served by the Corporation. • Reduction of wholesale water supply due to drought conditions. • Other unforeseen events which could cause imminent health or safety risks to the public.	N/A
City of Princeton	May 2024	WUG	NTMWD	NTMWD Sources	3	General Criteria • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 1. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other case • The water Supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.)	2%	General Criteria • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 2. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other case • The water Supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.)	5%	General Criteria • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 3. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other case • The water Supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment to equipment. (NTMWD may implement measures for only that portion of the system impacted.)	30%

						Stage 1		Stage 2		Stage 3	
Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal
						• A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions Demand Criteria • Water demand has exceeded or is expected to exceed 90% of maximum sustainable production or delivery capacity for an extended period. Supply Criteria • The combined storage in Lavon and Bois d'Arc Lake as published by the TWDB is less than: 70% of the combined conservation pool capacity during any of the months of April Through October 60% of the combined conservation pool capacity during any of the months of November through March • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 1 drought • NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source may be limited in availability within the next six months.		• A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions Demand Criteria • Water demand has exceeded or is expected to exceed 95% of maximum sustainable production or delivery capacity for an extended period. Supply Criteria • The combined storage in Lavon and Bois d'Arc Lake as published by the TWDB is less than: 55% of the combined conservation pool capacity during any of the months of April Through October 45% of the combined conservation pool capacity during any of the months of November through March • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 2 drought • NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source may be limited in availability within the next three months.		• A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions Demand Criteria • Water demand has exceeded or is expected to exceed maximum sustainable production or delivery capacity for an extended period. Supply Criteria • The combined storage in Lavon and Bois d'Arc Lake as published by the TWDB is less than: 30% of the combined conservation pool capacity during any of the months of April Through October 20% of the combined conservation pool capacity during any of the months of November through March • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a drought and have significantly reduced supplies available to NTMWD. • NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source has become limited in availability.	
Rural Bardwell WSC	Mar 2024	N/A	N/A	N/A	3	• Water consumption has reached 80 percent of daily maximum supply for three (3) consecutive days. • Water supply is reduced to a level that is only 20 percent greater than the average consumption for this previous month • There is an extended period (at least eight (8) weeks) of low rainfall and daily use has risen 20 percent above the use for the same period during the previous year. • The Corporation is placed on notice by its wholesale water provider of the existence of drought conditions.	N/A	• Water consumption has reached 90 percent of the amount available for three (3) consecutive days • The water level in any of the water storage tanks cannot be replenished for three (3) consecutive days.	N/A	• Failure of a major component of the system or an event which reduces the minimum residual pressure in the system below 20 psi for a period of 24 hours or longer • Water consumption of 95 percent or more of the maximum available for three (3) consecutive days. • Water consumption of 100 percent of the maximum available and the water storage levels in the system drop during one 24-hour period. • Natural or man-made contamination of the water supply source(s). • The declaration of a state of disaster due to drought conditions in a county or counties served by the Corporation. • Reduction of wholesale water supply due to drought conditions. • Other unforeseen events which could cause imminent health or safety risks to the public.	N/A
Sachse	Apr 2024	WUG	NTMWD	NTMWD Sources	3	General Criteria • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 1. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other case	2%	General Criteria • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 2. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other case	5%	General Criteria • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 3. • One or more source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other case	30%

Appendix M-1
Summary of Existing DCPs in Region C

Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Stage 1 Trigger	Stage 1 Savings Goal	Stage 2 Trigger	Stage 2 Savings Goal	Stage 3 Trigger	Stage 3 Savings Goal
						• The water Supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions Demand Criteria • Water demand has exceeded or is expected to exceed 90% of maximum sustainable production or delivery capacity for an extended period. Supply Criteria • The combined storage in Lavon and Bois d'Arc Lake as published by the TWDB is less than: 70% of the combined conservation pool capacity during any of the months of April Through October 60% of the combined conservation pool capacity during any of the months of November through March • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 1 drought • NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source may be limited in availability within the next six months.		• The water Supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions Demand Criteria • Water demand has exceeded or is expected to exceed 95% of maximum sustainable production or delivery capacity for an extended period. Supply Criteria • The combined storage in Lavon and Bois d'Arc Lake as published by the TWDB is less than: 55% of the combined conservation pool capacity during any of the months of April Through October 45% of the combined conservation pool capacity during any of the months of November through March • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 2 drought • NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source may be limited in availability within the next three months.		• The water Supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions Demand Criteria • Water demand has exceeded or is expected to exceed maximum sustainable production or delivery capacity for an extended period. Supply Criteria • The combined storage in Lavon and Bois d'Arc Lake as published by the TWDB is less than: 30% of the combined conservation pool capacity during any of the months of April Through October 20% of the combined conservation pool capacity during any of the months of November through March • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a drought and have significantly reduced supplies available to NTMWD. • NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source has become limited in availability.	
Talty SUD	Apr 2024	WUG	NTMWD	NTMWD Sources	3	• The executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 1. • Water demand is projected to approach the limit of the NTMWD's permitted supply. • The storage level in Lavon Lake as published by the Texas Water Development Board (TWDB), is less than 70 percent of the total conservation pool capacity during any of the months of April through October or less than 60 percent of the total conservation pool capacity during any of the months of November through March • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 1 drought • NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water	2%	• The executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 2. • Water demand is projected to approach the limit of the NTMWD's permitted supply. • The storage level in Lavon Lake as published by the Texas Water Development Board (TWDB), is less than 55 percent of the total conservation pool capacity during any of the months of April through October or less than 45 percent of the total conservation pool capacity during any of the months of November through March. • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 2 drought • NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water	10%	• The executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 3. • Water demand is projected to approach or exceed the limit of the NTMWD's permitted supply. • The storage level in Lavon Lake as published by the Texas Water Development Board (TWDB), is less than 30 percent of the total conservation pool capacity during any of the months of April through October or less than 20 percent of the total conservation pool capacity during any of the months of November through March. • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 3 drought • The water supply from Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source has become limited in availability	Variable

						Stage 1		Stage 2		Stage 3	
Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal
						source may be limited in availability within the next six months. • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate • Water demand exceeds 95% of the amount that can be delivered by NTMWD to Customers for three (3) consecutive days. • Supply source is interrupted or unavailable due to contamination, invasive species, equipment failure, or other cause. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • Part of the system has a shortage in supply or damage to equipment. NTMWD may implement measures for only that portion of the NTMWD system impacted.		source may be limited in availability within the next three months. • Water demand exceeds 98% of the amount that can be delivered by NTMWD to Customers for three (3) consecutive days. • Water demand for all or part of the delivery system equals delivery capacity because delivery capacity is inadequate • Supply source is interrupted or unavailable due to contamination, invasive species, equipment failure, or other cause. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • Part of the system has a shortage in supply or damage to equipment. NTMWD may implement measures for only that portion of the NTMWD system impacted.		• Water demand exceeds the amount that can be delivered by NTMWD to Customers • Water demand for all or part of the delivery system equals delivery capacity because delivery capacity is inadequate • Water supply system is unable to deliver water due to the failure or damage of major water system components. • Part of the system has a shortage in supply or damage to equipment. NTMWD may implement measures for only that portion of the NTMWD system impacted.	
City of Tioga	June 2022	WUG	N/A	Trinity aquifer	3	• Daily water demand exceeds 644,400 gallons per day for three consecutive days (50% of rated capacity of all wells)	>644,400 gpd	• Daily water demand exceeds 773,280 gallons per day for three consecutive days (60% of capacity of all wells) • Water pressures in the distribution system reman below 40 psi for more than six consecutive hours • Failure of any well, coupled with demand over 399,600 gpd (75% of capacity of the two smaller wells).	>773.280 gpd	• Daily water demand exceeds 966,600 gallons per day for three consecutive days (75% of rated capacity of all wells) • Imminent failure of a system component where immediate health or safety hazards exist • Water pressures in the distribution system continue to drop after implementing management steps	>966,600 gpd
Lake Cities Municipal Utility au	Apr-2024	WWP	UTRWD	UTRWD sources	3	• The total raw water supply in the water supply lakes available to Upper Trinity has dropped below 75% (25% depleted) during the time period from April 1 to October 31 or; • The total raw water supply in the water supply lakes available to Upper Trinity has dropped below 80% (20% depleted) during the time period from November 1 to March 31 or • Dallas Water Utilities has initiated Stage 1 and given notice to Upper Trinity or; • Water demand has reached or exceeded 80% of delivery capacity for three consecutive days or; • Water demand is approaching a level that will cause a reduced delivery capacity for all or part of the transmission system, as determined by Upper Trinity or; • The General Manager, with the concurrence of the Upper Trinity Board of Directors, finds that conditions warrant the declaration of Stage 1	5%	• The total raw water supply in the water supply lakes available to Upper Trinity has dropped below 60% (40% depleted) during the time period from April 1 to October 31 or; • The total raw water supply in the water supply lakes available to Upper Trinity has dropped below 65% (35% depleted) during the time period from November 1 to March 31 or • Dallas Water Utilities has initiated Stage 2 and given notice to Upper Trinity or; • Water demand has reached or exceeded 85% of delivery capacity for three consecutive days or; • Water demand is approaching a level that will cause a reduced delivery capacity for all or part of the transmission system, as determined by Upper Trinity or; • The transmission system is unable to deliver water at normal rates due to failure of, or damage to, major water system components or; • A significant deterioration in the quality of a water supply, being affected by a natural or man-made source: or • The General Manager, with the concurrence of the Upper Trinity Board of Directors, finds that	10%	• The total raw water supply in the water supply lakes available to Upper Trinity has dropped below 45% (55% depleted) during the time period from April 1 to October 31 or; • The total raw water supply in the water supply lakes available to Upper Trinity has dropped below 50% (50% depleted) during the time period from November 1 to March 31 or • Dallas Water Utilities has initiated Stage 3 and given notice to Upper Trinity or; • Water demand has reached or exceeded 90% of delivery capacity for three consecutive days or; • Water demand is approaching a level that will cause a reduced delivery capacity for all or part of the transmission system, as determined by Upper Trinity or; • The transmission system is unable to deliver water at normal rates due to failure of, or damage to, major water system components or; • Interruption of one or more water supply sources or; • Natural or man-made contamination of an Upper Trinity water supply source(s) that threatens water availability or; • The General Manager, with the concurrence of the Upper	20%

						Stage 1		Stage 2		Stage 3	
Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal
								conditions warrant the declaration of Stage 2		Trinity Board of Directors, finds that conditions warrant the declaration of Stage 3	
Rose Hill SUD	May 2022	WUG	NTMWD	NTMWD Sources, Lake Texoma, Jim chapman Lake, East Fork Water Reuse Project, Main Stem Pump stations,	3	• The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 1 • Water demand is projected to approach the limit of NTMWDs permitted supply • The storage level in Lavon Lake as published by the Texas Water Development Board (TWDB) is less than 70% of the total conservation pool capacity during any of the months of April through October or less that 60% of the total conservation pool capacity during the months of November through March • The Sabine River Authority (SRA) has indicated that its Upper Basin water supplies used by NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump stations, or some other NTMWD water source may be limited in availability with in the next 6 months • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate • Supply source is interrupted or unavailable due to contamination, invasive species, equipment failure, or other cause. • Water supply system us unable to deliver water due to the failure or damage of major water system components • Part of the system has a shortage in supply or damage to equipment. NTMWD may implement measures for only that portion of the NTMWD system impacted. • Suppliers water demand exceeds 95% of the amount that can be delivered to customers for three consecutive days • Suppliers water demand for all or part of the delivery system equals delivery capacity because delivery capacity is inadequate • Supply source becomes contaminated • Supplies water system is unable to deliver water due to the failure or damage of major water system components • Suppliers individual plan may be implemented if other criteria dictate	2%	• The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 2 • Water demand is projected to approach the limit of NTMWDs permitted supply • The storage level in Lavon Lake as published by the Texas Water Development Board (TWDB) is less than 55% of the total conservation pool capacity during any of the months of April through October or less that 45% of the total conservation pool capacity during the months of November through March • The Sabine River Authority (SRA) has indicated that its Upper Basin water supplies used by NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump stations, or some other NTMWD water source may be limited in availability with in the next 3 months • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate • Supply source is interrupted or unavailable due to contamination, invasive species, equipment failure, or other cause. • Water supply system us unable to deliver water due to the failure or damage of major water system components • Part of the system has a shortage in supply or damage to equipment. NTMWD may implement measures for only that portion of the NTMWD system impacted. • Suppliers water demand exceeds 98% of the amount that can be delivered to customers for three consecutive days • Suppliers water demand for all or part of the delivery system equals delivery capacity because delivery capacity is inadequate • Supply source becomes contaminated • Supply source is interrupted or unavailable due to invasive species • Supplies water system is unable to deliver water due to the failure or damage of major water system components • Suppliers individual plan may be implemented if other criteria dictate	10%	• The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 3 • Water demand is projected to approach the limit of NTMWDs permitted supply • The storage level in Lavon Lake as published by the Texas Water Development Board (TWDB) is less than 30% of the total conservation pool capacity during any of the months of April through October or less that 20% of the total conservation pool capacity during the months of November through March • The Sabine River Authority (SRA) has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in Stage 3 drought • The water supply from Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, or some other NTMWD water source has become limited in availability • Water demand exceeds the amount that can be delivered to Customers • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate • Supply source is interrupted or unavailable due to contamination, invasive species, equipment failure, or other cause. • Water supply system us unable to deliver water due to the failure or damage of major water system components • Part of the system has a shortage in supply or damage to equipment. NTMWD may implement measures for only that portion of the NTMWD system impacted. • Suppliers water demand exceeds the amount that can be delivered to customers • Suppliers water demand for all or part of the delivery system equals delivery capacity because delivery capacity is inadequate • Supply source becomes contaminated • Supply source is interrupted or unavailable due to invasive species • Supplies water system is unable to deliver water due to the failure or damage of major water system components • Suppliers individual plan may be implemented if other	Designated by NTMWD

Appendix M-1
Summary of Existing DCPs in Region C

Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Stage 1 Trigger	Stage 1 Savings Goal	Stage 2 Trigger	Stage 2 Savings Goal	Stage 3 Trigger	Stage 3 Savings Goal
Trinity River Authority (Livingston Wallisville)	May 2024	WWP	N/A	TRA Sources	3	• Total combined raw water supply in TRWD western and eastern division reservoirs drops below 75% (25% depleted) of conservation storage capacity; • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate; • Water demand is projected to approach the limit of permitted supply; • Supply source becomes contaminated; and • Water supply system is unable to deliver water due to the failure or damage of major water system components.	5%	• Total raw water supply in TRWD water supply reservoirs (Bridgeport, Eagle Mountain, Richland Chambers and Cedar Creek) drops below 60% (40% depleted) of conservation storage capacity. • Water demand has exceeded or is expected to exceed 85% of maximum sustainable production of delivery capacity for an extended period. • One or more of TRWD's water supply sources has become limited in availability. • Water demand is projected to approach the limit of permitted supply. • Supply source becomes contaminated or unusable for other regulatory reasons (i.e., invasive species). • Water supply system is unable to deliver water due to the failure or damage of major water system components. • Independent of actions by TRWD, the General Manager may at his or her discretion find that conditions warrant the declaration of a Stage 2 drought.	10%	• Total raw water supply in TRWD water supply reservoirs (Bridgeport, Eagle Mountain, Richland Chambers and Cedar Creek) drops below 45% (55% depleted) of conservation storage capacity. Water demand has exceeded or is expected to exceed 90% of maximum sustainable production of delivery capacity for an extended period. • Water demand for all or part of the TRWD delivery system approaches delivery capacity because delivery capacity is inadequate. • One or more of TRWD's water supply sources has become limited in availability. • Water demand is projected to approach the limit of permitted supply. • Supply source becomes contaminated or unusable for other regulatory reasons (i.e., invasive species). • Water supply system is unable to deliver water due to the failure or damage of major water system components.	25%
Walnut Creek SUD	Apr 2024	WWP	TRWD	TRWD sources	3	• Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • Water demand is projected to approach the limit of permitted supply. • Supply source becomes contaminated. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • The General Manager, with concurrence of the WCSUD Board of Directors, finds that conditions warrant the declaration of a Stage 1 drought.	5%	• Total raw water supply in TRWD western and eastern division reservoirs drops below 60% (40% depleted) of conservation storage capacity. • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • Water demand is projected to approach the limit of permitted supply. • Supply source becomes contaminated.	10%	• Total raw water supply in TRWD western division reservoir drops below 45% (55% depleted) of conservation storage capacity. • Water demand exceeds the amount that can be delivered to customers. • Water demand for all or part of the WCSUD delivery system approaches delivery capacity because delivery capacity is inadequate. • One or more of WCSUD's water supply sources has become limited in availability. • Water demand is projected to approach the limit of permitted supply. • Supply source becomes contaminated. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • The General Manager, with concurrence of the WCSUD Board of Directors, finds that • conditions warrant the declaration of a Stage 3 drought.	30%
Wylie Northeast SUD	Apr 2024	WUG	NTMWD	NTMWD Sources	3	General Criteria • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the termination of Stage 1. • The circumstances that caused the initiation of Stage 1 no longer prevail. Supply Criteria • The combined storage in Lavon and Bois d'Arc Lakes, as published by the TWDB, is greater than 75% of the combined conservation pool capacity during any of the months of April through October, or 65% of the combined conservation pool capacity during any of the months of November through March. • NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source may be limited in availability within the next six months.	2%	General Criteria • The executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 2. • One or more supply source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure, or other cause. • The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. Demand Criteria • Water demanded has exceeded or is expected to exceed 95% of maximum sustainable production or delivery capacity for an extended period. Supply Criteria • The combined storage in Lavon and Bois d'Arc Lakes, as published by the TWDB, is greater than 55% of the combined conservation pool capacity during any of the months of April through October, or 45% of the combined conservation pool capacity during any of the months of		General Criteria • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 3. • One or more supply source(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure, or other cause. • The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions. Demand Criteria • Water demanded has exceeded or is expected to exceed maximum sustainable production or delivery capacity for an extended period. Supply Criteria • The combined storage in Lavon and Bois d'Arc Lakes, as published by the TWDB, is greater than 55% of the combined conservation pool capacity during any of the months of April through October, or 45% of the combined conservation pool capacity during any of the months of	

						Stage 1		Stage 2		Stage 3	
Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal
								November through March. • NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source may be limited in availability within the next three months.		November through March. • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a drought and have significantly reduced supplies available to NTMWD. • The supply from Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source has become limited in availability.	
Tarrant Regional Water District (TRWD)	May 2024	WWP	N/A	Lake Bridgeport Eagle Mountain Lake Lake Benbrook Cedar Creek Reservoir Richland-Chambers Reservoir	3	• Total combined raw water supply in TRWD water supply reservoirs (Bridgeport, Eagle Mountain, Richland Chambers and Cedar Creek) drops below 75% (25% depleted) of conservation storage capacity. • Water demand has exceeded or is expected to exceed 80% of maximum sustainable production of delivery capacity for an extended period. • One or more of TRWD's water supply sources has become limited in availability. • Water demand is projected to approach the limit of permitted supply. • Supply source becomes contaminated or unusable for other regulatory reasons (i.e., invasive species). • Water supply system is unable to deliver water due to the failure or damage of major water system components. • The General Manager finds that conditions warrant the declaration of a Stage 1 drought.	5%	• Total raw water supply in TRWD water supply reservoirs (Bridgeport, Eagle Mountain, Richland Chambers and Cedar Creek) drops below 60% (40% depleted) of conservation storage capacity. • Water demand has exceeded or is expected to exceed 85% of maximum sustainable production of delivery capacity for an extended period. • One or more of TRWD's water supply sources has become limited in availability. • Water demand is projected to approach the limit of permitted supply. • Supply source becomes contaminated or unusable for other regulatory reasons (i.e. invasive species). • Water supply system is unable to deliver water due to the failure or damage of major water system components. • The General Manager finds that conditions warrant the declaration of a Stage 2 drought.	10%	• Total raw water supply in TRWD water supply reservoirs (Bridgeport, Eagle Mountain, Richland Chambers and Cedar Creek) drops below 45% (55% depleted) of conservation storage capacity. • Water demand has exceeded or is expected to exceed 90% of maximum sustainable production of delivery capacity for an extended period. • Water demand for all or part of the TRWD delivery system approaches delivery capacity because delivery capacity is inadequate. • One or more of TRWD's water supply sources has become limited in availability. • Water demand is projected to approach the limit of permitted supply. • Supply source becomes contaminated or unusable for other regulatory reasons (i.e., invasive species). • Water supply system is unable to deliver water due to the failure or damage of major water system components. • The General Manager finds that conditions warrant the declaration of a Stage 3 drought.	20%
Arlington	May-2019	WUG	TRWD	TRWD sources, Lake Arlington	3	• Total raw water supply in TRWD western and eastern division reservoirs drops to or below 45% (55% depleted) of conservation storage.	5%	• Total raw water supply in TRWD western and eastern division reservoirs drops to or below 60% (40% depleted) of conservation storage.	10%	• Total raw water supply in TRWD western and eastern division reservoirs drops to or below 45% (55% depleted) of conservation storage.	20%
Crowley	Apr-2019	WUG	Fort Worth (TRWD)	TRWD sources, Trinity Aquifer	3	• Water demand reaches or exceeds 90% of reliable delivery capacity for three consecutive days. The delivery capacity could be citywide or in a specified portion of the system. • Fort Worth's water treatment or distribution system becomes contaminated. • City of Crowley water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • Fort Worth's water supply system is unable to deliver water due to the failure or damage of major water system components. • TRWD initiated Stage 1 – Water Watch may be initiated for one or more of the following reasons: • Total raw water supply in TRWD western and eastern division reservoirs drops below 75% (25% depleted) of conservation storage. • Water demand for all or part of the TRWD delivery system exceeds delivery capacity because delivery capacity is inadequate. • Water demand is projected to approach the limit of TRWD's permitted supply. • TRWD's supply source becomes contaminated. • TRWD's water supply system is unable to deliver water due to the failure or damage of major water system components. • The TRWD General Manager, with the concurrence of the	5%	• Water demand reaches or exceeds 95% of reliable delivery capacity for three consecutive days. The delivery capacity could be citywide or in a specified portion of the system. • Contamination of the water supply source(s) or water supply system. • The City of Crowley's water demand for all or part of the delivery system equals or exceeds delivery capacity because delivery capacity is inadequate. • The City of Crowley's water supply system is unable to deliver water due to the failure or damage of major water system components. • TRWD initiated Stage 2 – Water Warning for one or more of the following reasons: • Total raw water supply in TRWD western and eastern division reservoirs drops below 60% (40% depleted) of conservation storage. • Water demand for all or part of the TRWD delivery system exceeds delivery capacity because delivery capacity is inadequate. • Water demand is projected to approach the limit of TRWD's permitted supply. • TRWD's supply source becomes contaminated. • TRWD's water supply system is unable to deliver water due to the failure or damage of major water system components. • The TRWD General Manager, with the concurrence of the	10%	• Water demand has reaches or exceeds 98% of reliable delivery capacity for one day. The delivery capacity could be citywide or in a specified portion of the system. • Contamination of the water supply source(s) or water supply system. • City of Crowley's water demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate. • Crowley's water supply system is unable to deliver water due to the failure or damage of major water system components. • TRWD has initiated Stage 3 – Emergency Water Use, which may also be initiated by one or more of the following: • Total raw water supply in TRWD western and eastern division reservoirs drops below 45% (55% depleted) of conservation storage. • Water demand for all or part of the TRWD delivery system exceeds delivery capacity because delivery capacity is inadequate. • Water demand is projected to approach or exceed the limit of TRWD's permitted supply. • TRWD's supply source becomes contaminated. • TRWD's water supply system is unable to deliver water due to the failure or damage of major water system components. • The TRWD General Manager, with the concurrence of the TRWD Board of Directors, finds that conditions warrant	

						Stage 1		Stage 2		Stage 3	
Entity	**Plan Date**	**Entity Type**	**Wholesale Water Provider(s)**	**Source(s)**	**No. of Stages**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**
						TRWD Board of Directors, finds that conditions warrant the declaration of a Stage 1 drought.		TRWD Board of Directors, finds that conditions warrant the declaration of a Stage 2 drought		the declaration of a Stage 3 drought.	
Euless	Apr-2019	WUG	TRA(TRWD)	TRWD Sources	3	• Total combined raw water supply in Tarrant Regional Water District (TRWD) western and eastern division reservoirs drops below 75% (25% depleted) of conservation storage. • Water demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate. • Water demand is projected to approach the limit of permitted supply. • Supply source becomes contaminated. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • The City Manager, or his/her designee, with concurrence or TRA, finds that conditions warrant the declaration of a Stage 1 drought.	5%	• Total raw water supply in TRWD western and eastern division reservoirs drops below 60% (40% depleted) of conservation shortage • Water demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate • Water demand is projected to approach the limit of permitted supply • Supply source becomes contaminated. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • The city manager, with concurrence of the Trinity River Authority, finds that conditions warrant the declaration of a stage 2 drought.	10%	• Total raw water supply in TRWD western and eastern division reservoirs drops below 45% (55% depleted) of conservation storage. • Water demand exceeds the amount that can be delivered to customers. • Water demand for all or part of the TRWD delivery system exceeds delivery capacity because delivery capacity is inadequate. • One or more of TRWD's water supply sources has become limited in availability. • Water demand is projected to approach the limit of permitted supply. • Supply source becomes contaminated. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • The city manager, with the concurrence of the TRA, finds that conditions warrant the declaration of a Stage 3 drought.	20%
Grapevine	May-2019	WUG	TRA(TRWD)	TRWD Sources, Grapevine Lake	3	• Stage 1, moderate condition is attained when the surface water demand reaches 90 percent of pumping capacity of the City of Grapevine/Trinity River Authority water treatment plants). • Production at the combined City of Grapevine and Trinity River Authority surface water treatment plant reduced to a point such that the aggregate surface water demand of the system is 90 percent of the reduced pumping capacity.		• Stage 3, critical condition is attained when the surface water demand (seven-day period) exceeds 100 percent of pumping capacity of the City of Grapevine/Trinity River Authority water treatment plants). • Production at the City of Grapevine/Trinity River Authority plants reduced to a point such that aggregate surface water demand of the system exceeds the reduced production, including a complete failure of the plant to produce any water.		• Stage 3, critical condition is attained when the surface water demand (seven-day period) exceeds 100 percent of pumping capacity of the City of Grapevine/Trinity River Authority water treatment plants). • Production at the City of Grapevine/Trinity River Authority plants reduced to a point such that aggregate surface water demand of the system exceeds the reduced production, including a complete failure of the plant to produce any water.	
Keller	Apr-2019	WUG	Fort Worth (TRWD)	TRWD Sources	3	• Keller's water demand reaches or exceeds 90% of reliable delivery capacity for three consecutive days. The delivery capacity could be citywide or in a specified portion of the system. • Keller's water supply sources or water distribution system becomes contaminated. • Keller's water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • Keller's water supply system is unable to deliver water due to the failure or damage of major water system components. • Fort Worth initiates Stage 1 – Water Watch for one or more of the following reasons: • Total raw water supply in TRWD western and eastern division reservoirs drops below 75% (25% depleted) of conservation storage. • Water demand for all or part of the TRWD delivery system exceeds delivery capacity because delivery capacity is inadequate. • One or more of TRWD's water supply sources has become limited in availability. • Water demand is projected to approach the limit of TRWD's permitted supply. • TRWD's supply source becomes contaminated. • TRWD's water supply system is unable to deliver water due to the failure or damage of major water system components. • The TRWD General Manager finds that conditions	5%	• Keller's water demand reaches or exceeds 95% of reliable delivery capacity for three consecutive days. The delivery capacity could be citywide or in a specified portion of the system. • Keller's water supply sources or water distribution system becomes contaminated. • Keller's water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • Keller's water supply system is unable to deliver water due to the failure or damage of major water system components. • Fort Worth initiates Stage 2 – Water Warning for one or more of the following reasons: • Total raw water supply in TRWD western and eastern division reservoirs drops below 60% (40% depleted) of conservation storage. • Water demand for all or part of the TRWD delivery system exceeds delivery capacity because delivery capacity is inadequate. • One or more of TRWD's water supply sources has become limited in availability. • Water demand is projected to approach the limit of TRWD's permitted supply. • TRWD's supply source becomes contaminated. • TRWD's water supply system is unable to deliver water due to the failure or damage of major water system components. • The TRWD General Manager finds that conditions warrant	10%	• Keller's water demand has reached or exceeds 98% of reliable delivery capacity for one day. The delivery capacity could be citywide or in a specified portion of the system. • Keller's water supply sources or water distribution system becomes contaminated. • Keller's water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • Keller's water supply system is unable to deliver water due to the failure or damage of major water system components. • Fort Worth initiates Stage 3 – Emergency Water Use, which may also be initiated by one or more of the following: o Total raw water supply in TRWD western and eastern division reservoirs drops below 45% (55% depleted) of conservation storage. • Water demand exceeds the amount that can be delivered to customers. • Water demand for all or part of the TRWD delivery system exceeds delivery capacity because delivery capacity is inadequate. • One or more of TRWD's water supply sources has become limited in availability. • Water demand is projected to approach or exceed the limit of TRWD's permitted supply. • TRWD's supply source becomes contaminated. o TRWD's water supply system is unable to deliver water due to the failure or damage of major water system	20%

Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Stage 1 Trigger	Stage 1 Savings Goal	Stage 2 Trigger	Stage 2 Savings Goal	Stage 3 Trigger	Stage 3 Savings Goal
						warrant the declaration of a Stage 1 drought.		the declaration of a Stage 2 drought.		components. • The TRWD General Manager finds that conditions warrant the declaration of a Stage 3 drought.	
MaBank	Jun-2019	WUG	TRWD	Cedar Creek Reservoir	3	• Total combined raw water supply in TRWD western and eastern division reservoirs drops below 75% (25% depleted) of conservation storage capacity. • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • Water demand is projected to approach the limit of permitted supply. • Water supply system is unable to deliver water due to the failure or damage of major water system components.	5%	• Total combined raw water supply in TRWD western and eastern division reservoirs drops below 60% (40% depleted) of conservation storage capacity. • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • Water demand is projected to approach the limit of permitted supply. • Supply source becomes contaminated. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • The General Manager with concurrence of the TRWD Board of Directors finds that conditions warrant Stage 2 drought.	10%	• Total combined raw water supply in TRWD western and eastern division reservoirs drops below 45% (55% depleted) of conservation storage capacity. • Water demand exceeds the amount that can be delivered. • Water demand for all or part of the system approaches delivery capacity because delivery capacity is inadequate. • Water demand is projected to approach the limit of permitted supply. • One or more of TRWD's water supply sources has become limited in availability. • Supply source becomes contaminated. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • The General Manager with concurrence of the TRWD Board of Directors finds that conditions warrant Stage 3 drought.	20%
Midlothian	Apr-2019	WUG	TRWD	TRWD Sources, Joe Pool Lake	3	• The Joe Pool Lake WSE declines to 516.0 feet; and • When the City Manager or their designee, is notified in writing by TRA that their Stage 1 drought management level has been declared. OR • Total combined raw water supply in TRWD western and eastern division reservoirs drops below 75% (25% depleted) of conservation storage capacity. • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • Water demand is projected to approach the limit of permitted supply. • Supply source becomes contaminated. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • The City Manager or their designee finds that conditions warrant the declaration of a Stage 1 drought.	5%	• The Joe Pool Lake WSE declines to below 511.0 feet; and • When the City Manager or their designee, is notified in writing by TRA that the reservoir is now operating at less than 60% of the conservation pool, and their Stage 2 drought management level has been declared. OR • Total raw water supply in TRWD western and eastern division reservoirs drops below 60% (40% depleted) of conservation storage capacity. • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • Water demand is projected to approach the limit of permitted supply. • Supply source becomes contaminated. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • The City Manager or their designee, finds that conditions warrant the declaration of a Stage 2 drought.	10%	• The Joe Pool Lake WSE declines to below 501.0 feet; and • When the City Manager or their designee, is notified in writing by TRA that the reservoir is now operating at less than 35% of the conservation pool, and their Stage 3 drought management level has been declared. OR • Total raw water supply in TRWD western and eastern division reservoirs drops below 45% (55% depleted) of conservation storage capacity. • Water demand exceeds the amount that can be delivered to customers. • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • One or more of TRWD's water supply sources has become limited in availability. • Water demand is projected to approach the limit of permitted supply. • Supply source becomes contaminated. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • The City Manager or their designee, finds that conditions warrant the declaration of a Stage 3 drought.	20%
Trophy Club MUD 1	Apr-2019	WUG	Fort Worth (TRWD)	TRWD Sources, Trinity Aquifer	3	• Water demand reaches or exceeds 90% of reliable delivery capacity for three (3) consecutive days. • Contamination of the City of Fort Worth's water treatment or distribution system. • Inadequate delivery capacity by the City of Fort Worth. • Failure of or damage to the City of Fort Worth's water supply system. • Water demand approaches a reduced delivery capacity for all or part of the system due to supply or production capacity limitation including contamination of the system. • Pursuant to requirements established in the agreement with the City of Fort Worth, notification is received requesting initiation of Stage 1 of their Drought Contingency Plan. • Conditions within the District's water system that warrant a mild reduction in water usage. These conditions may include loss of supply, storage, or	5%	• Water demand reaches or exceeds 95% of reliable delivery capacity for three (3) consecutive days. The delivery capacity could be District-wide or in a specified portion of the system. • Contamination of the water supply source(s) or water supply system. • Demand for all or part of the delivery system equals or exceeds delivery capacity because delivery capacity is inadequate. • Pursuant to requirements established in the agreement with the City of Fort Worth, notification is received requesting initiation of Stage 2 of their Drought Contingency Plan. • Conditions within the District's water system that warrants a moderate reduction in water usage. These conditions may include loss of supply, storage, or pumping capacity, water main break, or other system failure.	10%	• Water demand has reached or exceeds 98% of reliable delivery capacity for one (1) day. • Contamination of the water supply source(s) or water supply system. Demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate. • Pursuant to requirements established in the agreement with the City of Fort Worth, notification is received requesting initiation of Stage 3 of their Drought Contingency Plan. • Conditions within the District's water system that warrant a major reduction in water usage. These conditions may include loss of supply, storage, or pumping capacity, water main break, or other system failure	20%

Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Stage 1 Trigger	Stage 1 Savings Goal	Stage 2 Trigger	Stage 2 Savings Goal	Stage 3 Trigger	Stage 3 Savings Goal
						pumping capacity, water main break, or other system failure.					
Weatherford	Apr-2019	WUG	TRWD	TRWD Sources, Lake Weatherford	3	• The lake level in Lake Weatherford reaches 889.0 feet or 61.5% capacity; or • Water demand reaches 85 percent of the water treatment capacity or • Any mechanical failure of pumping equipment will require more than 48 hours to repair when dry weather conditions exist and continued dry weather is expected. • TRWD initiates Stage 1 – Water Watch for one or more of the following reasons: • Total raw water supply in TRWD western and eastern division reservoirs drops below 75% (25% depleted) of conservation storage. • Water demand for all or part of the TRWD delivery system exceeds delivery capacity because delivery capacity is inadequate. • Water demand is projected to approach the limit of TRWD's permitted supply. • TRWD's supply source becomes contaminated. • TRWD's water supply system is unable to deliver water due to the failure or damage of major water system components. • The TRWD General Manager, with the concurrence of the TRWD Board of Directors, finds that conditions warrant the declaration of Stage 1 drought.	5%	• The lake level in Lake Weatherford reaches 887.5 feet or 54% capacity; or • Water demand reaches 85 percent of the water treatment capacity or • Any mechanical failure of pumping equipment will require more than 48 hours to repair when dry weather conditions exist and continued dry weather is expected. • TRWD initiates Stage 2 – Water Warning for one or more of the following reasons: • Total raw water supply in TRWD western and eastern division reservoirs drops below 60% (40% depleted) of conservation storage. • Water demand for all or part of the TRWD delivery system exceeds delivery capacity because delivery capacity is inadequate. • Water demand is projected to approach the limit of TRWD's permitted supply. • TRWD's supply source becomes contaminated. • TRWD's water supply system is unable to deliver water due to the failure or damage of major water system components. • The TRWD General Manager, with the concurrence of the TRWD Board of Directors, finds that conditions warrant the declaration of Stage 2 drought.	10%	• The lake level in Lake Weatherford reaches 885.5 feet or 45% percent capacity; or • Water demand reaches 85 percent of the water treatment capacity or • Major water line breaks, pump or system failures occur, which cause unprecedented loss of capability to provide water service; or • Natural or man-made contamination of the water supply source(s) • TRWD initiates Stage 3 – Water Emergency for one or more of the following reasons: • Total raw water supply in TRWD western and eastern division reservoirs drops below 45% (55% depleted) of conservation storage. • Water demand for all or part of the TRWD delivery system exceeds delivery capacity because delivery capacity is inadequate. • Water demand is projected to approach the limit of TRWD's permitted supply. • TRWD's supply source becomes contaminated. • TRWD's water supply system is unable to deliver water due to the failure or damage of major water system components. • The TRWD General Manager, with the concurrence of the TRWD Board of Directors, finds that conditions warrant the declaration of Stage 3 drought.	20%
West Wise SUD (Wholesale)	Apr-2019	WUG	TRWD, Walnut Creek SUD	TRWD Sources	3	• Total water demand equals or exceeds 80 percent of daily maximum supply for three consecutive days (.800 mgd for 3 days), or as notified per Tarrant Regional Water District. • Supply source becomes contaminated. • Water supply is unable to deliver water due to the failure or damage of major water system components. • The General Manager, with concurrence of the WWSUD Board of Directors, finds that conditions warrant declaration of a Stage 1 drought.	6%	• Total water demand equals or exceeds 90 percent of daily maximum supply for three consecutive days (.900 mgd for 3 days), or as notified per Tarrant Regional Water District. • Supply source becomes contaminated. • Water supply is unable to deliver water due to the failure or damage of major water system components. • The General Manager, with concurrence of the WWSUD Board of Directors, finds that conditions warrant declaration of a Stage 2 drought.	6%	• Water consumption of 95 percent or more of • maximum available for three consecutive days (.950 mgd for 3 days), or as notified per Tarrant Regional Water District. • Water demand exceeds the amount that can be delivered to customers. • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • One or more of WWSUD's water supply sources has become limited in availability. • Water demand is projected to approach the limit of permitted supply. • Supply source becomes contaminated. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • The General Manager, with concurrence of the WWSUD Board of Directors, finds that conditions warrant declaration of a Stage 3 drought.	6%
West Wise SUD (Retail)	Mar-2019	WUG	TRWD, Walnut Creek SUD	TRWD Sources	3	• Stage 1 water allocation measures may be implemented when one or more of the following conditions exist: • Water consumption has reached 80 percent of daily maximum supply for three consecutive days (.800 mgd for 3 days). • Water supply is reduced to a level that is only 20 percent greater than the average consumption for the previous month. • There is an extended period (at least eight (8) weeks) of low rainfall and daily use has risen 20 percent above the use for the same period during the previous year.	N/A	• Stage 2 water allocation measures may be implemented when one of the following conditions exist: • Water consumption has reached 90 percent of the available for three consecutive days (.900 mgd for 3 days). • The Water level in any of the water storage tanks cannot be replenished for three consecutive days. Example: Water plant clear wells drop to 8 feet in 3 days.	N/A	• Stage 3 water allocation measures may be implemented when one of the following five conditions exist: • Failure of a major component of the system or an event which reduces the minimum residual pressure in the system below 20 psi for a period of 24 hours or longer • Water consumption of 95 percent or more of the maximum available for three consecutive days (.950 mgd for 3 days). • Water consumption of 100 percent of the maximum available and the water storage levels system drop during one 24-hour period. • Natural or man-made contamination of the water supply	N/A

Appendix M-1
Summary of Existing DCPs in Region C

						Stage 1		Stage 2		Stage 3	
Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal
										source(s). • The declaration of a state of disaster due to drought conditions in a county or counties served by the District. • Reduction of wholesale water supply due to drought conditions. • Other unforeseen events which could • cause imminent health or safety risks to the public.	
Azle	Apr-2024	WUG	TRWD	Eagle Mountain Lake	3	• Total combined raw water supply in TRWD western and eastern division reservoirs drops below 75% (25% depleted) of conservation storage capacity. • Water demand is projected to approach the limit of permitted supply. • Supply source becomes contaminated. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • The City Manager, with concurrence of the City Council, finds that conditions warrant the declaration of a Stage 1 drought.	5%	• Total raw water supply in TRWD western and eastern division reservoirs drops below 60% (40% depleted) of conservation storage capacity. • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • Water demand is projected to approach the limit of permitted supply. • Supply source becomes contaminated. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • The City Manager, with concurrence of the City Council, finds that conditions warrant the declaration of a Stage 2 drought.	10%	• Total raw water supply in TRWD western and eastern division reservoirs drops below 45% (55% depleted) of conservation storage capacity. • Water demand exceeds the amount that can be delivered to customers. • Water demand for all or part of the Azle delivery system approaches delivery capacity because delivery capacity is inadequate. • One or more of TRWD's water supply sources has become limited in availability. • Water demand is projected to approach the limit of permitted supply. • Supply source becomes contaminated. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • The City Manager, with concurrence of the City Council, finds that conditions warrant the declaration of a Stage 3 drought.	20%
Gastonia	Apr-2024	WUG	TRWD	TRWD Sources	3	• Water demand reaches or exceeds 90% of reliable delivery capacity for three consecutive days. The treatment capacity could be citywide or in a specified portion of the system. • Fort Worth's water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • Water supply system is unable to deliver water due to the failure or damage of major water system components, supply source becomes contaminated, power outage, grid failure, natural disaster, or extreme weather event. • • TRWD initiated Stage 1-Water Watch for one or more of the following reasons: • Total raw water supply in TRWD western and eastern division reservoirs drops below 75% (25% depleted) of conservation storage. • TRWD water demand has exceeded or is expected to exceed 80% of maximum sustainable production of delivery capacity for an extended period. • One or more of TRWD's water supply sources has become limited in availability. • TRWD water demand is projected to approach the limit of TRWD's permitted supply. • TRWD's supply source becomes contaminated or unusable for other regulatory reasons (i.e., invasive species).. • TRWD's water supply system is unable to deliver water due to the failure or damage of major water system components. • The TRWD General Manager, with the concurrence of the TRWD Board of Directors, finds that conditions warrant the declaration of a Stage 1 drought.	5%	• Water demand reaches or exceeds 95% of reliable delivery capacity for three consecutive • days. The treatment capacity could be citywide or in a specified portion of the system. • Demand for all or part of the delivery system equals or exceeds delivery capacity because delivery capacity is inadequate. • Water supply system is unable to deliver water due to the failure or damage of major water system components supply source becomes contaminated, power outage, grid failure, natural disaster, or extreme weather event.. • TRWD initiated Stage 2 – Water Warning for one or more of the following reasons: • Total raw water supply in TRWD western and eastern division reservoirs drops below 60% (40% depleted) of • conservation storage. • TRWD water demand has exceeded or is expected to exceed 85% of maximum sustainable production of delivery capacity for an extended period. • • One or more of TRWD's water supply sources has become limited in availability. • TRWD water demand is projected to approach the limit of TRWD's permitted supply. • TRWD's supply source becomes contaminated or unusable for other regulatory reasons (i.e. invasive species). • TRWD's water supply system is unable to deliver water due to the failure or damage of major water system components. • The TRWD General Manager, with the concurrence of the TRWD Board of Directors, finds that conditions warrant the declaration of a Stage 2 drought.	10%	• Water demand has reaches or exceeds 98% of reliable delivery capacity for one day. The delivery capacity could be citywide or in a specified portion of the system. • Demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate. • Water supply system is unable to deliver water due to the failure or damage of major water system components, supply source becomes contaminated, power outage, grid failure, natural disaster, or extreme weather event. • TRWD has initiated Stage 3 – Emergency Water Use, which may also be initiated by one or more of the following: • Total raw water supply in TRWD western and eastern division reservoirs drops below 45% (55% depleted) of conservation storage. • TRWD water demand has exceeded or is expected to exceed 90% of maximum sustainable production of delivery capacity for an extended period. • TRWD water demand for all or part of the TRWD delivery system exceeds delivery capacity because delivery capacity is inadequate. • One or more of TRWD's water supply sources has become limited in availability. • TRWD water demand is projected to approach or exceed the limit of TRWD's permitted supply. • TRWD's supply source becomes contaminated or unusable for other regulatory reasons (i.e., invasive species).. • TRWD's water supply system is unable to deliver water due to the failure or damage of major water system components. • The TRWD General Manager, with the concurrence of the TRWD Board of Directors, finds that conditions warrant the declaration of a Stage 3 drought.	20%

Appendix M-1
Summary of Existing DCPs in Region C

Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Stage 1 Trigger	Stage 1 Savings Goal	Stage 2 Trigger	Stage 2 Savings Goal	Stage 3 Trigger	Stage 3 Savings Goal
Hurst	May-2024	WUG	Fort Worth(TRWD)	TRWD Sources, Trinity Aquifer	3	• When, pursuant to requirements specified in the City of Hurst wholesale water purchase contract with the City of Fort Worth, notification is received requesting initiation of Stage 1 of the Drought Plan. • Water demands reach or exceed 90% of reliable delivery capacity for three consecutive days. The delivery capacity could be citywide or in a specified portion of the system. • Hurst' s water distribution system becomes contaminated. • Hurst' s water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • Hurst' s water supply system is unable to deliver water due to the failure or damage of major water system components, or due to other criteria, such as power outages or restrictions.	5%	• When, pursuant to requirements specified in the City of Hurst wholesale water purchase contract with the City of Fort Worth, notification is received requesting initiation of Stage 2 of the Drought Contingency Plan. • Water demand reaches or exceeds 95% of reliable delivery capacity for three consecutive days. The delivery capacity could be city wide or in a specified portion of the system. • Contamination of the water supply source(s) or water supply system. • Demand for all or part of the delivery system equals or exceeds delivery capacity because delivery capacity is inadequate. • Water supply system is unable to deliver water due to the failure or damage of major water system components.	10%	• When, pursuant to requirements specified in the City of Hurst wholesale water purchase contract with the City of Fort Worth, notification is received requesting initiation of Stage 3 of the Drought Plan. • Water demand has reached or exceeds 98% of reliable delivery capacity for one day. The delivery capacity could be citywide or in a specified portion of the system. • Contamination of the water supply source(s) or water supply system. • Demand for all or part of the water system exceeds delivery capacity because delivery capacity is inadequate. • Water supply system is unable to deliver water due to the failure or damage of major water system components • TRWD has initiated Stage 3 — Emergency Water Use, which may also be initiated by one or more of the following: • Total raw water supply in TRWD western and eastern division' s reservoirs drops below 45% (55% depleted) of conservation storage. • Water demand for all or part of the TRWD delivery system exceeds delivery capacity because delivery capacity is inadequate. • Water demand is projected to approach or exceed the limit of TRWD' s permitted supply. • TRWD' s supply source becomes contaminated. • TRWD' s water supply system is unable to deliver water due to failure or damage of major water system components. • The TRWD General Manager, with the concurrence of the TRWD Board of Directors, finds that conditions warrant the declaration of a Stage 3 Drought.	20%
Saginaw	May-2024	WUG	Fort worth(TRWD)	TRWD Sources	3	• Water demand reaches or exceeds 90% of reliable delivery capacity for three consecutive days. The delivery capacity could be citywide or in a specified portion of the system • Saginaw's water distribution system becomes contaminated • Saginaw's water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate • Saginaw's water supply system is unable to deliver water due to the failure or damage of major water system components • Fort Worth initiated Stage 1 - Water Watch for one or more of the following reasons: • Fort Worth's water treatment or distribution system becomes contaminated • Fort Worth's water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate • Fort Worth's water supply system is unable to deliver water due to the failure or damage of major water system components • TRWD initiated Stage 1 - Water Watch for one or more of the following reasons: • Total raw water supply in TRWD western and eastern division reservoirs drops below 75% (25% depleted) of conservation storage • Water demand for all or part of the TRWD delivery system exceeds delivery capacity because delivery capacity is inadequate • Water demand is projected to approach the limit of TRWD's permitted supply • TRWD's supply source becomes contaminated	5%	• Water demand reaches or exceeds 95% of reliable delivery capacity for three consecutive days. The delivery capacity could be citywide or in a specified portion of the system • Saginaw's water distribution system becomes contaminated • Saginaw's water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate • Saginaw's water supply system is unable to deliver water due to the failure or damage of major water system components • Fort Worth initiated Stage 2 - Water Warning for one or more of the following reasons: • Fort Worth's water treatment or distribution system becomes contaminated • Fort Worth's water demand for all or part of the delivery system equals or exceeds delivery capacity because delivery capacity is inadequate • Fort Worth's water supply system is unable to deliver water due to the failure or damage of major water system components • Fort Worth's water demand reaches or exceeds 95% of reliable delivery capacity for three consecutive days. The delivery capacity could be citywide or in a specified portion of the system • TRWD initiated Stage 2 - Water Warning for one or more of the following reasons: • Total raw water supply in TRWD western and eastern division reservoirs drops below 60% (40% depleted) of conservation storage • Water demand for all or part of the TRWD delivery system exceeds delivery capacity because delivery capacity	10%	• Customers shall be required to comply with the requirements and restrictions on certain nonessential water uses for Stage 3 of this Plan when falling treated water reservoir levels which routinely do not refill above 85 percent overnight. • Water demand reaches or exceeds 98% of reliable delivery capacity for three consecutive days. The delivery capacity could be citywide or in a specified portion of the system • Saginaw's water distribution system becomes contaminated • Saginaw's water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate • Saginaw's water supply system is unable to deliver water due to the failure or damage of major water system components • Fort Worth initiated Stage 3 - Emergency Water Use for one or more of the following reasons: • Fort Worth's water treatment or distribution system becomes contaminated • Fort Worth's water demand for all or part of the delivery system equals or exceeds delivery capacity because delivery capacity is inadequate • Fort Worth's water supply system is unable to deliver water due to the failure or damage of major water system components • Fort Worth's water demand reaches or exceeds 98% of reliable delivery capacity for three consecutive days. The delivery capacity could be citywide or in a specified portion of the system • TRWD initiated Stage 3 - Emergency Water Use for one or more of the following reasons:	20%

Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Stage 1 Trigger	Stage 1 Savings Goal	Stage 2 Trigger	Stage 2 Savings Goal	Stage 3 Trigger	Stage 3 Savings Goal
						• TRWD's water supply system is unable to deliver water due to the failure or damage of major water system components • The TRWD General Manager, with the concurrence of the TRWD Board of Directors, finds that conditions warrant the declaration of a Stage 1 drought		is inadequate • Water demand is projected to approach the limit of TRWD's permitted supply • TRWD's supply source becomes contaminated • TRWD's water supply system is unable to deliver water due to the failure or damage of major water system components • The TRWD General Manager, with the concurrence of the TRWD Board of Directors, finds that conditions warrant the declaration of a Stage 2 drought		• Total raw water supply in TRWD western and eastern division reservoirs drops below 45% (55% depleted) of conservation storage • Water demand for all or part of the TRWD delivery system exceeds delivery capacity because delivery capacity is inadequate • Water demand is projected to approach or exceed limit of TRWD's permitted supply • TRWD's supply source becomes contaminated • TRWD's water supply system is unable to deliver water due to the failure or damage of major water system components • The TRWD General Manager, with the concurrence of the TRWD Board of Directors, finds that conditions warrant the declaration of a Stage 3 drought	
Trinity River Authority (Tarrant County Water Supply Project)	Apr-2024	WWP	N/A	TRWD Sources	3	• Total combined raw water supply in TRWD western and eastern division reservoirs drops below 75% (25% depleted) of conservation storage capacity; • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate; • Water demand is projected to approach the limit of permitted supply; • Supply source becomes contaminated; • Water supply system is unable to deliver water due to the failure or damage of major water system components; and • The General Manager finds that conditions warrant the declaration of a Stage 1 drought.	5%	• Total raw water supply in TRWD western and eastern division reservoirs drops below 60% (40% depleted) of conservation storage capacity; • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate; • Water demand is projected to approach the limit of permitted supply; • Supply source becomes contaminated; • Water supply system is unable to deliver water due to the failure or damage of major water system components; and • The General Manager finds that conditions warrant the declaration of a Stage 2 drought. Subject to preceding paragraphs regarding the Termination of a Drought Response	10%	• Total raw water supply in TRWD western and eastern division reservoirs drops below 45% (55% depleted) of conservation storage capacity; Water demand exceeds the amount that can be delivered to customers; • Water demand for all or part of the TRWD delivery system approaches delivery capacity because delivery capacity is inadequate; • One or more of TRWD's water supply sources has become limited in availability; • Water demand is projected to approach the limit of permitted supply; • Supply source becomes contaminated; • Water supply system is unable to deliver water due to the failure or damage of major water system components; and • The General Manager finds that conditions warrant the declaration of a Stage 3 drought.	20%
Watauga	Apr-2024	WUG	North Richland Hills	TRWD Sources	3	• Water demand reaches or exceeds 90% of reliable delivery capacity for three consecutive days. The delivery capacity could be citywide or in a specified portion of the system. • Distribution system becomes contaminated. • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • TRWD initiated Stage 1- Water Watch for one or more of the following reasons: • Total raw water supply within the Tarrant Regional Water District (TRWD) western and eastern division reservoirs, drops below 75% (25% depleted) of conservation storage. o Water demand for all or part of the TRWD delivery system exceeds delivery capacity because delivery capacity is inadequate. • Water demand is projected to approach the limit of TRWD's permitted supply. • TRWD's supply source becomes contaminated. • TRWD's water supply system is unable to deliver water due to the failure or damage of major water system components. • The TRWD General Manager, with the concurrence of the TRWD Board of Directors, finds that conditions warrant the declaration of Stage 1 of the Plan.	5%	• Water demand reaches or exceeds 95% of reliable delivery capacity for three consecutive days. The delivery capacity could be citywide or in a specified portion of the system. • Contamination of the water supply source(s) or water supply system. • Demand for all or part of the delivery system equals or exceeds delivery capacity because delivery capacity is inadequate. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • TRWD initiated Stage 2 – Water Warning for one or more of the following reasons: • Total raw water supply within TRWD, western and eastern division reservoirs, drops below 60% (40% depleted) of conservation storage. • Water demand for all or part of the TRWD delivery system exceeds delivery capacity because delivery capacity is inadequate. • Water demand is projected to approach the limit of TRWD's permitted supply. • TRWD's supply source becomes contaminated. • TRWD's water supply system is unable to deliver water due to the failure or damage of major water system components. • The TRWD General Manager, with the concurrence of the TRWD Board of Directors, finds that conditions warrant the declaration of a Stage 2 of the plan.	10%	• Water demand reaches or exceeds 98% of reliable delivery capacity for one day. The delivery capacity could be citywide or in a specified portion of the system. • Contamination of the water supply source(s) or water supply system. • Demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • TRWD has initiated Stage 3 – Emergency Water Use, which may also be initiated by one or more of the following: • Total raw water supply within TRWD, western and eastern division reservoirs, drops below 45% (55% depleted) of conservation storage. • Water demand for all or part of the TRWD delivery system exceeds delivery capacity because delivery capacity is inadequate. • Water demand is projected to approach or exceed the limit of TRWD's permitted supply. • TRWD's supply source becomes contaminated. • TRWD's water supply system is unable to deliver water due to the failure or damage of major water system components. • The TRWD General Manager, with the concurrence of the TRWD Board of Directors, finds that conditions warrant the declaration of Stage 3 of the plan.	20%

Appendix M-1
Summary of Existing DCPs in Region C

Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Stage 1 Trigger	Stage 1 Savings Goal	Stage 2 Trigger	Stage 2 Savings Goal	Stage 3 Trigger	Stage 3 Savings Goal
Upper Trinity Regional Water District (UTRWD)	Apr-2024	WWP	Duddeston	Lewisville Lake, Lake Ray Roberts, Jim Chapman Lake, DWU Sources, Denton	3	• The total raw water supply in the water supply lakes available to Upper Trinity has dropped below 75%(25% depleted) during the time period from April 1 to October 31; or • The total raw water supply in the water supply lakes available to Upper Trinity has dropped below 80%(20% depleted) during the time period from November 1 to March 31; or • Dallas Water Utilities has initiated Stage 1 and given notice to Upper Trinity; or • Water demand has reached or exceeded 80% of delivery capacity for three consecutive days; or • Water demand is approaching a level that will cause a reduced delivery capacity for all or part of the transmission system, as determined by Upper Trinity or: • The Executive Director with the concurrence of the Upper Trinity Board of Directors, finds that conditions warrant the declaration of Stage 1.	5%	• The total raw water supply in the water supply lakes available to Upper Trinity has dropped below 60%(40% depleted) during the time period from April 1 to October 31; or • The total raw water supply in the water supply lakes available to Upper Trinity has dropped below 65%(35% depleted) during the time period from November 1 to March 31; or • Dallas Water Utilities has initiated Stage 2 and given notice to Upper Trinity; or • Water demand has reached or exceeded 85% of delivery capacity for three consecutive days; or • Water demand has reached a level that will cause a reduced delivery capacity for all or part of the transmission system, as determined by Upper Trinity or: • The Transmission system us unable to deliver water at normal rates due to failure of, or damage to, major water systems components; or • A significant deterioration in the quality of a water supply, being affected by a natural or man-made source; or • The Executive Director with the concurrence of the Upper Trinity Board of Directors, finds that conditions warrant the declaration of Stage 2.	10%	• The total raw water supply in the water supply lakes available to Upper Trinity has dropped below 45%(55% depleted) during the time period from April 1 to October 31; or • The total raw water supply in the water supply lakes available to Upper Trinity has dropped below 50%(50% depleted) during the time period from November 1 to March 31; or • Dallas Water Utilities has initiated Stage 3 and given notice to Upper Trinity; or • Water demand has reached or exceeded 90% of delivery capacity for three consecutive days; or • Water demand exceeds capacity for all or part of the transmission system, as determined by Upper Trinity or: • The Transmission system us unable to deliver water at normal rates due to failure of, or damage to, major water systems components; or • Interruption of one or more water supply sources; or; • Natural or man-made contamination of an Upper Trinity water supply source(s) that threatens water availability; or • The Executive Director with the concurrence of the Upper Trinity Board of Directors, finds that conditions warrant the declaration of Stage 3.	20%
Providence Village WCID	Mar-2017	WUG	UTRWD	UTRWD Sources	3	• UTRWD has announced Stage 1 - Water Watch, which may be a result of: • The total raw water supply in water supply lakes available to UTRWD has dropped below 75% (25% depleted); or • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 1 and given notice to UTRWD; or • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of Stage 1; or • Water demand has reached or exceeded (80%) of delivery capacity for three consecutive days; or • Water demand is approaching a level that will cause a reduced delivery capacity for all or part of the distribution system, as determined by Town of Providence Village; or • The water supply system has a significant limitation due to failure of or damage to important water system components	5%	• UTRWD has announced Stage 2 - Water Warning, which may be a result of: • The total raw water supply in water supply lakes available to UTRWD has dropped below 60% (40% depleted); or • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 2 and given notice to UTRWD; or • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of Stage 2; or • Water demand has reached or exceeded (85%) of delivery capacity for three consecutive days; or • Water demand has reached a level that will cause a reduced delivery capacity for all or part of the distribution system, as determined by Town of Providence Village; or • The water supply system is unable to deliver water at normal rates due to failure of or damage to important water system components • A significant deterioration in the quality of a water supply, being affected by a natural or man-made source	10%	• UTRWD has announced Stage 3 - Water Emergency, which may be a result of: • The total raw water supply in water supply lakes available to UTRWD has dropped below 45% (55% depleted); or • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 3 and given notice to UTRWD; or • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of Stage 3; or • Water demand has reached or exceeded (90%) of delivery capacity for three consecutive days; or • Water demand exceeds the delivery capacity for all or part of the distribution system, as determined by Town of Providence Village; or • The water supply system is unable to deliver water in adequate quantities due to failure of or damage to important water system components • interruption of one or more water supply source(s) • Natural or man-made contamination of the water supply source that threatens water availability	20%
Sanger	May-2024	WUG	UTRWD	UTRWD Sources, Trinity Aquifer	3	• UTRWD has announced Stage 1 - Water Watch, which may be a result of: • The total raw water supply in water supply lakes available to UTRWD has dropped below 75% (25% depleted) during the time period from April 1 to October 31; or • The total raw water supply in water supply lakes available to UTRWD has dropped below 80% (20% depleted) during the time period from November 1 to March 31; or • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 1 and given notice to UTRWD; or • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of Stage 1; or • Water demand has reached or exceeded (80%) of delivery capacity for three consecutive days; or • Water demand is approaching a level that will cause a	5%	• UTRWD has announced Stage 2 - Water Warning, which may be a result of: • The total raw water supply in water supply lakes available to UTRWD has dropped below 60% (40% depleted) during the time period from April 1 to October 31; or • The total raw water supply in the water supply lakes available to Upper Trinity has dropped below 65% (35% depleted) during the time period from November 1 to March 31; or • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 2 and given notice to UTRWD; or • UTRWD, with concurrence of the Board of Directors, finds that conditions warrant the declaration of Stage 2; or • Water demand has reached or exceeded (85%) of delivery capacity for three consecutive days; or • Water demand has reached a level that will cause a reduced delivery capacity for all or part of the	10%	• UTRWD has announced Stage 3 - Water Emergency, which may be a result of: • The total raw water supply in water supply lakes available to UTRWD has dropped below 45% (55% depleted) during the time period from April 1 to October 31; or • The total raw water supply in the water supply lakes available to Upper Trinity has dropped below 50% (50% depleted) during the time period from November 1 to March 31; or • Dallas Water Utilities (a source of raw water to UTRWD) has initiated Stage 3 and given notice to UTRWD; or • UTRWD, with concurrence of the Board of Directors, • finds that conditions warrant • the declaration of Stage 3; or • Water demand has reached or exceeded (90%) of delivery capacity for three consecutive days; or • Water demand exceeds the delivery capacity for all or part of the distribution system, as determined by City of	20%

Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Stage 1 Trigger	Stage 1 Savings Goal	Stage 2 Trigger	Stage 2 Savings Goal	Stage 3 Trigger	Stage 3 Savings Goal
						reduced delivery capacity for all or part of the distribution system, as determined by City of Sanger; or • The water supply system has a significant limitation due to failure of or damage to important water system components		distribution system, as determined by City of Sanger; or • The water supply system is unable to deliver water at normal rates due to failure of or damage to important water system components • A significant deterioration in the quality of a water supply, being affected by a natural or man-made source		Sanger; or • The water supply system is unable to deliver water in adequate quantities due to failure of or damage to important water system components • Interruption of one or more water supply source(s) • Natural or man-made contamination of the water supply source that threatens water availability	
Greater Texoma Utility Authority (GTUA)	Mar-2019	WWP	NTMWD	NTMWD Sources, Lake Texoma	3	• NTMWD has informed GTUA that NTMWD has initiated Stage 1 of their Plan. • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 1. • Water demand is projected to approach the limit of the NTMWD's permitted supply. • The storage level in Lake Lavon as published by the Texas Water Development Board (TWDB),4 is less than 70 percent of the total conservation pool capacity during any of the months of April through October or less than 60 percent of the total conservation pool capacity during any of the months of November through March. • The Sabine River Authority (SRA) has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 1 drought. • NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station, or some other NTMWD water source may be limited in availability within the next six (6) months. • Water demand exceeds 95 percent of the amount that can be delivered by NTMWD to Customers for three (3) consecutive days. • Water demand for all or part of the NTMWD delivery system approaches delivery capacity because delivery capacity is inadequate. • NTMWD supply source is interrupted or unavailable due to contamination, invasive species, equipment failure, or other cause. • NTMWD water supply system is unable to deliver water due to the failure or damage of major water system components. • Part of the NTMWD system has a shortage in supply or damage to equipment. NTMWD may implement measures for only that portion of the NTMWD system impacted. • • GTUA Stage 1 Initiation Conditions: • The General Manager, with the concurrence of the GTUA Board of Directors, finds that conditions warrant the declaration of Stage 1. • GTUA's water demand exceeds 95 percent of the amount that can be delivered to customers for three consecutive days. • GTUA's supply source becomes contaminated. • GTUA's water demand for all or part of the delivery system equals delivery capacity because delivery capacity is inadequate • GTUA's water system is unable to deliver water due to the failure or damage of major water system components	2%	• NTMWD has informed GTUA that NTMWD has initiated Stage 2 of their Plan. • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 2. • Water demand is projected to approach the limit of the NTMWD's permitted supply. • The storage level in Lake Lavon as published by the Texas Water Development Board (TWDB), is less than 55 percent of the total conservation pool capacity during any of the months of April through October or less than 45 percent of the total conservation pool capacity during any of the months of November through March. • The Sabine River Authority (SRA) has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 2 drought. • NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station, or some other NTMWD water source may be limited in availability within the next three (3) months. • Water demand exceeds 98 percent of the amount that can be delivered by NTMWD to Customers for three (3) consecutive days. • Water demand for all or part of the NTMWD delivery system approaches delivery capacity because delivery capacity is inadequate. • NTMWD supply source is interrupted or unavailable due to contamination, invasive species, equipment failure, or other cause. • NTMWD water supply system is unable to deliver water due to the failure or damage of major water system components. • Part of the NTMWD system has a shortage in supply or damage to equipment. NTMWD may implement measures for only that portion of the NTMWD system impacted. • • GTUA requirements for initiating Stage 2: • The General Manager, with the concurrence of the GTUA Board of Directors, finds that conditions warrant the declaration of Stage 2. • GTUA's water demand exceeds 98 percent of the amount that can be delivered to Customers for three consecutive days. • GTUA's supply source is interrupted or unavailable due to contamination, invasive species, equipment failure, or other cause. • GTUA's water demand for all or part of the delivery system equals delivery capacity because delivery capacity is inadequate. • GTUA's water system is unable to deliver water due to the failure or damage of major water system components.	10%	• NTMWD has informed GTUA that NTMWD has initiated Stage 3 of their Plan. • The Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 3. • NTMWD water demand is projected to approach the limit of the NTMWD's permitted supply. • The storage level in Lake Lavon as published by the Texas Water Development Board (TWDB),3 is less than 30 percent of the total conservation pool capacity during any of the months of April through October or less than 20 percent of the total conservation pool capacity during any of the months of November through March. • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 3 drought. • NTMWD has concern that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, the Main Stem Pump Station, or some other NTMWD water source has become limited in availability. • Water demand exceeds the amount that can be delivered by NTMWD to Member Cities and Customers. • Water demand for all or part of the NTMWD delivery system approaches delivery capacity because delivery capacity is inadequate. • NTMWD supply source is interrupted or unavailable due to contamination, invasive species, equipment failure, or other cause. • NTMWD water supply system is unable to deliver water due to the failure or damage of major water system components. • Part of the NTMWD system has a shortage in supply or damage to equipment. NTMWD may implement measures for only that portion of the NTMWD system impacted. • • GTUA requirements for initiating Stage 3: • The General Manager, with the concurrence of the GTUA Board of Directors, finds that conditions warrant the declaration of Stage 3. • GTUA's water demand exceeds the amount that can be delivered to Customers. • GTUA's water demand for all or part of the delivery system seriously exceeds delivery capacity because the delivery capacity is inadequate. • GTUA's supply source is interrupted or unavailable due to contamination, invasive species, equipment failure, or other cause. • GTUA's water system is unable to deliver water due to the failure or damage of major water system components.	Designated by GTUA Director

						Stage 1		Stage 2		Stage 3	
Entity	**Plan Date**	**Entity Type**	**Wholesale Water Provider(s)**	**Source(s)**	**No. of Stages**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**
Blue Ridge	Apr-2019	WUG	NTMWD	Woodbine Aquifer	3	• Condition 1: Notification is received from TCEQ requesting initiation of Stage 1 restrictions. • Condition 2: Water demand exceeds ninety percent (90%) of the water well flow rate for water supply for seven • (7) consecutive days. • Condition 3: Blue Ridge's combined water storage is less than 65 percent (65%) of capacity. • Condition 4: Deficiencies in the City's distribution system limit supply capabilities. • Condition 5: Supply source becomes contaminated. • Condition 6: As determined by the Director due to drought or reduced water supply	3%	• Condition 1: Notification is received from TCEQ requesting initiation of Stage 2 restrictions. • Condition 2: Water use exceeds 100 percent (100%) of the combined current maximum flow rate from Blue Ridge water supply for five (5) consecutive days. • Condition 3: Blue Ridge's combined water storage is less than 45 percent (45%) of total storage capacity. • Condition 4: Short-term deficiencies in the City's distribution system limit supply capabilities, such as system outage due to the failure or damage of major water system components. • Condition 5: Inability to maintain or replenish adequate volumes of water in storage to provide for public health and safety. • Condition 6: Supply source becomes contaminated. • Condition 7: As determined by Director due to drought or reduced water supply.	8%	• Condition 1: Notification is received from TCEQ requesting initiation of Stage 3 of the Plan. • Condition 2: Blue Ridge's combined water storage is less than 20 percent (20%) of Blue Ridge's total storage capacity. • Condition 3: Short-term deficiencies in the City's distribution system limit supply capabilities, such as system outage due to the failure or damage of major water system components. • Condition 4: Inability to maintain or replenish adequate volumes of water in storage to provide for public health and safety. • Condition 5: Supply source becomes contaminated. • Condition 6: As determined by the Director due to drought or reduced water supply.	20%
Everman	May-2019	WUG	N/A	Trinity Aquifer	3	• Water demand reaches or exceeds 90% of reliable delivery capacity for three consecutive days. The delivery capacity could be citywide or in a specified portion of the system. • Fort Worth's water treatment or distribution system becomes contaminated. • Fort Worth's water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • Fort Worth's water supply system is unable to deliver water due to the failure or damage of major water system components. • TRWD initiated Stage 1 – Water Watch for one or more of the following reasons: • Total raw water supply in TRWD western and eastern division reservoirs drops below 75% (25% depleted) of conservation storage. o Water demand for all or part of the TRWD delivery system exceeds delivery capacity because delivery capacity is inadequate. • Water demand is projected to approach the limit of TRWD's permitted supply. • TRWD's supply source becomes contaminated. • TRWD's water supply system is unable to deliver water due to the failure or damage of major water system components. • The TRWD General Manager, with the concurrence of the TRWD Board of Directors, finds that conditions warrant the declaration of a Stage 1 drought.	5%	• Water demand reaches or exceeds 95% of reliable delivery capacity for three consecutive days. The delivery capacity could be citywide or in a specified portion of the system. • Contamination of the water supply source(s) or water supply system. • Demand for all or part of the delivery system equals or exceeds delivery capacity because delivery capacity is inadequate. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • TRWD initiated Stage 2 –Water Warning for one or more of the following reasons: • Total raw water supply in TRWD western and eastern division reservoirs drops below 60% (40% depleted) of conservation storage. o Water demand for all or part of the TRWD delivery system exceeds delivery capacity because delivery capacity is inadequate. o Water demand is projected to approach the limit of TRWD's permitted supply. • TRWD's supply source becomes contaminated. o TRWD's water supply system is unable to deliver water due to the failure or damage of major water system components. • The TRWD General Manager, with the concurrence of the TRWD Board of Directors, finds that conditions warrant the declaration of a Stage 2 drought.	10%	• Water demand has reaches or exceeds 98% of reliable delivery capacity for one day. The delivery capacity could be citywide or in a specified portion of the system. • Contamination of the water supply source(s) • or water supply system. • Demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • TRWD has initiated Stage 3 – Emergency Water Use, which may also be initiated by one or more of the following: • Total raw water supply in TRWD western and eastern division reservoirs drops below 45% (55% depleted) of conservation storage. • Water demand for all or part of the TRWD delivery system exceeds delivery capacity because delivery capacity is inadequate. • Water demand is projected to approach or exceed the limit of TRWD's permitted supply. • TRWD's supply source becomes contaminated. • TRWD's water supply system is unable to deliver water due to the failure or damage of major water system components. • The TRWD General Manager, with the concurrence of the TRWD Board of Directors, finds that conditions warrant the declaration of a Stage 3 drought.	20%
White Shed WSC	May-2024	WUG	N/A	Woodbine Aquifer	3	• Water consumption has reached 85 percent of daily maximum supply for three (3) consecutive days	N/A	• Water consumption has reached 90 percent of the amount available for three consecutive days	N/A	• Total daily water demand equals or exceeds 95 percent of the system's safe. • Total daily water demand equals or exceeds 100 percent of capacity on a single day • There is natural or man-made contamination of the water supply source(s). • The declaration of a state of disaster due to drought conditions in a country or counties served by the Corporation. • Reduction of wholesale water supply due to drought conditions. • Other unforeseen events which could cause imminent health or safety risks to the public.	n/a

Appendix M-1
Summary of Existing DCPs in Region C

						Stage 1		Stage 2		Stage 3	
Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal
Arledge Ridge WSC	Apr-2022	WUG	N/A	Woodbine aquifer	3	• Water consumption has reached 80 percent of daily maximum supply for three (3) consecutive days. • Water supply is reduced to a level that is only 20 percent greater than the average consumption for the previous month. • There is an extended period (at least eight (8) weeks) of low rainfall and daily use has risen 20 percent above the use for the same period during the previous year.	N/A	• Water consumption has reached 90 percent of the amount available for three consecutive days. • The water level in any of the water storage tanks cannot be replenished for three (3) consecutive days.	N/A	• Failure of a major component of the system or an event which reduces the minimum residual pressure in the system below 20 psi for a period of 24 hours or longer. • Water consumption of 95 percent or more of the maximum available for three (3) consecutive days. • Water consumption of 100 percent of the maximum available and the water storage levels in the system drop during one 24-hour period. • Natural or man-made contamination of the water supply source(s). • The declaration of a state of disaster due to drought conditions in a county or counties served by the Corporation. • Reduction of wholesale water supply due to drought conditions. • Other unforeseen events which could cause imminent health or safety risks to the public.	N/A
Bear Creek SUD	Apr-2024	WUG	NTMWD	NTMWD Sources	3	• The executive director with the concurrence of the NTMWD Board of Directors, find that conditions warrant the declaration of Stage 1. • One or more sour(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other cause. • The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD) may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions • Water demand has exceeded or is expected to exceed 90% of maximum sustainable production or delivery capacity for an extended period. • The combined storage in Lavon and Bois d'Arc Lake, as published by the TWDB is less than:70% of the combined conservation pool capacity during any of the months of April Through October OR60% of the combined conservation pool capacity during any of the months of November through March • The Sabine River Authority (SRA) has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 1 drought • NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source may be limited in availability within the next six months.	2%	• The executive director with the concurrence of the NTMWD Board of Directors, find that conditions warrant the declaration of Stage 2. • One or more sour(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other cause. • The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD) may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions • Water demand has exceeded or is expected to exceed 95% of maximum sustainable production or delivery capacity for an extended period. • The combined storage in Lavon and Bois d'Arc Lake, as published by the TWDB is less than: 55% of the combined conservation pool capacity during any of the months of April Through October OR 45% of the combined conservation pool capacity during any of the months of November through March • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 2 drought • NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source may be limited in availability within the next six months.	5%	• The executive director with the concurrence of the NTMWD Board of Directors, find that conditions warrant the declaration of Stage 2. • One or more sour(s) is interrupted, unavailable, or limited due to contamination, invasive species, equipment failure or other cause. • The water supply system is unable to deliver needed supplies due to the failure or damage of major water system components. • Part of the system has a shortage of supply or damage to equipment. (NTMWD) may implement measures for only that portion of the system impacted.) • A portion of the service area is experiencing an extreme weather event or power grid/supply disruptions • Water demand has exceeded or is expected to exceed 95% of maximum sustainable production or delivery capacity for an extended period. • The combined storage in Lavon and Bois d'Arc Lake, as published by the TWDB is less than:55% of the combined conservation pool capacity during any of the months of April Through October OR 45% of the combined conservation pool capacity during any of the months of November through March • SRA has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Stage 2 drought • NTMWD is concerned that Lake Texoma, Jim Chapman Lake, the East Fork Water Reuse Project, Main Stem Pump Station, and/or some other NTMWD water source may be limited in availability within the next six months.	30%
Benbrook Water Authority	Mar-2024	N/A	N/A	N/A	3	• Initiated by BWA: • BWA water demand exceeds 90% of reliable delivery capacity for three consecutive days. • The delivery capacity could be citywide or in a specified portion of the system. • BWA water treatment or distribution system becomes contaminated. • BWA water demand for all or part of the delivery system approaches delivery capacity • because delivery capacity is inadequate. • BWA water supply system is unable to deliver water due to the failure or damage of major • water system components, or due to other criteria, such as energy shortages or outages.	5%	• Initiated by BWA: • BWA water demand exceeds 95% of reliable delivery capacity for two consecutive days. • The delivery capacity could be citywide or in a specified portion of the system. • BWA demand for all or part of the delivery system equals or exceeds delivery capacity • because delivery capacity is inadequate. • BWA water treatment or distribution system becomes contaminated. • BWA water supply system is unable to deliver water due to the failure or damage of major • water system components, or due to other criteria, such as energy shortages or outages.	10%	• Initiated by BWA • The BWA water demand exceeds 98% of reliable delivery capacity for one day. The delivery capacity could be citywide or in a specified portion of the system. • The BWA demand for all or part of the delivery system exceeds delivery capacity because • delivery capacity is inadequate. • The BWA water treatment or distribution system becomes contaminated. • The BWA water supply system is unable to deliver water due to the failure or damage of major water system components, or due to other criteria, such as energy shortages or outages. •	20%

Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Stage 1 Trigger	Stage 1 Savings Goal	Stage 2 Trigger	Stage 2 Savings Goal	Stage 3 Trigger	Stage 3 Savings Goal
						• • Initiated by TRWD: • Total combined raw water supply in TRWD western and eastern division reservoirs drops below 75% (25% depleted) of conservation storage capacity. • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • Water demand is projected to approach the limit of permitted supply. • Supply source becomes contaminated. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • The General Manager finds that conditions warrant the declaration of a Stage 1 drought.		• • Initiated by TRWD: • Total raw water supply in TRWD western and eastern division reservoirs drops below 60% (40% depleted) of conservation storage capacity. • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • Water demand is projected to approach the limit of permitted supply. • Supply source becomes contaminated. • Water supply system is unable to deliver water due to the failure or damage of major • water system components. • The General Manager finds that conditions warrant the declaration of a Stage 2 drought.		• Initiated by TRWD: • Total raw water supply in TRWD western and eastern division reservoirs drops below 45% • (55% depleted) of conservation storage capacity. • Water demand exceeds the amount that can be delivered to customers. • Water demand for all or part of the TRWD delivery system approaches delivery capacity • because delivery capacity is inadequate. • One or more of TRWD's water supply sources has become limited in availability. • Water demand is projected to approach the limit of permitted supply. • Supply source becomes contaminated. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • The TRWD General Manager finds that conditions warrant the declaration of a Stage 3 drought.	
East Cedar Creek (McKay)	Apr-2024	WUG	TRWD	TRWD sources	3	• ECCFWSD water demand exceeds 85% of reliable delivery capacity for three consecutive days. The delivery capacity could be system wide or in a specified portion of the system • ECCFWSD water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • ECCFWSD water treatment or distribution system becomes contaminated. • ECCFWSD water supply system us unable to deliver water due to the failure or damage of major water systems components, or due to other criteria, such as energy shortages or outages. • TRWD initiated Stage 1- Water watch for one or more of the following reasons: • Total combined raw water supply in TRWD western and eastern division reservoirs drops below 75% (25% depleted) of conservation storage capacity. • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • Water demand is projected to approach the limit of permitted supply. • Supply source becomes contaminated. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • The TRWD General Manager, with the concurrence of the TRWD Board of Directors, finds that conditions warrant the declaration of a Stage 1 drought.	5%	• ECCFWSD water demand exceeds 90% of reliable delivery capacity for three consecutive days. The delivery capacity could be system wide or in a specified portion of the system • ECCFWSD water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • ECCFWSD water treatment or distribution system becomes contaminated. • ECCFWSD water supply system us unable to deliver water due to the failure or damage of major water systems components, or due to other criteria, such as energy shortages or outages. • TRWD initiated Stage 2- Water watch for one or more of the following reasons: • Total combined raw water supply in TRWD western and eastern division reservoirs drops below 60% (40% depleted) of conservation storage capacity. • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • Water demand is projected to approach the limit of permitted supply. • Supply source becomes contaminated. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • The TRWD General Manager, with the concurrence of the TRWD Board of Directors, finds that conditions warrant the declaration of a Stage 2 drought.	10%	• ECCFWSD water demand exceeds 95% of reliable delivery capacity for three consecutive days. The delivery capacity could be system wide or in a specified portion of the system • ECCFWSD water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • ECCFWSD water treatment or distribution system becomes contaminated. • ECCFWSD water supply system us unable to deliver water due to the failure or damage of major water systems components, or due to other criteria, such as energy shortages or outages. • TRWD initiated Stage 3- Water watch for one or more of the following reasons: • Total combined raw water supply in TRWD western and eastern division reservoirs drops below 45% (55% depleted) of conservation storage capacity. • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • Water demand is projected to approach the limit of permitted supply. • Supply source becomes contaminated. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • The TRWD General Manager, with the concurrence of the TRWD Board of Directors, finds that conditions warrant the declaration of a Stage 3 drought.	20%
East Cedar Creek (Brooksire)	Apr-2024	WUG	TRWD	TRWD sources	3	• ECCFWSD water demand exceeds 85% of reliable delivery capacity for three consecutive days. The delivery capacity could be system wide or in a specified portion of the system • ECCFWSD water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • ECCFWSD water treatment or distribution system becomes contaminated. • ECCFWSD water supply system us unable to deliver water due to the failure or damage of major water systems components, or due to other criteria, such as energy shortages or outages. • TRWD initiated Stage 1- Water watch for one or more of	5%	• ECCFWSD water demand exceeds 90% of reliable delivery capacity for three consecutive days. The delivery capacity could be system wide or in a specified portion of the system • ECCFWSD water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • ECCFWSD water treatment or distribution system becomes contaminated. • ECCFWSD water supply system us unable to deliver water due to the failure or damage of major water systems components, or due to other criteria, such as energy shortages or outages. • TRWD initiated Stage 2- Water watch for one or more of	10%	• ECCFWSD water demand exceeds 95% of reliable delivery capacity for three consecutive days. The delivery capacity could be system wide or in a specified portion of the system • ECCFWSD water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • ECCFWSD water treatment or distribution system becomes contaminated. • ECCFWSD water supply system us unable to deliver water due to the failure or damage of major water systems components, or due to other criteria, such as energy shortages or outages. • TRWD initiated Stage 3- Water watch for one or more of the	20%

						Stage 1		Stage 2		Stage 3	
Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal
						the following reasons: • Total combined raw water supply in TRWD western and eastern division reservoirs drops below 75% (25% depleted) of conservation storage capacity. • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • Water demand is projected to approach the limit of permitted supply. • Supply source becomes contaminated. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • The TRWD General Manager, with the concurrence of the TRWD Board of Directors, finds that conditions warrant the declaration of a Stage 1 drought.		the following reasons: • Total combined raw water supply in TRWD western and eastern division reservoirs drops below 60% (40% depleted) of conservation storage capacity. • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • Water demand is projected to approach the limit of permitted supply. • Supply source becomes contaminated. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • The TRWD General Manager, with the concurrence of the TRWD Board of Directors, finds that conditions warrant the declaration of a Stage 2 drought.		following reasons: • Total combined raw water supply in TRWD western and eastern division reservoirs drops below 45% (55% depleted) of conservation storage capacity. • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • Water demand is projected to approach the limit of permitted supply. • Supply source becomes contaminated. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • The TRWD General Manager, with the concurrence of the TRWD Board of Directors, finds that conditions warrant the declaration of a Stage 3 drought.	

						Stage 1		Stage 2		Stage 3		Stage 4		Stage 5		Stage 6	
Entity	**Plan Date**	**Entity Type**	**Wholesale Water Provider(s)**	**Source(s)**	**No. of Stages**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**
						•		•		•		•		•		•	
Duncanville	May-2019	WUG	DWU	DWU Sources	5	If one or more occurs: • Dallas Water utilities initiates action and requests customer cities to do likewise • Combined required ground and elevated storage falls below 75 percent of capacity for a five-day period. • Distribution - Continued potable water storage depletion due to water demand or water pipeline breaks, pump or system failures which hinder system ability to continue to supply water at the demand encountered to all or part of the system. • Other - Natural or manmade contamination of water supply occurs.	1%	One of more may apply: • Dallas Water Utilities initiates action and requests customer cities to do likewise during high demand month. • Combined ground and elevated storage falls below 60 percent of capacity at the beginning of a 24-hour period. • Distribution - Stage 1 voluntary restrictions fail to alleviate continued potable water storage depletion • Situations that limit distribution of water, as determined by the Public Works Director, or designee, such as: • Short or long-term equipment failure or failure to maintain 20 psi at up to 200 locations or up to ten fire hydrants in a localized area. • Short-term deficiencies exist within an entire pressure district • Power failure or restrictions • Natural or manmade contamination of water supply occurs.	5%	One or more may apply: • Dallas Water utilities supply cut by five percent on a continuous basis during high demand month. • Combined ground and elevated storage fall below 50 percent of capacity at the beginning of a 24-hour period. • Distribution - Failure of Stage 2 restrictions to reduce usage below supply capability • Other - Situation that limit distribution of water, as determined by the Public Works Director, or designee, as such: • Long-term deficiencies in water supply within an entire pressure district. • Failure to maintain 20 psi at more than 300 service locations or more than 15 fire hydrants in a localized area. • Any unanticipated situations that limit distribution of water, as determined by the Public Works director, or Designee. • Power failure or restrictions. • Natural or manmade contamination of water supply occurs.	15%	• If one or more occurs: • Dallas Water Utilities supply cut by ten percent on a continuous basis during high demand months. • Combined ground and elevated storage falls below 40 percent of total capacity • Distribution - Failure of Stage 3 restrictions to reduce usage below supply capacity. • Any unanticipated situations that limit distribution of water, as determined by the designated official. • Power failure or restrictions. • Natural or manmade contaminations of water supply occurs.	25%	• If one or more occurs: • Dallas Water utilities water supply cut by greater than 15 percent on a continuous basis • Combined ground and elevated storage fall below 20 percent of total capacity. • Distribution - Failure of Stage 4 restrictions to reduce usage below supply capability. • Any unanticipated situations that severely limit distribution of water, as determined by the Public Works Director. • Notification of mandatory restrictions from the City of Dallas Water Utilities. • Power failure or restrictions. • Natural or manmade contamination of water supply occurs.	30%		
Coppell	Nov-2022	WUG	DWU	DWU sources	5	Stage 1 of the Plan shall • remain in effect year-round.	Voluntary Reduction	Customers shall be required to comply with the requirements and restrictions on certain non- essential water uses provided in Section IX of this Plan when one or more of the following conditions occurs: 1. Notification is received from DWU requiring implementation of like procedures by	2%	Customers shall be required to comply with the requirements and restrictions on certain non- essential water uses provided in Section IX of this Plan when one or more of the following conditions occurs: 1. Notification is received from DWU requiring water demand reductions in accordance with	5%	Customers shall be required to comply with the requirements and restrictions on certain non- essential water uses provided in Section IX of this Plan when one or more of the following conditions occurs: 1. Notification is received from DWU requiring water demand reductions in	15%	Customers shall be required to comply with the requirements and restrictions for Stage 5 of this Plan when the City Manager, or his/her designee, determines that a water supply emergency exists based on 1) Major water line breaks, or pump or system failures occur, which cause unprecedented loss of	20%	•	

Appendix M-1
Summary of Existing DCPs in Region C

Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Stage 1 Trigger	Stage 1 Savings Goal	Stage 2 Trigger	Stage 2 Savings Goal	Stage 3 Trigger	Stage 3 Savings Goal	Stage 4 Trigger	Stage 4 Savings Goal	Stage 5 Trigger	Stage 5 Savings Goal	Stage 6 Trigger	Stage 6 Savings Goal
								wholesale customers. 2. Water demands exceed ninety percent (90%) of the current maximum flow rate contracted with DWU for five (5) consecutive days. 3. Ground Storage Reservoir levels do not recover for two (2) consecutive days. • 4. Short-term deficiencies in the City's distribution system limit supply capabilities.		contract obligations for wholesale customers. 2. Water demands exceed ninety-five percent (95%) of the current maximum flow rate contracted with DWU for five (5) consecutive days. 3. Short-term deficiencies in the City's distribution system such as system outage due to the failure or damage of major water system components, limit supply capabilities. • 4. Ground Storage Reservoir levels do not recover for three (3) consecutive days.,		accordance with contract obligations for wholesale customers. 2. Water demands exceed one hundred percent (100%) of the current maximum flow rate contracted with DWU for two (2) consecutive days. 3. Short-term deficiencies in the City's distribution system such as system outage due to the failure or damage of major water system components, limit supply capabilities. 4. Ground Storage Reservoir levels do not recover for four • (4) consecutive days,		capability to provide water service, or • 2. Natural or man-made contamination of the water supply source(s)			
Ennis	Apr-2019	WUG	TRA(TRWS)	TRWD Sources, Lake Bardwell	6	• elevation of Lake Bardwell is less than 421" Mean Sea Level (MSL) or the daily water usage is greater than 45% of system capacity.	0%	• When the elevation of Lake Bardwell is equal to or less than 417' MSL or 74% of available capacity, and/or the daily potable water supply system demand is 6.0 Million Gallons per Day (MGD) or 50% of plant capacity	2%	• When the elevation of Lake Bardwell is equal to or less than 414' MSL or 54% of available capacity, and/or the daily potable water supply system demand is 7.3 Million Gallons per Day (MGD) or 60% of plant capacity	3%	• When the elevation of Lake Bardwell is equal to or less than 412' MSL or 40% of available capacity, and/or the daily potable water supply system demand is 9 Million Gallons per Day (MGD) or 75% of plant capacity	5%	• When the elevation of Lake Bardwell is equal to or less than 409' MSL or 20% of available capacity, and/or the daily potable water supply system demand is 10.8 Million Gallons per Day (MGD) or 90% of plant capacity	10%	• Customers shall be required to comply with the requirements and restrictions for Stage 5 of this Plan when the City Manager, or his designee determines that a water supply emergency exists based on: • Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service; • Natural or man-made contamination of the water supply source(s); or • Any other situation deemed an emergency by the city manager	Determined by Manager
Rockwall	Sep-2023	WUG	NTMWD	NTMWD sources	6	Customers shall be requested to voluntarily conserve water and adhere to the prescribed restrictions on certain water uses, defined in	10%	Customers shall be required to comply with the requirements and restrictions on certain nonessential water uses provided in Section IX of	15%	Customers shall be required to comply with the requirements and restrictions on certain nonessential water uses for Stage 3 of this Plan	20%	Customers shall be required to comply with the requirements and restrictions on certain nonessential water uses for Stage 4 of this Plan	30%	Customers shall be required to comply with the requirements and restrictions for Stage 5 of this Plan when the DCP	50%	Customers shall be required to comply with the water allocation plan prescribed in Section IX of this Plan and comply with the requirements and	Water Allocation Plan

						Stage 1		Stage 2		Stage 3		Stage 4		Stage 5		Stage 6	
Entity	**Plan Date**	**Entity Type**	**Wholesale Water Provider(s)**	**Source(s)**	**No. of Stages**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**
						Section VII – Definitions, when continually falling • treated water reservoir levels which do not refill above 100 percent overnight.		this Plan when falling treated water reservoir levels which routinely do not refill above 90 percent overnight. •		when falling treated water reservoir levels which • routinely do not refill above 85 percent overnight.		when falling treated water reservoir levels which • routinely do not refill above 75 percent overnight.		Administrator, or his/her designee, determines that a water supply emergency exists based on but not limited to: 1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service; or • 2. Natural or man-made contamination of the water supply source(s).		restrictions for Stage 5 of this Plan when falling • treated water reservoir levels which do not refill above 50 percent overnight.	
Waxahachie	Oct - 2020	WUG	TRA (TRWD)	Lake Waxahachie, Lake Bardwell, TRWD sources	6	Monitor weather conditions, activate Bardwell Reservoir Pump • Station to transfer raw water when Lake Waxahachie drops below elevation 531' msl for three consecutive days. This is 6" below the spillway overflow elevation. The lake is operating at approximately 97 percent capacity.	Voluntary	When Lake Waxahachie elevation drops to 527' msl. This is • 4.5-feet below spillway elevation and the lake is operating at less than 74 percent capacity: Customers will be encouraged to voluntarily conserve water and reduce non-essential water use as described in Section VII – Definitions, of this plan. The city will provide public education on water conservation tips and information through newspaper articles, city website and handouts. Lake Waxahachie and city parks adjacent to the lake will remain open.	2%	• When Lake Waxahachie elevation drops to 524' msl. This is 7.5-feet below spillway elevation and the lake is operating at less than 68 percent capacity: Customers shall be required to comply with requirements of mandatory limits on all lawn and landscape irrigation which will be restricted to Wednesday and Saturday only; provided however, that the City Manager, or his/her designee, after notice in the newspaper, radio, city website and any other methods deemed appropriate, may change the days to Tuesday, Thursday and Saturday. Non-essential water uses shall be prohibited, except for letter (a), as described in Section VII – Definitions, of this Plan. Items listed in letter (a) shall comply with mandatory watering limits in this stage. Require implementation of like procedures by Wholesale Water Customers in accordance with their contracts and state mandated drought and water conservation plans. Violators of this stage will be subject to	5%	• When Lake Waxahachie elevation drops to 520' msl. This is 11.5-feet below spillway elevation and the lake is operating at less than 45 percent capacity: Strengthen mandatory water restrictions to specified days: Saturday only from 4:00 a.m. to 10:00 a.m.; provided however, that the City Manager, after notice in the newspaper, radio, city website and any other methods deemed appropriate, may add an additional day and hours, being Wednesday 4:00 a.m. to 10:00 a.m. Above prohibitions shall apply as in Stage 1 and Stage 2. ALL COMMERCIAL AND INDUSTRIAL ACCOUNTS MUST SUBMIT A DETAILED WATER CONSERVATION PLAN TO THE CITY FOR CONSIDERATION AND APPROVAL Violators subject to fines as in Stage 2. Raise water rates penalty to $25.00 for water in excess of 10,000 gallons per account and	10%	• When Lake Waxahachie elevation drops to 517.5' msl. This is 14-feet below spillway elevation and the lake is operating at less than 25 percent capacity: Strengthen mandatory water restrictions, including no watering of residential and commercial lawns and landscapes. All violators subject to fines. First offense - minimum $250.00 fine; second offense - minimum $350.00 fine; third offense - minimum $500.00 fine. Mandatory reduction of water usage by commercial users per their approved water conservation plan. Raise penalty to $100.00 for use of water in excess of 10,000 gallons per all account and increase rates on cost per 1,000 gallons by an additional ten-percent (10%).	15%	Customers shall be required to comply with the requirements and restrictions for Stage 6 of this Plan when the City Manager, or his/her designee, determines that a water supply emergency exists based on: 1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service; or I. Natural or man-made contamination of the water supply source(s). Customers shall discontinue all non-essential and landscape irrigation water use until the evaluation of the impact and expected duration of the Emergency Water Outage is completed. Upon determination, the City Manager, or his/her designee, will notify customers by local radio, newspaper and any other methods deemed appropriate, of the water use restrictions and the • duration of such restrictions.	30%

Appendix M-1
Summary of Existing DCPs in Region C

						Stage 1		Stage 2		Stage 3		Stage 4		Stage 5		Stage 6	
Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal
										fines. First offense - warning; second offense - minimum $150.00 fine; third offense - minimum $250.00 fine. Water rate penalty of $5.00 for water use in excess of 10,000 gallons per account and rate per 1,000 gallons will be increased ten percent (10%) on all accounts		continue previous rate per 1,000 gallons as in Stage 2.					
Krum	Nov-2019	WUG	UTRWD	UTRWD Sources, Trinity Aquifer	5	• The Mayor or his/her designee finds that conditions warrant the declaration of Stage 1 • Ground water level reaches 100' above current pump settings. • City's water demand exceeds 90 percent of the amount that can be delivered to customers for three consecutive days. • City's water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • Water demand is approaching the limit of the permitted supply.	2%	• The Mayor or his/her designee finds that conditions warrant the declaration of Stage 2. • Ground water level reaches 75' above current pump settings. • City's water demand exceeds 95 percent of the amount that can be delivered to customers for three consecutive days. • City's water demand for all or part of the delivery system equals delivery capacity because delivery capacity is inadequate. • Water demand is approaching the limit of the permitted supply.	5%	• The Mayor or his/her designee finds that conditions warrant the declaration of Stage 3. • Ground water level reaches 50' above current pump settings. • City's water demand exceeds 98 percent of the amount that can be delivered to customers for three consecutive days. • City's water demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate. • Water demand is approaching the limit of the permitted supply.	10%	• The Mayor or his/her designee finds that conditions warrant the declaration of Stage 4. • Ground water level reaches 40' above current pump settings. • City's water demand exceeds the amount that can be delivered to customers. • City's water demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate. • Water demand is approaching the limit of the permitted supply.	As Necessary	• The Mayor or his/her designee finds that conditions warrant the declaration of Stage 5. • Major water line breaks, or pump or system failure occur, which cause unprecedented loss of capability to provide water service or • National or manmade contamination of the water supply occurs.	As Necessary		
Dallas County Park Cities MUD	May-2024	WWP	N/A	Grapevine Lake	4	• The District's water supply in Grapevine Lake becomes 35% depleted as a result of drought conditions. • Grapevine Reservoir becomes contaminated. • The District's demand exceeds 90% of its delivery capacity for seven consecutive days. • The District's water supply system is unable to deliver water to its customers due to the failure or damage of major water system components. • Any other condition	2%	• The District's water supply in Grapevine Lake becomes 45% depleted as a result of drought conditions. • Grapevine Reservoir becomes contaminated. • The District's demand exceeds 95% of its delivery capacity for seven consecutive days. • The District's water supply system is unable to deliver water to its customers due to the failure or damage of major water system components. • Any other condition	5%	• The District's water supply in Grapevine Lake becomes 55% depleted as a result of drought conditions. • Grapevine Reservoir becomes contaminated. • The District's demand exceeds 98% of its delivery capacity for seven consecutive days. • The District's water supply system is unable to deliver water to its customers due to the failure or damage of major water system components. • Any other condition	10%	• The District's water supply in Grapevine Lake becomes 70% depleted as a result of drought conditions. • Grapevine Reservoir becomes contaminated. • The District's demand exceeds its delivery capacity. • The District's water supply system is unable to deliver water to its customers due to the failure or damage of major water system components. • The District's water use is approaching	25%				

Appendix M-1
Summary of Existing DCPs in Region C

						Stage 1		Stage 2		Stage 3		Stage 4		Stage 5		Stage 6	
Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal
						that would cause the District to initiate Stage I.		that would cause the District to initiate Stage II.		that would cause the District to initiate Stage III.		the limit of the permitted supply. • Any other condition that would cause the District to initiate Stage I.					
Highland Park	Apr-2019	WUG	DCPCMUD	Grapevine Lake	4	• The Town's water use is approaching the limit of its contracted supply. • The Town's demand exceeds 90% of its delivery capacity for seven consecutive days. • The Town's water demand for any portion of the delivery system approaches the delivery capacity. • The Town's supply source or delivery system becomes • contaminated. • The Town's water supply system is unable to deliver water due to the failure or damage of major water system components. • The District has initiated Stage I. This may occur with one or more of the following: • The District's water supply in Grapevine Lake becomes 35% depleted. • Grapevine Reservoir becomes contaminated. • The District's demand exceeds 90% of its delivery capacity for seven consecutive days. • The District's water supply system is unable to deliver water to its customers due to the failure or damage of major water system components. • Any other condition that would cause the District to initiate Stage I.	2%	• The Town's water use is approaching the limit of its contracted supply. • The Town's demand exceeds 95% of its delivery capacity for seven consecutive days. • The Town's water demand for any portion of the delivery system approaches the delivery capacity. • The Town's supply source or delivery system becomes • contaminated. • The Town's water supply system is unable to deliver water due to the failure or damage of major water system components. • The District has initiated Stage II. This may occur with one or more of the following: The District's water supply in Grapevine Lake becomes 45% depleted. • Grapevine Reservoir becomes contaminated. • The District's demand exceeds 95% of its delivery capacity for five consecutive days. • The District's water system is unable to deliver water to its customers due to the failure or damage of major water system components. • Any other condition that would cause the District to initiate Stage II.	5%	• The Town's water use is approaching the limit of its contracted supply. • The Town's demand exceeds 98% of its delivery capacity for seven consecutive days. • The Town's water demand for any portion of the delivery system approaches the delivery capacity. • The Town's supply source or delivery system becomes • contaminated. • The Town's water supply system is unable to deliver water due to the failure or damage of major water system components. • The District has initiated Stage III. This may occur with one or more of the following: • The District's water supply in Grapevine Lake becomes 55% depleted. • Grapevine reservoir has been contaminated. • The District's water supply system is unable to deliver water to its customers due to the failure or damage of major water system components. • The District's water use is approaching the limit of the permitted supply. • Any other condition that would cause The District to initiate Stage III. • The District's demand exceeds 98% of its delivery capacity for three consecutive	10%	• The Town's demand exceeds the amount that can be delivered to customers. • The Town's water demand for any portion of the delivery system seriously exceeds delivery capacity. • The Town's supply source or delivery system becomes contaminated. • The Town's water supply system is unable to deliver water due to the failure or damage of major water system components. • The District has initiated Stage IV. This may occur with one or more of the following: • The District's water supply in Grapevine Lake becomes 70% depleted. • Grapevine reservoir has been contaminated. o The District's demand exceeds its delivery capacity. • The District's water supply system is unable to deliver water to its customers due to the failure or damage of major water system components. • The District's water use is approaching the limit of the permitted supply. • Any other condition that would cause the District to initiate Stage IV.	25%				

						Stage 1		Stage 2		Stage 3		Stage 4		Stage 5		Stage 6	
Entity	**Plan Date**	**Entity Type**	**Wholesale Water Provider(s)**	**Source(s)**	**No. of Stages**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**
										days.							
University Park	May-2024	WUG	DCPCMUD	Grapevine Lake	4	• The City's water use is approaching the limit of its contracted supply. • The City's demand exceeds 90% of its delivery capacity for seven consecutive days. • The City's water demand for any portion of the delivery system approaches the delivery capacity. • The City's supply source or delivery system becomes contaminated. • The City's water supply system is unable to deliver water due to the failure or damage of major water system components. • The District has initiated Stage I. This may occur with one or more of the following: o The District's water supply in Grapevine Lake becomes 35% depleted. • Grapevine Reservoir becomes contaminated. • The District's demand exceeds 90% of its delivery capacity for seven consecutive days. • The District's water supply system is unable to deliver water to its customers due to the failure or damage of major water system components. • Any other condition that would cause the District to initiate Stage I	2%	• The City's water use is approaching the limit of its contracted supply. • The City's demand exceeds 95% of its delivery capacity for seven consecutive days. • The City's water demand for any portion of the delivery system approaches the delivery capacity. • The City's supply source or delivery system becomes contaminated. • The City's water supply system is unable to deliver water due to the failure or damage of major water system components. • The District has initiated Stage II. This may occur with one or more of the following: o The District's water supply in Grapevine Lake becomes 45% depleted. • Grapevine Reservoir becomes contaminated. • The District's demand exceeds 95% of its delivery capacity for five consecutive days. • The District's water system is unable to deliver water to its customers due to the failure or damage of major water system components. • Any other condition that would cause the District to initiate Stage II	5%	• The City's water use is approaching the limit of its contracted supply. • The City's demand exceeds 98% of its delivery capacity for seven consecutive days. • The City's water demand for any portion of the delivery system approaches the delivery capacity. • The City's supply source or delivery system becomes contaminated. • The City's water supply system is unable to deliver water due to the failure or damage of major water system components. • The District has initiated Stage III. This may occur with one or more of the following: • The District's water supply in Grapevine Lake becomes 55% depleted. • Grapevine reservoir has been contaminated. • The District's demand exceeds 98% of its delivery capacity for three consecutive days. • The District's water supply system is unable to deliver water to it's customers due to the failure or damage of major water system components. • The District's water use is approaching the limit of the permitted supply. • Any other condition that would cause The District to initiate Stage III.	10%	• The City's demand exceeds the amount that can be delivered to customers. • The City's water demand for any portion of the delivery system seriously exceeds delivery capacity. • The City's supply source or delivery system becomes contaminated. • The City's water supply system is unable to deliver water due to the failure or damage of major water system components. • The District has initiated Stage IV. This may occur with one or more of the following: • The District's water supply in Grapevine Lake becomes 70% depleted. • Grapevine reservoir has been contaminated. • The District's demand exceeds its delivery capacity. • The District's water supply system is unable to deliver water to its customers due to the failure or damage of major water system components. • The District's water use is approaching the limit of the permitted supply. • Any other condition that would cause the District to initiate Stage IV.	25%				
Sherman	May-2019	WUG	GUTA	Lake Texoma, Trinity Aquifer, Woodbine Aquifer	4	• Customers shall be requested to voluntarily conserve water and adhere to the prescribed restrictions on certain water uses, defined in	5%	• Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses	15%	• Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses provided in Section 11.7 of this	20%	• The City of Sherman will recognize an emergency water shortage when one or more of the following conditions exist: • Natural or man-made					

Appendix M-1
Summary of Existing DCPs in Region C

						Stage 1		Stage 2		Stage 3		Stage 4		Stage 5		Stage 6	
Entity	**Plan Date**	**Entity Type**	**Wholesale Water Provider(s)**	**Source(s)**	**No. of Stages**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**
						section 11.7 - Definitions, when total daily water demand equals 80 percent of 18 mgd for five (5) consecutive days based on the "safe" operating capacity of water supply facilities.				Plan when water demands equal or equals 100 percent, or 23 mgd for three (3) consecutive days based on the state operating capacity of the facilities.		contamination occurs in the water supply source(s) of Lake Texoma • The City of Sherman experiences water production or distribution system limitations. • The City of Sherman experiences a system outage due to the failure or damage of major water system components.					
Athens	Apr-2019	WUG	Athens Municipal Water Authority	Lake Athens, Carrizo-Wilcox Aquifer	6	• When daily usage exceeds 4.5 million gallons per day (MGD).	Voluntary 10%	• When daily usage exceeds 4.5 MGD and the storage facilities do not refill above eighty (80) percent of full capacity overnight.	4.0 MGD	• When daily usage exceeds 4.5 MGD and the storage facilities do not refill above sixty-five (65) percent of full capacity overnight.	4.0 MGD or less	• When daily usage exceeds 4.5 MGD and the storage facilities do not refill above fifty (50) percent of full capacity overnight.	4.0 MGD or less	• When the City Administrator or his/her designee determines that a water supply emergency exists based on: • The occurrence of major water line breaks or pump or system failures, which cause unprecedented loss of capability to provide water service; or • Natural or man-made contamination of the water supply source(s).	4.0 MGD or less	• When daily usage exceeds 4.5 MGD and the storage facilities do not refill above thirty-five (35) percent of full capacity overnight.	
Gainesville	May-2019	WUG	N/A	Hubert Moss Lake, Trinity Aquifer	5	• The Mayor or his/her designee finds that conditions warrant the declaration of Stage 1 • The water storage level in Moss Lake is less than 65% of the total conservation pool capacity • Ground water level reaches 100' above current pump settings • City's water demand exceeds 90 percent of the amount that can be delivered to customers for three consecutive days. • City's water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • Water demand is approaching the limit of the permitted supply	2%	• The Mayor or his/her designee finds that conditions warrant the declaration of Stage 1 • The water storage level in Moss Lake is less than 55% of the total conservation pool capacity • Ground water level reaches 75' above current pump settings • City's water demand exceeds 95 percent of the amount that can be delivered to customers for three consecutive days • City's water demand for all or part of the delivery system equals delivery capacity because delivery capacity is inadequate • Water demand is approaching the limit of the permitted supply.	5%	• The Mayor or his/her designee finds that conditions warrant the declaration of Stage 3 • The water storage level in Moss Lake is less than 45% of the total conservation pool capacity • Ground water level reaches 50' above current pump settings • City's water demand exceeds 98 percent of the amount that can be delivered to customers for three consecutive days • City's water demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate • Water demand is approaching the limit of the permitted	10%	• The Mayor or his/her designee finds that conditions warrant the declaration of Stage 4 • The water storage level in Moss Lake is less than 35% of the total conservation pool capacity • Ground water level reaches 40' above current pump settings • City's water demand exceeds the amount that can be delivered to customers • City's water demand for all or part of the delivery system seriously exceeds delivery capacity because the delivery capacity is inadequate • Water demand is approaching the limit of the permitted	12%	• The Mayor or his/her designee finds that conditions warrant the declaration of Stage 5 • Major water line breaks, or pump or system failure occur, which cause unprecedented loss of capability to provide water service or • National or manmade contamination of the water supply sources occurs	15%		

Appendix M-1
Summary of Existing DCPs in Region C

						Stage 1		Stage 2		Stage 3		Stage 4		Stage 5		Stage 6	
Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal
										supply.		supply.					
Ladonia	Aug-2018	WUG	UTRWD	Trinity Aquifer	5	• Daily water exceeds 300,000 gallons per day for three consecutive • days, or • Daily water demand exceeds 250,000 gallons per day for seven consecutive days.		• Daily water exceeds 300,000 gallons per day for three consecutive days, or • Daily water demand exceeds 250,000 gallons per day for seven consecutive days.		• Daily water exceeds 450,000 gallons per day for three consecutive days		• Failure of either well, or • Imminent failure of system component where immediate health or safety hazards exist.		• Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water services, or • Natural or man-made contamination of the water supply source(s).			
Pottsboro	Oct-2018	WUG	Denison	Denison sources, Woodbine Aquifer	4	• Demand exceeds 90% of the amount that can • be delivered to customers for seven consecutive days • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate • Supply source becomes contaminated • Water supply system is unable to deliver water due to the failure or damage of major water system components • Water demand is approaching the limit of the permitted supply due to the failure or damage of major water system components • Water demand is approaching the limit of the permitted supply	0%	• Demand exceeds 95% of the amount that can be delivered to customers for seven consecutive days • Water demand for all or part of the delivery system equals delivery capacity because delivery capacity is inadequate • Supply source becomes contaminated • Water supply system is unable to deliver water due to the failure or damage of major water system components • Water demand is approaching the limit of the permitted supply due to the failure or damage of major water system components • Water demand is approaching the limit of the permitted supply	2%	• Demand exceeds 98% of the amount that can be delivered to customers for seven consecutive days • Water demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate • Supply source becomes contaminated • Water supply system is unable to deliver water due to the failure or damage of major water system components • Water demand is approaching the limit of the permitted supply due to the failure or damage of major water system components • Water demand is approaching the limit of the permitted supply	5%	• Demand exceeds the amount that can be delivered to customers • Water demand for all or part of the delivery system seriously exceeds delivery capacity because the delivery capacity is inadequate • Supply source becomes contaminated • Water supply system is unable to deliver water due to the failure or damage of major water system components • Water demand is approaching the limit of the permitted supply or damage of major water system components • Water demand is approaching the limit of the permitted supply	10%				
City of Denison	Unknown-2023	WWP	GUTA	Groundwater, Lake Randell, and Lake Texoma	5	• Demand exceeds eight (8) MGD of the amount that can be delivered to customers for seven (7) consecutive days • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate	0%	• Demand exceeds ten (10) MGD of the amount that can be delivered to customers for five (5) consecutive days • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate	2%	• Demand exceeds eleven (11) MGD of the amount that can be delivered to customers for three (3) consecutive days • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate	5%	• Demand exceeds 11.5 MGD of the amount that can be delivered to customers for three (3) consecutive days • Water demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate • Supply source	7%	• Demand exceeds the amount that can be delivered to customers • Water demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate • Supply source becomes contaminated • Water supply system	10%		

						Stage 1		Stage 2		Stage 3		Stage 4		Stage 5		Stage 6	
Entity	**Plan Date**	**Entity Type**	**Wholesale Water Provider(s)**	**Source(s)**	**No. of Stages**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**
						• Supply source becomes contaminated • Water supply system is unable to deliver water due to the failure or damage of major water system components • Water demand is approaching the limit of the permitted supply		• Supply source becomes contaminated • Water supply system is unable to deliver water due to the failure or damage of major water system components • Water demand is approaching the limit of the permitted supply		• Supply source becomes contaminated • Water supply system is unable to deliver water due to the failure or damage of major water system components • Water demand is approaching the limit of the permitted supply		becomes contaminated • Water supply system is unable to deliver water due to the failure or damage of major water system components • Water demand is approaching the limit of the permitted supply		is unable to deliver water due to the failure or damage of major water system components • Water demand is approaching the limit of the permitted supply			
Bolivar WSC	Mar 2024	WUG	UTRWD	Trinity Aquifer	4	• Demand exceeds 90% of the amount that can be delivered to customers for seven consecutive days. • Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate. • Supply Sources becomes contaminated. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • Water demand is approaching the limit of the permitted supply. •	2%	• Demand exceeds 95% of the amount that can be delivered to customers for three consecutive days. • Water demand for all or part of the delivery system equals delivery capacity because delivery capacity is inadequate. • Supply Sources becomes contaminated. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • Water demand is approaching the limit of the permitted supply. •	4%	• Demand exceeds 98% of the amount that can be delivered to customers for three consecutive days. • Water demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate. • Supply Sources becomes contaminated. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • Water demand is approaching the limit of the permitted supply. •	7%	• Demand exceeds the amount that can be delivered to customers. • Water demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate. • Supply Sources becomes contaminated. • Water supply system is unable to deliver water due to the failure or damage of major water system components. • Water demand is approaching the limit of the permitted supply. •	10%	•		•	
Buena Vista-Bethel SUD	Mar 2023	WUG	TRWD	Trinity Aquifer, Waxahachie	4	• Voluntary Conservation will begin annually on March 1 trough September 30 •	N/A	• Average daily well pump run-time is eighteen (18) hours for three (3) consecutive days and the net water storage is continually decreasing on a daily basis.	N/A	• Average daily well pump run time is twenty (20) hours for three (3) consecutive days and the net water storage is continually decreasing on a daily basis.	N/A	• Average daily well pump run time is twenty-two (22) hours for three (3) consecutive days. • The imminent or actual failure of a major component of the system, which would cause an immediate health or	N/A	•		•	

						Stage 1		Stage 2		Stage 3		Stage 4		Stage 5		Stage 6	
Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal
												safety hazard. • Water demand is exceeding the supply capacity for three (3) consecutive days • All available water supply (water wells) level is so low that the pumps cannot pump and meet the daily water demand.					
Forney Lake WSC	Oct 2022	WUG	NTMWD	NTMWD sources	6	• When continually falling treated water reservoir levels which do not refill above 100 percent overnight.	10%	• When continually falling treated water reservoir levels which do not refill above 90 percent overnight.	15%	• When continually falling treated water reservoir levels which do not refill above 85 percent overnight.	20%	• When continually falling treated water reservoir levels which do not refill above 75 percent overnight.	30%	• Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service. • Natural or man-made contamination of the water supply source(s).	50%	• When continually falling treated water reservoir levels which do not refill above 50 percent overnight.	Rationing
Leonard	Mar 2022	WUG	NTMWD	Woodbine Aquifer	5	• Short- or long-term equipment failure or failure to maintain 35 psi at up to 250 service locations or up to ten hydrants localized area. • Daily water demand equals or exceeds 260,000 gallons for 7 consecutive days or 290,000 gallons on a single day • At the discretion of the city administrator (to facilitate operations, maintenance, or repairs)	10%	• Stage 1 measures fail to alleviate the continued trigger conditions • Daily water demand equals or exceeds 260,000 gallons for 14 consecutive days or 300,000 gallons on a single day. • Short- or long-term equipment failure or failure to maintain 35 psi at up to 500 service locations or up to fifteen hydrants in a localized area.	15%	• Stage 2 measures fail to alleviate the continued trigger conditions. • Daily water demand equals or exceeds 270,000 gallons for 14 consecutive days or 310,000 gallons on a single day.	20%	• Stage 2 measures fail to alleviate the continued trigger conditions • Daily water demand equals or exceeds 180,000 gallons for 4 conse4cutive days or 315,000 gallons on a single day.	30%	• Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service • Natural or man-made contamination of the water supply source(s).	35%	•	

Appendix M-1
Summary of Existing DCPs in Region C

						Stage 1		Stage 2		Stage 3		Stage 4		Stage 5		Stage 6	
Entity	**Plan Date**	**Entity Type**	**Wholesale Water Provider(s)**	**Source(s)**	**No. of Stages**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**	**Trigger**	**Savings Goal**
North Farmersville	Mar 2023	WUG	NTMWD	NTMWD sources	4	• Water stored in Lake Palo Pinto is equal to or less than 22,316 acre-feet or 865 ft. MSL (84% of storage capacity) and more than 14,759 acre feet or 861 ft. MSL (56% of storage capacity). • When total daily water demand equals or exceeds 90% of the safe operating capacity of the system for three consecutive days or 95% of system capacity on a single day. • Any mechanical failure of pumping equipment which will require more than 24 hours to repair when no water shortage conditions exist. • Water availability is adequate but lake levels and/or reservoir capacities are low enough that some concern exist for future water supplies if the drought or emergency condition continues.	10%	• Water stored in Lake Palo Pinto is equal to or less than 14,759 acre-feet or 861 ft. MSL (56% of storage capacity) and more than 9,099 acre feet or 857 ft. MSL (35% of storage capacity). • Average daily water consumption reaches 100% of the safe operating capacity of the system for three consecutive days. • Average daily water consumption will not enable storage levels to be maintained. • System demand exceeds available high service pump capacity. • Any mechanical failure of pumping equipment, which will require more than 12 hours to repair if a mild drought is in progress. • Water availability from the lake is below normal and may continue to decline and cause moderate concern for both current and future supplies or water supplies have been reduced due to failure of a portion of the water supply system.	20%	• Water stored in Lake Palo Pinto is equal to or less than 9,099 acre-feet or 857 ft. MSL (35% of storage capacity) and more than 6,279 acre-feet or 854 MSL (24% of storage capacity). • Average daily water consumption reaches 110% of production capacity for a 24-hour period. • Any mechanical failure of pumping equipment, which will require more than 12 hours to repair if a moderate drought is in progress. • Water availability from the lake is well below normal, may continue to decline, and additional reductions in current of future water supplies are evident or water supplies have been reduced due to failure of a portion of the water supply system.	25%	• Water system is contaminated either accidentally or intentionally. Emergency condition is reached immediately upon detection. • Water system failure from acts of God (tornadoes, hurricanes) or man. Emergency condition is reached immediately upon detection. • Any interruption of water service through main water supply lines for more than 12-hours.Emergency condition is reached immediately upon detection. • There has been a failure in a major water supply source or system, such as the failure of a dam, storage reservoir, pump system, transmission pipelines, water treatment facility, major power failure, or natural disaster that causes a severe and prolonged limit on the ability of the water supply system to meet the water supply demands; or • The source water supply has been contaminated. Notification to the customers will be enacted at once and periodic updates will be conveyed through the news media on progress of emergency water conditions.	30%				
Pleasant Grove WSCP	June 2022	WUG	N/A	Carrizo Wilcox Aquifer		• The static water level in the Pleasant Grove Water Supply Corporation well(s) is Equal to or less than 200 feet above mean sea level. • When the specific capacity of the		• Well level drops to 190 feet.	25%	• Static Water level is well drops to 180 feet above sea level.	50%	• Static water in wells drop to 170 feet above sea level.	60%	• Static water level in wells • Major water line breaks, or pump or system failures occur, which cause Unprecedented loss of capability to provide water service	70%	• Water l wells drop to 50% of normal capacity.	Allocation

Appendix M-1
Summary of Existing DCPs in Region C

						Stage 1		Stage 2		Stage 3		Stage 4		Stage 5		Stage 6	
Entity	Plan Date	Entity Type	Wholesale Water Provider(s)	Source(s)	No. of Stages	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal	Trigger	Savings Goal
						Pleasant Grove Water Supply Corporation well(s) is Equal to or less than 75% of the well's original specific capacity. • The public water supplier may devise other triggering criteria, which are tailored to its system								• Natural or man-made contamination of the water supply source(s).			

Table M.2
Potential Emergency Supply Options

Water User Group Name	County	2030 Population	2030 Demand (Ac Ft/Yr)	Release from upstream reservoir	Curtailment of upstream/ downstream water rights	Local groundwater well	Brackish groundwater limited treatment	Brackish groundwater desalination	Emergency interconnect	Other named local supply	Trucked in water	Type of infrastructure required	Entity providing supply	Other local entities required to participate/coordinate	Emergency agreements/ Arrangements already in place?
ALVORD	WISE	6,073	827	NO	NO	NO	NO	NO	YES	YES	YES	**Emergency Interconnect:** Conveyance Facilities; **Other Named Local Supply:** Conveyance facilities, Treatment facility; **Trucked in Water:** None	**Emergency Interconnect:** City of Chico, Montague Water Systems, West Wise SUD, City of Decatur, Bolivar WSC; **Other Named Local Supply:** Big Sandy Creek, Denton Creek, Lake Amon Carter	City of Chico, Montague Water Systems, West Wise SUD, City of Decatur, Bolivar WSC	NO
AMC CREEKSIDE	Denton	6,078	408	NO	NO	NO	NO	NO	NO	NO	YES	**Trucked in Water:** None	N/A	N/A	NO
ANNETTA	PARKER	6,327	883	YES	NO	YES	NO	NO	YES	YES	YES	**Release from Upstream Reservoir:** Conveyance and treatment facilities; **Local Groundwater Well:** Conveyance Infrastructure; **Emergency Interconnect:** Conveyance Infrastructure; **Other Named Local Supply:** Conveyance Infrastructure, Treatment Facility; **Trucked in Water:** None	**Release from Upstream Reservoir:** Lake Weatherford; **Local Groundwater Well:** Trinity Aquifer; **Emergency Interconnect:** City of Aledo, Aledo Mobile Home Park, City of Weatherford, City of Hudson Oaks, City of Willow Park; **Other Named Local Supply:** Town Creek, Clear Fork Trinity River	City of Aledo, Aledo Mobile Home Park, City of Weatherford, City of Hudson Oaks, City of Willow Park	NO
ARLEDGE RIDGE WSC	Fannin	1,684	283	NO	NO	NO	NO	NO	YES	NO	NO	**Emergency Interconnect:** Conveyance facilities;**Trucked in Water:** None	**Emergency Interconnect:** City of Leon	City of Leon	YES
AVALON WATER SUPPLY & SEWER SERVICE	ELLIS	1,650	202	NO	NO	YES	YES	NO	NO	NO	YES	**Local Groundwater Well:** Conveyance Infrastructure; **Emergency Interconnect:** Conveyance Infrastructure; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer	South Ellis County WSC, Navarro, Mils WSC, B and B WSC, City of Italy, Rice Water Supply and Sewer Service, Buena Vista-Bethel SUD, City of Corsicana, City of Blooming Grove, City of Frost	NO
BELLS	Grayson	2,416	246	NO	NO	NO	NO	NO	YES	NO	NO	**Emergency Interconnect:** Conveyance facilities;**Trucked in Water:** None	**Emergency Interconnect:** SW Fannin County SUD	W Fannin County SUD	YES
BLACK ROCK WSC	DENTON	3,791	907	YES	YES	YES	NO	NO	NO	NO	YES	**Release from Upstream Reservoir:** Conveyance and treatment facilities; **Local Groundwater Well:** Conveyance Infrastructure; **Emergency Interconnect:** Conveyance Infrastructure; **Trucked in Water: None**	**Release from Upstream Reservoir:** Lake Ray Roberts; **Local Groundwater Well:** Trinity Aquifer	Mustang SUD, City of Denton, Bolivar WSC, City of Pilot Point	NO
BLUE MOUND	Tarrant	3,826	275	NO	NO	NO	NO	NO	NO	NO	YES	**Trucked in Water:** None	N/A	N/A	NO

Table M.2
Potential Emergency Supply Options

Water User Group Name	County	2030 Population	2030 Demand (Ac Ft/Yr)	Release from upstream reservoir	Curtailment of upstream/ downstream water rights	Local groundwater well	Brackish groundwater limited treatment	Brackish groundwater desalination	Emergency interconnect	Other named local supply	Trucked in water	Type of infrastructure required	Entity providing supply	Other local entities required to participate/coordinate	Emergency agreements/ Arrangements already in place?
BLUE RIDGE	COLLIN	4,664	781	NO	NO	YES	NO	NO	YES	YES	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Other Named Local Supply:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer, Woodbine Aquifer; **Emergency Interconnect:** Frognot WSC, Verona WSC, Westminster; **Other Named Local Supply:** Pilot Grove Creek	Frognot WSC, Verona WSC, Westminster	NO
BOIS D ARC MUD	Fannin	3,453	387	NO	NO	NO	NO	NO	YES	NO	NO	**Emergency Interconnect:** Conveyance facilities;**Trucked in Water:** None	**Emergency Interconnect:** City of Windom	City of Windom	YES
BRIDGEPORT	Wise	6,337	1,070	NO	NO	NO	NO	NO	NO	NO	YES	**Trucked in Water:** None	N/A	N/A	NO
BUTLER WSC	FREESTONE	737	158	NO	NO	YES	NO	NO	NO	YES	YES	**Local Groundwater Well:** Conveyance Infrastructure; **Emergency Interconnect:** Conveyance Infrastructure; **Trucked in Water:** None	**Local Groundwater Well:** Carrizo- Wilcox Aquifer; **Other Named Local Supply:** Trinity River	South Freestone WSC, Tucker WSC, City of Oakwood, Turlington WSC	NO
CALLISBURG WSC	Cooke	1,752	152	NO	NO	NO	NO	NO	YES	NO	NO	**Emergency Interconnect:** Conveyance facilities;**Trucked in Water:** None	**Emergency Interconnect:** Callisburg ISD	Callisburg ISD	YES
COLLINSVILLE	GRAYSON	3,794	399	NO	NO	YES	NO	NO	YES	YES	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Other Named Local Supply:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer, Woodbine Aquifer; **Emergency Interconnect:** Two Way SUD, City of Tioga, Kiowa Homeowners WSC; **Other Named Local Supply:** Ray Roberts Lake;	Two Way SUD, City of Tioga, Kiowa Homeowners WSC	NO
COMMUNITY WSC	Tarrant	6,186	908	NO	NO	YES	NO	NO	NO	NO	NO	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer;		NO
COUNTY-OTHER	COLLIN	10,000	1,497	NO	NO	YES	NO	NO	NO	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer; **Emergency Interconnect:** Allen, Frisco, McKinney, Plano		NO

Table M.2
Potential Emergency Supply Options

Water User Group Name	County	2030 Population	2030 Demand (Ac Ft/Yr)	Release from upstream reservoir	Curtailment of upstream/ downstream water rights	Local groundwater well	Brackish groundwater limited treatment	Brackish groundwater desalination	Emergency interconnect	Other named local supply	Trucked in water	Type of infrastructure required	Entity providing supply	Other local entities required to participate/coordinate	Emergency agreements/ Arrangements already in place?
COUNTY-OTHER	COOKE	7,000	889	NO	NO	YES	NO	NO	NO	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer; **Emergency Interconnect:** Gainesville, Muenster		NO
COUNTY-OTHER	DALLAS	3,000	6,108	NO	NO	YES	NO	NO	NO	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer; **Emergency Interconnect:** Dallas		NO
COUNTY-OTHER	DENTON	214,880	25,586	NO	NO	YES	NO	NO	NO	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer; **Emergency Interconnect:** Denton		NO
COUNTY-OTHER	ELLIS	8,800	1,040	NO	NO	YES	NO	NO	NO	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer; **Emergency Interconnect:** Ennis, Midlothian, Rockett SUD, Waxahachie		NO
COUNTY-OTHER	FANNIN	5,000	529	NO	NO	YES	NO	NO	NO	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer, Woodbine Aquifer; **Emergency Interconnect:** Bonham		NO
COUNTY-OTHER	FREESTONE	2,657	257	NO	NO	YES	NO	NO	NO	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Trucked in Water:** None	**Local Groundwater Well:** Carrizo-Wilcox Aquifer, Woodbine Aquifer; **Emergency Interconnect:** Fairfield, Teague, Wortham		NO
COUNTY-OTHER	GRAYSON	13,000	1,589	NO	NO	YES	NO	NO	NO	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer, Woodbine Aquifer; **Emergency Interconnect:** Denison, Sherman, Whitesboro		NO
COUNTY-OTHER	HENDERSON (C), HENDERSON (I)	10,000	869	NO	NO	YES	NO	NO	NO	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Trucked in Water:** None	**Local Groundwater Well:** Carrizo-Wilcox Aquifer, Queen City Aquifer Woodbine Aquifer; **Emergency Interconnect:** Athens, East Cedar Creek FWSD, West Cedar Creek MUD		NO

Table M.2
Potential Emergency Supply Options

Water User Group Name	County	2030 Population	2030 Demand (Ac Ft/Yr)	Release from upstream reservoir	Curtailment of upstream/ downstream water rights	Local groundwater well	Brackish groundwater limited treatment	Brackish groundwater desalination	Emergency interconnect	Other named local supply	Trucked in water	Type of infrastructure required	Entity providing supply	Other local entities required to participate/coordinate	Emergency agreements/ Arrangements already in place?
COUNTY-OTHER	JACK	3,400	365	NO	NO	YES	NO	NO	NO	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Trucked in Water:** None	**Local Groundwater Well:** Cross Timbers Aquifer; **Emergency Interconnect:** Jacksboro, Bryson		NO
COUNTY-OTHER	KAUFMAN	36,575	3,869	NO	NO	YES	NO	NO	NO	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Trucked in Water:** None	**Local Groundwater Well:** Nacatoch Aquifer; **Emergency Interconnect:** College Mound WSC, Forney, Kaufman, Terrell, West Cedar Creek MUD		NO
COUNTY-OTHER	NAVARRO	10,000	1,084	NO	NO	YES	NO	NO	NO	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Trucked in Water:** None	**Local Groundwater Well:** Nacatoch Aquifer, Other Aquifer; **Emergency Interconnect:** Chatfield WSC, Corsicana, Navarro Mills WSC		NO
COUNTY-OTHER	PARKER	355,000	44,628	NO	NO	YES	NO	NO	NO	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer; **Emergency Interconnect:** Fort Worth, Walnut Creek SUD, Weatherford		NO
COUNTY-OTHER	ROCKWALL	7,294	1,139	NO	NO	NO	NO	NO	NO	NO	YES	**Emergency Interconnect:** Conveyance facilities; **Trucked in Water:** None	**Emergency Interconnect:** Blackland WSC, Rockwall, Heath, Rockwall, Rowlett, Royse City, Wylie		NO
COUNTY-OTHER	TARRANT	100,000	22,472	NO	NO	YES	NO	NO	NO	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer; **Emergency Interconnect:** Arlington, Bedford, Benbrook, Bethesda WSC, Burleson, Colleyville, Crowley, Euless, Fort Worth, Grand Prairie, Grapevine, Haltom City, Hurst, Keller, Mansfield, North Richland Hills, Saginaw, Southlake, Watauga, White Settlement		NO
COUNTY-OTHER	WISE	270,000	31,172	NO	NO	YES	NO	NO	NO	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer; **Emergency Interconnect:** Bridgeport, Decatur, Fort Worth, Walnut Creek SUD, West Wise SUD		NO

Table M.2
Potential Emergency Supply Options

Water User Group Name	County	2030 Population	2030 Demand (Ac Ft/Yr)	Release from upstream reservoir	Curtailment of upstream/ downstream water rights	Local groundwater well	Brackish groundwater limited treatment	Brackish groundwater desalination	Emergency interconnect	Other named local supply	Trucked in water	Type of infrastructure required	Entity providing supply	Other local entities required to participate/coordinate	Emergency agreements/ Arrangements already in place?
CRESCENT HEIGHTS WSC	HENDERSON	2,178	180	NO	NO	YES	NO	NO	NO	NO	YES	**Local Groundwater Well:** Conveyance Infrastructure; **Emergency Interconnect:** Conveyance Infrastructure; **Trucked in Water:** None	**Local Groundwater Well:** Carrizo-Wilcox Aquifer	Athens, Malakoff, CRC WSC, Virginia Hill WSC, Lakeshore Utility Company Inc., Payne Springs WSC, City of Log Cabin, Bethel-Ash WSC, City of Eustace, Dogwood Estates Water	NO
DALWORTHINGTON GARDENS	Tarrant	2,352	919	NO	NO	NO	NO	NO	YES	NO	NO	**Emergency Interconnect:** Conveyance facilities;**Trucked in Water:** None	**Emergency Interconnect:** City of Fort Worth		YES
DECATUR	Wise	31,300	8,361	NO	NO	YES	NO	NO	NO	NO	NO	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer;		NO
DESERT WSC	Fannin	2,663	425	NO	NO	NO	NO	NO	NO	NO	YES	**Trucked in Water:** None	N/A	N/A	NO
DOGWOOD ESTATES WATER	HENDERSON	1,267	187	NO	NO	YES	NO	NO	NO	NO	YES	**Local Groundwater Well:** Conveyance Infrastructure; **Emergency Interconnect:** Conveyance Infrastructure; **Trucked in Water:** None	**Local Groundwater Well:** Carrizo- Wilcox Aquifer	Bethel-Ash WSC, Athens, Murchison, City of Eustace, Virginia Hill WSC, Crescent Heights WSC, Leagueville WSC	NO
EDGECLIFF	Tarrant	3,761	634	NO	NO	NO	NO	NO	YES	NO	NO	**Emergency Interconnect:** Conveyance facilities;**Trucked in Water:** None	**Emergency Interconnect:** City of Fort Worth	City of Fort Worth	YES
EUSTACE	HENDERSON	3,696	382	NO	NO	YES	YES	NO	YES	YES	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Other Named Local Supply:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Local Groundwater Well:** Carrizo-Wilcox Aquifer; **Emergency Interconnect:** Bethel-Ash WSC, Athens Land Company, Payne Springs WSC, East Cedar Creek FWSD, City of Mabank, Quality Water **of East Texas; Other Named Local Supply: Cedar Creek Reservoir**	Bethel-Ash WSC, Athens Land Company, Payne Springs WSC, East Cedar Creek FWSD, City of Mabank, Quality Water of East Texas	NO
EVERMAN	TARRANT	6,600	540	NO	NO	YES	NO	NO	NO	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer	Bethesda WSC, City of Kennedale, City of Fort Worth, City of Forest Hill, City of Crowley, City of Arlington, City of Edgecliff, City of Burleson, Johnson County SUD	NO
FAIRFIELD	FREESTONE	3,742	762	NO	NO	YES	NO	NO	NO	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Local Groundwater Well:** Carrizo-Wilcox Aquifer	South Freestone WSC, Ward Prairie WSC, Turlington WSC, Pleasant Grove WSC	NO

Table M.2
Potential Emergency Supply Options

Water User Group Name	County	2030 Population	2030 Demand (Ac Ft/Yr)	Release from upstream reservoir	Curtailment of upstream/ downstream water rights	Local groundwater well	Brackish groundwater limited treatment	Brackish groundwater desalination	Emergency interconnect	Other named local supply	Trucked in water	Type of infrastructure required	Entity providing supply	Other local entities required to participate/coordinate	Emergency agreements/ Arrangements already in place?
FROGNOT WSC	COLLIN, HUNT (D)	5,205	520	NO	NO	YES	NO	NO	NO	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer	City of Blue Ridge, Desert WSC, Westminster WSC, Verona WSC, Hickory Creek SUD, South Grayson WSC, City of Anna, North Collin SUD, West Leonard WSC, North Farmersville WSC, Caddo Basin SUD	NO
GUNTER	GRAYSON	3,371	528	NO	NO	YES	NO	NO	YES	YES	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Other Named Local Supply:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer, Woodbine Aquifer; **Emergency Interconnect:** Marilee SUD; **Other Named Local Supply:** Little Elm Creek	Marilee SUD	NO
HONEY GROVE	FANNIN	1,828	284	NO	NO	YES	NO	NO	YES	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; Groundwater field near the intersection of Hwy 82 and 100th St. **Emergency Interconnect:** Conveyance facilities; **Trucked in Water:** None	**Local Groundwater Well:** Bois D' Arc MUD, Trinity Aquifer, Woodbine Aquifer; **Emergency Interconnect:** Bois D' Arc MUD, Lamar County Water Supply District, Dial WSC, Mccraw Chapel WSC	Bois D' Arc MUD, Lamar County Water Supply District, Dial WSC, Mccraw Chapel WSC	YES
HORSESHOE BEND WATER SYSTEM	PARKER	4,367	597	NO	NO	YES	NO	NO	NO	YES	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Other Named Local Supply:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer; **Other Named Local Supply:** Brazos River	Parker County SUD, Rio Brazos WSC, Monarch Utilities	NO
JACKSBORO	JACK	4,387	931	NO	NO	NO	NO	NO	YES	YES	YES	**Emergency Interconnect:** Conveyance facilities; **Other Named Local Supply:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Emergency Interconnect:** City of Bryson, Walnut Creek SUD; **Other Named Local Supply:** West Fork Trinity River, Bridgeport Reservoir	City of Bryson, Walnut Creek SUD	NO

Table M.2
Potential Emergency Supply Options

Water User Group Name	County	2030 Population	2030 Demand (Ac Ft/Yr)	Release from upstream reservoir	Curtailment of upstream/ downstream water rights	Local groundwater well	Brackish groundwater limited treatment	Brackish groundwater desalination	Emergency interconnect	Other named local supply	Trucked in water	Type of infrastructure required	Entity providing supply	Other local entities required to participate/coordinate	Emergency agreements/ Arrangements already in place?
KEMP	Kaufman	1,987	345	NO	NO	NO	NO	NO	YES	NO	NO	**Emergency Interconnect:** Conveyance facilities;**Trucked in Water:** None	**Emergency Interconnect:** City of Mabank	City of Mabank	YES
KENTUCKYTOWN WSC	Grayson	4,050	485	NO	NO	NO	NO	NO	NO	NO	YES	**Trucked in Water:** None	N/A	N/A	NO
LADONIA	FANNIN	2,500	377	NO	NO	YES	YES	NO	YES	YES	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Other Named Local Supply:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer, Woodbine Aquifer; **Emergency Interconnect:** Mccraw Chapel WSC, DIAL WSC, Delta County MUD, North Hunt SUD, Bartley WSC, Arledge Ridge WSC, City of Dodd City, Town of Windom; **Other Named Local Supply:** North Sulphur River, Pecan Creek, Middle Sulphur River	Mccraw Chapel WSC, DIAL WSC, Delta County MUD, North Hunt SUD, Bartley WSC, Arledge Ridge WSC, City of Dodd City, Town of Windom	NO
LAKE KIOWA SUD	COOKE	2,609	1,046	NO	NO	YES	NO	NO	YES	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer, Woodbine Aquifer; **Emergency Interconnect:** Woodbine WSC	Woodbine WSC	NO
LAKESIDE	TARRANT	2,144	582	NO	NO	YES	NO	NO	YES	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer; **Emergency Interconnect:** Aqua Texas Inc., City of Fort Worth	Aqua Texas Inc., City of Fort Worth	YES
LEONARD	FANNIN	6,000	819	NO	NO	YES	YES	NO	YES	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer, Woodbine Aquifer; **Emergency Interconnect:** Southwest Fannin County SUD, Hickory Creek SUD, West Leonard WSC, Arledge Ridge WSC	Southwest Fannin County SUD, Hickory Creek SUD, West Leonard WSC, Arledge Ridge WSC	NO
LINDSAY	COOKE	1,776	223	NO	NO	YES	NO	NO	YES	YES	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Other Named Local Supply:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer; **Emergency Interconnect:** Myra Water System, City of Muenster, City of Gainesville, Bolivar WSC, ERA WSC; **Other Named Local Supply:** Elm Fork Trinity River	Myra Water System, City of Muenster, City of Gainesville, Bolivar WSC, ERA WSC	NO
LOG CABIN	Henderson	735	125	NO	NO	NO	NO	NO	NO	NO	YES	**Trucked in Water:** None	N/A	N/A	NO

Table M.2
Potential Emergency Supply Options

Water User Group Name	County	2030 Population	2030 Demand (Ac Ft/Yr)	Release from upstream reservoir	Curtailment of upstream/ downstream water rights	Local groundwater well	Brackish groundwater limited treatment	Brackish groundwater desalination	Emergency interconnect	Other named local supply	Trucked in water	Type of infrastructure required	Entity providing supply	Other local entities required to participate/coordinate	Emergency agreements/ Arrangements already in place?
LUELLA SUD	GRAYSON	2,717	274	NO	NO	YES	YES	NO	YES	YES	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Other Named Local Supply:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer, Woodbine Aquifer; **Emergency Interconnect:** City of Sherman, Pink Hill WSC, Kentuckytown WSC, South Grayson WSC, City of Howe; **Other Named Local Supply:** Deaver Creek	City of Sherman, Pink Hill WSC, Kentuckytown WSC, South Grayson WSC, City of Howe	NO
MOUNTAIN SPRINGS WSC	COOKE, DENTON	2,077	339	NO	NO	YES	NO	NO	NO	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer	Woodbine WSC, City of Tioga, City of Gainesville, Bolivar WSC, City of Collinsville	NO
MUENSTER	COOKE	2,139	355	NO	NO	YES	NO	NO	YES	YES	YES	**Release from Upstream Reservoir:** Conveyance and treatment facilities; **Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Other Named Local Supply:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Release from Upstream Reservoir:** Lake Muenster; **Local Groundwater Well:** Trinity Aquifer; **Emergency Interconnect:** Forestburg WSC, City of Gainesville, City of Lindsay, Myra Water System, Bolivar WSC; **Other Named Local Supply:** Elm Fork Trinity River	Forestburg WSC, City of Gainesville, City of Lindsay, Myra Water System, Bolivar WSC	NO
NEWARK	WISE	6,310	666	NO	NO	YES	YES	NO	YES	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer; **Emergency Interconnect:** City of Rhome	City of Rhome	NO
NORTHWEST GRAYSON COUNTY WCID 1	GRAYSON	3,054	298	YES	NO	YES	NO	NO	NO	YES	YES	**Release from Upstream Reservoir:** Conveyance and treatment facilities; **Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Other Named Local Supply:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Release from Upstream Reservoir:** Lake Texoma; **Local Groundwater Well:** Trinity Aquifer; **Other Named Local Supply:** Red River	Monarch Utilities, Callisburg WSC, Two Way SUD, City of Pottsboro, Woodbine WSC	NO

Table M.2
Potential Emergency Supply Options

Water User Group Name	County	2030 Population	2030 Demand (Ac Ft/Yr)	Release from upstream reservoir	Curtailment of upstream/ downstream water rights	Local groundwater well	Brackish groundwater limited treatment	Brackish groundwater desalination	Emergency interconnect	Other named local supply	Trucked in water	Type of infrastructure required	Entity providing supply	Other local entities required to participate/coordinate	Emergency agreements/ Arrangements already in place?
PANTEGO	TARRANT	2,653	671	NO	NO	YES	YES	NO	YES	YES	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Other Named Local Supply:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer; **Emergency Interconnect:** City of Dalworthington Gardens, City of Arlington; **Other Named Local Supply:** Kee Branch	City of Dalworthington Gardens, City of Arlington	NO
PELICAN BAY	TARRANT	12,830	862	YES	NO	YES	YES	NO	YES	NO	YES	**Release from Upstream Reservoir:** Conveyance and treatment facilities; **Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Trucked in Water:** None	**Release from Upstream Reservoir:** Eagle Mountain Lake; **Local Groundwater Well:** Trinity Aquifer; **Emergency Interconnect:** City of Azle, City of Fort Worth, Community WSC;	City of Azle, City of Fort Worth, Community WSC	NO
PLEASANT GROVE WSC	FREESTONE, NAVARRO	1,588	151	NO	NO	YES	NO	NO	NO	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Local Groundwater Well:** Carrizo-Wilcox Aquifer	Winkler WSC, Ward Prairie WSC, City of Fairfield, M E N WSC	NO
RUNAWAY BAY	Wise	5,217	1,876	NO	NO	YES	NO	NO	NO	NO	NO	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Local Groundwater Well:** Cross Timber Minor Aquifer;		NO
SANSOM PARK	Tarrant	8,659	914	NO	NO	NO	NO	NO	YES	NO	NO	**Emergency Interconnect:** Conveyance facilities;**Trucked in Water:** None	**Emergency Interconnect:** City of Fort Worth	City of Fort Worth	YES
SAVOY	Fannin	678	89	NO	NO	NO	NO	NO	YES	NO	NO	**Emergency Interconnect:** Conveyance facilities;**Trucked in Water:** None	**Emergency Interconnect:** SW Fannin County SUD	SW Fannin County SUD	YES
SOUTH ELLIS COUNTY WSC	ELLIS, NAVARRO	3,256	1,208	NO	NO	YES	NO	NO	NO	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer	South Ellis County WSC, Navarro Mils WSC, B and B WSC, City of Italy, Rice Water Supply and Sewer Service, Buena Vista-Bethel SUD, City of Corsicana, City of Blooming Grove, City of Frost	NO
SOUTHERN OAKS WATER SUPPLY	Freestone	1,444	259	NO	NO	NO	NO	NO	NO	NO	YES	**Trucked in Water:** None	N/A	N/A	NO

Table M.2
Potential Emergency Supply Options

Water User Group Name	County	2030 Population	2030 Demand (Ac Ft/Yr)	Release from upstream reservoir	Curtailment of upstream/ downstream water rights	Local groundwater well	Brackish groundwater limited treatment	Brackish groundwater desalination	Emergency interconnect	Other named local supply	Trucked in water	Type of infrastructure required	Entity providing supply	Other local entities required to participate/coordinate	Emergency agreements/ Arrangements already in place?
SOUTHMAYD	GRAYSON	1,055	112	NO	NO	YES	NO	NO	NO	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer	Monarch Utilities, Callisburg WSC, Two Way SUD, City of Pottsboro, Woodbine WSC, Lass Water Company, City of Sherman, City of Dorchester, Aqua Texas Inc	NO
SOUTHWEST FANNIN COUNTY SUD	FANNIN, GRAYSON	11,157	1,077	NO	NO	YES	NO	NO	YES	YES	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Other Named Local Supply:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer, Woodbine Aquifer; **Emergency Interconnect:** Starr WSC, Oak Ridge-South Gale WSC, City of Bells, City of Savoy, Ravenna Nunnelee WSC, City of Bonham, Randolph WSC, Arledge Ridge WSC, West Leonard WSC, Desert WSC, City of Trenton, City of Whitewright, Kentuckytown WSC; **Other Named Local Supply:** Bois D' Arc Creek, Red River	Starr WSC, Oak Ridge-South Gale WSC, City of bells, City of Savoy, Ravenna Nunnelee WSC, City of Bonham, Randolph WSC, Arledge Ridge WSC, West Leonard WSC, Desert WSC, City of Trenton, City of Whitewright, Kentuckytown WSC	NO
STARR WSC	GRAYSON	3,219	316	YES	NO	YES	NO	NO	NO	YES	YES	**Release from Upstream Reservoir:** Conveyance and treatment facilities; **Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Other Named Local Supply:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Release from Upstream Reservoir:** Lake Texoma; **Local Groundwater Well:** Trinity Aquifer; **Other Named Local Supply:** Red River	City of Denison, Oak Ridge-South Gale WSC, Southwest Fannin County SUD, City of Sherman, Pink Hill WSC	NO
TIOGA	GRAYSON	3,288	435	NO	NO	YES	NO	NO	YES	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer, Woodbine Aquifer; **Emergency Interconnect:** City of Collinsville, Two Way SUD, Marilee SUD, City of Celina, Mustang SUD, City of Pilot Point	City of Collinsville, Two Way SUD, Marilee SUD, City of Celina, Mustang SUD, City of Pilot Point	NO
TOM BEAN	GRAYSON	1,113	204	NO	NO	YES	NO	NO	YES	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer, Woodbine Aquifer; **Emergency Interconnect:** Kentuckytown WSC	Kentuckytown WSC	NO

Table M.2
Potential Emergency Supply Options

Water User Group Name	County	2030 Population	2030 Demand (Ac Ft/Yr)	Release from upstream reservoir	Curtailment of upstream/ downstream water rights	Local groundwater well	Brackish groundwater limited treatment	Brackish groundwater desalination	Emergency interconnect	Other named local supply	Trucked in water	Type of infrastructure required	Entity providing supply	Other local entities required to participate/coordinate	Emergency agreements/ Arrangements already in place?
TRENTON	FANNIN	970	174	NO	NO	YES	NO	NO	YES	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer, Woodbine Aquifer; **Emergency Interconnect:** Southwest Fannin County SUD, Desert WSC	Southwest Fannin County SUD, Desert WSC	NO
TRINIDAD	HENDERSON	1,261	177	NO	NO	YES	YES	NO	YES	YES	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Other Named Local Supply:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Local Groundwater Well:** Carrizo-Wilcox Aquifer; **Emergency Interconnect:** West Cedar Creek MUD, Community Water Company, Monarch Utilities, Crescent Heights WSC, Aqua Texas Inc., CRC WSC, Chatfield WSC, City of Kerens; **Other Named Local Supply:** Trinity River, Cedar Creek Reservoir	West Cedar Creek MUD, Community Water Company, Monarch Utilities, Crescent heights WSC, Aqua Texas Inc., CRC WSC, Chatfield WSC, City of Kerens	YES
TWO WAY SUD	COOKE, GRAYSON	9,811	1,274	NO	NO	YES	NO	NO	YES	YES	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Other Named Local Supply:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer, Woodbine Aquifer; **Emergency Interconnect:** Northwest Grayson Co WCID 1, City of Southmayd, City of Pottsboro, City of Denison, Lass Water Company, City of Dorchester, City of Tioga, City of Collinsville, Woodbine WSC, City of Whitesboro, Callisburg WSC; **Other Named Local Supply:** Big Mineral Creek, Mustang Creek Deaver Creek, Lake Texoma	Northwest Grayson Co WCID 1, City of Southmayd, City of Pottsboro, City of Denison, Lass Water Company, City of Dorchester, City of Tioga, City of Collinsville, Woodbine WSC, City of Whitesboro, Callisburg WSC	NO
VERONA SUD	COLLIN	8,512	1,120	NO	NO	YES	NO	NO	NO	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer, Woodbine Aquifer	City of Blue Ridge, Frognot WSC, North Collin SUD, City of Princeton, North Farmersville WSC, Westminster WSC	NO
WEST CEDAR CREEK MUD	Henderson	5,543	1,186	NO	NO	NO	NO	NO	NO	NO	YES	**Trucked in Water:** None	N/A	N/A	NO
WEST LEONARD WSC	Fannin	3,919	506	NO	NO	NO	NO	NO	NO	NO	YES	**Trucked in Water:** None	N/A	N/A	NO
WEST WISE SUD	Wise	5,672	670	NO	NO	NO	NO	NO	YES	NO	NO	**Emergency Interconnect:** Conveyance facilities;**Trucked in Water:** None	**Emergency Interconnect:** Walnut Creek SUD; City of Chico	Walnut Creek SUD; City of Chico	YES

Table M.2
Potential Emergency Supply Options

Water User Group Name	County	2030 Population	2030 Demand (Ac Ft/Yr)	Release from upstream reservoir	Curtailment of upstream/ downstream water rights	Local groundwater well	Brackish groundwater limited treatment	Brackish groundwater desalination	Emergency interconnect	Other named local supply	Trucked in water	Type of infrastructure required	Entity providing supply	Other local entities required to participate/coordinate	Emergency agreements/ Arrangements already in place?
WESTLAKE	Tarrant	6,933	7,990	NO	NO	YES	NO	NO	NO	NO	NO	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Local Groundwater Well:** Woodbine Minor Aquifer;		NO
WESTMINSTER SUD	Collin	5,367	1,011	NO	NO	NO	NO	NO	YES	NO	NO	**Emergency Interconnect:** Conveyance facilities;**Trucked in Water:** None	**Emergency Interconnect:** Collin County Adventure Camp	Collin County Adventure Camp	YES
WHITE SHED WSC	FANNIN	2,670	277	NO	NO	YES	NO	NO	NO	YES	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Other Named Local Supply:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer, Woodbine Aquifer; **Other Named Local Supply:** Red River	Bois D'arc MUD, City of Bonham, Ravenna Nunnelee WSC	NO
WHITEWRIGHT	FANNIN, GRAYSON	3,218	576	NO	NO	YES	NO	NO	YES	YES	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Other Named Local Supply:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer, Woodbine Aquifer; **Emergency Interconnect:** Southwest Fannin County SUD, Desert WSC, South Grayson WSC, Kentuckytown WSC; **Other Named Local Supply:** Bois D' Arc Creek	Southwest Fannin County SUD, Desert WSC, South Grayson WSC, Kentuckytown WSC; Other Named Local Supply: Bois D' Arc Creek	NO
WOODBINE WSC	COOKE, GRAYSON	7,453	760	NO	NO	YES	NO	NO	NO	NO	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Other Named Local Supply:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Local Groundwater Well:** Trinity Aquifer; **Emergency Interconnect:** R & N enterprises, Oak Ridge ventures Inc., Callisburg WSC, Two Way SUD, City of Collinsville, Mountain Springs WSC City of Gainesville; **Other Named Local Supply:** Big Mineral Creek	R & N enterprises, Oak Ridge ventures Inc., Callisburg WSC, Two Way SUD, City of Collinsville, Mountain Springs WSC City of Gainesville	NO
WORTHAM	FREESTONE	644	89	NO	NO	YES	YES	NO	YES	YES	YES	**Local Groundwater Well:** Conveyance facilities, Treatment Facilities; **Emergency Interconnect:** Conveyance facilities; **Other Named Local Supply:** Conveyance facilities, Treatment Facilities; **Trucked in Water:** None	**Local Groundwater Well:** Carrizo-Wilcox Aquifer; **Emergency Interconnect:** Corbet WSC, Pleasant Grove WSC, Point enterprise WSC, City of Mexia, White Rock WSC, Post Oak SUD; **Other Named Local Supply:** Tehuacana Creek	Corbet WSC, Pleasant Grove WSC, Point enterprise WSC, City of Mexia, White Rock WSC, Post Oak SUD	NO

Appendix N

Water Management Strategy Implementation Survey

Planning Region	WMS or WMS Project Name	Database Online Decade	Related Sponsor Entity and/or Benefitting WUGs	Implementation Survey Record Type	Has the sponsor taken affirmative vote or actions? (TWC 16.053(h)(10))	What is the status of the WMS project or WMS recommended in the 2022 SWP?	If the project has not been started or no longer is being pursued, please explain why	Impediments to project development	Information about project impediments	What funding type(s) are being used for the project? (Select all that apply)
C	Aledo - Parallel Pipeline & Pump Station Expansion from Fort Worth	2060	Project Sponsor(s): Aledo	Recommended WMS Project						
C	Alvord - Connect to West Wise SUD	2030	Project Sponsor(s): Alvord	Recommended WMS Project						
C	AMWA Athens Fish Hatchery Reuse	2060	WMS Seller: Athens Municipal Water Authority; WMS Supply Recipient: Irrigation, Henderson	Recommended WMS Supply Without WMS Project						
C	AMWA Athens Fish Hatchery Reuse	2060	WMS Seller: Athens Municipal Water Authority; WMS Supply Recipient: Livestock, Henderson	Recommended WMS Supply Without WMS Project						
C	Anna - New Well(s) in Woodbine Aquifer	2020	Project Sponsor(s): Anna	Recommended WMS Project	Yes	Project/WMS completed				
C	Annetta - Connect to Weatherford	2030	Project Sponsor(s): Annetta	Recommended WMS Project		Project/WMS not started				
C	Argyle WSC - New Well(s) in Trinity Aquifer	2020	Project Sponsor(s): Argyle WSC	Recommended WMS Project	Yes	Project/WMS completed				
C	Arledge Ridge WSC - New Well(s) in Woodbine Aquifer	2040	Project Sponsor(s): Arledge Ridge WSC	Recommended WMS Project						
C	Athens MWA - New Wells Phase 1	2020	Project Sponsor(s): Athens Municipal Water Authority	Recommended WMS Project	No	Project/WMS completed				
C	Athens MWA - New Wells Phase 2	2020	Project Sponsor(s): Athens Municipal Water Authority	Recommended WMS Project	No	Project/WMS completed				
C	Athens MWA - WTP Infrastructure Improvements	2020	Project Sponsor(s): Athens Municipal Water Authority	Recommended WMS Project	No	Project/WMS not started		Shift in timeline		
C	Azle - 4 MGD WTP Expansion	2020	Project Sponsor(s): Azle	Recommended WMS Project	Yes	Project/WMS started				
C	B H P WSC - Direct Connection to NTWMD	2020	Project Sponsor(s): B H P WSC	Recommended WMS Project	Yes	Project/WMS completed				
C	Bells - New Well(s) in Woodbine Aquifer	2030	Project Sponsor(s): Bells	Recommended WMS Project						
C	Benbrook - 3 MGD WTP Expansion	2030	Project Sponsor(s): Benbrook Water Authority	Recommended WMS Project						
C	Black Rock WSC - New Well(s) in Trinity Aquifer	2050	Project Sponsor(s): Black Rock WSC	Recommended WMS Project						
C	Blackland WSC - Direct Connection to NTWMD	2030	Project Sponsor(s): Blackland WSC	Recommended WMS Project	No	Project/WMS not started	Recommended online date after 2020, thus not evaluated.	Shift in timeline		Unknown
C	Blue Ridge - Connect to and Purchase Water from NTWMD	2030	Project Sponsor(s): Blue Ridge	Recommended WMS Project						
C	Blue Ridge - Increase Delivery Infrastructure from NTWMD-Phase 1	2040	Project Sponsor(s): Blue Ridge	Recommended WMS Project						
C	Blue Ridge - Increase Delivery Infrastructure from NTWMD-Phase 2	2060	Project Sponsor(s): Blue Ridge	Recommended WMS Project						
C	Bois D'Arc MUD - Connect to NTWMD	2030	Project Sponsor(s): Bois D Arc MUD	Recommended WMS Project						
C	Bolivar WSC - New Well(s) in Trinity Aquifer	2020	Project Sponsor(s): Bolivar WSC	Recommended WMS Project	Yes	Project/WMS completed				
C	Bridgeport - 1 MGD WTP Expansion	2070	Project Sponsor(s): Bridgeport	Recommended WMS Project						
C	Bridgeport - 2 MGD WTP Expansion	2060	Project Sponsor(s): Bridgeport	Recommended WMS Project						
C	Bridgeport - Expand Capacity of Lake Intake and Pump Station	2050	Project Sponsor(s): Bridgeport	Recommended WMS Project		Project/WMS no longer being pursued				
C	Burleson - Additional Infrastructure from Fort Worth	2050	Project Sponsor(s): Burleson	Recommended WMS Project						
C	Cash WSC - Additional Delivery Infrastructure from NTMWD	2020	Project Sponsor(s): Cash SUD	Recommended WMS Project	Yes	Project/WMS started				
C	Celina - Connect to and Purchase Water from NTMWD	2030	Project Sponsor(s): Celina	Recommended WMS Project	No	Project/WMS not started	Recommended online date after 2020, thus not evaluated.	Shift in timeline		Unknown
C	Chico - Additional Delivery Infrastructure from West Wise SUD	2040	Project Sponsor(s): Chico	Recommended WMS Project						
C	College Mound - Additional Delivery Infrastructure from Terrell	2070	Project Sponsor(s): College Mound WSC	Recommended WMS Project						
C	Conservation - Ables Springs WSC	2020	WUG Reducing Demand: Ables Springs WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				

Planning Region	WMS or WMS Project Name	Database Online Decade	Related Sponsor Entity and/or Benefitting WUGs	Implementation Survey Record Type	Has the sponsor taken affirmative vote or actions? (TWC 16.053(h)(10))	What is the status of the WMS project or WMS recommended in the 2022 SWP?	If the project has not been started or no longer is being pursued, please explain why	Impediments to project development	Information about project impediments	What funding type(s) are being used for the project? (Select all that apply)
C	Conservation - Addison	2020	WUG Reducing Demand: Addison	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Aledo	2020	WUG Reducing Demand: Aledo	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Allen	2020	WUG Reducing Demand: Allen	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Alvord	2020	WUG Reducing Demand: Alvord	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Anna	2020	WUG Reducing Demand: Anna	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Annetta	2020	WUG Reducing Demand: Annetta	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Argyle WSC	2020	WUG Reducing Demand: Argyle WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Arledge Ridge WSC	2020	WUG Reducing Demand: Arledge Ridge WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Arlington	2020	WUG Reducing Demand: Arlington	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Athens	2020	WUG Reducing Demand: Athens	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Aubrey	2020	WUG Reducing Demand: Aubrey	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Avalon Water Supply and Sewer Service	2030	WUG Reducing Demand: Avalon Water Supply & Sewer Service	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Azle	2020	WUG Reducing Demand: Azle	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - B and B WSC	2020	WUG Reducing Demand: B And B WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Balch Springs	2020	WUG Reducing Demand: Balch Springs	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Bear Creek SUD	2020	WUG Reducing Demand: Bear Creek SUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Becker Jiba WSC	2020	WUG Reducing Demand: Becker Jiba WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Bedford	2020	WUG Reducing Demand: Bedford	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Bells	2020	WUG Reducing Demand: Bells	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Benbrook	2020	WUG Reducing Demand: Benbrook Water Authority	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Black Rock WSC	2020	WUG Reducing Demand: Black Rock WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Blackland WSC	2020	WUG Reducing Demand: Blackland WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Blooming Grove	2020	WUG Reducing Demand: Blooming Grove	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Blue Ridge	2020	WUG Reducing Demand: Blue Ridge	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Bois D'Arc MUD	2020	WUG Reducing Demand: Bois D Arc MUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Bolivar WSC	2020	WUG Reducing Demand: Bolivar WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Bonham	2020	WUG Reducing Demand: Bonham	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Boyd	2020	WUG Reducing Demand: Boyd	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Bridgeport	2020	WUG Reducing Demand: Bridgeport	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Buena Vista - Bethel SUD	2020	WUG Reducing Demand: Buena Vista-Bethel SUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Butler	2020	WUG Reducing Demand: Butler WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Callisburg WSC	2020	WUG Reducing Demand: Callisburg WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Carrollton	2020	WUG Reducing Demand: Carrollton	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Cedar Hill	2020	WUG Reducing Demand: Cedar Hill	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				

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C	Conservation - Celina	2020	WUG Reducing Demand: Celina	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Chatfield WSC	2020	WUG Reducing Demand: Chatfield WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Chico	2020	WUG Reducing Demand: Chico	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Cockrell Hill	2020	WUG Reducing Demand: Cockrell Hill	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - College Mound WSC	2020	WUG Reducing Demand: College Mound WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Colleyville	2020	WUG Reducing Demand: Colleyville	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Collin County Other	2020	WUG Reducing Demand: County-Other, Collin	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Collinsville	2020	WUG Reducing Demand: Collinsville	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Combine WSC	2020	WUG Reducing Demand: Combine WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Community WSC	2020	WUG Reducing Demand: Community WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Cooke County Other	2020	WUG Reducing Demand: County-Other, Cooke	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Copeville SUD	2020	WUG Reducing Demand: Copeville SUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Coppell	2020	WUG Reducing Demand: Coppell	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Corbet WSC	2020	WUG Reducing Demand: Corbet WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Corinth	2020	WUG Reducing Demand: Corinth	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Corsicana	2020	WUG Reducing Demand: Corsicana	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Crandall	2020	WUG Reducing Demand: Crandall	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Crescent Heights WSC	2020	WUG Reducing Demand: Crescent Heights WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Cross Timbers WSC	2020	WUG Reducing Demand: Cross Timbers WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Crowley	2020	WUG Reducing Demand: Crowley	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Culleoka WSC	2020	WUG Reducing Demand: Culleoka WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Dallas	2020	WUG Reducing Demand: Dallas	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Dallas County	2020	WUG Reducing Demand: County-Other, Dallas	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Dalworthington Gardens	2020	WUG Reducing Demand: Dalworthington Gardens	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Dawson	2030	WUG Reducing Demand: Dawson	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Decatur	2020	WUG Reducing Demand: Decatur	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Denison	2020	WUG Reducing Demand: Denison	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Denton	2020	WUG Reducing Demand: Denton	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Denton County	2020	WUG Reducing Demand: County-Other, Denton	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Denton County FWSD 10	2020	WUG Reducing Demand: Denton County FWSD 10	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Denton County FWSD 1A	2020	WUG Reducing Demand: Denton County FWSD 1-A	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Denton County FWSD 7	2020	WUG Reducing Demand: Denton County FWSD 7	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Desert WSC	2020	WUG Reducing Demand: Desert WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - DeSoto	2020	WUG Reducing Demand: Desoto	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				

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C	Conservation - Dogwood Estates Water	2020	WUG Reducing Demand: Dogwood Estates Water	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Dorchester	2030	WUG Reducing Demand: Dorchester	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Duncanville	2020	WUG Reducing Demand: Duncanville	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - East Cedar Creek FWSD	2020	WUG Reducing Demand: East Cedar Creek FWSD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - East Fork SUD	2020	WUG Reducing Demand: East Fork SUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - East Garrett WSC	2020	WUG Reducing Demand: East Garrett WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Edgecliff Village	2020	WUG Reducing Demand: Edgecliff	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Ellis County	2020	WUG Reducing Demand: County-Other, Ellis	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Elmo WSC	2020	WUG Reducing Demand: Elmo WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Ennis	2030	WMS Supply Recipient: Manufacturing, Ellis	Recommended WMS Supply Without WMS Project	Yes	Project/WMS started				
C	Conservation - Ennis	2030	WMS Supply Recipient: Manufacturing, Ellis	Recommended WMS Supply Without WMS Project	Yes	Project/WMS started				
C	Conservation - Ennis	2020	WUG Reducing Demand: Ennis	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Euless	2020	WUG Reducing Demand: Euless	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Eustace	2030	WUG Reducing Demand: Eustace	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Everman	2020	WUG Reducing Demand: Everman	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Fairfield	2020	WUG Reducing Demand: Fairfield	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Fairview	2020	WUG Reducing Demand: Fairview	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Fannin County	2020	WUG Reducing Demand: County-Other, Fannin	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Farmers Branch	2020	WUG Reducing Demand: Farmers Branch	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Farmersville	2020	WUG Reducing Demand: Farmersville	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Fate	2020	WUG Reducing Demand: Fate	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Ferris	2020	WUG Reducing Demand: Ferris	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Flower Mound	2020	WUG Reducing Demand: Flower Mound	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Forest Hill	2020	WUG Reducing Demand: Forest Hill	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Forney	2020	WUG Reducing Demand: Forney	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Forney Lake WSC	2020	WUG Reducing Demand: Forney Lake WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Fort Worth	2020	WUG Reducing Demand: Fort Worth	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Freestone County	2020	WUG Reducing Demand: County-Other, Freestone	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Frisco	2020	WUG Reducing Demand: Frisco	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Frognot	2020	WUG Reducing Demand: Frognot WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Gainesville	2020	WUG Reducing Demand: Gainesville	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Garland	2020	WUG Reducing Demand: Garland	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Gastonia-Scurry SUD	2020	WUG Reducing Demand: Gastonia Scurry SUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Glenn Heights	2020	WUG Reducing Demand: Glenn Heights	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				

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C	Conservation - Grand Prairie	2020	WUG Reducing Demand: Grand Prairie	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Grapevine	2020	WUG Reducing Demand: Grapevine	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Grayson County	2020	WUG Reducing Demand: County-Other, Grayson	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Gunter	2020	WUG Reducing Demand: Gunter	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Hackberry	2020	WUG Reducing Demand: Hackberry	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Haltom City	2020	WUG Reducing Demand: Haltom City	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Haslet	2020	WUG Reducing Demand: Haslet	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Heath	2020	WUG Reducing Demand: Heath	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - High Point WSC	2020	WUG Reducing Demand: High Point WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Highland Park	2020	WUG Reducing Demand: Highland Park	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Highland Village	2020	WUG Reducing Demand: Highland Village	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Honey Grove	2020	WUG Reducing Demand: Honey Grove	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Horseshoe Bend Water System	2020	WUG Reducing Demand: Horseshoe Bend Water System	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Howe	2020	WUG Reducing Demand: Howe	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Hudson Oaks	2020	WUG Reducing Demand: Hudson Oaks	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Hurst	2020	WUG Reducing Demand: Hurst	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Hutchins	2020	WUG Reducing Demand: Hutchins	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Irving	2020	WUG Reducing Demand: Irving	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Italy	2020	WUG Reducing Demand: Italy	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Jack County	2020	WUG Reducing Demand: County-Other, Jack	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Jacksboro	2020	WUG Reducing Demand: Jacksboro	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Josephine	2020	WUG Reducing Demand: Josephine	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Justin	2020	WUG Reducing Demand: Justin	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Kaufman	2020	WUG Reducing Demand: Kaufman	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Kaufman County	2020	WUG Reducing Demand: County-Other, Kaufman	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Kaufman County Development Dist 1	2020	WUG Reducing Demand: Kaufman County Development District 1	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Kaufman County MUD 11	2020	WUG Reducing Demand: Kaufman County MUD 11	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Keller	2020	WUG Reducing Demand: Keller	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Kemp	2020	WUG Reducing Demand: Kemp	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Kennedale	2020	WUG Reducing Demand: Kennedale	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Kentucky Town WSC	2020	WUG Reducing Demand: Kentuckytown WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Kerens	2020	WUG Reducing Demand: Kerens	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Krum	2020	WUG Reducing Demand: Krum	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Ladonia	2020	WUG Reducing Demand: Ladonia	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				

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C	Conservation - Lake Cities MUA	2020	WUG Reducing Demand: Lake Cities Municipal Utility Authority	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Lake Kiowa SUD	2020	WUG Reducing Demand: Lake Kiowa SUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Lake Worth	2020	WUG Reducing Demand: Lake Worth	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Lakeside	2020	WUG Reducing Demand: Lakeside	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Lancaster	2020	WUG Reducing Demand: Lancaster	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Leonard	2020	WUG Reducing Demand: Leonard	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Lewisville	2020	WUG Reducing Demand: Lewisville	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Lindsay	2020	WUG Reducing Demand: Lindsay	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Little Elm	2020	WUG Reducing Demand: Little Elm	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Lucas	2020	WUG Reducing Demand: Lucas	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Luella SUD	2020	WUG Reducing Demand: Luella SUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - M E N WSC	2020	WUG Reducing Demand: M E N WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Mabank	2020	WUG Reducing Demand: Mabank	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Malakoff	2020	WUG Reducing Demand: Malakoff	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Mansfield	2020	WUG Reducing Demand: Mansfield	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Marilee SUD	2020	WUG Reducing Demand: Marilee SUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Markout WSC	2020	WUG Reducing Demand: Markout WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - McKinney	2020	WUG Reducing Demand: McKinney	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Melissa	2020	WUG Reducing Demand: Melissa	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Mesquite	2020	WUG Reducing Demand: Mesquite	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Midlothian	2020	WUG Reducing Demand: Midlothian	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Milligan WSC	2020	WUG Reducing Demand: Milligan WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Mount Zion WSC	2020	WUG Reducing Demand: Mount Zion WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Mountain Peak SUD	2020	WUG Reducing Demand: Mountain Peak SUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Mountain Spring WSC	2020	WUG Reducing Demand: Mountain Springs WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Muenster	2020	WUG Reducing Demand: Muenster	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Murphy	2020	WUG Reducing Demand: Murphy	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Mustang SUD	2020	WUG Reducing Demand: Mustang SUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Navarro County	2020	WUG Reducing Demand: County-Other, Navarro	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Navarro Mills WSC	2020	WUG Reducing Demand: Navarro Mills WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Nevada SUD	2020	WUG Reducing Demand: Nevada SUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Newark	2020	WUG Reducing Demand: Newark	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - North Collin WSC	2020	WUG Reducing Demand: North Collin SUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - North Farmersville WSC	2020	WUG Reducing Demand: North Farmersville WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				

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C	Conservation - North Kaufman WSC	2020	WUG Reducing Demand: North Kaufman WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - North Richland Hills	2020	WUG Reducing Demand: North Richland Hills	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Northlake	2020	WUG Reducing Demand: Northlake	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Northwest Grayson Co WCID 1	2020	WUG Reducing Demand: Northwest Grayson County WCID 1	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Oak Ridge South Gale WSC	2020	WUG Reducing Demand: Oak Ridge South Gale WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Ovilla	2020	WUG Reducing Demand: Ovilla	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Palmer	2020	WUG Reducing Demand: Palmer	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Paloma Creek North	2020	WUG Reducing Demand: Paloma Creek North	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Paloma Creek South	2020	WUG Reducing Demand: Paloma Creek South	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Pantego	2020	WUG Reducing Demand: Pantego	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Parker	2020	WUG Reducing Demand: Parker	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Parker County	2020	WUG Reducing Demand: County-Other, Parker	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Parker County SUD	2020	WUG Reducing Demand: Parker County SUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Pelican Bay	2030	WUG Reducing Demand: Pelican Bay	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Pilot Point	2020	WUG Reducing Demand: Pilot Point	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Pink Hill WSC	2020	WUG Reducing Demand: Pink Hill WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Plano	2020	WUG Reducing Demand: Plano	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Pleasant Grove WSC	2030	WUG Reducing Demand: Pleasant Grove WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Point Enterprise WSC	2030	WUG Reducing Demand: Point Enterprise WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Ponder	2020	WUG Reducing Demand: Ponder	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Pottsboro	2020	WUG Reducing Demand: Pottsboro	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Princeton	2020	WUG Reducing Demand: Princeton	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Prosper	2020	WUG Reducing Demand: Prosper	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Providence Village WCID	2020	WUG Reducing Demand: Providence Village WCID	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - R C H WSC	2020	WUG Reducing Demand: R C H WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Red Oak	2020	WUG Reducing Demand: Red Oak	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Reno	2020	WUG Reducing Demand: Reno (Parker)	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Rhome	2020	WUG Reducing Demand: Rhome	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Rice WSC	2020	WUG Reducing Demand: Rice Water Supply and Sewer Service	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Richardson	2020	WUG Reducing Demand: Richardson	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Richland Hills	2020	WUG Reducing Demand: Richland Hills	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - River Oaks	2020	WUG Reducing Demand: River Oaks	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Roanoke	2020	WUG Reducing Demand: Roanoke	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Rockett SUD	2020	WUG Reducing Demand: Rockett SUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				

Planning Region	WMS or WMS Project Name	Database Online Decade	Related Sponsor Entity and/or Benefitting WUGs	Implementation Survey Record Type	Has the sponsor taken affirmative vote or actions? (TWC 16.053(h)(10))	What is the status of the WMS project or WMS recommended in the 2022 SWP?	If the project has not been started or no longer is being pursued, please explain why	Impediments to project development	Information about project impediments	What funding type(s) are being used for the project? (Select all that apply)
C	Conservation - Rockwall	2020	WUG Reducing Demand: Rockwall	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Rockwall County	2020	WUG Reducing Demand: County-Other, Rockwall	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Rose Hill SUD	2020	WUG Reducing Demand: Rose Hill SUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Rowlett	2020	WUG Reducing Demand: Rowlett	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Royse City	2020	WUG Reducing Demand: Royse City	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Runaway Bay	2020	WUG Reducing Demand: Runaway Bay	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Sachse	2020	WUG Reducing Demand: Sachse	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Saginaw	2020	WUG Reducing Demand: Saginaw	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Sanger	2020	WUG Reducing Demand: Sanger	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Sansom Park	2020	WUG Reducing Demand: Sansom Park	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Sardis-Lone Elm WSC	2020	WUG Reducing Demand: Sardis Lone Elm WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Seagoville	2020	WUG Reducing Demand: Seagoville	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Seis Lagos UD	2020	WUG Reducing Demand: Seis Lagos UD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Sherman	2020	WUG Reducing Demand: Sherman	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - South Ellis County WSC	2020	WUG Reducing Demand: South Ellis County WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - South Freestone County WSC	2020	WUG Reducing Demand: South Freestone County WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - South Grayson WSC	2020	WUG Reducing Demand: South Grayson SUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Southlake	2020	WUG Reducing Demand: Southlake	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Southmayd	2030	WUG Reducing Demand: Southmayd	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Southwest Fannin County SUD	2020	WUG Reducing Demand: Southwest Fannin County SUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Springtown	2020	WUG Reducing Demand: Springtown	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Starr WSC	2020	WUG Reducing Demand: Starr WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Sunnyvale	2020	WUG Reducing Demand: Sunnyvale	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Talty SUD	2020	WUG Reducing Demand: Talty SUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Tarrant County	2020	WUG Reducing Demand: County-Other, Tarrant	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Teague	2020	WUG Reducing Demand: Teague	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Terrell	2020	WUG Reducing Demand: Terrell	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - The Colony	2020	WUG Reducing Demand: The Colony	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Tioga	2020	WUG Reducing Demand: Tioga	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Tom Bean	2020	WUG Reducing Demand: Tom Bean	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Trenton	2030	WUG Reducing Demand: Trenton	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Trinidad	2030	WUG Reducing Demand: Trinidad	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Trophy Club MUD 1	2020	WUG Reducing Demand: Trophy Club MUD 1	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Two Way SUD	2020	WUG Reducing Demand: Two Way SUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				

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C	Conservation - University Park	2020	WUG Reducing Demand: University Park	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Van Alstyne	2020	WUG Reducing Demand: Van Alstyne	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Verona SUD	2020	WUG Reducing Demand: Verona SUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Virginia Hill WSC	2020	WUG Reducing Demand: Virginia Hill WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Walnut Creek SUD	2020	WUG Reducing Demand: Walnut Creek SUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Watauga	2020	WUG Reducing Demand: Watauga	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Waxahachie	2020	WUG Reducing Demand: Waxahachie	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Weatherford	2020	WUG Reducing Demand: Weatherford	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - West Cedar Creek MUD	2020	WUG Reducing Demand: West Cedar Creek MUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - West Leonard WSC	2020	WUG Reducing Demand: West Leonard WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - West Wise SUD	2020	WUG Reducing Demand: West Wise SUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Westlake	2020	WUG Reducing Demand: Westlake	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Westminster WSC	2020	WUG Reducing Demand: Westminster WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Westover Hills	2020	WUG Reducing Demand: Westover Hills	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Westworth Village	2020	WUG Reducing Demand: Westworth Village	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - White Settlement	2020	WUG Reducing Demand: White Settlement	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - White Shed WSC	2020	WUG Reducing Demand: White Shed WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Whitesboro	2020	WUG Reducing Demand: Whitesboro	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Whitewright	2020	WUG Reducing Demand: Whitewright	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Willow Park	2020	WUG Reducing Demand: Willow Park	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Wilmer	2020	WUG Reducing Demand: Wilmer	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Wise County	2020	WUG Reducing Demand: County-Other, Wise	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Woodbine WSC	2020	WUG Reducing Demand: Woodbine WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Wortham	2020	WUG Reducing Demand: Wortham	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Wylie	2020	WUG Reducing Demand: Wylie	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation - Wylie Northeast SUD	2020	WUG Reducing Demand: Wylie Northeast SUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Anna	2020	WUG Reducing Demand: Anna	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Argyle WSC	2030	WUG Reducing Demand: Argyle WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Athens	2030	WUG Reducing Demand: Athens	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Benbrook	2020	WUG Reducing Demand: Benbrook Water Authority	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Blue Ridge	2020	WUG Reducing Demand: Blue Ridge	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Cedar Hill	2020	WUG Reducing Demand: Cedar Hill	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Colleyville	2030	WUG Reducing Demand: Colleyville	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Corinth	2030	WUG Reducing Demand: Corinth	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				

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C	Conservation – Waste Prohibition, Dalworthington Gardens	2030	WUG Reducing Demand: Dalworthington Gardens	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Denison	2020	WUG Reducing Demand: Denison	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Denton County FWSD 10	2030	WUG Reducing Demand: Denton County FWSD 10	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Denton County FWSD 7	2030	WUG Reducing Demand: Denton County FWSD 7	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, DeSoto	2020	WUG Reducing Demand: Desoto	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, East Garrett WSC	2060	WUG Reducing Demand: East Garrett WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Edgecliff	2030	WUG Reducing Demand: Edgecliff	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Ennis	2030	WUG Reducing Demand: Ennis	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Euless	2030	WUG Reducing Demand: Euless	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Farmers Branch	2020	WUG Reducing Demand: Farmers Branch	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Fate	2020	WUG Reducing Demand: Fate	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Forney Lake WSC	2020	WUG Reducing Demand: Forney Lake WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Hackberry	2020	WUG Reducing Demand: Hackberry	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Haslet	2030	WUG Reducing Demand: Haslet	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Hudson Oaks	2020	WUG Reducing Demand: Hudson Oaks	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Hutchins	2020	WUG Reducing Demand: Hutchins	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Kennedale	2030	WUG Reducing Demand: Kennedale	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Lake Worth	2030	WUG Reducing Demand: Lake Worth	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Lakeside	2020	WUG Reducing Demand: Lakeside	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Lancaster	2020	WUG Reducing Demand: Lancaster	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Lucas	2020	WUG Reducing Demand: Lucas	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Mabank	2020	WUG Reducing Demand: Mabank	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Midlothian	2020	WUG Reducing Demand: Midlothian	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Mount Zion WSC	2030	WUG Reducing Demand: Mount Zion WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Murphy	2020	WUG Reducing Demand: Murphy	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Ovilla	2020	WUG Reducing Demand: Ovilla	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Paloma Creek North	2030	WUG Reducing Demand: Paloma Creek North	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Paloma Creek South	2030	WUG Reducing Demand: Paloma Creek South	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Parker	2020	WUG Reducing Demand: Parker	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, R C H WSC	2020	WUG Reducing Demand: R C H WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Roanoke	2030	WUG Reducing Demand: Roanoke	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				

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C	Conservation – Waste Prohibition, Weatherford	2030	WUG Reducing Demand: Weatherford	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Westlake	2030	WUG Reducing Demand: Westlake	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation – Waste Prohibition, Westover Hills	2030	WUG Reducing Demand: Westover Hills	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Addison	2020	WUG Reducing Demand: Addison	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Allen	2020	WUG Reducing Demand: Allen	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Anna	2020	WUG Reducing Demand: Anna	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Argyle WSC	2030	WUG Reducing Demand: Argyle WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Arlington	2030	WUG Reducing Demand: Arlington	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Athens	2030	WUG Reducing Demand: Athens	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Bear Creek SUD	2020	WUG Reducing Demand: Bear Creek SUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Bedford	2030	WUG Reducing Demand: Bedford	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Benbrook	2020	WUG Reducing Demand: Benbrook Water Authority	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Black Rock WSC	2050	WUG Reducing Demand: Black Rock WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Blackland WSC	2020	WUG Reducing Demand: Blackland WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Blooming Grove	2050	WUG Reducing Demand: Blooming Grove	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Blue Ridge	2020	WUG Reducing Demand: Blue Ridge	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Boyd	2030	WUG Reducing Demand: Boyd	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Bridgeport	2030	WUG Reducing Demand: Bridgeport	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Buena Vista-Bethel SUD	2040	WUG Reducing Demand: Buena Vista-Bethel SUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Carrollton	2020	WUG Reducing Demand: Carrollton	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Cedar Hill	2020	WUG Reducing Demand: Cedar Hill	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Celina	2020	WUG Reducing Demand: Celina	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Chico	2030	WUG Reducing Demand: Chico	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Colleyville	2030	WUG Reducing Demand: Colleyville	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Coppell	2020	WUG Reducing Demand: Coppell	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Corinth	2030	WUG Reducing Demand: Corinth	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Corsicana	2050	WUG Reducing Demand: Corsicana	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – County-Other, Dallas	2020	WUG Reducing Demand: County-Other, Dallas	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – County-Other, Rockwall	2020	WUG Reducing Demand: County-Other, Rockwall	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – County-Other, Tarrant	2020	WUG Reducing Demand: County-Other, Tarrant	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Crandall	2020	WUG Reducing Demand: Crandall	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				

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C	Conservation, Irrigation Restrictions – Cross Timbers WSC	2030	WUG Reducing Demand: Cross Timbers WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Crowley	2020	WUG Reducing Demand: Crowley	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Dallas	2020	WUG Reducing Demand: Dallas	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Dalworthington Gardens	2030	WUG Reducing Demand: Dalworthington Gardens	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Decatur	2020	WUG Reducing Demand: Decatur	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Denison	2020	WUG Reducing Demand: Denison	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Denton	2020	WUG Reducing Demand: Denton	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Denton County FWSD 1-A	2020	WUG Reducing Demand: Denton County FWSD 1-A	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Denton County FWSD 10	2030	WUG Reducing Demand: Denton County FWSD 10	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Denton County FWSD 7	2030	WUG Reducing Demand: Denton County FWSD 7	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – DeSoto	2020	WUG Reducing Demand: Desoto	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – East Fork SUD	2020	WUG Reducing Demand: East Fork SUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – East Garrett WSC	2030	WUG Reducing Demand: East Garrett WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Edgecliff	2030	WUG Reducing Demand: Edgecliff	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Ennis	2030	WUG Reducing Demand: Ennis	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Euless	2030	WUG Reducing Demand: Euless	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Everman	2020	WUG Reducing Demand: Everman	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Fairfield	2050	WUG Reducing Demand: Fairfield	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Fairview	2020	WUG Reducing Demand: Fairview	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Farmers Branch	2020	WUG Reducing Demand: Farmers Branch	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Fate	2020	WUG Reducing Demand: Fate	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Flower Mound	2020	WUG Reducing Demand: Flower Mound	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Forney Lake WSC	2020	WUG Reducing Demand: Forney Lake WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Fort Worth	2020	WUG Reducing Demand: Fort Worth	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Frisco	2020	WUG Reducing Demand: Frisco	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Garland	2020	WUG Reducing Demand: Garland	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Grand Prairie	2020	WUG Reducing Demand: Grand Prairie	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Grapevine	2020	WUG Reducing Demand: Grapevine	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Gunter	2020	WUG Reducing Demand: Gunter	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Hackberry	2020	WUG Reducing Demand: Hackberry	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Haltom City	2020	WUG Reducing Demand: Haltom City	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				

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C	Conservation, Irrigation Restrictions – Haslet	2030	WUG Reducing Demand: Haslet	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Heath	2020	WUG Reducing Demand: Heath	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Highland Park	2020	WUG Reducing Demand: Highland Park	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Highland Village	2030	WUG Reducing Demand: Highland Village	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Hudson Oaks	2020	WUG Reducing Demand: Hudson Oaks	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Hurst	2020	WUG Reducing Demand: Hurst	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Hutchins	2020	WUG Reducing Demand: Hutchins	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Irving	2020	WUG Reducing Demand: Irving	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Josephine	2020	WUG Reducing Demand: Josephine	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Kaufman	2020	WUG Reducing Demand: Kaufman	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Kaufman County Development District 1	2020	WUG Reducing Demand: Kaufman County Development District 1	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Kaufman County MUD 11	2020	WUG Reducing Demand: Kaufman County MUD 11	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Keller	2020	WUG Reducing Demand: Keller	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Kemp	2020	WUG Reducing Demand: Kemp	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Kennedale	2030	WUG Reducing Demand: Kennedale	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Krum	2020	WUG Reducing Demand: Krum	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Lake Worth	2030	WUG Reducing Demand: Lake Worth	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Lakeside	2020	WUG Reducing Demand: Lakeside	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Lancaster	2020	WUG Reducing Demand: Lancaster	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Lewisville	2020	WUG Reducing Demand: Lewisville	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Little Elm	2020	WUG Reducing Demand: Little Elm	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Lucas	2020	WUG Reducing Demand: Lucas	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Mabank	2020	WUG Reducing Demand: Mabank	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Mansfield	2020	WUG Reducing Demand: Mansfield	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Markout WSC	2020	WUG Reducing Demand: Markout WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – McKinney	2020	WUG Reducing Demand: McKinney	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Melissa	2020	WUG Reducing Demand: Melissa	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Mesquite	2020	WUG Reducing Demand: Mesquite	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Midlothian	2020	WUG Reducing Demand: Midlothian	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Mount Zion WSC	2020	WUG Reducing Demand: Mount Zion WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Mountain Peak SUD	2020	WUG Reducing Demand: Mountain Peak SUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Mountain Springs WSC	2060	WUG Reducing Demand: Mountain Springs WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				

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C	Conservation, Irrigation Restrictions – Murphy	2020	WUG Reducing Demand: Murphy	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Nevada SUD	2020	WUG Reducing Demand: Nevada SUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – North Farmersville WSC	2020	WUG Reducing Demand: North Farmersville WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – North Richland Hills	2020	WUG Reducing Demand: North Richland Hills	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Northlake	2030	WUG Reducing Demand: Northlake	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Ovilla	2020	WUG Reducing Demand: Ovilla	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Paloma Creek North	2030	WUG Reducing Demand: Paloma Creek North	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Paloma Creek South	2030	WUG Reducing Demand: Paloma Creek South	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Parker	2020	WUG Reducing Demand: Parker	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Plano	2020	WUG Reducing Demand: Plano	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Pottsboro	2020	WUG Reducing Demand: Pottsboro	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Prosper	2020	WUG Reducing Demand: Prosper	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – R C H WSC	2020	WUG Reducing Demand: R C H WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Rhome	2020	WUG Reducing Demand: Rhome	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Richardson	2020	WUG Reducing Demand: Richardson	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Roanoke	2030	WUG Reducing Demand: Roanoke	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Rockwall	2020	WUG Reducing Demand: Rockwall	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Rowlett	2020	WUG Reducing Demand: Rowlett	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Runaway Bay	2020	WUG Reducing Demand: Runaway Bay	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Sachse	2020	WUG Reducing Demand: Sachse	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Saginaw	2020	WUG Reducing Demand: Saginaw	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Sanger	2020	WUG Reducing Demand: Sanger	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Sardis Lone Elm WSC	2020	WUG Reducing Demand: Sardis Lone Elm WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Seis Lagos UD	2020	WUG Reducing Demand: Seis Lagos UD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Sherman	2060	WUG Reducing Demand: Sherman	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – South Ellis County WSC	2050	WUG Reducing Demand: South Ellis County WSC	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Southlake	2020	WUG Reducing Demand: Southlake	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Springtown	2020	WUG Reducing Demand: Springtown	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Sunnyvale	2020	WUG Reducing Demand: Sunnyvale	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Talty SUD	2020	WUG Reducing Demand: Talty SUD	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Teague	2020	WUG Reducing Demand: Teague	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				

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C	Conservation, Irrigation Restrictions – Terrell	2020	WUG Reducing Demand: Terrell	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Tom Bean	2030	WUG Reducing Demand: Tom Bean	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Trenton	2030	WUG Reducing Demand: Trenton	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Trophy Club MUD 1	2020	WUG Reducing Demand: Trophy Club MUD 1	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – University Park	2020	WUG Reducing Demand: University Park	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Van Alstyne	2020	WUG Reducing Demand: Van Alstyne	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Watauga	2020	WUG Reducing Demand: Watauga	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Waxahachie	2040	WUG Reducing Demand: Waxahachie	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Weatherford	2020	WUG Reducing Demand: Weatherford	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Westlake	2030	WUG Reducing Demand: Westlake	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Westover Hills	2030	WUG Reducing Demand: Westover Hills	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Irrigation Restrictions – Wylie	2020	WUG Reducing Demand: Wylie	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Conservation - Desert WSC	2020	Project Sponsor(s): Desert WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Conservation - Dogwood Estates Water	2020	Project Sponsor(s): Dogwood Estates Water	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Conservation - South Ellis County WSC	2020	Project Sponsor(s): South Ellis County WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Ables Springs WSC	2020	Project Sponsor(s): Ables Springs WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Addison	2020	Project Sponsor(s): Addison	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Aledo	2020	Project Sponsor(s): Aledo	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Allen	2020	Project Sponsor(s): Allen	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Alvord	2020	Project Sponsor(s): Alvord	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Anna	2020	Project Sponsor(s): Anna	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Annetta	2020	Project Sponsor(s): Annetta	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Argyle WSC	2020	Project Sponsor(s): Argyle WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Arledge Ridge WSC	2020	Project Sponsor(s): Arledge Ridge WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Arlington	2020	Project Sponsor(s): Arlington	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Athens	2020	Project Sponsor(s): Athens	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Aubrey	2020	Project Sponsor(s): Aubrey	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Avalon Water Supply and Sewer Service	2020	Project Sponsor(s): Avalon Water Supply and Sewer Service	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Azle	2020	Project Sponsor(s): Azle	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - B and B WSC	2020	Project Sponsor(s): B And B WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Balch Springs	2020	Project Sponsor(s): Balch Springs	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Bear Creek SUD	2020	Project Sponsor(s): Bear Creek SUD	Recommended WMS Project	Yes	Project/WMS started				

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C	Conservation, Water Loss Control - Becker Jiba WSC	2020	Project Sponsor(s): Becker Jiba WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Bedford	2020	Project Sponsor(s): Bedford	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Bells	2020	Project Sponsor(s): Bells	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Benbrook	2020	Project Sponsor(s): Benbrook Water Authority	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Bethel-Ash WSC	2020	Project Sponsor(s): Bethel Ash WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Bethesda WSC	2020	Project Sponsor(s): Bethesda WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Black Rock WSC	2020	Project Sponsor(s): Black Rock WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Blackland WSC	2020	Project Sponsor(s): Blackland WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Blooming Grove	2020	Project Sponsor(s): Blooming Grove	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Blue Ridge	2020	Project Sponsor(s): Blue Ridge	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Bois D Arc MUD	2020	Project Sponsor(s): Bois D Arc MUD	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Bolivar WSC	2020	Project Sponsor(s): Bolivar WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Bonham	2020	Project Sponsor(s): Bonham	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Boyd	2020	Project Sponsor(s): Boyd	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Bridgeport	2020	Project Sponsor(s): Bridgeport	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Buena Vista - Bethel SUD	2020	Project Sponsor(s): Buena Vista-Bethel SUD	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Burleson	2020	Project Sponsor(s): Burleson	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Butler WSC	2020	Project Sponsor(s): Butler WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Caddo Basin SUD	2020	Project Sponsor(s): Caddo Basin SUD	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Callisburg WSC	2020	Project Sponsor(s): Callisburg WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Carrollton	2020	Project Sponsor(s): Carrollton	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Cash SUD	2020	Project Sponsor(s): Cash SUD	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Cedar Hill	2020	Project Sponsor(s): Cedar Hill	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Celina	2020	Project Sponsor(s): Celina	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Chatfield WSC	2020	Project Sponsor(s): Chatfield WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Chico	2020	Project Sponsor(s): Chico	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Cockrell Hill	2020	Project Sponsor(s): Cockrell Hill	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - College Mound WSC	2020	Project Sponsor(s): College Mound WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Colleyville	2020	Project Sponsor(s): Colleyville	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Collin County	2020	Project Sponsor(s): Municipal county-other (Collin)	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Collinsville	2020	Project Sponsor(s): Collinsville	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Combine WSC	2020	Project Sponsor(s): Combine WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Community WSC	2020	Project Sponsor(s): Community WSC	Recommended WMS Project	Yes	Project/WMS started				

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C	Conservation, Water Loss Control - Cooke County	2020	Project Sponsor(s): Municipal county-other (Cooke)	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Copeville SUD	2020	Project Sponsor(s): Copeville SUD	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Coppell	2020	Project Sponsor(s): Coppell	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Corbet WSC	2020	Project Sponsor(s): Corbet WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Corinth	2020	Project Sponsor(s): Corinth	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Corsicana	2020	Project Sponsor(s): Corsicana	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Crandall	2020	Project Sponsor(s): Crandall	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Crescent Heights WSC	2020	Project Sponsor(s): Crescent Heights WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Cross Timbers WSC	2020	Project Sponsor(s): Cross Timbers WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Crowley	2020	Project Sponsor(s): Crowley	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Culleoka WSC	2020	Project Sponsor(s): Culleoka WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Dallas	2020	Project Sponsor(s): Dallas	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Dallas County	2020	Project Sponsor(s): Municipal county-other (Dallas)	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Dalworthington Gardens	2020	Project Sponsor(s): Dalworthington Gardens	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Dawson	2020	Project Sponsor(s): Dawson	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Decatur	2020	Project Sponsor(s): Decatur	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Denison	2020	Project Sponsor(s): Denison	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Denton	2020	Project Sponsor(s): Denton	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Denton County	2020	Project Sponsor(s): Municipal county-other (Denton)	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Denton County FWSD 10	2020	Project Sponsor(s): Denton County FWSD 10	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Denton County FWSD 1A	2020	Project Sponsor(s): Denton County FWSD 1-A	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Denton County FWSD 7	2020	Project Sponsor(s): Denton County FWSD 7	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - DeSoto	2020	Project Sponsor(s): Desoto	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Dorchester	2020	Project Sponsor(s): Dorchester	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Duncanville	2020	Project Sponsor(s): Duncanville	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - East Cedar Creek FWSD	2020	Project Sponsor(s): East Cedar Creek FWSD	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - East Fork SUD	2020	Project Sponsor(s): East Fork SUD	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - East Garrett WSC	2020	Project Sponsor(s): East Garrett WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Edgecliff Village	2020	Project Sponsor(s): Edgecliff	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Ellis County	2020	Project Sponsor(s): Municipal county-other (Ellis)	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Elmo WSC	2020	Project Sponsor(s): Elmo WSC	Recommended WMS Project	Yes	Project/WMS started				

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C	Conservation, Water Loss Control - Ennis	2020	Project Sponsor(s): Ennis	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Euless	2020	Project Sponsor(s): Euless	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Eustace	2020	Project Sponsor(s): Eustace	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Everman	2020	Project Sponsor(s): Everman	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Fairfield	2020	Project Sponsor(s): Fairfield	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Fairview	2020	Project Sponsor(s): Fairview	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Fannin County	2020	Project Sponsor(s): Municipal county-other (Fannin)	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Farmers Branch	2020	Project Sponsor(s): Farmers Branch	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Farmersville	2020	Project Sponsor(s): Farmersville	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Fate	2020	Project Sponsor(s): Fate	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Ferris	2020	Project Sponsor(s): Ferris	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Files Valley WSC	2020	Project Sponsor(s): Files Valley WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Flower Mound	2020	Project Sponsor(s): Flower Mound	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Forest Hill	2020	Project Sponsor(s): Forest Hill	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Forney	2020	Project Sponsor(s): Forney	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Forney Lake WSC	2020	Project Sponsor(s): Forney Lake WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Fort Worth	2020	Project Sponsor(s): Fort Worth	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Freestone County	2020	Project Sponsor(s): Municipal county-other (Freestone)	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Frisco	2020	Project Sponsor(s): Frisco	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Frognot WSC	2020	Project Sponsor(s): Frognot WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Gainesville	2020	Project Sponsor(s): Gainesville	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Garland	2020	Project Sponsor(s): Garland	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Gastonia-Scurry SUD	2020	Project Sponsor(s): Gastonia Scurry SUD	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Glenn Heights	2020	Project Sponsor(s): Glenn Heights	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Grand Prairie	2020	Project Sponsor(s): Grand Prairie	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Grapevine	2020	Project Sponsor(s): Grapevine	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Grayson County	2020	Project Sponsor(s): Municipal county-other (Grayson)	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Gunter	2020	Project Sponsor(s): Gunter	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Hackberry	2020	Project Sponsor(s): Hackberry	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Haltom City	2020	Project Sponsor(s): Haltom City	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Haslet	2020	Project Sponsor(s): Haslet	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Heath	2020	Project Sponsor(s): Heath	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Henderson County	2020	Project Sponsor(s): Municipal county-other (Henderson)	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - High Point WSC	2020	Project Sponsor(s): High Point WSC	Recommended WMS Project	Yes	Project/WMS started				

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C	Conservation, Water Loss Control - Highland Park	2020	Project Sponsor(s): Highland Park	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Highland Village	2020	Project Sponsor(s): Highland Village	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Honey Grove	2020	Project Sponsor(s): Honey Grove	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Horseshoe Bend Water System	2020	Project Sponsor(s): Horseshoe Bend Water System	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Howe	2020	Project Sponsor(s): Howe	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Hudson Oaks	2020	Project Sponsor(s): Hudson Oaks	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Hurst	2020	Project Sponsor(s): Hurst	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Hutchins	2020	Project Sponsor(s): Hutchins	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Irving	2020	Project Sponsor(s): Irving	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Italy	2020	Project Sponsor(s): Italy	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Jack County	2020	Project Sponsor(s): Municipal county-other (Jack)	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Jacksboro	2020	Project Sponsor(s): Jacksboro	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Johnson County SUD	2020	Project Sponsor(s): Johnson County SUD	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Josephine	2020	Project Sponsor(s): Josephine	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Justin	2020	Project Sponsor(s): Justin	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Kaufman	2020	Project Sponsor(s): Kaufman	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Kaufman County	2020	Project Sponsor(s): Municipal county-other (Kaufman)	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Kaufman County Development District 1	2020	Project Sponsor(s): Kaufman County Development District 1	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Kaufman County MUD 11	2020	Project Sponsor(s): Kaufman County MUD 11	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Keller	2020	Project Sponsor(s): Keller	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Kemp	2020	Project Sponsor(s): Kemp	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Kennedale	2020	Project Sponsor(s): Kennedale	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Kentucky Town WSC	2020	Project Sponsor(s): Kentuckytown WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Kerens	2020	Project Sponsor(s): Kerens	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Krum	2020	Project Sponsor(s): Krum	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Ladonia	2020	Project Sponsor(s): Ladonia	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Lake Cities MUA	2020	Project Sponsor(s): Lake Cities Municipal Utility Authority	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Lake Kiowa SUD	2020	Project Sponsor(s): Lake Kiowa SUD	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Lake Worth	2020	Project Sponsor(s): Lake Worth	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Lakeside	2020	Project Sponsor(s): Lakeside	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Lancaster	2020	Project Sponsor(s): Lancaster	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Leonard	2020	Project Sponsor(s): Leonard	Recommended WMS Project	Yes	Project/WMS started				

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C	Conservation, Water Loss Control - Lewisville	2020	Project Sponsor(s): Lewisville	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Lindsay	2020	Project Sponsor(s): Lindsay	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Little Elm	2020	Project Sponsor(s): Little Elm	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Lucas	2020	Project Sponsor(s): Lucas	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Luella SUD	2020	Project Sponsor(s): Luella SUD	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - M-E-N WSC	2020	Project Sponsor(s): M E N WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Mabank	2020	Project Sponsor(s): Mabank	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Malakoff	2020	Project Sponsor(s): Malakoff	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Mansfield	2020	Project Sponsor(s): Mansfield	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Marilee SUD	2020	Project Sponsor(s): Marilee SUD	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Markout WSC	2020	Project Sponsor(s): Markout WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - McKinney	2020	Project Sponsor(s): McKinney	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Melissa	2020	Project Sponsor(s): Melissa	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Mesquite	2020	Project Sponsor(s): Mesquite	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Midlothian	2020	Project Sponsor(s): Midlothian	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Milligan WSC	2020	Project Sponsor(s): Milligan WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Mineral Wells	2020	Project Sponsor(s): Mineral Wells	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Mount Zion WSC	2020	Project Sponsor(s): Mount Zion WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Mountain Peak SUD	2020	Project Sponsor(s): Mountain Peak SUD	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Mountain Spring WSC	2020	Project Sponsor(s): Mountain Springs WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Muenster	2020	Project Sponsor(s): Muenster	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Murphy	2020	Project Sponsor(s): Murphy	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Mustang SUD	2020	Project Sponsor(s): Mustang SUD	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Navarro County	2020	Project Sponsor(s): Municipal county-other (Navarro)	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Navarro Mills WSC	2020	Project Sponsor(s): Navarro Mills WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Nevada SUD	2020	Project Sponsor(s): Nevada SUD	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Newark	2020	Project Sponsor(s): Newark	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - North Collin WSC	2020	Project Sponsor(s): North Collin SUD	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - North Farmersville	2020	Project Sponsor(s): North Farmersville WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - North Kaufman WSC	2020	Project Sponsor(s): North Kaufman WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - North Richland Hills	2020	Project Sponsor(s): North Richland Hills	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Northlake	2020	Project Sponsor(s): Northlake	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Northwest Grayson County WDIS1	2020	Project Sponsor(s): Northwest Grayson County WCID 1	Recommended WMS Project	Yes	Project/WMS started				

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C	Conservation, Water Loss Control - Oak Ridge South Gale WSC	2020	Project Sponsor(s): Oak Ridge South Gale WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Ovilla	2020	Project Sponsor(s): Ovilla	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Palmer	2020	Project Sponsor(s): Palmer	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Paloma Creek North	2020	Project Sponsor(s): Paloma Creek North	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Paloma Creek South	2020	Project Sponsor(s): Paloma Creek South	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Pantego	2020	Project Sponsor(s): Pantego	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Parker	2020	Project Sponsor(s): Parker	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Parker County	2020	Project Sponsor(s): Municipal county-other (Parker)	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Parker County SUD	2020	Project Sponsor(s): Parker County SUD	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Pelican Bay	2020	Project Sponsor(s): Pelican Bay	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Pilot Point	2020	Project Sponsor(s): Pilot Point	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Pink Hill WSC	2020	Project Sponsor(s): Pink Hill WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Plano	2020	Project Sponsor(s): Plano	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Pleasant Grove WSC	2020	Project Sponsor(s): Pleasant Grove WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Poetry WSC	2020	Project Sponsor(s): Poetry WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Ponder	2020	Project Sponsor(s): Ponder	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Pottsboro	2020	Project Sponsor(s): Pottsboro	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Princeton	2020	Project Sponsor(s): Princeton	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Prosper	2020	Project Sponsor(s): Prosper	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Providence Village WCID	2020	Project Sponsor(s): Providence Village WCID	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - R C H WSC	2020	Project Sponsor(s): R C H WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Red Oak	2020	Project Sponsor(s): Red Oak	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Red River Authority of Texas	2020	Project Sponsor(s): Red River Authority of Texas	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Reno	2020	Project Sponsor(s): Reno (Parker)	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Rhome	2020	Project Sponsor(s): Rhome	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Rice WSC	2020	Project Sponsor(s): Rice Water Supply and Sewer Service	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Richardson	2020	Project Sponsor(s): Richardson	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Richland Hills	2020	Project Sponsor(s): Richland Hills	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - River Oaks	2020	Project Sponsor(s): River Oaks	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Roanoke	2020	Project Sponsor(s): Roanoke	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Rockett SUD	2020	Project Sponsor(s): Rockett SUD	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Rockwall	2020	Project Sponsor(s): Rockwall	Recommended WMS Project	Yes	Project/WMS started				

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C	Conservation, Water Loss Control - Rockwall County	2020	Project Sponsor(s): Municipal county-other (Rockwall)	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Rose Hill SUD	2020	Project Sponsor(s): Rose Hill SUD	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Rowlett	2020	Project Sponsor(s): Rowlett	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Royse City	2020	Project Sponsor(s): Royse City	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Runaway Bay	2020	Project Sponsor(s): Runaway Bay	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Sachse	2020	Project Sponsor(s): Sachse	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Saginaw	2020	Project Sponsor(s): Saginaw	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Sanger	2020	Project Sponsor(s): Sanger	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Sansom Park	2020	Project Sponsor(s): Sansom Park	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Sardis Lone Elm WSC	2020	Project Sponsor(s): Sardis Lone Elm WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Seagoville	2020	Project Sponsor(s): Seagoville	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Seis Lagos UD	2020	Project Sponsor(s): Seis Lagos UD	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Sherman	2020	Project Sponsor(s): Sherman	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - South Freestone County WSC	2020	Project Sponsor(s): South Freestone County WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - South Grayson WSC	2020	Project Sponsor(s): South Grayson SUD	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Southlake	2020	Project Sponsor(s): Southlake	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Southmayd	2020	Project Sponsor(s): Southmayd	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Southwest Fannin County SUD	2020	Project Sponsor(s): Southwest Fannin County SUD	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Springtown	2020	Project Sponsor(s): Springtown	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Starr WSC	2020	Project Sponsor(s): Starr WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Sunnyvale	2020	Project Sponsor(s): Sunnyvale	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Talty WSC	2020	Project Sponsor(s): Talty SUD	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Tarrant County	2020	Project Sponsor(s): Municipal county-other (Tarrant)	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Teague	2020	Project Sponsor(s): Teague	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Terrell	2020	Project Sponsor(s): Terrell	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - The Colony	2020	Project Sponsor(s): The Colony	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Tioga	2020	Project Sponsor(s): Tioga	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Tom Bean	2020	Project Sponsor(s): Tom Bean	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Trenton	2020	Project Sponsor(s): Trenton	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Trinidad	2020	Project Sponsor(s): Trinidad	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Trophy Club	2020	Project Sponsor(s): Trophy Club MUD 1	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Two Way SUD	2020	Project Sponsor(s): Two Way SUD	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - University Park	2020	Project Sponsor(s): University Park	Recommended WMS Project	Yes	Project/WMS started				

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C	Conservation, Water Loss Control - Van Alstyne	2020	Project Sponsor(s): Van Alstyne	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Verona SUD	2020	Project Sponsor(s): Verona SUD	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Virginia Hill WSC	2020	Project Sponsor(s): Virginia Hill WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Walnut Creek SUD	2020	Project Sponsor(s): Walnut Creek SUD	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Watauga	2020	Project Sponsor(s): Watauga	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Waxahachie	2020	Project Sponsor(s): Waxahachie	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Weatherford	2020	Project Sponsor(s): Weatherford	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - West Cedar Creek MUD	2020	Project Sponsor(s): West Cedar Creek MUD	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - West Leonard WSC	2020	Project Sponsor(s): West Leonard WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - West Wise SUD	2020	Project Sponsor(s): West Wise SUD	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Westlake	2020	Project Sponsor(s): Westlake	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Westminster WSC	2020	Project Sponsor(s): Westminster WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Westover Hills	2020	Project Sponsor(s): Westover Hills	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Westworth Village	2020	Project Sponsor(s): Westworth Village	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - White Settlement	2020	Project Sponsor(s): White Settlement	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - White Shed WSC	2020	Project Sponsor(s): White Shed WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Whitesboro	2020	Project Sponsor(s): Whitesboro	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Whitewright	2020	Project Sponsor(s): Whitewright	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Willow Park	2020	Project Sponsor(s): Willow Park	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Wilmer	2020	Project Sponsor(s): Wilmer	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Wise County	2020	Project Sponsor(s): Municipal county-other (Wise)	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Woodbine WSC	2020	Project Sponsor(s): Woodbine WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Wortham	2020	Project Sponsor(s): Wortham	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Wylie	2020	Project Sponsor(s): Wylie	Recommended WMS Project	Yes	Project/WMS started				
C	Conservation, Water Loss Control - Wylie Northeast SUD	2020	Project Sponsor(s): Wylie Northeast SUD	Recommended WMS Project	Yes	Project/WMS started				
C	Corsicana - 8 MGD WTP Expansion, Halbert-Richland Chambers-1	2050	Project Sponsor(s): Corsicana	Recommended WMS Project						
C	Corsicana - 8 MGD WTP Expansion, Halbert-Richland Chambers-2	2070	Project Sponsor(s): Corsicana	Recommended WMS Project						
C	Corsicana - New 8 MGD WTP, Halbert-Richland Chambers	2030	Project Sponsor(s): Corsicana	Recommended WMS Project						
C	County Other, Jack - Infrastructure to Connect to Jacksboro	2020	Project Sponsor(s): Municipal county-other (Jack)	Recommended WMS Project	No	Project/WMS not started		Project sponsor not identified		
C	County Other, Jack - Infrastructure to Connect to Walnut Creek SUD	2020	Project Sponsor(s): Municipal county-other (Jack)	Recommended WMS Project	No	Project/WMS not started		Project sponsor not identified		
C	County Other, Kaufman - WTP and Connect to TRWD	2020	Project Sponsor(s): Municipal county-other (Kaufman)	Recommended WMS Project	No	Project/WMS not started		Project sponsor not identified		

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C	County Other, Parker - New Well(s) in Trinity Aquifer	2020	Project Sponsor(s): Municipal county-other (Parker)	Recommended WMS Project	Yes	Project/WMS completed				
C	County-Other, Denton - New Well(s) in Trinity Aquifer	2020	Project Sponsor(s): Municipal county-other (Denton)	Recommended WMS Project	Yes	Project/WMS completed				
C	County-Other, Denton - New Well(s) in Woodbine Aquifer	2020	Project Sponsor(s): Municipal county-other (Denton)	Recommended WMS Project	Yes	Project/WMS completed				
C	County-Other, Freestone - Additional Delivery Infrastructure from Corsicana	2050	Project Sponsor(s): Municipal county-other (Freestone)	Recommended WMS Project						
C	County-Other, Freestone - New Delivery and Treatment Facilities from TRWD	2050	Project Sponsor(s): Municipal county-other (Freestone)	Recommended WMS Project						
C	County-Other, Parker-WTP and Transmission Facilities to TRWD	2060	Project Sponsor(s): Municipal county-other (Parker)	Recommended WMS Project						
C	Cross Timbers WSC - Additional Delivery Infrastructure	2030	Project Sponsor(s): Cross Timbers WSC	Recommended WMS Project						
C	Cross Timbers WSC - New Well(s) in Trinity Aquifer	2020	Project Sponsor(s): Cross Timbers WSC	Recommended WMS Project	Yes	Project/WMS started				
C	Crowley - Additional Delivery Infrastructure Fort Worth	2030	Project Sponsor(s): Crowley	Recommended WMS Project						
C	Denison - 10 MGD Desalination WTP Expansion	2050	Project Sponsor(s): Denison	Recommended WMS Project						
C	Denison - Expand Raw Water Delivery from Lake Texoma - Phase 1	2030	Project Sponsor(s): Denison	Recommended WMS Project						
C	Denison - Expand Raw Water Delivery from Lake Texoma - Phase 2	2060	Project Sponsor(s): Denison	Recommended WMS Project		Project/WMS no longer being pursued				
C	Denison - New 4 MGD Desalination WTP	2030	Project Sponsor(s): Denison	Recommended WMS Project	Yes	Project/WMS started				
C	Denton - 20 MGD WTP Expansion	2070	Project Sponsor(s): Denton	Recommended WMS Project						
C	Denton - 20 MGD WTP Expansion-Ray Roberts	2040	Project Sponsor(s): Denton	Recommended WMS Project						
C	Denton - 25 MGD WTP Expansion	2060	Project Sponsor(s): Denton	Recommended WMS Project						
C	Denton - 30 MGD WTP Expansion-Ray Roberts-1	2030	Project Sponsor(s): Denton	Recommended WMS Project		Project/WMS no longer being pursued	Fewer plant expansions recommended in 2026 Plan			
C	Denton - 30 MGD WTP Expansion-Ray Roberts-2	2050	Project Sponsor(s): Denton	Recommended WMS Project		Project/WMS no longer being pursued	Fewer plant expansions recommended in 2026 Plan			
C	Desert WSC - New Well(s) in Woodbine Aquifer	2070	Project Sponsor(s): Desert WSC	Recommended WMS Project		Project/WMS no longer being pursued	No longer needed			
C	Dogwood Estates Water - New Well(s) in Carrizo-Wilcox Aquifer	2040	Project Sponsor(s): Dogwood Estates Water	Recommended WMS Project		Project/WMS no longer being pursued	No longer needed			
C	Dorchester - New Well(s) in Trinity Aquifer	2020	Project Sponsor(s): Dorchester	Recommended WMS Project	No	Project/WMS no longer being pursued	No longer needed			
C	DWU - Connect IPL to Bachman	2030	Project Sponsor(s): Dallas	Recommended WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Addison	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Argyle WSC	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Aubrey	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2020	WMS Seller: Dallas; WMS Supply Recipient: Balch Springs	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Bolivar WSC	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Carrollton	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Cedar Hill	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Celina	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Cockrell Hill	Recommended WMS Supply Without WMS Project						

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C	DWU - Conservation Surplus Reallocation	2070	WMS Seller: Dallas; WMS Supply Recipient: Combine WSC	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2020	WMS Seller: Dallas; WMS Supply Recipient: Combine WSC	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Coppell	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Corinth	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: County-Other, Dallas	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: County-Other, Denton	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2070	WMS Seller: Dallas; WMS Supply Recipient: County-Other, Tarrant	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2020	WMS Seller: Dallas; WMS Supply Recipient: County-Other, Tarrant	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Cross Timbers WSC	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2040	WMS Seller: Dallas; WMS Supply Recipient: Denton	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2060	WMS Seller: Dallas; WMS Supply Recipient: Denton County FWSD 10	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Denton County FWSD 10	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2070	WMS Seller: Dallas; WMS Supply Recipient: Denton County FWSD 1-A	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Denton County FWSD 1-A	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2060	WMS Seller: Dallas; WMS Supply Recipient: Denton County FWSD 7	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Denton County FWSD 7	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Desoto	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2020	WMS Seller: Dallas; WMS Supply Recipient: Duncanville	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Farmers Branch	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2060	WMS Seller: Dallas; WMS Supply Recipient: Flower Mound	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Flower Mound	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2070	WMS Seller: Dallas; WMS Supply Recipient: Glenn Heights	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2020	WMS Seller: Dallas; WMS Supply Recipient: Glenn Heights	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2060	WMS Seller: Dallas; WMS Supply Recipient: Grand Prairie	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2020	WMS Seller: Dallas; WMS Supply Recipient: Grand Prairie	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2070	WMS Seller: Dallas; WMS Supply Recipient: Grapevine	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2040	WMS Seller: Dallas; WMS Supply Recipient: Grapevine	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2060	WMS Seller: Dallas; WMS Supply Recipient: Highland Village	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Highland Village	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2060	WMS Seller: Dallas; WMS Supply Recipient: Hutchins	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Hutchins	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2070	WMS Seller: Dallas; WMS Supply Recipient: Irrigation, Collin	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2020	WMS Seller: Dallas; WMS Supply Recipient: Irrigation, Collin	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2070	WMS Seller: Dallas; WMS Supply Recipient: Irrigation, Denton	Recommended WMS Supply Without WMS Project						

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C	DWU - Conservation Surplus Reallocation	2020	WMS Seller: Dallas; WMS Supply Recipient: Irrigation, Denton	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2070	WMS Seller: Dallas; WMS Supply Recipient: Irrigation, Kaufman	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2020	WMS Seller: Dallas; WMS Supply Recipient: Irrigation, Kaufman	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2070	WMS Seller: Dallas; WMS Supply Recipient: Irrigation, Rockwall	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2020	WMS Seller: Dallas; WMS Supply Recipient: Irrigation, Rockwall	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2060	WMS Seller: Dallas; WMS Supply Recipient: Justin	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Justin	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2060	WMS Seller: Dallas; WMS Supply Recipient: Krum	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2040	WMS Seller: Dallas; WMS Supply Recipient: Krum	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2060	WMS Seller: Dallas; WMS Supply Recipient: Ladonia	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2060	WMS Seller: Dallas; WMS Supply Recipient: Lake Cities Municipal Utility Authority	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Lake Cities Municipal Utility Authority	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2070	WMS Seller: Dallas; WMS Supply Recipient: Lancaster	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Lancaster	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2060	WMS Seller: Dallas; WMS Supply Recipient: Lewisville	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Lewisville	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2070	WMS Seller: Dallas; WMS Supply Recipient: Manufacturing, Dallas	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2020	WMS Seller: Dallas; WMS Supply Recipient: Manufacturing, Dallas	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2070	WMS Seller: Dallas; WMS Supply Recipient: Manufacturing, Denton	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2020	WMS Seller: Dallas; WMS Supply Recipient: Manufacturing, Denton	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2060	WMS Seller: Dallas; WMS Supply Recipient: Mining, Denton	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2040	WMS Seller: Dallas; WMS Supply Recipient: Mining, Denton	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2060	WMS Seller: Dallas; WMS Supply Recipient: Mustang SUD	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Mustang SUD	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2060	WMS Seller: Dallas; WMS Supply Recipient: Northlake	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Northlake	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2070	WMS Seller: Dallas; WMS Supply Recipient: Ovilla	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2040	WMS Seller: Dallas; WMS Supply Recipient: Ovilla	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2060	WMS Seller: Dallas; WMS Supply Recipient: Paloma Creek North	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Paloma Creek North	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2060	WMS Seller: Dallas; WMS Supply Recipient: Paloma Creek South	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Paloma Creek South	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2060	WMS Seller: Dallas; WMS Supply Recipient: Pilot Point	Recommended WMS Supply Without WMS Project						

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C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Pilot Point	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2060	WMS Seller: Dallas; WMS Supply Recipient: Ponder	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Ponder	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2060	WMS Seller: Dallas; WMS Supply Recipient: Providence Village WCID	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Providence Village WCID	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2070	WMS Seller: Dallas; WMS Supply Recipient: Red Oak	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2020	WMS Seller: Dallas; WMS Supply Recipient: Red Oak	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2060	WMS Seller: Dallas; WMS Supply Recipient: Sanger	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2040	WMS Seller: Dallas; WMS Supply Recipient: Sanger	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2060	WMS Seller: Dallas; WMS Supply Recipient: Seagoville	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2020	WMS Seller: Dallas; WMS Supply Recipient: Seagoville	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2070	WMS Seller: Dallas; WMS Supply Recipient: Steam-Electric Power, Dallas	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2020	WMS Seller: Dallas; WMS Supply Recipient: Steam-Electric Power, Dallas	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2070	WMS Seller: Dallas; WMS Supply Recipient: The Colony	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2020	WMS Seller: Dallas; WMS Supply Recipient: The Colony	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2070	WMS Seller: Dallas; WMS Supply Recipient: Wilmer	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Seller: Dallas; WMS Supply Recipient: Wilmer	Recommended WMS Supply Without WMS Project						
C	DWU - Conservation Surplus Reallocation	2030	WMS Supply Recipient: Dallas	Recommended WMS Supply Without WMS Project						
C	DWU - Infrastructure to Treat and Deliver to Customers 2020	2030	Project Sponsor(s): Dallas	Recommended WMS Project						
C	DWU - Infrastructure to Treat and Deliver to Customers 2030	2040	Project Sponsor(s): Dallas	Recommended WMS Project						
C	DWU - Infrastructure to Treat and Deliver to Customers 2040	2050	Project Sponsor(s): Dallas	Recommended WMS Project						
C	DWU - Lake Columbia	2070	Project Sponsor(s): Dallas	Recommended WMS Project	No	Project/WMS not started	Recommended online date after 2040, thus not evaluated.	Shift in timeline		Unknown
C	DWU - Main Stem Balancing Reservoir	2050	Project Sponsor(s): Dallas	Recommended WMS Project	Yes	Project/WMS started				Unknown
C	DWU - Neches River Run-of-the-River Diversions	2060	Project Sponsor(s): Dallas	Recommended WMS Project						
C	DWU - Parallel IPL	2070	Project Sponsor(s): Dallas	Recommended WMS Project						
C	East Fork SUD - Additional Delivery Infrastructure from NTMWD	2030	Project Sponsor(s): East Fork SUD	Recommended WMS Project	No	Project/WMS not started	Recommended online date after 2020, thus not evaluated.	Shift in timeline		Unknown
C	Ennis - 16 MGD WTP Expansion	2070	Project Sponsor(s): Ennis	Recommended WMS Project		Project/WMS no longer being pursued				
C	Ennis - 6 MGD WTP Expansion	2050	Project Sponsor(s): Ennis	Recommended WMS Project						
C	Ennis - 8 MGD WTP Expansion	2060	Project Sponsor(s): Ennis	Recommended WMS Project		Project/WMS no longer being pursued				
C	Ennis - Indirect Reuse	2040	Project Sponsor(s): Ennis	Recommended WMS Project	Yes	Project/WMS started				
C	Eustace - New Well(s) in Carrizo-Wilcox Aquifer	2050	Project Sponsor(s): Eustace	Recommended WMS Project		Project/WMS no longer being pursued	Existing supply is sufficient			
C	Fairfield - New WTP and Transmission System from TRWD	2050	Project Sponsor(s): Fairfield	Recommended WMS Project						
C	Fate - Additional Delivery Infrastructure from NTWMD	2050	Project Sponsor(s): Fate	Recommended WMS Project						
C	Ferris - Additional Delivery Infrastructure from Rockett	2070	Project Sponsor(s): Ferris	Recommended WMS Project						

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C	Flower Mound - Alliance Direct Reuse	2020	Project Sponsor(s): Flower Mound	Recommended WMS Project	Yes	Project/WMS started				
C	Forney - Increase Delivery Infrastructure from NTWMD	2020	Project Sponsor(s): Forney	Recommended WMS Project		Project/WMS not started		Shift in timeline		
C	Fort Worth - 23 MGD WTP Expansion-West Plant	2040	Project Sponsor(s): Fort Worth	Recommended WMS Project						
C	Fort Worth - 30 MGD WTP Expansion-Eagle Mountain	2040	Project Sponsor(s): Fort Worth	Recommended WMS Project						
C	Fort Worth - 35 MGD WTP Expansion-Eagle Mountain	2030	Project Sponsor(s): Fort Worth	Recommended WMS Project						
C	Fort Worth - 35 MGD WTP Expansion-West Plant	2040	Project Sponsor(s): Fort Worth	Recommended WMS Project						
C	Fort Worth - 50 MGD WTP Expansion-General 1	2050	Project Sponsor(s): Fort Worth	Recommended WMS Project						
C	Fort Worth - 50 MGD WTP Expansion-General 2	2060	Project Sponsor(s): Fort Worth	Recommended WMS Project						
C	Fort Worth - 50 MGD WTP Expansion-General 3	2060	Project Sponsor(s): Fort Worth	Recommended WMS Project						
C	Fort Worth - 50 MGD WTP Expansion-General 4	2070	Project Sponsor(s): Fort Worth	Recommended WMS Project						
C	Fort Worth - 50 MGD WTP Expansion-Rolling Hills	2040	Project Sponsor(s): Fort Worth	Recommended WMS Project						
C	Fort Worth Direct Reuse - Alliance Corridor	2020	Project Sponsor(s): Fort Worth	Recommended WMS Project		Project/WMS not started		Shift in timeline		
C	Fort Worth Mary's Creek WRF Future Direct Reuse	2020	Project Sponsor(s): Fort Worth	Recommended WMS Project	Yes	Project/WMS started				
C	Fort Worth Village Creek WRF Future Direct Reuse	2020	Project Sponsor(s): Fort Worth	Recommended WMS Project		Project/WMS not started		Shift in timeline		
C	Frisco - Direct Reuse	2020	Project Sponsor(s): Frisco	Recommended WMS Project	Yes	Project/WMS started				
C	Gainesville - 5 MGD WTP Expansion 1	2050	Project Sponsor(s): Gainesville	Recommended WMS Project						
C	Gainesville - 5 MGD WTP Expansion 2	2070	Project Sponsor(s): Gainesville	Recommended WMS Project		Project/WMS no longer being pursued				
C	Gainesville - Expand Direct Reuse	2020	Project Sponsor(s): Gainesville	Recommended WMS Project						
C	Gainesville - Infrastructure to Deliver to Customers	2030	Project Sponsor(s): Gainesville	Recommended WMS Project						
C	Gainesville - Unallocated Groundwater Supply Utilization	2020	WMS Seller: Gainesville; WMS Supply Recipient: Mining, Cooke	Recommended WMS Supply Without WMS Project						
C	Glenn Heights Additional Delivery Infrastructure from DWU	2060	Project Sponsor(s): Glenn Heights	Recommended WMS Project		Project/WMS no longer being pursued				
C	Grand Prairie - Additional Delivery Infrastructure from DWU	2020	Project Sponsor(s): Grand Prairie	Recommended WMS Project		Project/WMS not started		Shift in timeline		
C	Grand Prairie - Connect to Arlington	2030	Project Sponsor(s): Grand Prairie	Recommended WMS Project						
C	GTUA - Connection from Sherman to CGMA	2030	Project Sponsor(s): Greater Texoma Utility Authority	Recommended WMS Project						
C	GTUA - Parallel Collin-Grayson Municipal Alliance Pipeline	2030	Project Sponsor(s): Greater Texoma Utility Authority	Recommended WMS Project						
C	GTUA - Regional Water System Phase 1	2020	Project Sponsor(s): Greater Texoma Utility Authority	Recommended WMS Project	Yes	Project/WMS started				
C	GTUA - Regional Water System Phase 2	2030	Project Sponsor(s): Greater Texoma Utility Authority	Recommended WMS Project						
C	Gunter - New Well(s) in Trinity Aquifer	2020	Project Sponsor(s): Gunter	Recommended WMS Project	Yes	Project/WMS completed				
C	Hackberry - Additional Delivery Infrastructure from NTMWD	2050	Project Sponsor(s): Hackberry	Recommended WMS Project						
C	Hudson Oaks - Direct Connection to Fort Worth	2020	Project Sponsor(s): Hudson Oaks	Recommended WMS Project	Yes	Project/WMS completed				
C	Irrigation, Fannin - New Well(s) in Trinity Aquifer	2020	Project Sponsor(s): Irrigation (Fannin)	Recommended WMS Project	Yes	Project/WMS completed				
C	Irving - TRA Central Reuse	2030	Project Sponsor(s): Irving	Recommended WMS Project	Yes	Project/WMS started				
C	Justin - New Well(s) in Trinity Aquifer	2020	Project Sponsor(s): Justin	Recommended WMS Project	Yes	Project/WMS completed				
C	Kennedale - Additional Delivery Infrastructure from Fort Worth	2040	Project Sponsor(s): Kennedale	Recommended WMS Project						

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C	Kennedale - Connect to Arlington	2030	Project Sponsor(s): Kennedale	Recommended WMS Project						
C	Krum - New Well(s) in Trinity Aquifer	2020	Project Sponsor(s): Krum	Recommended WMS Project	Yes	Project/WMS completed				
C	Ladonia - Infrastructure and Treatment from Water from Ralph Hall (UTRWD)	2030	Project Sponsor(s): Ladonia	Recommended WMS Project						
C	Lakeside - New Well(s) in Trinity Aquifer	2020	Project Sponsor(s): Lakeside	Recommended WMS Project	Yes	Project/WMS started				
C	Leonard - Water System Improvements	2030	Project Sponsor(s): Leonard	Recommended WMS Project						
C	Lewisville - 6 MGD WTP Expansion-1	2030	Project Sponsor(s): Lewisville	Recommended WMS Project	Yes	Project/WMS completed				
C	Lewisville - 6 MGD WTP Expansion-2	2040	Project Sponsor(s): Lewisville	Recommended WMS Project		Project/WMS no longer being pursued				
C	Lewisville - 6.5 MGD WTP Expansion	2050	Project Sponsor(s): Lewisville	Recommended WMS Project		Project/WMS no longer being pursued				
C	Livestock, Henderson - New Well(s) in Carrizo-Wilcox Aquifer	2020	Project Sponsor(s): Livestock (Henderson)	Recommended WMS Project	Yes	Project/WMS completed				
C	Livestock, Tarrant - New Well(s) in Trinity Aquifer	2020	Project Sponsor(s): Livestock (Tarrant)	Recommended WMS Project	Yes	Project/WMS completed				
C	M E N WSC - Additional Delivery Infrastructure from Corsicana (Upsize Lake Halbert Connection)	2050	Project Sponsor(s): M E N WSC	Recommended WMS Project						
C	Mabank - 3 MGD WTP Expansion	2020	Project Sponsor(s): Mabank	Recommended WMS Project	Yes	Project/WMS started				
C	Mabank - 5 MGD WTP Expansion	2060	Project Sponsor(s): Mabank	Recommended WMS Project		Project/WMS no longer being pursued				
C	Mabank - Additional Delivery Infrastructure from TRWD (Cedar Creek Reservoir)	2030	Project Sponsor(s): Mabank	Recommended WMS Project						
C	Mansfield - 15 MGD WTP Expansion	2030	Project Sponsor(s): Mansfield	Recommended WMS Project						
C	Mansfield - 20 MGD WTP Expansion	2060	Project Sponsor(s): Mansfield	Recommended WMS Project						
C	Mansfield - 35 MGD WTP Expansion	2060	Project Sponsor(s): Mansfield	Recommended WMS Project						
C	Manufacturing, Collin - New Well(s) in Woodbine Aquifer	2030	Project Sponsor(s): Manufacturing (Collin)	Recommended WMS Project	Yes	Project/WMS started				
C	Manufacturing, Wise County - New Well(s) in Trinity Aquifer	2020	Project Sponsor(s): Manufacturing (Wise)	Recommended WMS Project	Yes	Project/WMS completed				
C	Marvin Nichols (328) - TRWD, NTMWD, UTRWD	2050	Project Sponsor(s): North Texas MWD; Tarrant Regional WD; Upper Trinity Regional WD	Recommended WMS Project	No	Project/WMS not started	Recommended online date after 2040, thus not evaluated.	Shift in timeline		Unknown
C	Melissa - Additional Delivery Infrastructure from NTMWD	2030	Project Sponsor(s): Melissa	Recommended WMS Project	Yes	Project/WMS started				Unknown
C	Midlothian - Expand Auger WTP to 16 MGD	2020	Project Sponsor(s): Midlothian	Recommended WMS Project	Yes	Project/WMS completed				
C	Midlothian - Expand Auger WTP to 24 MGD	2020	Project Sponsor(s): Midlothian	Recommended WMS Project	Yes	Project/WMS started				
C	Midlothian - Expand Auger WTP to 32 MGD	2040	Project Sponsor(s): Midlothian	Recommended WMS Project						
C	Midlothian - Expand Tayman WTP to 20 MGD	2020	Project Sponsor(s): Midlothian	Recommended WMS Project	Yes	Project/WMS started				
C	Mining, Grayson County - New Well(s) in Trinity Aquifer	2020	Project Sponsor(s): Mining (Grayson)	Recommended WMS Project	Yes	Project/WMS completed				
C	Mining, Jack - Indirect Reuse (Jacksboro)	2020	WMS Seller: Jacksboro; WMS Supply Recipient: Mining, Jack	Recommended WMS Supply Without WMS Project		Project/WMS no longer being pursued	No longer needed			
C	Mining, Kaufman County - New Well(s) in Nacatoch Aquifer	2040	Project Sponsor(s): Mining (Kaufman)	Recommended WMS Project						
C	Mining, Parker County - New Well(s) in Trinity Aquifer	2030	Project Sponsor(s): Mining (Kaufman)	Recommended WMS Project		Project/WMS no longer being pursued	No longer needed			
C	Muenster - Develop Lake Muenster Supply	2020	Project Sponsor(s): Muenster	Recommended WMS Project	Yes	Project/WMS started				
C	Navarro Mills WSC - New Well in Woodbine Aquifer Q-168	2050	Project Sponsor(s): Navarro Mills WSC	Recommended WMS Project		Project/WMS no longer being pursued	No longer needed			

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C	Newark - Connect to Rhome	2020	Project Sponsor(s): Newark	Recommended WMS Project						
C	Non-Municipal Conservation, Irrigation, Cooke	2050	WUG Reducing Demand: Irrigation, Cooke	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Non-Municipal Conservation, Irrigation, Ellis	2020	WUG Reducing Demand: Irrigation, Ellis	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Non-Municipal Conservation, Irrigation, Fannin	2020	WUG Reducing Demand: Irrigation, Fannin	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Non-Municipal Conservation, Irrigation, Wise	2030	WUG Reducing Demand: Irrigation, Wise	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Non-Municipal Conservation, Mining, Wise	2020	WUG Reducing Demand: Mining, Wise	Recommended Demand Reduction Strategy Without WMS Project	Yes	Project/WMS started				
C	Northwest Grayson County WCID 1 - New Well(s) in Trinity Aquifer	2020	Project Sponsor(s): Northwest Grayson County WCID 1	Recommended WMS Project	Yes	Project/WMS started				
C	NTMWD & Irving - Lake Chapman Pump Station Expansion	2020	Project Sponsor(s): Irving; North Texas MWD	Recommended WMS Project		Project/WMS no longer being pursued				
C	NTMWD - Additional Lake Texoma Blend Phase 1	2040	Project Sponsor(s): North Texas MWD	Recommended WMS Project						
C	NTMWD - Additional Lake Texoma Blend Phase 2	2060	Project Sponsor(s): North Texas MWD	Recommended WMS Project						
C	NTMWD - Additional Lavon Watershed Reuse	2050	Project Sponsor(s): North Texas MWD	Recommended WMS Project						
C	NTMWD - Additional Measure to Access Full Lake Lavon Yield	2030	Project Sponsor(s): North Texas MWD	Recommended WMS Project						
C	NTMWD - Bois D'Arc Lake	2020	Project Sponsor(s): North Texas MWD	Recommended WMS Project	Yes	Project/WMS completed				
C	NTMWD - Expanded Wetland Reuse	2030	Project Sponsor(s): North Texas MWD	Recommended WMS Project						
C	NTMWD - Oklahoma Water	2070	Project Sponsor(s): North Texas MWD	Recommended WMS Project		Project/WMS not started				
C	NTMWD Treatment & Treated Water Distribution Improvements 2020-2030	2020	Project Sponsor(s): North Texas MWD	Recommended WMS Project	Yes					
C	NTMWD Treatment & Treated Water Distribution Improvements 2030-2040	2030	Project Sponsor(s): North Texas MWD	Recommended WMS Project						
C	NTMWD Treatment & Treated Water Distribution Improvements 2040-2050	2040	Project Sponsor(s): North Texas MWD	Recommended WMS Project						
C	NTMWD Treatment & Treated Water Distribution Improvements 2050-2060	2050	Project Sponsor(s): North Texas MWD	Recommended WMS Project						
C	NTMWD Treatment & Treated Water Distribution Improvements 2060-2070	2060	Project Sponsor(s): North Texas MWD	Recommended WMS Project						
C	NTWMD - Fannin County Water Supply Project	2030	Project Sponsor(s): North Texas MWD	Recommended WMS Project						
C	Ovilla - Additional Delivery Infrastructure from DWU	2070	Project Sponsor(s): Ovilla	Recommended WMS Project						
C	Palmer - Additional Delivery Infrastructure from Rockett	2060	Project Sponsor(s): Palmer	Recommended WMS Project						
C	Pantego - Connect to Arlington	2030	Project Sponsor(s): Pantego	Recommended WMS Project						
C	Pantego - Connect to Fort Worth	2030	Project Sponsor(s): Pantego	Recommended WMS Project						
C	Parker - Additional Delivery Infrastructure from NTWMD	2020	Project Sponsor(s): Parker	Recommended WMS Project	Yes					
C	Parker County SUD - 3.5 MGD WTP Desal Expansion-BRA Supply	2030	Project Sponsor(s): Parker County SUD	Recommended WMS Project						
C	Pelican Bay - Connect to Azle	2030	Project Sponsor(s): Pelican Bay	Recommended WMS Project						
C	Pelican Bay - New Well(s) in Trinity Aquifer	2020	Project Sponsor(s): Pelican Bay	Recommended WMS Project	Yes	Project/WMS completed				
C	Pilot Point - New Well(s) in Trinity Aquifer	2020	Project Sponsor(s): Pilot Point	Recommended WMS Project	Yes	Project/WMS completed				
C	Pink Hill WSC - New Well(s) in Trinity Aquifer	2030	Project Sponsor(s): Pink Hill WSC	Recommended WMS Project		Project/WMS no longer being pursued	No longer needed			
C	Pink Hill WSC - New Well(s) in Woodbine Aquifer	2030	Project Sponsor(s): Pink Hill WSC	Recommended WMS Project		Project/WMS no longer being pursued	No longer needed			

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C	Pleasant Grove WSC - New Well(s) in Carrizo-Wilcox Aquifer	2070	Project Sponsor(s): Pleasant Grove WSC	Recommended WMS Project		Project/WMS no longer being pursued	No longer needed			
C	Prosper - Additional Delivery Infrastructure from NTMWD	2030	Project Sponsor(s): Prosper	Recommended WMS Project	No	Project/WMS no longer being pursued	No longer needed			Unknown
C	Purchase Carrizo-Wilcox Supply From Mexia	2020	WMS Seller: Mexia; WMS Supply Recipient: Wortham	Recommended WMS Supply Without WMS Project						
C	Rice WSC - Additional Delivery Infrastructure from Corsicana	2030	Project Sponsor(s): Rice Water Supply and Sewer Service	Recommended WMS Project		Project/WMS no longer being pursued	No longer needed			
C	Rockett SUD - 10 MGD WTP Expansion at Sokoll-1	2030	Project Sponsor(s): Rockett SUD	Recommended WMS Project						
C	Rockett SUD - 10 MGD WTP Expansion at Sokoll-2	2060	Project Sponsor(s): Rockett SUD	Recommended WMS Project		Project/WMS no longer being pursued	No longer needed			
C	Rockett SUD - 4 MGD WTP Expansion at Sokoll	2070	Project Sponsor(s): Rockett SUD	Recommended WMS Project		Project/WMS no longer being pursued	No longer needed			
C	Rockett SUD - Unallocated Supply Utilization	2050	WMS Seller: Rockett SUD; WMS Supply Recipient: County-Other, Ellis	Recommended WMS Supply Without WMS Project						
C	Rockett SUD - Unallocated Supply Utilization	2050	WMS Seller: Rockett SUD; WMS Supply Recipient: Ferris	Recommended WMS Supply Without WMS Project						
C	Rockett SUD - Unallocated Supply Utilization	2050	WMS Seller: Rockett SUD; WMS Supply Recipient: Palmer	Recommended WMS Supply Without WMS Project						
C	Rockett SUD - Unallocated Supply Utilization	2050	WMS Seller: Rockett SUD; WMS Supply Recipient: Sardis Lone Elm WSC	Recommended WMS Supply Without WMS Project						
C	Rockett SUD - Unallocated Supply Utilization	2030	WMS Supply Recipient: Rockett SUD	Recommended WMS Supply Without WMS Project						
C	Rockwall - Additional Delivery Infrastructure from NTWMD	2020	Project Sponsor(s): Rockwall	Recommended WMS Project						
C	Rowlett - Additional Delivery Infrastructure from NTWMD	2030	Project Sponsor(s): Rowlett	Recommended WMS Project	No	Project/WMS not started	Recommended online date after 2020, thus not evaluated.	Shift in timeline		Unknown
C	Runaway Bay - 3 MGD WTP Expansion-1	2020	Project Sponsor(s): Runaway Bay	Recommended WMS Project	Yes	Project/WMS started				Unknown
C	Runaway Bay - 3 MGD WTP Expansion-2	2060	Project Sponsor(s): Runaway Bay	Recommended WMS Project		Project/WMS no longer being pursued	No longer needed			
C	Runaway Bay - Increase Capacity of Lake Intake	2070	Project Sponsor(s): Runaway Bay	Recommended WMS Project						
C	Runaway Bay - Unallocated Supply Utilization	2020	WMS Seller: Runaway Bay; WMS Supply Recipient: County-Other, Wise	Recommended WMS Supply Without WMS Project						
C	Sardis Lone Elm - Connect to TRWD	2020	Project Sponsor(s): Sardis Lone Elm WSC	Recommended WMS Project	No	Project/WMS not started	No data and did not ear back from the sponsor	Other	No data and did not ear back from the sponsor	Unknown
C	Seagoville - Unallocated Supply Utilization	2020	WMS Seller: Seagoville; WMS Supply Recipient: Combine WSC	Recommended WMS Supply Without WMS Project						
C	Seagoville - Unallocated Supply Utilization	2020	WMS Supply Recipient: Seagoville	Recommended WMS Supply Without WMS Project						
C	Seagoville - Unallocated Supply Utilization	2020	WMS Supply Recipient: Seagoville	Recommended WMS Supply Without WMS Project						
C	Seagoville - Unallocated Supply Utilization	2020	WMS Supply Recipient: Seagoville	Recommended WMS Supply Without WMS Project						
C	Seagoville - Unallocated Supply Utilization	2020	WMS Supply Recipient: Seagoville	Recommended WMS Supply Without WMS Project						
C	Seagoville - Unallocated Supply Utilization	2020	WMS Supply Recipient: Seagoville	Recommended WMS Supply Without WMS Project						
C	SEP, Tarrant - Reuse	2030	Project Sponsor(s): Steam-electric power (Tarrant)	Recommended WMS Project						
C	Sherman - 10 MGD WTP Expansion (Desal)-1	2020	Project Sponsor(s): Sherman	Recommended WMS Project	Yes	Project/WMS started				Unknown
C	Sherman - 10 MGD WTP Expansion (Desal)-2	2050	Project Sponsor(s): Sherman	Recommended WMS Project		Project/WMS no longer being pursued	No longer needed			
C	Sherman - 10 MGD WTP Expansion (Desal)-3	2060	Project Sponsor(s): Sherman	Recommended WMS Project		Project/WMS no longer being pursued	No longer needed			
C	Sherman - 20 MGD WTP Expansion (Desal)	2070	Project Sponsor(s): Sherman	Recommended WMS Project		Project/WMS no longer being pursued	No longer needed			
C	Sherman - Unallocated Supply Utilization	2030	WMS Seller: Sherman; WMS Supply Recipient: Anna	Recommended WMS Supply Without WMS Project						
C	Sherman - Unallocated Supply Utilization	2030	WMS Seller: Sherman; WMS Supply Recipient: Bells	Recommended WMS Supply Without WMS Project						
C	Sherman - Unallocated Supply Utilization	2030	WMS Seller: Sherman; WMS Supply Recipient: Celina	Recommended WMS Supply Without WMS Project						

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C	Sherman - Unallocated Supply Utilization	2030	WMS Seller: Sherman; WMS Supply Recipient: Collinsville	Recommended WMS Supply Without WMS Project						
C	Sherman - Unallocated Supply Utilization	2030	WMS Seller: Sherman; WMS Supply Recipient: County-Other, Collin	Recommended WMS Supply Without WMS Project						
C	Sherman - Unallocated Supply Utilization	2030	WMS Seller: Sherman; WMS Supply Recipient: County-Other, Grayson	Recommended WMS Supply Without WMS Project						
C	Sherman - Unallocated Supply Utilization	Unknown	WMS Seller: Sherman; WMS Supply Recipient: Dorchester	Recommended WMS Supply Without WMS Project						
C	Sherman - Unallocated Supply Utilization	2020	WMS Seller: Sherman; WMS Supply Recipient: Gunter	Recommended WMS Supply Without WMS Project						
C	Sherman - Unallocated Supply Utilization	2030	WMS Seller: Sherman; WMS Supply Recipient: Howe	Recommended WMS Supply Without WMS Project						
C	Sherman - Unallocated Supply Utilization	2030	WMS Seller: Sherman; WMS Supply Recipient: Kentuckytown WSC	Recommended WMS Supply Without WMS Project						
C	Sherman - Unallocated Supply Utilization	2030	WMS Seller: Sherman; WMS Supply Recipient: Lake Kiowa SUD	Recommended WMS Supply Without WMS Project						
C	Sherman - Unallocated Supply Utilization	2030	WMS Seller: Sherman; WMS Supply Recipient: Luella SUD	Recommended WMS Supply Without WMS Project						
C	Sherman - Unallocated Supply Utilization	2030	WMS Seller: Sherman; WMS Supply Recipient: Manufacturing, Grayson	Recommended WMS Supply Without WMS Project						
C	Sherman - Unallocated Supply Utilization	2030	WMS Seller: Sherman; WMS Supply Recipient: Marilee SUD	Recommended WMS Supply Without WMS Project						
C	Sherman - Unallocated Supply Utilization	2030	WMS Seller: Sherman; WMS Supply Recipient: Melissa	Recommended WMS Supply Without WMS Project						
C	Sherman - Unallocated Supply Utilization	2030	WMS Seller: Sherman; WMS Supply Recipient: Northwest Grayson County WCID 1	Recommended WMS Supply Without WMS Project						
C	Sherman - Unallocated Supply Utilization	2030	WMS Seller: Sherman; WMS Supply Recipient: Pilot Point	Recommended WMS Supply Without WMS Project						
C	Sherman - Unallocated Supply Utilization	Unknown	WMS Seller: Sherman; WMS Supply Recipient: Pottsboro	Recommended WMS Supply Without WMS Project						
C	Sherman - Unallocated Supply Utilization	Unknown	WMS Seller: Sherman; WMS Supply Recipient: Sherman	Recommended WMS Supply Without WMS Project						
C	Sherman - Unallocated Supply Utilization	2030	WMS Seller: Sherman; WMS Supply Recipient: South Grayson SUD	Recommended WMS Supply Without WMS Project						
C	Sherman - Unallocated Supply Utilization	2020	WMS Seller: Sherman; WMS Supply Recipient: Southmayd	Recommended WMS Supply Without WMS Project						
C	Sherman - Unallocated Supply Utilization	Unknown	WMS Seller: Sherman; WMS Supply Recipient: Steam-Electric Power, Grayson	Recommended WMS Supply Without WMS Project						
C	Sherman - Unallocated Supply Utilization	2050	WMS Seller: Sherman; WMS Supply Recipient: Tioga	Recommended WMS Supply Without WMS Project						
C	Sherman - Unallocated Supply Utilization	Unknown	WMS Seller: Sherman; WMS Supply Recipient: Tom Bean	Recommended WMS Supply Without WMS Project						
C	Sherman - Unallocated Supply Utilization	2030	WMS Seller: Sherman; WMS Supply Recipient: Two Way SUD	Recommended WMS Supply Without WMS Project						
C	Sherman - Unallocated Supply Utilization	2030	WMS Seller: Sherman; WMS Supply Recipient: Van Alstyne	Recommended WMS Supply Without WMS Project						
C	Sherman - Unallocated Supply Utilization	2030	WMS Seller: Sherman; WMS Supply Recipient: Whitesboro	Recommended WMS Supply Without WMS Project						
C	Sherman - Unallocated Supply Utilization	2040	WMS Seller: Sherman; WMS Supply Recipient: Whitewright	Recommended WMS Supply Without WMS Project						
C	Sherman - Unallocated Supply Utilization	2030	WMS Seller: Sherman; WMS Supply Recipient: Woodbine WSC	Recommended WMS Supply Without WMS Project						
C	South Freestone County WSC - New Well(s) in Carrizo-Wilcox Aquifer	2020	Project Sponsor(s): South Freestone County WSC	Recommended WMS Project	No	Project/WMS not started	No data and did not ear back from the sponsor	Other	No data and did not ear back from the sponsor	Unknown
C	Southlake - Additional Delivery Infrastructure Fort Worth	2040	Project Sponsor(s): Southlake	Recommended WMS Project						
C	Southwest Fannin Co SUD - New Well(s) in Woodbine Aquifer	2030	Project Sponsor(s): Southwest Fannin County SUD	Recommended WMS Project		Project/WMS no longer being pursued	No longer needed			
C	Springtown - Infrastructure Improvements- Surface Water Treatment Plant & Supply Project	2020	Project Sponsor(s): Springtown	Recommended WMS Project	No	Project/WMS not started	No data and did not ear back from the sponsor	Other	No data and did not ear back from the sponsor	Unknown
C	Sunnyvale - Additional Delivery Infrastructure from NTMWD	2030	Project Sponsor(s): Sunnyvale	Recommended WMS Project	No	Project/WMS not started	Recommended online date after 2020, thus not evaluated.	Shift in timeline		Unknown

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C	Teague - New Wells in Carrizo-Wilcox Aquifer Q-135	2020	Project Sponsor(s): Teague	Recommended WMS Project		Project/WMS completed		Other	No data and did not ear back from the sponsor	Unknown
C	Terrell - Ground Storage Tank and Pump Station at NTWMD Delivery Point	2020	Project Sponsor(s): Terrell	Recommended WMS Project	Yes	Project/WMS started				Unknown
C	Terrell - Infrastructure Improvements to Wholesale Customer	2020	Project Sponsor(s): Terrell	Recommended WMS Project	No	Project/WMS not started	Recommended online date after 2020, thus not evaluated.	Shift in timeline		Unknown
C	Trenton - New Well(s) in Woodbine Aquifer	2030	Project Sponsor(s): Trenton	Recommended WMS Project						
C	TRWD - Additional Capacity to Convey Richland Chambers Reuse (IPL)	2030	Project Sponsor(s): Tarrant Regional WD	Recommended WMS Project						
C	TRWD - Additional Transmission Pipeline	2060	Project Sponsor(s): Tarrant Regional WD	Recommended WMS Project						
C	TRWD - ASR Pilot	2020	Project Sponsor(s): Tarrant Regional WD	Recommended WMS Project	Yes	Project/WMS started				Unknown
C	TRWD - Carrizo-Wilcox Groundwater	2040	Project Sponsor(s): Tarrant Regional WD	Recommended WMS Project						
C	TRWD - Cedar Creek Wetlands Reuse	2030	Project Sponsor(s): Tarrant Regional WD	Recommended WMS Project						
C	TRWD - Reuse from TRA Central WWTP	2030	Project Sponsor(s): Tarrant Regional WD	Recommended WMS Project						
C	TRWD - Tehuacana Reservoir	2040	Project Sponsor(s): Tarrant Regional WD	Recommended WMS Project	Yes	Project/WMS started				Unknown
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Arlington	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2060	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Avalon Water Supply & Sewer Service	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2040	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Bedford	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2020	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Boyd	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2050	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Buena Vista-Bethel SUD	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Colleyville	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Community WSC	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: County-Other, Dallas	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2020	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: County-Other, Ellis	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2060	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: County-Other, Navarro	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2020	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: County-Other, Parker	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: County-Other, Tarrant	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2020	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: County-Other, Wise	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2020	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Dalworthington Gardens	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2020	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Decatur	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2020	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: East Cedar Creek FWSD	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2070	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: East Garrett WSC	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Edgecliff	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2050	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Ennis	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2040	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Euless	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Forest Hill	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2040	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Fort Worth	Recommended WMS Supply Without WMS Project						

Planning Region	WMS or WMS Project Name	Database Online Decade	Related Sponsor Entity and/or Benefitting WUGs	Implementation Survey Record Type	Has the sponsor taken affirmative vote or actions? (TWC 16.053(h)(10))	What is the status of the WMS project or WMS recommended in the 2022 SWP?	If the project has not been started or no longer is being pursued, please explain why	Impediments to project development	Information about project impediments	What funding type(s) are being used for the project? (Select all that apply)
C	TRWD - Unallocated Supply Utilization	2020	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Grand Prairie	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2020	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Grapevine	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Haltom City	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Haslet	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Hurst	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	Unknown	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Irrigation, Dallas	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2060	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Irrigation, Kaufman	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	Unknown	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Irrigation, Parker	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Irrigation, Tarrant	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Irrigation, Wise	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2050	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Italy	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Keller	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2020	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Kemp	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Lake Worth	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	Unknown	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Malakoff	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	Unknown	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Manufacturing, Dallas	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	Unknown	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Manufacturing, Denton	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Manufacturing, Ellis	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	Unknown	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Manufacturing, Navarro	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2020	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Manufacturing, Parker	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2020	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Manufacturing, Tarrant	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	Unknown	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Manufacturing, Wise	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2060	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Mining, Henderson	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Mining, Jack	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Mining, Tarrant	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2040	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Mining, Wise	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2020	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Mountain Peak SUD	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: North Richland Hills	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Northlake	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2020	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Reno (Parker)	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2020	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Rhome	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	Unknown	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Rice Water Supply and Sewer Service	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Richland Hills	Recommended WMS Supply Without WMS Project						

Planning Region	WMS or WMS Project Name	Database Online Decade	Related Sponsor Entity and/or Benefitting WUGs	Implementation Survey Record Type	Has the sponsor taken affirmative vote or actions? (TWC 16.053(h)(10))	What is the status of the WMS project or WMS recommended in the 2022 SWP?	If the project has not been started or no longer is being pursued, please explain why	Impediments to project development	Information about project impediments	What funding type(s) are being used for the project? (Select all that apply)
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: River Oaks	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Roanoke	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Saginaw	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2070	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Sansom Park	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2070	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: South Ellis County WSC	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Steam-Electric Power, Ellis	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2020	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Steam-Electric Power, Freestone	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Steam-Electric Power, Henderson	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Steam-Electric Power, Jack	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Steam-Electric Power, Tarrant	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Steam-Electric Power, Wise	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Trophy Club MUD 1	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: West Cedar Creek MUD	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	Unknown	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Westlake	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Westover Hills	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: Westworth Village	Recommended WMS Supply Without WMS Project						
C	TRWD - Unallocated Supply Utilization	2030	WMS Seller: Tarrant Regional WD; WMS Supply Recipient: White Settlement	Recommended WMS Supply Without WMS Project						
C	UTRWD - Additional Direct Reuse	2030	Project Sponsor(s): Upper Trinity Regional WD	Recommended WMS Project						
C	UTRWD - Lake Ralph Hall and Reuse	2030	Project Sponsor(s): Upper Trinity Regional WD	Recommended WMS Project	Yes	Project/WMS started				Unknown
C	UTRWD WTP and Treated Water Distribution System Water Management Strategies 2020-2030	2020	Project Sponsor(s): Upper Trinity Regional WD	Recommended WMS Project	Yes	Project/WMS started				Unknown
C	UTRWD WTP and Treated Water Distribution System Water Management Strategies 2030-2040	2030	Project Sponsor(s): Upper Trinity Regional WD	Recommended WMS Project						
C	UTRWD WTP and Treated Water Distribution System Water Management Strategies 2040-2050	2040	Project Sponsor(s): Upper Trinity Regional WD	Recommended WMS Project						
C	UTRWD WTP and Treated Water Distribution System Water Management Strategies 2050-2060	2050	Project Sponsor(s): Upper Trinity Regional WD	Recommended WMS Project						
C	UTRWD WTP and Treated Water Distribution System Water Management Strategies 2060-2070	2060	Project Sponsor(s): Upper Trinity Regional WD	Recommended WMS Project						
C	Van Alstyne - Water System Improvements	2040	Project Sponsor(s): Van Alstyne	Recommended WMS Project	No	Project/WMS not started	Recommended online date after 2020, thus not evaluated.	Shift in timeline		Unknown
C	Verona SUD - New Well(s) in Woodbine Aquifer	2030	Project Sponsor(s): Verona SUD	Recommended WMS Project		Project/WMS no longer being pursued	No longer needed			

Planning Region	WMS or WMS Project Name	Database Online Decade	Related Sponsor Entity and/or Benefitting WUGs	Implementation Survey Record Type	Has the sponsor taken affirmative vote or actions? (TWC 16.053(h)(10))	What is the status of the WMS project or WMS recommended in the 2022 SWP?	If the project has not been started or no longer is being pursued, please explain why	Impediments to project development	Information about project impediments	What funding type(s) are being used for the project? (Select all that apply)
C	Walnut Creek SUD - 6 MGD WTP Expansion	2020	Project Sponsor(s): Walnut Creek SUD	Recommended WMS Project	No	Project/WMS not started	Sponsor is still planning	Shift in timeline		Unknown
C	Walnut Creek SUD - New 7 MGD WTP-Eagle Mountain	2060	Project Sponsor(s): Walnut Creek SUD	Recommended WMS Project						
C	Watauga & N Richland Hills - Increase Delivery Infrastructure from Fort Worth	2020	Project Sponsor(s): North Richland Hills	Recommended WMS Project	Yes	Project/WMS started				Unknown
C	Watauga - Additional Delivery Infrastructure North Richland Hills/Fort Worth	2030	Project Sponsor(s): Watauga	Recommended WMS Project						
C	Waxahachie - 12 MGD WTP Expansion-Howard Road	2070	Project Sponsor(s): Waxahachie	Recommended WMS Project						
C	Waxahachie - 30" Raw Water Line from IPL to Howard Road WTP	2030	Project Sponsor(s): Waxahachie	Recommended WMS Project		Project/WMS no longer being pursued	No longer needed			
C	Waxahachie - 36" Raw Water Line from IPL to Lake Waxahachie	2030	Project Sponsor(s): Waxahachie	Recommended WMS Project		Project/WMS no longer being pursued	No longer needed			
C	Waxahachie - 36" Raw Water Line from Lake Waxahachie to Howard Rd WTP	2030	Project Sponsor(s): Waxahachie	Recommended WMS Project		Project/WMS no longer being pursued	No longer needed			
C	Waxahachie - 48" TRWD Parallel Supply Line to Sokoll WTP	2030	Project Sponsor(s): Waxahachie	Recommended WMS Project						
C	Waxahachie - 8 MGD WTP Expansion-Howard Road	2050	Project Sponsor(s): Waxahachie	Recommended WMS Project						
C	Waxahachie - Dredge Lake Waxahachie	2040	Project Sponsor(s): Waxahachie	Recommended WMS Project		Project/WMS completed				
C	Waxahachie - Increase Delivery Infrastructure to Rockett SUD	2030	Project Sponsor(s): Waxahachie	Recommended WMS Project		Project/WMS no longer being pursued	No longer needed			
C	Waxahachie - Phase 1 Delivery Infrastructure to Customers In South Ellis County	2030	Project Sponsor(s): Waxahachie	Recommended WMS Project						
C	Waxahachie - Phase 2 Delivery Infrastructure to Customers In South Ellis County	2050	Project Sponsor(s): Waxahachie	Recommended WMS Project		Project/WMS no longer being pursued	No longer needed			
C	Waxahachie - Raw Water Intake Improvements at Lake Bardwell	2030	Project Sponsor(s): Waxahachie	Recommended WMS Project		Project/WMS completed				
C	Weatherford - 14 MGD WTP Expansion	2050	Project Sponsor(s): Weatherford	Recommended WMS Project						
C	Weatherford - 18 MGD WTP Expansion	2060	Project Sponsor(s): Weatherford	Recommended WMS Project						
C	Weatherford - 8 MGD WTP Expansion	2020	Project Sponsor(s): Weatherford	Recommended WMS Project	Yes	Project/WMS started				Unknown
C	Weatherford - Additional Indirect Reuse Phase 1	2020	Project Sponsor(s): Weatherford	Recommended WMS Project	Yes	Project/WMS started				Unknown
C	Weatherford - Additional Indirect Reuse Phase 2	2030	Project Sponsor(s): Weatherford	Recommended WMS Project						
C	Weatherford - Expand Lake Benbrook Pump Station	2020	Project Sponsor(s): Weatherford	Recommended WMS Project	No	Project/WMS not started	Recommended online date after 2020, thus not evaluated.	Shift in timeline		Unknown
C	West Wise SUD - 1.5 MGD WTP Expansion	2050	Project Sponsor(s): West Wise SUD	Recommended WMS Project						
C	White Shed WSC - New Well(s) in Woodbine Aquifer	2030	Project Sponsor(s): White Shed WSC	Recommended WMS Project		Project/WMS no longer being pursued	No longer needed			
C	Willow Park - Connect to Fort Worth	2020	Project Sponsor(s): Willow Park	Recommended WMS Project	Yes	Project/WMS completed				Unknown
C	Wilmer - Direct Connection to Dallas (36" Transmission Line)	2070	Project Sponsor(s): Wilmer	Recommended WMS Project		Project/WMS no longer being pursued				
C	Wilmer - Increase Capacity of Connection with Lancaster	2020	Project Sponsor(s): Wilmer	Recommended WMS Project	Yes	Project/WMS started				Unknown
C	Wise County WSD - 9 MGD WTP Expansion	2020	Project Sponsor(s): Wise County WSD	Recommended WMS Project	No	Project/WMS not started	No data and did not ear back from the sponsor	Other	No data and did not ear back from the sponsor	Unknown
C	Wright Patman Reallocation NTMWD, TRWD, and UTRWD	2070	Project Sponsor(s): North Texas MWD; Tarrant Regional WD; Upper Trinity Regional WD	Recommended WMS Project		Project/WMS not started				

Planning Region	WMS or WMS Project Name	Database Online Decade	Related Sponsor Entity and/or Benefitting WUGs	Implementation Survey Record Type	Has the sponsor taken affirmative vote or actions? (TWC 16.053(h)(10))	What is the status of the WMS project or WMS recommended in the 2022 SWP?	If the project has not been started or no longer is being pursued, please explain why	Impediments to project development	Information about project impediments	What funding type(s) are being used for the project? (Select all that apply)
C	Wylie Northeast SUD - Additional Delivery Infrastructure from NTWMD	2030	Project Sponsor(s): Wylie Northeast SUD	Recommended WMS Project	No	Project/WMS not started	Recommended online date after 2020, thus not evaluated.	Shift in timeline		Unknown

Implementation of Certain Types of Recommneded Water Management Strategies

Water Management Strategy/Project Name	Project Sponsor	WMS Project Sponsor Region	Online Decade	Capital Cost	Anticipated Footprint Acreage (acres)	SPONSOR AUTHORIZATION	PERMITTING STATUS (as applicable)									PLANNING, DESIGN, AND CONSTRUCTION STATUS						TOTAL FUNDS EXPENDED TO DATE	Other significant activities completed (summary)
							STATE WATER RIGHT STATUS				FEDERAL 404 PERMIT STATUS (if applicable)		DESALINATION PERMIT STATUS		OTHER KEY PERMITS	GEOTECH/DESIGN	LAND ACQUISITION		CONSTRUCTION				
						Date(s) that the sponsor took an affirmative vote or other action to make expenditures necessary to construct or file applications for state or federal permits (date(s))	Anticipated (or actual) TCEQ application filed (date)	Anticipated (or actual) State Water Right Permit Administratively Complete (date)	Anticipated (or actual) Draft State Water Right Permit Issued (date)	Anticipated (or actual) Date Final State Water Right Permit Issued (date)	Anticipated (or actual) application for permit filed (date)	Anticipated (or actual) permit issuance (date)	Anticipated (or actual) diversion permit issued (date)	Anticipated (or actual) Discharge/Disposal Permit Issued (date)	Summary of other permits and status (summary)	Generally describe the types and amount (as %s) of geotechnical/ reconnaissance/ engineering feasibility or other technical, testing, and/or design work etc. performed to date (summary)	Percent Land Acquisition Completed (%)	Anticiptated land acquisition completion (date)	Anticipated start of construction (Date)	Percent construction completed (%)	Anticipated construction completion (date)	Rough approximation of the total expenditures, to date, on ALL activities related to project implementation to date (millions of $s)	Comments
Lake Tehuacana	TRWD	C	2050	$457,095,000	15,000	TRWD published its latest Integrated Water Supply Plan in 2014, and Tehuacana was included in 3 of the 4 recommended paths forward. TRWD is currently completing an updated Integrated Water Supply Plan, which includes an updated cost and modeling analysis of Tehuacana as a potential future water supply. The updated IWSP is expected to be completed by May 2025.	2032	2033	2040	2041	2035	2040	N/A	N/A		3%	0%	2045	2043	0%	2048	$ 1,200,000.00	Project has been studied and evaluated under multiple planning efforts
Marvin Nichols Reservoir	TRWD, NTMWD, UTRWD	C	2060	$7,364,971,000	66,103	8/22/2024: 8/31/2023;10/21/2021	2032	2034	2043	2045	2038	2045	N/A	N/A		3%	0%	2052	2048	0%	2055	$4,771,169.00	Project has been studied and evaluated under multiple planning efforts
Main Stem Balancing Reservoir	DWU	C	2050	$1,767,099,000	3,500		2032	2033	2038	2039	2034	2039	N/A	N/A	DWU has the permits to reuse its wastewater	3%	0%	2045	2043	0%	2048		Project has been studied and evaluated under multiple planning efforts; Recommended in 2024 Dallas Long-Range Water Supply Plan.
Wright Patman Reallocation	TRWD, NTMWD	C	2080	$4,760,029,000	14,372	Expenditures have been made on multiple studies over the past years. The latest report was published on February 1, 2024, "Marvin Nichols Reservoirs and Lake Wright Patman Reallocation Yield Update". Report was funded by NTWMD, TRWD, DWU, UTRWD, Irving and SRBA.	2057	2058	2064	2064	2060	2065	N/A	N/A		3%	0%	2069	2067	0%	2074	$ 1,276,860.00	Project has been studied and evaluated under multiple planning efforts, including a joint study with the USACE.
Sabine Off-channel Reservoir	DWU	C	2080	$903,296,000	800		2060	2061	2065	2065	2067	2070	N/A	N/A		3%	0%	2074	2074	0%	2076		Project has been studied and evaluated under multiple planning efforts; Recommended in 2024 Dallas Long-Range Water Supply Plan.

FOOTNOTE 1 : ANY DATE ENTERED THAT IS PRIOR TO ADOPTION OF THE REGIONAL WATER PLAN IS ASSUMED TO BE AN 'ACTUAL' DATE

Appendix O

Rural Outreach

Appendix O
Rural Outreach

WATER USER GROUP NAME	ENTITY HAS SELF-REPORTED WATER USE RESTRICTIONS TO TCEQ DUE TO WATER SUPPLY ISSUES DURING THE CURRENT PLANNING CYCLE	ENTITY HAS SELF-REPORTED HAVING LESS THAN 180 DAYS OF WATER SUPPLY REMAINING DURING THE CURRENT PLANNING CYCLE	ENTITY HAS NOT PREVIOUSLY ENGAGED IN THE REGIONAL PLANNING PROCESS	ENTITY HAS IDENTIFIED AS FACING SIGNIFICANT NEAR-TERM SHORAGES UNDER DROUGHT CONDITIONS IN PREVIOUS REGIONAL WATER PLANS	PRIORITY FOR OUTREACH	OUTREACH MEASURES PERFORMED	RESPONSE RECEIVED FROM ENTITY
Aledo	No	No	Yes	No	Low	Survey email, phone call.	No
Alvord	No	No	Yes	No	Low	Survey email, phone call.	No
Annetta	No	No	No	No	Very Low	Survey email, phone call.	No
Arledge Ridge WSC	No	No	No	No	Very Low	Survey email, phone call.	No
Aubrey	Yes	No	No	No	Low	Survey email, phone call.	No
Avalon Water Supply & Sewer Service	No	No	Yes	No	Low	Survey email, phone call.	No
B And B WSC	No	No	Yes	No	Low	Survey email, phone call.	No
Becker Jiba WSC	No	No	Yes	No	Low	Survey email, phone call.	No
Bells	No	No	Yes	No	Low	Survey email, phone call.	No
Bethel Ash WSC	No	No	Yes	No	Low	Survey email, phone call.	No
Bethel Ash WSC	No	No	Yes	No	Low	Survey email, phone call.	No
Bethel Ash WSC	No	No	Yes	No	Low	Survey email, phone call.	No
Black Rock WSC	No	No	Yes	No	Low	Survey email, phone call.	No
Blooming Grove	No	No	Yes	No	Low	Survey email, phone call.	No
Blue Ridge	No	No	Yes	Yes	Moderate	Survey email, phone call.	No
Bolivar WSC	Yes	No	Yes	No	Moderate	Survey email, phone call.	No
Bonham	No	No	Yes	No	Low	Survey email, phone call.	No
Boyd	No	No	No	Yes	Low	Survey email, phone call.	Yes
Bridgeport	No	No	Yes	No	Low	Survey email, phone call.	No
Butler WSC	No	No	Yes	No	Low	Survey email, phone call.	No
Callisburg WSC	No	No	Yes	No	Low	Survey email, phone call.	No
Chatfield WSC	No	No	Yes	No	Low	Survey email, phone call.	No
Chico	No	No	Yes	No	Low	Survey email, phone call.	No
Cockrell Hill	No	No	Yes	No	Low	Survey email, phone call.	No
College Mound SUD	No	No	Yes	No	Low	Survey email, phone call.	No
Collinsville	No	No	Yes	No	Low	Survey email, phone call.	No
Combine WSC	No	No	Yes	No	Low	Survey email, phone call.	No
Copeville WSC	No	No	Yes	No	Low	Survey email, phone call.	No
Corbet WSC	No	No	Yes	No	Low	Survey email, phone call.	No
Corsicana	No	No	No	No	Very Low	Survey email, phone call.	No
County-Other, Collin	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Cooke	No	No	No	No	Very Low	Phone call.	Yes
County-Other, Cooke	No	No	No	No	Very Low	Phone call, number disconnected.	N/A
County-Other, Cooke	No	No	No	No	Very Low	Phone call, left voicemail.	No
County-Other, Cooke	No	No	No	No	Very Low	Phone call, number disconnected.	N/A
County-Other, Cooke	No	No	No	No	Very Low	Phone call, left voicemail.	No
County-Other, Dallas	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Denton	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Denton	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Denton	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Denton	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Denton	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Denton	No	No	No	No	Very Low	Survey sent to water provider.	N/A

Appendix O
Rural Outreach

WATER USER GROUP NAME	ENTITY HAS SELF-REPORTED WATER USE RESTRICTIONS TO TCEQ DUE TO WATER SUPPLY ISSUES DURING THE CURRENT PLANNING CYCLE	ENTITY HAS SELF-REPORTED HAVING LESS THAN 180 DAYS OF WATER SUPPLY REMAINING DURING THE CURRENT PLANNING CYCLE	ENTITY HAS NOT PREVIOUSLY ENGAGED IN THE REGIONAL PLANNING PROCESS	ENTITY HAS IDENTIFIED AS FACING SIGNIFICANT NEAR-TERM SHORAGES UNDER DROUGHT CONDITIONS IN PREVIOUS REGIONAL WATER PLANS	PRIORITY FOR OUTREACH	OUTREACH MEASURES PERFORMED	RESPONSE RECEIVED FROM ENTITY
County-Other, Ellis	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Ellis	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Ellis	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Ellis	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Fannin	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Fannin	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Fannin	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Fannin	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Fannin	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Fannin	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Fannin	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Fannin	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Fannin	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Fannin	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Freestone	No	No	No	No	Very Low	Phone call, number disconnected.	N/A
County-Other, Freestone	No	No	No	No	Very Low	Phone call, number disconnected.	N/A
County-Other, Freestone	No	No	No	No	Very Low	Phone call, left voicemail.	No
County-Other, Freestone	No	No	No	No	Very Low	Phone call, left voicemail.	No
County-Other, Freestone	No	No	No	No	Very Low	Phone call, number disconnected.	N/A
County-Other, Grayson	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Grayson	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Henderson	No	No	No	No	Very Low	Phone call, left voicemail.	N/A
County-Other, Henderson	No	No	No	No	Very Low	Phone call, left voicemail.	N/A
County-Other, Henderson	No	No	No	No	Very Low	Phone call, left voicemail.	N/A
County-Other, Jack	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Kaufman	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Kaufman	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Kaufman	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Navarro	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Navarro	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Navarro	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Navarro	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Navarro	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Navarro	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Navarro	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Parker	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Parker	Yes	No	No	No	Low	Survey sent to water provider.	N/A
County-Other, Parker	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Parker	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Parker	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Parker	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Parker	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Parker	No	No	No	No	Very Low	Survey sent to water provider.	N/A

WATER USER GROUP NAME	ENTITY HAS SELF-REPORTED WATER USE RESTRICTIONS TO TCEQ DUE TO WATER SUPPLY ISSUES DURING THE CURRENT PLANNING CYCLE	ENTITY HAS SELF-REPORTED HAVING LESS THAN 180 DAYS OF WATER SUPPLY REMAINING DURING THE CURRENT PLANNING CYCLE	ENTITY HAS NOT PREVIOUSLY ENGAGED IN THE REGIONAL PLANNING PROCESS	ENTITY HAS IDENTIFIED AS FACING SIGNIFICANT NEAR-TERM SHORAGES UNDER DROUGHT CONDITIONS IN PREVIOUS REGIONAL WATER PLANS	PRIORITY FOR OUTREACH	OUTREACH MEASURES PERFORMED	RESPONSE RECEIVED FROM ENTITY
County-Other, Parker	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Parker	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Tarrant	Yes	No	No	No	Low	Survey sent to water provider.	N/A
County-Other, Tarrant	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Wise	Yes	No	No	No	Low	Survey sent to water provider.	N/A
County-Other, Wise	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Wise	No	No	No	No	Very Low	Survey sent to water provider.	N/A
County-Other, Wise	No	No	No	No	Very Low	Survey sent to water provider.	N/A
Crandall	No	No	Yes	No	Low	Survey emailed, phone call.	No
Crescent Heights WSC	No	No	Yes	No	Low	Survey emailed, phone call.	No
Culleoka WSC	No	No	No	No	Very Low	Survey emailed, phone call.	No
Dalworthington Gardens	No	No	Yes	No	Low	Survey emailed, phone call.	No
Dawson	No	No	Yes	No	Low	Survey emailed, phone call.	No
Decatur	No	No	Yes	No	Low	Survey emailed, phone call.	No
Desert WSC	No	No	Yes	No	Low	Survey emailed, phone call.	No
Dorchester	No	No	Yes	No	Low	Survey emailed, phone call.	No
East Cedar Creek FWSD	No	No	No	No	Very Low	Survey emailed, phone call.	No
East Cedar Creek FWSD	No	No	No	No	Very Low	Survey emailed, phone call.	No
East Garrett WSC	No	No	Yes	No	Low	Survey emailed, phone call.	No
Edgecliff	No	No	No	No	Very Low	Survey emailed, phone call.	No
Elmo WSC	No	No	Yes	No	Low	Survey emailed, phone call.	No
Eustace	No	No	Yes	No	Low	Survey emailed, phone call.	No
Everman	No	No	Yes	No	Low	Survey emailed, phone call.	No
Fairfield	No	No	Yes	No	Low	Survey emailed, phone call.	No
Fairfield	No	No	Yes	No	Low	Survey emailed, phone call.	No
Fairfield	No	No	Yes	No	Low	Survey emailed, phone call.	No
Fairview	No	No	Yes	No	Low	Survey emailed, phone call.	No
Farmersville	No	No	Yes	No	Low	Survey emailed, phone call.	Yes
Ferris	No	No	Yes	No	Low	Survey emailed, phone call.	No
Gainesville	No	No	Yes	No	Low	Survey emailed, phone call.	No
Gastonia Scurry SUD	No	No	No	No	Very Low	Survey emailed, phone call.	No
Gunter	Yes	No	Yes	No	Moderate	Survey emailed, phone call.	No
Hackberry	No	No	Yes	No	Low	Survey emailed, phone call.	No
Haslet	No	No	Yes	No	Low	Survey emailed, phone call.	No
Heath	Yes	No	Yes	No	Moderate	Survey emailed, phone call.	No
High Point WSC	No	No	Yes	No	Low	Survey emailed, phone call.	No
Highland Park	No	No	No	No	Very Low	Survey emailed, phone call.	No
Honey Grove	No	No	No	No	Very Low	Survey emailed, phone call.	No
Howe	No	No	Yes	No	Low	Survey emailed, phone call.	No
Hudson Oaks	No	No	Yes	No	Low	Survey emailed, phone call.	No
Hutchins	No	No	Yes	No	Low	Survey emailed, phone call.	No
Italy	No	No	Yes	No	Low	Survey emailed, phone call.	No
Jacksboro	No	No	Yes	No	Low	Survey emailed, phone call.	No

WATER USER GROUP NAME	ENTITY HAS SELF-REPORTED WATER USE RESTRICTIONS TO TCEQ DUE TO WATER SUPPLY ISSUES DURING THE CURRENT PLANNING CYCLE	ENTITY HAS SELF-REPORTED HAVING LESS THAN 180 DAYS OF WATER SUPPLY REMAINING DURING THE CURRENT PLANNING CYCLE	ENTITY HAS NOT PREVIOUSLY ENGAGED IN THE REGIONAL PLANNING PROCESS	ENTITY HAS IDENTIFIED AS FACING SIGNIFICANT NEAR-TERM SHORAGES UNDER DROUGHT CONDITIONS IN PREVIOUS REGIONAL WATER PLANS	PRIORITY FOR OUTREACH	OUTREACH MEASURES PERFORMED	RESPONSE RECEIVED FROM ENTITY
Justin	Yes	No	No	Yes	Moderate	Survey emailed, phone call.	No
Kaufman	No	No	Yes	No	Low	Survey emailed, phone call.	No
Kaufman County Development District 1	No	No	Yes	No	Low	Survey emailed, phone call.	No
Kaufman County MUD 11	No	No	Yes	No	Low	Survey emailed, phone call.	No
Kemp	No	No	No	No	Very Low	Survey emailed, phone call.	No
Kennedale	No	No	No	No	Very Low	Survey emailed, phone call.	No
Kentuckytown WSC	No	No	Yes	No	Low	Survey emailed, phone call.	No
Kerens	No	No	Yes	No	Low	Survey emailed, phone call.	No
Krum	No	No	No	No	Very Low	Survey emailed, phone call.	No
Ladonia	No	No	Yes	No	Low	Survey emailed, phone call.	No
Lake Kiowa SUD	No	No	Yes	No	Low	Survey emailed, phone call.	No
Lake Worth	No	No	Yes	No	Low	Survey emailed, phone call.	No
Lakeside	No	No	No	Yes	Low	Survey emailed, phone call.	No
Leonard	No	No	Yes	Yes	Moderate	Survey emailed, phone call.	No
Lindsay	No	No	No	No	Very Low	Survey emailed, phone call.	No
Log Cabin	No	No	No	No	Very Low	Survey emailed, phone call.	No
Lucas	Yes	No	No	No	Low	Survey emailed, phone call.	No
Luella SUD	No	No	Yes	No	Low	Survey emailed, phone call.	No
M E N WSC	No	No	Yes	No	Low	Survey emailed, phone call.	No
Malakoff	No	No	Yes	No	Low	Survey emailed, phone call.	No
Mountain Springs WSC	No	No	Yes	No	Low	Survey emailed, phone call.	No
Muenster	No	No	No	No	Very Low	Survey emailed, phone call.	No
Mustang SUD	Yes	Yes	No	No	Moderate	Survey emailed, phone call.	No
Newark	No	No	Yes	Yes	Moderate	Survey emailed, phone call.	No
North Farmersville WSC	No	No	No	No	Very Low	Survey emailed, phone call.	No
North Kaufman WSC	Yes	No	Yes	No	Moderate	Survey emailed, phone call.	No
Northlake	Yes	No	No	No	Low	Survey emailed, phone call.	No
Northwest Grayson County WCID 1	No	No	Yes	Yes	Moderate	Survey emailed, phone call.	No
Oak Ridge South Gale WSC	No	No	Yes	No	Low	Survey emailed, phone call.	No
Ovilla	No	No	Yes	No	Low	Survey emailed, phone call.	Yes
Palmer	No	No	Yes	No	Low	Survey emailed, phone call.	No
Pantego	Yes	No	Yes	No	Moderate	Survey emailed, phone call.	No
Parker	No	No	Yes	No	Low	Survey emailed, phone call.	No
Parker County SUD	No	No	Yes	No	Low	Survey emailed, phone call.	No
Parker County SUD	Yes	No	Yes	No	Moderate	Survey emailed, phone call.	No
Pilot Point	No	No	Yes	Yes	Moderate	Survey emailed, phone call.	No
Pink Hill WSC	No	No	Yes	No	Low	Survey emailed, phone call.	Yes
Pleasant Grove WSC	No	No	Yes	No	Low	Survey emailed, phone call.	No
Ponder	Yes	No	Yes	Yes	High	Survey emailed, phone call.	No
Pottsboro	No	No	No	No	Very Low	Survey emailed, phone call.	No
Providence Village WCID	Yes	No	Yes	No	Moderate	Survey emailed, phone call.	Yes
Red River Authority of Texas	Yes	No	Yes	No	Moderate	Survey emailed, phone call.	Yes
Rhome	Yes	No	Yes	Yes	High	Survey emailed, phone call.	No

Appendix O
Rural Outreach

WATER USER GROUP NAME	ENTITY HAS SELF-REPORTED WATER USE RESTRICTIONS TO TCEQ DUE TO WATER SUPPLY ISSUES DURING THE CURRENT PLANNING CYCLE	ENTITY HAS SELF-REPORTED HAVING LESS THAN 180 DAYS OF WATER SUPPLY REMAINING DURING THE CURRENT PLANNING CYCLE	ENTITY HAS NOT PREVIOUSLY ENGAGED IN THE REGIONAL PLANNING PROCESS	ENTITY HAS IDENTIFIED AS FACING SIGNIFICANT NEAR-TERM SHORAGES UNDER DROUGHT CONDITIONS IN PREVIOUS REGIONAL WATER PLANS	PRIORITY FOR OUTREACH	OUTREACH MEASURES PERFORMED	RESPONSE RECEIVED FROM ENTITY
Rice Water Supply and Sewer Service	No	No	Yes	No	Low	Survey emailed, phone call.	No
Richland Hills	No	No	Yes	No	Low	Survey emailed, phone call.	No
River Oaks	No	No	Yes	No	Low	Survey emailed, phone call.	No
RoaNoke	No	No	Yes	No	Low	Survey emailed, phone call.	No
Rose Hill SUD	No	No	Yes	No	Low	Survey emailed, phone call.	No
Runaway Bay	No	No	Yes	No	Low	Survey emailed, phone call.	No
Sanger	Yes	No	Yes	No	Moderate	Survey emailed, phone call.	No
Sansom Park	No	No	Yes	No	Low	Survey emailed, phone call.	Yes
Savoy	No	No	No	No	Very Low	Survey emailed, phone call.	No
South Ellis County WSC	No	No	Yes	No	Low	Survey emailed, phone call.	No
South Freestone County WSC	No	No	Yes	Yes	Moderate	Survey emailed, phone call.	No
South Grayson SUD	No	No	No	No	Very Low	Survey emailed, phone call.	No
Southmayd	No	No	Yes	Yes	Moderate	Survey emailed, phone call.	No
Southwest Fannin County SUD	No	No	Yes	No	Low	Survey emailed, phone call.	No
Springtown	No	No	Yes	Yes	Moderate	Survey emailed, phone call.	No
Sunnyvale	No	No	Yes	No	Low	Survey emailed, phone call.	Yes
Talty SUD	No	No	Yes	No	Low	Survey emailed, phone call.	No
Teague	No	No	Yes	Yes	Moderate	Survey emailed, phone call.	No
Tioga	No	No	Yes	No	Low	Survey emailed, phone call.	No
Tom Bean	No	No	Yes	No	Low	Survey emailed, phone call.	No
Trenton	No	No	Yes	No	Low	Survey emailed, phone call.	No
Trinidad	No	No	Yes	No	Low	Survey emailed, phone call.	No
Two Way SUD	No	No	Yes	Yes	Moderate	Survey emailed, phone call.	No
Van Alstyne	Yes	No	Yes	No	Moderate	Survey emailed, phone call.	No
Verona SUD	No	No	Yes	No	Low	Survey emailed, phone call.	No
West Cedar Creek MUD	No	No	Yes	No	Low	Survey emailed, phone call.	No
West Wise SUD	No	No	No	No	Very Low	Survey emailed, phone call.	No
Westlake	No	No	Yes	No	Low	Survey emailed, phone call.	No
Westminster SUD	No	No	Yes	No	Low	Survey emailed, phone call.	No
Westover Hills	No	No	Yes	No	Low	Survey emailed, phone call.	No
Westworth Village	No	No	Yes	No	Low	Survey emailed, phone call.	No
White Shed WSC	No	No	Yes	No	Low	Survey emailed, phone call.	No
Whitesboro	No	No	Yes	No	Low	Survey emailed, phone call.	No
Whitewright	No	No	No	No	Very Low	Survey emailed, phone call.	No
WilLow Park	No	No	Yes	No	Low	Survey emailed, phone call.	No
Wilmer	No	No	Yes	No	Low	Survey emailed, phone call.	No
Woodbine WSC	No	No	No	Yes	Low	Survey emailed, phone call.	No
Wortham	No	No	Yes	No	Low	Survey emailed, phone call.	No

Appendix P

Comments on Initially Prepared Plan

APPENDIX P COMMENTS ON INITIALLY PREPARED PLAN

This Appendix will be completed for the final plan, after Region C receives comments on the Initially Prepared Plan.