2026 RIO GRANDE REGIONAL WATER PLAN

INITIALLY PREPARED PLAN

Prepared by: Rio Grande Regional Water Planning Group
With administration by: Lower Rio Grande Valley Development Council

MARCH 1, 2025

BLACK & VEATCH

KRC

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SIMPLICITY WORKS

RIO GRANDE
REGIONAL WATER PLANNING GROUP

2026 Rio Grande Regional Water Plan

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Prepared by:

Rio Grande Regional Water Planning Group

with funding assistance from the Texas Water Development Board

with administration by the Lower Rio Grande Valley Development Council

With assistance from:

Black & Veatch Corporation
TBPE Reg. No. F-258

James Kennedy
Kennedy Resource Company
TXPG No. 3130

Laura Raun Public Relations

Document is for Interim Review and Not Intended for Construction, Bidding, or Permit Purposes.

Jaime J. Burke, PE

92863.
Texas Serial No.

March 1, 2025
Date

March 2025
BV Project 411250

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Water Measurements

Acre-foot (AF) = 43,560 cubic feet = 325,851 gallons
Acre-foot per year (ac-ft/yr) = 325,851 gallons per year = 893 gallons per day
Gallons per minute (gpm) = 1,440 gallons per day = 1.6 ac-ft/yr
Million gallons per day (mgd) = 1,000,000 gallons per day = 1,120 ac-ft/yr

INITIALLY PREPARED PLAN

EXECUTIVE SUMMARY

Rio Grande Regional Water Plan

B&V PROJECT NO. 411250

PREPARED FOR

Rio Grande Regional Water Planning Group

1 MARCH 2025

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List of Abbreviations

acft	Acre-Feet
acft/yr	Acre-Feet per Year
ASR	Aquifer Storage and Recovery
BMP	Best Management Practices
DCP	Drought Contingency Plan
DMI	Domestic, Municipal, and Industrial
DOR	Drought of Record
DWDOR	Drought Worse than the Drought of Record
GCD	Groundwater Conservation District
GMA	Groundwater Management Area
HB	House Bill
ID	Irrigation District
LLM	Lower Laguna Madre
MAG	Modeled Available Groundwater
mg/L	Milligrams per Liter
mgd	Million Gallons per Day
MWP	Major Water Provider
psi	Pounds per Square Inch
PUB	Public Utilities Board
RO	Reverse Osmosis
RWP	Regional Water Plan
RWPG	Regional Water Planning Group
SB1	Senate Bill 1
SWP	State Water Plan
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TDS	Total Dissolved Solids
TWDB	Texas Water Development Board
WAM	Water Availability Model
WCP	Water Conservation Plan
WID	Water Improvement District
WMS	Water Management Strategy
WSC	Water Supply Corporation
WWP	Wholesale Water Provider
WUG	Water User Group

Executive Summary

ES.1 Water Planning in Texas

The Texas Water Development Board (TWDB) is charged with preparing a comprehensive and flexible long-term plan for the development, conservation, and management of the state's water resources. Historically, the state water plan (SWP) had been prepared by the TWDB with input from other state and local agencies and the public. Senate Bill 1 (SB1) that was enacted in 1997 by the 75th Legislature established a "bottom up" approach whereby SWPs are based on regional water plans (RWPs) prepared and adopted by the 16 appointed Regional Water Planning Groups (RWPGs). SB1 states that the purpose of regional water planning is the following:

" … provide for the orderly development, management, and conservation of water resources and preparation for and response to drought conditions in order that sufficient water will be available at a reasonable cost to ensure public health, safety, and welfare; further economic development; and protect the agricultural and natural resources of that particular region."

SB1 also provides that future regulatory and financing decisions of the Texas Commission on Environmental Quality (TCEQ) and the TWDB be consistent with the current SWP. In 2013, House Bill 4 was enacted, which lends greater weight to the SWP by committing an additional funding pool to implementing projects recommended in the plan by way of the State Water Implementation Fund for Texas. In 2023, the Texas Legislature passed Senate Bill 28 and Senate Joint Resolution 75, which provided for the creation of the Texas Water Fund. Additionally, Senate Bill 30 authorized a $1 billion appropriation of revenue to the Texas Water Fund. In November 2023, Texas voters approved Proposition 6, which created the Texas Water Fund. Both funding appropriations have been important to moving water infrastructure projects forward in Texas.

Each RWPG member is appointed to serve without pay; the group represents a range of stakeholders and acts as the decision-making body for the regional water planning effort. The Rio Grande RWPG (Region M) members are listed in Table ES-1. The Lower Rio Grande Valley Development Council has served as the political subdivision to administer the regional water planning grant, and Black & Veatch Corporation was selected as the prime consultant for the planning and engineering tasks required to develop the plan.

Table ES-1 Region M Water Planning Group Members

Interest	Name	Resident County
Public	Tomas Rodriguez	Webb
	Laredo	
Counties	Joe Rathmell	Zapata
	County Judge, Zapata County	
	David L. Fuentes	Hidalgo
	Precinct 1 Commissioner, Hidalgo County	
Municipalities Industries	Jorge Flores	Maverick
	Eagle Pass Water Works	
	Marilyn Gilbert	Cameron
	Brownsville Public Utilities Board	
	Donald K. McGhee, Secretary*	Cameron
	Hydro Systems, Inc., Harlingen	
Agriculture	Neal Wilkins, Ph.D.	Jim Hogg
	East Wildlife Foundation	
Agriculture Environmental	Dale Murden	Hidalgo
	Texas Citrus Mutual, Mission	
	Jaime Flores	Hidalgo
	The Arroyo Colorado Watershed	
Small Business	Carlos Garza	Hidalgo
	AEC Engineering, LLC, Edinburg	
Small Business River Authorities	Nick Benavides*	Webb
	Nick Benavides Co., Laredo	
	Jim Darling, Chairman*	Hidalgo
	Rio Grande Regional Water Authority	
Water Districts	Sonny Hinojosa, Vice-Chairman*	Hidalgo
	Hidalgo County Irrigation District No. 2, San Juan	
Water Districts Water Utilities	Tom McLemore	Cameron
	Harlingen Irrigation District	
	Steven Sanchez	Hidalgo
	North Alamo Water Supply Corporation (WSC)	
Groundwater Management Area	Louie Peña	(GMA 16)
	Brush Country Groundwater Conservation District (GCD)	
Groundwater Management Area	Debbie Farmer	(GMA 13)
	Wintergarden GCD, Carrizo Springs	

Interest	Name	Resident County
Other	Glenn Jarvis Attorney, McAllen	Hidalgo
	Frank Schuster* Val Verde Vegetable Co., McAllen	Hidalgo
Electric Generating Utilities	Robert Latham	Hidalgo
*Executive Committee		

The RWPs are updated every 5 years, and a year after their adoption, an updated SWP is released. This RWP covers a 50-year planning horizon from 2030 to 2080.

The RWPGs work with the TWDB to evaluate current demands and project future water demands for each category of water user group (WUG): municipal, irrigation, livestock, steam-electric power generation, manufacturing, and mining. Measured quantities, conservation goals, and modeling are used to develop availability data for all major water resources which indicate how much water can be relied on in a drought year within the management goals for each resource. In Region M, these values are largely based on the firm yield from the Amistad-Falcon Reservoir system and the modeled available groundwater (MAG) and non-MAG values for the Gulf Coast, Yegua-Jackson, and Carrizo-Wilcox aquifers.

For each WUG, the currently available water supplies are evaluated and projected over the planning horizon. Estimated future needs are identified and quantified by comparing the reliable, drought year supplies with the drought year demands. These projections for needs drive the development of specific recommendations for water management strategies (WMSs). WMSs include approaches to reduce demands, increase supplies, and minimize losses.

The plan also contains policy recommendations at the state and local level as follows, including environmental protection, drought response, and resource management.

The chapters of the RWP are listed below:

- Chapter 1. Description of the Regional Water Planning Area
- Chapter 2. Population and Water Demand Projections
- Chapter 3. Water Supply Analysis
- Chapter 4. Identification of Water Needs
- Chapter 5. Water Management Strategies
- Chapter 6. Impacts of Regional Water Plan and Protection of Resource
- Chapter 7. Drought Response Information, Activities, and Recommendations
- Chapter 8. Policy Recommendations and Unique Sites
- Chapter 9. Implementation and Comparison to the Previous Regional Water Plan
- Chapter 10. Public Participation and Plan Adoption

The TWDB has a database that contains reports for all of the data described in this plan. The reports from the 2027 Regional and State Water Planning Database (DB27) are available at https://www3.twdb.texas.gov/apps/SARA/reports/list.

Additional instructions include:

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 planning region letter parameter, click view report.

Reports available include:

1. Water User Group (WUG) Population
2. WUG Demand
3. Source Availability
4. WUG Existing Water Supply
5. WUG Identified Water Needs/Surplus
6. WUG Second-Tier Identified Water Need
7. WUG Data Comparison to 2026 RWP
8. Source Data Comparison to 2026 RWP
9. WUG Unmet Needs
10. Recommended WUG Water Management Strategies (WMS)
11. Recommended Projects Associated with WMSs
12. Alternative WUG WMSs
13. Alternative Projects Associated with WMSs
14. WUG Management Supply Factor
15. Recommended Water Management Strategy Supply Associated With a New or Amended Interbasin Transfer (IBT) Permit
16. WUG Recommended WMS Supply Associated with a New or Amended IBT Permit and Total Recommended Conservation WMS Supply
17. Sponsored Recommended WMS Supplies Unallocated to WUGs
18. Major Water Provider (MWP) Existing Sales and Transfers
19. MWP WMS Summary

ES.2 The Rio Grande Regional Water Planning Area

ES.2.1 Population, Economy, and Natural Resources

The Rio Grande Regional Water Planning Area (Region M) consists of the eight counties along the middle and lower Rio Grande up to the river's mouth at the Gulf of Mexico. From the earliest settlement, this area has been tied to the waters of the Rio Grande for domestic and agricultural uses. The tropical or subtropical climate allows a long growing season most years. The amount of rainfall varies across the Lower Rio Grande Region from an average of 28 inches at the coast to 18 inches in the northwestern portion of the region, primarily from thunderstorms in the spring and occasional hurricanes in the late summer and fall. These storms can generate tremendous amounts of rainfall over a short period of time and cause extensive flooding because of the region's relatively flat terrain.

Figure ES-1 shows population centers in Region M. The population of the region is expected to grow to over 2.1 million people by the end of the current planning horizon, which represents a 11.8 percent population increase from 2030 to 2080. Chapter 2 describes the population and municipal demand projections in detail.

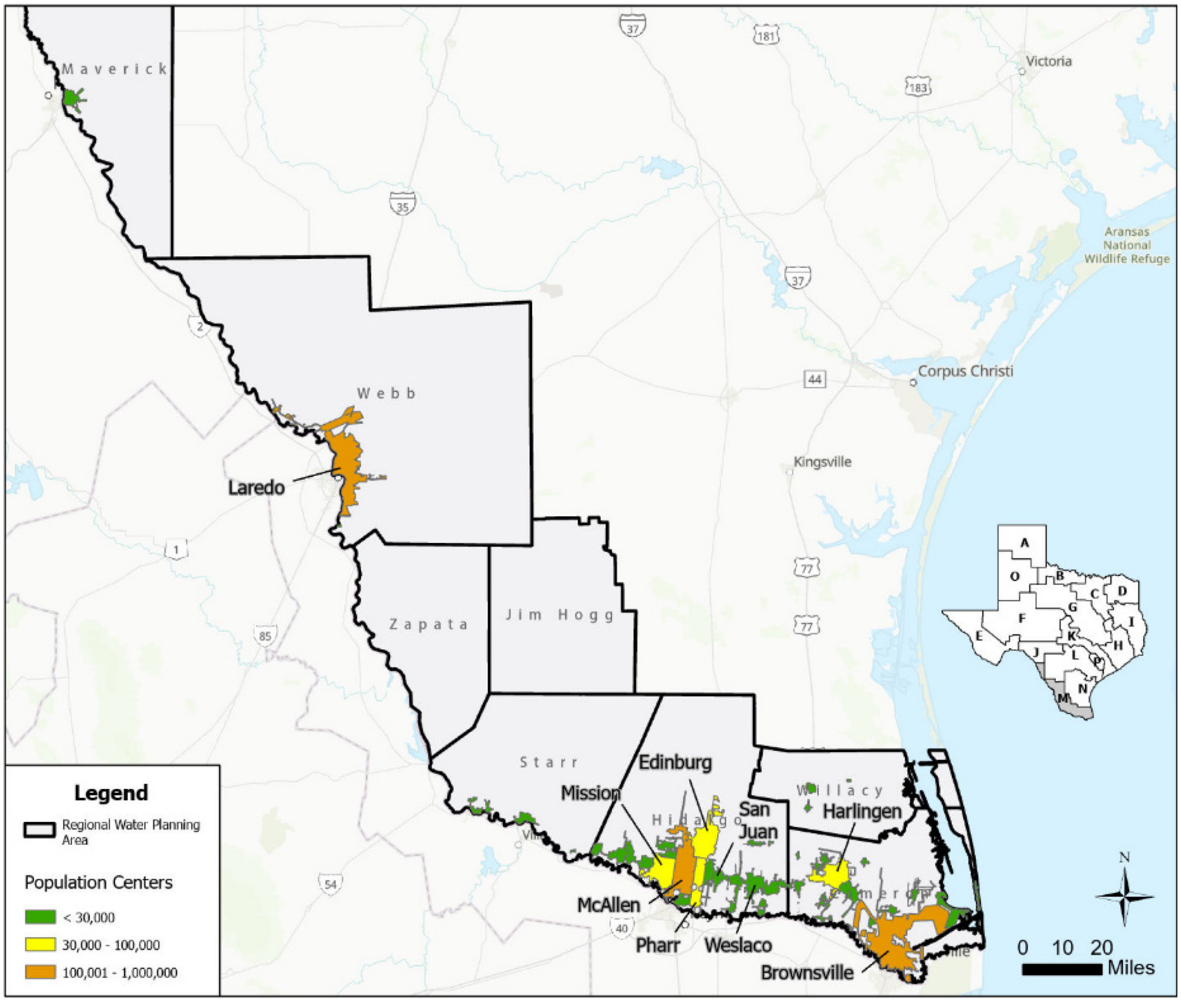

Figure ES-1 Population Centers of Region M

Region M's population is concentrated in Cameron, Hidalgo, and Webb counties, accounting for 90.5 percent of the regional total in 2020. The US Census Bureau estimates the total population of Region M in 2020 at 1,721,610, up 8.8 percent from 2010. Figure ES-2 shows historical and projected population in each county, according to US census historical data. Detailed population projections for each WUG are included in Appendix A.1.

An important factor driving rapid population growth in the Rio Grande Region is its cultural, social, and economic relationship with Mexico. Nationwide, Mexico's population growth rate in 2020 was 0.7 percent, compared with 1 percent for the United States.[1]

The Mexican portion of the Rio Grande watershed was home to approximately 12.61 million in 2017 and is anticipated to have 14.4 million by 2030. Using the growth rate identified by the National Water Commission of Mexico for the Rio Grande watershed, the population in 2080 would be over 20 million.

[1] World Bank Population Growth Data. http://data.worldbank.org/indicator/SP.POP.GROW accessed 6/18/24.

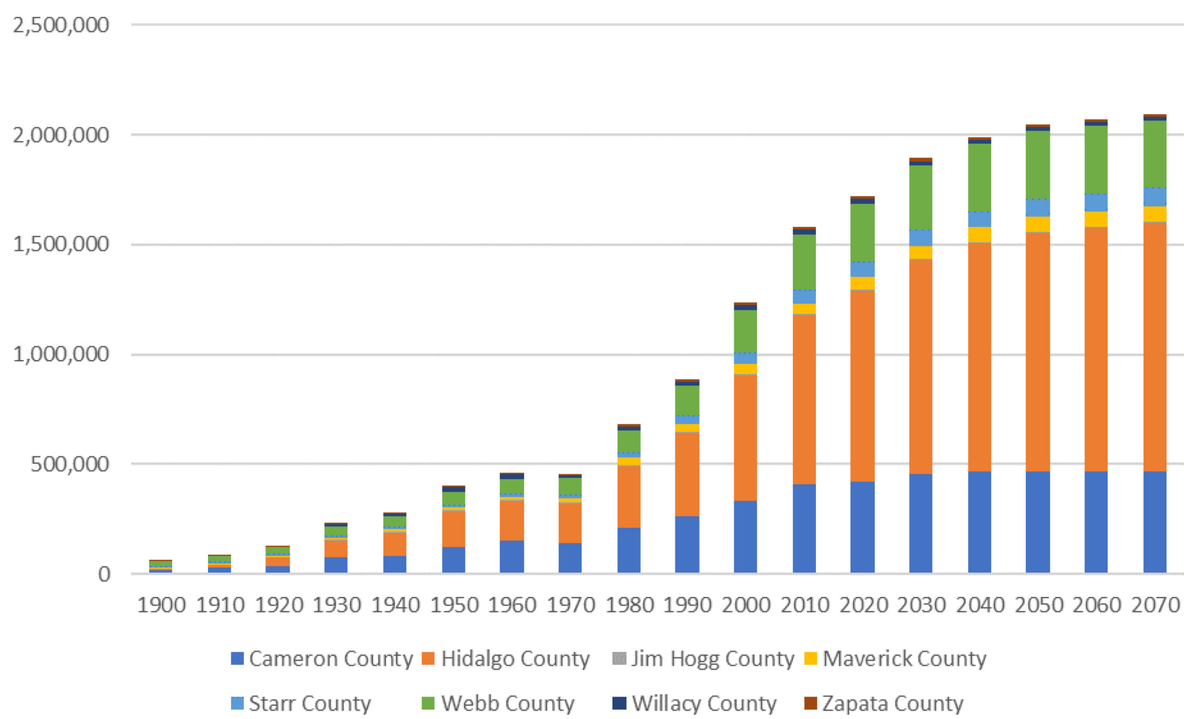

Figure ES-2 Region M Historical and Projected Population, US Census Bureau and TWDB

Table ES-2 shows Region M population projections by county.

Table ES-2 Population Projections by County

County	2030	2040	2050	2060	2070	2080
Cameron	453,325	465,039	469,300	468,071	466,828	465,573
Hidalgo	975,403	1,041,413	1,084,465	1,107,185	1,130,153	1,153,373
Jim Hogg	4,676	4,622	4,508	4,391	4,273	4,154
Maverick	62,424	66,814	70,294	72,996	75,728	78,490
Starr	70,499	75,394	79,002	81,275	83,573	85,896
Webb	292,999	304,635	308,179	305,094	301,977	298,824
Willacy	19,933	19,647	19,083	18,366	17,641	16,908
Zapata	14,075	14,288	14,295	14,158	14,019	13,878
Total	**1,893,334**	**1,991,852**	**2,049,126**	**2,071,536**	**2,094,192**	**2,117,096**

Aquifers in Mexico's Rio Grande watershed are overextended; the growth on both sides of the border will continue to put pressure on the capabilities of both surface and groundwater. Historically, agriculture has dominated the economy of the Rio Grande Region. Increased pressure on water available for irrigation, combined with the way that water is allocated in drought years, has been difficult for farmers across the region, especially those with perennial crops and citrus or pecan trees. A shift has occurred toward urbanization and diversification of the economy, but agriculture still plays a major role. Grain sorghum, sugarcane, cotton, citrus, and onions made up the bulk of the agriculture receipts in the region; agriculture is centered in Hidalgo and Cameron counties (Figure ES-3). Cattle and farmland accounted for just under 6 million acres, almost 80 percent of the region's land area. In 2024, the Rio Grande Valley Sugar Growers, Inc. decided to close the only sugar mill in Texas due to the lack of reliable water supply, including the reduced deliveries from Mexico. The mill supported hundreds of mill workers and over 100 local sugar cane growers, and its closure will have a significant impact on the economy in the Rio Grande Valley.

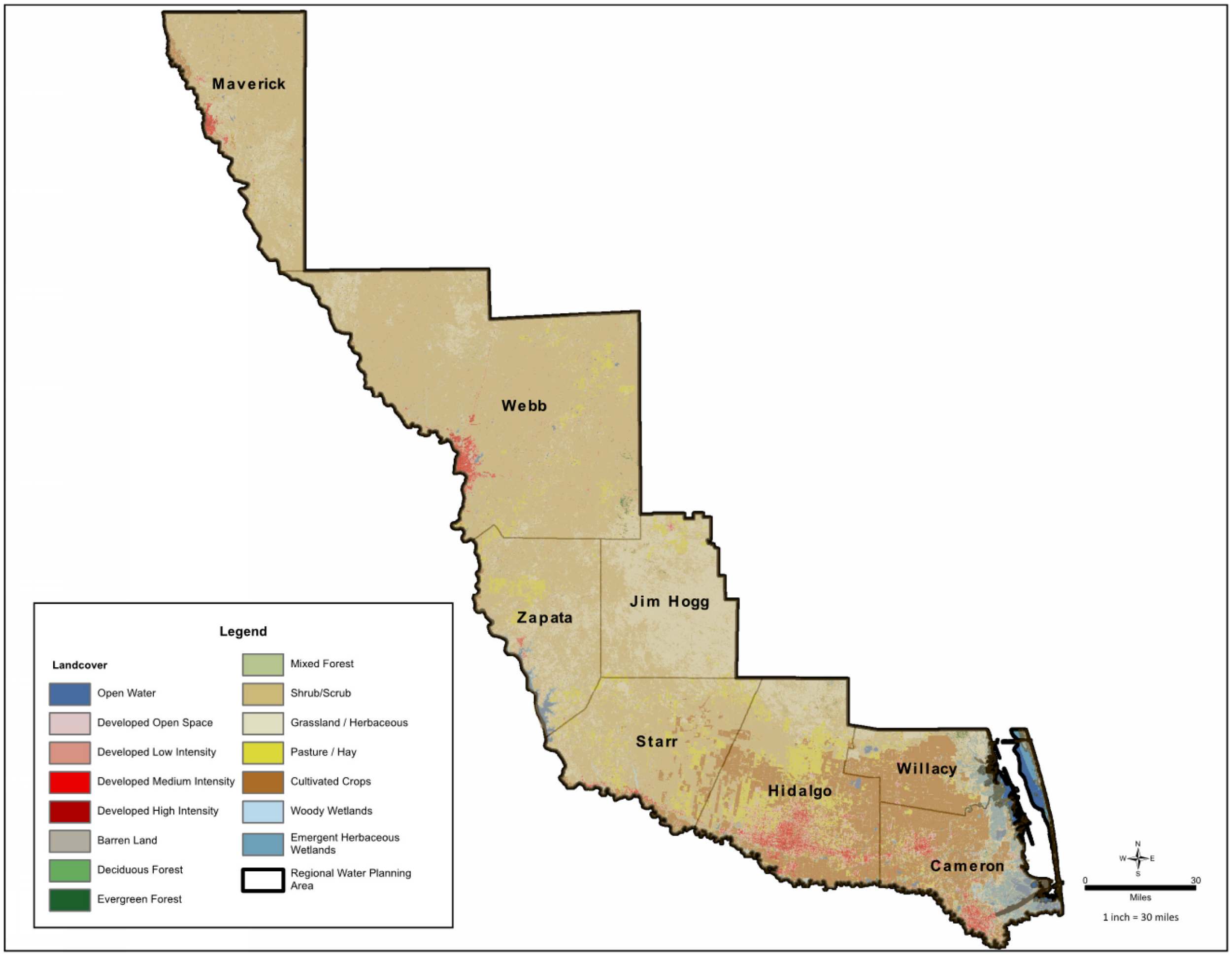

Figure ES-3 Region M Land Use Map

The Texas labor market forecasts for 2020 to 2030 predict 17 percent employment growth in the planning area. The major economic growth areas are construction, professional and business services, education and health services, and leisure and hospitality; information technology and mining show little to no growth.[2]

[2] Texas Labor Market and Career Information, Texas Workforce Commission. https://texaslmi.com/LMIbyCategory/Projections. Accessed 7/11/2024.

Some areas of Cameron and Willacy counties have seen recent growth of wind power generation, which may allow some farmers to maintain farmlands that were otherwise not economically viable.

Oil and gas production in the region have changed considerably from traditional oil drilling to hydraulic fracturing and nontraditional development, which has a significant impact on the regional economy and associated water demands. Webb and Maverick counties experienced significant oil and gas activity in the Eagle Ford Shale region. Mining water demands are discussed further in Chapter 2.

Region M experiences lower income and higher unemployment than the rest of Texas (Table ES-3). A clear division exists between the urban growth centers (Brownsville, McAllen, Harlingen, Laredo) and smaller rural towns and colonias. According to the TWDB, as of 2023, seven out of the eight counties in Region M are labeled as eligible for funds through the Economically Distressed Areas Program.

Table ES-3 Median Household Income, Poverty, and Unemployment Rate, by County

County	Median Household Income, 2022 ($/Year)[1]	Persons in Poverty Level, 2023 (%)[1]	Unemployment Rate, 2024 (in 2024 $) (%)[2]
Cameron	$47,435	22.60%	4.80%
Hidalgo	$49,371	27.40%	5.40%
Jim Hogg	$42,292	26.90%	4.40%
Maverick	$48,497	21.90%	8.00%
Starr	$35,979	32.80%	8.60%
Webb	$59,984	20.90%	3.70%
Willacy	$42,839	29.00%	6.60%
Zapata	$35,061	32.80%	6.10%

1. US Census Bureau State and County, QuickFacts. https://www.census.gov/quickfacts/fact/table/tx/INC110217. Accessed 6/26/2024.
2. Bureau of Labor Statistics, Unemployment. https://data.bls.gov/map/MapToolServlet. Accessed 6/26/2024.

Colonias are semirural subdivisions that are often developed with substandard or no potable water and sanitary sewer systems. Without potable waterlines, many colonia residents rely on buckets or drums of water, which may become contaminated. Improper wastewater disposal can add to the health and safety concerns.

Efforts have been made at the state, county, and local levels to provide basic services in many of the colonias in Region M. These efforts are complicated by the fact that, when sewer and waterlines are brought into a colonia, many of the homes do not meet building codes and are therefore unable to pass inspections to qualify for water or sewer hookups. Some areas of Region M have been successful in improving services to colonias, but growth in the colonia population is still a challenge to residents, state, county, and local government.[3]

[3] Texas Secretary of State website. https://www.sos.state.tx.us/border/. Accessed 2/25/2015.

ES.2.2 Surface Water Resources

ES.2.2.1 The Rio Grande

Region M draws most of its water from the Rio Grande, via the Amistad-Falcon Reservoir system, which is shared with Mexico. The waters of the Middle and Lower Rio Grande are managed by the International Boundary and Water Commission and the TCEQ's Rio Grande Watermaster.

Most of the inflows in this section of the river are from the Mexican watershed. Two major agreements between Mexico and the US (in 1906 and 1944) establish how these waters are shared. Annually, Mexico is to deliver a minimum of 350,000 acre-feet (acft) to the United States, on average, over a 5-year cycle, except for years of extraordinary drought, when the watershed in Mexico cannot provide enough runoff water, or in cases of serious accident to hydraulic systems.

Releases from Amistad and Falcon reservoirs are coordinated to deliver water to users throughout the region. The US system of water rights is unique to the Rio Grande: a tiered system prioritizes domestic, municipal, and industrial (DMI) water rights and establishes two classes (A and B) of mining and irrigation water rights. Each tier of water rights has a dedicated "storage pool" in the reservoir accounting system, and at the end of each month, the DMI pool is replenished to ensure that those water rights can be delivered in full. After this and an operational reserve have been set aside, what remains, if any, is available to the Class A and B accounts. In a severe drought, there may be no water after the DMI and operational reserves are met, and Class A and B rights can be completely curtailed. This affects both farmers and the functionality of the delivery systems, many of which rely on irrigation water for the operational baseline flows.

Water in the Rio Grande is normally of suitable quality for irrigation, livestock, and industrial uses; however, salinity, nutrients, and fecal coliform bacteria are of concern throughout the basin. Salinity concentrations in the Rio Grande are the result of both human activities and natural conditions. Untreated or poorly treated discharges from inadequate wastewater treatment facilities, primarily in Mexico, and nonpoint source pollution on both sides of the river, including poorly constructed or malfunctioning septic and sewage collection systems and improperly managed animal wastes, contribute to fecal coliform levels. Nutrient levels are a concern in the Rio Grande, but current levels do not represent a severe threat to human health, nor have they supported excessive aquatic plant growth.

ES.2.2.1.1 Drought of Record

The Rio Grande Basin and the Amistad-Falcon Reservoir system refer to the drought spanning from June 1994 to August 2023 (US portion) as the drought of record (DOR). This period is the most severe hydrologic drought, according to the Rio Grande Water Availability Model (WAM), and is used to predict firm yield, the supply that could be expected in the most severe historical drought scenario, over the planning horizon, as shown in Table ES-4.

Table ES-4 Firm Yield Projections for the Amistad-Falcon Reservoir System 2030 to 2080 (acft/yr)

Source	2030	2040	2050	2060	2070	2080
Amistad-Falcon Reservoir	1,001,776	1,001,268	1,000,760	999,553	997,821	995,863

The current period of record was updated this cycle in the WAM to extend through the year 2018. The model's previous period of record ended in the year 2000. Extending the period of record allowed for the DOR to be updated, which reduced the firm yield of the Amistad-Falcon Reservoir System, as compared to last cycle. The naturalized flow record that is used in the WAM is one way to evaluate the scale and duration of drought. Other measures and indicators of drought can be used to compare recent years with the historical record. In the past couple of years, reservoirs levels in the Amistad-Falcon Reservoir have been low. A lack of deliveries from Mexico are leading to drought restriction conditions, but it has yet to be determined whether this could result in a potential new DOR. The DOR is discussed in detail in Chapter 7.

ES.2.2.2 The Nueces-Rio Grande Basin and the Arroyo Colorado

Within the Rio Grande Region, the Nueces-Rio Grande Coastal Basin encompasses the southeastern portion of Webb County, nearly two-thirds of Jim Hogg County, the majority of Hidalgo and Cameron counties, and all of Willacy County (Figure ES-4). Two major drainage courses are in the basin: the main floodway and the Arroyo Colorado.

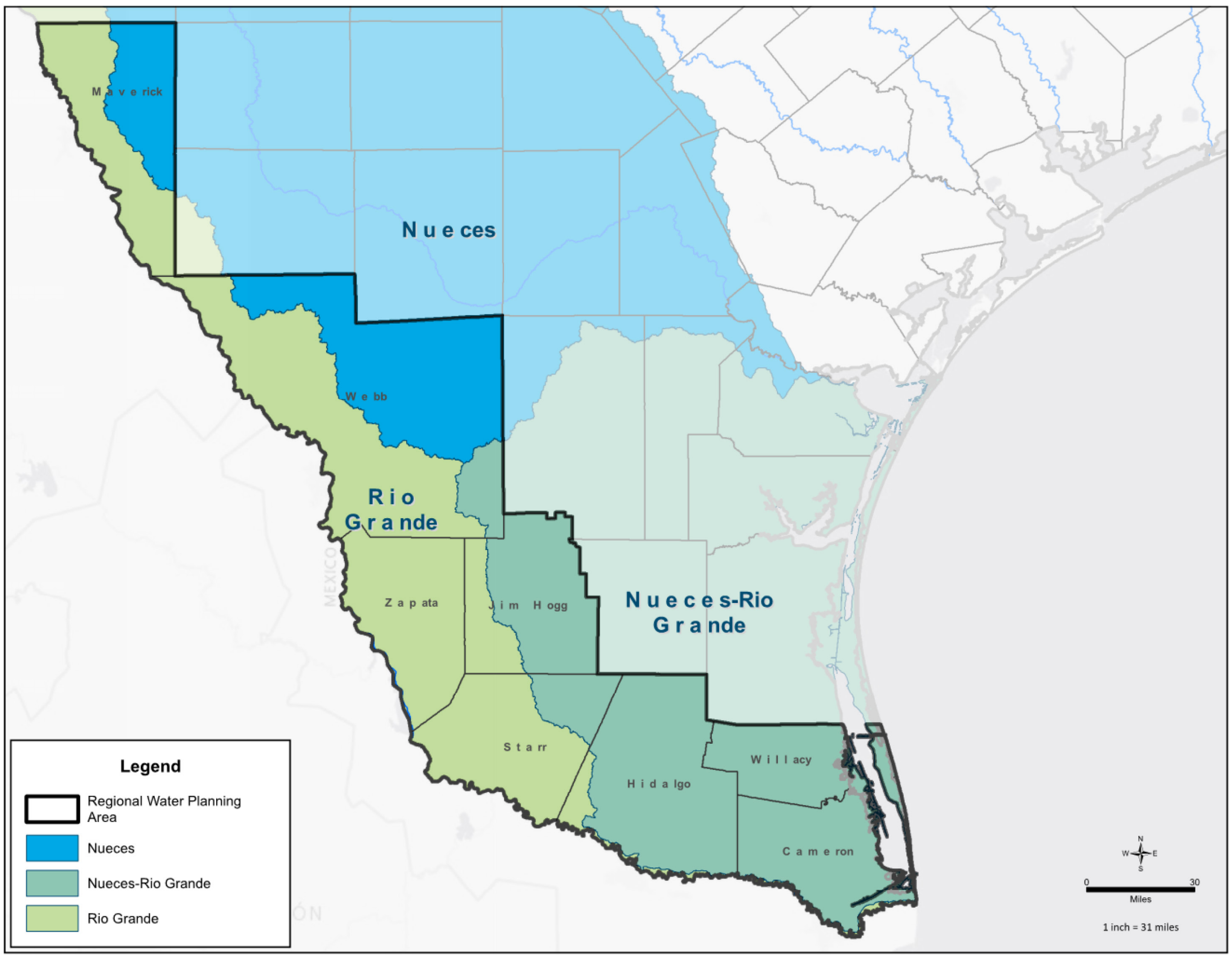

Figure ES-4 River Basins in Region M

The Arroyo Colorado is an ancient distributary channel of the Rio Grande River that drains an area of approximately 706 square miles, or 500,000 acres, covering portions of three Texas counties (Hidalgo, Cameron, and Willacy), and over 25 municipalities in the Lower Rio Grande Valley. In addition to natural drainage, most of the surface water diverted from the Lower Rio Grande is pumped into this basin and discharges into the Arroyo Colorado. The Arroyo Colorado River is the primary source of freshwater for the Lower Laguna Madre (LLM) estuary. It is imperative that adequate amounts of fresh water flow into the LLM and that water quality meets the needs of the various uses, including irrigation, recreation, industrial, municipal, and aquatic life uses.

ES.2.3 Groundwater Resources

The major aquifer underlying Region M is the Gulf Coast, which runs the extent of the Texas coast and Hidalgo, Starr, Jim Hogg, and the western portions of Willacy and Cameron counties. This aquifer is predominantly brackish, with irregular pockets of fresh and very saline water. The Carrizo-Wilcox Aquifer also spans Texas and extends through Webb and part of Maverick counties.

The joint groundwater planning process involves various stakeholders to determine how much water can be withdrawn annually and still meet desired future conditions. This process is undertaken for each of the groundwater management areas (GMAs) by representatives of GCDs and members of the public. The MAG values are the result of this process, which become the groundwater availabilities for the regional water planning process.

In some cases, aquifers or parts of aquifers within a GMA are locally important but are not planned for in the same way. Availabilities for these aquifers are developed through the aquifer models but are considered non-MAG availabilities because they are not included in the joint groundwater planning process. The minor and alluvial aquifers in the region, including the Yegua-Jackson aquifer, may produce significant quantities of water that supply relatively small areas.

Refer to Table ES-5 for the groundwater availability in the Region M aquifers.

Table ES-5 Groundwater Data for Significant Aquifers in Region M (acft/yr)

Aquifer	County	Data	2030	2040	2050	2060	2070	2080
Carrizo-Wilcox	Maverick	MAG	545	547	545	545	276	276
Carrizo-Wilcox	Webb	MAG	910	912	910	910	910	910
Gulf Coast	Cameron	MAG	7,999	9,311	10,620	11,932	11,932	11,932
Gulf Coast	Cameron	Non-MAG	43,167	46,720	50,273	53,824	53,824	53,824
Gulf Coast	Hidalgo	MAG	93,462	99,105	104,721	110,363	110,431	110,431
Gulf Coast	Jim Hogg	MAG	6,167	6,167	6,167	6,167	7,084	7,084
Gulf Coast	Starr	MAG	4,797	5,797	6,794	7,795	7,795	7,795
Gulf Coast	Webb	MAG	789	959	1,129	1,299	1,299	1,299
Gulf Coast	Willacy	MAG	1,150	1,329	1,486	1,665	1,703	1,703
Gulf Coast	Willacy	Non-MAG	1,407	1,622	1,838	2,053	2,053	2,053
Yegua-Jackson	Starr	Non-MAG	33	38	43	48	48	48
Yegua-Jackson	Webb	Non-MAG	20,000	20,000	20,000	20,000	20,000	20,000
Yegua-Jackson	Zapata	Non-MAG	7,987	7,987	7,987	7,987	7,987	7,987
Total			**188,413**	**200,494**	**212,513**	**224,588**	**225,342**	**225,342**

Figure ES-5 shows the major and minor aquifers in the region.

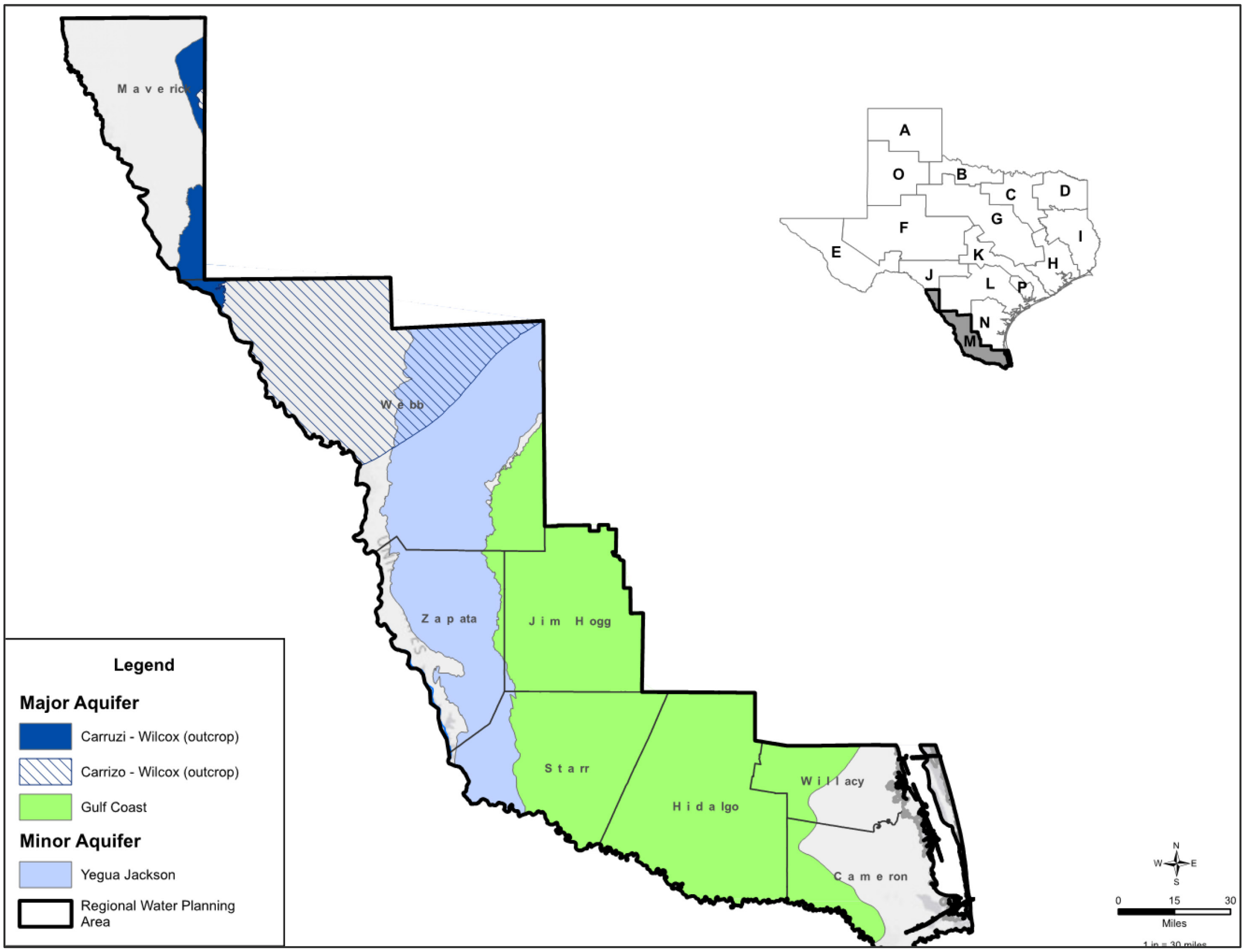

Figure ES-5 Major and Minor Aquifers in Region M

In general, groundwater from the major aquifers in the region has total dissolved solids concentrations exceeding 1,000 milligrams per liter (mg/L) (slightly saline) and often exceeds 3,000 mg/L (moderately saline). However, some areas of fresh and useable groundwater constitute a critical supply for many towns, domestic needs in rural areas, and livestock. Localized areas of high boron content occur throughout the study area.

A 2014 report from TWDB's Brackish Resource Aquifer Characterization System program presented information on the brackish groundwater resources of the Lower Rio Grande Valley, in response to increased development of these resources.[4] Chapter 3 presents a detailed description of groundwater quality in the Gulf Coast Aquifer, Carrizo Wilcox Aquifer, Yegua-Jackson Aquifer, and Rio Grande Alluvium in the Rio Grande Region.

[4] http://www.twdb.texas.gov/publications/reports/numbered_reports/doc/R383_BrackishGW.pdf?d=22146.57000000443.

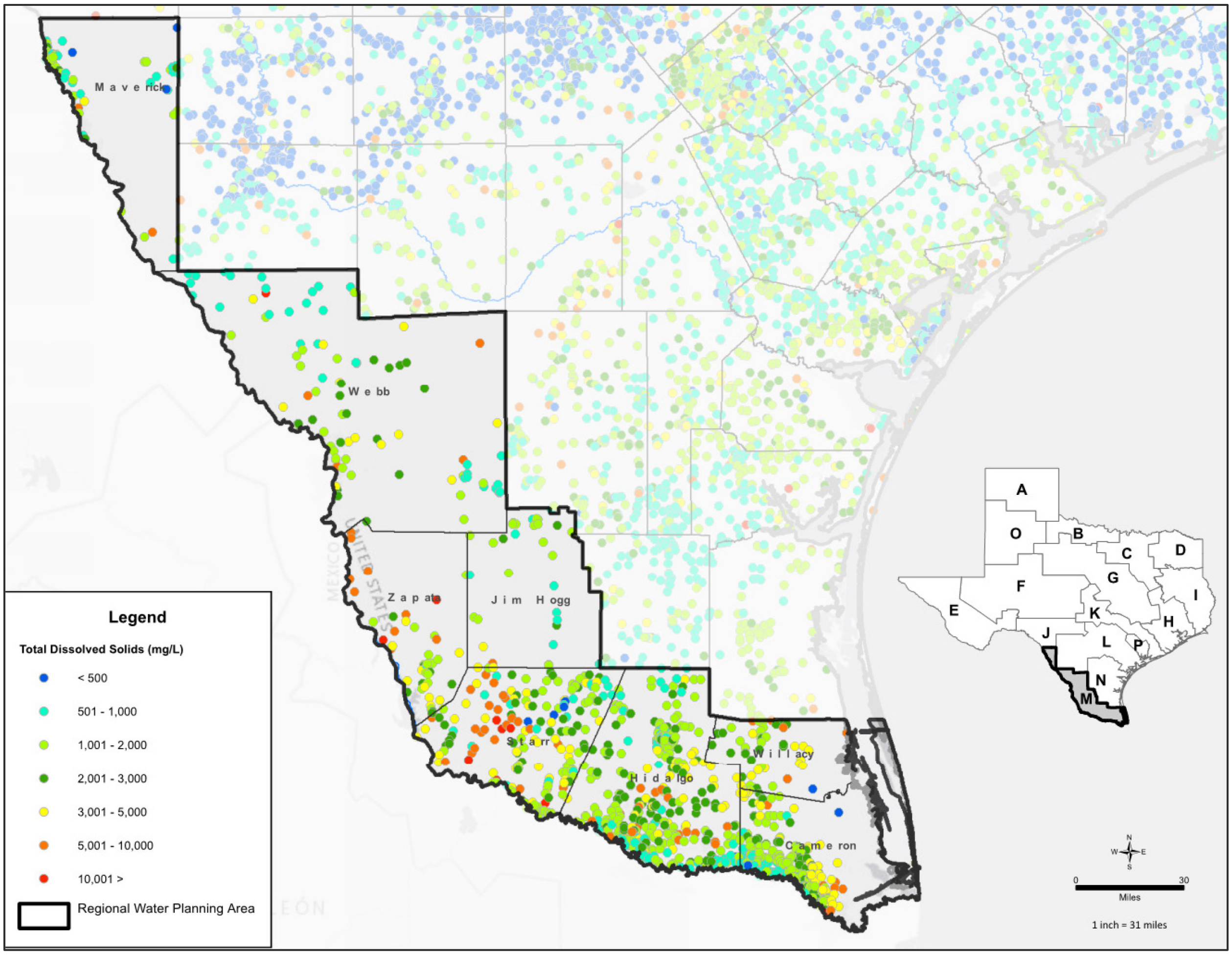

Figure ES-6 Brackish Groundwater Data in Region M (TWDB)

ES.3 Current and Projected Water Use

Both irrigation and municipal demands are greatest in the Lower Rio Grande, which is primarily served by a network of irrigation districts (IDs) that divert water to farmers and municipal utilities from the Rio Grande. Demand in other WUG types is comparatively small, as shown on Figure ES-7.

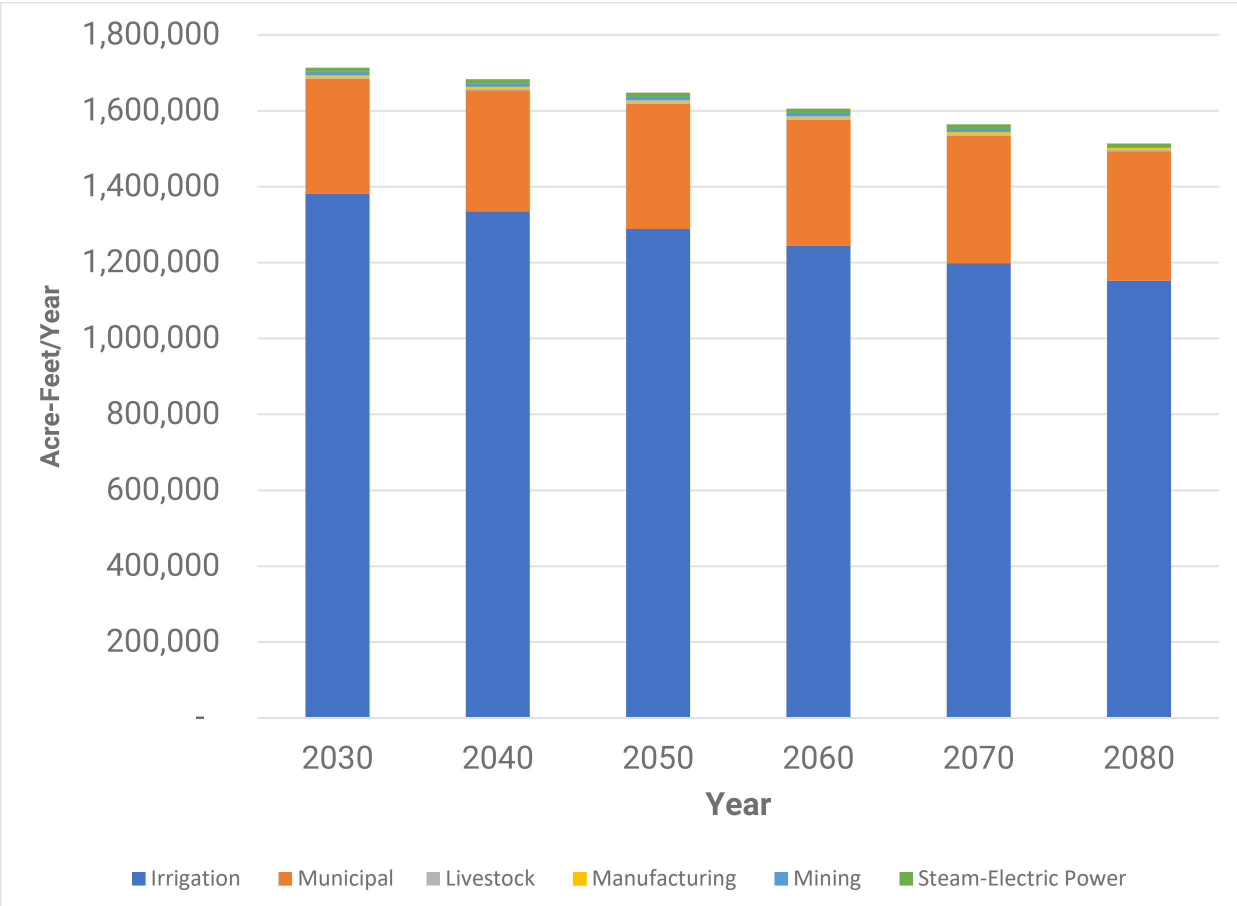

Figure ES-7 Water Demand Projections for Each WUG Type in Region M (acft/yr)

ES.3.1 Major Water Providers

Region M has two general types of wholesale water providers (WWPs): those that provide raw water, mostly IDs, and those who provide treated water to municipal and industrial users.

IDs (Figure ES-8) divert and deliver raw water to irrigated farmland, municipalities, and industrial or livestock users. In Region M, 25 IDs operate under the Texas Water Code, but each one has its own internal operating policies. The districts are mostly earthen canal, some concrete lined canals, and some pipeline. The losses within IDs, as a result of seepage, evaporation, and operational losses, are anywhere between 10 percent and 40 percent. Water districts are discussed in more detail in Chapter 3.

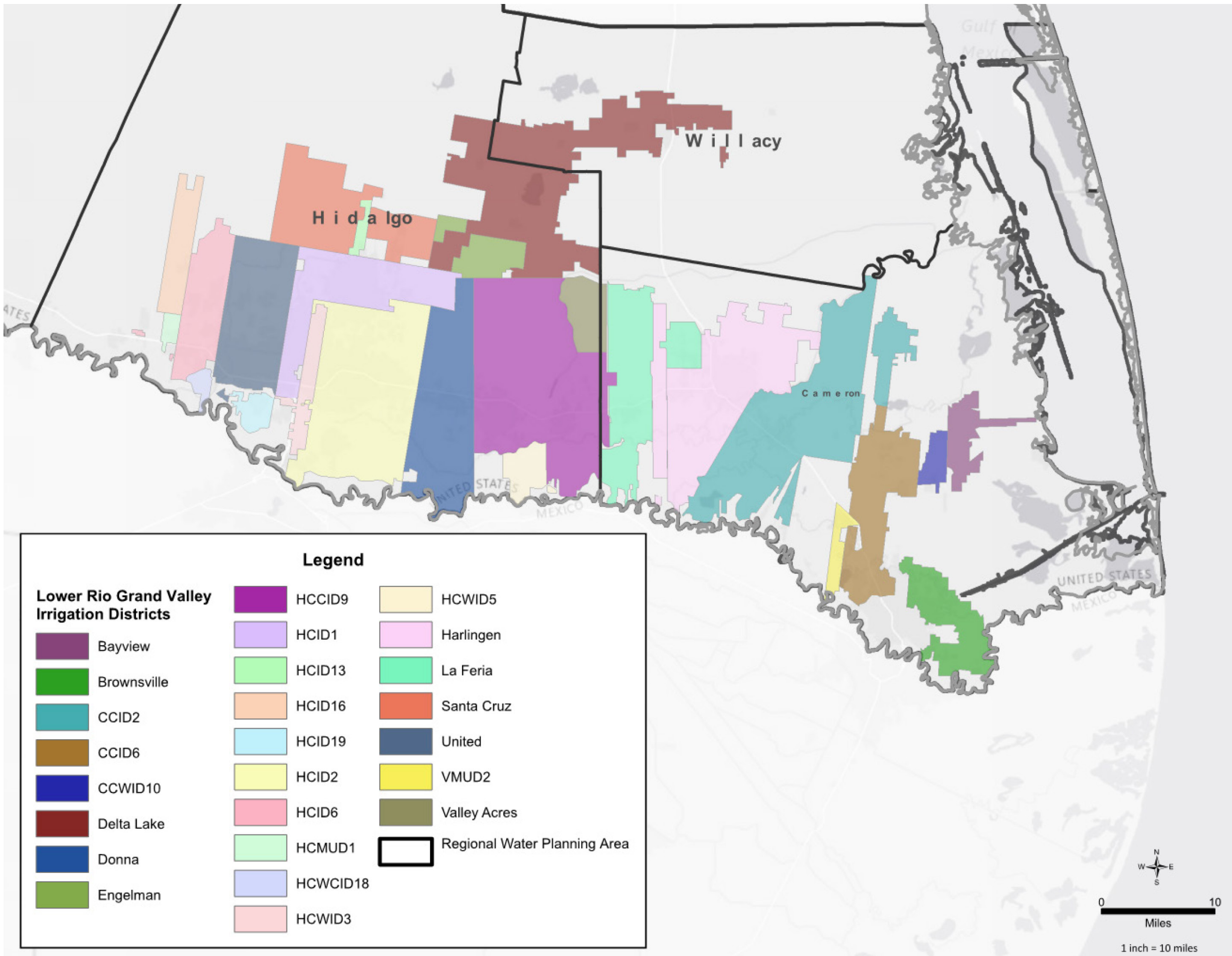

Figure ES-8　Lower Rio Grande Valley Irrigation Districts

WSCs cover most of the rural area in the Lower Rio Grande Valley. The largest are North Alamo WSC, East Rio Hondo WSC, Sharyland WSC, and Military Highway WSC, all of which treat and deliver both surface and groundwater to significant unincorporated and rural areas and edges of cities. Other WSCs in the region include Southmost Regional Water Authority, Valley Municipal Utility District 2, Webb County Water Utility, and Laguna Madre Water District. Brownsville, Eagle Pass, Harlingen, Laredo, Rio Grande City, and Weslaco also sell water to other WUGs in sufficient quantity to be considered WWPs.

Major Water Providers

Major Water Provider (MWP) was a new designation in the 2021 planning cycle; an MWP is any WUG or WWP of particular significance to the water supply of a region, as determined by the RWPG. At the February 21, 2024, Region M meeting, the planning group approved the same definition of an MWP as in the 2021 Plan, which is any entity that provides 3,000 acft or more of municipal water per year, and then voted to add Mexico as a new MWP due to the region's unique international water-sharing situation. According to current estimates of 2030 municipal supplies, the entities listed in Table ES-6 have been designated as MWP in the 2026 RWP.

While technically not a WUG or WWP, and therefore not allowed to be classified as a MWP according to TWDB rules, Mexico is of particular significance to Region M because it provides water to the Amistad-Falcon Reservoir System that it shares with the United States, based on the 1944 Treaty, impacting water levels in the reservoirs and the water users on the United States' side.

Table ES-6 Region M Major Water Providers

Major Water Providers	
Agua Special Utility District	Hidalgo County Irrigation District No. 16
Alamo	Hidalgo County Irrigation District No. 2
Bayview Irrigation District No. 11	Hidalgo County Irrigation District No. 6
Brownsville	Hidalgo County Water Improvement District (WID) No. 3*
Brownsville Irrigation District	Laguna Madre Water District
Cameron County Irrigation District No. 2	Laredo
Cameron County Irrigation District No. 3 - La Feria	McAllen
Cameron County Irrigation District No. 6 - Los Fresnos	Military Highway Water Supply Corporation (WSC)
Cameron County WID No. 10	Mission
Delta Lake Irrigation District	North Alamo WSC
Donna Irrigation District-Hidalgo County No. 1	Pharr
Eagle Pass	Rio Grande City
East Rio Hondo WSC	San Benito
Edinburg	San Juan
Harlingen	Sharyland WSC
Harlingen Irrigation District-Cameron County No. 1	Southmost Regional Water Authority
Hidalgo and Cameron Counties Irrigation District No. 9	United Irrigation District
Hidalgo County Irrigation District No. 1	Weslaco

*In January 2025, Hidalgo County Water Improvement District No. 3 and Santa Cruz Water Control and Improvement District No. 15 consolidated into Hidalgo County Consolidated Water Control and Improvement District.

ES.3.2 Municipal Demands

Municipal demands (Figure ES-7) are expected to increase regionally from a projected 303,225 acft/yr in 2030 to 340,085 acft/yr in 2080. Demand projections have decreased significantly from last cycle, based on results from the 2020 US Census.

Table ES-7 Municipal Demand by County (acft/yr)

County	2030	2040	2050	2060	2070	2080
Cameron	74,074	75,432	75,918	75,549	75,213	74,904
Hidalgo	157,628	168,725	176,995	180,732	184,515	188,335
Jim Hogg	613	603	587	573	556	541
Maverick	10,083	10,753	11,316	11,762	12,211	12,663
Starr	11,107	11,793	12,337	12,700	13,066	13,438
Webb	44,739	46,312	46,870	46,399	45,924	45,442
Willacy	2,494	2,477	2,443	2,403	2,368	2,340
Zapata	2,487	2,508	2,504	2,476	2,449	2,422
Total	**303,225**	**318,603**	**328,970**	**332,594**	**336,302**	**340,085**

Most of this demand is currently met by surface water from the Rio Grande, most commonly delivered by IDs. However, multiple brackish groundwater desalination plants have been built since 2000 and supply approximately 24,000 acft/yr of potable water. Fresh groundwater availability is limited in the region and is used mostly as a backup water supply for utilities or for individual homes, particularly in rural and unincorporated areas, with a few exceptions.[5] Refer to Figure ES-9 for a comparison of municipal supplies to municipal demands.

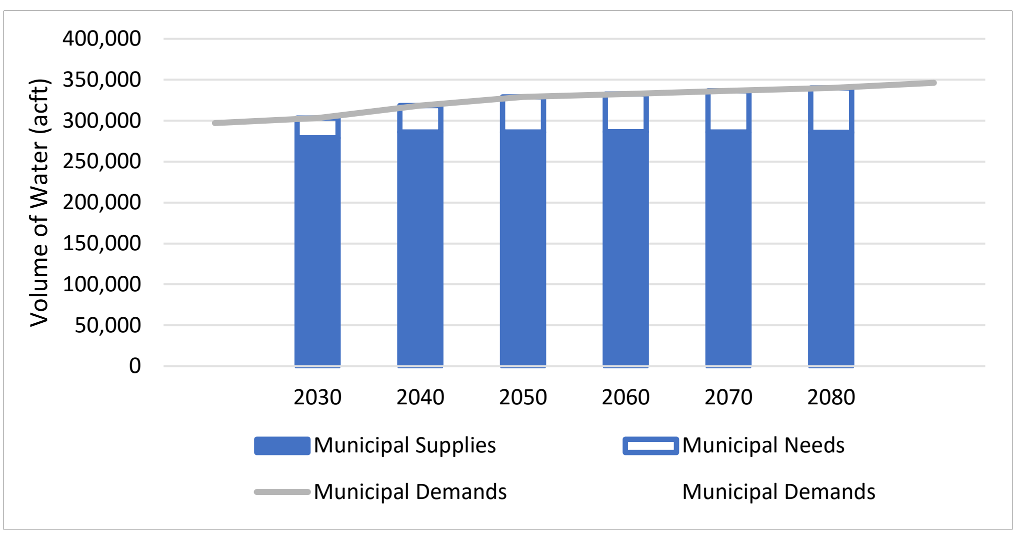

Figure ES-9 Municipal Supplies Shown as a Portion of Municipal Demands

[5] Military Highway WSC and the City of Hidalgo both have significant sources of well water.

The surface water rights of every municipal utility that is diverted by an ID are reduced by the estimated conveyance losses for that ID. These losses represent regular losses through seepage, evaporation, and operations in a drought year but not a scenario where push water is required. For those IDs that primarily serve irrigation users, long periods between irrigations in drought years are possible, especially when the district goes on allocation and limits irrigation water use. Because the ID conveyance systems generally require an operational minimum of water to charge the canals, periods of time when municipal water rights are not sufficient to meet operational requirements are possible and additional water, or push water, is required.

ES.3.3 Irrigation and Livestock Demands

Irrigation represents the largest water demand in Region M (1.4 million acft/yr in 2030 and 1.15 million acft/yr in 2080) but is projected to decrease as a result of both urbanization and increasing pressure on the region's water resources. Supplies available to irrigators are curtailed significantly in drought years because irrigation and mining water rights are treated as residual users of stored water from the reservoirs and, therefore, bear the brunt of water supply shortages. In essence, irrigation and mining water use must adjust to the available water supply. Refer to Figure ES-10 for a comparison of irrigation supplies to irrigation demands.

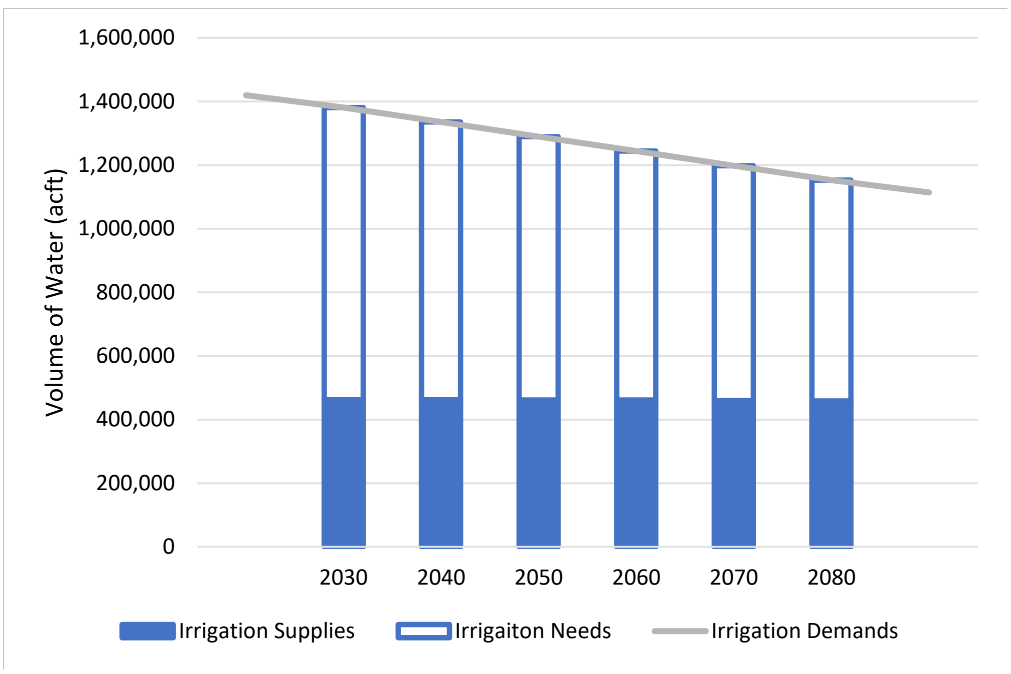

Figure ES-10 Irrigation Supplies as a Portion of Irrigation Demands (acft/yr)

Irrigation demands shown in this plan represent the worst-case scenario, wherein the demands are based on a dry year, and the supplies are what can be expected in the worst drought year. The difference between drought year demand and actual use in a particular year for agricultural users can be significant. If a drought year is anticipated, farmers can prepare by planting crops and vegetables with lower water demands, which are often of lower value, but may require fewer or no irrigations. Increases in farming efficiency can also allow irrigators to maintain higher value crops or higher yields in times with less available water.

Livestock demands are shown as being 100 percent met by existing supplies. Livestock is managed so that drought year demands are limited to the supplies known to be available. Livestock demands are met with Rio Grande water, groundwater, and some local supplies of surface water reserved particularly for livestock.

ES.3.4 Industrial Demands

Mining, steam-electric power generation, and manufacturing demands make up a small portion of the region's water use. However, a localized analysis revealed that mining demands represent a fairly significant portion of water usage in Maverick and Webb counties. These industrial uses are illustrated on Figure ES-11 through Figure ES-13.

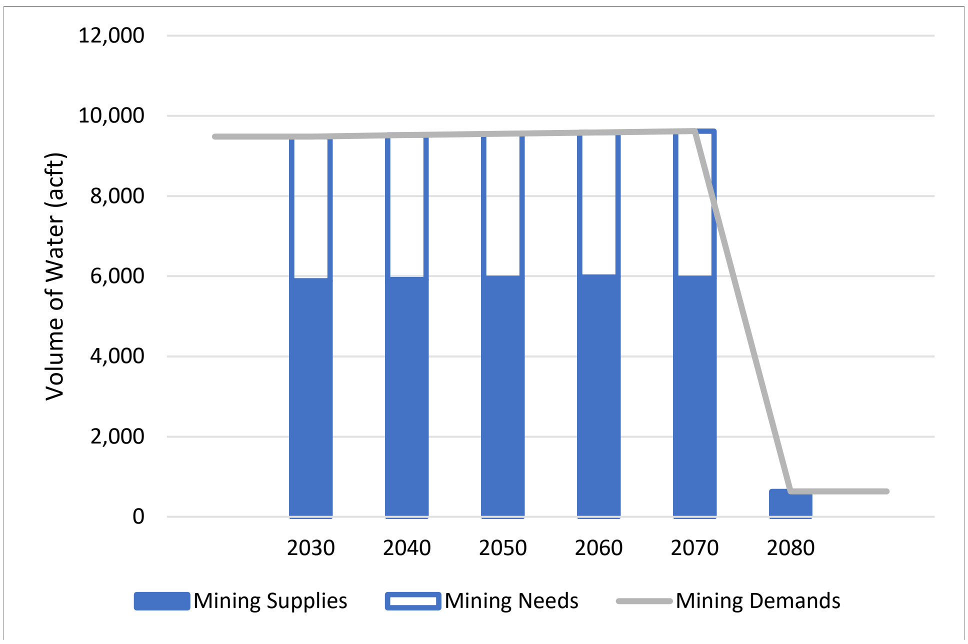

Figure ES-11 Mining Supplies as a Portion of Mining Water Demands (acft/yr)

Mining water usage in Region M is dominated by hydraulic fracturing, with some aggregate operations. One of the major hurdles in evaluating mining water usage is the lack of consistent reporting, especially for groundwater usage. In Region M, the use of surface water from the Rio Grande allowed the Region M Planning Group to further inform water demand projections for mining.

Statewide, a major shift from gas to oil production significantly changed the spatial distribution of production in a relatively short time. Within Region M, accelerated development of the Eagle Ford Shale reflected this trend in Webb and Maverick counties. Adoption of operating practices that allowed for more water recycling and use of brackish water also changed patterns of water consumption and usage at the same time that overall water usage was increasing.

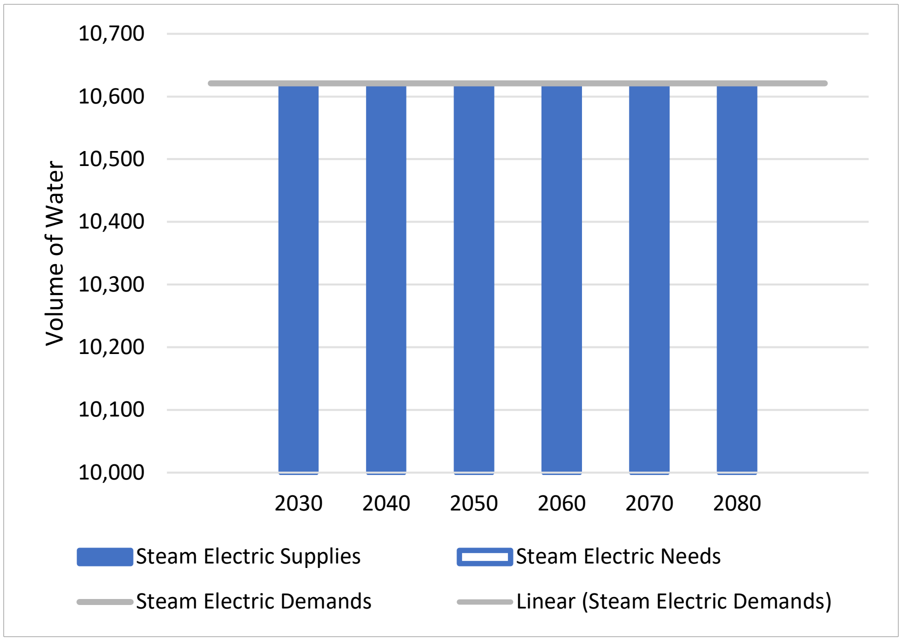

Figure ES-12 Steam-Electric Supplies as a Portion of Steam-Electric Water Demands (acft/yr)

Steam-electric power water use estimates include volumes reported to the TWDB Annual Water Use Survey by large power generation plants that sell power on the open market but generally do not include cogeneration plants that generate power for manufacturing or mining processes. Steam-electric power water use volumes that were reported by surveyed municipal water sellers rather than the power generators are included in these estimates.

Steam-electric power generation water demand is projected to remain below 1 percent the overall non-municipal water demands in Region M throughout the planning horizon. The steam-electric water demands are projected to be a constant 10,621 acft/yr from 2030 to 2080. The demand projections are lower than those in the 2021 Region M Water Plan, mainly due to the cancellation of two planned facilities associated with Coronado Power Ventures (La Paloma Energy Center). As shown on Figure ES-12, existing supplies meet the projected needs.

The primary manufacturing water users in Region M are related to the agriculture industry and the fishing industry, including sugar and vegetable processing. Manufacturing projections show an increase from 4,685 acft/yr in decade 2030 to 5,619 acft/yr in decade 2080. The increase in demand occurs primarily in Cameron and Hidalgo counties.

Water demand associated with manufacturing is met by both groundwater and surface water and comprises a relatively small portion of the regional demand and need. As shown on Figure ES-13, current supplies meet 100 percent of 2030-2050 projected demands, and nearly 100 percent for the other decades.

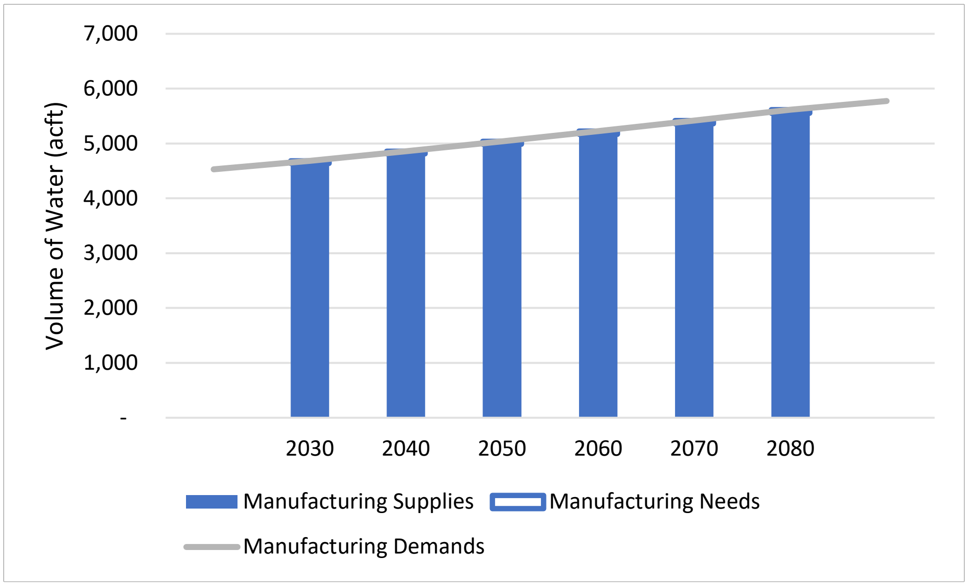

Figure ES-13 Manufacturing Supplies as a Portion of Manufacturing Water Demands (acft/yr)

ES.4 Water Management Strategies

The RWPG is tasked with evaluating all potentially feasible WMSs and recommending selected strategies to meet current and future needs in the region. The potentially feasible WMSs came from three major sources:

1. The recommended WMS from the 2021 Region M Plan;
2. Responses to requests sent to all water providers and stakeholders for project and strategy descriptions; and
3. The list of WMS for consideration listed in the water planning guidance documents provided by the TWDB.

All of the WMSs received, and some developed by the RWPG, were compiled to form the list of potentially feasible WMSs. The costs, projected yield, feasibility, and impacts were evaluated for accuracy, consistency, and compliance with TWDB rules and guidance where that information was available; where information was not available, assumptions were made and documented.

The WMS components included in this RWP are limited to the infrastructure and costs that are required to develop and convey increased water supplies from water supply sources and to treat the water for end WUG requirements. Conservation WMSs that are needed to address water loss or infrastructure bottlenecks in an existing water supply conveyance system and result in increased supplies or decreased demands are also included. Infrastructure components associated with internal water distribution networks that do not convey an additional water supply volume or address current losses are not included in the RWP.

For every WUG, the projected water saved through drought management, ID Improvements, and Advanced Municipal Water Conservation that affects the WUG was subtracted from the original need to obtain a revised need after conservation. If a need still existed, additional WMSs were considered for the WUG.

The WMS or portfolio of strategies with sufficient yield to meet the needs after drought management and conservation, or that were requested by a WUG, WWP, or ID were recommended for each WUG, and any additional viable WMS that ranked well were listed as alternative recommended strategies. Only WMSs with insufficient information or major feasibility concerns were evaluated but not recommended.

Environmental impacts of each WMS were evaluated and categorized according to the type of WMS. The categories of impacts that were quantified include the following:

- Acres impacted permanently;
- Construction impacted acreage;
- Inundation acreage;
- Agricultural resources impacted;
- Wetland impact;
- Habitat impacted acreage;
- Threatened and endangered species count;
- Cultural resources impact;
- Environmental water needs;
- Effect of upstream development on bays, estuaries, and arms of the Gulf of Mexico;
- Reduction in WWTP effluent;
- Volume of brine;
- Total dissolved solids (TDS) of brine; and
- Reliability.

ES.4.1 Water Conservation, Assumptions and Methodology

Water Conservation addresses water use reduction and water loss reduction for municipal, irrigation, and industrial water uses.

ES.4.1.1 Advanced Municipal Water Conservation

Advanced Municipal Water Conservation is recommended for most municipal WUGs in Region M. A variety of conservation measures are recommended as described in the TWDB best management practices (BMPs), any combination of which can be used to meet the specific goals for a municipality or utility.[6]

For every municipal WUG with a projected need or a per capita water use rate greater than 140 gallons per capita per day, municipal conservation yield and costs were estimated. Entities with needs and a GPCD greater than 140 GPCD were assigned a 10 percent usage reduction per decade. After the 140 GPCD goal was achieved, or for entities with a need and a GPCD below 140, the decadal reduction was set to 5 percent. A minimum value of 80 GPCD was fixed. Once the minimum value was reached,

[6] Water Conservation Implementation Task Force. “Water Conservation Best Management Practices Guide.” November 2004.

entities were projected to stop reducing their GPCD. Regardless of need, conservation is not recommended for WUGs with a GPCD less than 80. Two strategies – water loss mitigation and water use reduction – are recommended to reach the target GPCDs. The amount of water that can be conserved by implementing advanced municipal conservation measures and associated costs were estimated with the assistance of the Unified Costing Model tool.

ES.4.1.2 Irrigation District Conservation

IDs carry over 85 percent of the water that is used from the Rio Grande system in Region M. These districts were initially built to deliver water for agricultural use, but many districts now serve municipal and industrial users as well. Most of these systems have similar components, with initial pump stations to divert water from the river, some storage in either off-channel reservoirs or in the main canals, and canal or pipeline networks that deliver water to municipal utilities for treatment and distribution or to farmlands. Black & Veatch updated work that was done with Texas A&M AgriLife Research to develop expected water conservation and costs for conservation WMSs for all 25 IDs in Region M.

The ID conservation WMSs submitted via surveys over the past three planning cycles were used to form the basis of a general ID conservation WMS for all IDs. ID conservation strategies include the following:

- Canal lining (new linings and replacement of damaged linings);
- Installation or replacement of pipeline, including interconnects between IDs where IDs are capable of serving new WUG or measurable efficiency gains are achieved; and
- General repairs and improvements, including new metering and controls, which can include installation of automated system controls, meters and supervisory control and data acquisition (SCADA) systems where implementation leads to measurable efficiency gains.

All WMSs were assumed to apply to the first decade of planning, 2030, unless noted otherwise. The total annual estimated potential water savings in 2080 for all the WMSs submitted was 151,233 acft. The amount of water that can be conserved per ID was calculated based on estimates of current conveyance efficiency and a maximum efficiency of 90 percent.

It is intended that these IDs could implement any water conservation or storage improvements, including, but not limited to, metering, control automation, gates, canal lining, repair of canal lining, pipeline installation, district interconnects, new reservoirs, reservoir improvements, or any other strategy that provides beneficial, measurable conservation improvements to the ID.

ES.4.1.3 On-Farm Conservation

On-Farm conservation measures can be grouped into the following categories: water use management practices, land management systems, on-farm water delivery systems, water district delivery systems, and tailwater recovery systems. Water district delivery system improvements, including conveyance infrastructure, metering, and telemetry, are addressed as a separate WMS, although the operational effectiveness and efficiency of the IDs are necessary to reap the full benefits of on-farm measures. On-farm efficiency depends on timely delivery of water, adequate head to push water across a field, and an available supply whether on farm or from the ID.

These measures are considered on-farm conservation measures, but in most cases, implementation in a drought year increases the potential yield of a crop per acft of water but may not reduce the irrigator's overall demand for water. When water is available in a drought year, farmers are likely to use it. Making better use of the water that is available is critical to helping farmers through drought, and the Region M

Planning Group recommends continued research, education, demonstration, and large-scale implementation of these and any other irrigation conservation measures that farmers find to be appropriate.

A select subset of On-Farm Conservation strategies that were developed based on input from stakeholders and ID are discussed in detail in Chapter 5. These strategies are of particular interest to the region, although the full range of BMP described in TWDB literature is recommended where appropriate.[7] On-farm conservation is recommended for all irrigators in the planning area.

ES.4.1.4 Industrial Conservation

Implementation of BMPs for Industrial Users is recommended for every manufacturing, mining, and steam electric power user in Region M. The TWDB Water Implementation Task Force recommended strategies for industrial users to conserve water in the "Best Management Practices for Industrial Water Users" guidance.[8] The guide provides BMPs for specific industries, as well as general BMPs that are recommended for any type of industrial user.

ES.4.2 Conversion/Purchase of Surface Water Rights

Urbanization of agricultural lands within Region M is projected to increase throughout the planning period. As areas that are currently farmed are developed, the water associated with irrigating that land will become available for other uses. For the purpose of this plan, it was assumed that the increase in municipal water demand is proportional to the decrease in irrigation demand due to urbanization and estimates for urbanization rates were made for each county.

Purchase of water rights through urbanization was recommended for municipal WUGs with recommended strategies that required additional water rights to be feasible (such as expansion of a surface water treatment plant) to accompany those strategies. Additionally, the strategy for acquisition of water rights through urbanization was evaluated for most municipal WUGs that use surface water with or without needs prior to 2080.

ES.4.3 Wastewater Reuse

With increasing pressure statewide on water resources, Texas water users are considering and pursuing reuse or recycling of wastewater. Wastewater can be treated and reused for either potable or non-potable uses and can include a step that returns water to the environment for a period of time (indirect) or not (direct). All approaches to reuse have been evaluated, and the most appropriate alternatives recommended.

ES.4.3.1 Non-Potable Reuse

Wastewater reuse is most commonly used for agriculture, landscape, public parks, and golf course irrigation; industrial uses; dust control; and construction activities. This WMS is feasible if several factors are taken into consideration: (1) the location of wastewater treatment facilities relative to the location of potential users of reclaimed water, (2) the level of treatment and quality of the reclaimed water, (3) the water quality requirements of particular users, and (4) the public acceptance of reuse.

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[7] Texas Water Development Board. Best Management Practices for Agricultural Water Users. http://www.twdb.texas.gov/conservation/BMPs/Ag/index.asp. November 2013.

[8] Water Conservation Implementation Task Force. "Water Conservation Best Management Practices: Best Management Practices for Industrial Water Users." February 2013.

Non-potable reuse was evaluated for those entities that identified it as a desired WMS. In each case, the end user's demands were evaluated to verify that the supply was considered only where a demand would have otherwise been filled by municipal water, limited to meeting 25 percent of demands.

ES.4.3.2 Potable Reuse

Highly treated wastewater effluent can be used as a supplemental water supply for potable use. Indirect potable reuse is commonly practiced in Texas when surface water supplies are deliberately augmented with treated wastewater effluent. Direct potable reuse has become a feasible alternative in recent years, because of advances in technology and public acceptance as well as precedent in regulatory acceptance.

This WMS is feasible if several factors are taken into consideration: (1) the location of wastewater treatment facilities relative to the location of potential surface waters and water treatment facilities, (2) the level of treatment and quality of the reclaimed water, (3) the water quality requirements for potable water, and (4) the public acceptance of reuse.

Most of the potable reuse strategies recommended in this RWP are considered direct reuse because they do not have sufficient evidence that the reuse water would be retained in a natural environmental buffer for what would be considered an extended amount of time. By TWDB definition, indirect reuse refers to water that is returned to a natural water body so that an additional permit is required to access that water after buffering. A few indirect potable reuse projects are included, and one of those exceptions is a new indirect potable reuse project for Brownsville Public Utilities Board (PUB) that takes treated effluent through a pipeline and outfalls in a resaca before reaching the water treatment plant. In addition to the submitted potable reuse WMSs, an evaluation of wastewater treatment plants in the region was performed to determine other entities that could benefit from potable reuse.

Many of the locations where potable reuse was recommended are in the Nueces-Rio Grande Basin, but the source waters are predominantly from the Rio Grande. Wastewater reuse projects will primarily impact the flows into the drainage network, including the Arroyo Colorado. Water rights holders along the Arroyo Colorado and other drainage canals in the Nueces Rio-Grande Basin could potentially be impacted, including irrigators, some shrimp farming, and other aquaculture.

ES.4.4 Surface Water Treatment and Distribution/Transmission

Operational, treatment, and distribution/transmission projects that allow a WUG to either access a new supply or develop new supplies are included as municipal infrastructure improvements. Municipal infrastructure improvements focus on problem-specific WMSs that relate to treatment or distribution and transmission. Insufficient treatment capacity or capability can be a supply limitation and transmission and distribution projects may be required for entities that need to expand to new areas of the utility to support growth or are experiencing significant water losses due to eroded pipelines, or leaking water tanks. Because these projects are particular to the municipal utility systems, they were evaluated individually from the available information.

ES.4.5 Storage Reservoirs

Storage reservoirs include both on-channel and off-channel new storage in the region. In some cases, other strategy categories contain projects that also include small storage ponds/reservoirs that are included within the larger project. Descriptions of those are included in the other strategy categories.

Four off-channel reservoirs are included as recommended strategies in the 2026 Plan.

The Banco Morales Reservoir project was requested by Brownsville PUB and is for the construction of an off-channel raw water reservoir to capture excess water from the lower Rio Grande that currently flows into the Gulf of Mexico. The other three (Delta “Panchita” Reservoir, Santa Cruz Reservoir, and Engleman Reservoir) are included with water treatment plants and fall under a regional water facility type of strategy called the Delta Region Water Management Supply. This strategy was requested by the Hidalgo County Drainage District #1 and involves the construction of the three reservoirs in northeastern Hidalgo County to capture tailwaters and precipitation runoff for beneficial use.

One alternative storage reservoir strategy is requested by Brownsville PUB for the construction of a weir and on-channel reservoir to capture and store excess river flow for an additional water supply in the lower Rio Grande Valley. The weir and reservoir would be located about 4 miles southeast of Brownsville.

ES.4.6 Fresh Groundwater

Although Region M relies mostly on surface water, numerous entities and individuals rely on minimally treated groundwater to meet their needs. Utilities that are farther from the Rio Grande and surface water distribution networks have few alternative sources and have identified portions of the aquifer(s) that produce acceptable water for municipal use without advanced treatment technology.

In some cases, where there appears to be additional available fresh groundwater, further development of that source is recommended within the MAG values for the applicable aquifer. In some cases, this is the recommendation for County-Other entities, where domestic wells are distributed over a large area and pump small amounts for a single household.

ES.4.7 Desalination

Several desalination methods are used to treat brackish and saline groundwater and seawater, the most common of which is membrane technology. The most prevalent membrane technology is reverse osmosis (RO). Brackish or saline water is highly pressurized and pushed through semipermeable membranes that separate the brackish or saline water into fresh water and a concentrated byproduct. For higher TDS found in seawater, RO becomes significantly more energy intensive and has a lower yield of permeate, or fresh water. A typical pressure for seawater with 35,000 mg/L could be in excess of 1,000 pounds per square inch (psi). That compares to less than 200 psi for 3,000 mg/L TDS groundwater. The higher TDS plants yield less than 50 percent of the water supplied. The remaining 50 percent is the concentrated byproduct, which generally requires disposal and can add significant costs to a project. This compares to approximately 80 percent with the lower salinity brackish water facilities. Surface water intakes will require additional pretreatment of suspended solids prior to the RO treatment.

ES.4.7.1 Brackish Groundwater Development and Treatment

Texas currently has 53 municipal brackish desalination plants, with a combined capacity of about 157 million gallons per day (mgd). That includes 90 mgd of brackish groundwater desalination and 65 mgd of brackish surface water desalination.[9]

The disposal of concentrate from desalination facilities will increase levels of TDS in the receiving streams if it is not disposed of through deep well injection. Many of the facilities that are currently treating brackish groundwater dispose of concentrate in the drainage canal network in the Nueces-Rio

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[9] Texas Water Development Board Desalination Facts. [Desalination Facts - Innovative Water Technologies | Texas Water Development Board] Accessed 1/14/25.

Grande Basin, which is a part of why desalination is affordable for some utilities in the region. This network of canals is usually brackish and discharges into the Laguna Madre, parts of which are naturally hypersaline. The greatest recent threat to wildlife in the LLM has been increased inflows of low-salinity water.

As with any groundwater development project, there is potential to affect the quality of the aquifer as more water is drawn from it. While the recommended projects stay within the approved groundwater availability for each aquifer, land subsidence may be a byproduct of increased groundwater pumping.

ES.4.7.2 Seawater Desalination

Texas does not yet have a seawater desalination plant. Charged with developing the first seawater desalination plant in Texas, the TWDB has completed multiple feasibility studies and pilot-plant studies. To this date, two desalination plants have been proposed within Region M – one by the Brownsville PUB and the other by the Laguna Madre Water District.

Seawater desalination remains one of the higher cost WMSs, but costs have declined over the years as technology advances. When placed in conjunction with power generation facilities, power costs can be lower, and a combined water intake and discharge will lower, capital costs. Assessing the actual cost should be included in a feasibility analysis.

ES.4.8 Aquifer Storage and Recovery

HB807 requires that aquifer storage and recovery (ASR) be considered in each RWP. ASR is typically a way to capture water when there are excess surface water flows, similar to a surface reservoir. However, the water is then pumped to a confined aquifer where it can be pumped back out as needed. The benefits compared with surface water reservoirs include that there are no losses to evaporation, and that ASR is likely to be simpler in terms of permitting and construction. The drawbacks include very specific requirements for the local geology to make ASR feasible, and the potential for losses.

At this time, the region is not recommending an ASR project, although one project for Eagle Pass is included as an alternative strategy. Few entities have run-of-the-river water rights for the Rio Grande, which enable higher withdrawals when the river is full. It is possible that water right holders could potentially use water during “no-charge pumping” periods to charge an ASR system, but this would need to be evaluated. Additionally, much more information is required about the suitability of the geology and hydrogeology of the region.

ES.5 Drought Planning and Threats to Resources

TCEQ requires water conservation plans (WCPs) to be developed, implemented, and submitted by municipal, industrial/mining, and other non-agricultural water right holders of 1,000 acft of water per year, and agricultural water right holders of 10,000 acft/yr or more. Additionally, all wholesale and retail public water suppliers and IDs are required to develop a drought contingency plan (DCP). WCPs are required to include quantified 5- and 10-year targets for water savings, and DCPs outline entity responses to drought, including triggers for conservation stages and the restrictions of water use in each drought stage.

The drought response varies from entity to entity, primarily between those who serve customers, including irrigators, with raw water and those who deliver treated water. For those entities, such as IDs, that deliver water to irrigators, the response to drought is focused on the allocation system and how agricultural water rights are fulfilled when supplies are limited by the TCEQ Watermaster. Each water district responds slightly differently, in some cases allowing water to be sold between farmers in their district, or for farmers to consolidate their allocations on a portion of their land, leaving other areas for dry land farming or to fallow.

Those entities who deliver treated water generally developed triggers that were based either on the remaining municipal water rights available to the city for that year or the capacities of their treatment plants, so that high demands on the plants trigger a conservation stage. The conservation stages for cities included limitations on car washing and lawn watering, ranging from voluntary in early stages to some fines or other penalties in later stages.

The Rio Grande RWPG recognizes that there is known, unquantified uncertainty associated with estimating population, water demands, hydrologic conditions, and WMS firm yields, as well as the current trends of the reservoir firm yields and the decreased inflows from tributaries on both the US side and Mexican side. On a regionwide basis, the Rio Grande RWPG considered planning for uncertainty and Drought Worse than the Drought of Record (DWDOR), such as incorporation of forecasting tools and climate models to evaluate supplies or application of a safety factor. However, the Rio Grande RWPG chose not to plan for uncertainty or DWDOR on a regional scale at this time because forecasting tools have not been able to provide the resolution needed for water planning on a regional basis.

Additionally, the Rio Grande RWPG recognizes the uncertainty of the water deliveries from Mexico. On November 7, 2024, the United States and Mexico International Boundary Water Commissions signed Minute 331 which focused on improving reliability and predictability of Rio Grande water deliveries. The Minute, which comes amid growing water scarcity on both sides of the Rio Grande, recognizes the importance to the United States of incorporating Texas water deliveries in the annual allocation plans of Mexico's water managers. During the current cycle, which began on October 25, 2020, Mexico has delivered a total of 425,405 acft. Mexico's obligation under the treaty is to deliver 1.75 million acft by October 24, 2025, absent extraordinary drought or a serious infrastructure accident.

While planning measures to address a DWDOR have not been included on a regionwide basis, several entities have recommended strategies and projects in this plan that will provide them with a secondary source of water, such as potable reuse or groundwater, in order to continue to plan for times when surface water availability may be limited.

ES.5.1 Threats to Agricultural and Natural Resources

As described in detail in Chapter 3, under the existing water rights system, irrigation water use is a "residual" claimant to available water supplies from the Rio Grande. During periods of low inflows to the reservoir system, when there are little or no allocations made to irrigation and mining storage accounts, these users deplete their storage accounts and may suffer shortages.

An additional threat to the region's water supplies is unchecked development of groundwater resources. Only a small portion of the region is in a GCD. Without a GCD, the conservation goals described in the desired future conditions for each aquifer cannot be implemented or monitored.

Pumping groundwater in some locations may impact surface water, especially near the Amistad Dam. Water marketing companies are actively seeking water sources to be sold to entities in need of new water sources. In and around Val Verde County, there is strong evidence of interaction between groundwater and surface water. The pumping of groundwater in the Devils and Pecos River basins has been shown to directly impact these streamflows and the flows in Goodenough Springs, which play a significant role in supplying water for Region M. Any reduction in the water supply in the Amistad Reservoir presents a threat to the whole region.

Another threat to agricultural and natural resources of the region is the impact of urbanization on currently undeveloped areas and the loss of water and habitat availability for wildlife. This would have a negative impact on ecotourism. Urbanization plays a major role in determining how water resources will be used in the future. Particularly in Cameron and Hidalgo counties, projected urbanization is expected to significantly reduce the area of irrigable farmland. In addition to the direct reduction of irrigable farmland acreage due to change in land use, urbanization also impacts adjacent farmland by increasing property values and restricting some types of agricultural activities (e.g., use of pesticides).

The conservation WMSs discussed in this plan aim to assist water users in making the most of what water is available in drought years. IDs play a major role in the delivery of water, and improvements of their operations and efficiency represent a significant portion of the strategy for meeting future demands. Given the uncertainty associated with irrigation water rights for all of the reasons described above, it will become increasingly critical for all users in Region M to carefully manage their water.

ES.6 Policy Recommendations and Unique Sites

As in previous regional water planning cycles, the Rio Grande RWPG continues to choose not to designate any stream segments or reservoirs as unique.

Policy recommendations from the Rio Grande RWPG that address State, Federal, and international issues have been updated for this cycle and are included in Chapter 8 of the plan.

ES.7 Implementation and Comparison to the Previous Regional Water Plan

Each update to the Regional Water Plan (RWP) is an opportunity for the Regional Water Planning Group (RWPG) to evaluate the changes in the region's water use and conservation goals, and to lay out a path toward meeting future water needs. Every 5-year cycle of planning includes reevaluation of demands, current and future, an update of supplies currently being used, and development of a range of WMSs that can be used to meet projected needs. Comparing the current plan to the previous plan allows for an understanding of how things change within these 5-year cycles.

In addition, an implementation survey was conducted for the 2026 Rio Grande RWP, which describes the progress toward implementing projects that were recommended in the 2021 RWP.

ES.8 Public Participation

Public participation is the basis of the regional water planning process initiated by Senate Bill 2 in 1997. Under Texas Water Development Board (TWDB) rules laid out in 31 Texas Administrative Code (TAC) §357, regional water planning groups (RWPGs) must include a broad cross-section of stakeholder groups representing communities throughout the region.

The Rio Grande RWPG abides by the Open Meetings Act[10] and Public Information Act[11], which require members of governmental bodies to participate in education training and open records training pursuant to Sections 551.005 and 552.012 of the Texas Government Code, respectively. These Acts in conjunction determine how open meetings are operated and public information is made available to the public. More information can be found on the Office of the Texas Attorney General website (https://www.texasattorneygeneral.gov/). The Rio Grande RWPG met all requirements under the Texas Open Meetings Act and Public Information Act in accordance with Title 31 of the Texas Administrative Code (31 TAC) Sections 357.12, 357.21, and 357.50(f).

The group also identified key groups of stakeholders that represent utilities, irrigation districts (IDs), farmers, and environmental organizations, beyond the individual stakeholders on the planning group, that have participated in development of the plan. The Rio Grande RWPG held regular meetings throughout the planning process, generally on a monthly basis. Each meeting provided opportunity for public comment. Meeting schedules, agendas, and minutes were emailed to the planning group and posted on the Region M website, and the meeting dates were listed on the TWDB website. The Rio Grande RWPG's website: www.RioGrandeWaterPlan.org, is a resource for the public on issues of concern to regional water planning and information on the planning process.

[10] Office of the Texas Attorney General. "Open Meetings Act". https://www.texasattorneygeneral.gov/open-government/open-meetings-act-training.
[11] Office of the Texas Attorney General. "Public Information Act". https://www.texasattorneygeneral.gov/open-government/governmental-bodies/pia-and-oma-training-resources/public-information-act-training.

INITIALLY PREPARED PLAN

CHAPTER 1: DESCRIPTION OF THE REGIONAL WATER PLANNING AREA

Rio Grande Regional Water Plan

BV PROJECT NO. 411250

PREPARED FOR

Rio Grande Regional Water Planning Group

1 MARCH 2025

BLACK & VEATCH

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acft	Acre-Feet
acft/yr	Acre-Feet per Year
BRACS	Brackish Resource Aquifer Characterization System
CRP	Clean Rivers Program
DCP	Drought Contingency Plan
DMI	Domestic/Municipal/Industrial
DOR	Drought of Record
ESA	Endangered Species Act
IBWC	International Boundary and Water Commission
IWRP	Integrated Water Resources Plan
mg/L	Milligrams per Liter
MUD	Municipal Utility District
MWP	Major Water Provider
NWR	National Wildlife Refuge
PUB	Public Utilities Board
RWP	Regional Water Plan
RWPG	Regional Water Planning Group
SB1	Senate Bill 1
SP	State Park
SUD	Special Utility District
SWP	State Water Plan
TCEQ	Texas Commission on Environmental Quality
TMDL	Total Maximum Daily Load
TPDES	Texas Pollutant Discharge Elimination System
TPWD	Texas Parks and Wildlife Department
TWDB	Texas Water Development Board
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
WAM	Water Availability Model
WID	Water Improvement District
WMA	Wildlife Management Area
WMS	Water Management Strategy
WPP	Watershed Protection Plan
WSC	Water Supply Corporation
WUG	Water User Group

1.0 Description of the Regional Water Planning Area

1.1 Planning Background

The Texas Water Development Board (TWDB) was established in 1957 through a state constitutional amendment and is charged with preparing a comprehensive and flexible long-term plan for the development, conservation, and management of the state's water resources. Historically, the State Water Plan (SWP) had been prepared by the TWDB with input from other state and local agencies and the public. Senate Bill 1 (SB1) was enacted in 1997 by the 75th Legislature; the bill established a "bottom up" approach whereby SWPs would be based on Regional Water Plans (RWPs) prepared and adopted by the 16 Regional Water Planning Groups (RWPGs). SB1 states the purpose of regional water planning:

"…provide for the orderly development, management, and conservation of water resources and preparation for and response to drought conditions in order that sufficient water will be available at a reasonable cost to ensure public health, safety, and welfare; further economic development; and protect the agricultural and natural resources of that particular region."

SB1 also provides that future regulatory and financing decisions of the Texas Commission on Environmental Quality (TCEQ) and the TWDB be consistent with the current SWP. In 2013, House Bill 4 was enacted, which lends greater weight to the SWP by committing an additional funding pool to the implementation of projects recommended in the plan by way of the State Water Implementation Fund for Texas.

The Rio Grande Regional Water Planning Group (Region M) members, listed in Table 1-1, act as the decision-making body for the regional water planning effort. The Lower Rio Grande Valley Development Council serves as the political subdivision to administer the regional water planning grant, and Black & Veatch Corporation was selected as the prime consultant for the planning and engineering tasks required for development of the RWP.

Table 1-1 Region M Water Planning Group

Interest	Name	Resident County
Public	Tomas Rodriguez Laredo	Webb
Counties	Joe Rathmell County Judge, Zapata County	Zapata
	David L. Fuentes Precinct 1 Commissioner, Hidalgo County	Hidalgo
Municipalities	Jorge Flores Eagle Pass Water Works	Maverick
	Marilyn Gilbert Brownsville Public Utilities Board	Cameron

Interest	Name	Resident County
Industries	Donald K. McGhee, Secretary*	Cameron
	Hydro Systems, Inc., Harlingen	
Agriculture	Neal Wilkins, Ph.D.	Jim Hogg
	East Wildlife Foundation	
	Dale Murden	Hidalgo
	Texas Citrus Mutual, Mission	
Environmental	Jaime Flores	Hidalgo
	The Arroyo Colorado Watershed	
Small Business	Carlos Garza	Hidalgo
	AEC Engineering, LLC, Edinburg	
	Nick Benavides*	Webb
	Nick Benavides Co., Laredo	
River Authorities	Jim Darling, Chairman*	Hidalgo
	Rio Grande Regional Water Authority	
Water Districts	Sonny Hinojosa, Vice-Chairman*	Hidalgo
	Hidalgo County Irrigation District No. 2, San Juan	
	Tom McLemore	Cameron
	Harlingen Irrigation District	
Water Utilities	Steven Sanchez	Hidalgo
	North Alamo Water Supply Corporation (WSC)	
Groundwater Management Area	Louie Peña	(GMA 16)
	Brush Country GCD	
	Debbie Farmer	(GMA 13)
	Wintergarden GCD, Carrizo Springs	
Other	Glenn Jarvis	Hidalgo
	Attorney, McAllen	
	Frank Schuster*	Hidalgo
	Val Verde Vegetable Co., McAllen	
Electric Generating Utilities	Robert Latham	Hidalgo
	Magic Valley Generation Station	
*Executive Committee Member		

The RWPs are updated every 5 years and used as a part of the update to the SWP. The RWPs, which are based on an assessment of future water demands and currently available water supply, include specific recommendations for meeting identified water needs through the end of a 50-year planning horizon (2030 through 2080 for this plan). The plans also include recommendations regarding policy at the state and local level, including environmental protection, drought response, and resource management.

1.2 The Rio Grande Regional Water Planning Area

The Rio Grande Regional Water Planning Area (Region M) consists of the eight counties along the middle and lower Rio Grande up to the mouth of the river at the Gulf of Mexico (Figure 1-1).

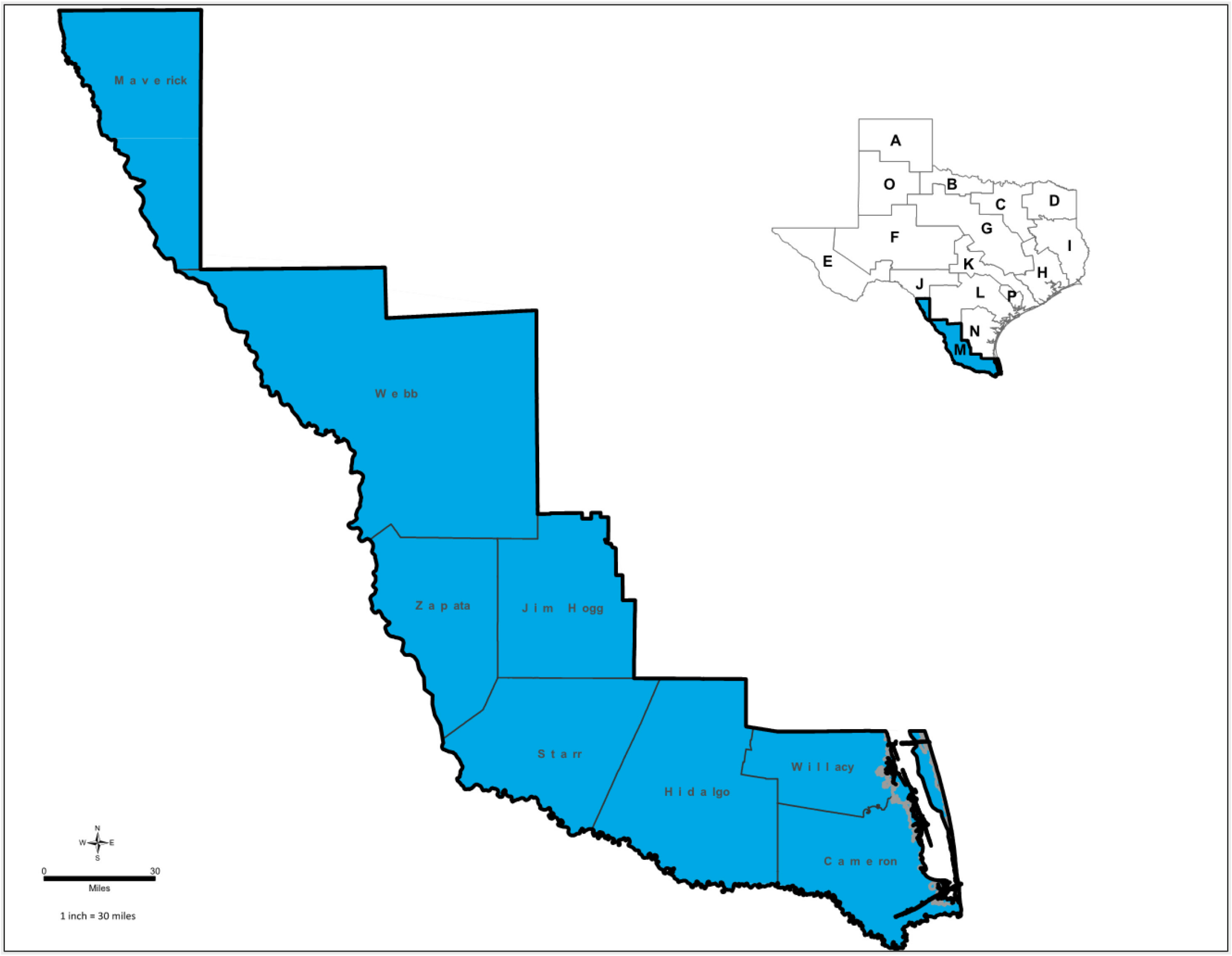

Figure 1-1 Rio Grande Regional Planning Area (Region M)

1.2.1 Climate

The climate ranges from humid subtropical in the eastern portion, nearest to the Gulf Coast, and drier tropical to subtropical in the west. The number of frost-free days varies from 320 days at the coast to 230 days in the northwestern portion of the region near Maverick County, resulting in a long growing season most years.[1] The amount of rainfall varies across the Lower Rio Grande Region from an average of 28 inches at the coast to 18 inches in the northwestern portion of the region; rainfall is primarily from thunderstorms in the spring and occasional hurricanes in the late summer and fall. These storms can generate tremendous amounts of rainfall over a short period of time and cause extensive flooding because of the region's relatively flat terrain. The fall storms provide a large portion of the surface water runoff captured in water supply reservoirs within the Rio Grande basin.

1.2.2 Population and Economy

The population of Region M is concentrated in Cameron, Hidalgo, and Webb counties, accounting for 90.5 percent of the regional total in 2020. Figure 1-2 shows the historical population in each county (US Census historical data).

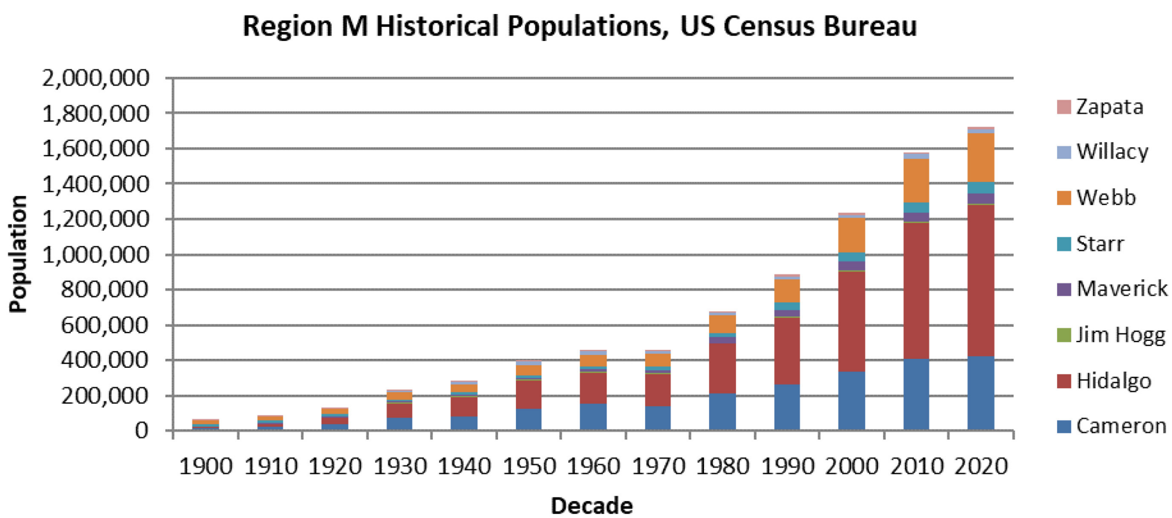

Figure 1-2 Region M Historical Populations, US Census Bureau

[1] "Texas Interactive Average Last Frost Date Map." Plantmaps.com, www.plantmaps.com/interactive-texas-last-frost-date-map.php.

Figure 1-3 shows current population centers in Region M. The population of the region is expected to grow to over 2.1 million people by the end of the current planning horizon, which represents a 11.8 percent population increase from 2030 to 2080. Chapter 2 describes the population and municipal demand projections in detail.

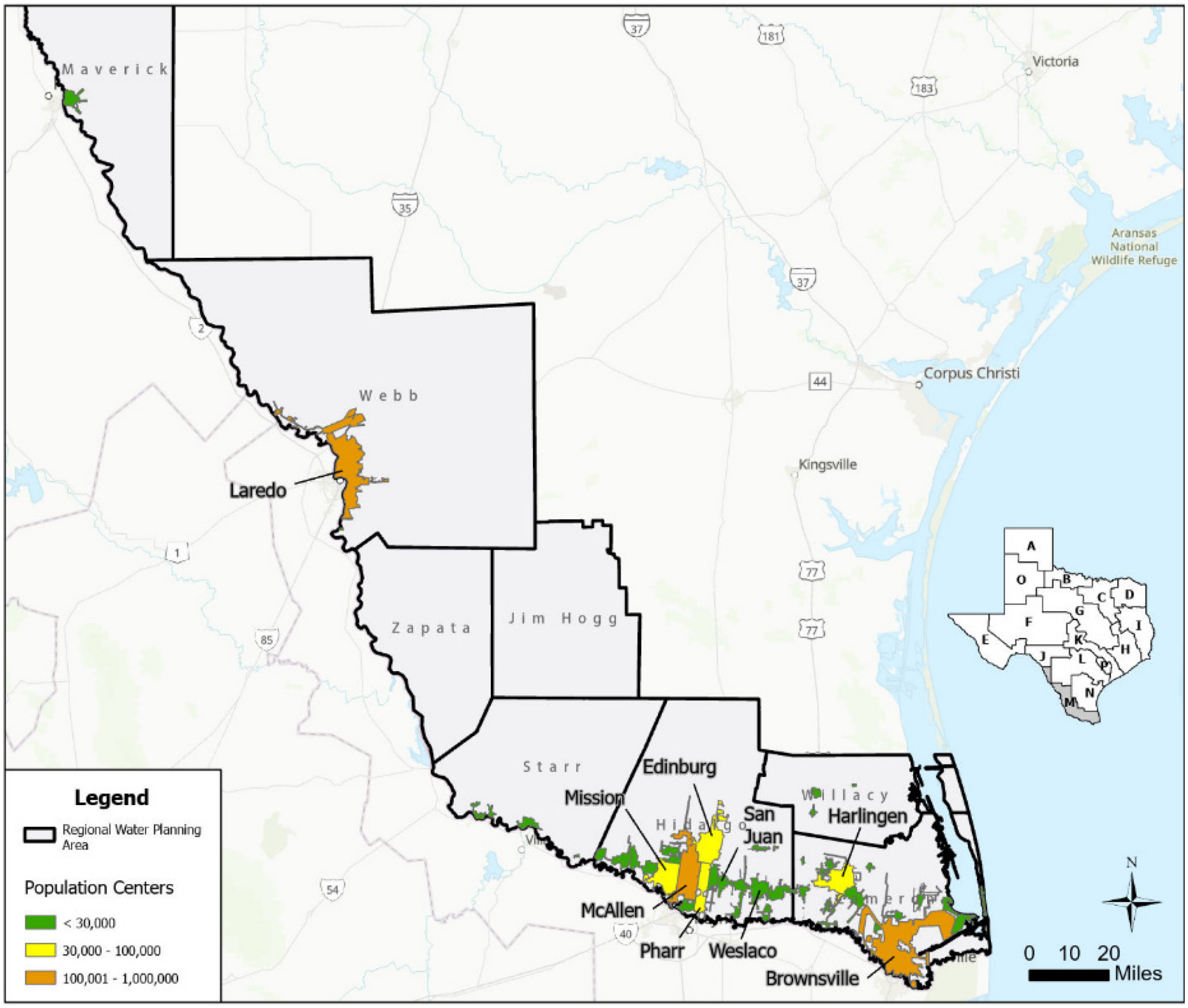

Figure 1-3 Population Centers of Region M

An important factor driving rapid population growth in the Rio Grande Region is its cultural, social, and economic relationship with Mexico. Nationwide, Mexico's population growth rate in 2020 was 0.7 percent, compared with 1 percent for the United States.[2] The Mexican portion of the Rio Grande watershed (known as the Rio Bravo in Mexico) was home to approximately 12.61 million people in 2017 and is anticipated to have 14.4 million inhabitants by 2030.[3] An annual growth rate of 1.01 percent is projected by the World Bank between 2017 and 2030; using this growth rate, the projected population

[2] World Bank Population Growth Data. http://data.worldbank.org/indicator/SP.POP.GROW accessed 6/18/24.
[3] Estadísticas del Agua en México, 2018. Gobierno de la República de México, Secretaría de Medio Ambiente y Recursos Naturales, Comisión Nacional del Agua https://files.conagua.gob.mx/conagua/publicaciones/Publicaciones/EAM2018.pdf. Accessed 06/10/2019.

in 2070 would be over 21 million. Growth on both sides of the border will continue to put pressure on the capabilities of surface and groundwater to meet the region's needs.

Historically, agriculture has dominated the economy of the Rio Grande Region. There has been a shift toward urbanization and diversification of the economy, but agriculture still plays a major role.

The 2022 United States Department of Agriculture (USDA) Census of Agriculture lists the total pre-tax income from farm-related sources as $77.7 million for Region M, of $1.9 billion across Texas. Grain sorghum, sugar cane, cotton, citrus, and onions make up the bulk of the agriculture receipts in the region, and most of this is centered in Hidalgo and Cameron counties (Figure 1-4).[4] Cattle and farmland accounted for just under 6 million acres, almost 80 percent of the region's land area. In 2024, the Rio Grande Valley Sugar Growers, Inc. decided to close the only sugar mill in Texas due to the lack of reliable water supply, including the reduced deliveries from Mexico. The mill supported hundreds of mill workers and over 100 local sugar cane growers, and its closure will have a significant impact on the economy in the Rio Grande Valley.

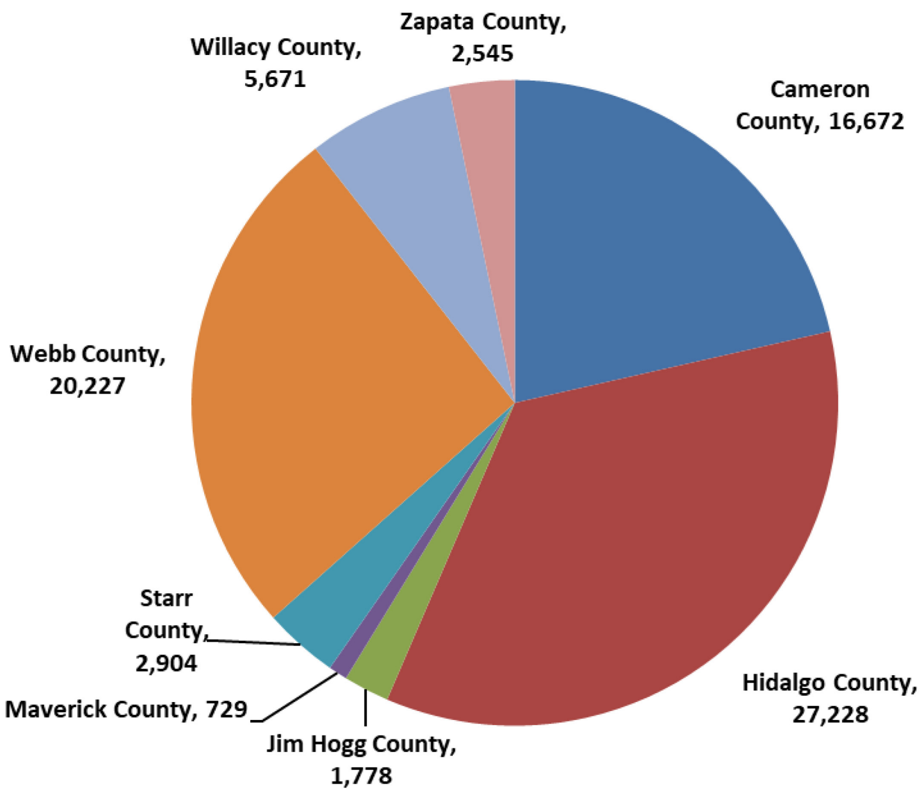

Figure 1-4 Pre-Tax Gross Farm Income by County ($1,000), USDA 2022 Agriculture Census

[4] USDA. *2022 Agricultural Census*. https://www.nass.usda.gov/Publications/AgCensus/2022/Full_Report/Volume_1,_Chapter_2_County_Level/Texas/st48_2_001_001.pdf. Accessed 7/11/2024.

The Texas labor market forecasts for 2020 to 2030 predict 17 percent employment growth in the planning area. The major economic growth areas are construction, professional and business services, education and health services, and leisure and hospitality; information technology and mining show little to no growth.[5]

Oil and gas production in the region changed considerably in the 2000s from traditional oil drilling to hydraulic fracturing and nontraditional development, which had a significant impact on the regional economy and associated water demands. Mining water demands are discussed further in Chapter 2.

Nature tourism contributes considerably to the Rio Grande Valley economy. The Economic Impact of Travel on Texas report from 2018 shows that travel and visitor spending within the Rio Grande Valley had been steadily increasing, but has seen minor decline in recent years (Figure 1-5).[6] The quality of the river and its adjacent wildlife habitat will directly affect the number of ecotourists visiting the region in the future.

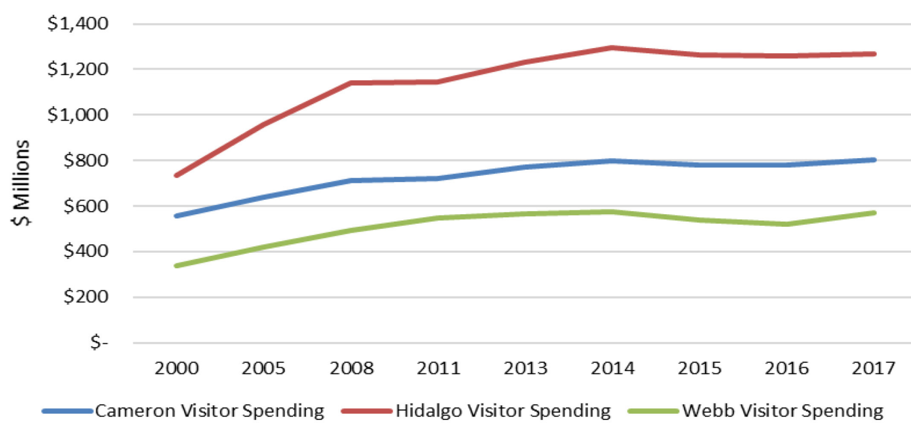

Figure 1-5 Direct County Travel Spending ($ Millions)

Despite growth in some sectors of the economy, the region experiences significantly lower income and higher unemployment than the rest of Texas and the nation as a whole (Table 1-2). A clear division exists between the urban growth centers (Brownsville, McAllen, Harlingen, and Laredo) and smaller rural towns and colonias. Colonias are semi-rural subdivisions that are often built with substandard potable water and sanitary sewer systems. The properties are often sold through a contract for deed, which is a loan from the seller to the buyer that is paid in installments while the seller retains the title. This arrangement does not allow the homeowner to access traditional home ownership financing. There have been efforts at the state, county, and local levels to provide basic services in many of the colonias in Region M.[7]

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[5] Texas Labor Market and Career Information, Texas Workforce Commission. https://texaslmi.com/LMIbyCategory/Projections . Accessed 7/11/2024.

[6] Dean Runyan Associates. The Economic Impact of Travel on Texas. 2020 https://static1.squarespace.com/static/5ea0c297db073c065cc8f3a7/t/6154bb00195acd09f0b205fd/1632942878218/TX_TravelImpacts_2020.pdf. Accessed 7/11/2024.

[7] Texas Secretary of State website. http://www.sos.state.tx.us/border/colonias/faqs.shtml. Accessed 2/25/2015.

Table 1-2 Median Household Income, Poverty, and Unemployment Rate, by County

County	Median Household Income, 2022 ($/Year)[1]	Persons in Poverty Level, 2023 (%)[1]	Unemployment Rate, 2024 (in 2024 $) (%)[2]
Cameron	$47,435	22.60%	4.80%
Hidalgo	$49,371	27.40%	5.40%
Jim Hogg	$42,292	26.90%	4.40%
Maverick	$48,497	21.90%	8.00%
Starr	$35,979	32.80%	8.60%
Webb	$59,984	20.90%	3.70%
Willacy	$42,839	29.00%	6.60%
Zapata	$35,061	32.80%	6.10%

[1] US Census Bureau State and County, QuickFacts. https://www.census.gov/quickfacts/fact/table/tx/INC110217. Accessed 6/26/2024.
[2] Bureau of Labor Statistics, Unemployment. https://data.bls.gov/map/MapToolServlet. Accessed 6/26/2024.

As of 2023, seven out of the eight counties in Region M are labeled as eligible for funds through the Economically Distressed Areas Program.[8]

1.2.3 Surface Water Resources

Region M draws the majority of its water from the Rio Grande via the Amistad-Falcon Reservoir system, which is jointly operated with Mexico. Inflows to the watershed come from both the United States and Mexican watersheds. Two major treaties between Mexico and the United States (1906 and 1944) establish how these waters are shared. Annually, Mexico is to deliver a minimum of 350,000 acre-feet (acft) to the United States on average over a 5-year cycle. Exceptions are provided for years of extraordinary drought, when the watershed in Mexico cannot provide sufficient runoff water, or in cases of serious accident to hydraulic systems. The International Boundary and Water Commission (IBWC) manages the accounting of water in Mexican and US storage. The IBWC began negotiation of a new Minute in 2023 to increase the predictability and reliability of Rio Grande water deliveries to users in both the United States and Mexico. Minute 331 was signed by the United States and Mexico on November 7, 2024.

Releases from Amistad and Falcon reservoirs to deliver water to users are coordinated by the Rio Grande Watermaster. Amistad-Falcon reservoir system water rights are apportioned using classes of water rights (different from prior appropriation, which is used on most rivers in Texas). The three classes are Domestic/Municipal/Industrial (DMI), and Class A and Class B, which are typically designated for irrigation and mining. Each water right holder has an annual maximum diversion, and each withdrawal of water is "charged to" their account. The exception to this is when the system is operating in excess flow and/or storage, so the Watermaster may declare a period of "no charge pumping."

[8] Texas Water Development Board. Economically Distressed Areas Program Quarterly Report. September 1, 2022 – August 31, 2023. https://www.twdb.texas.gov/publications/reports/edap_reports/doc/SFY2023-EDAP-Annual-Report.pdf?d=5372.600000023842. Accessed 6/26/2024.

The US portion of reservoir storage capacity is divided into storage pools that are designated for reservoir operations or fulfillment of water rights; each class of water rights has a dedicated storage pool in the reservoir accounting system as outlined in the Texas Administrative Code Chapter Subchapter C §303.22.[9] With the amount of U.S. water in storage in the Amistad-Falcon Reservoir System on the last Saturday of each month, the Rio Grande Watermaster performs the following calculation: 4,600 acre feet is deducted for Dead Storage, 225,000 acre feet is deducted to re-establish the Domestic, Municipal, and Industrial Reserve, from the remaining storage, the end-of-month account balances for all Lower and Middle Rio Grande irrigation and mining accounts is deducted, and from the remaining storage, 75,000 acre feet is deducted for the Operational Reserve. If there is water remaining after the computation, it may be allocated to the Class A and Class B (irrigation and mining) accounts with Class A receiving 1.7 times more than Class B accounts.

The Arroyo Colorado (Figure 1-6) flows approximately 90 miles from its headwaters southwest of the City of Mission, to its confluence with the Lower Laguna Madre in the northeast portion of Cameron County. The Arroyo Colorado is an ancient distributary channel of the Rio Grande. The land area that drains into the Arroyo Colorado is known as the Arroyo Colorado Watershed. This area is approximately 706 square miles or 500,000 acres covering portions of three Texas counties (Hidalgo, Cameron, and Willacy) and over 25 municipalities in the Lower Rio Grande Valley. Approximately 330,000 acres of the watershed are used for agriculture. Agricultural producers in the watershed grow cotton, grain sorghum, corn, sugar cane, citrus, and vegetables because of the fertile soil, temperate climate, and access to irrigation water. Almost all the irrigation return flows and urban runoff from these areas are discharged into drainage canals which flow to the Arroyo Colorado and are the main source of excess nutrients entering the waterbody. Perennial (year-round) flow is sustained mainly by flows from municipal wastewater treatment facilities.

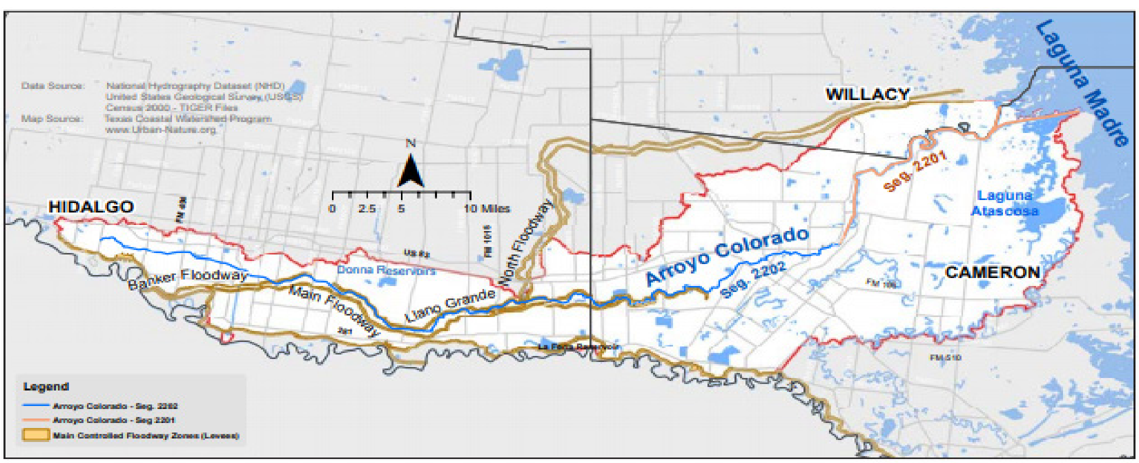

Figure 1-6 **Hydrologic Map of the Arroyo Colorado Showing Floodway Systems (Arroyo Colorado Watershed Protection Plan, 2017 update)[10]**

The Arroyo Colorado River is the primary source of freshwater for the Lower Laguna Madre, which is one of only three hypersaline lagoons (i.e., saltier than the ocean) in the world and is considered the

[9] Texas Administrative Code https://texreg.sos.state.tx.us/public/readtac$ext.TacPage?sl=R&app=9&p_dir=&p_rloc=&p_tloc=&p_ploc=&pg=1&p_tac=&ti=30&pt=1&ch=303&rl=22. Accessed 6/26/2024.

[10] Arroyo Colorado Watershed Protection Plan. https://arroyocolorado.org/.

most productive hypersaline lagoon system. As a result of this, it is imperative not only that adequate amounts of fresh water flow into the Lower Laguna Madre but that the water quality meets the needs of the various uses of the water body including irrigation, recreation, industrial, municipal, and aquatic life. Having water of good quality not only improves the uses of the Arroyo Colorado but also improves the economy in the region. The Rio Grande and the Arroyo Colorado are discussed in detail in Chapter 3.

The three river basins in Region M are shown on Figure 1-7. The Rio Grande basin in Hidalgo and Cameron counties is a very narrow strip of land as a result of the river delta. The majority of water that is used in these counties is transported through irrigation districts from the Rio Grande basin for use in the coastal Nueces-Rio Grande basin and drains to the Gulf through drainage channels and the Arroyo Colorado.

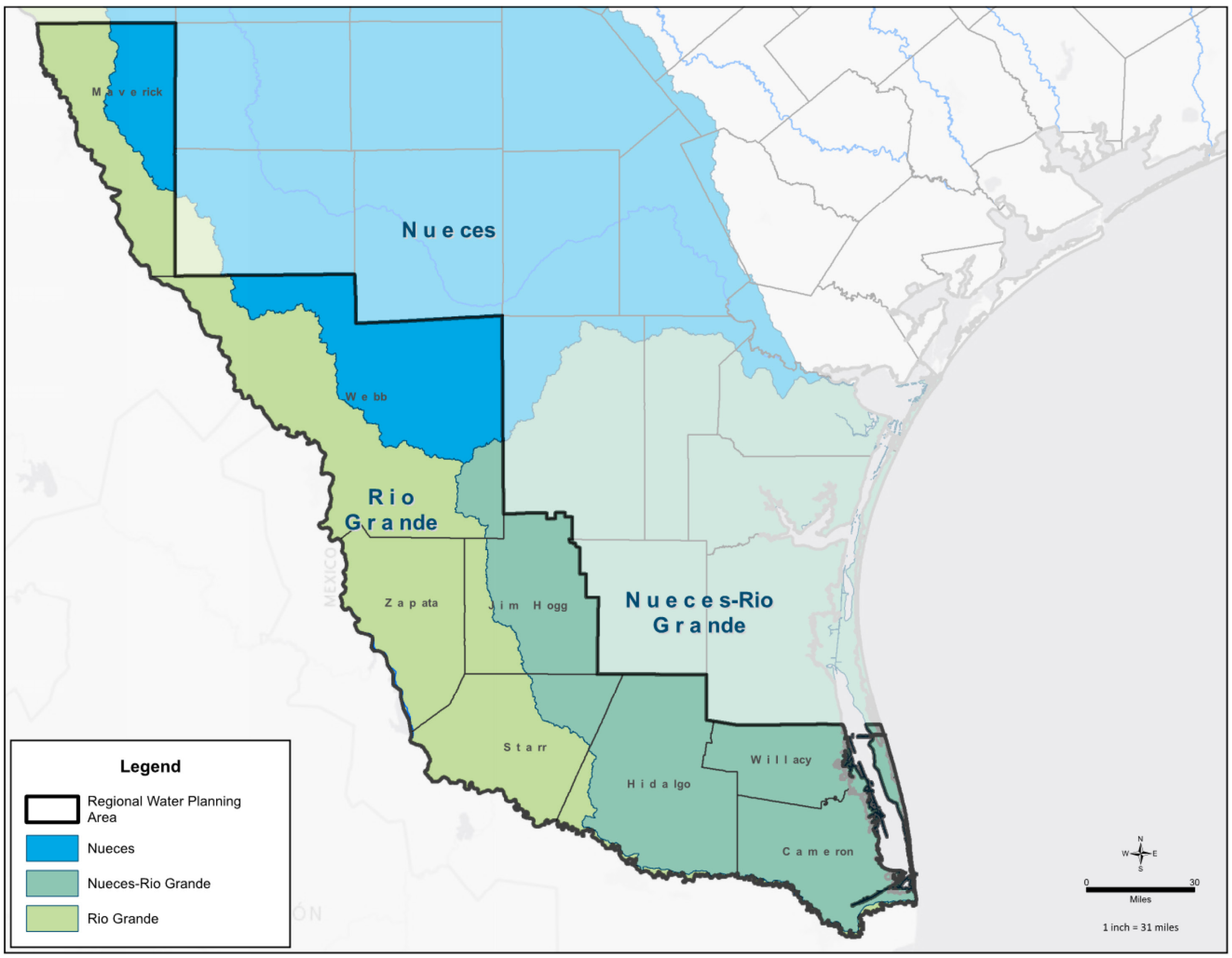

Figure 1-7 River Basins in Region M

1.2.4 Surface Water Quality

To support its charge to restore and maintain the quality of water in the state, the TCEQ establishes the Texas Surface Water Quality Standards (TSWQS) in Title 30 of the Texas Administrative Code (TAC) §307 and then monitors the water bodies to determine whether they meet applicable water quality standards. In 1991, the Texas Legislature created the Texas Clean Rivers Program (CRP) to conduct water quality monitoring and public outreach across the state through partnerships between TCEQ and local agencies in a coordinated manner.[11] The IBWC administers the CRP in the Rio Grande basin, and the Nueces River Authority administers both the Nueces and Nueces-Rio Grande basins.

Using data collected through the CRP, the TCEQ evaluates water quality in the state and identifies water bodies that do not meet the TSWQS. Every 2 years, the TCEQ compiles the *Texas Integrated Report*, which identifies water bodies with water quality impairments[12] and those with concerns for use attainment and screening levels[13]. Impaired segments are water bodies that do not meet one or more water quality standards. Segments with water quality concerns are water bodies that are near nonattainment of the water quality standards based on numeric criteria or that have water quality not meeting screening levels. The TCEQ does not currently have numeric water quality standards for nutrients in rivers, streams, and estuaries. Instead, the TCEQ uses screening methods to evaluate whether a water body exceeds screening levels for phosphorus, ammonia-nitrogen, nitrate-nitrogen, and chlorophyll-a. Water bodies that exceed the screening levels for nutrients are shown as having a water quality concern for the applicable pollutant. For some freshwater reservoirs, the TCEQ has numeric criteria for chlorophyll-a; however, none is included within the Lavaca Regional Water Planning Area.

Table 1-3 provides a list of water bodies in the Rio Grande Region for which the TCEQ assesses and reports water quality. The table identifies whether each water body is listed as having an impairment or a concern, and also identifies the parameter for which there is a water quality impairment or concern.

Table 1-3 TCEQ Rio Grande Region Water Quality Evaluation of Impairments and Concerns

Segment No.	Segment Name	Impairment(s)	Concern(s)
2201	Arroyo Colorado Tidal	Bacteria in Water, Depressed Dissolved Oxygen in Water, Mercury in Edible Tissue, PCBs in Edible Tissue	Chlorophyll-a in Water, Depressed Dissolved Oxygen in Water, Nitrate in Water, Total Phosphorus in Water
2201A	Harding Ranch Drainage Ditch Tributary (A) to the Arroyo Colorado Tidal	NA - None	NA - None
2201B	Unnamed Drainage Ditch Tributary (B) in Cameron County Drainage District No. 3	Bacteria in Water	Chlorophyll-a in Water

[11] International Boundary and Water Commission, US Section Texas Clean Rivers Program. *2022 Basin Highlights Report, Texas Rio Grande Basin Program Update*. http://www.ibwc.state.gov/CRP/Publications.html.
[12] TCEQ *2022 Texas Integrated Report - Index of Water Quality Impairments*. https://www.tceq.texas.gov/downloads/water-quality/assessment/integrated-report-2022/2022-imp-index.pdf.
[13] TCEQ *2022 Texas Integrated Report – Water Bodies with Concerns for Use Attainment and Screening Levels.* https://www.tceq.texas.gov/downloads/water-quality/assessment/integrated-report-2022/2022-concerns.pdf.

Segment No.	Segment Name	Impairment(s)	Concern(s)
2201C	Drainage ditches flowing into Arroyo Colorado Tidal	NA - None	NA - None
2202	Arroyo Colorado Above Tidal	Bacteria in Water, Mercury in Edible Tissue, PCBs in Edible Tissue	Chlorophyll-a in Water, Nitrate in Water, Total Phosphorus in Water
2202A	Donna Reservoir	PCBs in Edible Tissue	NA - None
2202B	Unnamed Drainage Ditch Tributary (B) to S. Arroyo Colorado	NA - None	Ammonia in Water, Bacteria in Water, Chlorophyll-a in Water
2202C	Unnamed Drainage Ditch Tributary (C) to S. Arroyo Colorado	NA - None	Ammonia in Water, Bacteria in Water
2202D	Unnamed Drainage Ditch Tributary (D) to S. Arroyo Colorado	NA - None	NA - None
2202E	Unnamed Drainage Ditch Tributary (E) to S. Arroyo Colorado	NA - None	NA - None
2202F	Drainage ditches flowing into Arroyo Colorado Above Tidal	NA - None	NA - None
2301	Rio Grande Tidal	NA - None	Bacteria in Water, Chlorophyll-a in Water, Depressed Dissolved Oxygen in Water, Nitrate in Water
2302	Rio Grande Below Falcon Reservoir	Bacteria in Water	Ammonia in Water, Chlorophyll-a in Water, Depressed Dissolved Oxygen in Water, pH
2302A	Arroyo Los Olmos	Bacteria in Water, Depressed Dissolved Oxygen in Water	Chlorophyll-a in Water, Depressed Dissolved Oxygen in Water
2303	International Falcon Reservoir	NA - None	Ambient Toxicity in Water, Fish Kill in Water
2304	Rio Grande Below Amistad Reservoir	Bacteria in Water	Ammonia in Water, Ambient Toxicity in Water
2304B	Manadas Creek	NA - None	Bacteria in Water, Nitrate in Water, Total Phosphorus in Water, Antimony in Sediment
2491	Laguna Madre	Bacteria in Water, Depressed Dissolved Oxygen in Water	Bacteria in Water, Chlorophyll-a in Water, Nitrate in Water

Segment No.	Segment Name	Impairment(s)	Concern(s)
2491OW	Laguna Madre (Oyster Waters)	Bacteria in Water	NA - None
2491A	Drainage ditches flowing into segment 2491	NA - None	NA - None
2491B	North Floodway	NA - None	Bacteria in Water, Chlorophyll-a in Water, Nitrate in Water
2491C	Drainage ditches flowing into Lower Laguna Madre	NA - None	Bacteria in Water, Chlorophyll-a in Water, Nitrate in Water, Total Phosphorus in Water
2493	South Bay	NA - None	NA - None
2493OW	South Bay (Oyster Waters)	NA - None	NA - None
2494	Brownsville Ship Channel	NA - None	Depressed Dissolved Oxygen in Water
2494A	Port Isabel Fishing Harbor	Bacteria in Water	NA - None
2494B	Drainage ditches flowing into San Martin Lakes	NA - None	NA - None
2494C	San Martin Lakes	NA - None	NA - None
2501	Gulf of Mexico	Bacteria in Water, Mercury in Edible Tissue	NA - None
2501BO	Boca Chica State Park (Recreational Beaches)	NA - None	NA - None
2501SP	South Padre Island (Recreational Beaches)	NA - None	NA - None

The 1972 Federal Water Pollution Control Act, now called the Clean Water Act, is the federal law that establishes the National Pollutant Discharge Elimination System, which is a permit program to control point source discharges to surface waters.[14] The objective of the Clean Water Act is to restore and maintain the chemical, physical, and biological integrity of the nation's waters. As part of this, a national goal of "fishable, swimmable" water bodies, and states are required to identify any waters that do not meet this goal and develop total maximum daily loads (TMDLs) for the water bodies. TMDLs are intended to guide watershed management and are the basis of the monitoring and identification of river segments as impaired that is undertaken in the CRP.

Rio Grande water quality within Region M is evaluated in four segments over the Middle Rio Grande sub-basin and three segments in the Lower Rio Grande sub-basin. From Amistad Dam south to the confluence with the Rio Salado from Mexico, the river is impaired for contact recreation because of high bacteria, nitrates and low dissolved oxygen, and concern for toxicity and bacteria near Laredo as a result of urban runoff and discharges outside of US jurisdiction. Manadas Creek, an unclassified water body

[14] United States Environmental Protection Agency (USEPA). Clean Water Act, http://www.epa.gov/agriculture/lcwa.html. Accessed 4/29/2019.

northwest of Laredo, has high bacteria and chlorophyll-a caused by urban runoff and high metal content from industrial activity. Falcon Reservoir is not impaired, but there is concern for toxicity near Zapata. San Felipe Creek is impaired for bacteria but has a positive effect on the Rio Grande water quality. The Lower Rio Grande sub-basin is separated into the freshwater stream and the stream impacted by tidal flows. The freshwater portion, which runs from Falcon Reservoir to downstream of Brownsville, is impaired in small reaches from consistently high bacteria counts near urban areas. Additionally, there are concerns across the entire segment for fish consumption because of elevated mercury levels. The tidal stream portion has no impairments but there can be high chlorophyll-a levels.

The Arroyo Colorado is the major drainage waterway for approximately two dozen cities in this area and almost 300,000 acres of farmland. The Arroyo Colorado includes the TCEQ Classified Stream Segments 2201 and 2202, which are impaired for high bacteria and experience high nutrient concentrations. Segment 2201 is also impaired for low dissolved oxygen.

Regular monitoring of water quality as a result of these programs draws attention to the need for continued assessment and evaluation of water data and integrated regional approaches to managing the watersheds to meet quality goals.

1.2.5 Drought of Record

The drought of record (DOR) is the basis of the firm yield projection for each river basin. The DOR identifies the worst drought on record, and the firm yield is the supply that can be expected from that river or system in that most severe drought scenario. The firm yield and DOR are determined using the Rio Grande Water Availability Model (WAM), which models the existing system and demands under historical hydrologic flows. The Rio Grande WAM has a period of record from January 1940 to December 2000.

Typically, the DOR is defined as the longest period between full reservoir storage with firm-yield demands applied to the system over the period of record. The Amistad-Falcon Reservoir system is used to store water for Mexico and the United States using a storage pool accounting system. The total storage capacity and reservoir stages under firm yield demands are shown on Figure 1-8 for the combined storage (United States and Mexico) and the portion belonging to the United States. Critical drought start and end dates are shown, as well as the storage minima and the date they occurred.

This cycle, the DOR has changed due to an update to the TCEQ Rio Grande Water Availability Model to extend the period of record through 2018. The new DOR modeled for both the combined reservoir system and the US portion spans the late 1990s to early 2000s: June 1994 (6/1994) to August 2003 (8/2003) for the US portion and January 1994 (1/1994) to May 2003 (5/2003) for the combined system.

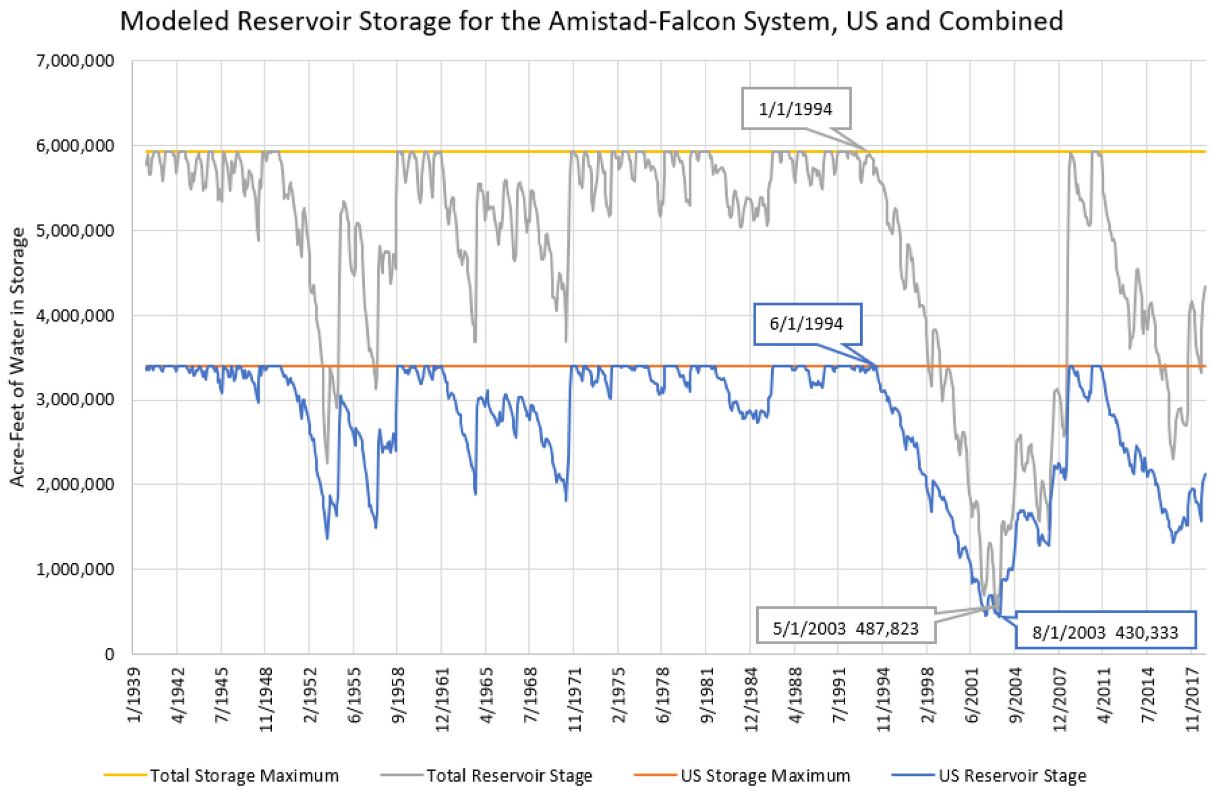

Figure 1-8 Modeled Reservoir Storage for the Amistad-Falcon System, US and Combined

The hydrologic record in the Rio Grande WAM, including all the drought periods discussed, is used to predict firm yield over the planning horizon, given in Table 1-4. The DOR is discussed in detail in Chapter 7.

Table 1-4 Firm Yield Projections, Amistad-Falcon Reservoir System 2030-2080 (acft/yr)

Source	2030	2040	2050	2060	2070	2080
Amistad-Falcon Reservoir	1,001,776	1,001,268	1,000,760	999,553	997,821	995,863

1.2.6 Groundwater Resources

The major aquifer that underlies Region M is the Gulf Coast Aquifer System, which runs the extent of the Texas coast and Hidalgo, Starr, Jim Hogg, and the western portions of Willacy and Cameron counties. This aquifer is predominantly brackish, with irregular pockets of fresh and very saline water. The Carrizo-Wilcox Aquifer also spans Texas and extends through Webb and part of Maverick counties.

The minor aquifers in the region, including the Yegua-Jackson Aquifer, may produce significant quantities of water that supply relatively small areas. Figure 1-9 shows the major and minor aquifers in Region M. A more detailed discussion of each of these groundwater sources is presented in Chapter 3.

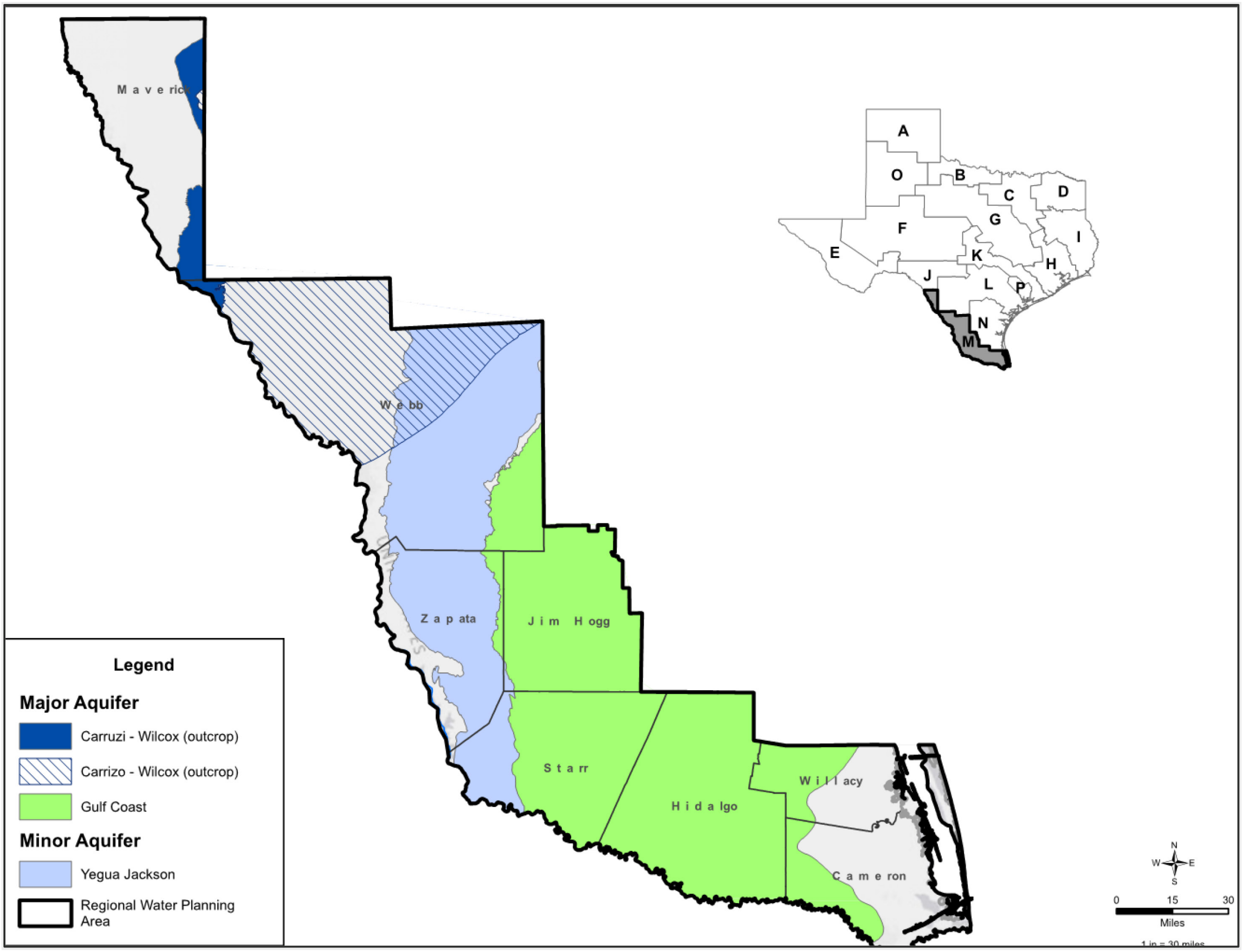

Figure 1-9 Major and Minor Aquifers in Region M

1.2.7 Groundwater Quality

In general, groundwater from the major aquifers in the region has total dissolved solids concentrations exceeding 1,000 milligrams per liter (mg/L) (slightly saline) and often exceeds 3,000 mg/L (moderately saline). Some areas of fresh and useable groundwater constitute a critical supply for many towns, domestic needs in rural areas, and livestock. Localized areas of high boron content occur throughout the study area. In response to increased development of these resources, a 2014 report from TWDB's Brackish Resource Aquifer Characterization System (BRACS) program presented information on the brackish groundwater resources of the Lower Rio Grande Valley. Chapter 3 presents a detailed description of groundwater quality of the significant aquifers in the Rio Grande Region.

1.3 Current Water Use

The water use category with the largest demand in Region M is Irrigation, followed by Municipal. Demand in other water use categories is comparatively small, as shown on Figure 1-10. Regional demand is concentrated in the Lower Rio Grande Valley, specifically Cameron, Hidalgo, and Willacy counties, with a significant municipal demand in the Laredo area of Webb County. Lower Rio Grande Valley users are primarily served by a network of irrigation districts that divert water to farmers and municipal utilities from the Rio Grande.

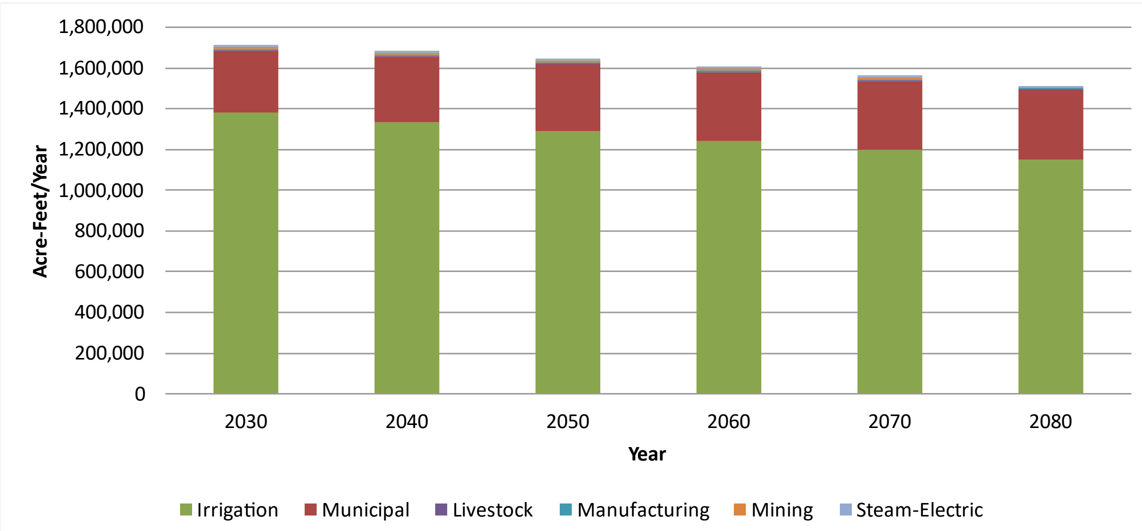

Figure 1-10 Water Demand Projections for Each Water Use Category in Region M (acft/yr)

1.3.1 Water Demands

Municipal demands are expected to increase regionally from a projected 303,225 acre-feet/year (acft/yr) in 2030 to 340,085 acft/yr in 2080. Most municipal demand is currently met by treated surface water from the Rio Grande; however, multiple brackish groundwater desalination plants have been built since 2000. Fresh groundwater availability is limited in the region and is used mostly as a backup water supply for utilities or for individual homes, particularly in rural and unincorporated areas, with a few exceptions.[15]

Projected irrigation demands are significantly greater than municipal demands (1.38 million acft/yr in 2030 and 1.15 million acft/yr in 2080) but are projected to decrease as a result of both urbanization of lands and increasing pressure on the water resources of the region. Supplies available to irrigators are curtailed significantly in drought years because irrigation and mining water rights are treated as residual users of stored water from the reservoirs.

The difference between drought year demand and use in a particular year for agricultural users can be significant. If a drought year is anticipated, farmers can prepare by planting crops and vegetables with lower water demands, which are often of lower value. Increases in farming efficiency can also allow irrigators to maintain higher value crops or higher yields in times with less available water. This RWP

[15] Military Highway Water Supply Corporation and the City of Hidalgo both have significant sources of well water.

represents the worst-case scenario, wherein the demands are based on a dry year, and on-farm conservation is discussed as a water management strategy (WMS).

Livestock, mining, steam-electric power generation, and manufacturing demands make up a small portion of the total water use of the region. However, in some counties (Webb and Maverick), mining demands represent a significant portion of water usage.

1.3.2 Major Water Providers

Major Water Provider (MWP) was a new designation in the 2021 planning cycle; an MWP is any Water User Group (WUG) or wholesale water provider (WWP) of particular significance to the water supply of a region, as determined by the RWPG. At the February 21, 2024, Region M meeting, the planning group approved the same definition of an MWP as in the 2021 Plan, which is any entity that provides 3,000 acft or more of municipal water per year, and then voted to add Mexico as a new MWP due to the region's unique international water-sharing situation. According to current estimates of 2030 municipal supplies, the entities listed in Table 1-5 have been designated as MWP in the 2026 RWP.

While technically not a WUG or WWP, and therefore not allowed to be classified as a MWP per TWDB rules, Mexico is of particular significance to Region M because it provides water to the Amistad-Falcon Reservoir System that it shares with the United States, based on the 1944 Treaty, impacting water levels in the reservoirs and the water users on the United States' side.

Table 1-5 Region M Major Water Providers

Major Water Providers	
Agua Special Utility District (SUD)	Hidalgo County Irrigation District No. 16
Alamo	Hidalgo County Irrigation District No. 2
Bayview Irrigation District No. 11	Hidalgo County Irrigation District No. 6
Brownsville Public Utilities Board	Hidalgo County Water Improvement District (WID) No. 3
Brownsville Irrigation District	Laguna Madre Water District
Cameron County Irrigation District No. 2	Laredo
Cameron County Irrigation District No. 3 - La Feria	McAllen
Cameron County Irrigation District No. 6 - Los Fresnos	Military Highway Water Supply Corporation (WSC)
Cameron County Water Improvement District No. 10	Mission
Delta Lake Irrigation District	North Alamo WSC
Donna Irrigation District-Hidalgo County No. 1	Pharr
Eagle Pass	Rio Grande City
East Rio Hondo WSC	San Benito
Edinburg	San Juan
Harlingen	Sharyland WSC
Harlingen Irrigation District-Cameron County No. 1	Southmost Regional Water Authority

Major Water Providers	
Hidalgo and Cameron Counties Irrigation District No. 9	United Irrigation District
Hidalgo County Irrigation District No. 1	Weslaco

1.3.3 Agricultural and Natural Resources

1.3.3.1 Topography, Geology, and Soils

The Rio Grande Region is located entirely within the Western Gulf Coastal Plains of the United States, an elevated sea bottom with low topographic relief. Topography in the region ranges from a rolling, undulating relief in the northwestern portion and becomes progressively flatter near the Gulf Coast. The lower portion of the region consists of a broad, flat plain that rises gently from sea level at the Gulf of Mexico in the east to an elevation of approximately 960 feet in the northern part of Maverick County at the upper end of the region. The western edge of this plain culminates in a westward-facing escarpment known as the Bordas Escarpment. Drainage in the region is by the Rio Grande and Nueces River basins and their tributaries. The Rio Grande flows southeasterly through the region before turning east to its confluence with the Gulf of Mexico.

Geologic formations exposed in the region include Cretaceous, Tertiary, and Quaternary-aged deposits. In general, the geologic strata of the Rio Grande Region decrease in age from west to east across the area. The oldest strata, which are of Cretaceous age, outcrop in northwestern Maverick County and consist of chalky limestone and marl. The most recent sediments are located in Cameron County. In general, soils in the Rio Grande Region generally consist of calcareous to neutral clays, clay loams, and sandy loams.

1.3.3.2 Vegetation Areas (Biotic Communities)

Located within the Matamoran District of the Tamaulipan Biotic Province,[16] the Lower Rio Grande Valley is the northern boundary of much of the semitropical biota of Mexico. A number of plant and animal species from the more xeric and mesic areas to the west and northeast, respectively, converge in the Lower Rio Grande area.

1.3.3.2.1 Terrestrial Vegetative Types

The predominant vegetation type in this area is thorny brush, but there is overlap with the vegetative communities of the Chihuahuan Desert to the west, the Balconian Province to the north (Texas Hill Country), and the tropical plant communities of Mexico to the south. The result is unique and varied flora and fauna. Xeric plants such as mesquite (*Prosopis glandulosa*), leatherstem (*Jatropha dioica*), lotebrush (*Ziziphus obtusifolia*), and brasil (*Condalia hookeri*) are found in this area. Sugar hackberry (*Celtis laevigata*) and Texas persimmon (*Diospyra texana*), more prevalent to the north, are also located in the Lower Rio Grande Valley. Other common species such as lantana (*Lantana horrida*), Mexican olive (*Cordia boisierri*), and Texas ebony (*Pithecellobium ebano*) are typically more tropical in location. Montezuma bald cypress (*Taxodium mucronatum*), Gregg wild buckwheat (*Eriogonum greggi*), Texas ebony and anacahuita (*Mexican olive*) have their northernmost extension in the Lower Rio Grande Valley. More than 90 percent of total riparian vegetation and 95 percent of Tamaulipan thornscrub have been cleared since the 1900s. Surface water remains only briefly in arroyos following substantial rainfall.

[16] Blair, F. W. 1950. The biotic provinces of Texas. The Texas Journal of Science 1(2):93-117.

Because of this scarcity of water, the resulting vegetation types are closely correlated to topographic characteristics.[17]

Eleven distinct biotic communities compose the Lower Rio Grande Valley, stretching from Falcon Reservoir to the Gulf of Mexico.[18] The communities to the northwest are arid, semi-desert, thorny brush. Vegetation communities toward the coast are comprised of more wetlands, marshes, and saline environments (refer to Figure 1-11).

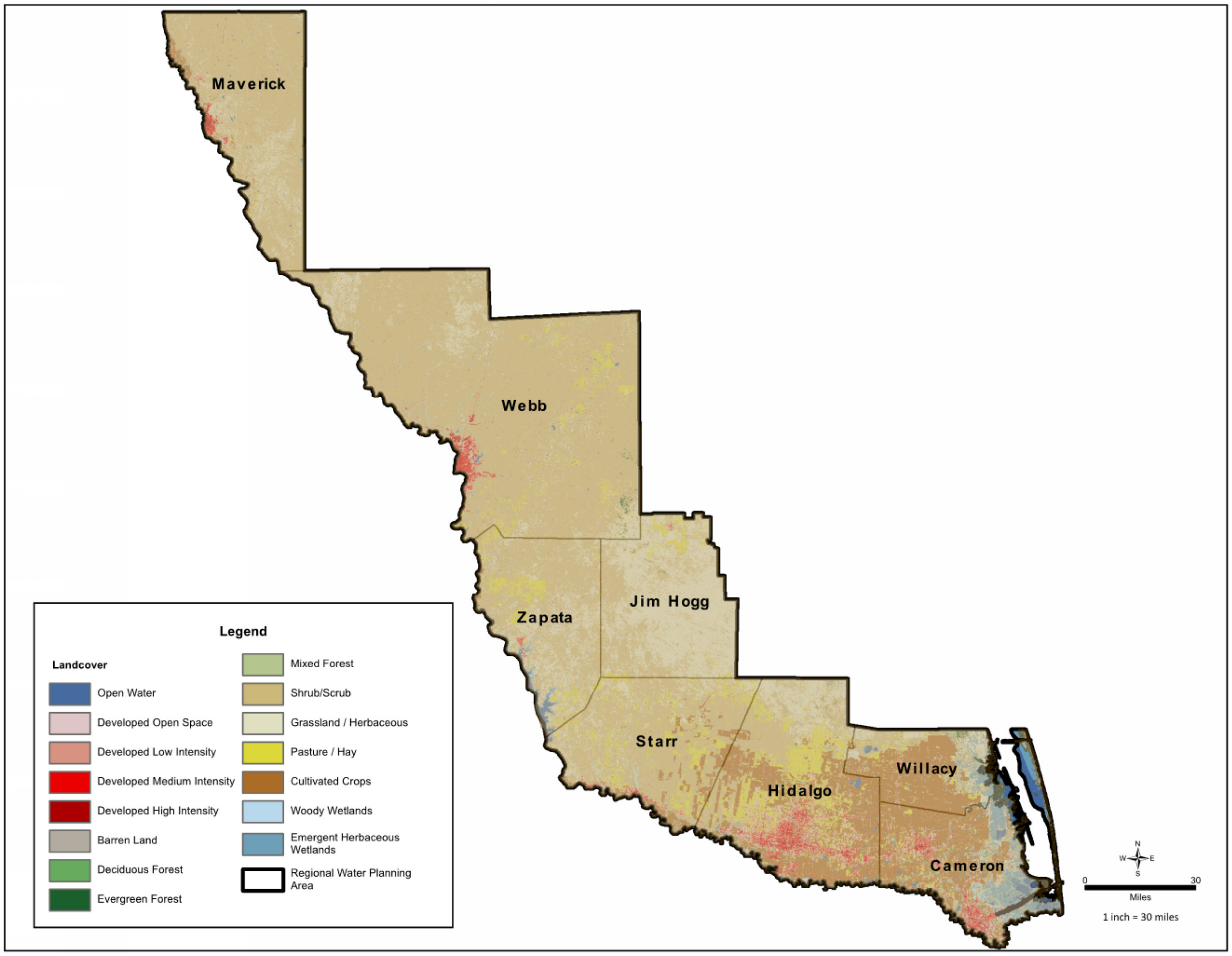

Figure 1-11 Region M Land Use Map

[17] South Texas Sand Sheet, William R. Carr, Plant Resources Center, The University of Texas at Austin. http://w3.biosci.utexas.edu/prc/DigFlora/WRC/Carr-SandSheet.html

[18] U.S. Fish and Wildlife Service, 1997, Final Lower Rio Grande Valley and Santa Ana national wildlife refuges comprehensive conservation plan: U.S. Fish and Wildlife Service, Region 2, Albuquerque, New Mexico.

1.3.3.2.1.1 Ramaderos

This region, which occupies west-central Starr County, consists of arroyos that provide wildlife habitat.

1.3.3.2.1.2 Chihuahuan Thorn Forest

Located below Falcon Dam along the Rio Grande, the Chihuahuan Thorn Forest includes a narrow riparian zone and an upland desert shrub community. Rare plants such as the Montezuma bald cypress and the federally endangered Johnston's frankenia (*Frankenia johnstonii*) are found here, as well as such uncommon birds as the brown jay (*Cyanocorax morio*), ringed kingfisher (*Ceryle torquata*), and red-billed pigeon (*Columba flavirostris*).

1.3.3.2.1.3 Upper Valley Flood Forest

This community is located along the Rio Grande from south-central Starr County to the western border of Hidalgo County. The floodplain narrows in this region, with typical riverbank trees including Rio Grande ash (*Fraxinus berlandieriana*), sugar hackberry, black willow (*Salix nigra*), and cedar elm (*Ulmus crassifolia*). Only a short distance from the river, the dominant species shift to honey mesquite, granjeno (*Celtis pallida*), and prickly pear (*Opuntia lindheimeri*).

1.3.3.2.1.4 Barretal

The Barretal community occurs in southeastern Starr County, just north of the Upper Valley Flood Forest. Barreta (*Helietta parvifolia*), a small tree located on gravelly caliche hilltops, paloverde (*Parkinsonia texana*), guajillo (*Acacia berlandieri*), blackbrush (*Acacia rigidula*), anacahuita, yucca (*Yucca treculeana*), and many species of cacti are typical of this community.

1.3.3.2.1.5 Upland Thorn Scrub

Upland Thorn Scrub, the most common community in the Tamaulipan Biotic Province, occurs in southwestern Hidalgo County. Typical woody plants include anacahuita, cenizo (*Leucophyllum frutescens*), and paloverde.

1.3.3.2.1.6 Mid-Valley Riparian Woodland

This community is located along the Rio Grande from western Hidalgo County eastward to the Sabal Palm Forest. This tall, dense, closed-canopy bottomland hardwood forest is favored by chachalacas (*Ortalis vetula*) and green jays (*Cyanocorax yncas*), birds more typical of Mexico. Trees of this community include Rio Grande ash, sugar hackberry, black willow, cedar elm, Texas ebony, and anaqua (*Ehretia anacua*).

1.3.3.2.1.7 Woodland Potholes and Basins

Central Hidalgo County and western Willacy County contain this community of seasonal wetlands and playa lakes. Additionally, three hypersaline lakes are present, attracting migrating shorebirds. The federally endangered ocelot (*Leopardus pardalis*) occupies dense thickets in this area. Wetlands are located in low woodlands of honey mesquite, granjeno, prickly pear, lotebush, elbow bush (*Forestiera angustifolia*), and brasil.

1.3.3.2.1.8 Mid-Delta Thorn Forest

The Mid-Delta Thorn Forest originally covered eastern Hidalgo County, the western two-thirds of Cameron County, and southwest Willacy County. Conversion of land for agricultural and urban uses has left only isolated pockets of native vegetation remaining. Typical plants include honey mesquite, Texas ebony, coma (*Bumelia lanuginosa*), anacua, granjeno, colima (*Zanthoxylum fagara*), and other thicketforming species. This region provides excellent wildlife habitat and is a preferred area for white-winged dove (*Zenaida asiatica*).

1.3.3.2.1.9 Sabal Palms Forest

This area of riparian forest contains the last remaining acreage of original Sabal Palm Forest in south Texas. It is located on the Rio Grande at the southernmost tip of Texas. Vegetation in this region includes Texas sabal palm (*Sabal texana*), Texas ebony, tepeguaje (*Leucaena pulverulenta*), anacua, brasil, and granjeno. The National Audubon Society's Sabal Palm Grove Sanctuary is located in this area.

1.3.3.2.1.10 Loma Tidal Flats

Located at the mouth of the Rio Grande, this community consists of clay dunes, saline flats, marshes, and shallow bays along the Gulf of Mexico. Sea ox-eye (*Borrichia frutescens*), saltwort (*Batis maritima*), glasswort (*Salicornia sp.*), gulf cordgrass (*Spartina spartinae*), Berlandier's fiddlewood (*Citharexylum berlandieri*), Texas ebony, and yucca are typical plants of this region.

1.3.3.2.1.11 Coastal Brushland Potholes

This community comprises dense brushy woodland around freshwater ponds, changing to low brush and grasslands around brackish ponds, and saline estuaries nearer the Gulf of Mexico. Typical plants include honey mesquite, granjeno, barbed-wire cactus (*Acanthocereus pentagonus*), and gulf cordgrass. Area wetlands provide important habitat for migratory wildlife.

1.3.3.2.2 Lower Laguna Madre

The Lower Laguna Madre is a hypersaline bay in the eastern portions of Cameron and Willacy counties. The Lower Laguna Madre is characterized by its shallow depth, approximately 2 feet on average, extensive seagrass meadows, and tidal flats. Small portions of the Lower Laguna Madre are estuarine in nature with more moderate to brackish salinities. The Arroyo Colorado and Rio Grande provide most of the freshwater inflow to the bay; other drainage canals and floodways have smaller contributions. Fresh water from these sources aid in moderating salinities in the bay and are vital to the success of estuarine dependent aquatic species. The Lower Laguna Madre supports a wide variety of marine aquatic organisms and wildlife. It also supports considerable water-related recreational activities (boating, sport fishing, bird watching, etc.) and commercial fisheries.

1.3.3.3 Protected Areas

Public and private interests have created several refuges and preserves in the Lower Rio Grande Valley to protect remaining vegetation and the habitats of endangered and threatened species. These include the Lower Rio Grande Valley National Wildlife Corridor/Refuge, Laguna Atascosa National Wildlife Refuge (NWR), Santa Ana NWR, Anzalduas County Park, Falcon State Park (SP), Bentsen-Rio Grande Valley SP, Boca Chica SP, Las Palomas Wildlife Management Area (WMA), Arroyo Colorado WMA, Sabal Palm Audubon Center and Sanctuary, the Nature Conservancy's Chihuahua Woods Preserve, the South Bay Coastal Preserve, Estero Llano Grande, and Resaca de la Palma.[19]

Nine local communities, United States Fish and Wildlife Service (USFWS), and the Texas Parks and Wildlife Department (TPWD) developed and completed the final stages of the World Birding Center in

[19] Fish and Wildlife Service. Endangered and threatened species. https://www.fws.gov/. Accessed 4/11/2019.

2009.[20] These nine sites are considered world class birding destinations and attract thousands of visitors to view migratory birds and learn about conservation of natural resources.[21]

1.3.3.3.1 Lower Rio Grande Valley National Wildlife Refuge and Wildlife Corridor

The USFWS, with the support and assistance of the TPWD and several private organizations and individuals, is creating a wildlife corridor along the Rio Grande from Falcon Dam to the Gulf of Mexico. The wildlife refuge serves as the largest component of the Lower Rio Grande Wildlife Corridor, and it currently includes 150 individual tracts totaling 107,000 acres. The completed refuge is projected to total 132,500 acres in fee and conservation easements. The wildlife refuges described below are part of this system. Additional acreage is purchased from willing sellers at fair market value or obtained through conservation easements.

1.3.3.3.2 Laguna Atascosa National Wildlife Refuge

Laguna Atascosa NWR contains more than 88,378 acres of land, providing essential habitat for a variety of south Texas wildlife. It is located north of the Rio Grande and south of the Arroyo Colorado along the Laguna Madre.

1.3.3.3.3 Santa Ana National Wildlife Refuge

This 2,088-acre refuge receives extensive bird-watching attention because it is located at the convergence of two major migratory waterfowl flyways, the Central and the Mississippi. More than half of all butterfly species in the United States are found in this refuge.

1.3.3.3.4 Falcon State Park

This park, managed by the TPWD, contains over 500 acres above Falcon Dam. It is popular with bird watchers because of its diversity of bird species.

1.3.3.3.5 Sabal Palm Audubon Center and Sanctuary

This sanctuary, owned by the National Audubon Society, is located in the southernmost point of Texas on the Rio Grande. It is a 527-acre forested area that includes a substantial portion of the remaining sabal palm forest. The sanctuary is popular with bird watchers and other nature enthusiasts for its wildlife. The state threatened southern yellow bat (*Lasiurus ega*) is a year-round resident. The ocelot and jaguarundi (*Herpailurus yagouaroundi*) are believed to inhabit parts of the sanctuary.

1.3.3.3.6 Bentsen-Rio Grande Valley State Park

This park, managed by the TPWD, is located west of Mission in Hidalgo County. It consists of almost 600 acres of subtropical resaca woodlands and brushland and is a popular bird-watching area. Boca Chica State Park, administered by Bentsen-Rio Grande Valley SP, is located in Southeastern Cameron County. Endangered and rare birds, such as brown pelicans, reddish egrets, osprey, peregrine falcons, and several others, are commonly found in the park area.

1.3.3.3.7 East Wildlife Foundation Ranchland

The East Wildlife Foundation is a nonprofit tax-exempt organization, the mission of which is to support wildlife conservation and other public benefits of ranching and private land stewardship. The foundation

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[20] Glusac, Elaine. "The Texas Border Draws Frequent Fliers." *The New York Times*. 6 Apr. 2010. www.nytimes.com/2010/04/11/travel/11explorer.html. Accessed 4/11/2019.

[21] World Birding Center. http://www.worldbirdingcenter.org/. Accessed 4/11/2019 and https://pubs.usgs.gov/sir/2016/5078/sir20165078.pdf.

includes management of over 215,000 acres of native South Texas rangeland. This land is operated as six separate ranches in parts of Jim Hogg, Starr, Willacy, and Kenedy counties. Traditionally maintained as native rangeland and as working cattle ranches, the lands operated by the foundation are now managed as a field laboratory for discovery and problem solving.

1.3.3.4 Rare, Threatened, or Endangered Plant and Animal Species

The federal Endangered Species Act (ESA) of 1973, with amendments, provides a means to conserve endangered and threatened species and the ecosystems on which these species depend. The ESA provides for conservation programs for endangered and threatened species and indicates that agencies are to take steps as may be appropriate for achieving the purposes of conserving species of fish and wildlife protected by international treaty. Federal agencies are required to ensure that no actions that an agency would undertake will jeopardize the continued existence of any endangered or threatened species, except as provided by the ESA. Any federal permits required to implement components of this water plan would be subject to the terms of the ESA. Federally listed species present in Region M are shown in Table 1-6.

Table 1-6 Federally Threatened and Endangered Species in Region M [22]

Taxonomy	Scientific Name	Common Name	Federal Designation
Birds	*Falco femoralis septentrionalis*	Northern Aplomado Falcon	Endangered
Birds	*Charadrius melodus*	Piping Plover	Threatened
Birds	*Calidris canutus rufa*	Red Knot	Threatened
Fish	*Carcharhinus longimanus*	Oceanic Whitetip Shark	Threatened
Fish	*Pristis pectinata*	Smalltooth Sawfish	Endangered
Mammals	*Physeter macrocephalus*	Sperm Whale	Endangered
Mammals	*Balaenoptera borealis*	Sei Whale	Endangered
Mammals	*Balaenoptera musculus*	Blue Whale	Endangered
Mammals	*Balaenoptera ricei*	Gulf of Mexico Bryde's Whale	Endangered
Mammals	*Eubalaena glacialis*	North Atlantic Right Whale	Endangered
Mammals	*Leopardus pardalis*	Ocelot	Endangered
Mammals	*Trichechus manatus*	West Indian Manatee	Threatened
Reptiles	*Caretta caretta*	Loggerhead Sea Turtle	Threatened
Reptiles	*Chelonia mydas*	Green Sea Turtle	Threatened
Reptiles	*Eretmochelys imbricata*	Atlantic Hawksbill Sea Turtle	Endangered
Reptiles	*Lepidochelys kempii*	Kemp's Ridley Sea Turtle	Endangered
Reptiles	*Dermochelys coriacea*	Leatherback Sea Turtle	Endangered

[22] Texas PWD Rare Threatened, and Endangered Species of Texas by County. https://tpwd.texas.gov/gis/rtest/. Accessed 5/16/2024.

Taxonomy	Scientific Name	Common Name	Federal Designation
Mollusks	*Popenaias popeii*	Texas Hornshell	Endangered
Plants	*Thymophylla tephroleuca*	Ashy Dogweed	Endangered
Plants	*Astrophytum asterias*	Star Cactus	Endangered
Plants	*Physaria thamnophila*	Zapata Bladderpod	Endangered
Plants	*Manihot walkerae*	Walker's Manioc	Endangered
Plants	*Ayenia limitaris*	Texas Ayenia	Endangered
Plants	*Ambrosia cheiranthifolia*	South Texas Ambrosia	Endangered

There are 18 USFWS federally listed threatened or endangered animal species. The Texas Fish and Wildlife Service lists 60 species as threatened or endangered.

1.3.4 Threats to Agricultural and Natural Resources

The Region M planning area is experiencing urbanization and growing demands on water on both sides of the border with Mexico and in neighboring regions.

1.3.4.1 Drought and Inflows from Mexico

Under DOR conditions, hydrologic simulations of reservoir operations indicate that surface water rights for irrigation will only be fulfilled between 25 and 40 percent of their authorized diversion. Irrigation and mining supplies are structured to vary along with availability and bear the associated economic costs of such shortages. In addition to drought, variability in deliveries from Mexico can impact the US water supplies and, therefore, water available for irrigation. The terms of the 1944 treaty grant a minimum of 350,000 acft/yr to the United States storage from Mexico, but this annual target is not always met (Figure 1-12). Figure 1-12 was the most recent graphic available with data through January 18, 2025. More specific (e.g., reservoir levels), and recent data and reports can be found at ibwc.gov.

The irrigation conservation WMSs discussed in this plan aim to assist farmers in making the most of what water is available in drought years. Agricultural shortages are managed through efficient water use, low water demand crop selection, and other irrigation best management practices, which are recommended in Chapter 5. Additionally, the RWPG has advocated for Mexico to meet the 1944 treaty water delivery obligation, described in Chapter 7.

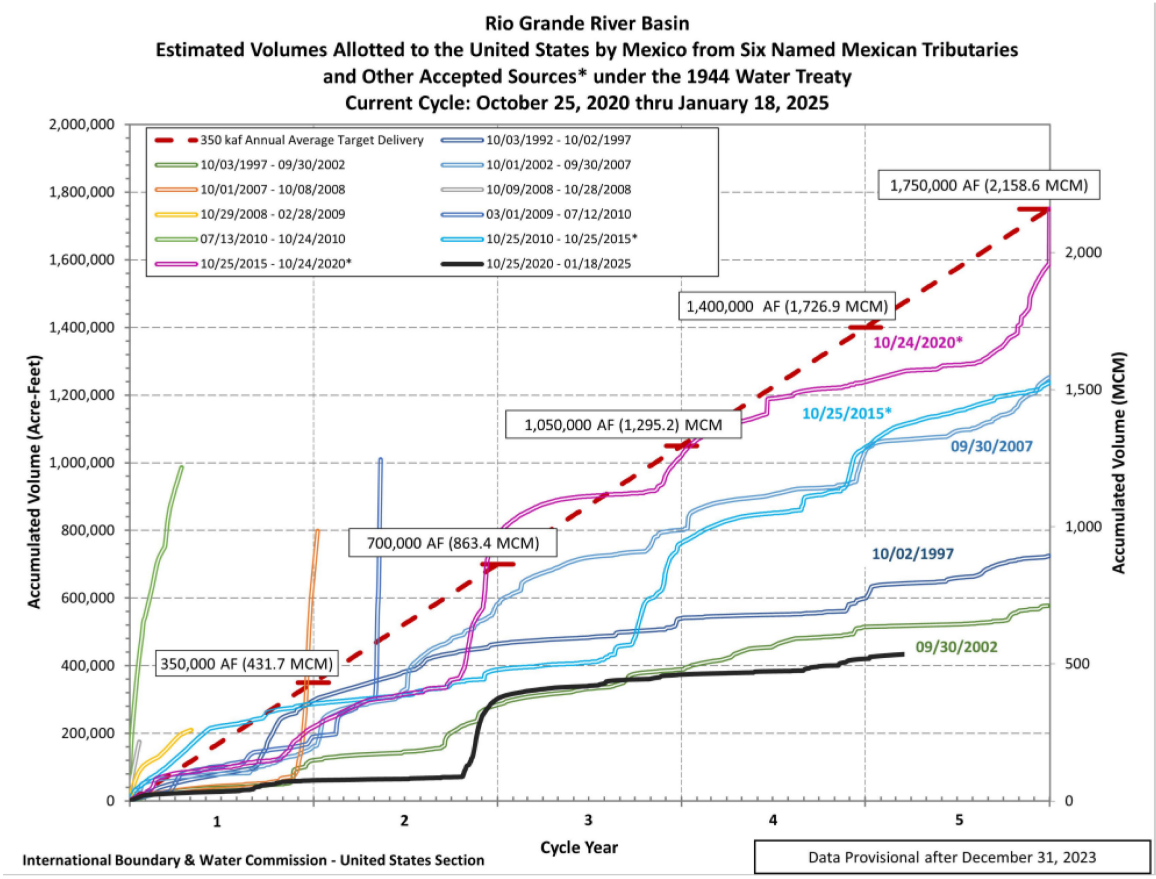

Figure 1-12 Water Delivered to the United States from Mexico, 1992 to 2025[23]

1.3.4.2 Groundwater Marketing

Drilling and marketing of groundwater in locations that may impact surface water, especially near the Amistad Dam, can impact stream and spring flows and reduce availability. Water marketing companies are actively seeking water sources to be sold to entities in need of new water sources. Recently, there has been substantial interest in groundwater in and around Val Verde County. In this particular area, strong evidence suggests interaction between groundwater and surface water. The pumping of groundwater in the Devils and Pecos River basins have been shown to directly impact these streamflows and the flows in Goodenough Springs, which play a significant role in supplying water for Region M. Any reduction in the water supply in the Amistad Reservoir presents a threat to the region. Policy recommendations from Region M have included further study into groundwater and surface water interactions.

1.3.4.3 Urbanization

Another threat to agricultural and natural resources of the region is the impact of ongoing and projected urbanization on currently undeveloped areas and the loss of water and habitat availability for wildlife. Increased pumping of groundwater from the Gulf Coast Aquifer and the Rio Grande Alluvium may threaten riparian habitats fringing resacas and potholes. This effect would have a negative impact on ecotourism. The lowering of Falcon Lake level due to reduced inflow could negatively impact the

[23] Mexico Deliveries During the Current 5-Year Cycle. https://ibwc.gov/Water_Data/mexico_deliveries.html. Accessed 5/16/2024.

diversity of bird species that currently exists. WMSs in this plan that recommend groundwater use will be limited to the modeled available groundwater (MAG) for each aquifer.

Urbanization plays a major role in determining future demand. The impact can be quantified from previous rates of urbanization (loss of flat-rate acres and loss of irrigated acres) and the separation of water rights from the land as a part of the development process. Particularly in Cameron and Hidalgo counties, projected urbanization is expected to significantly reduce the area of irrigable farmland. Within the Lower Rio Grande Valley, urbanization is expected to be concentrated in corridors along State Highways 77 and 83, with some additional development through agricultural areas.

In addition to the direct reduction of irrigable farmland acreage due to change in land use, urbanization also impacts adjacent farmland by increasing property values and restricting some types of agricultural activities (e.g., use of pesticides). Urbanization impacts the effectiveness of irrigation district distribution networks by shifting land use to a patchwork of farmland and developed areas.

Irrigation districts play a critical role in the delivery of almost 85 percent of the water used in the region, including irrigation and municipal water. The improvements discussed in this plan for irrigation districts are intended not only to reduce the losses in their systems but also to allow for better management and controls over their systems and improved service to utilities.

1.4 Existing Local and Regional Water Plans

1.4.1 Drought Planning

TCEQ requires water conservation plans to be developed, implemented, and submitted by municipal, industrial/mining, and other non-agricultural water right holders of 1,000 acft of water per year and agricultural water right holders of 10,000 acft/yr or more. Additionally, all wholesale and retail public water suppliers and irrigation districts are required to develop a drought contingency plan (DCP). Water conservation plans are required to include quantified 5- and 10-year targets for water savings, and DCPs outline entity responses to drought, including triggers for conservation stages and the restrictions of water use in each drought stage.

Because of these requirements and recent drought conditions, many communities in the Rio Grande Region have addressed drought preparedness and water conservation planning. A review of TCEQ records shows that many communities and irrigation districts in the region have water conservation and DCPs. Table 1-7 lists the approval date of the most recently received water conservation and DCPs. It should be noted that smaller public water systems (i.e., those with fewer than 3,300 connections) were required to prepare drought plans but do not have to file their drought plans with the TCEQ.

Table 1-7 Local Water Plans Filed with TCEQ

Entity	Water Conservation Plan Date	Drought Contingency Plan Date
Agua SUD	4/25/2019	4/8/2024
Alamo	4/16/2024	4/16/2024
Bayview Irrigation District No. 11	5/15/2019	5/6/2019
Brownsville Irrigation District	1/12/2024	1/24/2024
Brownsville Public Utilities Board	4/1/2024	4/1/2024
Cameron County Irrigation District No. 2	4/24/2019	5/1/2024
Cameron County Irrigation District No. 6	-	3/14/2024
Delta Lake Irrigation District	9/19/2014	1/17/2024
Donna	4/27/2022	3/10/2022
Donna Irrigation District	5/3/2024	5/3/2024
Eagle Pass Water Works System	2/2/2022	2/2/2022
East Rio Hondo WSC	2/1/2024	2/1/2024
Edinburg	5/1/2024	5/1/2024
El Jardin Water Supply Corporation	-	5/1/2014
Engelman Irrigation District	7/22/2022	7/22/2022
Harlingen Irrigation District	5/14/2020	8/1/2024
Harlingen Waterworks System	5/1/2024	10/1/2024
Hidalgo	5/1/2024	5/1/2024
Hidalgo Co. Irrigation District No. 1	-	10/19/2023
Hidalgo Co. Irrigation District No. 2	4/18/2019	9/1/2022
Hidalgo Co. Irrigation District No. 5	4/30/2019	4/30/2019
Hidalgo Co. Irrigation District No. 6	6/24/2024	6/24/2024
Hidalgo Co. Irrigation District No. 9	-	9/15/2020
Hidalgo Co. Irrigation District No. 13	-	4/22/2019
Hidalgo Water Improvement District No. 3*	5/15/2024	5/15/2024
La Feria Irrigation District	5/20/2019	5/20/2019
Laguna Madre Water District	9/14/2022	9/14/2022
Laredo	4/1/2024	4/1/2024
Maverick County Water Control and Improvement District No. 1	9/12/2023	5/1/2019

Entity	Water Conservation Plan Date	Drought Contingency Plan Date
McAllen, McAllen Public Utility	4/24/2023	4/24/2023
Mercedes	-	5/31/2024
Military Highway Water Supply Corporation	5/5/2014	4/25/2024
Mission Public Works Department	9/27/2023	8/1/2024
North Alamo WSC	9/17/2019	9/17/2019
Pharr	5/20/2024	5/20/2024
Rio Grande City	-	5/28/2019
Roma	4/1/2024	4/1/2024
San Benito	5/1/2024	5/1/2024
San Juan	4/19/2024	4/19/2024
Santa Cruz Water Control and Improvement District No. 15*	-	5/29/2024
Sharyland WSC	10/17/2024	10/17/2024
Southmost Regional Water Authority	4/24/2019	4/24/2019
United Irrigation District	5/9/2024	5/9/2024
Weslaco	5/23/2019	5/23/2019
Zapata County Waterworks	11/16/2022	8/30/2024

*In January 2025, Hidalgo County Water Improvement District No. 3 and Santa Cruz Water Control and Improvement District No. 15 consolidated into Hidalgo County Consolidated Water Control and Improvement District.

The drought response varies from entity to entity, primarily between those who serve customers, including irrigators, with raw water and those who deliver treated water. For those entities, such as irrigation districts, that deliver water to irrigators, the response to drought is focused on the allocation system and how agricultural water rights are fulfilled when supplies are limited by the TCEQ Watermaster. Each water district responds slightly differently, in some cases allowing water to be sold between farmers in their district or for farmers to consolidate their allocation on a portion of their land, leaving other areas for dry land farming.

The entities that deliver treated water generally developed triggers that were either based on the balance remaining in municipal water rights accounts for that year or the capacities of their treatment plants, so that high demands on the plants trigger a conservation stage. The conservation stages for cities included limitations on car washing and lawn watering, ranging from voluntary in early stages to some fines or other penalties in later stages.

1.4.2 Existing Regional Water Plans

Immediately prior to the initiation of the SB1 regional water planning program, two regional water supply planning projects were conducted within the Rio Grande Region. In February 1998, Phase I of the

South Texas Regional Water Supply Plan was completed under the sponsorship of the South Texas Development Council, with funding assistance from the TWDB. This plan addressed water supply needs in Jim Hogg, Starr, Webb, and Zapata counties. The report for this initial planning phase provided background data and identified key issues that need to be addressed in future water planning. Specific recommendations regarding water supply strategies were not developed.

In February 1999, the Integrated Water Resources Plan (IWRP) for the Lower Rio Grande Valley was completed. This planning effort was sponsored by the Lower Rio Grande Valley Development Council with funding from the TWDB, the US Economic Development Administration, the US Bureau of Reclamation, and local sources. This plan addressed water planning issues in Cameron, Hidalgo, and Willacy counties. In addition to comparing projected water supplies and demand, the IWRP makes specific recommendations for meeting future demands, including "improvements to the irrigation canal delivery system; aggressive water conservation efforts in all areas of consumption; and implementation of wastewater reuse, desalination of brackish groundwater, and desalination of seawater where cost effective."

The Arroyo Colorado Watershed Protection Plan (WPP) is a comprehensive watershed-based strategy to improve water quality and aquatic and riparian habitat in the Arroyo Colorado River in South Texas. The Arroyo Colorado WPP was last updated in 2017 and is intended to be updated every 5 years.[24] The Arroyo Colorado Watershed Partnership, which is composed of stakeholders, has grown to over 720 members. In collaboration with the Lower Rio Grande Valley Texas Pollutant Discharge Elimination System (TPDES) stormwater task force and local citizens, the Arroyo Partnership installed more than 1,000 storm drains that read "No Dumping, Drains to Laguna Madre." Education and outreach activities occur on a daily basis, and over 32,000 individuals have experienced the watershed model, a hands-on water quality education tool that demonstrates the impact of pollution within the watershed. Numerous agriculture and wastewater infrastructure best management practices have been implemented.

The Lower Rio Grande Water Quality Initiative was formed to address persistent high bacteria and salinity levels in the Lower Rio Grande. The group led a bi-national effort to identify all potential discharges and develop a hydrologic model with the data, collected in 2014 and 2015.

The Texas Rio Grande Basin Clean Rivers Program includes regular water quality monitoring, special studies as needed, annual Basin Highlight Reports since 2011, and Basin Summary Reports every 5 years. The program also includes outreach and educational components that help volunteers, students, and partner organizations monitor, collect, and analyze samples.[25]

In 2013, the Bureau of Reclamation and the Rio Grande Regional Water Authority evaluated the impacts of climate change on the Lower Rio Grande Valley in a Basin Study and recommended brackish groundwater desalination as the best alternative water source to ensure reliability in the face of uncertain supplies. The study, funded by a grant through the WaterSMART program, reviewed a range of climate scenarios and identified a median of 84,000 acft/yr less water being available. In response to this reduction, the Basin Study proposed four brackish groundwater desalination facilities and a trunk line to connect three clusters of municipalities, centering around McAllen, Weslaco, and Harlingen. The concept was sized and phased using the Southmost Regional Water Authority model, which was designed to meet 40 percent of the demands of the member cities. The Basin Study has been used, in

[24] Arroyo Colorado Watershed Partnership. Update to the Arroyo Colorado Watershed Protection Plan, August 2017. http://arroyocolorado.org/media/671263/arroyo-colorado-wppfinaloptimized.pdf.
[25] IBWC. Clean Rivers Program. https://www.ibwc.gov/CRP/Index.htm.

conjunction with detailed groundwater data gathered by the TWDB in the BRACS report, to inform other studies.

The Lower Rio Grande Valley (LRGV) TPDES Stormwater Management Task Force is a joint program between the Research, Applied, Technology, Education and Service (RATES) and various municipalities across the Rio Grande Valley to educate and improve how cities and civil engineers plan for stormwater management, as a joint effort to develop a proactive regional approach to stormwater management. Task force goals are to reduce stormwater pollution, protect the natural environment and benefit the community.

The LRGV Stormwater Task Force Partnership and RATES, in partnership with NASA, and in collaboration with the TCEQ and USIBWC, kicked-off a 3-year project in Del Rio Texas, on April 18, 2024, with a stakeholder workshop. The project proposes to develop a forecast-capable hydrologic model and prototype decision support tool for water supply decision makers in the Rio Grande Basin using NASA data and technologies. The objective is to analyze and document how NASA data and technology can be applied to support water supply decision making by engaging in co-creation of knowledge with municipalities, irrigation districts, and other stakeholders in the basin. The program will accomplish this objective by engaging with these partners through workshops, developing NASA empowered hydrologic modeling tools that ingest NASA datasets, and examining how the data and outputs from these models could support decision making. Through engagement with stakeholders, RATES will assess how the modeling framework, augmented with NASA data and technology, can be leveraged to support water supply forecasting for the Rio Grande Basin.

1.4.3 Regional and State Flood Plans

In 2019, the Texas legislature passed Senate Bill 8 to establish a new regional and state flood planning process aimed at protecting against loss of life and property from flooding. The TWDB delineated 15 Regional Flood Planning Areas and appointed initial members to the Regional Flood Planning Groups. The Regional Flood Planning Groups then prepared and submitted Regional Flood Plans in January 2023 and submitted Amended Regional Flood Plans to TWDB in July 2023. The approved Regional Flood Plans were then incorporated into the state's first 2024 State Flood Plan. Similar to the regional water planning process, the regional flood planning process will recur in 5-year cycles.

Each Regional Flood Plan includes a Flood Hazard Risk Assessment, Flood Management Evaluations, Flood Management Strategies, Flood Management Projects, and administrative, regulatory, and legislative recommendations. Identification of evaluations, strategies, and projects in the Regional Flood Plan can enable sponsors to be eligible for certain types of funding from the TWDB, including the newly established Flood Infrastructure Fund.

The Rio Grande Regional Water Planning Area is predominantly located in the Region 15 Lower Rio Grande Flood Planning Region, with portions of Maverick, Webb, and Jim Hogg Counties located within the Region 13 Nueces Flood Planning Region. Table 1-8 summarizes the number of structures located in the 100-year floodplain for each county, as identified by the Region 13 and Region 15 Regional Flood Plans.

Table 1-8 Number of Structures in 100-year Floodplain, as Identified by the Regional Flood Plans

County	Region 13 Number of Structures	Region 15 Number of Structures	Total Number of Structures in 100-Year Floodplain
Cameron	--	83,546	83,546
Hidalgo	--	142,880	142,880
Jim Hogg	812	60	872
Maverick	15	1,919	1,934
Starr	--	5,558	5,558
Webb	360	11,076	11,436
Willacy	--	6,685	6,685
Zapata	--	412	412

The Region 13 Regional Flood Plan included a total of 163 flood management evaluations (studies), zero flood mitigation projects, and 40 flood management strategies. The Region 15 Regional Flood Plan included a total of 95 flood management evaluations (studies), 2 flood mitigation projects, and 51 flood management strategies. For more information about the regional flood planning process and for copies of the state and regional flood plans, visit https://www.twdb.texas.gov/flood/planning/.

1.4.4 Public Water Supply Systems

The TWDB conducts water loss audits annually for retail water utilities. The breakdown of the aggregated water loss audits from Region M is summarized in Table 1-9 for 46 unique Public Water Systems reported 2020, 2021, and 2022.

Table 1-9 Summary of Region M Water Loss Audit Data, 2020-2022 (million gallons)

<table>
<tr><th colspan="9">Region M</th></tr>
<tr><td colspan="9">46 Audits Submitted</td></tr>
<tr><td colspan="9">System Input Volume</td></tr>
<tr><td colspan="9">75,328</td></tr>
<tr><td colspan="4">Authorized Consumption</td><td colspan="5">Water Loss</td></tr>
<tr><td colspan="4">65,435</td><td colspan="5">9,893</td></tr>
<tr><td colspan="4">86.9%</td><td colspan="5">13.1%</td></tr>
<tr><td colspan="2">Billed Consumption</td><td colspan="2">Unbilled Consumption</td><td colspan="3">Apparent Loss</td><td colspan="2">Real Loss</td></tr>
<tr><td colspan="2">64,102</td><td colspan="2">1,333</td><td colspan="3">1,631</td><td colspan="2">8,262</td></tr>
<tr><td colspan="2">85.1%</td><td colspan="2">1.8%</td><td colspan="3">2.1%</td><td colspan="2">11.0%</td></tr>
<tr><td>Billed Metered</td><td>Billed Unmetered</td><td>Unbilled Metered</td><td>Unbilled Unmetered</td><td>Unauthorized Consumption</td><td>Customer Meter Accuracy Loss</td><td>Systematic Data Handling Discrepancy</td><td>Reported Breaks and Leaks</td><td>Unreported Loss</td></tr>
<tr><td>64,047</td><td>54</td><td>393</td><td>941</td><td>161</td><td>1,322</td><td>147</td><td>407</td><td>7,856</td></tr>
<tr><td>85.0%</td><td>0.1%</td><td>0.5%</td><td>1.3%</td><td>0.2%</td><td>1.7%</td><td>0.2%</td><td>0.5%</td><td>10.5%</td></tr>
</table>

Revenue Water	Non-Revenue Water
64,102	11,226
85.1%	14.9%

INIITIALLY PREPARED PLAN

CHAPTER 2: POPULATION AND WATER DEMAND PROJECTIONS

Rio Grande Regional Water Plan

BV PROJECT NO. 411250

PREPARED FOR

Rio Grande Regional Water Planning Group

1 MARCH 2025

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acft/yr	Acre-Feet per Year
BEG	Bureau of Economic Geology
DB27	2027 Regional and State Water Planning Database
DMI	Domestic/Municipal/Industrial
GPCD	Gallons per Capita per Day
MUD	Municipal Utility District
MWP	Major Water Provider
NASS	National Agricultural Statistical Service
PUD	Public Utility District
RWP	Regional Water Plan
RWPG	Regional Water Planning Group
SUD	Special Utility District
SWP	State Water Plan
TSDC	Texas State Data Center
TWC	Texas Workforce Commission
TWDB	Texas Water Development Board
WAM	Water Availability Model
WCID	Water Control & Improvement District
WID	Water Improvement District
WMS	Water Management Strategy
WSC	Water Supply Corporation
WUG	Water User Group
WWP	Wholesale Water Providers

2.0 Population and Water Demand Projections

2.1 Introduction

To plan for future growth, current water demands must be quantified, and trends must be identified for change in demand. Region M has experienced changes in both the quantity and type of demands as a result of population growth, changes in irrigated farmland and the type of crops that are grown in any given year, changes in oil and gas mining operations, and other factors.

The Texas Water Development Board (TWDB) collaborated with the Regional Water Planning Groups (RWPGs) to develop the adopted demand projections for the region's water users, shown on Figure 2-1 and in Table 2-1. Population and municipal demands were estimated for utilities and rural areas for municipal water user group (WUG) projections. Other users were aggregated into geographical areas defined by county and river basin boundaries, such as irrigation and steam-electric power generation, to form the demand projections for all other WUGs. TWDB estimated demands using historical data and recent studies for each category to establish the base year. The base year was used with a rate of change to project decadal estimates over the 50-year planning horizon.

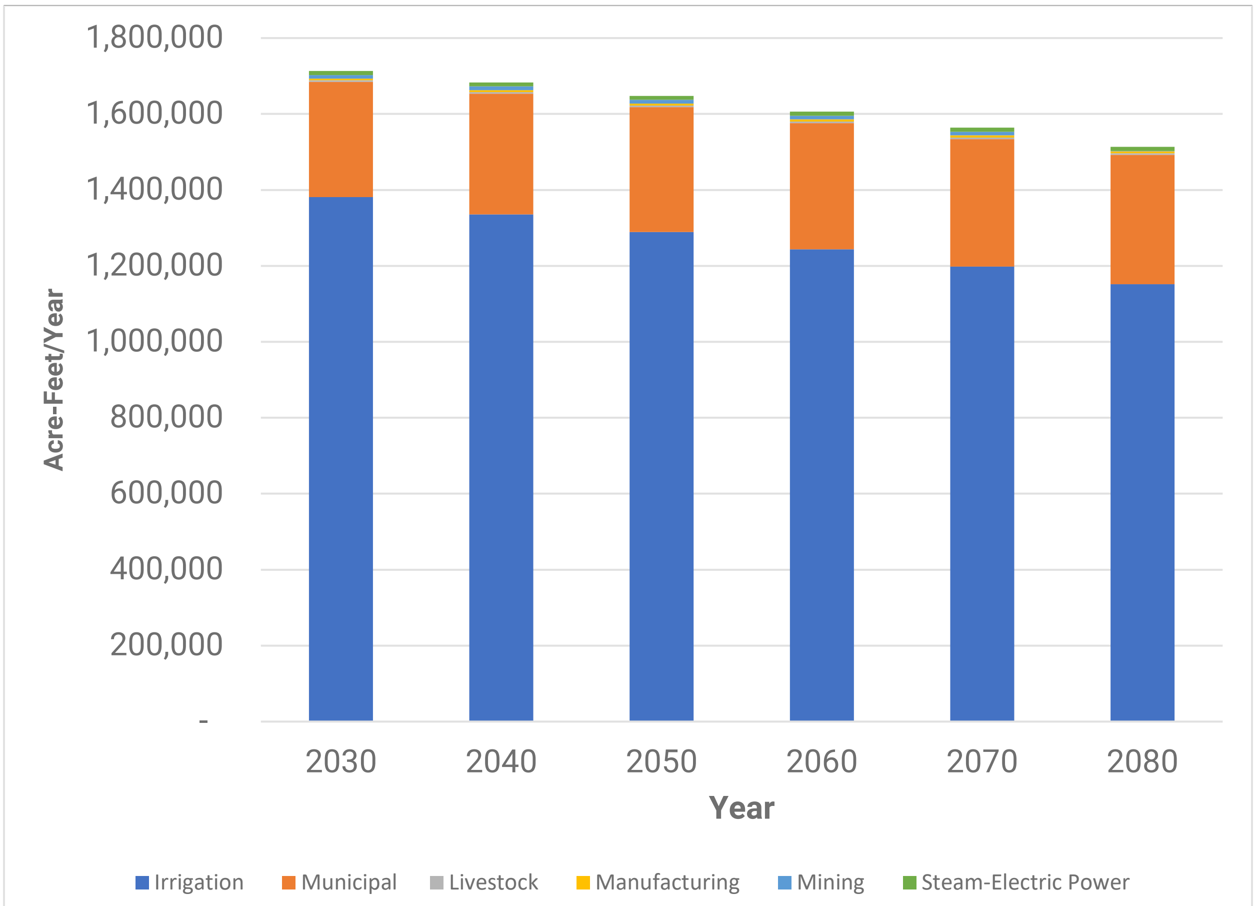

Figure 2-1 Aggregated Demands for Each Water User Group in Region M (acft/yr)

The TWDB draft demand projections were distributed to the RWPGs for review and were revised where necessary based on local information. The Region M Planning Group approved the TWDB estimates for livestock, manufacturing, mining, and steam-electric demands. Revisions were requested and adopted for population, municipal demands, and irrigation demands.

Table 2-1 Regional Demand Projections by Water Use Category (acft/yr)

Water User Group Type	2030	2040	2050	2060	2070	2080
Irrigation	1,381,152	1,335,343	1,289,533	1,243,724	1,197,914	1,152,113
Municipal	303,225	318,603	328,970	332,594	336,302	340,085
Livestock	4,216	4,216	4,216	4,216	4,216	4,216
Manufacturing	4,685	4,859	5,040	5,226	5,419	5,619
Mining	9,484	9,519	9,555	9,589	9,621	634
Steam-Electric	10,621	10,621	10,621	10,621	10,621	10,621
TOTAL	**1,713,003**	**1,683,357**	**1,647,950**	**1,605,799**	**1,563,729**	**1,512,724**

2.2 Population and Municipal Demands

2.2.1 Population Projections

The TWDB generated draft projections for population and municipal demand, which were reviewed by the RWPG and WUGs in the region. Proposed revisions were sent to the TWDB on behalf of the RWPG on August 10, 2023.The TWDB reviewed the request and recommended adoption of the proposed changes on November 1, 2023; the changes were adopted by the Board on November 9, 2023.

Population projections for this cycle were based on the 2020 U.S. Census data. For this reason, the population projections for Region M are generally lower than in previous cycles. Per demographers at the Pew Research Center, the 2020 Census had a nationwide undercount of 5% for Hispanic populations. To address these concerns, the RWPG requested an increase to the county population in Cameron County, Hidalgo County, and Webb County, based on a 5% increase to the Hispanic population percent in each county. These are the three counties where municipal WUGs requested revisions to their population projections.

Figure 2-2 shows the major population centers within the region. Table 2-2 shows the population forecasted by county over the planning horizon.

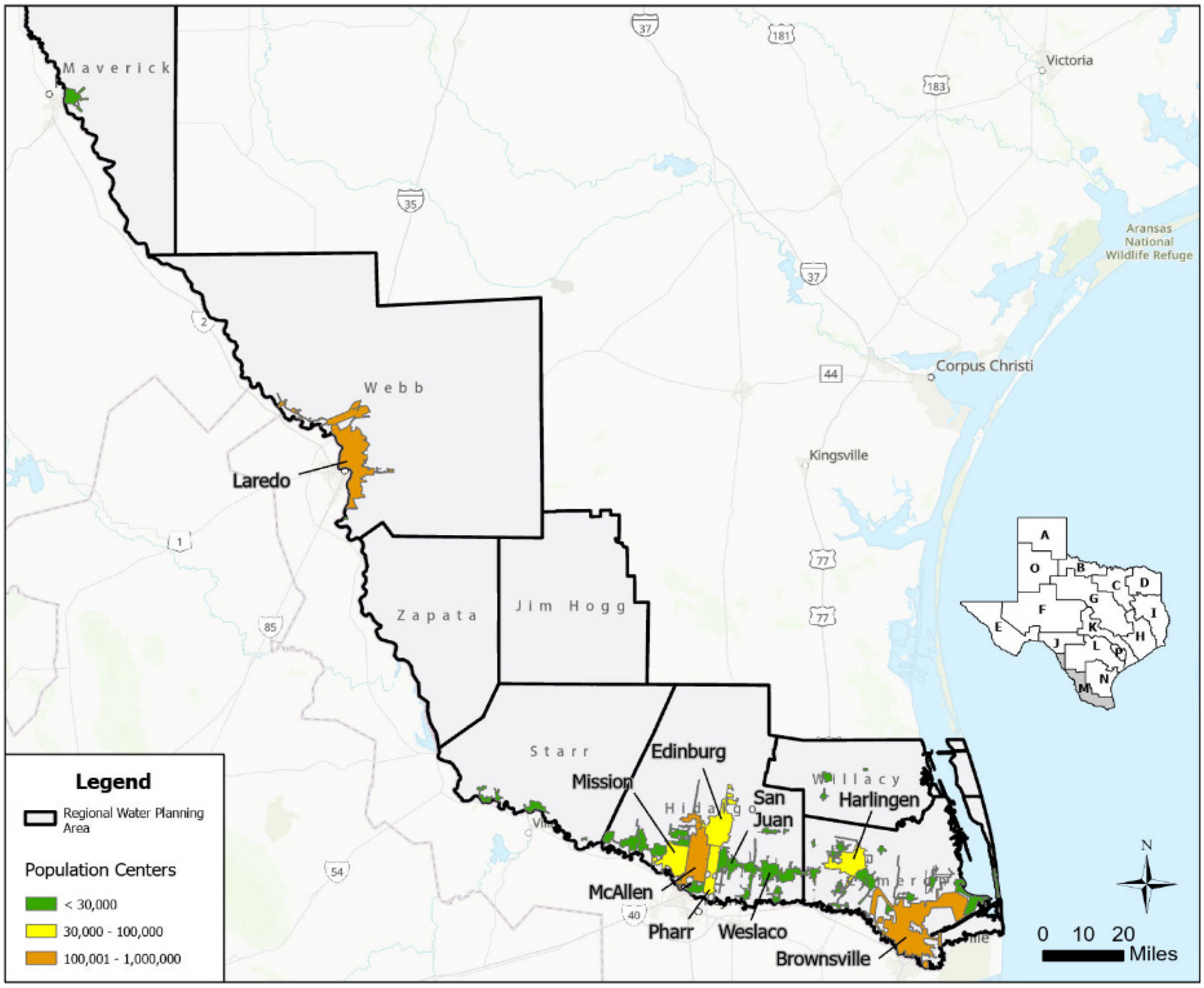

Figure 2-2 Population Centers for Region M

Table 2-2 Population Growth Projections for Region M

County	2030	2040	2050	2060	2070	2080
Cameron	453,325	465,039	469,300	468,071	466,828	465,573
Hidalgo	975,403	1,041,413	1,084,465	1,107,185	1,130,153	1,153,373
Jim Hogg	4,676	4,622	4,508	4,391	4,273	4,154
Maverick	62,424	66,814	70,294	72,996	75,728	78,490
Starr	70,499	75,394	79,002	81,275	83,573	85,896
Webb	292,999	304,635	308,179	305,094	301,977	298,824
Willacy	19,933	19,647	19,083	18,366	17,641	16,908
Zapata	14,075	14,288	14,295	14,158	14,019	13,878
Total	**1,893,334**	**1,991,852**	**2,049,126**	**2,071,536**	**2,094,192**	**2,117,096**

County-level population projections are based on Texas State Data Center (TSDC) Office of the State Demographer county-level population estimates. The base year projections are based on the 2020 census, and projections were developed using demographic trends including birth rates, survival rates, and net migration rates for population cohorts separated by age, gender, and race/ethnicity. TSDC's projections extend to 2050, and the TWDB staff has extended the projection through 2080. Overall, the population for the region increases over the planning horizon, but certain counties do project a decrease in population due to updates to the birth/death and migration rates for each individual county. Refer to Figure 2-3 to see how the Region M population is distributed among the eight counties for 2030.

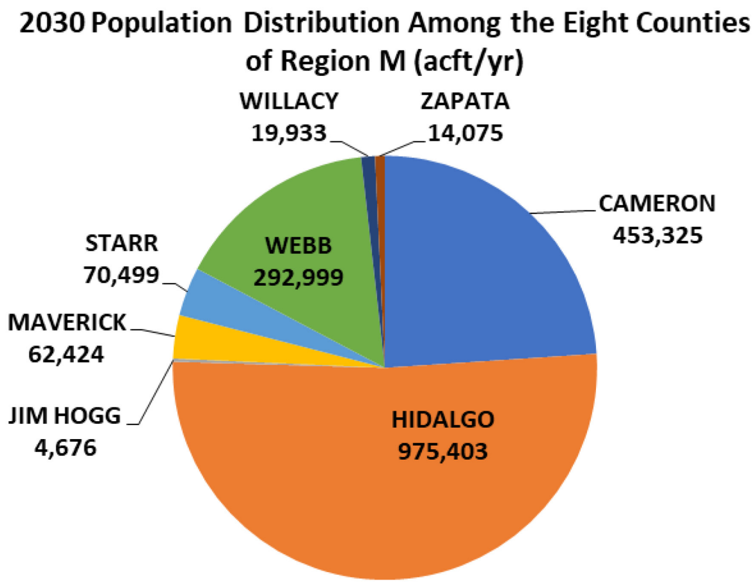

Figure 2-3 2030 Population Distribution Among the Eight Counties of Region M (acft/yr)

The county-level projections were then distributed to a municipal utility level. Municipal WUGs in the 2026 RWPs are defined as follows:

A. Privately-owned utilities that provide an average of more than 100 acre-feet per year (acft/yr) for municipal use for all owned water systems;

B. Water systems serving institutions or facilities owned by the state or federal government that provide more than 100 acft/yr for municipal use;

C. All other retail public utilities not covered in sections (A) and (B) that provide more than 100 acft/yr for municipal use;

D. Collective reporting units, or groups of retail public utilities that have a common association and are requested for inclusion by the RWPG; and

E. Municipal and domestic water use, referred to as "County-Other," not included in paragraphs (A) through (D) of this subsection.

The list of WUGs for the 2026 RWPs was prepared using the rules listed above and TWDB Water Use Survey data for 2015 to 2019.

The population projections (Table 2-3) for each WUG were developed by allocating growth from the county projections to each of the municipal water utilities and rural areas within that county. All county population not accounted for in a defined municipal WUG (based on items A-D above) is aggregated into a County-Other WUG, which represents unincorporated areas and utilities that do not meet WUG criteria. A combination of factors influences the allocation of growth, including the historical growth of a WUG or historical population and instances where a WUG is expected to have a constant population, such as a prison or military base. Where WUGs are split between counties, they are listed under each county with the portion of their population in that county and indicated by an asterisk. Detailed population projections split between county and river basin are included in the Reports from the 2027 Regional and State Water Planning Database, included in Appendix 2A.

Table 2-3 Projected Population, by Decade

County; City	2030	2040	2050	2060	2070	2080
CAMERON COUNTY						
Brownsville	191,689	196,629	198,396	197,812	197,213	196,600
Combes	3,041	3,120	3,146	3,135	3,124	3,111
County-Other, Cameron	26,712	21,315	15,478	10,491	7,194	4,294
East Rio Hondo Water Supply Corporation (WSC)*	26,908	31,911	37,034	40,909	43,001	45,200
El Jardin WSC	12,677	13,004	13,122	13,085	13,048	13,009
Harlingen	85,744	87,959	88,766	88,532	88,296	88,057
La Feria	6,210	6,369	6,425	6,403	6,379	6,353
Laguna Madre Water District	11,100	11,384	11,484	11,445	11,405	11,362
Los Fresnos	7,486	7,678	7,745	7,717	7,689	7,660
Military Highway WSC*	28,305	29,031	29,285	29,182	29,074	28,963
North Alamo WSC*	4,317	4,428	4,467	4,450	4,434	4,418
Olmito WSC	7,329	7,534	7,643	7,706	7,778	7,864
Palm Valley	1,308	1,341	1,353	1,349	1,342	1,337
Primera	6,782	8,749	10,061	11,067	12,174	12,783
Rio Hondo	1,711	1,755	1,770	1,764	1,758	1,751
San Benito	25,980	26,650	26,890	26,810	26,730	26,646
Santa Rosa	2,947	3,023	3,049	3,039	3,026	3,014
Valley Municipal Utility District (MUD) 2	3,079	3,159	3,186	3,175	3,163	3,151
Cameron County Total	**453,325**	**465,039**	**469,300**	**468,071**	**466,828**	**465,573**
HIDALGO COUNTY						
Agua Special Utility District (SUD)*	65,987	70,846	73,984	75,406	76,841	78,289

County; City	2030	2040	2050	2060	2070	2080
Alamo	19,549	20,026	20,404	21,105	21,819	22,550
County-Other, Hidalgo	27,570	16,844	4,818	5,523	6,252	6,997
Donna	17,377	18,378	19,045	19,500	19,962	20,430
Edcouch	2,552	2,349	2,246	2,415	2,588	2,765
Edinburg	85,768	93,195	97,911	99,436	100,966	102,501
Elsa	4,659	4,231	4,010	4,334	4,669	5,013
Hidalgo	12,072	12,740	13,187	13,512	13,841	14,175
Hidalgo County MUD No. 1	5,256	5,449	5,590	5,759	5,931	6,107
La Joya	4,764	5,080	5,286	5,399	5,514	5,630
La Villa	2,092	2,491	2,731	2,704	2,676	2,646
McAllen	165,587	184,057	201,554	206,901	212,332	217,849
Mercedes	14,571	14,784	14,985	15,549	16,125	16,714
Military Highway WSC*	15,911	15,602	15,510	16,284	17,077	17,889
Mission	88,336	93,383	96,747	99,076	101,437	103,831
North Alamo WSC*	212,974	235,887	250,160	252,649	255,098	257,509
Pharr	85,215	91,086	94,908	96,862	98,836	100,833
San Juan	23,805	24,380	24,837	25,693	26,565	27,455
Sharyland WSC	88,944	97,326	102,604	103,989	105,371	106,749
Weslaco	32,414	33,279	33,948	35,089	36,253	37,441
Hidalgo County Total	**975,403**	**1,041,413**	**1,084,465**	**1,107,185**	**1,130,153**	**1,153,373**
JIM HOGG COUNTY						
County-Other, Jim Hogg	1,194	1,182	1,155	1,130	1,103	1,075
Jim Hogg County Water Control & Improvement District (WCID) 2	3,482	3,440	3,353	3,261	3,170	3,079
Jim Hogg County Total	**4,676**	**4,622**	**4,508**	**4,391**	**4,273**	**4,154**
MAVERICK COUNTY						
County-Other, Maverick	1,328	883	588	404	278	191
Eagle Pass	58,692	62,688	65,889	68,762	71,614	74,461
Maverick County	2,404	3,243	3,817	3,830	3,836	3,838
Maverick County Total	**63,107**	**72,491**	**81,243**	**90,304**	**98,988**	**107,327**
STARR COUNTY						

County; City	2030	2040	2050	2060	2070	2080
Agua SUD*	244	242	240	243	245	247
County-Other, Starr	4,359	4,437	4,594	5,045	5,495	5,945
El Sauz WSC	1,708	1,868	1,979	2,022	2,066	2,109
El Tanque WSC	1,385	1,207	1,054	939	836	744
La Grulla	8,309	8,878	9,298	9,569	9,842	10,119
Rio Grande City	17,880	19,073	19,959	20,549	21,147	21,751
Rio WSC	8,102	9,597	10,564	10,561	10,547	10,523
Roma	21,305	22,518	23,450	24,213	24,986	25,771
Union WSC	7,207	7,574	7,864	8,134	8,409	8,687
Starr County Total	**70,499**	**75,394**	**79,002**	**81,275**	**83,573**	**85,896**
WEBB COUNTY						
County-Other, Webb	12,504	8,353	3,925	3,926	3,931	3,938
Laredo	267,373	277,989	281,208	278,353	275,465	272,541
Mirando City WSC	268	279	282	279	275	272
Webb County	12,854	18,014	22,764	22,536	22,306	22,073
Webb County Total	**292,999**	**304,635**	**308,179**	**305,094**	**301,977**	**298,824**
WILLACY COUNTY						
County-Other, Willacy	4665	4680	4326	3649	2822	1813
Lyford	1,992	1,905	1,829	1,766	1,719	1,690
North Alamo WSC*	4,517	4,527	4,553	4,607	4,699	4,841
Port Mansfield Public Utility District (PUD)	358	428	519	660	822	1011
Raymondville	6,991	6,822	6,681	6,580	6,534	6,555
Sebastian Mud	1,410	1,285	1,175	1,104	1,045	998
Willacy County Total	**19,933**	**19,647**	**19,083**	**18,366**	**17,641**	**16,908**
ZAPATA COUNTY						
County-Other, Zapata	1,162	1,316	1,424	1,487	1,537	1,581
Falcon Rural WSC	377	305	246	205	172	146
Siesta Shores WCID	1,552	1,576	1,576	1,558	1,542	1,523
Zapata County	10,099	10,249	10,251	10,146	10,038	9,925

County; City	2030	2040	2050	2060	2070	2080
Zapata County San Ygnacio and Ramireño	338	286	243	213	187	166
Zapata County WCID-Hwy 16 East	547	556	555	549	543	537
Zapata County Total	14,075	14,288	14,295	14,158	14,019	13,878
Region M Total	**1,893,334**	**1,991,852**	**2,049,126**	**2,071,536**	**2,094,192**	**2,117,096**
*WUGs are in more than one county; population splits are shown.						

2.2.2 Municipal Water Demand Projections

Municipal water demand projections utilize the population projections and a per-person water use volume (gallons per capita per day, GPCD). The base year for the 2026 planning cycle uses the 2021 Plan's baseline dry year (most commonly 2011) GPCD values for water utility and rural areas (county-other) and applies "passive conservation" savings to calculate an updated 2020 baseline GPCD. Passive conservation assumes that a GPCD gradually declines based on natural replacement rates for adoption of water-efficient fixtures and appliances. The 2020 baseline GPCD is then projected out to 2080, continuing to incorporate passive conservation, as appropriate. For each municipal WUG, the projected GPCD is multiplied by the projected population for each future decade to develop municipal water demand projections. When calculating the baseline or projected GPCD values, TWDB staff applied a minimum of 60 GPCD.[1]

The efficiency gains that are applied to GPCD are based on new construction and gradual replacement of fixtures and appliances in existing homes. The fixtures that were included in this estimate are toilets, showerheads, dishwashers, and clothes washers. Total water savings are based on the phased implementation of federal efficiency requirements for each of these kinds of fixtures/appliances and assumptions about the rate at which new homes are constructed and old fixtures are replaced.[2] This is considered passive conservation and measures beyond those described above are included in the discussion of advanced water conservation as a water management strategy (WMS) in later chapters. The regional average GPCD for 2030 is 131.3 and in 2080 is 130.7, which is only a 0.5 percent reduction in per-capita daily demand over 50 years. The baseline GPCD and projected municipal water demands for all Region M WUGs are shown in Table 2-4. Appendix 2B provides data on the water savings by decade due to passive conservation for each municipal WUG.

[1] The 60 GPCD minimum was based on the "Standard New Homes Retrofitted…" estimate of 39 GPCD for indoor use (Analysis of Water Use in New Single Family Homes, Prepared by William B. DeOreo of Aquacraft Water Engineering & Management for the Salt Lake City Corporation and the USEPA, 2011) and an estimate that indoor use accounts for 69 percent of total household use (The Grass is Always Greener…Outdoor Residential Water Use in Texas, Sam Marie Hermitte and Robert Mace, TWDB Technical Note 12-01, 2012). The total of 56.5 GPCD is rounded up to account for additional local government and commercial water use.

[2] For details regarding the way efficiency improvements were calculated, refer to the Regional Water Planning Documentation, Projection Methodology for Draft Population and Municipal Demands, TWDB.

Table 2-4 GPCD and Projected Municipal WUG Demands by County (acft/yr)

County; City	Base Dry-Year GPCD	2030	2040	2050	2060	2070	2080
CAMERON COUNTY							
Brownsville	154	32,212	32,908	33,204	33,106	33,006	32,903
Combes	85	275	280	282	281	280	279
County-Other, Cameron	147	4,244	3,371	2,448	1,659	1,138	679
East Rio Hondo WSC	125	3,636	4,290	4,978	5,499	5,781	6,076
El Jardin WSC	102	1,365	1,391	1,404	1,400	1,396	1,392
Harlingen	159	14,830	15,149	15,288	15,248	15,208	15,166
La Feria	118	787	802	810	807	804	800
Laguna Madre Water District	378	4,638	4,745	4,787	4,771	4,754	4,736
Los Fresnos	60	503	516	521	519	517	515
Military Highway WSC	136	4,180	4,267	4,305	4,290	4,274	4,257
North Alamo WSC	146	687	702	708	705	703	700
Olmito WSC	166	1,326	1,358	1,377	1,389	1,402	1,417
Palm Valley	166	236	241	243	242	241	240
Primera	79	570	730	840	924	1,016	1,067
Rio Hondo	66	118	120	121	121	120	120
San Benito	116	3,249	3,316	3,346	3,336	3,326	3,315
Santa Rosa	79	247	252	254	253	252	251
Valley MUD 2	286	971	994	1,002	999	995	991
Cameron County Total		**74,074**	**75,432**	**75,918**	**75,549**	**75,213**	**74,904**
HIDALGO COUNTY							
Agua SUD	100	7,100	7,579	7,914	8,066	8,220	8,375
Alamo	125	2,638	2,688	2,739	2,833	2,929	3,027
County-Other, Hidalgo	109	3,220	1,953	559	640	725	811
Donna	117	2,192	2,308	2,391	2,449	2,507	2,565
Edcouch	81	219	200	192	206	221	236

County; City	Base Dry-Year GPCD	2030	2040	2050	2060	2070	2080
Edinburg	121	11,209	12,114	12,727	12,925	13,124	13,323
Elsa	102	508	459	435	470	507	544
Hidalgo	118	1,534	1,608	1,665	1,706	1,747	1,790
Hidalgo County MUD 1	92	515	529	543	559	576	593
La Joya	116	596	633	658	672	687	701
La Villa	100	225	266	292	289	286	283
McAllen	211	38,276	42,409	46,441	47,673	48,924	50,195
Mercedes	102	1,593	1,605	1,627	1,688	1,751	1,815
Military Highway WSC	136	2,350	2,293	2,280	2,394	2,510	2,630
Mission	187	18,065	19,030	19,716	20,190	20,672	21,159
North Alamo WSC	146	33,888	37,393	39,656	40,051	40,439	40,821
Pharr	100	9,135	9,698	10,105	10,313	10,523	10,736
San Juan	129	3,324	3,388	3,451	3,570	3,691	3,815
Sharyland WSC	160	15,541	16,948	17,867	18,108	18,349	18,589
Weslaco	156	5,500	5,624	5,737	5,930	6,127	6,327
Hidalgo County Total		**157,628**	**168,725**	**176,995**	**180,732**	**184,515**	**188,335**
JIM HOGG COUNTY							
County-Other, Jim Hogg	109	139	137	133	131	127	124
Jim Hogg County WCID 2	126	474	466	454	442	429	417
Jim Hogg County Total		**613**	**603**	**587**	**573**	**556**	**541**
MAVERICK COUNTY							
County-Other, Maverick	120	169	111	74	51	35	24
Eagle Pass	150	9,579	10,192	10,713	11,180	11,644	12,107
Maverick County	128	335	450	529	531	532	532
Maverick County Total		**10,083**	**10,753**	**11,316**	**11,762**	**12,211**	**12,663**

County; City	Base Dry-Year GPCD	2030	2040	2050	2060	2070	2080
STARR COUNTY							
Agua SUD	100	26	26	26	26	26	26
County-Other, Starr	115	536	543	562	618	673	728
El Sauz WSC	91	167	181	192	196	200	204
El Tanque WSC	134	201	174	152	136	121	108
La Grulla	161	1,460	1,554	1,628	1,675	1,723	1,771
Rio Grande City	214	4,200	4,468	4,676	4,814	4,954	5,096
Rio WSC	93	809	953	1,049	1,049	1,047	1,045
Roma	108	2,475	2,603	2,711	2,799	2,888	2,979
Union WSC	157	1,233	1,291	1,341	1,387	1,434	1,481
Starr County Total		**11,107**	**11,793**	**12,337**	**12,700**	**13,066**	**13,438**
WEBB COUNTY							
County-Other, Webb	105	1,396	922	433	433	434	435
Laredo	144	41,831	43,292	43,794	43,349	42,899	42,444
Mirando City WSC	101	29	30	30	30	30	29
Webb County	107	1,483	2,068	2,613	2,587	2,561	2,534
Webb County Total		**44,739**	**46,312**	**46,870**	**46,399**	**45,924**	**45,442**
WILLACY COUNTY							
County-Other, Willacy	112	560	558	515	435	336	216
Lyford	88	186	177	170	164	160	157
North Alamo WSC	146	719	718	722	730	745	767
Port Mansfield PUD	350	138	165	200	254	317	390
Raymondville	106	796	773	757	746	740	743
Sebastian MUD	64	95	86	79	74	70	67
Willacy County Total		**2,494**	**2,477**	**2,443**	**2,403**	**2,368**	**2,340**
ZAPATA COUNTY							

County; City	Base Dry-Year GPCD	2030	2040	2050	2060	2070	2080
County-Other, Zapata	127	157	177	191	200	206	212
Falcon Rural WSC	169	70	56	45	38	32	27
San Ygnacio MUD	123	207	209	209	206	204	202
Siesta Shores WCID	166	1,829	1,850	1,851	1,832	1,812	1,792
Zapata County	170	63	53	45	39	35	31
Zapata County WCID-Hwy 16 East	266	161	163	163	161	160	158
Zapata County Total		**2,487**	**2,508**	**2,504**	**2,476**	**2,449**	**2,422**

2.3 Manufacturing Water Demand Projections

The primary manufacturing water users in Region M are related to the agriculture industry and the fishing industry, including sugar and vegetable processing. As detailed in Table 2-5, manufacturing projections show an increase from 4,685 acft/yr in decade 2030 to 5,619 acft/yr in decade 2080. The increase in demand occurs primarily in Cameron and Hidalgo counties.

Table 2-5 Manufacturing Demand Projections by County (acft/yr)

County	2030	2040	2050	2060	2070	2080
Cameron	460	477	495	513	532	552
Hidalgo	3,926	4,071	4,222	4,378	4,540	4,708
Jim Hogg	42	44	46	48	50	52
Maverick	98	102	106	110	114	118
Starr	81	84	87	90	93	96
Webb	78	81	84	87	90	93
Willacy	0	0	0	0	0	0
Zapata	0	0	0	0	0	0
Total	**4,685**	**4,859**	**5,040**	**5,226**	**5,419**	**5,619**

Manufacturing water demand projections were developed using 2015 through 2019 data from the TWDB Annual Water Use Survey, historical water use at individual facilities, and Texas Workforce Commission (TWC) employment projections. The baseline manufacturing water demands are based on the highest annual water use, aggregated by county, between 2015 and 2019. The baseline is then projected using a statewide production growth proxy representing consistent incremental change to ensure the accommodation of potential near-term economic and manufacturing sector production growth. Since the first projected decade (2030) of the full planning horizon (2030 – 2080) is more than ten years from the baseline water use data, the statewide annual historical water use rate of change from 2010 - 2019 was chosen as the proxy to adjust the baseline value to the initial year of projections value (2030). This is to account for potential changes in production and water use that may occur between the baseline water use value and the first projected decade. For each planning decade after 2030, a statewide manufacturing growth proxy was applied annually to project increases in manufacturing water demands. For the 2026 Regional Water Plan, the growth proxy was based on the CBP historical number of establishments in the manufacturing sector from 2010-2019. The statewide rate of change was applied to all region-county projections for each decade following 2030.

TWDB staff focuses on facilities that use large volumes of water (more than 10 million gallons), relative to the area of the state and/or are self-supplied by groundwater or surface water. Smaller-use facilities are generally supplied by public utilities as commercial accounts and, thus, are part of the municipal water demands. TWDB staff conducted additional reviews of Texas Commission on Environmental Quality industrial water right usage reports and contacted WWPs and groundwater conservation districts who are not otherwise surveyed to ensure that all large-water use manufacturing facilities are included in the historical estimates.

Because of the increasing reliance on water reuse as a significant source to meet future manufacturing water demands, water reuse volumes have been included in industrial projections. The 2015 through 2019 average volume of reuse water reported statewide by surveyed manufacturing facilities was 32,004 acft/yr, or 3 percent of the total average freshwater manufacturing water use in that same period.

2.4 Steam-Electric Power Generation Water Demand Projections

Steam-electric power water use estimates include volumes reported to the TWDB Annual Water Use Survey by large power generation plants that sell power on the open market but generally do not include cogeneration plants that generate power for manufacturing or mining processes. Steam-electric power water use volumes that were reported by surveyed municipal water sellers rather than the power generators are included in these estimates.

Steam-electric power generation water demand is projected to remain below 1 percent the overall non-municipal water demands in Region M throughout the planning horizon. The steam-electric water demands are projected to be a constant 10,621 acft/yr from 2030 to 2080, as shown in Table 2-6 by county for the planning horizon. The demand projections are lower than those in the 2021 Region M Water Plan, mainly due to the cancellation of two planned facilities associated with Coronado Power Ventures (La Paloma Energy Center).

Table 2-6 Steam-Electric Power Generation Demands by County (acft/yr)

County	2030	2040	2050	2060	2070	2080
Cameron	165	165	165	165	165	165
Hidalgo	10,325	10,325	10,325	10,325	10,325	10,325
Jim Hogg	0	0	0	0	0	0
Maverick	0	0	0	0	0	0
Starr	0	0	0	0	0	0
Webb	131	131	131	131	131	131
Willacy	0	0	0	0	0	0
Zapata	0	0	0	0	0	0
Total	**10,621**	**10,621**	**10,621**	**10,621**	**10,621**	**10,621**

The 2030 water demand projections for each county are based on the highest county-aggregated historical steam-electric power water use in the most recent 5 years (2015 through 2019). The anticipated water use of future facilities and the reported water use of facilities scheduled for retirement, as listed in the state and federal reports, were taken into account in the demand projections. Demand projections were held constant throughout the planning period.

As is the case for the manufacturing demand projections previously described, power generation is expected to rely on water reuse to meet future water demands; estimated water reuse volumes have been included in steam-electric power projection demands. The 2015 through 2019 average volume of reuse water reported statewide by surveyed power facilities was 65,111 acft, or 13 percent of the total average freshwater steam-electric water use. Landfill gas, wood waste biomass, and battery power plants, as well as any power generating facilities using renewable energy sources, are not included in the water demand projections.

2.5 Mining Water Demand Projections

Mining water usage in Region M is dominated by hydraulic fracturing, with some aggregate operations. One of the major hurdles in evaluating mining water usage is the lack of consistent reporting, especially for groundwater usage. In Region M, the use of surface water from the Rio Grande allowed the Region M Planning Group to further inform water demand projections for mining.

Mining water use estimates were based on the 2022 TWDB contracted study, Water Use by the Mining Industry in Texas,[3] with the University of Texas Bureau of Economic Geology (UTBEG). Per TWDB, this study provided a comprehensive and quantitative assessment of mining water use across Texas and identified major mining operations in the state, including oil and gas, aggregates, and coal and lignite. Both historical and current water use were determined, and projections of future water demand were developed for 2030-2080 in each major sub-category within the mining sector, highlighting water use for unconventional oil and gas development. The study also analyzed water use patterns, technological

[3] University of Texas Bureau of Economic Geology. Water Use by the Mining Industry in Texas. August 2022. https://www.twdb.texas.gov/waterplanning/data/projections/MiningStudy/doc/Final%20TWDB%20Mining%20Water%20Use%20Report.PDF

changes, market trends, and water source information. County-level projections were compiled as the sum of individual projections for three sub-sector mining categories: oil and gas, aggregates, and coal. Mining water demand projections are displayed in Table 2-7 by county for the planning horizon.

Table 2-7 Mining Water Demand Projections (acft/yr)

County	2030	2040	2050	2060	2070	2080
Cameron	0	0	0	0	0	0
Hidalgo	234	260	286	312	337	361
Jim Hogg	9	9	9	9	9	9
Maverick	4,898	4,898	4,898	4,898	4,898	2
Starr	193	200	207	213	218	223
Webb	4,142	4,144	4,147	4,149	4,151	31
Willacy	2	2	2	2	2	2
Zapata	6	6	6	6	6	6
Total	**9,484**	**9,519**	**9,555**	**9,589**	**9,621**	**634**

Statewide, a major shift from gas to oil production significantly changed the spatial distribution of production in a relatively short time. Within Region M, accelerated development of the Eagle Ford Shale reflected this trend in Webb and Maverick counties. Adoption of operating practices that allowed for more water recycling and use of brackish water also changed patterns of water consumption and usage at the same time that overall water usage was increasing.

Water usage was estimated for the upstream segment of the oil and gas industry, that is, water used to extract the commodity until it leaves the wellhead. For the aggregate industry, estimates included washing but no further processing, for coal mostly pit dewatering and aquifer depressurization, or mining as defined in the Standard Industrial Classification/North American Industry Classification System codes. Therefore, cement factories, in spite of large quarries, are grouped with manufacturing and not mining.

Reuse or recycling was taken into account in water-use values, as well as opportunity usages such as stormwater collection for aggregate mining. Usage numbers mostly represent consumption. The division of water between surface and groundwater sources is not well documented. Some facilities provided this information directly, but no consistent information is available because of the reporting exemption for the oil and gas industry. Historically (2010-2019), TWDB data estimates approximately 62 percent of water used in mining statewide was groundwater, and regional estimates varied from 24 percent in Zapata County to 94 percent in Jim Hogg County.

The UTBEG report estimated water usage for the oil and gas, coal, and aggregate for a base year (2019) and projected through 2080. Water usage from the different sectors was calculated in different ways, specific to the sector. In general, the data used were collected from reports submitted to the state for permitting (e.g., information about wells submitted to Railroad Commission of Texas), databases including the Information Handling Services (IHS) Enerdeq Database and FracFocus, surveys distributed by TWDB, and communication with operators and industry trade groups.

The UTBEG report stated that for the oil and gas sector water, usage was projected in the 2022 study using a resource-based approach. Estimates of annual hydraulic fracturing water use are based on Total Recoverable Resources (TRR) analyses of oil and gas reservoirs for three of the major plays in Texas. Estimates of quantity of developable resources, quantity of operations needed for extraction, and amount of water used by these operations were developed for each major production region. Concentration of future operations was distributed spatially by characteristics of each major play. Temporal distribution was accomplished by modeling production with a hyperbolic decline curve, once again parameterized by data specific to each play.

No comprehensive data set exists for aggregate mining. Surveys were distributed to operators, but despite collaboration with industry trade groups, response rates were low. Some data from similar historical water-use surveys distributed by TWDB were available. Records of aggregate production coupled with water-use coefficients from previous studies were also utilized in the attempt to quantify aggregate industry water use. The product of aggregate mining is used locally, so population projections were used to predict future production and water use for this sector as well.

2.6 Irrigation Water Demand Projections

Irrigation use within Region M is largely dependent on available supply from the Amistad-Falcon Reservoir system; however, it is important for regional planning that irrigation estimates make a distinction between irrigation water use and irrigation water demand. Since the RWP process permits only a single demand scenario and is intended to represent a drought year, irrigation demand is best developed assuming a dry year in which regional irrigation water needs are met, rather than limiting demand to the availability of surface water supplies.

In most actual drought years, some farmers can respond to anticipated limited water supplies by selecting crops that require less water or no "applied" water (dry land farming); such plants are often lower in value. Similarly, citrus and pecan trees can tolerate minimal water for a limited time period, but their true demand is greater than the minimum water required to survive. To address the long-term needs of the farmers in Region M, demands are based on the "worst-case" scenario, where there is minimal rainfall.

Various methodologies have been proposed for estimating irrigation demand. The 2016 RWP established a base year utilizing TWDB water use estimates, by county, from 2005 through 2009 and aggregating the maximum year for each county to assemble a new representative demand year. The demand was expected to decline over the planning horizon, and the rate of decline was correlated with the increase in demand for municipal water. For 2030 through 2070, the decadal increase in municipal demands was subtracted from the irrigation demand to estimate the impact of urbanization. For the 2021 RWP, the Region M RWPG used a methodology using 2011 as a base year for the irrigation demand projections because of the little rainfall (high demand) and full reservoirs (minimal supply constraints) experienced, for an annual irrigation water use of 1,426,960 acft. Additionally, the Region M RWPG incorporated a rate of change over the planning horizon using the combined influences of sedimentation and the historical rate at which irrigation water rights have been converted to municipal use.

For the 2026 planning cycle, the Region M RWPG agreed to use the same methodology as in the 2021 Plan. Thus, the 2030-2070 demands were kept identical to the 2021 RWP projections, and then linearly extended to 2080. The projected irrigation demands by county are shown below (Table 2-8).

Table 2-8 Irrigation Demand Projections by County (acft/yr)

County	Historical Use Estimate 2011	Irrigation Projections					
		2030	2040	2050	2060	2070	2080
Cameron	537,217	519,972	502,725	485,479	468,233	450,987	433,744
Hidalgo	688,667	666,560	644,451	622,343	600,236	578,127	556,024
Jim Hogg	360	348	337	325	314	302	290
Maverick	61,706	59,725	57,744	55,763	53,782	51,801	49,820
Starr	23,875	23,109	22,342	21,576	20,809	20,043	19,277
Webb	10,425	10,090	9,756	9,421	9,086	8,752	8,417
Willacy	99,610	96,412	93,215	90,017	86,819	83,621	80,424
Zapata	5,100	4,936	4,773	4,609	4,445	4,281	4,117
Total	**1,426,960**	**1,381,152**	**1,335,343**	**1,289,533**	**1,243,724**	**1,197,914**	**1,152,113**

Supply from the Amistad-Falcon Reservoir system is expected to decrease as a result of sedimentation, which reduces the overall storage capacity. A sediment loading rate was estimated for each reservoir and the reduction in storage is incorporated into the Water Availability Model (WAM). The WAM projections predict a 2030 firm yield of 1,001,776 acft and a 2080 firm yield of 995,863 acft.

As land use changes from agricultural, the water rights are typically converted to municipal use rights. When a Class A or B water right is converted to a domestic/municipal/industrial (DMI), it is reduced to 50 or 40 percent of the maximum diversion, respectively. The distribution of Rio Grande water rights associated with all DMI, Class A, and Class B was evaluated from 2010 through 2017 and used to estimate how water right distribution could be expected to change over the planning horizon (Figure 2-4).

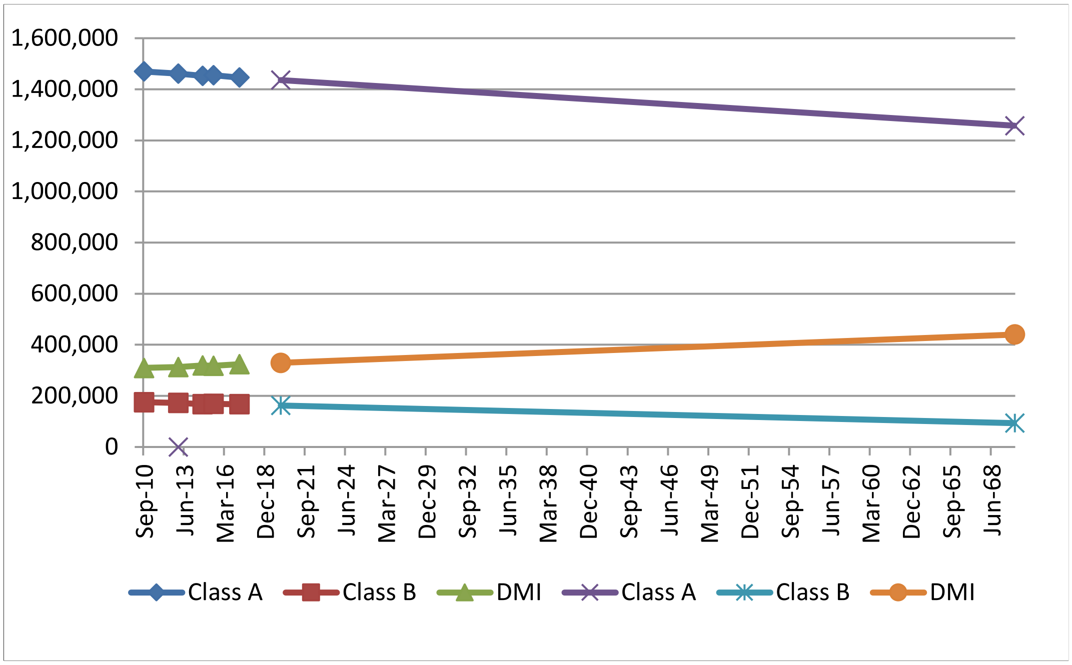

Figure 2-4 Distribution of Water Right Types (Maximum Diversion)

As detailed in Table 2-9, an estimated delivery volume was projected for the planning horizon using the rules for how water is allocated to water right holder accounts according to water right class. A decadal rate of change from the delivery volume was applied to the 2011 supply, which resulted in an overall reduction in demand that follows the reduction in availability and irrigable acreage. These trends were applied to surface water and assumed for groundwater-based demands.

Table 2-9 Projected Distribution of Water Rights and Supplies

Lower Basin Authorized Diversion		Middle Basin Authorized Diversion		Total Authorized Diversion		Firm Yield	
						2030	2080
MUNILWR	253,428	MUNIMID	74,215	MUNI	327,643	327,643	327,643
LOW-A-IRR	1,411,050	MID-A-IRR	156,946	A-IRR	1,567,996	616,056	610,653
LOW-A-MIN	1,077	MID-A-MIN	9,173	A-MIN	10,250	4,027	3,992
LOW-A-MUN	465	MID-A-MUN	2,050	A-MUN	2,515	988	980
LOW-B-IRR	131,682	MID-B-IRR	18,051	B-IRR	149,733	47,063	46,651
LOW-B-MIN	5,020	MID-B-MIN	10,176	B-MIN	15,196	4,776	4,735
LOW-B-MUN	3,823	MID-B-MUN	62	B-MUN	3,885	1,221	1,210

2.7 Livestock Water Demand Projections

Livestock water use estimates are based on historical TWDB annual water use estimates consisting of species-specific water use per head values, multiplied by annual inventory estimates, plus surveyed water use for non-standard livestock production such as fish hatcheries. Table 2-10 displays the livestock category and per head daily water use information.

Table 2-10 Livestock Category and Estimated Per Head Daily Water Use

TWDB Category	Subcategory	Per Head Daily Water Use (gallons)
Cattle	Milk	55
	Fed and Other	15
Chickens	Non-Broilers	0.09
	Broilers	0.09
Turkeys	Turkeys	0.2
Equine	Horses, Ponies, Mules, Donkeys, and Burros	12
Hogs	Hogs	5
Sheep	Sheep	2
Goats	Milk, Meat, Angora	2

Livestock is expected to make up less than 1 percent of the overall non-municipal water demands in Region M throughout the planning horizon. The livestock water demand projections show a constant demand of 4,216 acft/yr for decade 2030 through decade 2080. The regionwide livestock projections are shown in Table 2-11 by county for the planning horizon.

Table 2-11 Livestock Demand Projections (acft/yr)

County	2030	2040	2050	2060	2070	2080
Cameron	287	287	287	287	287	287
Hidalgo	649	649	649	649	649	649
Jim Hogg	420	420	420	420	420	420
Maverick	473	473	473	473	473	473
Starr	945	945	945	945	945	945
Webb	886	886	886	886	886	886
Willacy	197	197	197	197	197	197
Zapata	359	359	359	359	359	359
Region Total	**4,216**	**4,216**	**4,216**	**4,216**	**4,216**	**4,216**

The 2030 water demand projections for each county were based on the average of the most recent 5 years (2015 through 2019) of water use estimates. The same growth trend from the 2022 SWP was applied to project livestock water demand for 2040 through 2070 and then held constant for 2080. Additionally, the TWDB updated the inventory estimates for broiler chickens for 2015 through 2019, and updated livestock water use estimates for 2015 through 2019 using new per head daily water use for milk cows, chickens, hogs, and goats (Table 2-10); these figures were used in developing the livestock water demand projections.

The rate of change for projections from the 2021 RWP was then applied to the updated base year. During previous RWP cycles, many counties, including all of those within Region M, chose to hold the base constant throughout the planning horizon.

2.8 Major Water Providers

Major Water Provider (MWP) was a new designation in the 2021 planning cycle; an MWP is any WUG or wholesale water provider (WWP) of particular significance to the water supply of a region, as determined by the RWPG. At the February 21, 2024, Region M meeting, the planning group approved the same definition of an MWP as in the 2021 Plan, which is any entity that provides 3,000 acft or more of municipal water per year, and then voted to add Mexico as a new MWP due to the region's unique international water-sharing situation. According to current estimates of 2030 municipal supplies, the entities listed in Table 2-12 have been designated as MWP in the 2026 RWP. Appendix 2C includes the population and demand projections for the MWPs.

While technically not a WUG or WWP, and therefore not allowed to be classified as a MWP per TWDB rules, Mexico is of particular significance to Region M because it provides water to the Amistad-Falcon Reservoir System that it shares with the United States, based on the 1944 Treaty, impacting water levels in the reservoirs and the water users on the United States' side.

Table 2-12 Region M Major Water Providers

Major Water Providers	
Agua Special Utility District (SUD)	Hidalgo County Irrigation District No. 16
Alamo	Hidalgo County Irrigation District No. 2
Bayview Irrigation District No. 11	Hidalgo County Irrigation District No. 6
Brownsville PUB	Hidalgo County Water Improvement District (WID) No. 3*
Brownsville Irrigation District	Laguna Madre Water District
Cameron County Irrigation District No. 2	Laredo
Cameron County Irrigation District No. 3 - La Feria	McAllen
Cameron County Irrigation District No. 6 - Los Fresnos	Military Highway Water Supply Corporation (WSC)
Cameron County Water Improvement District No. 10	Mission
Delta Lake Irrigation District	North Alamo WSC
Donna Irrigation District-Hidalgo County No. 1	Pharr
Eagle Pass	Rio Grande City

Major Water Providers	
East Rio Hondo WSC	San Benito
Edinburg	San Juan
Harlingen	Sharyland WSC
Harlingen Irrigation District-Cameron County No. 1	Southmost Regional Water Authority
Hidalgo and Cameron Counties Irrigation District No. 9	United Irrigation District
Hidalgo County Irrigation District No. 1	Weslaco

*In January 2025, Hidalgo County Water Improvement District No. 3 and Santa Cruz Water Control and Improvement District No. 15 consolidated into Hidalgo County Consolidated Water Control and Improvement District.

Irrigation districts[4] divert and deliver raw water to irrigated farmland, municipalities, and some industrial and livestock water users. There are 25 irrigation districts in Region M that operate under the Texas Water Code, each of which has its own internal operating policies (Figure 2-5). The physical distribution networks are earthen canals, concrete lined canals, and pipeline. Irrigation districts are discussed in more detail in Chapter 3.

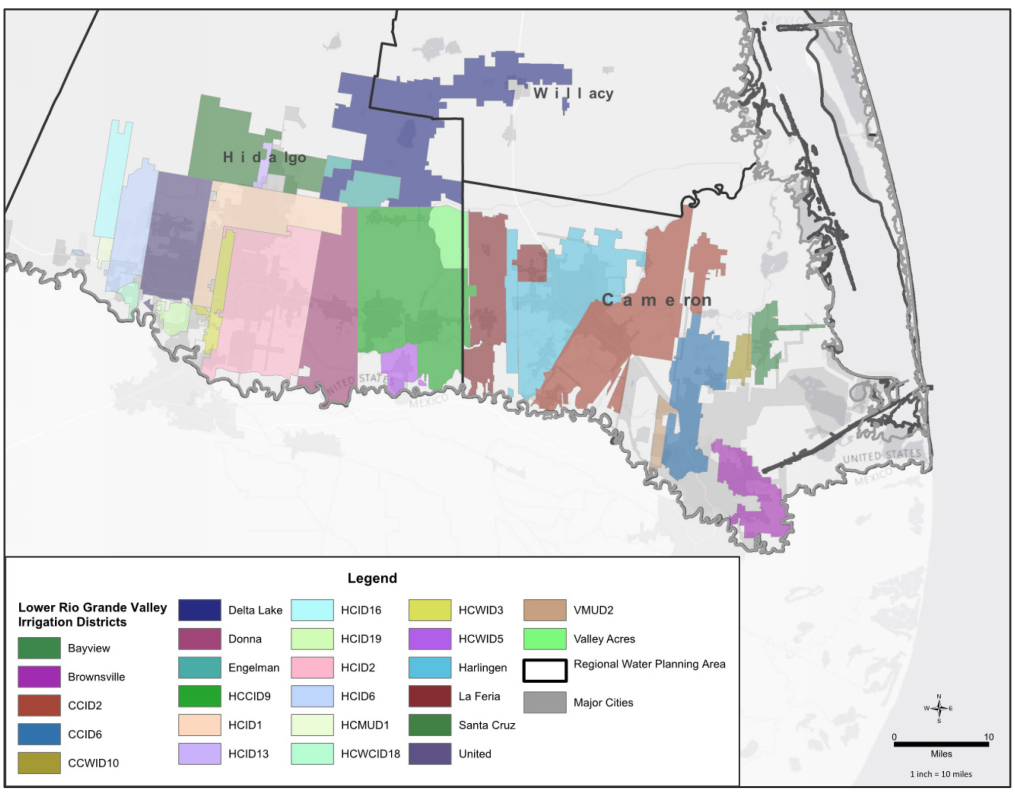

Figure 2-5 Lower Rio Grande Valley Irrigation Districts

[4] For simplicity, the following designations will be referred to collectively as irrigation districts in this plan: irrigation districts, water control and improvement districts, water improvement districts, and other similar designations.

WSCs cover most of the rural area in the Lower Rio Grande Valley and supply many of the populated rural areas in the western counties. The largest are North Alamo WSC, East Rio Hondo WSC, Sharyland WSC, and Military Highway WSC, which all treat and deliver both surface and groundwater to significant unincorporated and rural areas and portions of cities. Additionally, the larger municipal utilities in the region are considered MWPs, which include Alamo, Brownsville PUB, Eagle Pass, Edinburg, Harlingen, Laredo, McAllen, Pharr, Rio Grande City, San Benito, San Juan, and Weslaco.

Appendix 2A. Relevant Reports from the 2027 Regional and State Water Planning Database (DB27)

DRAFT Region M Water User Group (WUG) Population

	WUG Population					
	2030	2040	2050	2060	2070	2080
Cameron County Total	**453,325**	**465,039**	**469,300**	**468,071**	**466,828**	**465,573**
Cameron County / Nueces-Rio Grande Basin Total	**450,904**	**462,555**	**466,796**	**465,573**	**464,338**	**463,091**
Brownsville	189,772	194,663	196,412	195,834	195,241	194,634
Combes	3,041	3,120	3,146	3,135	3,124	3,111
East Rio Hondo WSC	26,908	31,911	37,034	40,909	43,001	45,200
El Jardin WSC	12,586	12,910	13,028	12,991	12,954	12,915
Harlingen	85,744	87,959	88,766	88,532	88,296	88,057
La Feria	6,210	6,369	6,425	6,403	6,379	6,353
Laguna Madre Water District	11,100	11,384	11,484	11,445	11,405	11,362
Los Fresnos	7,486	7,678	7,745	7,717	7,689	7,660
Military Highway WSC	28,087	28,807	29,060	28,957	28,850	28,740
North Alamo WSC	4,317	4,428	4,467	4,450	4,434	4,418
Olmito WSC	7,329	7,534	7,643	7,706	7,778	7,864
Palm Valley	1,308	1,341	1,353	1,349	1,342	1,337
Primera	6,782	8,749	10,061	11,067	12,174	12,783
Rio Hondo	1,711	1,755	1,770	1,764	1,758	1,751
San Benito	25,980	26,650	26,890	26,810	26,730	26,646
Santa Rosa	2,947	3,023	3,049	3,039	3,026	3,014
Valley MUD 2	2,884	2,959	2,985	2,974	2,963	2,952
County-Other	26,712	21,315	15,478	10,491	7,194	4,294
Cameron County / Rio Grande Basin Total	**2,421**	**2,484**	**2,504**	**2,498**	**2,490**	**2,482**
Brownsville	1,917	1,966	1,984	1,978	1,972	1,966
El Jardin WSC	91	94	94	94	94	94
Military Highway WSC	218	224	225	225	224	223
Valley MUD 2	195	200	201	201	200	199
Hidalgo County Total	**975,403**	**1,041,413**	**1,084,465**	**1,107,185**	**1,130,153**	**1,153,373**
Hidalgo County / Nueces-Rio Grande Basin Total	**947,949**	**1,022,712**	**1,075,714**	**1,097,744**	**1,119,999**	**1,142,493**
Agua SUD	62,952	67,587	70,581	71,937	73,306	74,688
Alamo	19,549	20,026	20,404	21,105	21,819	22,550
Donna	17,377	18,378	19,045	19,500	19,962	20,430
Edcouch	2,552	2,349	2,246	2,415	2,588	2,765
Edinburg	85,768	93,195	97,911	99,436	100,966	102,501
Elsa	4,659	4,231	4,010	4,334	4,669	5,013
Hidalgo	11,899	12,558	12,998	13,319	13,643	13,972
Hidalgo County MUD 1	5,256	5,449	5,590	5,759	5,931	6,107

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

DRAFT Region M Water User Group (WUG) Population

	WUG Population					
	2030	2040	2050	2060	2070	2080
La Joya	3,859	4,115	4,282	4,373	4,466	4,560
La Villa	2,092	2,491	2,731	2,704	2,676	2,646
McAllen	165,587	184,057	201,554	206,901	212,332	217,849
Mercedes	14,571	14,784	14,985	15,549	16,125	16,714
Military Highway WSC	15,817	15,510	15,418	16,188	16,976	17,783
Mission	88,336	93,383	96,747	99,076	101,437	103,831
North Alamo WSC	212,974	235,887	250,160	252,649	255,098	257,509
Pharr	85,215	91,086	94,908	96,862	98,836	100,833
San Juan	23,805	24,380	24,837	25,693	26,565	27,455
Sharyland WSC	88,944	97,326	102,604	103,989	105,371	106,749
Weslaco	32,414	33,279	33,948	35,089	36,253	37,441
County-Other	4,323	2,641	755	866	980	1,097
Hidalgo County / Rio Grande Basin Total	**27,454**	**18,701**	**8,751**	**9,441**	**10,154**	**10,880**
Agua SUD	3,035	3,259	3,403	3,469	3,535	3,601
Hidalgo	173	182	189	193	198	203
La Joya	905	965	1,004	1,026	1,048	1,070
Military Highway WSC	94	92	92	96	101	106
County-Other	23,247	14,203	4,063	4,657	5,272	5,900
Jim Hogg County Total	**4,676**	**4,622**	**4,508**	**4,391**	**4,273**	**4,154**
Jim Hogg County / Nueces-Rio Grande Basin Total	**4,599**	**4,546**	**4,434**	**4,318**	**4,202**	**4,085**
Jim Hogg County WCID 2	3,482	3,440	3,353	3,261	3,170	3,079
County-Other	1,117	1,106	1,081	1,057	1,032	1,006
Jim Hogg County / Rio Grande Basin Total	**77**	**76**	**74**	**73**	**71**	**69**
County-Other	77	76	74	73	71	69
Maverick County Total	**62,424**	**66,814**	**70,294**	**72,996**	**75,728**	**78,490**
Maverick County / Nueces Basin Total	**20**	**13**	**9**	**6**	**4**	**3**
County-Other	20	13	9	6	4	3
Maverick County / Rio Grande Basin Total	**62,404**	**66,801**	**70,285**	**72,990**	**75,724**	**78,487**
Eagle Pass	58,692	62,688	65,889	68,762	71,614	74,461
Maverick County	2,404	3,243	3,817	3,830	3,836	3,838
County-Other	1,308	870	579	398	274	188

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

DRAFT Region M Water User Group (WUG) Population

	WUG Population					
	2030	2040	2050	2060	2070	2080
Starr County Total	**70,499**	**75,394**	**79,002**	**81,275**	**83,573**	**85,896**
Starr County / Nueces-Rio Grande Basin Total	**906**	**922**	**955**	**1,048**	**1,142**	**1,235**
County-Other	906	922	955	1,048	1,142	1,235
Starr County / Rio Grande Basin Total	**69,593**	**74,472**	**78,047**	**80,227**	**82,431**	**84,661**
Agua SUD	244	242	240	243	245	247
El Sauz WSC	1,708	1,868	1,979	2,022	2,066	2,109
El Tanque WSC	1,385	1,207	1,054	939	836	744
La Grulla	8,309	8,878	9,298	9,569	9,842	10,119
Rio Grande City	17,880	19,073	19,959	20,549	21,147	21,751
Rio WSC	8,102	9,597	10,564	10,561	10,547	10,523
Roma	21,305	22,518	23,450	24,213	24,986	25,771
Union WSC	7,207	7,574	7,864	8,134	8,409	8,687
County-Other	3,453	3,515	3,639	3,997	4,353	4,710
Webb County Total	**292,999**	**304,635**	**308,179**	**305,094**	**301,977**	**298,824**
Webb County / Nueces Basin Total	**1,936**	**2,492**	**2,991**	**2,962**	**2,932**	**2,903**
Webb County	1,635	2,291	2,896	2,867	2,837	2,808
County-Other	301	201	95	95	95	95
Webb County / Nueces-Rio Grande Basin Total	**2,856**	**1,908**	**896**	**897**	**898**	**899**
County-Other	2,856	1,908	896	897	898	899
Webb County / Rio Grande Basin Total	**288,207**	**300,235**	**304,292**	**301,235**	**298,147**	**295,022**
Laredo	267,373	277,989	281,208	278,353	275,465	272,541
Mirando City WSC	268	279	282	279	275	272
Webb County	11,219	15,723	19,868	19,669	19,469	19,265
County-Other	9,347	6,244	2,934	2,934	2,938	2,944
Willacy County Total	**19,933**	**19,647**	**19,083**	**18,366**	**17,641**	**16,908**
Willacy County / Nueces-Rio Grande Basin Total	**19,933**	**19,647**	**19,083**	**18,366**	**17,641**	**16,908**
Lyford	1,992	1,905	1,829	1,766	1,719	1,690
North Alamo WSC	4,517	4,527	4,553	4,607	4,699	4,841
Port Mansfield PUD	358	428	519	660	822	1,011
Raymondville	6,991	6,822	6,681	6,580	6,534	6,555
Sebastian MUD	1,410	1,285	1,175	1,104	1,045	998
County-Other	4,665	4,680	4,326	3,649	2,822	1,813

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

DRAFT Region M Water User Group (WUG) Population

	WUG Population					
	2030	2040	2050	2060	2070	2080
Zapata County Total	**14,075**	**14,288**	**14,295**	**14,158**	**14,019**	**13,878**
Zapata County / Rio Grande Basin Total	**14,075**	**14,288**	**14,295**	**14,158**	**14,019**	**13,878**
Falcon Rural WSC	377	305	246	205	172	146
Siesta Shores WCID	1,552	1,576	1,576	1,558	1,542	1,523
Zapata County	10,099	10,249	10,251	10,146	10,038	9,925
Zapata County San Ygnacio & Ramireño	338	286	243	213	187	166
Zapata County WCID-Hwy 16 East	547	556	555	549	543	537
County-Other	1,162	1,316	1,424	1,487	1,537	1,581
Region M Population Total	**1,893,334**	**1,991,852**	**2,049,126**	**2,071,536**	**2,094,192**	**2,117,096**

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

DRAFT Region M Water User Group (WUG) Demand

	WUG Demand (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Cameron County Total	**594,958**	**579,086**	**562,344**	**544,747**	**527,184**	**509,652**
Cameron County / Nueces-Rio Grande Basin Total	**563,163**	**548,315**	**532,605**	**516,044**	**499,517**	**483,020**
Brownsville	31,890	32,579	32,872	32,775	32,676	32,574
Combes	275	280	282	281	280	279
East Rio Hondo WSC	3,636	4,290	4,978	5,499	5,781	6,076
El Jardin WSC	1,355	1,381	1,394	1,390	1,386	1,382
Harlingen	14,830	15,149	15,288	15,248	15,208	15,166
La Feria	787	802	810	807	804	800
Laguna Madre Water District	4,638	4,745	4,787	4,771	4,754	4,736
Los Fresnos	503	516	521	519	517	515
Military Highway WSC	4,148	4,234	4,272	4,257	4,241	4,224
North Alamo WSC	687	702	708	705	703	700
Olmito WSC	1,326	1,358	1,377	1,389	1,402	1,417
Palm Valley	236	241	243	242	241	240
Primera	570	730	840	924	1,016	1,067
Rio Hondo	118	120	121	121	120	120
San Benito	3,249	3,316	3,346	3,336	3,326	3,315
Santa Rosa	247	252	254	253	252	251
Valley MUD 2	910	931	939	936	932	928
County-Other	4,244	3,371	2,448	1,659	1,138	679
Manufacturing	460	477	495	513	532	552
Livestock	281	281	281	281	281	281
Irrigation	488,773	472,560	456,349	440,138	423,927	407,718
Cameron County / Rio Grande Basin Total	**31,795**	**30,771**	**29,739**	**28,703**	**27,667**	**26,632**
Brownsville	322	329	332	331	330	329
El Jardin WSC	10	10	10	10	10	10
Military Highway WSC	32	33	33	33	33	33
Valley MUD 2	61	63	63	63	63	63
Steam Electric Power	165	165	165	165	165	165
Livestock	6	6	6	6	6	6
Irrigation	31,199	30,165	29,130	28,095	27,060	26,026
Hidalgo County Total	**839,322**	**828,481**	**814,820**	**796,632**	**778,493**	**760,402**
Hidalgo County / Nueces-Rio Grande Basin Total	**809,576**	**800,649**	**789,020**	**771,629**	**754,283**	**736,984**
Agua SUD	6,773	7,230	7,550	7,695	7,842	7,990
Alamo	2,638	2,688	2,739	2,833	2,929	3,027

*A single asterisk next to a WUG's name denotes that the WUG is split by more than one planning region.

DRAFT Region M Water User Group (WUG) Demand

	WUG Demand (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Donna	2,192	2,308	2,391	2,449	2,507	2,565
Edcouch	219	200	192	206	221	236
Edinburg	11,209	12,114	12,727	12,925	13,124	13,323
Elsa	508	459	435	470	507	544
Hidalgo	1,512	1,585	1,641	1,682	1,722	1,764
Hidalgo County MUD 1	515	529	543	559	576	593
La Joya	483	513	533	544	556	568
La Villa	225	266	292	289	286	283
McAllen	38,276	42,409	46,441	47,673	48,924	50,195
Mercedes	1,593	1,605	1,627	1,688	1,751	1,815
Military Highway WSC	2,336	2,279	2,267	2,380	2,495	2,614
Mission	18,065	19,030	19,716	20,190	20,672	21,159
North Alamo WSC	33,888	37,393	39,656	40,051	40,439	40,821
Pharr	9,135	9,698	10,105	10,313	10,523	10,736
San Juan	3,324	3,388	3,451	3,570	3,691	3,815
Sharyland WSC	15,541	16,948	17,867	18,108	18,349	18,589
Weslaco	5,500	5,624	5,737	5,930	6,127	6,327
County-Other	505	306	88	100	114	127
Manufacturing	3,878	4,021	4,170	4,324	4,484	4,650
Mining	232	257	283	309	334	357
Steam Electric Power	10,325	10,325	10,325	10,325	10,325	10,325
Livestock	633	633	633	633	633	633
Irrigation	640,071	618,841	597,611	576,383	555,152	533,928
Hidalgo County / Rio Grande Basin Total	**29,746**	**27,832**	**25,800**	**25,003**	**24,210**	**23,418**
Agua SUD	327	349	364	371	378	385
Hidalgo	22	23	24	24	25	26
La Joya	113	120	125	128	131	133
Military Highway WSC	14	14	13	14	15	16
County-Other	2,715	1,647	471	540	611	684
Manufacturing	48	50	52	54	56	58
Mining	2	3	3	3	3	4
Livestock	16	16	16	16	16	16
Irrigation	26,489	25,610	24,732	23,853	22,975	22,096

*A single asterisk next to a WUG's name denotes that the WUG is split by more than one planning region.

DRAFT Region M Water User Group (WUG) Demand

	WUG Demand (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Jim Hogg County Total	**1,432**	**1,413**	**1,387**	**1,364**	**1,337**	**1,312**
Jim Hogg County / Nueces-Rio Grande Basin Total	**1,299**	**1,282**	**1,258**	**1,238**	**1,213**	**1,191**
Jim Hogg County WCID 2	474	466	454	442	429	417
County-Other	130	128	124	123	119	116
Manufacturing	42	44	46	48	50	52
Mining	9	9	9	9	9	9
Livestock	362	362	362	362	362	362
Irrigation	282	273	263	254	244	235
Jim Hogg County / Rio Grande Basin Total	**133**	**131**	**129**	**126**	**124**	**121**
County-Other	9	9	9	8	8	8
Livestock	58	58	58	58	58	58
Irrigation	66	64	62	60	58	55
Maverick County Total	**75,277**	**73,970**	**72,556**	**71,025**	**69,497**	**63,076**
Maverick County / Nueces Basin Total	**175**	**174**	**173**	**173**	**173**	**64**
County-Other	3	2	1	1	1	0
Mining	108	108	108	108	108	0
Livestock	64	64	64	64	64	64
Maverick County / Rio Grande Basin Total	**75,102**	**73,796**	**72,383**	**70,852**	**69,324**	**63,012**
Eagle Pass	9,579	10,192	10,713	11,180	11,644	12,107
Maverick County	335	450	529	531	532	532
County-Other	166	109	73	50	34	24
Manufacturing	98	102	106	110	114	118
Mining	4,790	4,790	4,790	4,790	4,790	2
Livestock	409	409	409	409	409	409
Irrigation	59,725	57,744	55,763	53,782	51,801	49,820
Starr County Total	**35,435**	**35,364**	**35,152**	**34,757**	**34,365**	**33,979**
Starr County / Nueces-Rio Grande Basin Total	**391**	**396**	**403**	**418**	**432**	**445**
County-Other	111	113	117	128	140	151
Mining	97	100	103	107	109	111
Livestock	183	183	183	183	183	183
Starr County / Rio Grande Basin Total	**35,044**	**34,968**	**34,749**	**34,339**	**33,933**	**33,534**
Agua SUD	26	26	26	26	26	26

*A single asterisk next to a WUG's name denotes that the WUG is split by more than one planning region.

DRAFT Region M Water User Group (WUG) Demand

	WUG Demand (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
El Sauz WSC	167	181	192	196	200	204
El Tanque WSC	201	174	152	136	121	108
La Grulla	1,460	1,554	1,628	1,675	1,723	1,771
Rio Grande City	4,200	4,468	4,676	4,814	4,954	5,096
Rio WSC	809	953	1,049	1,049	1,047	1,045
Roma	2,475	2,603	2,711	2,799	2,888	2,979
Union WSC	1,233	1,291	1,341	1,387	1,434	1,481
County-Other	425	430	445	490	533	577
Manufacturing	81	84	87	90	93	96
Mining	96	100	104	106	109	112
Livestock	762	762	762	762	762	762
Irrigation	23,109	22,342	21,576	20,809	20,043	19,277
Webb County Total	**60,066**	**61,310**	**61,539**	**60,738**	**59,934**	**55,000**
Webb County / Nueces Basin Total	**2,535**	**2,600**	**2,659**	**2,658**	**2,658**	**771**
Webb County	189	263	332	329	326	322
County-Other	34	22	10	10	10	10
Manufacturing	34	36	37	38	40	41
Mining	1,894	1,895	1,896	1,897	1,898	14
Livestock	384	384	384	384	384	384
Webb County / Nueces-Rio Grande Basin Total	**422**	**314**	**202**	**202**	**202**	**202**
County-Other	319	211	99	99	99	99
Livestock	103	103	103	103	103	103
Webb County / Rio Grande Basin Total	**57,109**	**58,396**	**58,678**	**57,878**	**57,074**	**54,027**
Laredo	41,831	43,292	43,794	43,349	42,899	42,444
Mirando City WSC	29	30	30	30	30	29
Webb County	1,294	1,805	2,281	2,258	2,235	2,212
County-Other	1,043	689	324	324	325	326
Manufacturing	44	45	47	49	50	52
Mining	2,248	2,249	2,251	2,252	2,253	17
Steam Electric Power	131	131	131	131	131	131
Livestock	399	399	399	399	399	399
Irrigation	10,090	9,756	9,421	9,086	8,752	8,417

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DRAFT Region M Water User Group (WUG) Demand

	WUG Demand (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Willacy County Total	**99,105**	**95,891**	**92,659**	**89,421**	**86,188**	**82,963**
Willacy County / Nueces-Rio Grande Basin Total	**99,105**	**95,891**	**92,659**	**89,421**	**86,188**	**82,963**
Lyford	186	177	170	164	160	157
North Alamo WSC	719	718	722	730	745	767
Port Mansfield PUD	138	165	200	254	317	390
Raymondville	796	773	757	746	740	743
Sebastian MUD	95	86	79	74	70	67
County-Other	560	558	515	435	336	216
Mining	2	2	2	2	2	2
Livestock	197	197	197	197	197	197
Irrigation	96,412	93,215	90,017	86,819	83,621	80,424
Zapata County Total	**7,788**	**7,646**	**7,478**	**7,286**	**7,095**	**6,904**
Zapata County / Rio Grande Basin Total	**7,788**	**7,646**	**7,478**	**7,286**	**7,095**	**6,904**
Falcon Rural WSC	70	56	45	38	32	27
Siesta Shores WCID	207	209	209	206	204	202
Zapata County	1,829	1,850	1,851	1,832	1,812	1,792
Zapata County San Ygnacio & Ramireño	63	53	45	39	35	31
Zapata County WCID-Hwy 16 East	161	163	163	161	160	158
County-Other	157	177	191	200	206	212
Mining	6	6	6	6	6	6
Livestock	359	359	359	359	359	359
Irrigation	4,936	4,773	4,609	4,445	4,281	4,117
Region M Demand Total	**1,713,383**	**1,683,161**	**1,647,935**	**1,605,970**	**1,564,093**	**1,513,288**

*A single asterisk next to a WUG's name denotes that the WUG is split by more than one planning region.

Appendix 2B. Passive Conservation Water Savings by Decade

County	EntityName	Base GPCD	Passive Conservation Savings (GPCD)					
			2030	2040	2050	2060	2070	2080
HIDALGO	Agua SUD	100	3.95	4.5	4.5	4.5	4.5	4.5
STARR	Agua SUD	100	3.95	4.5	4.5	4.5	4.5	4.5
HIDALGO	Alamo	125	4.55	5.17	5.17	5.17	5.17	5.17
CAMERON	Brownsville	154	3.98	4.59	4.59	4.59	4.59	4.59
CAMERON	Combes	85	4.36	4.9	4.9	4.9	4.9	4.9
CAMERON	County-Other, Cameron	147	5.15	5.82	5.82	5.82	5.82	5.82
HIDALGO	County-Other, Hidalgo	109	4.72	5.51	5.51	5.51	5.51	5.51
JIM HOGG	County-Other, Jim Hogg	109	5.1	5.84	5.84	5.84	5.84	5.84
MAVERICK	County-Other, Maverick	120	6.72	7.68	7.68	7.68	7.68	7.68
STARR	County-Other, Starr	115	5.14	5.72	5.72	5.72	5.72	5.72
WEBB	County-Other, Webb	105	5.31	6.43	6.43	6.43	6.43	6.43
WILLACY	County-Other, Willacy	112	4.91	5.64	5.64	5.64	5.64	5.64
ZAPATA	County-Other, Zapata	127	6.48	7.17	7.17	7.17	7.17	7.17
HIDALGO	Donna	117	4.37	4.9	4.9	4.9	4.9	4.9
MAVERICK	Eagle Pass	150	4.29	4.85	4.85	4.85	4.85	4.85
CAMERON	East Rio Hondo WSC	125	4.38	4.99	4.99	4.99	4.99	4.99
HIDALGO	Edcouch	81	4.37	4.88	4.88	4.88	4.88	4.88
HIDALGO	Edinburg	121	4.33	4.96	4.96	4.96	4.96	4.96
CAMERON	El Jardin WSC	102	5.84	6.49	6.49	6.49	6.49	6.49
STARR	El Sauz WSC	91	3.95	4.6	4.6	4.6	4.6	4.6
STARR	El Tanque WSC	134	4.26	4.99	4.99	4.99	4.99	4.99
HIDALGO	Elsa	102	4.57	5.11	5.11	5.11	5.11	5.11
ZAPATA	Falcon Rural WSC	169	4.24	4.8	4.8	4.8	4.8	4.8
CAMERON	Harlingen	159	4.59	5.24	5.24	5.24	5.24	5.24
HIDALGO	Hidalgo	118	4.58	5.29	5.29	5.29	5.29	5.29
HIDALGO	Hidalgo County MUD 1	92	4.61	5.34	5.34	5.34	5.34	5.34
JIM HOGG	Jim Hogg County WCID 2	126	4.5	5.1	5.1	5.1	5.1	5.1
CAMERON	La Feria	118	4.89	5.52	5.52	5.52	5.52	5.52
STARR	La Grulla	161	4.16	4.73	4.73	4.73	4.73	4.73
HIDALGO	La Joya	116	4.29	4.83	4.83	4.83	4.83	4.83
HIDALGO	La Villa	100	4.1	4.57	4.57	4.57	4.57	4.57
CAMERON	Laguna Madre Water District	378	4.98	5.86	5.86	5.86	5.86	5.86
WEBB	Laredo	144	4.33	4.97	4.97	4.97	4.97	4.97
CAMERON	Los Fresnos	60	0	0	0	0	0	0
WILLACY	Lyford	88	4.43	4.98	4.98	4.98	4.98	4.98
MAVERICK	Maverick County	128	3.71	4.2	4.2	4.2	4.2	4.2
HIDALGO	McAllen	211	4.64	5.3	5.3	5.3	5.3	5.3
HIDALGO	Mercedes	102	4.43	5.06	5.06	5.06	5.06	5.06
CAMERON	Military Highway WSC	136	4.15	4.77	4.77	4.77	4.77	4.77
HIDALGO	Military Highway WSC	136	4.15	4.77	4.77	4.77	4.77	4.77
WEBB	Mirando City WSC	101	4.7	5.23	5.23	5.23	5.23	5.23
HIDALGO	Mission	187	4.43	5.07	5.07	5.07	5.07	5.07
CAMERON	North Alamo WSC	146	3.95	4.48	4.48	4.48	4.48	4.48
HIDALGO	North Alamo WSC	146	3.95	4.48	4.48	4.48	4.48	4.48
WILLACY	North Alamo WSC	146	3.95	4.48	4.48	4.48	4.48	4.48
CAMERON	Olmito WSC	166	4.46	5.13	5.13	5.13	5.13	5.13
CAMERON	Palm Valley	166	5.04	5.55	5.55	5.55	5.55	5.55
HIDALGO	Pharr	100	4.3	4.95	4.95	4.95	4.95	4.95
WILLACY	Port Mansfield PUD	350	5.26	6.05	6.05	6.05	6.05	6.05
CAMERON	Primera	79	3.97	4.5	4.5	4.5	4.5	4.5
WILLACY	Raymondville	106	4.3	4.83	4.83	4.83	4.83	4.83
STARR	Rio Grande City	214	4.3	4.86	4.86	4.86	4.86	4.86
CAMERON	Rio Hondo	66	4.44	4.99	4.99	4.99	4.99	4.99

County	EntityName	Base GPCD	Passive Conservation Savings (GPCD)					
			2030	2040	2050	2060	2070	2080
STARR	Rio WSC	93	3.82	4.35	4.35	4.35	4.35	4.35
STARR	Roma	108	4.27	4.8	4.8	4.8	4.8	4.8
CAMERON	San Benito	116	4.36	4.92	4.92	4.92	4.92	4.92
HIDALGO	San Juan	129	4.34	4.95	4.95	4.95	4.95	4.95
CAMERON	Santa Rosa	79	4.24	4.72	4.72	4.72	4.72	4.72
WILLACY	Sebastian MUD	64	4	4	4	4	4	4
HIDALGO	Sharyland WSC	160	4.01	4.54	4.54	4.54	4.54	4.54
ZAPATA	Siesta Shores WCID	123	4.15	4.73	4.73	4.73	4.73	4.73
STARR	Union WSC	157	4.23	4.78	4.78	4.78	4.78	4.78
CAMERON	Valley MUD 2	286	4.53	5.14	5.14	5.14	5.14	5.14
WEBB	Webb County	107	4.02	4.51	4.51	4.51	4.51	4.51
HIDALGO	Weslaco	156	4.51	5.13	5.13	5.13	5.13	5.13
ZAPATA	Zapata County	166	4.28	4.82	4.82	4.82	4.82	4.82
ZAPATA	Zapata County San Ygnacio and Ramireño	170	4.57	5.06	5.06	5.06	5.06	5.06
ZAPATA	Zapata County WCID-Hwy 16 East	266	2.77	3.55	3.55	3.55	3.55	3.55

Appendix 2C. Major Water Providers Population and Water Demand Projections

Agua SUD	Use Type	2030	2040	2050	2060	2070	2080
Population		66,231	71,088	74,224	75,649	77,086	78,536
WUG Demand	Municipal	7,126	7,605	7,940	8,092	8,246	8,401

Alamo		2030	2040	2050	2060	2070	2080
Population		19,549	20,026	20,404	21,105	21,819	22,550
WUG Demand	Municipal	2,638	2,688	2,739	2,833	2,929	3,027

Bayview Irrigation District No. 11		2030	2040	2050	2060	2070	2080
County-Other, Cameron – Contract Demand	Municipal	183	183	183	183	183	183
Irrigation, Cameron – Contract Demand	Irrigation	16,978	16,978	16,978	16,978	16,978	16,978
WWP Demand		17,161	17,161	17,161	17,161	17,161	17,161

Brownsville PUB		2030	2040	2050	2060	2070	2080
Population		191,689	196,629	198,396	197,812	197,213	196,600
WUG Demand	Municipal	32,212	32,908	33,204	33,106	33,006	32,903
El Jardin WSC – Contract Demand	Municipal	1,200	1,200	1,200	1,200	1,200	1,200
Cameron County Irrigation – Contract Demand	Irrigation	1,783	1,783	1,783	1,783	1,783	1,783
Cameron County Manufacturing – Contract Demand	Manufacturing	292	292	292	292	292	292
Steam Electric Power Generation, Cameron County – Contract Demand	Steam Electric Power	165	165	165	165	165	165
WWP Demand		35,652	36,348	36,644	36,546	36,446	36,343

Brownsville Irrigation District		2030	2040	2050	2060	2070	2080
Brownsville – Contract Demand	Municipal	1,200	1,200	1,200	1,200	1,200	1,200
County-Other, Cameron – Contract Demand	Municipal	334	334	334	334	334	334
Hidalgo County WID 3 – Contract Demand	Wholesale Water Provider	2,000	2,000	2,000	2,000	2,000	2,000
Irrigation, Cameron – Contract Demand	Irrigation	31,949	31,949	31,949	31,949	31,949	31,949
WWP Demand		35,483	35,483	35,483	35,483	35,483	35,483

Cameron County Irrigation District No. 2		2030	2040	2050	2060	2070	2080
Cameron County Other – Contract Demand	Municipal	750	750	750	750	750	750
East Rio Hondo WSC – Contract Demand	Municipal	5,521	5,521	5,521	5,521	5,521	5,521
Cameron County Irrigation – Contract Demand	Irrigation	151,536	151,536	151,536	151,536	151,536	151,536
Cameron County Manufacturing – Contract Demand	Manufacturing	192	192	192	192	192	192
Rio Hondo – Contract Demand	Municipal	771	771	771	771	771	771
San Benito – Contract Demand	Municipal	7,032	7,032	7,032	7,032	7,032	7,032
WWP Demand		165,802	165,802	165,802	165,802	165,802	165,802

Cameron County Irrigation District No. 3 - La Feria		2030	2040	2050	2060	2070	2080
Cameron County Other – Contract Demand	Municipal	900	900	900	900	900	900
Cameron County Irrigation – Contract Demand	Irrigation	34,220	34,194	34,169	34,109	34,023	33,928
La Feria – Contract Demand	Municipal	3,000	3,000	3,000	3,000	3,000	3,000
Santa Rosa – Contract Demand	Municipal	900	900	900	900	900	900
Sebastian MUD – Contract Demand	Municipal	300	300	300	300	300	300
Siesta Shores WCID – Contract Demand	Municipal	216	216	216	216	216	216
WWP Demand		**39,536**	**39,510**	**39,485**	**39,425**	**39,339**	**39,244**

Cameron County ID No. 6		2030	2040	2050	2060	2070	2080
Brownsville PUB – Contract Demand	Municipal	300	300	300	300	300	300
Cameron County Irrigation District 10	Wholesale Water Provider	25,414	25,414	25,414	25,414	25,414	25,414
Cameron County Irrigation – Contract Demand	Irrigation	49,565	49,565	49,565	49,565	49,565	49,565
Los Fresnos – Contract Demand	Municipal	1,051	1,051	1,051	1,051	1,051	1,051
Cameron County Manufacturing – Contract Demand	Manufacturing	20	20	20	20	20	20
Olmito WSC – Contract Demand	Municipal	1,885	1,885	1,885	1,885	1,885	1,885
WWP Demand		**78,235**	**78,235**	**78,235**	**78,235**	**78,235**	**78,235**

Cameron County ID No. 10		2030	2040	2050	2060	2070	2080
Bayvirew Irrigation District 11	Wholesale Water Provider	17,161	17,161	17,161	17,161	17,161	17,161
Cameron County Irrigation – Contract Demand	Irrigation	7,953	7,953	7,953	7,953	7,953	7,953
WWP Demand		**25,114**	**25,114**	**25,114**	**25,114**	**25,114**	**25,114**

Delta Lake ID		2030	2040	2050	2060	2070	2080
Willacy County-Other - Contract Demand	Municipal	100	100	100	100	100	100
Engelman Irrigation District	Wholesale Water Provider	6,872	6,866	6,861	6,849	6,832	6,813
Hidalgo County Irrigation – Contract Demand	Irrigation	39,655	39,625	39,595	39,525	39,426	39,316
Willacy County Irrigation – Contract Demand	Irrigation	30,283	30,260	30,238	30,184	30,108	30,025
Willacy County Livestock – Contract Demand	Livestock	235	235	140	140	140	140
Lyford - Contract Demand	Municipal	980	980	980	980	980	980
North Alamo WSC - Contract Demand	Municipal	8,727	8,727	8,727	8,727	8,727	8,727
Raymondville - Contract Demand	Municipal	5,894	5,894	5,894	5,894	5,894	5,894
Valley Acres Irrigation District	Wholesale Water Provider	6,510	6,505	6,500	6,489	6,472	6,455
WWP Demand		**99,256**	**99,192**	**99,035**	**98,888**	**98,679**	**98,450**

Donna Irrigation District-Hidalgo County #1		2030	2040	2050	2060	2070	2080
Hidalgo County-Other	Municipal	2,690	2,690	2,690	2,690	2,690	2,690
Donna - Contract Demand	Municipal	4,381	4,381	4,381	4,381	4,380	4,380
Hidalgo County Irrigation – Contract Demand	Irrigation	37,513	37,484	37,456	37,390	37,296	37,193
WWP Demand		**44,584**	**44,555**	**44,527**	**44,461**	**44,366**	**44,263**

Eagle Pass		2030	2040	2050	2060	2070	2080
Population		**58,692**	**62,688**	**65,889**	**68,762**	**71,614**	**74,461**
WUG Demand	Municipal	9,579	10,192	10,713	11,180	11,644	12,107

East Rio Hondo WSC		2030	2040	2050	2060	2070	2080
Population		**26,908**	**31,911**	**37,034**	**40,909**	**43,001**	**45,200**
WUG Demand	Municipal	3,636	4,290	4,978	5,499	5,781	6,076
Cameron County Other – Contract Demand	Municipal	182	182	182	182	182	182
Military Highway WSC - Contract Demand	Municipal	33	33	33	33	33	33
WWP Demand		**3,851**	**4,505**	**5,193**	**5,714**	**5,996**	**6,291**

Edinburg		2030	2040	2050	2060	2070	2080
Population		**85,768**	**93,195**	**97,911**	**99,436**	**100,966**	**102,501**
WUG Demand	Municipal	11,209	12,114	12,727	12,925	13,124	13,323

Harlingen		2030	2040	2050	2060	2070	2080
Population		**85,744**	**87,959**	**88,766**	**88,532**	**88,296**	**88,057**
WUG Demand	Municipal	14,830	15,149	15,288	15,248	15,208	15,166
East Rio Hondo WSC – Contract Demand	Municipal	336	336	336	224	224	224
Cameron County Manufacturing – Contract Demand	Irrigation	112	112	112	112	112	113
Cameron County Irrigation – Contract Demand	Manufacturing	150	150	150	150	150	150
WWP Demand		**15,428**	**15,747**	**15,886**	**15,734**	**15,694**	**15,653**

Harlingen ID No. 1		2030	2040	2050	2060	2070	2080
Combes – Contract Demand	Municipal	796	796	796	796	796	796
East Rio Hondo – Contract Demand	Municipal	345	345	345	345	345	345
Harlingen – Contract Demand	Municipal	28,737	28,737	28,737	28,737	28,737	28,737
Cameron County Irrigation – Contract Demand	Irrigation	43,959	43,926	43,893	43,815	43,705	43,584
Military Highway WSC – Contract Demand	Municipal	806	806	806	806	806	806
Palm Valley – Contract Demand	Municipal	313	313	313	313	313	313
Primera – Contract Demand	Municipal	400	400	400	400	400	400
WWP Demand		**75,356**	**75,323**	**75,290**	**75,212**	**75,102**	**74,981**

Harlingen and Cameron County Irrigation District No. 9		2030	2040	2050	2060	2070	2080
Edcouch – Contract Demand	Municipal	465	465	465	465	465	464
Elsa – Contract Demand	Municipal	1,089	1,089	1,089	1,088	1,088	1,087
Irrigation, Cameron – Contract Demand	Irrigation	5,082	5,078	5,074	5,065	5,052	5,038
Irrigation, Hidalgo – Contract Demand	Irrigation	63,588	63,540	63,492	63,381	63,221	63,046
La Villa – Contract Demand	Municipal	362	362	362	362	362	362
Mercedes – Contract Demand	Municipal	3,239	3,239	3,239	3,239	3,239	3,239
North Alamo WSC – Contract Demand	Municipal	5,613	5,613	5,613	5,613	5,613	5,613
Weslaco – Contract Demand	Municipal	7,976	7,976	7,976	7,976	7,976	7,976
WWP Demand		**87,414**	**87,362**	**87,310**	**87,189**	**87,016**	**86,825**

Hidalgo County Irrigation District No. 1		2030	2040	2050	2060	2070	2080
Edinburg – Contract Demand	Municipal	10,847	10,847	10,847	10,847	10,847	10,847
Hidalgo County Irrigation District 13	Wholesale Water Provider	1,738	1,736	1,735	1,732	1,728	1,723
Hidalgo County MUD 1 – Contract Demand	Municipal	813	813	813	812	811	811
Hidalgo County Irrigation – Contract Demand	Irrigation	29,543	29,520	29,498	29,446	29,372	29,291
McAllen – Contract Demand	Municipal	4,000	4,000	4,000	4,000	4,000	4,000
North Alamo WSC - Contract Demand	Municipal	1,400	1,400	1,400	1,400	1,400	1,400
Santa Cruz Irrigation District 15	Wholesale Water Provider	30,728	30,706	30,683	30,631	30,556	30,474
Sharyland WSC – Contract Demand	Municipal	9,881	9,881	9,881	9,881	9,881	9,881
Steam-Electric Power, Hidalgo – Contract Demand	Steam Electric Power	2,453	2,453	2,453	2,453	2,453	2,453
WWP Demand		**91,403**	**91,356**	**91,310**	**91,202**	**91,048**	**90,880**

Hidalgo County Irrigation District No. 2		2030	2040	2050	2060	2070	2080
Alamo – Contract Demand	Municipal	4,175	4,175	4,175	4,175	4,175	4,175
Edinburg – Contract Demand	Municipal	4,003	4,003	4,003	4,003	4,003	4,003
Hidalgo County WID 3	Wholesale Water Provider	220	220	220	219	219	218
Irrigation, Hidalgo – Contract Demand	Irrigation	52,841	52,801	52,762	52,669	52,536	52,391
McAllen – Contract Demand	Municipal	22,450	22,450	22,450	22,450	22,450	22,450
North Alamo WSC - Contract Demand	Municipal	3,491	3,490	3,489	3,487	3,484	3,479
Pharr – Contract Demand	Municipal	6,691	6,691	6,691	6,691	6,691	6,691
San Juan – Contract Demand	Municipal	2,533	2,533	2,533	2,533	2,533	2,533
WWP Demand		**96,404**	**96,363**	**96,323**	**96,227**	**96,091**	**95,940**

Hidalgo County Irrigation District No. 6		2030	2040	2050	2060	2070	2080
Agua SUD - Contract Demand	Municipal	8,329	8,329	8,329	8,329	8,329	8,329
Irrigation, Hidalgo – Contract Demand	Irrigation	13,126	13,116	13,106	13,083	13,050	13,014
Steam-Electric Power, Hidalgo – Contract Demand	Steam Electric Power	3,423	3,423	3,423	3,423	3,423	3,423
WWP Demand		**24,878**	**24,868**	**24,858**	**24,835**	**24,802**	**24,766**

Hidalgo County Irrigation District No. 16		2030	2040	2050	2060	2070	2080
Agua SUD – Contract Demand	Municipal	4,205	4,205	4,205	4,205	4,205	4,205
Irrigation, Hidalgo – Contract Demand	Irrigation	12,263	12,253	12,244	12,223	12,192	12,158
La Joya – Contract Demand	Municipal	513	513	513	513	513	513
Livestock, Hidalgo – Contract Demand	Livestock	100	100	100	100	100	100
Mining, Hidalgo – Contract Demand	Mining	80	80	80	80	79	79
WWP Demand		**17,161**	**17,151**	**17,142**	**17,121**	**17,089**	**17,055**

Hidalgo County Water Improvement District (WID) No. 3*		2030	2040	2050	2060	2070	2080
Irrigation, Hidalgo – Contract Demand	Irrigation	3,576	3,573	3,571	3,564	3,555	3,546
McAllen - Contract Demand	Municipal	17,209	17,209	17,209	17,209	17,209	17,209
Mining, Hidalgo – Contract Demand	Mining	40	40	40	40	40	40
WWP Demand		**20,825**	**20,822**	**20,820**	**20,813**	**20,804**	**20,795**

***In January 2025, Hidalgo County Water Improvement District No. 3 and Santa Cruz Water Control and Improvement District No. 15 consolidated into Hidalgo County Consolidated Water Control and Improvement District.**

Laguna Madre Water District		2030	2040	2050	2060	2070	2080
Population		**11,100**	**11,384**	**11,484**	**11,445**	**11,405**	**11,362**
WUG Demand	Municipal	4,638	4,745	4,787	4,771	4,754	4,736
Manufacturing, Cameron – Contract Demand	Manufacturing	118	118	118	118	118	118
WWP Demand		**4,756**	**4,863**	**4,905**	**4,889**	**4,872**	**4,854**

Laredo		2030	2040	2050	2060	2070	2080
Population		**267,373**	**277,989**	**281,208**	**278,353**	**275,465**	**272,541**
WUG Demand	Municipal	41,831	43,292	43,794	43,349	42,899	42,444
Irrigation, Webb – Contract Demand	Irrigation	1,436	1,435	1,434	1,431	1,427	1,421
Manufacturing, Webb – Contract Demand	Manufacturing	100	100	100	100	100	100
Mining, Webb – Contract Demand	Mining	66	66	66	66	66	66
Steam-Electric Power, Webb – Contract Demand	Steam Electric Power	30	30	30	30	30	30
WWP Demand		**43,463**	**44,923**	**45,424**	**44,976**	**44,522**	**44,061**

McAllen		2030	2040	2050	2060	2070	2080
Population		**165,587**	**184,057**	**201,554**	**206,901**	**212,332**	**217,849**
WUG Demand	Municipal	38,276	42,409	46,441	47,673	48,924	50,195
Edinburg - Contract Demand	Municipal	55	55	55	55	55	55
Hidalgo County Manufacturing – Contract Demand	Manufacturing	300	300	300	300	300	300
Hidalgo County Steam-Electric Power – Contract Demand	Steam Electric Power	3,295	3,295	3,295	3,295	3,295	3,295
WWP Demand		**41,926**	**46,059**	**50,091**	**51,323**	**52,574**	**53,845**

Military Highway WSC		2030	2040	2050	2060	2070	2080
Population		**44,216**	**44,633**	**44,795**	**45,466**	**46,151**	**46,852**
WUG Demand	Municipal	6,530	6,560	6,585	6,684	6,784	6,887
San Juan - Contract Demand	Municipal	35	35	35	35	35	35
WWP Demand		**6,565**	**6,595**	**6,620**	**6,719**	**6,819**	**6,922**

Mission		2030	2040	2050	2060	2070	2080
Population		**88,336**	**93,383**	**96,747**	**99,076**	**101,437**	**103,831**
WUG Demand	Municipal	18,065	19,030	19,716	20,190	20,672	21,159

North Alamo WSC		2030	2040	2050	2060	2070	2080
Population		**221,808**	**244,842**	**259,180**	**261,706**	**264,231**	**266,768**
WUG Demand	Municipal	35,294	38,813	41,086	41,486	41,887	42,288
Port Mansfield PUD - Contract Demand	Municipal	150	150	150	150	150	150
Primera - Contract Demand	Municipal	205	205	205	205	205	205
San Juan - Contract Demand	Municipal	1,687	1,687	1,687	1,687	1,687	1,687
WWP Demand		**37,336**	**40,855**	**43,128**	**43,528**	**43,929**	**44,330**

Pharr		2030	2040	2050	2060	2070	2080
Population		**85,215**	**91,086**	**94,908**	**96,862**	**98,836**	**100,833**
WUG Demand		9,135	9,698	10,105	10,313	10,523	10,736

Rio Grande City		2030	2040	2050	2060	2070	2080
Population		**17,880**	**19,073**	**19,959**	**20,549**	**21,147**	**21,751**
WUG Demand	Municipal	4,200	4,468	4,676	4,814	4,954	5,096
El Sauz - Contract Demand	Municipal	163	163	163	163	163	163
El Tanque - Contract Demand	Municipal	276	276	276	276	276	276
Rio WSC - Contract Demand	Municipal	1,053	1,053	1,053	1,053	1,052	1,052
WWP Demand		**5,692**	**5,960**	**6,168**	**6,306**	**6,445**	**6,587**

San Benito		2030	2040	2050	2060	2070	2080
Population		**25,980**	**26,650**	**26,890**	**26,810**	**26,730**	**26,646**
WUG Demand		3,249	3,316	3,346	3,336	3,326	3,315

San Juan		2030	2040	2050	2060	2070	2080
Population		**23,805**	**24,380**	**24,837**	**25,693**	**26,565**	**27,455**
WUG Demand		3,324	3,388	3,451	3,570	3,691	3,815

Sharyland WSC		2030	2040	2050	2060	2070	2080
Population		**88,944**	**97,326**	**102,604**	**103,989**	**105,371**	**106,749**
WUG Demand		15,541	16,948	17,867	18,108	18,349	18,589

Southmost Regional Water Authority		2030	2040	2050	2060	2070	2080
Brownsville PUB - Contract Demand	Municipal	10,719	10,719	10,719	10,719	10,719	10,719
Los Fresnos - Contract Demand	Municipal	286	286	286	286	286	286
Manufacturing, Cameron - Contract Demand	Manufacturing	242	242	242	242	242	242
Valley MUD - Contract Demand	Municipal	290	290	290	290	290	290
WWP Demand		**11,537**	**11,537**	**11,537**	**11,537**	**11,537**	**11,537**

United Irrigation District		2030	2040	2050	2060	2070	2080
Irrigation, Hidalgo	Irrigation	17,500	17,500	17,500	17,500	17,500	17,500
McAllen - Contract Demand	Municipal	11,250	11,250	11,250	11,250	11,250	11,250
Mission - Contract Demand	Municipal	22,700	22,700	22,700	22,700	22,700	22,700
Sharyland WSC - Contract Demand	Municipal	10,420	10,420	10,420	10,420	10,420	10,420
WWP Demand		**61,870**	**61,870**	**61,870**	**61,870**	**61,870**	**61,870**

Weslaco		2030	2040	2050	2060	2070	2080
Population		**32,414**	**33,279**	**33,948**	**35,089**	**36,253**	**37,441**
WUG Demand	Municipal	5,500	5,624	5,737	5,930	6,127	6,327
Military Highway WSC - Contract Demand	Municipal	175	175	175	175	175	175
WWP Demand		**5,675**	**5,799**	**5,912**	**6,105**	**6,302**	**6,502**

INITIALLY PREPARED PLAN

CHAPTER 3: WATER SUPPLY ANALYSIS

Rio Grande Regional Water Plan

BV PROJECT NO. 411250

PREPARED FOR

Rio Grande Regional Water Planning Group

1 MARCH 2025

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acft	Acre-Feet
acft/yr	Acre-Feet per Year
BRACS	Brackish Resource Aquifer Characterization System
CEAT	Comisión Estatal del Agua en Tamaulipas
CILA	Comisión Internacional de Límites y Aguas
CONAGUA	Comisión Nacional del Agua
DFC	Desired Future Conditions
DMI	Domestic/Municipal/Industrial
DOR	Drought of Record
GAM	Groundwater Availability Model
GCD	Groundwater Conservation District
GMA	Groundwater Management Area
GPCD	Gallons per Capita per Day
gpm	Gallons per Minute
HB1763	House Bill 1763
HCWID	Hidalgo County Water Improvement District
IBWC	International Boundary and Water Commission
JAC	Joint Advisory Committee
KCGCD	Kenedy County Groundwater Conservation District
LRGWQI	Lower Rio Grande/Río Bravo Water Quality Initiative
LRGVDC	Lower Rio Grande Development council
MAG	Modeled Available Groundwater
mg/L	Milligrams per Liter
mgd	Million Gallons per Day
MUD	Municipal Utility District
MWP	Major Water Provider
PUB	Public Utilities Board
RWP	Regional Water Plan
RWPG	Regional Water Planning Group
SEDUMA	Secretaría de Desarrollo Urbano y Medio Ambiente
SUD	Special Utility District
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TDS	Total Dissolved Solids
TWDB	Texas Water Development Board

WAM	Water Availability Model
WCID	Water Control and Improvement District
WID	Water Improvement District
WMS	Water Management Strategy
WRAP	Water Rights Analysis Package
WSC	Water Supply Corporation
WUG	Water User Group
WWP	Wholesale Water Providers
WWTP	Wastewater Treatment Plant

3.0 Water Supply Analysis

The planning effort requires a detailed understanding of current and potential water supplies. Region M water users rely mainly on surface water from the Rio Grande, although both fresh and brackish groundwater is used across the region for primary or supplementary water supplies. Increasingly, sources that require additional treatment, such as brackish groundwater, are being considered in the face of increasing demands. Reuse of water for both potable and non-potable uses is expected to increase in the region as demands on existing surface and groundwater increase and the technology, permitting, and public acceptance processes become more commonplace. Figure 3-1 displays the 2030 estimates of available water resources in Region M.

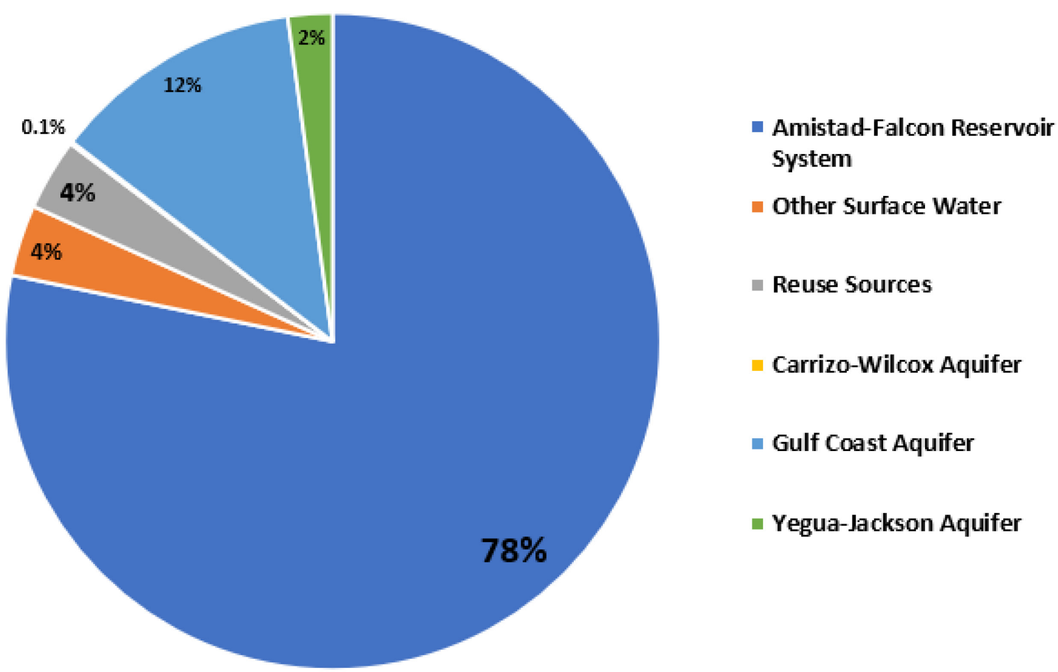

Figure 3-1 Major Groundwater, Surface Water, and Reuse Water Source Projections in Region M

In 2023, surveys were sent to entities in the region, contacted individually and/or through the irrigation district and utility managers associations, asking for information about current supplies. Other resources documenting the allocation of groundwater and surface water resources from the Texas Commission on Environmental Quality (TCEQ) and the Texas Water Development Board (TWDB) have been used to estimate current reliable supplies.

3.1 Surface Water Availability

3.1.1 Rio Grande

The Rio Grande is the fifth longest river in the United States and among the top 20 in the world. It extends from 12,000 feet above sea level in the San Juan Mountains of Colorado to the Gulf of Mexico (1,901 miles) and forms a 1,255 mile segment of the border between the United States and Mexico.

The entire Rio Grande basin (Figure 3-2) covers an area approximately 336,000 square miles, with approximately half the watershed in the United States and the other half in Mexico.[1] Approximately 182,000 square miles of the basin contribute flow; the remainder includes numerous endorheic, or closed, basins. Roughly 54,000 square miles of the total watershed are within Texas, about 8,100 square miles of which are endorheic basins.

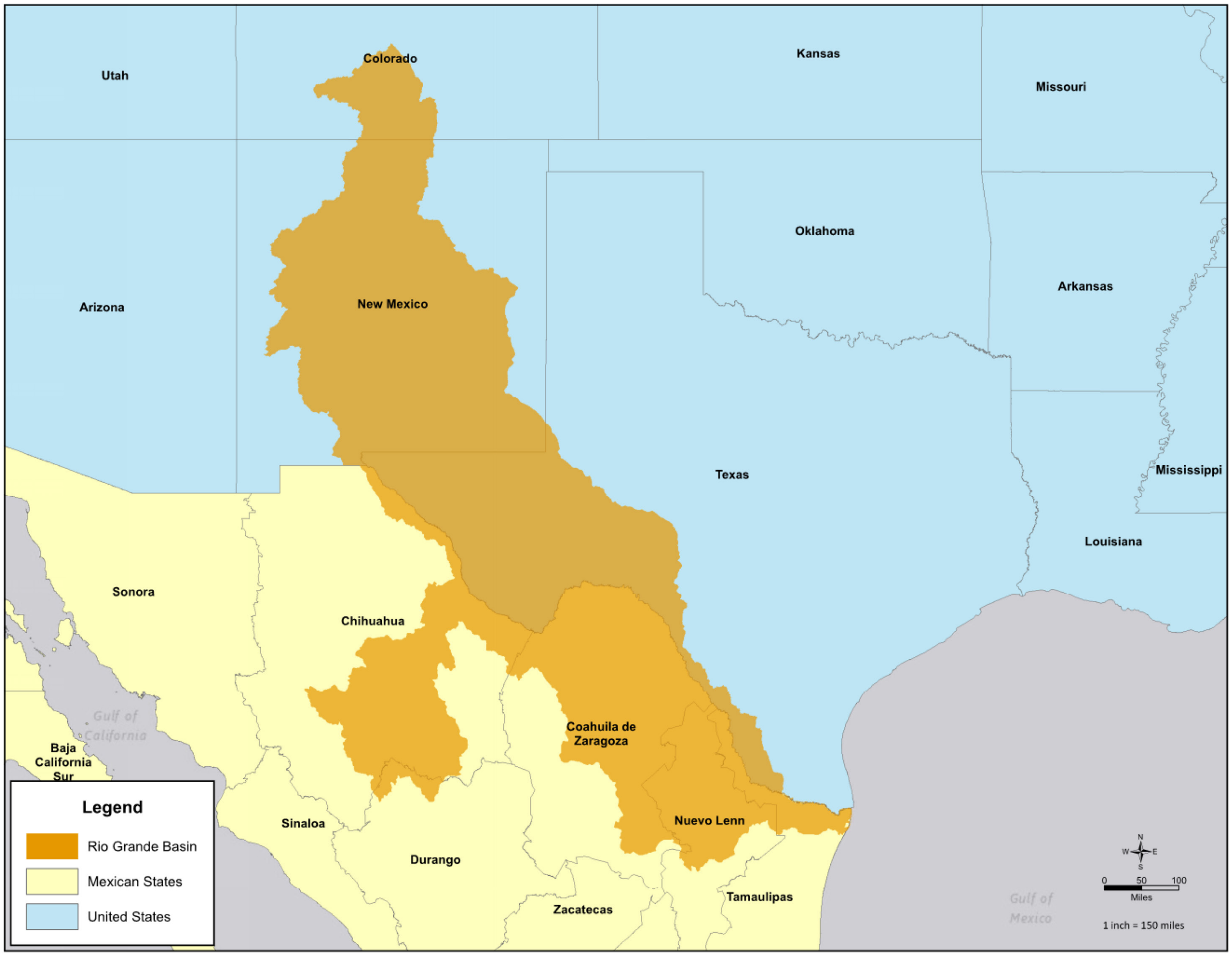

Figure 3-2 Rio Grande Basin

[1] In Mexico, the Rio Grande is referred to as the Rio Bravo.

The two major international reservoirs on the Rio Grande, Falcon and Amistad, are operated as a system by the International Boundary and Water Commission (IBWC) for flood control and water supply purposes. The Amistad Reservoir is located in Val Verde County (in Region J) at the confluence of the Devils River, 12 miles northwest of Del Rio. Falcon Reservoir is located between the cities of Laredo, Texas, and Rio Grande City, Texas, about 275 river miles upstream from the Gulf of Mexico.

In addition to the two international reservoirs on the Rio Grande (Amistad and Falcon), Mexico has constructed an extensive system of reservoirs on tributaries of the Rio Grande. Figure 3-3 shows the location of these reservoirs noted by text.

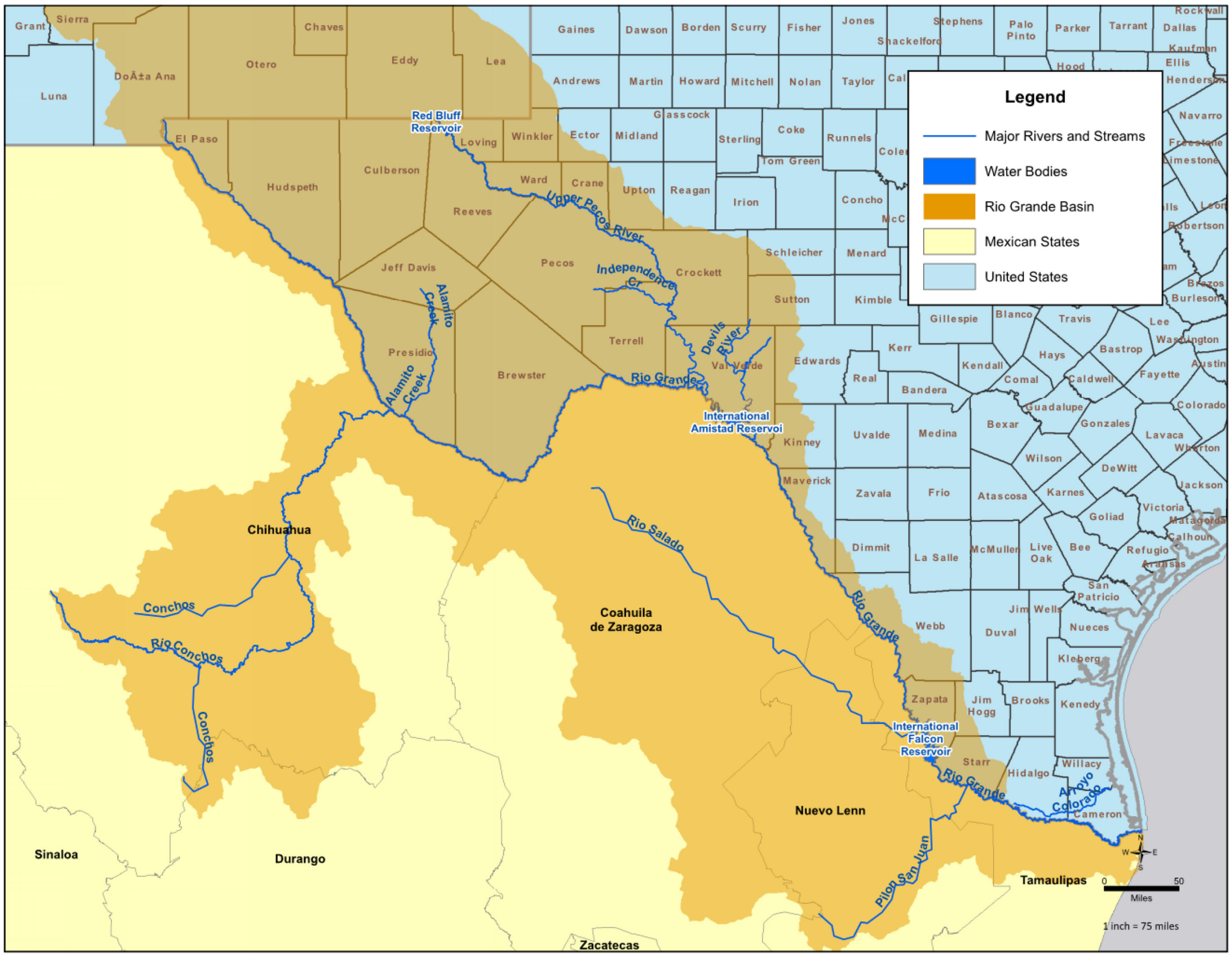

Figure 3-3 **Rio Grande Basin Hydrography, Showing Tributaries and Major Reservoirs in Texas and Mexico**

3.1.1.1 Drought of Record

The drought of record (DOR) is the basis of the firm yield projection for each river basin. The DOR identifies the worst drought on record, and the firm yield is the supply that can be expected from that river or system in that most severe drought scenario. The firm yield and DOR are determined using the Rio Grande Water Availability Model (WAM), which models the existing system and demands under historical hydrologic flows. The Rio Grande WAM has a period of record from January 1940 to December 2018.

Typically, the DOR is defined as the longest period between full reservoir storage with firm yield demands applied to the system over the period of record. The Amistad-Falcon reservoir system is used to store water for Mexico and the United States using a storage pool accounting system. The total storage capacity and reservoir stages under firm yield demands are shown on Figure 3-4 for the combined storage (United States and Mexico) and the portion belonging to the United States. Critical drought starting and ending dates are shown, as well as the storage minima and the date they occurred.

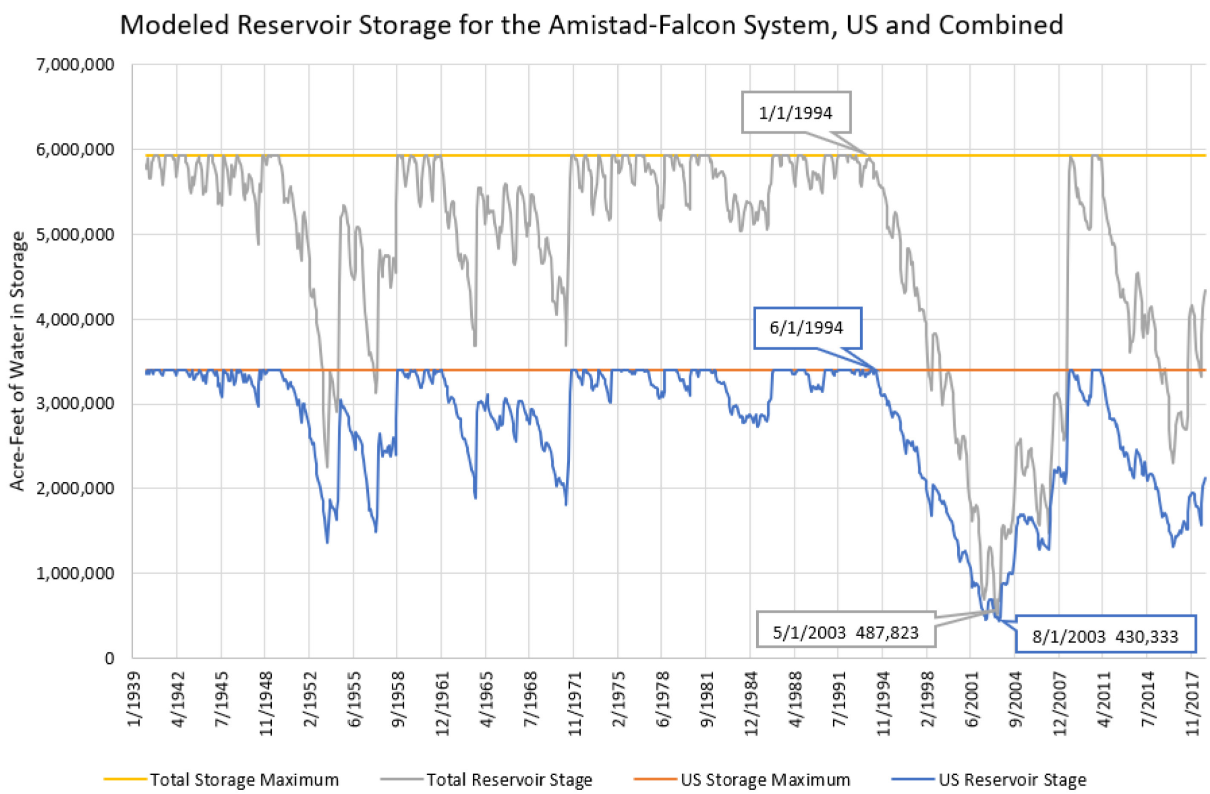

Figure 3-4 Modeled Reservoir Storage for the Amistad-Falcon System, United States and Combined

This cycle, the DOR has changed because of an update to the TCEQ Rio Grande WAM to extend the period of record through 2018. The new DOR modeled for both the combined reservoir system and the United States portion spans the late 1990s to early 2000s: 6/1994 to 8/2003 for the United States portion and 1/1994 to 5/2003 for the combined system. The DOR and drought responses are discussed in detail in Chapter 7.

3.1.1.2 Shared Resources with Mexico

Two treaties between the United States and Mexico contain basic provisions regarding the development and use of Rio Grande waters by the two countries. The 1906 convention provides for delivery to Mexico by the United States of 60,000 acre-feet (acft) of water annually in the El Paso-Juarez Valley upstream from Fort Quitman, Texas. The cycle lasts either 5 years or until the U.S. conservation capacity at both reservoirs is filled with waters belonging to the U.S. If shortages occur in the water supply for United States, deliveries to Mexico are to be reduced in the same proportion as deliveries to the United States. Region M interprets from the 1906 convention and 1944 treaty that the flows in the Rio Grande at Fort Quitman are owned 100 percent by the United States because Mexico waived any and all claims to the waters of the Rio Grande for any purpose whatever between the head of the present Mexican Canal and Fort Quitman, Texas. All other flows occurring in the main channel of the Rio Grande downstream from Fort Quitman are owned 50 percent by the United States and 50 percent by Mexico.

The treaty of February 3, 1944, for "Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande" described how Mexico and the United States would divide the waters of the Rio Grande from Fort Quitman to the Gulf of Mexico and the waters of the Colorado River. Of the waters of the Rio Grande, the treaty allots to Mexico: (1) all of the waters reaching the main channel of the Rio Grande from the San Juan and Alamo rivers, including the return flows from the lands irrigated from those two rivers; (2) two-thirds of the flow in the main channel of the Rio Grande from the measured Conchos, San Diego, San Rodrigo, Escondido, and Salado rivers, and the Las Vacas Arroyo, subject to certain provisions; and (3) one-half of all other flows occurring in the main channel of the Rio Grande downstream from Fort Quitman. The treaty allots to the United States: (1) all of the waters reaching the main channel of the Rio Grande from the Pecos and Devils Rivers, Goodenough Spring, and Alamito, Terlingua, San Felipe, and Pinto Creeks; (2) one-third of the flow reaching the main channel of the river from the six named measured tributaries from Mexico (the treaty provides that this third shall not be less, as an average amount in cycles of 5 consecutive years, than 350,000 acft annually); and (3) one-half of all other flows occurring in the main channel of the Rio Grande downstream from Fort Quitman.[2]

The treaty allows exceptions for years of extraordinary drought or serious accident to the hydraulic systems on the Mexican tributaries; however, extraordinary drought is not defined. As a result, Mexico often runs a deficit for up to 4 consecutive years and repays the debt in years of high precipitation. This significantly impacts the reliability of supplies and is especially difficult for farmers whose water rights are the most vulnerable to reduced system availability.

Although the term "extraordinary drought" is not expressly defined in the treaty, as other terms are defined in Article 1, it is implicitly defined in the second subparagraph of Article 4B(d) as an event that makes it difficult for Mexico "…to make available the run off of 350,000 acft (431,721,000 cubic meters) annually." In other words, it is a drought condition when there is less than 1,050,000 acft (350,000 United States' share and 700,000 Mexico share) of "run-off waters in the watersheds of the named Mexican tributaries" to allow Mexico to deliver the required amount of 1,050,000 acft to the Rio Grande. This amount is measured at the Rio Grande, without regard to conveyance losses in Mexico, and so Mexico must assume conveyance losses in Mexico and deliver to the Rio Grande the full amount. If there is sufficient runoff water in the watershed of the Mexican tributaries, an extraordinary drought does not exist.

The IBWC tracks the deliveries of water from Mexico to the United States. Figure 3-5 depicts the amount of water that has been delivered from Mexico in each of the previous cycles since 1988. The cycles last either 5 years or until the conservation pools in the two reservoirs are full. Figure 3-5 was the most recent graphic available with data through May 11, 2024. More specific (e.g., reservoir levels) and recent data and reports can be found at ibwc.gov. Figure 3-6 displays the deliveries for this current cycle compared with the target delivery rate as described in the 1944 treaty. The graph shows that deliveries from Mexico in the last few years have been much lower than what is expected. The IBWC began negotiation of a new Minute in 2023 to increase the predictability and reliability of Rio Grande water

[2]The International Boundary and Water Commission. Its Mission, Organization, and Procedures for Solution of Boundary and Water Problems. http://ibwc.gov/.html.

deliveries to users in both the United States and Mexico. Minute 331 was signed by the United States and Mexico on November 7, 2024.

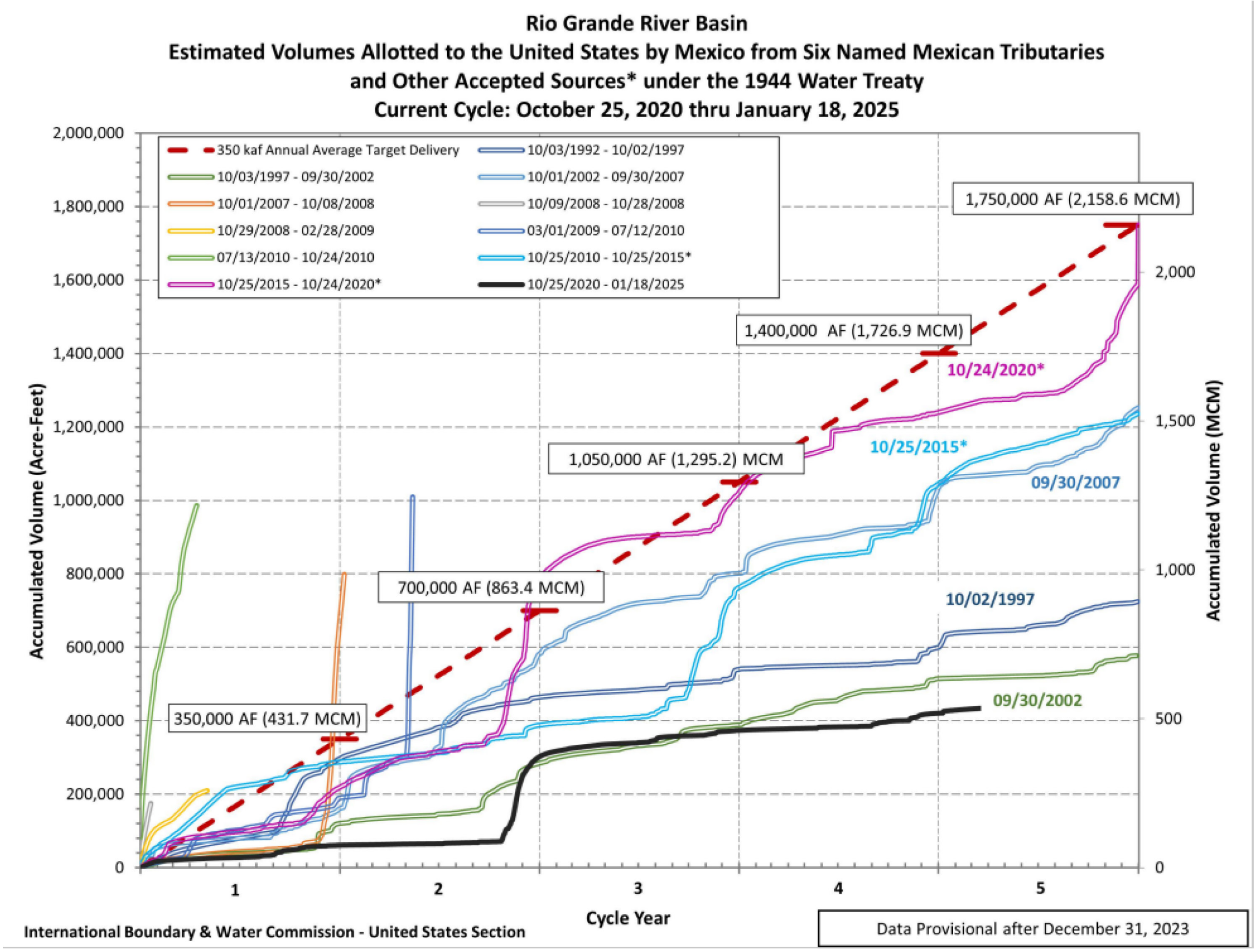

Figure 3-5 Water Delivered to the United States from Mexico, 1992 to 2025 (IBWC)[3]

[3] IBWC. Mexico Deliveries During the Current 5-Year Cycle. https://ibwc.gov/Water_Data/mexico_deliveries.html. Accessed 5/16/2024.

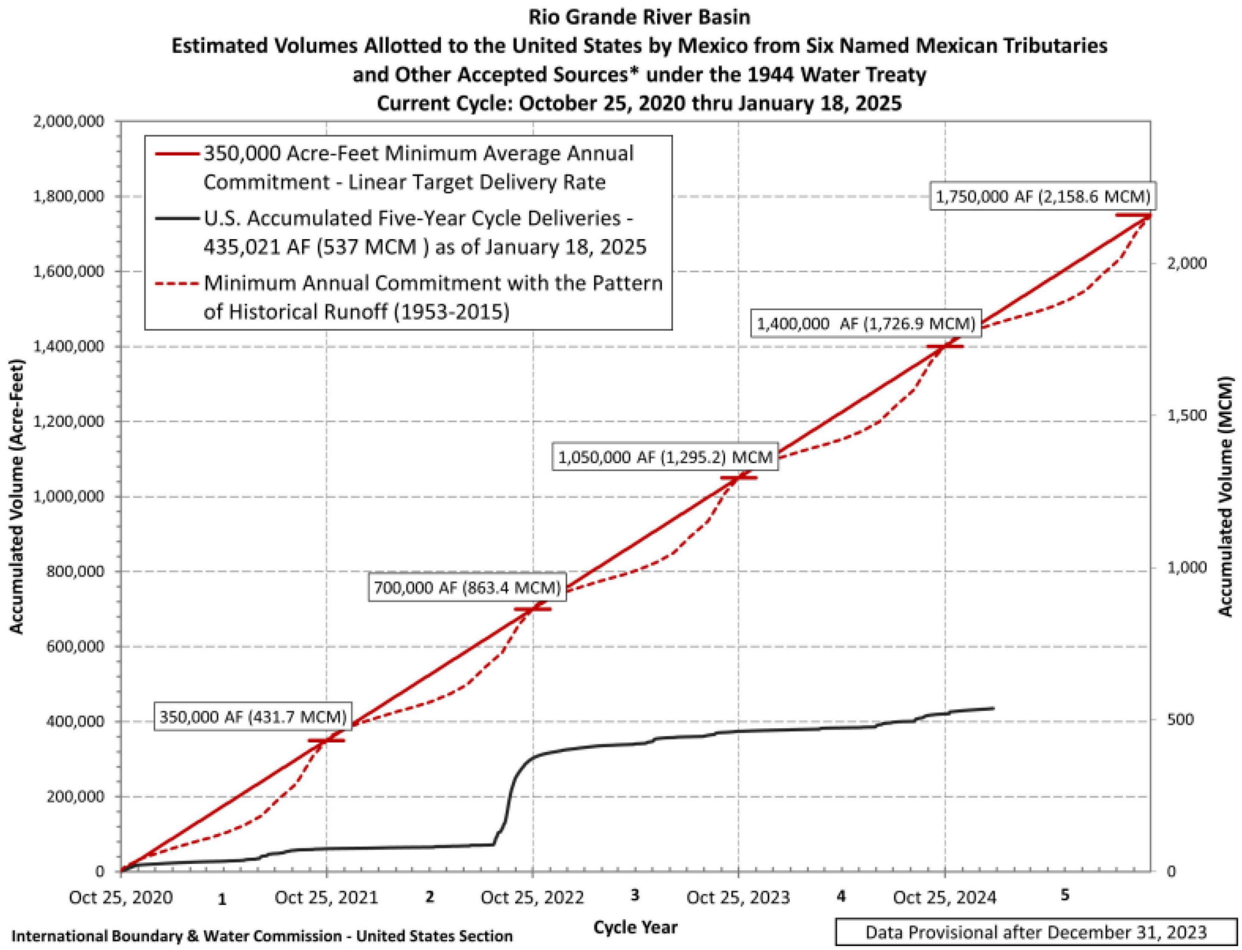

Figure 3-6 **Water Delivered to the United States from Mexico, Current Cycle (IBWC)[4]**

3.1.1.3 Rio Grande Water Availability Model

Availability in the Rio Grande for the United States use is determined by the Rio Grande WAM, maintained by the TCEQ. Estimated historical streamflow conditions are developed, including typical wet, dry, and normal flow periods, as they would be without the influence of manmade diversions, dams, and other influence on the watershed, called naturalized flows. The current Rio Grande WAM includes data from 1940 to 2018 from control points, or locations where contributing streams have gauging data, in both Texas and Mexico. The Rio Grande WAM extends to the New Mexico state line and includes data from both the Rio Grande and the Pecos Rivers at the state line, according to the provisions of existing compacts between the states.

The 1940 to 2018 historical period includes the droughts of the 1950s and 1990s, both of which represent extreme drought conditions for most of the Rio Grande basin. To estimate the firm yield, the Rio Grande WAM is run with parameters intended to approximate a drought scenario, called Run 3. This model run assumes that all water rights are fully diverted and that there are no return flows into the Rio Grande. The most current version of the Rio Grande WAM Run 3 is dated October 1, 2023. In addition to

[4] IBWC. "Mexico Deliveries." https://ibwc.gov/Water_Data/mexico_deliveries.html; Accessed July 2024.

extending the period of record through 2018, the model is a simplified version of the WAM that uses aggregated totals to represent the approximately 1,500 individual water rights.

Firm yield values for 2030 through 2080 were estimated by the WAM Run 3 and show a reduction in availability over time because of sedimentation. The annual firm yield, averaged for each planning decade, is shown in Table 3-1.

Table 3-1 Firm Yield Projections for the Amistad-Falcon Reservoir System 2030-2080 (acft/yr)

Source	2030	2040	2050	2060	2070	2080
Amistad-Falcon Reservoir	1,001,776	1,001,268	1,000,760	999,553	997,821	995,863

The Rio Grande WAM then simulates the monthly ability of individual water right holders to make diversions in accordance with the TCEQ's Rio Grande operating rules. The simulations are performed using the Water Rights Analysis Package (WRAP) program.[5] The results of this simulation indicate that the Rio Grande basin has no water that is not already appropriated and include an estimated reliability for each of the different types of water rights.[6] These monthly simulations are aggregated into decadal averages for planning purposes.

All of the Rio Grande Basin below the New Mexico state line, including the Mexican portion of the basin, is included in the Rio Grande WAM. The 1944 treaty provision requiring a minimum of 350,000 acre-feet per year (acft/yr) to be delivered to the United States from the six named Mexican tributaries has not been incorporated as a rule into the WAM because shortages are allowed to accumulate over up to a 5-year period in times of drought. The transfer of Mexican water from the six named Mexican tributaries of the Rio Grande to the United States is modeled after Mexico's demands and reservoirs on these tributaries have been simulated. The United States is allotted one-third of the remaining flow at the mouths of each of the six named Mexican tributaries. Demands for water along the Rio Grande by both US and Mexican water users downstream of these Mexican tributaries are then simulated in the model.

Kennedy Resource Company, Inc., was asked to review and modify the 2023 Rio Grande WAM as a part of the 2026 update to the Region M plan. This included incorporating modified irrigation patterns above Fort Quitman and modeling the San Solomon Springs as cutoff from the rest of the basin. These two items made the model consistent with Region E's version of the model. A hydrologic variance was requested by the Region M planning group and approved by the TWDB in a letter dated November 9, 2023 (Appendix 3B). Table 3-2 includes details for hydrologic models used, including the model name, version date, model input/output files used, date model used and any relevant comments.

[5] "Water Rights Analysis Package (WRAP) Users and Reference Manual." Texas Water Resources Institute at Texas A&M University. Revised July 2022 by Ralph A. Wurbs (Wurbs, 2022). The version of the WRAP program dated July 2022 was used for the 2023 Rio Grande WAM (Wurbs, 2022).

[6] There are water rights that are not considered in the RWP, including those held by state and federal government agencies that are not used in meeting the needs of any of the WUGs that are planned for in this process.

Table 3-2 Details for Hydrologic Models Used

Model Name	Version Date	Input/Output Files Used	Date Model Used	Comments
TCEQ Rio Grande Run 3	10/1/2023	RG3.dat, RG3.dis, RG3.flo, RG3.his, RG3.fad, RG3.eva RG3.out then numerous Tables *.tou July 2022 version of the SIM and TABLES executables.	11/1/23	TCEQ Authorized Diversion Amounts and Authorized Reservoir Capacities – No sedimentation
			12/10/23	Amistad/Falcon and Casa Blanca set to Firm Yield – No sedimentation
			12/15/23	TCEQ Authorized Diversion Amounts and Authorized Reservoir Capacities – sedimentation for 2030 and 2080
			2/8/24	Amistad/Falcon and Casa Blanca set to Firm Yield – sedimentation for 2030 and 2080
TCEQ Rio Grande Run 3 Modified	10/1/2023	RG3.dat, RG3.dis, RG3.flo, RG3.his, RG3.fad, RG3.eva RG3.out then numerous Tables *.tou July 2022 version of the SIM and TABLES executables.	12/15/2023-2/10/2024	Altered to incorporate TWDB Region M Planning Variance Evaluated to determine TCEQ authorized diversions for Run of River water rights and firm yields for Amistad/Falcon and Casa Blanca (2030-2080)
TCEQ Nueces-Rio Grande Coastal WAM Run 3	10/1/2023	NRG3.dat, NRG3.dis, NRG3.flo, NRG3.his, NRG3.fad, NRG3.eva NRG3.out then numerous Tables *.tou July 2022 version of the SIM and TABLES executables.	12/2023	Evaluated to determine TCEQ authorized diversions for Run of River water rights – no reservoirs in WAM, so no sedimentation incorporated

Table 3-3 summarizes the results of Run 3 of the Rio Grande WAM, which evaluated the firm yield associated with the aggregated middle- and lower-basin water rights that are used in the simplified WAM. The table shows the maximum authorized diversion associated with each type of water right and the firm yield that can be expected in a drought similar to the worst historical DOR.

The table displays the water rights separated into middle and lower basin, and by user designations for "MUNI" - municipal (most commonly raw water for municipal treatment plants), "IRR" - irrigation, and

"MIN" - mining, Classes A and B. A list of relevant Rio Grande active water rights is included in Appendix 3C.

Table 3-3 Rio Grande WAM Modeled Water Rights, Firm Yield Results (acft/yr)

Authorized Diversion						Firm Yield	
Lower Basin		Middle Basin		Total		2030	2080
MUNILWR	253,428	MUNIMID	74,215	MUNI	327,643	327,643	327,643
LOW-A-IRR	1,411,050	MID-A-IRR	156,946	A-IRR	1,567,996	616,056	610,653
LOW-A-MIN	1,077	MID-A-MIN	9,173	A-MIN	10,250	4,027	3,992
LOW-A-MUN	465	MID-A-MUN	2,051	A-MUN	2,515	988	980
LOW-B-IRR	131,682	MID-B-IRR	18,051	B-IRR	149,733	47,063	46,651
LOW-B-MIN	5,020	MID-B-MIN	10,176	B-MIN	15,196	4,776	4,735
LOW-B-MUN	3,823	MID-B-MUN	62	B-MUN	3,885	1,221	1,210

Various run-of-river water rights on the Rio Grande are exceptions to typical operations, three of which have been evaluated for firm yields (Table 3-4).

Table 3-4 Rio Grande Run-of-River Water Rights

Water Right No.	Water Right Holder	Authorized Diversion	Firm Yield
952-001	City of Eagle Pass Water Works System	4,600	1,180
952-002	City of Laredo	2,818	626
952-003	Maverick County	641	182

3.1.1.4 Rio Grande Operations

Waters of the Rio Grande are treated as a "stock resource" that is accumulated in the Amistad-Falcon reservoir system and released on demand in accordance with water rights set by law. The TCEQ administers the United States' share of water stored in Amistad and Falcon reservoirs in compliance with the decision of the Thirteenth Court of Civil Appeals in the case "State of Texas, et al. vs. Hidalgo County Water Control and Improvement District No. 18, et al.," commonly referred to as the Valley Water Suit, and the Adjudication Decree in the Middle Rio Grande under the Water Rights Adjudication act of 1967. The TCEQ Rio Grande Watermaster program is responsible for allocating, monitoring, and controlling the use of surface water in the Rio Grande basin from Fort Quitman to the Gulf of Mexico.

Since the 1960s, the US portion of the Rio Grande below Amistad has been fully adjudicated so that no "unclaimed" water is regularly available in the system. Water rights on the river are divided into two major types: domestic/municipal/industrial (DMI) rights, and irrigation and mining rights (which are sub-divided into Class A and Class B). These rights represent the annual allowable maximum diverted, but because demand exceeds supply in a drought year, only the highest priority (i.e., DMI) water rights are guaranteed to receive the full amount of their water rights. Classes A and B irrigation and mining accounts are allocated water on a pro-rata basis but are not necessarily able to access their maximum authorized diversion each year.

To determine the amount of water to be allocated to various accounts, the Watermaster makes the following computations at the beginning of each month:

1. From the amount of water in usable storage, 225,000 acft are deducted to re-establish the DMI storage pool. These uses are given the highest priority.
2. From the remaining storage, the total end-of-month account balances for all lower and middle Rio Grande irrigation and mining water right holders are deducted.
3. From the remaining storage, the operating reserve is deducted to account for evaporation, seepage, conveyance losses, and emergencies.
4. Any remaining storage is allocated to the irrigation and mining accounts.

Steps 2 through 4 are iterative and are all based on the reservoir volume.

Water that has been designated for municipal use must be used for municipal purposes, and similarly, irrigation water rights for irrigation, etc., unless it is permanently converted through TCEQ. When irrigation and mining water rights are converted to municipal water rights, the maximum diversions for Class A are reduced by 50 percent and Class B by 60 percent. The main mechanism for this conversion is urbanization.

Generally, under the current TCEQ rules and regulations, all US water that is diverted from the lower and middle Rio Grande by authorized diverters is accounted for by the Rio Grande Watermaster, with appropriate charges against annual authorized diversion accounts in accordance with existing individual water rights and against individual storage accounts in Falcon and Amistad reservoirs.

When there are substantial flows in the river from high runoff conditions, the Rio Grande Watermaster may allow water rights holders along the lower and middle Rio Grande to divert water without those diversions being charged to their accounts. These are referred to as "no-charge pumping" periods, and diversions during such periods are authorized by an order issued by the Texas Water Commission on August 4, 1981. When no-charge pumping is declared by the Rio Grande Watermaster, authorized water rights holders can divert to the extent it is available, without their respective annual water use and storage accounts being charged.

DMI water right accounts have no storage, thus cannot roll over any unused water each year; they are limited to diverting no more than their water right in each year. Classes A and B water right accounts can accumulate up to 1.41 times the annual authorized diversion right in storage. If an allottee does not use any water for 2 consecutive years, its account is reduced to zero.

3.1.1.5 Irrigation Districts

Irrigation districts operate under rules and regulations in the Texas Water Code and within the TCEQ operational rules that resulted in part from the Valley Water Suit. Among other things, this judgment allocated specific amounts of water in the Lower Rio Grande Valley to individual DMI water users (typically cities) with documented historical water usage, and it assigned these DMI water rights to specific irrigation districts, which had pumping facilities on the river, for the subsequent diversion and delivery of river water to the DMI users. In effect, the irrigation districts were assigned municipal water rights that were specifically designated for certain individual DMI water users. Most of the DMI water users in the Lower Rio Grande Valley continue to obtain their water supplies from the irrigation districts under the original water rights that are owned by the irrigation districts but that have specific assignments to the DMI users.

Most water in the Lower Rio Grande is diverted and delivered by irrigation districts, although some farmers, entities, and individuals divert their own water directly, including most users in the Middle Rio Grande. Water right holders request diversion certifications from the Watermaster and then divert water from the Rio Grande into their storage and delivery systems. Water is metered as it is pumped out of the river, according to TCEQ Watermaster rules, but most districts do not meter any water provided to irrigators or "domestic" water usage for lawn watering and livestock.

In some cases, there are written contracts between the DMI users and the irrigation districts for water delivery; however, often there are only general agreements between the DMI users and the irrigation districts that water will be delivered pursuant to the requirements of the original water rights that specifically assigned water to the DMI users. When these delivery contracts or agreements expire, they are often extended with revised rates to cover pumping costs. Sometimes when the annual allotment for DMI water, as stipulated in a water right, is exceeded by an individual DMI water user, the irrigation district will continue to supply DMI water to the DMI user under the district's own water right, to the extent that a district has these rights available, and then charge the DMI user for this additional water. If the district does not have available municipal water rights, the city or the district can acquire municipal use water from third parties to deliver to the city. This one-time delivery of water is referred to as "contract water," which means that water is being delivered to a DMI user on a short-term contractual basis, governed by the Watermaster rules.

The DMI water users can draw their maximum authorized water right from the DMI Reserve.

Some municipal water users have their own water rights, and some that have specific contracts for DMI water from the irrigation districts under the districts' water rights exclusive of the original allotments from the Rio Grande Valley Water Suit.

Irrigation water rights are also generally held by the irrigation district. Farmers pay an annual flat rate assessment that entitles them to receive irrigation water according to acreage. Each district operates somewhat differently with respect to if and how water can be sold and purchased within and outside of the district. For instance, during a drought period, some districts allow farmers to consolidate their allocation of water on one portion of their land, some allow for sales within the district, and some allow for sales outside of the district. When the district is not on allocation, most water will be delivered to farmers on a "first-come, first-served" basis.

The drought year projections for 2030 water rights, 2030 diverted, and 2030 delivered to end users (drought year diversion impacted by irrigation district delivery losses) are shown in Table 3-5.

- Column 2030 Water Right lists the authorized diversion;
- Column 2030 Diverted lists how much can be reliably diverted in a drought year (Class A and B reliability); and
- Column 2030 Delivered lists how much supply a District could deliver to end users (the 2030 diverted less any conveyance losses from the irrigation district).

Each irrigation district is described in two sections: current water rights with their estimated conveyance efficiency and associated customers. Water rights are listed by 1) priority (i.e., DMI, Class A, and Class B); 2) if owned by the irrigation district; and 3) alphabetical order by users that hold their own water rights and are under contract with each irrigation district.

Table 3-5 Irrigation District Water Rights, Water Diversions, and Water Deliveries (acft/yr)

User	2030 Water Right	2030 Diversion	2030 Delivery
Bayview Irrigation District No. 11 (Bayview ID)			
DMI Municipal	183	183	124
Irrigation Class A, Cameron County	16,978	6,771	4,604
Brownsville Irrigation District (Brownsville ID)			
DMI Municipal	3,834	3,834	2,607
Irrigation Class A, Cameron County	31,949	12,741	8,664
Cameron County Irrigation District No. 2 (CCID #2)			
DMI Municipal	8,914	8,914	7,131
DMI Industrial	192	192	154
DMI East Rio Hondo WSC	3,836	3,836	3,069
DMI San Benito	1,532	1,532	1,226
Irrigation Class A, Cameron County	151,536	60,433	48,346
Irrigation Class B, Cameron County	14	4	3
Cameron County Irrigation District No. 6 (CCID #6) - Los Fresnos			
DMI Industrial	20	20	17
DMI Los Fresnos	1,051	1,051	893
DMI Olmito DMI	1,885	1,885	1,602
Irrigation Class A, Cameron County	48,399	19,301	16,406
Cameron County Water Improvement District No. 10 (CCWID #10)			
Irrigation Class A, Cameron County (From CCID #6)	7,953	3,172	2,157
Mining Class A, Cameron County	35	14	9
Delta Lake ID			
DMI Municipal	8,110	8,110	5,272
Raymondville, Class A	224	89	58
DMI Lyford	980	980	637
DMI North Alamo WSC	8,577	8,577	5,575
DMI Port Mansfield PUD	150	150	98
DMI Willacy County Navigation District	100	100	65
Irrigation Class A, Hidalgo County	99,268	39,588	25,732
Irrigation Class B, Hidalgo County	256	67	43
Irrigation Class A, Willacy County	75,808	30,232	19,651
Irrigation Class B, Willacy County	196	51	33
Donna ID			
DMI Municipal	4,190	4,190	2,975
DMI Domestic & Livestock	2,690	2,690	1,910
Irrigation Class A, Hidalgo County	94,064	37,513	26,634
Irrigation Class A, City of Donna	480	191	136
Engleman ID			

User	2030 Water Right	2030 Diversion	2030 Delivery
Irrigation Class A, Hidalgo County (From Delta Lake ID)	17,231	6,872	4,879
Harlingen ID			
DMI Municipal	856	856	728
DMI Harlingen Water Works System	22,488	22,488	19,115
DMI Military Highway WSC	632	632	537
DMI Palm Valley	313	313	266
DMI Primera	400	400	340
Irrigation Class A, Cameron County	113,883	45,417	38,604
Irrigation Class A, Harlingen Water Works System	4,454	1,776	1,510
Irrigation Class A, Town of Progreso (delivered to Military Highway WSC)	174	69	59
Hidalgo & Cameron County ID No. 9 (H&CCID #9)			
DMI Municipal	13,454	13,454	9,418
DMI Industrial	3,174	3,174	2,222
DMI Mercedes	1,015	1,015	711
DMI Weslaco	736	736	515
DMI Town of La Blanca	13	13	9
Irrigation Class A, Cameron County	12,395	4,943	3,460
Irrigation Class B, Cameron County	4	1	1
Irrigation Class A, Hidalgo County	159,757	63,711	44,598
Irrigation Class B, Hidalgo County	55	14	10
Irrigation Class A, Edcouch	226	90	63
Irrigation Class A, Elsa	698	278	195
Irrigation Class A, La Villa	63	25	17
Hidalgo County Irrigation District No. 1 (HCID#1)			
DMI Municipal	13,003	13,003	9,232
DMI Edinburg	10,847	10,847	7,701
DMI Hidalgo MUD	631	631	448
DMI Sharyland WSC	4,458	4,458	3,165
Irrigation Class A, Hidalgo County	74,079	29,543	20,975
Irrigation Class B, Edinburg	10	3	2
Irrigation Class B, Hidalgo MUD	700	182	129
Hidalgo County Irrigation District No. 2 (HCID #2)			
DMI Municipal	27,320	27,320	20,490
DMI Alamo	2,175	2,175	1,631
DMI North Alamo WSC	1,457	1,457	1,093
DMI Pharr	6,691	6,691	5,018
DMI San Juan	2,533	2,533	1,900
DMI Mcallen	6,611	6,611	4,958

User	2030 Water Right	2030 Diversion	2030 Delivery
DMI Edinburg	2,591	2,591	1,943
Irrigation Class A, Hidalgo County	132,500	52,841	39,631
Irrigation Class A, HCWID #3	552	220	165
Irrigation Class B, North Alamo WSC	3,750	976	732
Irrigation Class B, Hidalgo County	375	98	73
Hidalgo County Irrigation District No. 5 (HCID #5)			
Irrigation Class A, Hidalgo County	14,235	5,677	4,030
Irrigation Class B, Hidalgo County	403	105	74
Hidalgo County Irrigation District No. 6 (HCID #6)			
DMI Municipal	6,816	6,816	4,839
DMI Agua SUD	1,513	1,513	1,074
Irrigation Class A, Hidalgo County	32,913	13,126	9,319
Hidalgo County Irrigation District No. 13 (HCID #13) - Baptist Seminary			
Irrigation Class A, Hidalgo County	4,357	1,738	1,234
Hidalgo County Irrigation District No. 16 (HCID #16)			
DMI Municipal	1,500	1,500	1,065
DMI Domestic & Livestock	100	100	71
DMI Agua SUD	3,166	3,166	2,248
DMI La Joya	13	13	9
DMI Los Ebanos (delivered to Agua SUD)	13	13	9
DMI Penitas (delivered to Agua SUD)	13	13	9
DMI Sullivan City (delivered to Agua SUD)	13	13	9
Irrigation Class A, Hidalgo County	30,749	12,263	8,707
Mining Class A, Hidalgo County	200	80	57
Hidalgo County Water Improvement District No. 3 *			
DMI Municipal	13,980	13,980	12,582
DMI McAllen	3,229	3,229	2,906
Irrigation Class A, Hidalgo County	8,553	3,411	3,070
Mining Class A, Hidalgo County	100	40	36
Irrigation Class A, HCID#2	552	165	149
Hidalgo County Water Improvement District No. 18 (HCWCID #18)			
Irrigation Class B, Hidalgo County	99	26	18
Hidalgo County Water Improvement District No. 19 (HCWCID #19)			
Irrigation Class A, Hidalgo County	8,016	3,197	2,270
La Feria ID - Cameron County Irrigation District No. 3 (CCID #3)			
DMI Municipal	5,212	5,212	3,544
DMI Siesta Shores WCID	200	200	136
Irrigation Class A, Cameron County	85,808	34,220	23,270
Irrigation Class B, Siesta Shores WCID	63	16	11

User	2030 Water Right	2030 Diversion	2030 Delivery
Maverick County Water Improvement District (WID)			
Irrigation Class A, Maverick County	134,900	59,626	39,949
Irrigation Class A, Maverick County - Municipal	2,049	906	607
County of Maverick	641	111	74
Santa Cruz Water Control and Improvement (WCID) No. 15			
DMI Municipal	120	120	72
DMI North Alamo WSC	749	749	449
Irrigation Class A, Hidalgo County	74,873	29,859	17,916
United ID			
DMI Municipal	25,815	25,815	21,943
DMI Mission	2,838	2,838	2,412
DMI Sharyland WSC	8,666	8,666	7,366
DMI United for Mission	5,300	5,300	4,505
Irrigation Class A, Hidalgo County	29,374	11,714	9,957
Irrigation Class A, Mission	5,000	1,994	1,695
Valley Acres ID			
Irrigation Class A, Cameron County	2,177	868	616
Irrigation Class A, Hidalgo County	13,947	5,562	3,949
Manufacturing Class A, Cameron County	200	80	57

*In January 2025, Hidalgo County Water Improvement District No. 3 and Santa Cruz Water Control and Improvement District No. 15 consolidated into Hidalgo County Consolidated Water Control and Improvement District.

As the basis of the supply analysis, diversions were projected to 2070 to reflect the gradually decreasing yield from the reservoirs caused by sedimentation. The deliveries were projected with the combined impacts of conveyance losses and the reduction in reliability from lower reservoir yields. These supply projections are intended to show what supplies are currently available and project what supplies would continue to be available if no water management strategies (WMSs) are implemented.

In Chapter 5, irrigation district conservation is evaluated, which will reduce the impact of conveyance losses on the delivery projections. Additionally, urbanization is considered, which is expected to reduce irrigation use and make some additional water available to meet growing municipal demands through the conversion of water rights.

3.1.1.6 Drought and Push Water

The Rio Grande allocation system fulfils the DMI Reserve monthly. The impacts of drought on DMI water right holders are not reduced diversions but are likely increased demand because of low rainfall and increased outdoor water use, so the main concern is ownership or long-term contracts for sufficient water rights to meet demands for the entire year. Municipal conservation can help a utility to stay within its annual water budget. To date, there has not been a drought severe enough to impact the DMI reserve. It is considered 100 percent reliable.

Agricultural water users are not guaranteed their full authorized diversion each year and must adapt to the water that is available for Class A and B water rights under the Amistad-Falcon system. In the worst historical drought, Class A water right holders could expect about 40 percent of their authorized diversion, and Class B water right holders could expect about 26 percent. Conservation for irrigators (not the only Class A and B water right users, but the largest by far) is more about maximizing the water that is available for irrigation and the ability to adapt to drought years through changing crops or limiting irrigated acreage.

Severe reductions in irrigation water do impact the operations of irrigation districts, so that "push water" may not be available. Many of the water districts deliver water primarily for irrigation and use this water to charge their networks of canals, and municipal water rights are effectively "carried on" the irrigation water. In years of severe drought, there may be periods when little to no irrigation water is delivered, so municipalities may need to purchase additional water to provide a minimum operational amount of water in the system. This is in addition to the regular water losses experienced by districts as a result of seepage, evaporation, and operational losses.

When an irrigation district goes on allocation, agricultural usage slows dramatically. This reduction of usage has historically allowed the reservoirs and irrigators' useable account balances to re-charge, and for the system to go back to normal operations with irrigation deliveries to charge the canals and make municipal water available. Although the system does have a self-righting tendency, push water is still a concern that may be exacerbated by urbanization. The recommendations for addressing this concern include the construction or expansion of storage capacity for cities so that a city has sufficient supply between deliveries and increasing inter-connectedness between both raw and treated water systems for increased flexibility and resilience in times of shortage. Irrigation districts may be able to adapt their systems to meet the needs of a customer base that is shifting from irrigation customers to municipal customers.

3.1.1.7 Water Quality

Water in the Rio Grande is normally of suitable quality for irrigation, livestock, industrial uses, and basic treatment for municipal supplies; however, salinity, nutrients, and fecal coliform bacteria are of concern throughout the basin. Salinity concentrations in the Rio Grande are the result of both human activities and natural conditions. For example, the naturally salty waters of the Pecos River are a major source of the salts that flow into the Amistad Reservoir and continue downstream. One possible source is nonpoint source pollution on both sides of the river, including poorly constructed or malfunctioning septic and sewage collection systems and improperly managed animal wastes. Nutrient levels are a concern in the Rio Grande, but current levels do not represent a severe threat to human health; however, biennial water quality assessments conducted by TCEQ consistently show elevated levels of chlorophyll and depressed dissolved oxygen in portions of the Rio Grande downstream of Falcon Dam, possibly indicating eutrophication occurring in the river as a result of excessive nutrients, such as ammonia and nitrate.

In addition to natural sources of salinity in the Rio Grande watershed, human activities also increase the loading of salts to the river. Several major agricultural drains that contribute flow to the Rio Grande below Falcon Dam contain seasonally high levels of chlorides and sulfates.[7] These drains receive irrigation return flows from an estimated 1,115 square kilometers (km^2) of irrigated land, 4/5 of which

[7] International Boundary and Water Commission (IBWC). 2000-2006. Water Bulletins. http://www.ibwc.state.gov/water_data/water_bulletins.html; Accessed October 2016.

are located in Mexico (888 km^2). Trend analyses conducted on historical water quality data collected in the portion of the Rio Grande downstream of Falcon Reservoir showed increasing trends in chlorides, sulfate, and total dissolved solids over time.[8] The same trend analyses also showed increasing trends in nutrients, fecal indicator bacteria, and biochemical oxygen demand.

With active sources of pollution on both sides of the river and separate US and Mexican institutional frameworks in place to control them, coordinated binational efforts to protect water quality in the Rio Grande are necessary to improve water quality. In 2013, the TCEQ partnered with two US Federal agencies (IBWC and EPA) and two Mexican Federal agencies (Comisión Internacional de Límites y Aguas [CILA] and Comisión Nacional del Agua [CONAGUA]) and the Mexican State of Tamaulipas (Secretaría de Desarrollo Urbano y Medio Ambiente [SEDUMA]/Comisión Estatal del Agua en Tamaulipas [CEAT]) to begin a binational initiative to restore and protect water quality in the Lower Rio Grande below Falcon Dam. The Lower Rio Grande/Río Bravo Water Quality Initiative (LRGWQI) began under the auspices of the IBWC and follows the protocols established under the US/Mexico Water Treaty of 1944. An official exchange of letters signed on September 10, 2013, by the Principal Engineers of the two sections of the IBWC includes the official Terms of Reference for the initiative, which established the study area, goals, and objectives of the project, as well as the structure of the binational core group and working groups.

The objectives, as described in the LRGWQI Terms of Reference, are to complete the following:

- Address current and future water quality issues;
- Evaluate management strategies for point sources;
- Evaluate other mechanisms and strategies to improve water quality under steady-state conditions, including salinity management; and
- Suggest implementation strategies.

The most important goal of the initiative is the development of a binational watershed-based plan to restore and protect water quality in the river. The Terms of Reference for the LRGWQI also described the technical approach that was to be used for the initiative, which included the following:

- Binational Data Exchange;
- Historical Data Review;
- Identification of Data Gaps;
- Data Collection; and
- Data Analysis and Modeling.

All technical tasks listed in the Terms of Reference for the LRGWQI were completed in August 2018. As of 2024, the work products of the LRGWQI include a detailed watershed characterization report containing a historical data review and analysis, a point source analysis, and a geospatial analysis of steady state nonpoint sources. Between 2016 and 2018, the LRGWQI also developed binational models of water quality in the Lower Rio Grande, which are incorporated into a decision support system

[8] Miranda, R.M. and Harper, H.D. (2017). Watershed Characterization Report: Lower Rio Grande/Río Bravo Water Quality initiative. Texas Commission on Environmental Quality Report prepared for the Texas General Land Office and US Fish and Wildlife Service as a deliverable to TGLO Contract No. 13-096-000-7128 – Coastal Impact Assistance Program USFWS Financial Assistance Award Number F12AF01188.

designed to help resource managers and decision makers incorporate water quality planning into their efforts.

Most recently, the work to develop a binational plan has occurred under the United States Environmental Protection Agency's (USEPA's) Border 2025 Program. In 2021, a local binational partnership was created to identify financial resources and to establish sector-based subgroups to draft portions of a binational plan. According to the USEPA's website, under Border 2025, a Water Policy Workgroup has been formed with the goal of improving water quality along the border. The objectives of the Water Policy Workgroup include the following:

- **Objective 1:** Address Border Water Management in the Tijuana River Watershed. The EPA and SEMARNAT are to coordinate with specific federal, state, and local entities to plan and implement high priority infrastructure projects that address transboundary pollution affecting the Tijuana River watershed.
- **Objective 2:** Improve Drinking Water and Wastewater Treatment Infrastructure. Ten (10) drinking water and/or wastewater projects will be developed and certified by the NADB Board of Directors by 2025 under the Border Water Infrastructure Program.
- **Objective 3:** Improve operations and maintenance (O&M) of Drinking Water and Wastewater Infrastructure.
- **Objective 4:** Promote beneficial reuse of treated wastewater and conservation of water and energy. One hundred (100) percent of Border Water Infrastructure Program projects selected for development will include an assessment of water reuse opportunities, if appropriate, by 2025.
- **Objective 5:** Implement projects to prevent and reduce the levels of trash and sediment from entering high priority binational watersheds. Projects that prevent/reduce marine litter should primarily focus on preventing waste at the source through improvements to solid waste management systems, education campaigns, and monitoring as well as reducing trash from entering the aquatic environment through the capture of litter using river booms in known watershed litter hot spots. Funding sources are intended for at least one project in Tijuana River, New River, Rio Grande, and Santa Cruz River watersheds will be implemented to address trash or sediment by 2025.
- **Objective 6:** Improve access to transboundary water quality data.

3.1.2 Nueces River Basin

The Nueces River basin is bounded by the Rio Grande and Nueces-Rio Grande basins on its southern boundary and by the Colorado, San Antonio, and San Antonio-Nueces basins on its northern boundary. The basin extends from Edwards County in Texas to its discharge point in Nueces Bay, which flows into Corpus Christi Bay and ultimately to the Gulf of Mexico. Only a small portion of the Nueces Basin in Webb and Maverick counties is located within the Rio Grande Region. The Nueces River does not pass through Region M, and the Nueces basin does not contribute significant surface water supply to the region.

3.1.3 Nueces-Rio Grande Basin

The Nueces-Rio Grande basin is bounded on the north by the Nueces River basin and on the west and south by the Rio Grande basin. The drainage area of the Nueces-Rio Grande basin is 10,442 square miles, terminating at the Laguna Madre Estuary. Within the Rio Grande Region the basin encompasses the southeastern portion of Webb County, nearly two-thirds of Jim Hogg County, the majority of Hidalgo and Cameron counties, and all of Willacy County (Figure 3-7).

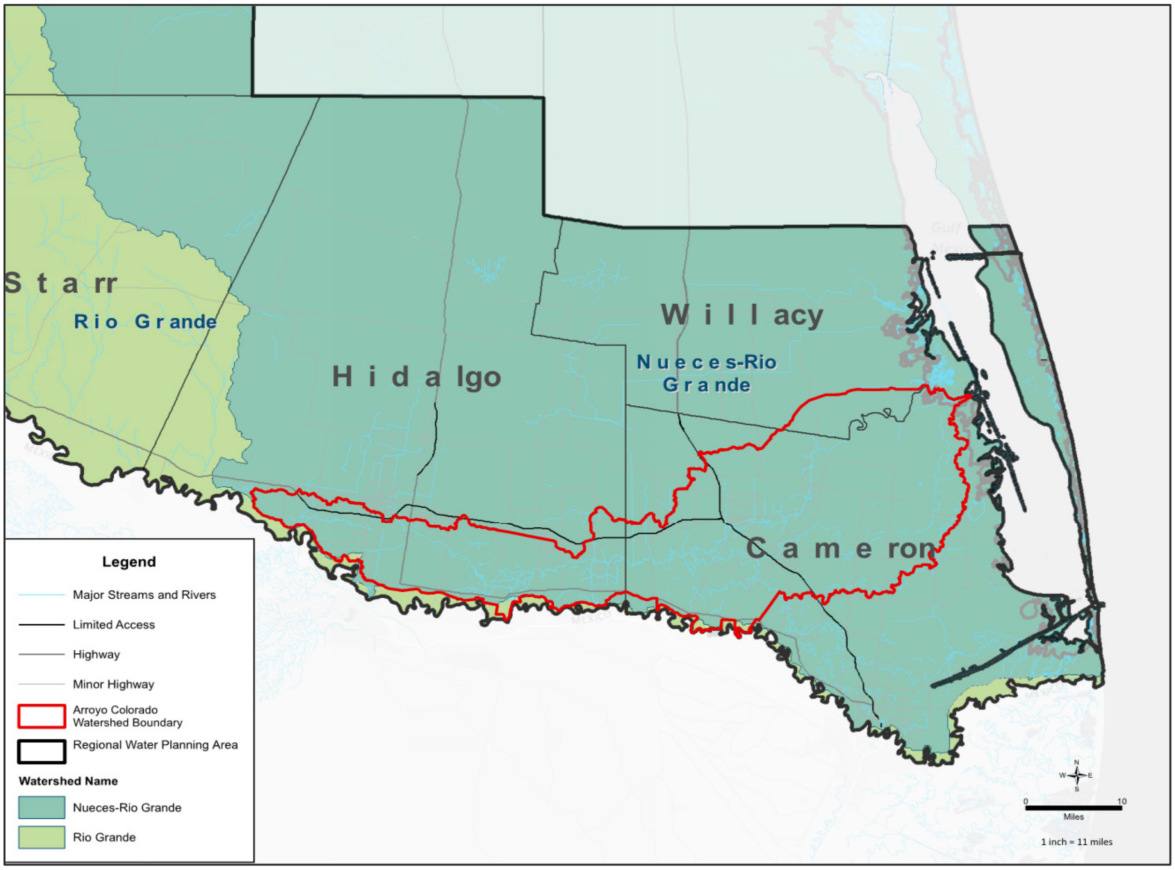

Figure 3-7 Nueces-Rio Grande Basin, Including Major Drainage-Ways

Two major drainage courses are in the basin: the main floodway and the Arroyo Colorado. Inflows from the Arroyo Colorado are critical to the ecological health of the Laguna Madre Estuary. In addition to natural drainage, most of the surface water diverted from the Lower Rio Grande is pumped into this basin and discharges into the Arroyo Colorado. There are no natural perennial streams and no significant water supplies from this basin.

The TWDB evaluated the Lower Laguna Madre Estuary and noted that the combined freshwater inflows to the estuary between 1977 and 2010 averaged 523,602 acft/yr and ranged from a minimum of 234,158 acft in 1990 to 2,726,325 acft in 2010. The two gauging stations are on the North Floodway at the town of Sebastian and the Arroyo Colorado at Harlingen. Gauged inflow to the Lower Laguna Madre accounted for 60 percent of the inflows, ungauged flows (estimated using precipitation data over ungauged watershed areas) accounted for approximately 38 percent of the combined inflow, and the net diversions and return flows accounted for the remaining 2 percent.

The Arroyo Colorado traverses Willacy, Cameron, and Hidalgo counties and is the major drainage-way for approximately two dozen cities in this area, with the notable exception of Brownsville. Almost 500,000 acres in these three counties are irrigated for cotton, citrus, vegetables, grain sorghum, corn, and sugar cane production, and much of the runoff and return flows from these areas are discharged into the Arroyo Colorado. The Arroyo Colorado and the Brownsville Ship Channel both discharge into the Laguna Madre near the northern border of Willacy County.

Use of the water in the Arroyo Colorado for municipal, industrial, and/or irrigation purposes is somewhat limited because of the water quality conditions that exist there. The Arroyo Colorado has two TCEQ classified stream segments: a freshwater segment (Segment 2202) and a tidally influenced marine segment (Segment 2201). Segments 2201 and 2202 are listed as impaired for high bacteria levels. Segment 2201 is also listed as impaired for low dissolved oxygen. Nutrient concentrations (nitrogen and phosphorus compounds) are high in both segments.

According to available publications and literature, existing springs within the Nueces-Rio Grande Coastal Basin of the Region M planning area (Cameron, Hidalgo, and Willacy counties) are few and small in terms of their discharge. No major springs are extensively relied upon for water supply purposes. Many of the small springs do provide water for livestock and wildlife when they are flowing.

3.1.4 Livestock Local Supplies

Livestock local supplies are dispersed supplies that are available only at the point of use and do not impact firm yield. These supplies are generally runoff collection, such as livestock supply ponds, and are assumed to be freshwater. Livestock is managed in such a way that populations will be maintained at a level that can be supported by a combination of known groundwater supplies and livestock local supplies available during drought conditions. Livestock local supplies are shown in Table 3-6.

Table 3-6 Livestock Local Supplies (acft/yr)

County	Basin	2020	2030	2040	2050	2060	2070
Jim Hogg	Nueces-Rio Grande	257	257	257	257	257	257
Maverick	Nueces	64	64	64	64	64	64
Maverick	Rio Grande	409	409	409	409	409	409
Starr	Rio Grande	75	75	75	75	75	75
Webb	Nueces	384	384	384	384	384	384
Webb	Nueces-Rio Grande	73	73	73	73	73	73
Webb	Rio Grande	344	344	344	344	344	344
Zapata	Rio Grande	249	249	249	249	249	249

3.1.5 Allocation of Surface Water Supplies

Water from the Amistad-Falcon Reservoir system is the primary surface water supply. This subsection discusses the established supplies that can be considered reliable within the context of the Rio Grande operations. TCEQ annual water rights records were used to establish most supplies. Short-term contracts for water were not considered to be reliable supplies, although longer-term contracts and those anticipated to be renewed were considered reliable.

Class A and B water rights were reduced according to the volume reliability anticipated in a drought year, which decreases over the planning horizon because of sedimentation in the reservoirs. DMI water rights were expected to be 100 percent reliable.

In the supply data, irrigation districts are shown as directly accessing the Rio Grande and as delivering the water that they divert to end users. These data show the physical relationships between the districts and the users that they serve. The delivery losses in the districts were estimated and tracked, and irrigation district conservation is recommended as a WMS to access the water that is currently lost in these systems. Delivery losses that were based on estimated conveyance efficiency were applied to all water supplied by each district. Those water rights that are not diverted by irrigation districts were shown to directly supply the end user, in some cases public supply utilities and in other cases individuals. According to the use designation, this water was counted as supplying county-other demand, irrigation, mining, livestock, or industrial demand. Where the TCEQ data were insufficient to understand the supplies associated with the Rio Grande, entities were contacted individually.

Livestock local surface water supplies were assumed for all counties with livestock demand. Because the demands are based on a drought year scenario, it was assumed that ranchers will manage their livestock so that reliable water sources will be sufficient. These supplies were assumed to be used only for livestock and independent of other surface water sources listed.

3.2 Groundwater Availability

The major aquifer that underlies Region M is the Gulf Coast, which underlies Hidalgo, Starr, Jim Hogg, and the western portions of Willacy and Cameron counties. The Carrizo-Wilcox extends through Webb and part of Maverick counties; however, only the outcrop has fresh water, and the subsurface water tends to be slightly to moderately saline. The minor aquifers in the region may produce significant quantities of water that supply relatively small areas, including the Rio Grande Alluvium, Laredo Formation, and Yegua-Jackson Aquifer. The majority of groundwater is slightly or moderately saline.

3.2.1 Groundwater Planning

On September 1, 2005, the Texas Legislature passed House Bill 1763 (HB1763) that presented changes in how groundwater availability is determined in Texas. HB1763 includes the following: (1) regionalizes decisions on groundwater availability; (2) requires regional water planning groups to use groundwater availability numbers from the groundwater conservation districts (GCDs); and (3) defines a permitting target/cap for groundwater production.

The joint groundwater planning process involves various stakeholders to determine how much water can be withdrawn annually and still meet desired future conditions (DFC). This process is undertaken for each of the groundwater management areas (GMAs) by representatives of GCDs and members of the public. The modeled available groundwater (MAG) values are the result of this process, which become the groundwater availabilities for the regional water planning process.

The GMAs work with a model of the aquifers in that region to establish estimates of current and future pumping, recharge, and other aquifer characteristics. The MAG for each part of the aquifer indicates how much groundwater pumping should occur in future decades to maintain the DFC. The most recent reports from GMA 16 (GR21-021 MAG) and GMA 13 (GR21-018 MAG) were used along with the DFC-compatible non-relevant aquifer availabilities provided by TWDB to establish the MAG availabilities for each decade of the planning horizon.

In some cases, there are aquifers or parts of aquifers within a GMA that are locally important but are not planned for in the same way. Availabilities for these aquifers are developed through the aquifer models but are considered non-MAG availabilities because they are not included in the joint groundwater planning process. One such example is the inclusion of the non-MAG Gulf Coast Aquifer in Cameron and Willacy Counties of GMA 16. Pumping in these areas is not included in the MAG but is approved by the TWDB and included as non-MAG sources in the TWDB database. They are identified as areas “outside official TWDB aquifer boundary." Table 3-7 summarizes the aquifer availabilities in Region M, including MAG and non-MAG.

Table 3-7 Available Groundwater for Significant Aquifers in Region M (acft/yr)

Aquifer	County	Data	2030	2040	2050	2060	2070	2080
Carrizo-Wilcox	Maverick	MAG	545	547	545	545	276	276
Carrizo-Wilcox	Webb	MAG	910	912	910	910	910	910
Gulf Coast	Cameron	MAG	7,999	9,311	10,620	11,932	11,932	11,932
Gulf Coast	Cameron	Non-MAG	43,167	46,720	50,273	53,824	53,824	53,824
Gulf Coast	Hidalgo	MAG	93,462	99,105	104,721	110,363	110,431	110,431
Gulf Coast	Jim Hogg	MAG	6,167	6,167	6,167	6,167	7,084	7,084
Gulf Coast	Starr	MAG	4,797	5,797	6,794	7,795	7,795	7,795
Gulf Coast	Webb	MAG	789	959	1,129	1,299	1,299	1,299
Gulf Coast	Willacy	MAG	1,150	1,329	1,486	1,665	1,703	1,703
Gulf Coast	Willacy	Non-MAG	1,407	1,622	1,838	2,053	2,053	2,053
Yegua-Jackson	Starr	Non-MAG	33	38	43	48	48	48
Yegua-Jackson	Webb	Non-MAG	20,000	20,000	20,000	20,000	20,000	20,000
Yegua-Jackson	Zapata	Non-MAG	7,987	7,987	7,987	7,987	7,987	7,987
Total			**188,413**	**200,494**	**212,513**	**224,588**	**225,342**	**225,342**

Currently, four GCDs exist in the region: Brush Country, Kenedy County, Red Sands, and Starr County (Figure 3-8).

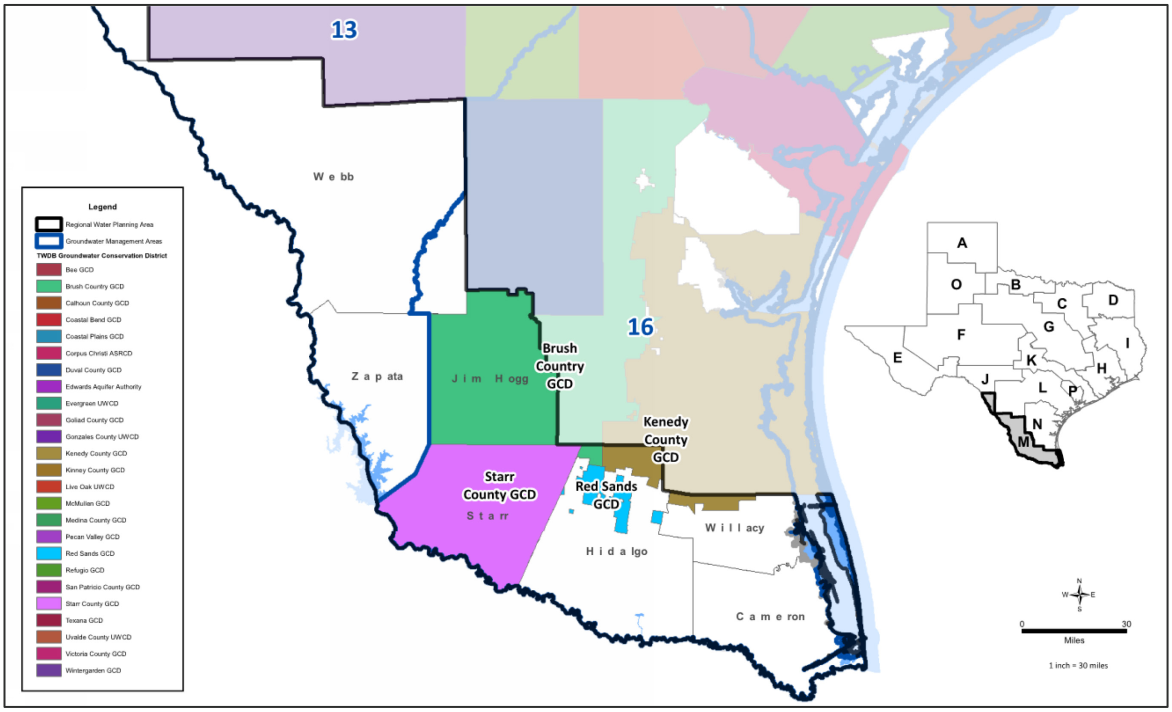

Figure 3-8 Groundwater Conservation Districts and Groundwater Management Areas in Region M

3.2.1.1 Brush Country Groundwater Conservation District

The Brush Country GCD was created by legislative enactment in 2009 and was confirmed by voters at a confirmation election held on November 3, 2009. On August 26, 2013, the Brush Country Board of Directors adopted comprehensive rules to manage, protect, and conserve the groundwater resources within its district boundaries. The Brush Country GCD territory includes all of Jim Hogg County, the area of Jim Wells County outside of the City of Alice and outside the Kenedy County GCD, the area of Brooks County outside of the Kenedy County GCD, and a small area in northern Hidalgo County. The current Brush County GCD Management Plan identifies the Gulf Coast Aquifer as the only major aquifer within the district's boundaries and the Yegua-Jackson Aquifer as the only minor aquifer within the district's boundaries. The most recent established DFC for the Gulf Coast Aquifer was adopted on November 23, 2021, and is a drawdown of 89 feet. The Yegua-Jackson Aquifer was identified as "non-relevant" for the purposes of joint planning and, therefore, no DFC was established.

Brush Country GCD has been actively participating in GMA 16 meetings and is considered fully operational.

3.2.1.2 Kenedy County Groundwater Conservation District

The Kenedy County Groundwater Conservation District (KCGCD) covers 1,686,889 acres, including all land within Kenedy County and parts of Brooks, Hidalgo, Jim Wells, Kleberg, Nueces, and Willacy counties. The district includes 44,311 acres of northern Willacy County and 73,006 acres of northeastern Hidalgo County. The district's mission is to develop and implement an efficient, economical, and environmentally sound groundwater management program to protect and enhance the groundwater resources of the district.

The KCGCD's most current Groundwater Management Plan was approved by the TWDB on January 18, 2023. The only major aquifer within the district is the Gulf Coast Aquifer and there are no minor aquifers.

The DFC established for the Kenedy County GCD for the Gulf Coast Aquifer, as part of the 2021 joint planning process, was an average drawdown of 27 feet from January 1, 2010, to December 31, 2079.

3.2.1.3 Red Sands Groundwater Conservation District

The majority of the Red Sands GCD is located in Hidalgo County and in the southern parts of Willacy County. The district comprises an area of land in the northwestern corner of Hidalgo County, an adjacent area in north central Hidalgo County, and an area along the border between Hidalgo and Willacy counties.

Red Sands GCD adopted its most current Groundwater Management Plan on September 21, 2023. The Red Sands GCD management plan details the historical and current state of its district and its plans to adhere to TWDB and groundwater conservation. Red Sands is in the process of registering all wells in the district and issuing permits for those wells. Many inactive wells are in the district, and Red Sands is in the process of plugging those inactive wells in accordance with the goals in its conservation plan. The major aquifer within the district is the Gulf Coast Aquifer. There is a limited water supply in the Red Sands GCD, the DFC determined in the 2021 joint planning process identifies a target of 60 feet of average drawdown from January 1, 2010, to December 31, 2079. According to the most recent groundwater modeling, this allows for up to 2,863 acft/yr of pumping by 2060. Because of this limited water supply and location restrictions, Red Sands has maintained community engagement goals to remain active in groundwater conservation.

3.2.1.4 Starr County Groundwater Conservation District

Starr County GCD consists entirely of Starr County, bounded by Zapata, Jim Hogg, Brooks, and Hidalgo counties, and the Rio Grande. Starr County GCD is governed by a five-member Board of Directors.

Starr County GCD overlies parts of both the Gulf Coast Aquifer and the Yegua-Jackson Aquifer. The Portion of the Gulf Coast has low water availability and a total dissolved solids (TDS) ranging from 1,000 to more than 10,000 milligrams per liter (mg/L). The Yegua Jackson Aquifer has low yield with water quality between 50 and 10,000 mg/L TDS. Starr county GCD has adopted the average drawdown goal of 94-foot area-wide for the Gulf Coast Aquifer System from January 1, 2010, to December 31, 2079, for GMA 16. The portion of the Yegua-Jackson Aquifer in Starr County is not included in the MAG process.

3.2.2 Gulf Coast Aquifer

The Gulf Coast Aquifer exists in an irregular band along the Texas coast from the Texas-Louisiana border to Mexico. Historically, the Gulf Coast Aquifer has been used to supply varying quantities of water in Cameron, Hidalgo, Jim Hogg, eastern Starr, southeastern Webb, and southern Willacy counties (Figure 3-9).

The Gulf Coast Aquifer consists of interbedded clays, silts, sands, and gravels, which are hydrologically connected to form a leaky aquifer system. In general, there are four components of this system: the deepest zone is the Catahoula; above the Catahoula is the Jasper Aquifer located within the Oakville Sandstone; the Evangeline Aquifer contained within the Fleming and Goliad sands is separated from the Jasper by the Burkeville confining layer; and the uppermost aquifer, the Chicot, consists of the Lissie, Willis, Bentley, Montgomery, Beaumont, and overlying alluvial deposits. In Region M, these overlying alluvial deposits include portions of the Rio Grande alluvium. These zones extend into Zapata and Webb counties but produce smaller quantities of water in these areas.

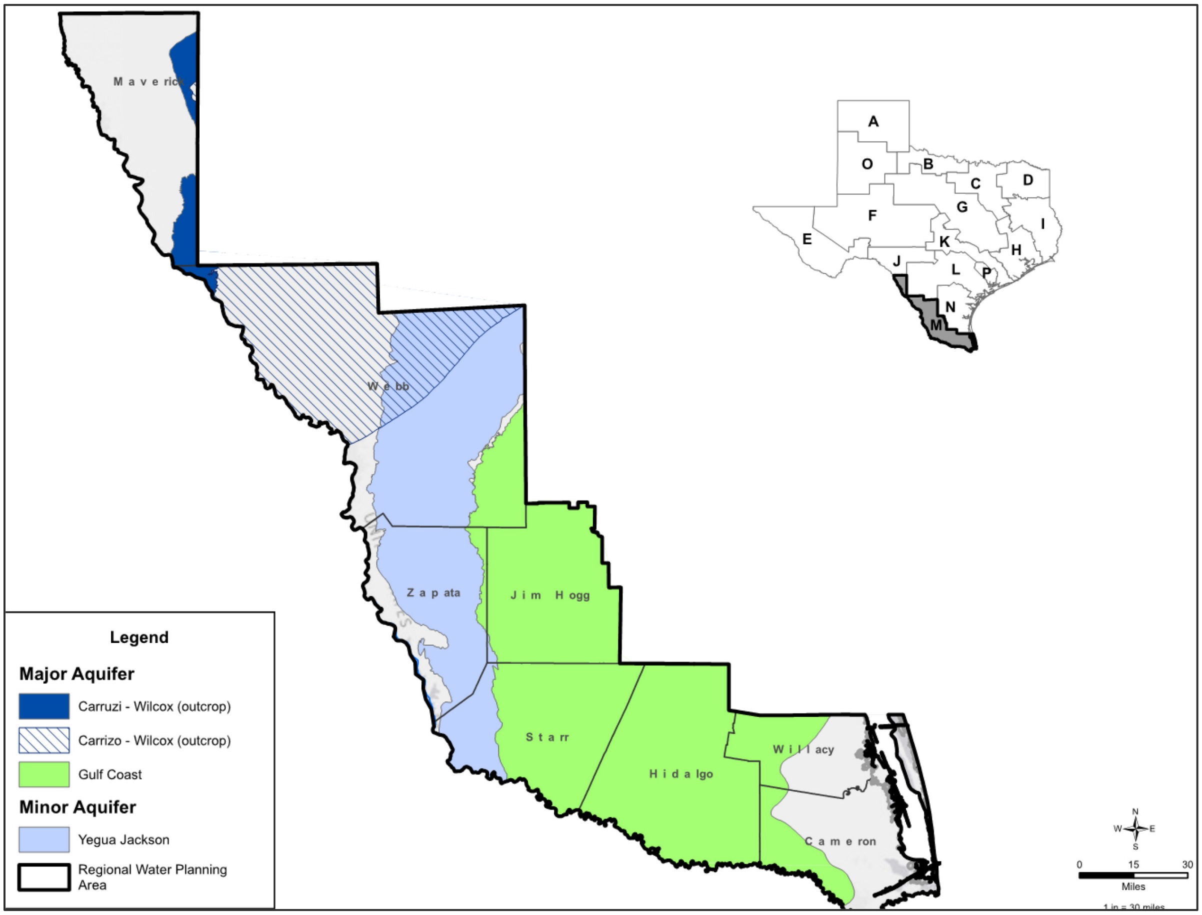

Figure 3-9 Major and Minor Aquifers in Region M

The primary water-producing zone varies from one area of the region to another. The Chicot Aquifer is the primary water-producing zone in western Cameron and eastern Hidalgo counties. The Evangeline Aquifer produces significant quantities of water in Cameron, Hidalgo, and Willacy counties. The Oakville Sandstone produces significant quantities of water in northeastern Starr County, northwestern Hidalgo County, and a portion of Jim Hogg County. The Catahoula formation produces small to moderate quantities of water in Webb County (Table 3-8).

Recharge to the Gulf Coast Aquifer occurs primarily through percolation of precipitation. This may be supplemented in some areas by the addition of irrigation water from the Rio Grande, which may have negative impacts on water quality in localized areas. In some areas, recharge may be limited by shallow subsurface drainage systems designed to control the buildup of salts resulting from continued irrigation operations.

Table 3-8 Gulf Coast Aquifer MAG and Non-MAG Availability Projections by County and River Basin (acft/yr)

Source County	Source Basin	2030	2040	2050	2060	2070	2080
Cameron	Nueces-Rio Grande	7,536	8,771	10,005	11,241	11,241	11,241
Cameron	Rio Grande	463	540	615	691	691	691
Cameron (Non-MAG)	Nueces-Rio Grande	42,395	45,821	49,247	52,673	52,673	52,673
Cameron (Non-MAG)	Rio Grande	772	899	1,026	1,151	1,151	1,151
Hidalgo	Nueces-Rio Grande	91,421	96,658	101,867	107,103	107,171	107,171
Hidalgo	Rio Grande	2,041	2,447	2,854	3,260	3,260	3,260
Jim Hogg	Nueces-Rio Grande	5,230	5,230	5,230	5,230	6,008	6,008
Jim Hogg	Rio Grande	937	937	937	937	1076	1076
Starr	Nueces-Rio Grande	1,958	2,366	2,772	3,180	3,180	3,180
Starr	Rio Grande	2,839	3,431	4,022	4,615	4,615	4,615
Webb	Nueces	22	27	32	37	37	37
Webb	Nueces-Rio Grande	642	780	918	1,056	1,056	1,056
Webb	Rio Grande	125	152	179	206	206	206
Willacy	Nueces-Rio Grande	1,150	1,329	1,486	1,665	1,703	1,703
Willacy (Non-MAG)	Nueces-Rio Grande	1,407	1,622	1,838	2,053	2,053	2,053
Total		**158,938**	**171,010**	**183,028**	**195,098**	**196,121**	**196,121**

Although significant quantities of groundwater are available, recent pumping has resulted in dropping groundwater levels in some areas. Anecdotally, northern Hidalgo and western Willacy counties are experiencing dropping water levels in recent drought years of up to 80 feet.

Well yields can vary significantly. In the Oakville Sandstone, average production is about 120 gallons per minute (gpm), while in the Chicot Aquifer the average well yield is about 10 times this rate, or 1,200 gpm. In the Catahoula Formation, yields range from 30 to 150 gpm. Availability from the Gulf Coast Aquifer is based on GAM Run 21-021 MAG: Modeled Available Groundwater for the Gulf Coast Aquifer System in GMA 16, finalized December 7, 2022. As described in Subsection 3.2.1, non-MAG availability in the Gulf Coast Aquifer is based on GMA 16 Joint Planning Cycle 2019-2022 preliminary modeling data, approved by the TWDB to be included in the RWP last cycle.

3.2.2.1 Brackish Groundwater in the Gulf Coast Aquifer, Lower Rio Grande Valley, Texas

The TWDB initiated a study of the groundwater resources in the Lower Rio Grande Valley under the Brackish Resources Aquifer Characterization System (BRACS) program. Most of the groundwater in the study area (parts of Cameron, Willacy, Hidalgo, and Starr counties) has concentrations of TDS greater than 1,000 mg/L and does not meet drinking water quality standards (Figure 3-10). The Gulf Coast Aquifer and overlying quaternary geologic units underlie an area of about 3,900 square miles in the study area, and it is the primary source of groundwater in the area.

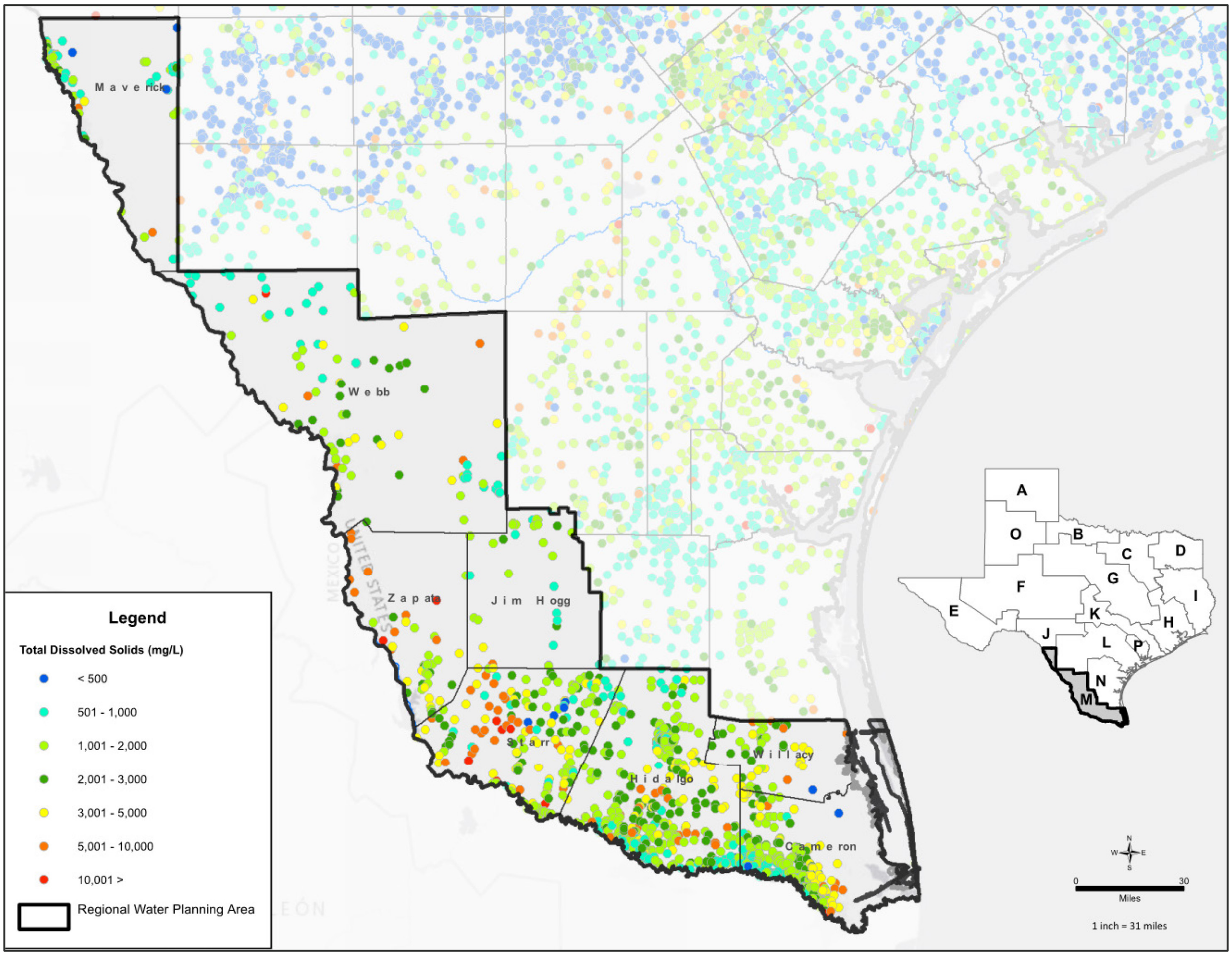

Figure 3-10 Distribution of Wells Sampled for TDS, BRACS Report

The BRACS study used thousands of water well and geophysical logs for geologic, water chemistry, water level, and aquifer test data from a wide variety of sources to characterize the groundwater in the Gulf Coast Aquifer. From this information, three-dimensional salinity zones were mapped within the aquifer containing groundwater of a similar salinity range shown in Table 3-9.

Table 3-9 Salinity Ranges for Groundwater as Defined in BRACS

Salinity	Range of Total Dissolved Solids (mg/L)
Fresh Water	0 – 1,000
Slightly Saline Water	1,000 – 3,000
Moderately Saline Water	3,000 – 10,000
Very Saline Water	10,000 – 35,000
Brine	greater than 35,000

TWDB estimated that the Gulf Coast Aquifer in the study area contains a significant volume of brackish groundwater: more than 40 million acft of slightly saline groundwater; 112 million acft of moderately saline groundwater; and 123 million acft of very saline groundwater. Not all of the brackish groundwater can be produced or economically extracted and treated, but the estimates provide an indication of the potential availability of this important resource.

The study delineated 21 separate geographic areas that each have a unique salinity zone profile from ground surface to the base of the Gulf Coast Aquifer. Some of the salinity zones are quite complex, with intermingled groundwater of different salinity ranges that could not be classified into unique, mapped zones. Placement of these boundaries represents best professional judgment and can undoubtedly be refined with more data from future drilling and testing. The use of these boundaries accordingly requires caution when evaluating future well fields near one of them.

3.2.3 Carrizo-Wilcox Aquifer

The Carrizo Sand, or Carrizo-Wilcox Aquifer, outcrops in a very small area in northwest Webb County, approximately 60 miles to the north-northwest of Laredo (refer to "Carrizo-Wilcox [outcrop]" on Figure 3-9). The formation continues north into Dimmit, Zavala, and Maverick counties, roughly parallel in orientation to those formations occurring to the east and south.

The Carrizo-Wilcox Aquifer is the principal and most prolific aquifer within the northern portion of Region M. The Carrizo-Wilcox Aquifer is a coarse to fine grained, massive, loosely cemented, cross-bedded sandstone with some interbedded thinner sandstones and shales. It yields moderate to large quantities of groundwater, but the yield decreases with distance from the outcrop as the formation dips southeastward. Recharge occurs primarily through exposure of the Carrizo-Wilcox sands to precipitation at the outcrop and where the outcrop is incised by creeks or streams.

The projected quantities of water available from the Carrizo-Wilcox Aquifer are presented in Table 3-10. These estimates were derived by assessing GAM Run 21-018 MAG: Modeled Available Groundwater for the Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson Aquifers in GMA 13, finalized July 25, 2022.

Table 3-10 Carrizo-Wilcox Aquifer MAG Availability Projections by County and River Basin (acft/yr)

Source County	Source Basin	2030	2040	2050	2060	2070	2080
Maverick	Nueces	542	544	542	542	273	273
Maverick	Rio Grande	3	3	3	3	3	3
Webb	Nueces	890	892	890	890	890	890
Webb	Rio Grande	20	20	20	20	20	20
Total		**1,455**	**1,459**	**1,455**	**1,455**	**1,186**	**1,186**

3.2.4 Yegua-Jackson Aquifer

The Yegua-Jackson Aquifer extends in a narrow band from the Rio Grande and Mexico across the state to the Sabine River and Louisiana. In Region M, the Yegua-Jackson Aquifer extends in a narrow band from the Rio Grande through Starr, Zapata, and Webb counties (Figure 3-9). The amount and type of use from the Yegua-Jackson Aquifer vary across the region.

The Yegua-Jackson aquifer consists of complex associations of sand, silt, and clay deposited during the Tertiary Period. Net sand thickness is generally less than 200 feet at any location within the aquifer. Water quality varies greatly within the aquifer, and shallow occurrences of poor-quality water are not uncommon; this is especially true in the Region M planning area. In general, however, small to moderate amounts of usable quality water can be found within shallow sands (less than 300 feet deep) over much of the Yegua-Jackson Aquifer. Although the occurrence, quality, and quantity of water from this aquifer are erratic, domestic and livestock supplies are available from shallow wells over most of its extent. Locally, water for municipal, industrial, and irrigation purposes is available. Yields of most wells are small, less than 50 gpm, but in some areas, yields of adequately constructed wells may be as high as 500 gpm. Availabilities in the Yegua-Jackson Aquifer are based on GAM Run 1721-027 018 MAG: Modeled Available Groundwater for the Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson Aquifers in GMA 13, from finalized July 25, 2022. The Yegua-Jackson aquifer availabilities are DFC compatible non-relevant availability estimates, generated in the GR21-021 MAG model run for the areas in GMA 16 and in the GR21-018 MAG model run for the areas in GMA 13. Table 3-11 summarizes non-MAG availability projections in the Yegua-Jackson Aquifer, separated by basin.

Table 3-11 Yegua-Jackson Aquifer Non-MAG Availability Projections by County and River Basin (acft/yr)

Source County	Source Basin	2020	2030	2040	2050	2060	2070
Starr	Rio Grande	33	38	43	48	48	48
Webb	Nueces	11,969	11,969	11,969	11,969	11,969	11,969
Webb	Rio Grande	8,031	8,031	8,031	8,031	8,031	8,031
Zapata	Rio Grande	7,987	7,987	7,987	7,987	7,987	7,987
Total		**28,020**	**28,025**	**28,030**	**28,035**	**28,035**	**28,035**

3.2.5 Rio Grande Alluvium

The alluvial aquifer of the lower Rio Grande Valley consists of terrace, floodplain, and delta deposits of the Rio Grande. These deposits are made up of unconsolidated gravel, sand, silt, and clay. The aquifer also includes some clay, silt, sand, and gravel of the Goliad, Lissie, and Beaumont Formations, which underlie the alluvium. The aquifer extends along the Rio Grande from below Falcon Dam in Starr County for about 100 miles to Brownsville in Cameron County. In southern Starr County and southwestern Hidalgo County, the aquifer follows a narrow strip along the river 5 to 10 miles wide. From eastern Hidalgo County, the aquifer extends northward into Willacy County, where its maximum width in Texas is about 28 miles. The alluvial aquifer also covers the western half of Cameron County. The productive area of the aquifer convers about 950 square miles, most of which is in or around the Rio Grande basin in Hidalgo, Cameron, and Willacy counties. This additional area adjacent to the Rio Grande basin has been included in this discussion because of its hydrologic connection with the aquifer in the basin. The potential yield of the aquifer in the Rio Grande basin depends on the amount of water recharged by the infiltration of precipitation and by seepage from the Rio Grande and the amount of water withdrawn from the aquifer in the area north of the basin.

Groundwater in the upper part of the aquifer generally is under water-table conditions; however, local artesian conditions exist where the water passes under relatively impermeable clays. The maximum thickness of the aquifer is about 700 feet. Its thickness is irregular and is generally less than 500 feet. The best quality of water in the aquifer occurs near the Rio Grande at depths of less than 75 feet in southeastern Starr County, between 50 and 250 feet in southern Hidalgo County, and between 100 and 300 feet in western Cameron County.

Recharge to the aquifer is from the percolation of water from the land surface. This water is from precipitation, canals and drains, irrigation return water, and the Rio Grande. Water normally flows from the Rio Grande into the aquifer, except when the river is at its lowest level.

Although a number of entities pump Rio Grande Alluvial groundwater, there is no MAG for this aquifer. The Rio Grande alluvium intermingles with the Gulf Coast Aquifer, and in many cases it is difficult to delineate these two aquifers. The wells at Southmost Regional Water Authority and Military Highway WSC have been identified in some cases as drawing from Gulf Coast and in other cases drawing from Rio Grande Alluvium.

3.2.6 Allocation of Groundwater Supplies

Groundwater usage records were gathered from the TWDB groundwater database, from the Water User Group (WUG) Entity detailed gallons per capita per day (GPCD) reports, from the municipal and industrial water uses surveys, and from entities themselves. Municipal groundwater supplies were based on information from the municipalities/utilities and considered to be consistent over the planning horizon.

For county-wide WUGs, such as irrigation, mining, and county-other, the TWDB historical groundwater pumping database was used. These values were compared against the stated demands.

In using these resources, the aquifers identified were checked against availability information, including, but not limited to, the MAG values. The RWP processes relies on MAG as the annual amount of groundwater that can reliably be extracted from an aquifer in a given area while still meeting conservation goals set out by the GMAs.

The RWP is required to present only supplies and recommended projects within the TWDB-approved groundwater availability (MAG + Non-MAG) volume totals. Thus, the total existing supplies plus any recommended groundwater projects must be no greater than the TWDB-approved groundwater availability for that county.

In some cases, current identified supplies are larger than the TWDB-approved groundwater availability within a particular county. As a result, the RWP may need to cite existing supplies in the plan as less than the water that is actually being supplied. All counties with current supplies that are less than the TWDB-approved groundwater availability will be unaffected, and existing supplies can be shown in full.

3.3 Recycled Water

The use of wastewater treatment plant (WWTP) effluent as reclaimed water is becoming increasingly common as an alternative water supply. Water reuse is classified as direct or indirect and potable or non-potable. Direct reuse is defined as the use of reclaimed water that is piped directly from the WWTP to the place where it is utilized. Indirect reuse is defined as the use of reclaimed water by discharging to a water supply source, such as surface water or groundwater, where it blends with the water supply and may be further purified before being removed for non-potable or potable uses. Potable water is suitable for direct consumption, and non-potable is used to meet a range of other demands. This gives the following four classes of reuse:

1. Direct potable;
2. Direct non-potable;
3. Indirect potable; and
4. Indirect non-potable.

The most common class is direct non-potable for irrigation or industrial type uses. Irrigation use may include turf irrigation, or in some cases, crop irrigation. Many forms of indirect reuse have been implemented through the years as discharges from one water user contribute to streamflow or groundwater recharge and are then diverted by a downstream water user. In unique cases involving groundwater-based return flows or inter-basin transfers, a discharger may retain a right to its return flows. For planning purposes, indirect reuse is considered water that would require a permit to access after it has been discharged into the environment. This form of indirect reuse is limited by the legal complexity required to demonstrate that a discharge increases water availability.

The Texas Administrative Code (TAC) Chapter 210 authorizes individual producers of reclaimed water to implement water reuse in Texas. Many individual WUGs in Region M have 210 authorizations with water reuse in various stages of implementation. The following two classes of water are authorized:

- Type I Reclaimed Water – suitable for use where contact between humans and the reclaimed water is likely; and
- Type II Reclaimed Water – suitable for use where contact between humans and the reclaimed water is unlikely.

Currently, 11 municipalities in Region M use reclaimed water to satisfy municipal demands. Table 3-12 presents data and information provided by the associated WUGs. Most uses are for non-potable purposes, such as service water at WWTPs and landscape irrigation and ponds.

Table 3-12 Current Reuse Water Usage in the Lower Rio Grande Valley

Municipality	WWTP	Average Reuse		Maximum Reuse Capacity		Intended Use
		(MGD)	(acft/yr)	(MGD)	(acft/yr)	
Brownsville PUB	Robindale WWTP	6	6,721	7.25	8,120	Irrigation
Brownsville PUB	Southside WWTP	3.57	4,000	6.4	7,168	Potable
Eagle Pass	Eagle Pass WWTP	0.58	650	3.0	3,360	Dust Control and Golf Course Irrigation, Ponds
Edinburg	Edinburg WWTP	3	3,360	6.15	6,888	Power Plant Process Water
Harlingen	Harlingen WWTP No. 2	1.0	1,120	3.63	4,060	Golf Course; Sports Fields; Watering Ponds
La Feria	La Feria WWTP	0.16	174	1.0	1,120	Irrigation
Laguna Madre Water District	Isla Blanca WWTP	0.06	67	1.3	1,456	Irrigation
Laguna Madre Water District	Laguna Vista WWTP	0.1	112	0.3	336	Golf Course Irrigation and Lagoons
Laredo	North Laredo WWTP	0.53	594	1.46	1,639	Plant Water, Golf Course Irrigation
Laredo	Laredo Southside WWTP	0.08	90	6.0	6,720	Plant Water, Irrigation, Belt Press
Laredo	Zacate Creek WWTP	0.08	90	7.0	7,840	Plant Water, Irrigation, Process Water
McAllen	McAllen North WWTP	8	8,961	5.63	6,300	Plant Water; Master Plan Community
McAllen	McAllen South WWTP	3.12	3,500	5.0	5,600	Golf Course Irrigation
Pharr	Pharr WWTP	2.0	2,240	4.0	4,480	Parks; Golf Course Irrigation
Valley MUD No. 2	Rancho Viejo WWTP	0.1	112	0.21	235	Golf Course Pond
Weslaco	Weslaco North WWTP	0.7	770	2.45	2,744	Plant Water; Direct Reuse
Weslaco	Weslaco South WWTP	0.94	1,053	1.25	1,400	Plant Water; Golf Course Irrigation

Availability of reuse water is limited by the treatment capacity and actual flow of the WWTPs that supply the effluent. It is assumed that half of a WWTP's average effluent is available on a consistent basis to be used for reuse water.

Currently, the area uses reclaimed water for non-potable purposes; however, there is likely to be increased focus on potential potable reuse water. Several utilities have been identified as feasible candidates to implement potable reuse systems, discussed further in Chapter 5.

3.3.1 Allocation of Recycled Water Supplies

Existing recycled water supplies were evaluated and projected to continue through the planning horizon. Non-potable reuse supplies were limited to one-third of a municipal demand because, in many cases, the volume of water that can be recycled is significantly larger than the limited demands that can be met with non-potable water.

Future supplies are based on the capacities of existing WWTPs. This methodology is discussed further in Chapter 5 under the reuse WMS.

3.4 Major Water Providers

A Major Water Provider (MWP) is defined as any wholesale water provider (WWP) or municipal WUG that has demands greater than 3,000 acft/yr in 2030.

A summary of existing sales and transfers for MWPs by decade and category of use is included in Appendix 3D.

Appendix 3A. Relevant Reports from the 2027 Regional and State Water Planning Database (DB27)

DRAFT Region M Source Total Availability

				Source Availability (acre-feet per year)					
Source Name	**County**	**Basin**	**Salinity***	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Groundwater Source Availability Total				**188,413**	**200,494**	**212,513**	**224,588**	**225,342**	**225,342**
Carrizo-Wilcox Aquifer	Maverick	Nueces	Fresh	542	544	542	542	273	273
Carrizo-Wilcox Aquifer	Maverick	Rio Grande	Fresh/ Brackish	3	3	3	3	3	3
Carrizo-Wilcox Aquifer	Webb	Nueces	Fresh	890	892	890	890	890	890
Carrizo-Wilcox Aquifer	Webb	Rio Grande	Fresh/ Brackish	20	20	20	20	20	20
Gulf Coast Aquifer System	Cameron	Nueces-Rio Grande	Fresh/ Brackish	49,931	54,592	59,252	63,914	63,914	63,914
Gulf Coast Aquifer System	Cameron	Rio Grande	Fresh/ Brackish	1,235	1,439	1,641	1,842	1,842	1,842
Gulf Coast Aquifer System	Hidalgo	Nueces-Rio Grande	Fresh/ Brackish	91,421	96,658	101,867	107,103	107,171	107,171
Gulf Coast Aquifer System	Hidalgo	Rio Grande	Fresh/ Brackish	2,041	2,447	2,854	3,260	3,260	3,260
Gulf Coast Aquifer System	Jim Hogg	Nueces-Rio Grande	Fresh/ Brackish	5,230	5,230	5,230	5,230	6,008	6,008
Gulf Coast Aquifer System	Jim Hogg	Rio Grande	Fresh/ Brackish	937	937	937	937	1,076	1,076
Gulf Coast Aquifer System	Starr	Nueces-Rio Grande	Fresh/ Brackish	1,958	2,366	2,772	3,180	3,180	3,180
Gulf Coast Aquifer System	Starr	Rio Grande	Fresh/ Brackish	2,839	3,431	4,022	4,615	4,615	4,615
Gulf Coast Aquifer System	Webb	Nueces	Fresh/ Brackish	22	27	32	37	37	37
Gulf Coast Aquifer System	Webb	Nueces-Rio Grande	Fresh/ Brackish	642	780	918	1,056	1,056	1,056
Gulf Coast Aquifer System	Webb	Rio Grande	Fresh/ Brackish	125	152	179	206	206	206
Gulf Coast Aquifer System	Willacy	Nueces-Rio Grande	Fresh/ Brackish	2,557	2,951	3,324	3,718	3,756	3,756
Gulf Coast Aquifer System	Zapata	Rio Grande	Fresh	0	0	0	0	0	0

* Salinity field indicates whether the source availability is considered ‘fresh’ (less than 1,000 mg/L), ‘brackish’ (1,000 to 10,000 mg/L), ‘saline’ (10,001 mg/L to 34,999 mg/L), or ‘seawater’ (35,000 mg/L or greater). Sources can also be labeled as ‘fresh/brackish’ or ‘brackish/saline’, if a combination of the salinity types is appropriate.

** Since reservoir sources can exist across multiple counties, the county field value, ‘reservoir’ is applied to all reservoir sources.

DRAFT Region M Source Total Availability

				Source Availability (acre-feet per year)					
Source Name	**County**	**Basin**	**Salinity***	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Yegua-Jackson Aquifer	Jim Hogg	Rio Grande	Fresh	0	0	0	0	0	0
Yegua-Jackson Aquifer	Starr	Rio Grande	Fresh	33	38	43	48	48	48
Yegua-Jackson Aquifer	Webb	Nueces	Fresh	11,969	11,969	11,969	11,969	11,969	11,969
Yegua-Jackson Aquifer	Webb	Rio Grande	Fresh	8,031	8,031	8,031	8,031	8,031	8,031
Yegua-Jackson Aquifer	Zapata	Rio Grande	Fresh	7,987	7,987	7,987	7,987	7,987	7,987

Reuse Source Availability Total				**45,342**	**59,410**	**63,971**	**69,981**	**76,456**	**79,256**
Direct Reuse	Cameron	Nueces-Rio Grande	Fresh	9,064	13,737	15,782	15,782	16,782	16,782
Direct Reuse	Cameron	Rio Grande	Fresh	112	112	112	112	112	112
Direct Reuse	Hidalgo	Nueces-Rio Grande	Fresh	31,856	33,526	34,646	39,446	41,686	41,686
Direct Reuse	Hidalgo	Rio Grande	Fresh	2,887	4,887	6,283	7,493	7,493	7,493
Direct Reuse	Maverick	Rio Grande	Fresh	650	650	650	650	650	650
Direct Reuse	Webb	Rio Grande	Fresh	773	6,498	6,498	6,498	9,733	12,533

Surface Water Source Availability Total				**1,046,502**	**1,045,994**	**1,045,486**	**1,044,279**	**1,042,509**	**1,040,401**
Amistad-Falcon Lake/Reservoir System	Reservoir**	Rio Grande	Fresh	1,001,776	1,001,268	1,000,760	999,553	997,821	995,863
Casa Blanca Lake/Reservoir	Reservoir**	Rio Grande	Fresh	600	600	600	600	562	412
Livestock Local Supply	Jim Hogg	Nueces-Rio Grande	Fresh	257	257	257	257	257	257
Livestock Local Supply	Jim Hogg	Rio Grande	Fresh	0	0	0	0	0	0
Livestock Local Supply	Maverick	Nueces	Fresh	64	64	64	64	64	64

* Salinity field indicates whether the source availability is considered 'fresh' (less than 1,000 mg/L), 'brackish' (1,000 to 10,000 mg/L), 'saline' (10,001 mg/L to 34,999 mg/L), or 'seawater' (35,000 mg/L or greater). Sources can also be labeled as 'fresh/brackish' or 'brackish/saline', if a combination of the salinity types is appropriate.

** Since reservoir sources can exist across multiple counties, the county field value, 'reservoir' is applied to all reservoir sources.

DRAFT Region M Source Total Availability

				Source Availability (acre-feet per year)					
Source Name	**County**	**Basin**	**Salinity***	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Livestock Local Supply	Maverick	Rio Grande	Fresh	409	409	409	409	409	409
Livestock Local Supply	Starr	Rio Grande	Fresh	75	75	75	75	75	75
Livestock Local Supply	Webb	Nueces	Fresh	384	384	384	384	384	384
Livestock Local Supply	Webb	Nueces-Rio Grande	Fresh	73	73	73	73	73	73
Livestock Local Supply	Webb	Rio Grande	Fresh	344	344	344	344	344	344
Livestock Local Supply	Zapata	Rio Grande	Fresh	249	249	249	249	249	249
Loma Alta Lake/Reservoir	Reservoir**	Nueces-Rio Grande	Fresh	0	0	0	0	0	0
Nueces-Rio Grande Run-of-River	Cameron	Nueces-Rio Grande	Fresh	3,115	3,115	3,115	3,115	3,115	3,115
Nueces-Rio Grande Run-of-River	Hidalgo	Nueces-Rio Grande	Fresh	37,100	37,100	37,100	37,100	37,100	37,100
Nueces-Rio Grande Run-of-River	Willacy	Nueces-Rio Grande	Fresh	68	68	68	68	68	68
Rio Grande Run-of-River	Maverick	Rio Grande	Fresh	1,988	1,988	1,988	1,988	1,988	1,988

Region M Source Availability Total	2030	2040	2050	2060	2070	2080
Region M Source Availability Total	**1,280,257**	**1,305,898**	**1,321,970**	**1,338,848**	**1,344,307**	**1,344,999**

* Salinity field indicates whether the source availability is considered 'fresh' (less than 1,000 mg/L), 'brackish' (1,000 to 10,000 mg/L), 'saline' (10,001 mg/L to 34,999 mg/L), or 'seawater' (35,000 mg/L or greater). Sources can also be labeled as 'fresh/brackish' or 'brackish/saline', if a combination of the salinity types is appropriate.
** Since reservoir sources can exist across multiple counties, the county field value, 'reservoir' is applied to all reservoir sources.

DRAFT Region M Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Cameron County WUG Total			**255,330**	**255,852**	**256,041**	**256,111**	**256,299**	**256,067**
Cameron County / Nueces-Rio Grande Basin WUG Total			**245,349**	**245,876**	**246,067**	**246,152**	**246,361**	**246,154**
Brownsville	M	Amistad-Falcon Lake/Reservoir System	31,960	31,960	31,960	31,960	31,960	31,960
Brownsville	M	Gulf Coast Aquifer System | Cameron County	9,930	9,931	9,930	9,931	9,931	9,930
Combes	M	Amistad-Falcon Lake/Reservoir System	677	677	677	677	677	677
East Rio Hondo WSC	M	Amistad-Falcon Lake/Reservoir System	4,764	4,764	3,964	3,964	3,964	3,964
East Rio Hondo WSC	M	Gulf Coast Aquifer System | Cameron County	896	896	896	896	896	896
El Jardin WSC	M	Amistad-Falcon Lake/Reservoir System	1,171	1,172	1,172	1,172	1,172	1,172
Harlingen	M	Amistad-Falcon Lake/Reservoir System	19,838	19,837	19,837	19,840	19,840	19,839
Harlingen	M	Direct Reuse	1,120	1,120	1,120	1,120	1,120	1,120
La Feria	M	Amistad-Falcon Lake/Reservoir System	1,300	1,400	1,500	1,700	2,000	2,200
Laguna Madre Water District	M	Amistad-Falcon Lake/Reservoir System	7,513	7,513	7,513	7,513	7,513	7,513
Los Fresnos	M	Amistad-Falcon Lake/Reservoir System	715	715	715	715	715	715
Los Fresnos	M	Gulf Coast Aquifer System | Cameron County	267	267	267	267	267	267
Military Highway WSC	M	Amistad-Falcon Lake/Reservoir System	399	399	399	399	399	399
Military Highway WSC	M	Gulf Coast Aquifer System | Cameron County	1,265	1,265	1,265	1,265	1,265	1,265
Military Highway WSC	M	Gulf Coast Aquifer System | Hidalgo County	2,435	2,435	2,435	2,435	2,435	2,435
North Alamo WSC	M	Amistad-Falcon Lake/Reservoir System	309	304	303	303	303	301
North Alamo WSC	M	Gulf Coast Aquifer System | Cameron County	2	2	2	2	2	2
North Alamo WSC	M	Gulf Coast Aquifer System | Hidalgo County	228	229	230	230	230	231
North Alamo WSC	M	Gulf Coast Aquifer System | Willacy County	22	24	23	23	23	23
Olmito WSC	M	Amistad-Falcon Lake/Reservoir System	1,665	1,665	1,665	1,665	1,665	1,665

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

DRAFT Region M Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Palm Valley	M	Amistad-Falcon Lake/Reservoir System	266	266	266	266	266	266
Primera	M	Amistad-Falcon Lake/Reservoir System	340	340	340	340	340	340
Primera	M	Gulf Coast Aquifer System | Cameron County	205	205	205	205	205	205
Rio Hondo	M	Amistad-Falcon Lake/Reservoir System	617	617	617	617	617	617
San Benito	M	Amistad-Falcon Lake/Reservoir System	3,846	4,346	5,326	5,426	5,626	5,626
Santa Rosa	M	Amistad-Falcon Lake/Reservoir System	612	612	612	612	612	612
Valley MUD 2	M	Amistad-Falcon Lake/Reservoir System	737	737	737	737	737	737
Valley MUD 2	M	Direct Reuse	90	103	103	103	103	103
Valley MUD 2	M	Gulf Coast Aquifer System | Cameron County	340	358	376	394	412	412
County-Other	M	Amistad-Falcon Lake/Reservoir System	1,790	1,790	1,790	1,790	1,790	1,790
County-Other	M	Gulf Coast Aquifer System | Cameron County	20	20	20	20	20	20
Manufacturing	M	Amistad-Falcon Lake/Reservoir System	461	461	461	461	461	461
Manufacturing	M	Gulf Coast Aquifer System | Cameron County	518	518	518	518	518	518
Livestock	M	Amistad-Falcon Lake/Reservoir System	411	411	411	411	411	411
Irrigation	M	Amistad-Falcon Lake/Reservoir System	144,738	144,635	144,530	144,293	143,984	143,580
Irrigation	M	Gulf Coast Aquifer System | Cameron County	817	817	817	817	817	817
Irrigation	M	Nueces-Rio Grande Run-of-River	3,065	3,065	3,065	3,065	3,065	3,065
Cameron County / Rio Grande Basin WUG Total			**9,981**	**9,976**	**9,974**	**9,959**	**9,938**	**9,913**
Brownsville	M	Amistad-Falcon Lake/Reservoir System	323	323	323	323	323	323
Brownsville	M	Gulf Coast Aquifer System | Cameron County	61	60	61	60	60	61
El Jardin WSC	M	Amistad-Falcon Lake/Reservoir System	9	8	8	8	8	8

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

DRAFT Region M Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Military Highway WSC	M	Amistad-Falcon Lake/Reservoir System	3	3	3	3	3	3
Military Highway WSC	M	Gulf Coast Aquifer System | Cameron County	8	8	8	8	8	8
Military Highway WSC	M	Gulf Coast Aquifer System | Hidalgo County	15	15	15	15	15	15
Valley MUD 2	M	Amistad-Falcon Lake/Reservoir System	61	61	61	61	61	61
Valley MUD 2	M	Direct Reuse	8	9	9	9	9	9
Valley MUD 2	M	Gulf Coast Aquifer System | Cameron County	27	28	30	31	32	32
Steam Electric Power	M	Gulf Coast Aquifer System | Cameron County	165	165	165	165	165	165
Livestock	M	Amistad-Falcon Lake/Reservoir System	25	25	25	25	25	25
Irrigation	M	Amistad-Falcon Lake/Reservoir System	9,235	9,230	9,225	9,210	9,188	9,162
Irrigation	M	Gulf Coast Aquifer System | Cameron County	41	41	41	41	41	41
Hidalgo County WUG Total			**402,785**	**403,279**	**401,491**	**401,123**	**400,576**	**399,958**
Hidalgo County / Nueces-Rio Grande Basin WUG Total			**390,830**	**391,341**	**389,563**	**389,210**	**388,689**	**388,094**
Agua SUD	M	Amistad-Falcon Lake/Reservoir System	7,992	7,993	7,994	7,994	7,994	7,995
Alamo	M	Amistad-Falcon Lake/Reservoir System	3,131	3,131	3,131	3,131	3,131	3,131
Alamo	M	Gulf Coast Aquifer System | Hidalgo County	522	522	522	522	522	522
Donna	M	Amistad-Falcon Lake/Reservoir System	3,111	3,111	3,111	3,110	3,110	3,110
Edcouch	M	Amistad-Falcon Lake/Reservoir System	262	262	262	262	262	262
Edinburg	M	Amistad-Falcon Lake/Reservoir System	10,758	10,758	10,758	10,758	10,758	10,758
Elsa	M	Amistad-Falcon Lake/Reservoir System	568	568	568	567	567	567
Hidalgo	M	Amistad-Falcon Lake/Reservoir System	136	136	136	136	135	135
Hidalgo	M	Gulf Coast Aquifer System | Hidalgo County	1,592	1,757	1,757	1,757	1,757	1,757

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

DRAFT Region M Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Hidalgo County MUD 1	M	Amistad-Falcon Lake/Reservoir System	577	577	577	577	576	576
La Joya	M	Amistad-Falcon Lake/Reservoir System	288	288	288	288	288	288
La Villa	M	Amistad-Falcon Lake/Reservoir System	236	236	236	236	236	236
McAllen	M	Amistad-Falcon Lake/Reservoir System	33,544	33,544	31,744	31,744	31,744	31,744
McAllen	M	Direct Reuse	2,251	2,251	2,251	2,251	2,251	2,251
McAllen	M	Gulf Coast Aquifer System | Hidalgo County	1,120	1,120	1,120	1,120	1,120	1,120
Mercedes	M	Amistad-Falcon Lake/Reservoir System	2,267	2,267	2,267	2,267	2,267	2,267
Mercedes	M	Gulf Coast Aquifer System | Hidalgo County	626	626	626	626	626	626
Military Highway WSC	M	Amistad-Falcon Lake/Reservoir System	327	327	327	327	327	327
Military Highway WSC	M	Gulf Coast Aquifer System | Cameron County	1,034	1,034	1,034	1,034	1,034	1,034
Military Highway WSC	M	Gulf Coast Aquifer System | Hidalgo County	1,991	1,991	1,991	1,991	1,991	1,991
Mission	M	Amistad-Falcon Lake/Reservoir System	18,400	18,400	18,399	18,398	18,397	18,395
North Alamo WSC	M	Amistad-Falcon Lake/Reservoir System	11,797	11,836	11,861	11,872	11,882	11,888
North Alamo WSC	M	Gulf Coast Aquifer System | Cameron County	65	66	66	66	66	66
North Alamo WSC	M	Gulf Coast Aquifer System | Hidalgo County	8,132	8,159	8,178	8,191	8,201	8,208
North Alamo WSC	M	Gulf Coast Aquifer System | Willacy County	1,097	1,276	1,297	1,297	1,297	1,297
Pharr	M	Amistad-Falcon Lake/Reservoir System	5,018	5,018	5,018	5,018	5,018	5,018
Pharr	M	Direct Reuse	914	970	1,011	1,031	1,052	1,074
Pharr	M	Gulf Coast Aquifer System | Hidalgo County	1,400	1,400	1,400	1,400	1,400	1,400
San Juan	M	Amistad-Falcon Lake/Reservoir System	2,960	2,960	2,960	2,960	2,960	2,960
San Juan	M	Gulf Coast Aquifer System | Cameron County	662	662	662	662	662	662

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

DRAFT Region M Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
San Juan	M	Gulf Coast Aquifer System | Hidalgo County	1,120	1,120	1,120	1,120	1,120	1,120
Sharyland WSC	M	Amistad-Falcon Lake/Reservoir System	17,073	17,073	17,073	17,073	17,073	17,073
Weslaco	M	Amistad-Falcon Lake/Reservoir System	5,408	5,408	5,408	5,408	5,408	5,408
Weslaco	M	Direct Reuse	770	971	1,052	1,052	1,052	1,052
County-Other	M	Amistad-Falcon Lake/Reservoir System	428	428	428	428	428	428
County-Other	M	Gulf Coast Aquifer System | Hidalgo County	78	78	78	78	78	78
Manufacturing	M	Amistad-Falcon Lake/Reservoir System	2,167	2,167	2,167	2,167	2,167	2,167
Manufacturing	M	Gulf Coast Aquifer System | Hidalgo County	2,500	2,500	2,500	2,500	2,500	2,500
Mining	M	Amistad-Falcon Lake/Reservoir System	1,075	1,070	1,070	1,068	1,065	1,057
Mining	M	Gulf Coast Aquifer System | Hidalgo County	466	466	466	466	466	466
Steam Electric Power	M	Amistad-Falcon Lake/Reservoir System	5,876	5,876	5,876	5,876	5,876	5,876
Steam Electric Power	M	Direct Reuse	3,295	3,295	3,295	3,295	3,295	3,295
Steam Electric Power	M	Gulf Coast Aquifer System | Hidalgo County	1,154	1,154	1,154	1,154	1,154	1,154
Livestock	M	Amistad-Falcon Lake/Reservoir System	4	20	20	20	20	20
Livestock	M	Gulf Coast Aquifer System | Hidalgo County	686	686	686	686	686	686
Irrigation	M	Amistad-Falcon Lake/Reservoir System	220,385	220,216	220,051	219,659	219,103	218,482
Irrigation	M	Gulf Coast Aquifer System | Hidalgo County	5,567	5,567	5,567	5,567	5,567	5,567
Hidalgo County / Rio Grande Basin WUG Total			**11,955**	**11,938**	**11,928**	**11,913**	**11,887**	**11,864**
Agua SUD	M	Amistad-Falcon Lake/Reservoir System	519	519	519	519	519	519
Hidalgo	M	Amistad-Falcon Lake/Reservoir System	1	1	1	1	1	1
Hidalgo	M	Gulf Coast Aquifer System | Hidalgo County	25	25	25	25	25	25

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DRAFT Region M Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
La Joya	M	Amistad-Falcon Lake/Reservoir System	76	76	76	76	76	76
Military Highway WSC	M	Amistad-Falcon Lake/Reservoir System	6	6	6	6	6	6
Military Highway WSC	M	Gulf Coast Aquifer System | Cameron County	20	20	20	20	20	20
Military Highway WSC	M	Gulf Coast Aquifer System | Hidalgo County	39	39	39	39	39	39
County-Other	M	Amistad-Falcon Lake/Reservoir System	1,596	1,596	1,596	1,596	1,596	1,596
County-Other	M	Gulf Coast Aquifer System | Hidalgo County	154	154	154	154	154	154
Manufacturing	M	Amistad-Falcon Lake/Reservoir System	66	66	66	66	66	66
Mining	M	Amistad-Falcon Lake/Reservoir System	8	12	11	10	9	12
Mining	M	Gulf Coast Aquifer System | Hidalgo County	4	4	4	4	4	4
Livestock	M	Amistad-Falcon Lake/Reservoir System	67	51	51	51	51	51
Livestock	M	Gulf Coast Aquifer System | Hidalgo County	20	20	20	20	20	20
Irrigation	M	Amistad-Falcon Lake/Reservoir System	9,122	9,117	9,108	9,094	9,069	9,043
Irrigation	M	Gulf Coast Aquifer System | Hidalgo County	232	232	232	232	232	232
Jim Hogg County WUG Total			**2,396**	**2,396**	**2,396**	**2,396**	**2,396**	**2,396**
Jim Hogg County / Nueces-Rio Grande Basin WUG Total			**2,254**	**2,254**	**2,254**	**2,254**	**2,254**	**2,254**
Jim Hogg County WCID 2	M	Gulf Coast Aquifer System | Jim Hogg County	1,412	1,412	1,412	1,412	1,412	1,412
County-Other	M	Gulf Coast Aquifer System | Jim Hogg County	137	137	137	137	137	137
Manufacturing	M	Gulf Coast Aquifer System | Jim Hogg County	52	52	52	52	52	52
Mining	M	Gulf Coast Aquifer System | Jim Hogg County	9	9	9	9	9	9
Livestock	M	Gulf Coast Aquifer System | Jim Hogg County	105	105	105	105	105	105
Livestock	M	Local Surface Water Supply	257	257	257	257	257	257

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DRAFT Region M Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Irrigation	M	Gulf Coast Aquifer System | Jim Hogg County	282	282	282	282	282	282
Jim Hogg County / Rio Grande Basin WUG Total			**142**	**142**	**142**	**142**	**142**	**142**
County-Other	M	Gulf Coast Aquifer System | Jim Hogg County	16	16	16	16	16	16
Livestock	M	Gulf Coast Aquifer System | Jim Hogg County	60	60	60	60	60	60
Irrigation	M	Gulf Coast Aquifer System | Jim Hogg County	66	66	66	66	66	66
Maverick County WUG Total			**51,544**	**51,514**	**51,485**	**51,413**	**51,248**	**51,133**
Maverick County / Nueces Basin WUG Total			**161**	**161**	**161**	**161**	**97**	**70**
County-Other	M	Amistad-Falcon Lake/Reservoir System	1	1	1	1	1	1
County-Other	M	Carrizo-Wilcox Aquifer | Maverick County	5	5	5	5	5	5
Mining	M	Amistad-Falcon Lake/Reservoir System	27	27	27	27	27	0
Mining	M	Carrizo-Wilcox Aquifer | Maverick County	64	64	64	64	0	0
Livestock	M	Carrizo-Wilcox Aquifer | Maverick County	40	40	40	40	0	0
Livestock	M	Local Surface Water Supply	24	24	24	24	64	64
Maverick County / Rio Grande Basin WUG Total			**51,383**	**51,353**	**51,324**	**51,252**	**51,151**	**51,063**
Eagle Pass	M	Amistad-Falcon Lake/Reservoir System	9,441	9,441	9,441	9,441	9,441	9,441
Eagle Pass	M	Rio Grande Run-of-River	1,180	1,180	1,180	1,180	1,180	1,180
Maverick County	M	Amistad-Falcon Lake/Reservoir System	547	547	547	546	544	543
Maverick County	M	Rio Grande Run-of-River	182	182	182	182	182	182
County-Other	M	Amistad-Falcon Lake/Reservoir System	175	175	175	175	175	175
Manufacturing	M	Amistad-Falcon Lake/Reservoir System	106	106	106	106	106	106
Manufacturing	M	Carrizo-Wilcox Aquifer | Maverick County	3	3	3	3	3	3

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DRAFT Region M Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Mining	M	Amistad-Falcon Lake/Reservoir System	1,203	1,202	1,201	1,199	1,196	1,219
Livestock	M	Local Surface Water Supply	409	409	409	409	409	409
Irrigation	M	Amistad-Falcon Lake/Reservoir System	38,137	38,108	38,080	38,011	37,915	37,805
Starr County WUG Total			**12,356**	**12,359**	**12,361**	**12,361**	**12,353**	**12,341**
Starr County / Nueces-Rio Grande Basin WUG Total			**457**	**457**	**457**	**457**	**456**	**455**
County-Other	M	Gulf Coast Aquifer System | Starr County	103	103	103	103	103	103
Mining	M	Amistad-Falcon Lake/Reservoir System	114	114	114	114	113	112
Livestock	M	Gulf Coast Aquifer System | Starr County	240	240	240	240	240	240
Starr County / Rio Grande Basin WUG Total			**11,899**	**11,902**	**11,904**	**11,904**	**11,897**	**11,886**
Agua SUD	M	Amistad-Falcon Lake/Reservoir System	34	33	32	32	32	31
El Sauz WSC	M	Amistad-Falcon Lake/Reservoir System	105	105	105	105	105	105
El Tanque WSC	M	Amistad-Falcon Lake/Reservoir System	177	177	177	177	177	177
La Grulla	M	Amistad-Falcon Lake/Reservoir System	593	593	593	593	593	593
Rio Grande City	M	Amistad-Falcon Lake/Reservoir System	3,488	3,488	3,488	3,488	3,488	3,488
Rio WSC	M	Amistad-Falcon Lake/Reservoir System	616	616	616	616	616	616
Roma	M	Amistad-Falcon Lake/Reservoir System	2,732	2,732	2,732	2,732	2,732	2,732
Union WSC	M	Amistad-Falcon Lake/Reservoir System	542	542	542	542	542	542
County-Other	M	Gulf Coast Aquifer System | Starr County	185	185	185	185	185	185
County-Other	M	Yegua-Jackson Aquifer | Starr County	33	38	43	48	48	48
Manufacturing	M	Gulf Coast Aquifer System | Starr County	96	96	96	96	96	96
Mining	M	Amistad-Falcon Lake/Reservoir System	55	55	55	55	55	55

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DRAFT Region M Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Mining	M	Gulf Coast Aquifer System | Starr County	57	57	57	57	57	57
Livestock	M	Gulf Coast Aquifer System | Starr County	687	687	687	687	687	687
Livestock	M	Local Surface Water Supply	75	75	75	75	75	75
Irrigation	M	Amistad-Falcon Lake/Reservoir System	2,304	2,303	2,301	2,296	2,289	2,279
Irrigation	M	Gulf Coast Aquifer System | Starr County	120	120	120	120	120	120
Webb County WUG Total			**74,994**	**75,011**	**75,028**	**75,026**	**75,016**	**74,975**
Webb County / Nueces Basin WUG Total			**2,719**	**2,728**	**2,739**	**2,744**	**2,750**	**2,718**
Webb County	M	Amistad-Falcon Lake/Reservoir System	265	265	265	266	265	265
County-Other	M	Gulf Coast Aquifer System | Webb County	6	6	6	6	6	6
County-Other	M	Yegua-Jackson Aquifer | Webb County	6	6	6	6	6	6
Manufacturing	M	Amistad-Falcon Lake/Reservoir System	20	20	20	20	20	20
Manufacturing	M	Carrizo-Wilcox Aquifer | Webb County	44	44	44	44	44	44
Mining	M	Amistad-Falcon Lake/Reservoir System	1,862	1,860	1,859	1,855	1,849	1,819
Mining	M	Carrizo-Wilcox Aquifer | Webb County	29	29	29	29	29	29
Mining	M	Gulf Coast Aquifer System | Webb County	103	114	126	134	147	145
Livestock	M	Local Surface Water Supply	384	384	384	384	384	384
Webb County / Nueces-Rio Grande Basin WUG Total			**224**	**224**	**224**	**224**	**223**	**223**
County-Other	M	Gulf Coast Aquifer System | Webb County	121	121	121	121	120	120
Livestock	M	Gulf Coast Aquifer System | Webb County	30	30	30	30	30	30
Livestock	M	Local Surface Water Supply	73	73	73	73	73	73

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DRAFT Region M Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Webb County / Rio Grande Basin WUG Total			**72,051**	**72,059**	**72,065**	**72,058**	**72,043**	**72,034**
Laredo	M	Amistad-Falcon Lake/Reservoir System	59,201	59,201	59,201	59,201	59,201	59,201
Laredo	M	Direct Reuse	773	773	773	773	773	773
Mirando City WSC	M	Gulf Coast Aquifer System | Webb County	70	70	70	70	70	70
Webb County	M	Amistad-Falcon Lake/Reservoir System	2,046	2,046	2,046	2,045	2,046	2,046
County-Other	M	Carrizo-Wilcox Aquifer | Webb County	20	20	20	20	20	20
County-Other	M	Gulf Coast Aquifer System | Webb County	19	19	19	19	15	15
County-Other	M	Yegua-Jackson Aquifer | Webb County	107	107	107	107	107	107
Manufacturing	M	Amistad-Falcon Lake/Reservoir System	83	83	83	83	83	83
Mining	M	Amistad-Falcon Lake/Reservoir System	2,275	2,274	2,272	2,268	2,261	2,275
Mining	M	Carrizo-Wilcox Aquifer | Webb County	63	63	63	63	63	63
Mining	M	Gulf Coast Aquifer System | Webb County	122	136	149	160	174	176
Steam Electric Power	M	Amistad-Falcon Lake/Reservoir System	131	131	131	131	131	131
Livestock	M	Amistad-Falcon Lake/Reservoir System	50	50	50	50	50	50
Livestock	M	Gulf Coast Aquifer System | Webb County	5	5	5	5	5	5
Livestock	M	Local Surface Water Supply	344	344	344	344	344	344
Irrigation	M	Amistad-Falcon Lake/Reservoir System	6,742	6,737	6,732	6,719	6,700	6,675
Willacy County WUG Total			**26,472**	**26,396**	**26,240**	**26,179**	**26,106**	**26,035**
Willacy County / Nueces-Rio Grande Basin WUG Total			**26,472**	**26,396**	**26,240**	**26,179**	**26,106**	**26,035**
Lyford	M	Amistad-Falcon Lake/Reservoir System	588	588	588	588	588	588
North Alamo WSC	M	Amistad-Falcon Lake/Reservoir System	409	375	350	337	325	317
North Alamo WSC	M	Gulf Coast Aquifer System | Cameron County	3	2	2	2	2	2

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

DRAFT Region M Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
North Alamo WSC	M	Gulf Coast Aquifer System | Hidalgo County	320	292	272	259	249	241
North Alamo WSC	M	Gulf Coast Aquifer System | Willacy County	23	24	24	24	24	24
Port Mansfield PUD	M	Amistad-Falcon Lake/Reservoir System	98	98	98	98	98	98
Raymondville	M	Amistad-Falcon Lake/Reservoir System	3,402	3,402	3,402	3,402	3,402	3,402
Raymondville	M	Gulf Coast Aquifer System | Willacy County	4	5	5	5	5	5
Sebastian MUD	M	Amistad-Falcon Lake/Reservoir System	204	204	204	204	204	204
County-Other	M	Amistad-Falcon Lake/Reservoir System	486	486	486	485	485	485
County-Other	M	Gulf Coast Aquifer System | Willacy County	561	561	561	561	561	561
Mining	M	Gulf Coast Aquifer System | Willacy County	2	2	2	2	2	2
Livestock	M	Amistad-Falcon Lake/Reservoir System	235	235	140	140	140	140
Livestock	M	Gulf Coast Aquifer System | Willacy County	74	74	74	74	74	74
Irrigation	M	Amistad-Falcon Lake/Reservoir System	19,982	19,967	19,951	19,917	19,866	19,811
Irrigation	M	Gulf Coast Aquifer System | Willacy County	81	81	81	81	81	81
Zapata County WUG Total			**5,562**	**5,561**	**5,560**	**5,557**	**5,554**	**5,548**
Zapata County / Rio Grande Basin WUG Total			**5,562**	**5,561**	**5,560**	**5,557**	**5,554**	**5,548**
Falcon Rural WSC	M	Amistad-Falcon Lake/Reservoir System	309	309	309	309	309	309
Siesta Shores WCID	M	Amistad-Falcon Lake/Reservoir System	363	363	363	363	363	363
Zapata County	M	Amistad-Falcon Lake/Reservoir System	2,334	2,334	2,334	2,334	2,334	2,334
Zapata County San Ygnacio & Ramireño	M	Amistad-Falcon Lake/Reservoir System	284	284	284	284	284	284
Zapata County WCID-Hwy 16 East	M	Amistad-Falcon Lake/Reservoir System	502	502	502	502	502	502
County-Other	M	Amistad-Falcon Lake/Reservoir System	63	63	63	63	63	63

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DRAFT Region M Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
County-Other	M	Yegua-Jackson Aquifer | Zapata County	117	117	117	117	117	117
Mining	M	Amistad-Falcon Lake/Reservoir System	6	6	6	6	6	6
Mining	M	Yegua-Jackson Aquifer | Zapata County	2	2	2	2	2	2
Livestock	M	Local Surface Water Supply	145	145	145	145	145	145
Livestock	M	Yegua-Jackson Aquifer | Zapata County	214	214	214	214	214	214
Irrigation	M	Amistad-Falcon Lake/Reservoir System	1,143	1,142	1,141	1,138	1,135	1,129
Irrigation	M	Yegua-Jackson Aquifer | Zapata County	80	80	80	80	80	80
Region M WUG Existing Water Supply Total			**831,439**	**832,368**	**830,602**	**830,166**	**829,548**	**828,453**

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

Appendix 3B. Hydrologic Variance Documentation

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

November 9, 2023

Mr. James Darling
Chair
Region M Regional Water Planning Group
c/o Rio Grande Regional Water Authority
322 S. Missouri Ave
Weslaco, TX 78596

Dear Chairman Darling:

I have reviewed your request dated August 31, 2023, for approval of alternative water supply assumptions to be used in determining existing and future surface water availability. This letter confirms that the TWDB approves the following assumptions:

1. Incorporate updated water rights as of July 2023 in the Rio Grande WAM in the assessment of existing and future supply.

2. Use modified irrigation patterns above Fort Quitman in the Rio Grande WAM so that diversions only occur from March through October in the assessment of existing and future supply.

3. Model the San Solomon Springs as cut off from the rest of the basin in the Rio Grande WAM in the assessment of existing and future supply.

4. Estimate source water available for a reuse water management strategy based on the estimated amount of water returned to a utility's wastewater treatment plant for each decade, less the amount of reuse water already being utilized as existing supply. The amount of water returned to a utility's wastewater treatment plant will be estimated at 50% of the utility's projected water demands, adjusted for water conservation and drought management strategies, unless site-specific information is available. This method will be applied in the Rio Grande WAM and the Nueces-Rio Grande Coastal Basin WAM in the assessment of future reuse supply.

5. Incorporate updated water rights as of July 2023 in the Nueces-Rio Grande Coastal Basin WAM in the assessment of existing and future supply.

6. Modify the priority dates for the three reservoirs included in the Delta Region Water Management Strategy when assessing strategy supply using the Nueces-Rio Grande Coastal Basin WAM.

While the use of these modified conditions may be reasonable for planning purposes, WAM RUN3 would be utilized by the Texas Commission on Environmental Quality for analyzing permit applications. It is acceptable to use the modified conditions for WMS supply evaluations only if the yield produced is more conservative (less) for surface water appropriations than WAM RUN3.

While the TWDB authorizes these modification to evaluate existing and future water supplies for development of the 2026 Region M 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 512-771-8797 or kevin.smith@twdb.texas.gov if you have any questions.

Sincerely,

Jeff Walker Digitally signed by Jeff Walker
Date: 2023.11.16 09:21:01
-06'00'

Jeff Walker
Executive Administrator

c: Manuel Cruz, Lower Rio Grande Valley Development Council
Jaime Burke, P.E., Black & Veatch, Corp.
Jennifer Jackson, WSP (Region E)
Kevin Smith, Water Supply Planning
Nelun Fernando, Ph.D., Surface Water

RIO GRANDE
REGIONAL WATER PLANNING GROUP

August 31, 2023

Mr. Jeff Walker
Executive Administrator
Texas Water Development Board
P.O. Box 13231
1700 North Congress Avenue
Austin, Texas 78711-3231

Subject: Submittal of hydrologic variance checklists by the Rio Grande Regional Water Planning Group (Region M)

Dear Mr. Walker:

The Rio Grande Regional Water Planning Group (RGRWPG) approved hydrologic assumptions and needed hydrologic variances for submittal to the TWDB at the August 2, 2023, RGRWPG meeting. The RGRWPG's hydrologic variance checklists for the Rio Grande Basin and the Nueces-Rio Grande Basin are attached for your consideration.

We appreciate your consideration of this request. Should you have any questions regarding this submittal, please contact our Consultant, Jaime Burke, via phone at (512) 271-4472 or via email at burkej@bv.com. If further evaluation is necessary, the RGRWPG would welcome the TWDB's support in this effort.

Very Truly Yours,

James Darling

James Darling, Chairman
Rio Grande Regional Water Planning Group

Enclosures: Hydrologic Variance Checklists for Rio Grande and Nueces-Rio Grande (PDF)

C: Mr. Kevin Smith, TWDB (electronically)
Mr. Manuel Cruz, LRGVDC (electronically)

Administrative Agent: Lower Rio Grande Valley Development Council, Manuel Cruz, Executive Director
301 W Railroad – Weslaco, Texas 78596
Telephone: 956-682-3481 Fax: 956-631-4670 Website: riograndewaterplan.org

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: M

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.

   Rio-Grande 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.

   - Updated water rights data as of July 2023 will be incorporated into the WAM, as available.
     a. This variance provides more up-to-date data for the model.
   - The Rio Grande WAM will be run to be consistent with Region E with respect to the following:
     a. Irrigation demand patterns above Fort Quitman will be modified so that diversions only occur March through October, which is consistent with the operations of the Rio Grande Project. This demand pattern change does not have a discernible impact on the firm yield of the Amistad-Falcon system in Region M.
     b. Modeling the San Solomon Springs (within Region E) to be cut off from the rest of the basin (impact to Region F). This should not have a discernible impact on the firm yield of the Amistad-Falcon system in Region M.

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

- Source water available for a reuse water management strategy will be determined based on the estimated amount of water returned to a utility's WWTPs for each decade, less the amount of reuse water already being utilized as existing supply.
  a. The amount of water returned to a utility's WWTP will be estimated at 50% of the utility's projected water demands, adjusted for water conservation and drought management strategies, unless site-specific information is available.

      i. Direct Reuse does not require WAM modeling, since there are no return flows
      ii. Indirect Reuse would be entered as a return flow to assess downstream availability

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

   These variances were requested last cycle, with the exception of the San Solomon Springs cut off variance. Region E let us know about that variance this cycle, and we thought we should include it as well for consistency.

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 and Strategy Supply

   - Sedimentation will be incorporated for major reservoirs for 2030 and 2080, based on IBWC data, and the decades in between will be interpolated.
   - Updated water rights data as of July 2023 will be incorporated into the Rio Grande WAM, as available.
   - The Rio Grande WAM will be run to be consistent with Region E with respect to the following:
     a. Irrigation demand patterns above Fort Quitman will be modified so that diversions only occur March through October, which is consistent with the operations of the Rio Grande Project. This demand pattern change does not have a discernible impact on the firm yield of the Amistad-Falcon system in Region M.
     b. Modeling the San Solomon Springs (within Region E) to be cut off from the rest of the basin (impact to Region F). This should not have a discernible impact on the firm yield of the Amistad-Falcon system in Region M.

   - Source water available for a reuse water management strategy will be determined based on the estimated amount of water returned to a utility's WWTPs for each decade, less the amount of reuse water already being utilized as existing supply.

[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.

a. The amount of water returned to a utility's WWTP will be estimated at 50% of the utility's projected water demands, adjusted for water conservation and drought management strategies, unless site-specific information is available.

   i. Direct Reuse does not require WAM modeling, since there are no return flows
   ii. Indirect Reuse would be entered as a return flow to assess downstream availability

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.

   Yes

   Strategy Supply

   a. The amount of water returned to a utility's WWTP will be estimated at 50% of the utility's projected water demands, adjusted for water conservation and drought management strategies, unless site-specific information is available.

      i. Direct Reuse does not require WAM modeling, since there are no return flows
      ii. Indirect Reuse would be entered as a return flow to assess downstream availability

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.

    Yes

    Region E, as described above.

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: M

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.

   Nueces-Rio Grande Coastal 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.

   - Updated water rights data as of July 2023 will be incorporated into the WAM, as available.
     a. This variance provides more up-to-date data for the model.
   - When modeling the Delta Region Water Management Strategy using the Nueces-Rio Grande Coastal Basin WAM, the priority dates for the three reservoirs will be modified to reflect one or more reservoirs as senior, and the others as more junior, with respect to one another.
     a. This variance allowed for better analysis of how the reservoirs could be operated to obtain the most storage.
   - Source water available for a reuse water management strategy will be determined based on the estimated amount of water returned to a utility's WWTPs for each decade, less the amount of reuse water already being utilized as existing supply.

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

a. The amount of water returned to a utility's WWTP will be estimated at 50% of the utility's projected water demands, adjusted for water conservation and drought management strategies, unless site-specific information is available.

i. Direct Reuse does not require WAM modeling, since there are no return flows
ii. Indirect Reuse would be entered as a return flow to assess downstream availability

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

   This was included as part of an Amendment to the 2021 Region M Plan submitted in 2022.

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 and Strategy Supply

- Updated water rights data as of July 2023 will be incorporated into the WAM, as available.
    a. This variance provides more up-to-date data for the model.
- When modeling the Delta Region Water Management Strategy using the Nueces-Rio Grande Coastal Basin WAM, the priority dates for the three reservoirs will be modified to reflect one or more reservoirs as senior, and the others as more junior, with respect to one another. (Strategy only)
    a. This variance allowed for better analysis of how the reservoirs could be operated to obtain the most storage.
- Source water available for a reuse water management strategy will be determined based on the estimated amount of water returned to a utility's WWTPs for each decade, less the amount of reuse water already being utilized as existing supply. (Strategy only)
    a. The amount of water returned to a utility's WWTP will be estimated at 50% of the utility's projected water demands, adjusted for water conservation and drought management strategies, unless site-specific information is available.

        i. Direct Reuse does not require WAM modeling, since there are no return flows
        ii. Indirect Reuse would be entered as a return flow to assess downstream availability
- Because there are no major reservoirs in this basin, no sedimentation will be incorporated.

[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.

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.

   Yes

   Strategy Supply

   - Source water available for a reuse water management strategy will be determined based on the estimated amount of water returned to a utility's WWTPs for each decade, less the amount of reuse water already being utilized as existing supply.
     a. The amount of water returned to a utility's WWTP will be estimated at 50% of the utility's projected water demands, adjusted for water conservation and drought management strategies, unless site-specific information is available.

        i. Direct Reuse does not require WAM modeling, since there are no return flows
        ii. Indirect Reuse would be entered as a return flow to assess downstream availability

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.

    No

    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.

Appendix 3C. Rio Grande Active Water Rights

WR No	WR Issue Date	Amend	Owners	Divert Amt	Use	Prio Class	Basin	County
27	9/7/1971		Agua Special Utility District	125	INDUSTRIAL INDUSTRIAL - POWER GENERATION MUNICIPAL/DOMESTIC WATER QUALITY	M	Rio Grande	MULTIPLE
81	9/7/1971		Agua Special Utility District	2415.948	MUNICIPAL/DOMESTIC	M	Rio Grande	STARR
294	9/10/1971		Agua Special Utility District	375	INDUSTRIAL INDUSTRIAL - POWER GENERATION MUNICIPAL/DOMESTIC	M	Rio Grande	CAMERON
319	9/13/1971		Agua Special Utility District	0.575	AGRICULTURE - IRRIGATION	A	Rio Grande	HIDALGO
423	9/20/1971	H	Agua Special Utility District	100	MUNICIPAL/DOMESTIC	M	Rio Grande	MULTIPLE
521	9/23/1971		Agua Special Utility District	250	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
571	9/27/1971	C	Agua Special Utility District	98.4	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
832	10/15/1971	E	Agua Special Utility District	1000	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
835	10/15/1971		Bayview Irrigation District 11	16898.39	AGRICULTURE - IRRIGATION MINING	A	Rio Grande	MULTIPLE
843	10/15/1971	G	Brownsville Irrigation District	31949.45	AGRICULTURE - IRRIGATION	A	Rio Grande	CAMERON
843	10/15/1971	G	Brownsville Irrigation District	3834	MUNICIPAL/DOMESTIC	M	Rio Grande	CAMERON
82	9/7/1971		Brownsville Navigation District	62.5	AGRICULTURE - IRRIGATION	B	Rio Grande	CAMERON
83	9/7/1971		Brownsville Navigation District	62.5	AGRICULTURE - IRRIGATION	B	Rio Grande	CAMERON
51	9/7/1971		Cameron County Irrigation District 2	13.725	AGRICULTURE - IRRIGATION	B	Rio Grande	CAMERON
841	10/18/1971		Cameron County Irrigation District 2	192	INDUSTRIAL	M	Rio Grande	CAMERON
841	10/18/1971		Cameron County Irrigation District 2	8677.768	MUNICIPAL/DOMESTIC	M	Rio Grande	CAMERON

WR No	WR Issue Date	Amend	Owners	Divert Amt	Use	Prio Class	Basin	County
841	10/18/1971	F	Cameron County Irrigation District 2	151536.2	AGRICULTURE - IRRIGATION	A	Rio Grande	CAMERON
829	10/15/1971	E	Cameron County Irrigation District 6	48398.52	AGRICULTURE - IRRIGATION MINING	A	Rio Grande	MULTIPLE
829	10/15/1971		Cameron County Irrigation District 6	20	INDUSTRIAL	M	Rio Grande	MULTIPLE
829	10/15/1971	E	Cameron County Irrigation District 6	208	MUNICIPAL/DOMESTIC	M	Rio Grande	MULTIPLE
834	10/15/1971	C	Cameron County Water Improvement District 10	7501.049	AGRICULTURE - IRRIGATION	A	Rio Grande	CAMERON
834	10/15/1971	C	Cameron County Water Improvement District 10	35	AGRICULTURE - IRRIGATION MINING	A	Rio Grande	CAMERON
843	10/15/1971		City of Alamo	83	MUNICIPAL/DOMESTIC	M	Rio Grande	CAMERON
875	10/7/1971		City of Donna	480	AGRICULTURE - IRRIGATION	A	Rio Grande	HIDALGO
124	9/7/1971		City of Eagle Pass	22.5	AGRICULTURE - IRRIGATION	B	Rio Grande	MAVERICK
3998	8/14/1985	O	City of Eagle Pass Water Works System	9391.425	MUNICIPAL/DOMESTIC	M	Rio Grande	MAVERICK
3998	8/14/1985		City of Eagle Pass Water Works System	53	AGRICULTURE - IRRIGATION	A	Rio Grande	MAVERICK
3998	8/14/1985		City of Eagle Pass Water Works System	50	INDUSTRIAL MUNICIPAL/DOMESTIC	M	Rio Grande	MAVERICK
825	10/15/1971		City of Edcouch	225.925	AGRICULTURE - IRRIGATION	A	Rio Grande	HIDALGO
421	9/16/1971		City of Edinburg	10.37	AGRICULTURE - IRRIGATION	B	Rio Grande	MULTIPLE
801	10/6/1971		City of Edinburg	2591.32	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
826	10/15/1971		City of Elsa	697.6	AGRICULTURE - IRRIGATION	A	Rio Grande	HIDALGO
302	9/10/1971		City Of Hidalgo	311.25	AGRICULTURE - IRRIGATION	A	Rio Grande	HIDALGO
36	9/7/1971		City of La Grulla	54	AGRICULTURE - IRRIGATION	B	Rio Grande	MULTIPLE

WR No	WR Issue Date	Amend	Owners	Divert Amt	Use	Prio Class	Basin	County
190	9/7/1971		City of La Grulla	35	AGRICULTURE - IRRIGATION	B	Rio Grande	STARR
236	9/7/1971		City of La Grulla	7.152	MUNICIPAL/DOMESTIC	M	Rio Grande	CAMERON
264	9/7/1971	C	City of La Grulla	2.5	MUNICIPAL/DOMESTIC	M	Rio Grande	STARR
767	10/5/1971		City of La Grulla	1	AGRICULTURE - IRRIGATION	B	Rio Grande	STARR
787	10/6/1971		City of La Grulla	31.25	AGRICULTURE - IRRIGATION	B	Rio Grande	MULTIPLE
863	10/20/1971		City of La Grulla	551.8632	MUNICIPAL/DOMESTIC	M	Rio Grande	STARR
864	10/20/1971		City of La Joya	12.5	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
827	10/15/1971		City Of La Villa	62.5	AGRICULTURE - IRRIGATION	A	Rio Grande	HIDALGO
601	9/28/1971		City of Laredo	1287	AGRICULTURE - IRRIGATION	A	Rio Grande	STARR
601	9/28/1971		City of Laredo	1029.98	AGRICULTURE - IRRIGATION	B	Rio Grande	STARR
2698	8/15/1983		City of Laredo	500	AGRICULTURE - IRRIGATION	A	Rio Grande	WEBB
2761	8/15/1983		City of Laredo	166.65	AGRICULTURE - IRRIGATION	A	Rio Grande	WEBB
2761	8/15/1983		City of Laredo	58.3275	AGRICULTURE - IRRIGATION	B	Rio Grande	WEBB
2774	8/15/1983	A	City of Laredo	157	AGRICULTURE - IRRIGATION	B	Rio Grande	WEBB
2777	8/15/1983		City of Laredo	1279	AGRICULTURE - IRRIGATION	B	Rio Grande	MULTIPLE
3997	8/14/1985	CD	City of Laredo	49489.91	MUNICIPAL/DOMESTIC	M	Rio Grande	WEBB
3997	8/14/1985		City of Laredo		MUNICIPAL/DOMESTIC	M	Rio Grande	WEBB
3997	8/14/1985		City of Laredo		MUNICIPAL/DOMESTIC	M	Rio Grande	WEBB
3997	8/14/1985		City of Laredo		MUNICIPAL/DOMESTIC	M	Rio Grande	WEBB

WR No	WR Issue Date	Amend	Owners	Divert Amt	Use	Prio Class	Basin	County
3997	8/14/1985		City of Laredo	10915.26	INDUSTRIAL MUNICIPAL/DOMESTIC	M	Rio Grande	WEBB
853	10/19/1971		City of Los Fresnos	1051.405	MUNICIPAL/DOMESTIC	M	Rio Grande	CAMERON
821	10/14/1971		City of Lyford	370.325	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
353	9/13/1971		City of McAllen	678.84	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
848	10/18/1971		City of McAllen	550	MUNICIPAL/DOMESTIC	M	Rio Grande	MULTIPLE
823	10/14/1971		City of Mercedes	1015	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
580	9/27/1971		City of Mission	65	AGRICULTURE - IRRIGATION	B	Rio Grande	HIDALGO
581	9/28/1971		City of Mission	10	MUNICIPAL/DOMESTIC	B	Rio Grande	HIDALGO
806	10/7/1971		City of Mission	140.91	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
806	10/7/1971		City of Mission	1364.51	INDUSTRIAL MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
828	10/15/1971		City of Mission	1250	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
845	10/18/1971		City of Mission	214.6625	MUNICIPAL/DOMESTIC	A	Rio Grande	HIDALGO
808	10/7/1971		City of Pharr	1764	MUNICIPAL/DOMESTIC	M	Rio Grande	MULTIPLE
874	10/7/1971		City of Pharr	1185.88	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
2727	8/15/1983		City of Pharr	1500	AGRICULTURE - IRRIGATION INDUSTRIAL INDUSTRIAL - POWER GENERATION MINING MUNICIPAL/DOMESTIC WATER QUALITY	M	Rio Grande	WEBB
855	10/19/1971	A	City of Primera	400	MUNICIPAL/DOMESTIC	M	Rio Grande	CAMERON

WR No	WR Issue Date	Amend	Owners	Divert Amt	Use	Prio Class	Basin	County
822	10/14/1971		City of Raymondville	223.95	AGRICULTURE - IRRIGATION	A	Rio Grande	HIDALGO
464	9/22/1971		City of Rio Grande City	51.375	AGRICULTURE - IRRIGATION	B	Rio Grande	HIDALGO
711	10/1/1971		City of Rio Grande City	33.75	AGRICULTURE - IRRIGATION	B	Rio Grande	MULTIPLE
851	10/19/1971	N	City of Rio Grande City	3151.458	MUNICIPAL/DOMESTIC	M	Rio Grande	STARR
814	1/31/1972		City of Roma	3352.18	MUNICIPAL/DOMESTIC	M	Rio Grande	STARR
841	10/18/1971		City of San Benito	1532	MUNICIPAL/DOMESTIC	M	Rio Grande	CAMERON
386	9/17/1971		City of San Juan	75	AGRICULTURE - IRRIGATION	B	Rio Grande	HIDALGO
573	9/27/1971		City of San Juan	73.418	AGRICULTURE - IRRIGATION	B	Rio Grande	WEBB
873	10/7/1971		City of San Juan	316.275	MUNICIPAL/DOMESTIC	M	Rio Grande	STARR
812	1/31/1972	J	City of Weslaco	128.79	MUNICIPAL/DOMESTIC	M	Rio Grande	MULTIPLE
824	3/29/1973		City of Weslaco	736.25	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
809	10/8/1971	BR	Delta Lake Irrigation District	50	AGRICULTURE - IRRIGATION MINING RECREATION INDUSTRIAL	A	Rio Grande	MULTIPLE
811	10/8/1971	D	Delta Lake Irrigation District	1230	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
811	10/8/1971		Delta Lake Irrigation District	610	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
811	10/8/1971		Delta Lake Irrigation District	600	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
811	10/8/1971		Delta Lake Irrigation District	5670	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
811	10/8/1971	F	Delta Lake Irrigation District	175026.4	AGRICULTURE - IRRIGATION	A	Rio Grande	HIDALGO
811	10/8/1971	E	Delta Lake Irrigation District	451.789	AGRICULTURE - IRRIGATION	B	Rio Grande	HIDALGO

WR No	WR Issue Date	Amend	Owners	Divert Amt	Use	Prio Class	Basin	County
805	10/7/1971		Donna Irrigation District Hidalgo County 1	2690	DOMESTIC AND LIVESTOCK	M	Rio Grande	HIDALGO
805	10/7/1971		Donna Irrigation District Hidalgo County 1	4190	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
805	10/7/1971		Donna Irrigation District Hidalgo County 1	91863.6	AGRICULTURE - IRRIGATION	A	Rio Grande	HIDALGO
834	10/15/1971		East Rio Hondo Water Supply Corporation	28.495	AGRICULTURE - IRRIGATION	A	Rio Grande	CAMERON
835	10/15/1971		East Rio Hondo Water Supply Corporation	79.64	AGRICULTURE - IRRIGATION MINING	A	Rio Grande	MULTIPLE
838	10/15/1971	AB	East Rio Hondo Water Supply Corporation	3835.781	INDUSTRIAL MUNICIPAL/DOMESTIC	M	Rio Grande	CAMERON
699	10/1/1971	B	Falcon Rural Water Supply Corp	164	MUNICIPAL/DOMESTIC	M	Rio Grande	STARR
699	10/1/1971	B	Falcon Rural Water Supply Corp	85	MUNICIPAL/DOMESTIC	M	Rio Grande	STARR
831	10/15/1971	P	Harlingen Irrigation District Cameron County 1	856.065	INDUSTRIAL MUNICIPAL/DOMESTIC	M	Rio Grande	CAMERON
831	10/15/1971	O	Harlingen Irrigation District Cameron County 1	110277.4	AGRICULTURE - IRRIGATION	A	Rio Grande	CAMERON
831	10/15/1971	O	Harlingen Irrigation District Cameron County 1	4375	AGRICULTURE - IRRIGATION	A	Rio Grande	CAMERON
19	9/7/1971	A	HARLINGEN WATERWORKS SYSTEM	98.75	AGRICULTURE - IRRIGATION	B	Rio Grande	CAMERON
831	10/15/1971	Q	HARLINGEN WATERWORKS SYSTEM	22569.65	MUNICIPAL/DOMESTIC	M	Rio Grande	CAMERON
831	10/15/1971		HARLINGEN WATERWORKS SYSTEM	1712.438	AGRICULTURE - IRRIGATION	A	Rio Grande	CAMERON
834	10/15/1971	B	HARLINGEN WATERWORKS SYSTEM	1625	AGRICULTURE - IRRIGATION	A	Rio Grande	CAMERON
840	10/15/1971		HARLINGEN WATERWORKS SYSTEM	116.325	AGRICULTURE - IRRIGATION	A	Rio Grande	CAMERON
452	9/20/1971		Hidalgo & Cameron Counties Irrigation District 9	58.75	AGRICULTURE - IRRIGATION	B	Rio Grande	HIDALGO
812	1/31/1972	H	Hidalgo & Cameron Counties Irrigation District 9	3174.21	INDUSTRIAL MUNICIPAL/DOMESTIC	M	Rio Grande	MULTIPLE

WR No	WR Issue Date	Amend	Owners	Divert Amt	Use	Prio Class	Basin	County
812	1/31/1972		Hidalgo & Cameron Counties Irrigation District 9	2580	MUNICIPAL/DOMESTIC	M	Rio Grande	MULTIPLE
812	1/31/1972	H	Hidalgo & Cameron Counties Irrigation District 9	7194	MUNICIPAL/DOMESTIC	M	Rio Grande	MULTIPLE
812	1/31/1972		Hidalgo & Cameron Counties Irrigation District 9	1340	MUNICIPAL/DOMESTIC	M	Rio Grande	MULTIPLE
812	1/31/1972		Hidalgo & Cameron Counties Irrigation District 9	1840	MUNICIPAL/DOMESTIC	M	Rio Grande	MULTIPLE
812	1/31/1972		Hidalgo & Cameron Counties Irrigation District 9	500	MUNICIPAL/DOMESTIC	M	Rio Grande	MULTIPLE
812	1/31/1972		Hidalgo & Cameron Counties Irrigation District 9	169486.6	AGRICULTURE - IRRIGATION	A	Rio Grande	MULTIPLE
804	10/7/1971		Hidalgo County Irrigation District 1	1625	AGRICULTURE - IRRIGATION	A	Rio Grande	MULTIPLE
816	10/18/1971		Hidalgo County Irrigation District 1	2423	INDUSTRIAL MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
816	10/18/1971	H	Hidalgo County Irrigation District 1	20919	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
816	10/18/1971		Hidalgo County Irrigation District 1	814	INDUSTRIAL MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
816	10/18/1971	H	Hidalgo County Irrigation District 1	51773	AGRICULTURE - IRRIGATION	A	Rio Grande	HIDALGO
2914	3/26/1974		Hidalgo County Irrigation District 1		AGRICULTURE - IRRIGATION		Rio Grande	HIDALGO
810	10/8/1971		Hidalgo County Irrigation District 13	4356.85	AGRICULTURE - IRRIGATION	A	Rio Grande	MULTIPLE
802	10/8/1971		Hidalgo County Irrigation District 16	600	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
802	10/8/1971		Hidalgo County Irrigation District 16	100	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
802	10/8/1971		Hidalgo County Irrigation District 16	30748.85	AGRICULTURE - IRRIGATION	A	Rio Grande	HIDALGO
802	10/8/1971		Hidalgo County Irrigation District 16	200	MINING	A	Rio Grande	HIDALGO
808	10/7/1971	K	Hidalgo County Irrigation District 2	130500	AGRICULTURE - IRRIGATION MINING	A	Rio Grande	MULTIPLE

WR No	WR Issue Date	Amend	Owners	Divert Amt	Use	Prio Class	Basin	County
808	10/7/1971	L	Hidalgo County Irrigation District 2	14087.77	MUNICIPAL/DOMESTIC	M	Rio Grande	MULTIPLE
808	10/7/1971		Hidalgo County Irrigation District 2	13273	INDUSTRIAL MUNICIPAL/DOMESTIC	M	Rio Grande	MULTIPLE
808	10/7/1971	M	Hidalgo County Irrigation District 2	4200	AGRICULTURE - IRRIGATION	A	Rio Grande	MULTIPLE
813	10/14/1971		Hidalgo County Irrigation District 5	14234.63	AGRICULTURE - IRRIGATION	A	Rio Grande	HIDALGO
813	10/14/1971	A	Hidalgo County Irrigation District 5	402.5	AGRICULTURE - IRRIGATION	B	Rio Grande	HIDALGO
828	10/15/1971	J	Hidalgo County Irrigation District 6	9816	INDUSTRIAL MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
828	10/15/1971	J	Hidalgo County Irrigation District 6	26913	AGRICULTURE - IRRIGATION MINING	A	Rio Grande	HIDALGO
833	10/15/1971	F	Hidalgo County Municipal Utility District 1	700.25	AGRICULTURE - IRRIGATION	B	Rio Grande	HIDALGO
833	10/15/1971	F	Hidalgo County Municipal Utility District 1	630.5853	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
832	10/15/1971		Hidalgo County Water Control and Improvement District 18	99.3548	AGRICULTURE - IRRIGATION MINING	B	Rio Grande	HIDALGO
806	10/7/1971		Hidalgo County Water Control and Improvement District 19	8015.81	AGRICULTURE - IRRIGATION	A	Rio Grande	HIDALGO
848	10/18/1971		Hidalgo County Water Improvement District 3	5000	MUNICIPAL/DOMESTIC	M	Rio Grande	MULTIPLE
848	10/18/1971		Hidalgo County Water Improvement District 3	8980	MUNICIPAL/DOMESTIC	M	Rio Grande	MULTIPLE
848	10/18/1971		Hidalgo County Water Improvement District 3	8552.6	AGRICULTURE - IRRIGATION	A	Rio Grande	MULTIPLE
848	10/18/1971		Hidalgo County Water Improvement District 3	100	MINING	A	Rio Grande	MULTIPLE
803	1/31/1972	K	La Feria Irrigation District Cameron County 3	4962	INDUSTRIAL MUNICIPAL/DOMESTIC	M	Rio Grande	MULTIPLE
803	1/31/1972	J	La Feria Irrigation District Cameron County 3	85808.43	AGRICULTURE - IRRIGATION	A	Rio Grande	MULTIPLE

WR No	WR Issue Date	Amend	Owners	Divert Amt	Use	Prio Class	Basin	County
850	10/19/1971	K	Laguna Madre Water District	3946.522	MUNICIPAL/DOMESTIC	M	Rio Grande	MULTIPLE
850	10/19/1971		Laguna Madre Water District	3750	MUNICIPAL/DOMESTIC	M	Rio Grande	CAMERON
2671	8/15/1983		Maverick County WCID 1	132400	AGRICULTURE - IRRIGATION	A	Rio Grande	MULTIPLE
2671	8/15/1983	F	Maverick County WCID 1	2696	AGRICULTURE - IRRIGATION MINING RECREATION	A	Rio Grande	MULTIPLE
2671	8/15/1983		Maverick County WCID 1	1085966	HYDROELECTRIC	A	Rio Grande	MULTIPLE
2671	8/15/1983		Maverick County WCID 1	2049	DOMESTIC AND LIVESTOCK INDUSTRIAL MUNICIPAL/DOMESTIC	A	Rio Grande	MULTIPLE
2688	8/15/1983		Maverick County WCID 1	725	AGRICULTURE - IRRIGATION		Rio Grande	MULTIPLE
2688	8/15/1983		Maverick County WCID 1	270	AGRICULTURE - IRRIGATION		Rio Grande	MULTIPLE
284	5/29/1975		Military Highway Water Supply Corporation	164	MUNICIPAL/DOMESTIC		Rio Grande	HIDALGO
285	5/29/1975		Military Highway Water Supply Corporation	260	MUNICIPAL/DOMESTIC		Rio Grande	HIDALGO
286	5/29/1975		Military Highway Water Supply Corporation	66	MUNICIPAL/DOMESTIC		Rio Grande	HIDALGO
831	10/15/1971		Military Highway Water Supply Corporation	632.0482	MUNICIPAL/DOMESTIC	M	Rio Grande	CAMERON
240	9/7/1971	AB	North Alamo Water Supply Corporation	11690.46	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
240	9/7/1971	S	North Alamo Water Supply Corporation	80	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
240	9/7/1971	S	North Alamo Water Supply Corporation	250	INDUSTRIAL MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
240	9/7/1971	S	North Alamo Water Supply Corporation	534.79	INDUSTRIAL MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
461	5/14/1973		North Alamo Water Supply Corporation	3750	MUNICIPAL/DOMESTIC	B	Rio Grande	MULTIPLE

WR No	WR Issue Date	Amend	Owners	Divert Amt	Use	Prio Class	Basin	County
804	10/7/1971		North Alamo Water Supply Corporation	889.1465	AGRICULTURE - IRRIGATION	A	Rio Grande	MULTIPLE
809	10/8/1971		North Alamo Water Supply Corporation	335.68	AGRICULTURE - IRRIGATION	A	Rio Grande	MULTIPLE
812	1/31/1972		North Alamo Water Supply Corporation	1323.275	AGRICULTURE - IRRIGATION	A	Rio Grande	MULTIPLE
841	10/18/1971	H	Olmito Water Supply Corporation	890	MUNICIPAL/DOMESTIC	M	Rio Grande	CAMERON
854	10/19/1971		Olmito Water Supply Corporation	995.71	INDUSTRIAL MUNICIPAL/DOMESTIC	M	Rio Grande	CAMERON
809	10/8/1971		Palm Valley Estate Utility District	312.5	MUNICIPAL/DOMESTIC	M	Rio Grande	MULTIPLE
7	9/7/1971		Port Mansfield Public Utility District	50	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
201	9/7/1971		Port Mansfield Public Utility District	100	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
285	9/9/1971		Rio Water Supply Corporation	43	MUNICIPAL/DOMESTIC	M	Rio Grande	MULTIPLE
292	9/10/1971	A	Rio Water Supply Corporation	11.6	MUNICIPAL/DOMESTIC	M	Rio Grande	STARR
463	9/22/1971		Rio Water Supply Corporation	50.25	AGRICULTURE	B	Rio Grande	STARR
582	9/28/1971		Rio Water Supply Corporation	762.9133	MUNICIPAL/DOMESTIC	M	Rio Grande	STARR
624	9/29/1971	C	Rio Water Supply Corporation	2	MUNICIPAL/DOMESTIC	M	Rio Grande	STARR
711	10/1/1971		Rio Water Supply Corporation	102.9	AGRICULTURE - IRRIGATION	B	Rio Grande	MULTIPLE
767	10/5/1971		Rio Water Supply Corporation	115	AGRICULTURE - IRRIGATION	B	Rio Grande	STARR
787	10/6/1971		Rio Water Supply Corporation	23.25	AGRICULTURE - IRRIGATION	B	Rio Grande	MULTIPLE
804	10/7/1971		Santa Cruz Water Control and Improvement District No 15	120	MUNICIPAL/DOMESTIC	M	Rio Grande	MULTIPLE
804	10/7/1971	H	Santa Cruz Water Control and Improvement District No 15	5000	MINING	A	Rio Grande	MULTIPLE

WR No	WR Issue Date	Amend	Owners	Divert Amt	Use	Prio Class	Basin	County
804	10/7/1971	H	Santa Cruz Water Control and Improvement District No 15	68398.2	AGRICULTURE - IRRIGATION	A	Rio Grande	MULTIPLE
518	9/23/1971		SHARYLAND WATER SUPPLY CORPORATION	217.075	AGRICULTURE - IRRIGATION	B	Rio Grande	HIDALGO
755	10/5/1971		SHARYLAND WATER SUPPLY CORPORATION	191.8932	AGRICULTURE - IRRIGATION	B	Rio Grande	STARR
803	1/31/1972		SHARYLAND WATER SUPPLY CORPORATION	250	INDUSTRIAL MUNICIPAL/DOMESTIC	M	Rio Grande	MULTIPLE
809	10/8/1971		Sharyland Water Supply Corporation	8665.887	MUNICIPAL/DOMESTIC	M	Rio Grande	MULTIPLE
809	10/8/1971		Sharyland Water Supply Corporation	250	INDUSTRIAL MUNICIPAL/DOMESTIC	M	Rio Grande	MULTIPLE
346	9/13/1971		Siesta Shores Water Control and Improvement Distric	200	MUNICIPAL/DOMESTIC	M	Rio Grande	ZAPATA
861	10/20/1971		Town of Fronton	12.5	MUNICIPAL/DOMESTIC	M	Rio Grande	STARR
862	10/20/1971		Town of Garceno	12.5	MUNICIPAL/DOMESTIC	M	Rio Grande	STARR
857	10/19/1971		Town of Hidalgo	12.5	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
852	10/19/1971		Town of La Blanca	12.5	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
858	10/19/1971		Town of Los Ebanos	12.5	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
860	10/20/1971		Town of Penitas	12.5	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
815	10/14/1971		Town of Progreso	173.7	AGRICULTURE - IRRIGATION	A	Rio Grande	HIDALGO
859	10/19/1971		Town of Sullivan City	12.5	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
126	9/7/1971	M	U.S. Department of the Interior Fish and Wildlife Service	21199.59	AGRICULTURE - IRRIGATION INSTREAM	B	Rio Grande	MULTIPLE

WR No	WR Issue Date	Amend	Owners	Divert Amt	Use	Prio Class	Basin	County
126	9/7/1971	M	U.S. Department of the Interior Fish and Wildlife Service	2848.365	AGRICULTURE - IRRIGATION INSTREAM RECREATION	A	Rio Grande	MULTIPLE
2076	11/17/1969		U.S. Department of the Interior Fish and Wildlife Service	1000	RECREATION		Rio Grande	HIDALGO
3129	6/17/1975		U.S. Department of the Interior Fish and Wildlife Service	2935	AGRICULTURE - IRRIGATION		Rio Grande	HIDALGO
232	9/7/1971	C	Union Water Supply Corporation	454.34	MUNICIPAL/DOMESTIC	M	Rio Grande	MULTIPLE
787	10/6/1971		Union Water Supply Corporation	37.5	AGRICULTURE - IRRIGATION	B	Rio Grande	MULTIPLE
846	10/18/1971	M	United Irrigation District	16000	INDUSTRIAL MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
846	10/18/1971		United Irrigation District	8625	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
846	10/18/1971		United Irrigation District	1190	INDUSTRIAL MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
847	10/18/1971	F	United Irrigation District	34374.31	AGRICULTURE - IRRIGATION MINING	A	Rio Grande	MULTIPLE
849	10/18/1971		United Irrigation District	5300	MUNICIPAL/DOMESTIC	M	Rio Grande	HIDALGO
807	10/7/1971		Valley Acres, Inc.	16124.25	AGRICULTURE - IRRIGATION	A	Rio Grande	HIDALGO
807	10/7/1971		Valley Acres, Inc.	200	INDUSTRIAL	A	Rio Grande	HIDALGO
72	9/7/1971	F	Valley Municipal Utility District No. 2	5715.625	AGRICULTURE - IRRIGATION	B	Rio Grande	CAMERON
202	9/7/1971		Valley Municipal Utility District No. 2	798	MUNICIPAL/DOMESTIC	M	Rio Grande	CAMERON
2720	8/15/1983		Webb County	307	MUNICIPAL/DOMESTIC	M	Rio Grande	WEBB
2720	8/15/1983		Webb County	2004.067	INDUSTRIAL MUNICIPAL/DOMESTIC	M	Rio Grande	WEBB

WR No	WR Issue Date	Amend	Owners	Divert Amt	Use	Prio Class	Basin	County
2744	8/15/1983		Webb County	600	AGRICULTURE - IRRIGATION		Rio Grande	WEBB
2804	8/15/1983	H	Zapata County Waterworks	2083.95	MUNICIPAL/DOMESTIC	M	Rio Grande	ZAPATA
803	1/31/1972		Zapata County WCID Hwy 16 East	502	MUNICIPAL/DOMESTIC	M	Rio Grande	MULTIPLE

Appendix 3D. Major Water Providers Sales and Transfers

DRAFT Region M Major Water Provider (MWP) Existing Sales and Transfers

Major Water Providers are entities of particular significance to a region's water supply as defined by the Regional Water Planning Group (RWPG), and may be a Water User Group (WUG) entity, Wholesale Water Provider (WWP) entity , or both (WUG/WWP). Retail denotes WUG projected demands and existing water supplies used by the WUG. Wholesale denotes a WWP or WUG/WWP selling water to another entity.

Agua SUD - WUG/WWP	Water Volumes (acre-feet per year)					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Retail WUG Demands	7,126	7,605	7,940	8,092	8,246	8,401
Total Projected Wholesale Contract and Retail Demands	**7,126**	**7,605**	**7,940**	**8,092**	**8,246**	**8,401**
Surface Water Sales to Retail Customers	8,545	8,545	8,545	8,545	8,545	8,545
Total Wholesale and Retail Sales to Customers	**8,545**	**8,545**	**8,545**	**8,545**	**8,545**	**8,545**

Alamo - WUG	Water Volumes (acre-feet per year)					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Retail WUG Demands	2,638	2,688	2,739	2,833	2,929	3,027
Total Projected Wholesale Contract and Retail Demands	**2,638**	**2,688**	**2,739**	**2,833**	**2,929**	**3,027**
Groundwater Sales to Retail Customers	522	522	522	522	522	522
Surface Water Sales to Retail Customers	3,131	3,131	3,131	3,131	3,131	3,131
Total Wholesale and Retail Sales to Customers	**3,653**	**3,653**	**3,653**	**3,653**	**3,653**	**3,653**

Bayview Irrigation District 11 - WWP	Water Volumes (acre-feet per year)					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Wholesale Contract Demands	17,161	17,161	17,161	17,161	17,161	17,161
Total Projected Wholesale Contract and Retail Demands	**17,161**	**17,161**	**17,161**	**17,161**	**17,161**	**17,161**
Surface Water Sales to Wholesale Customers	4,728	4,725	4,721	4,713	4,702	4,689
Total Wholesale and Retail Sales to Customers	**4,728**	**4,725**	**4,721**	**4,713**	**4,702**	**4,689**

Brownsville - WUG/WWP	Water Volumes (acre-feet per year)					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Retail WUG Demands	32,212	32,908	33,204	33,106	33,006	32,903
Projected Wholesale Contract Demands	3,440	3,440	3,440	3,440	3,440	3,440
Total Projected Wholesale Contract and Retail Demands	**35,652**	**36,348**	**36,644**	**36,546**	**36,446**	**36,343**
Groundwater Sales to Retail Customers	9,991	9,991	9,991	9,991	9,991	9,991
Surface Water Sales to Retail Customers	32,283	32,283	32,283	32,283	32,283	32,283
Groundwater Sales to Wholesale Customers	457	457	457	457	457	457
Surface Water Sales to Wholesale Customers	1,911	1,910	1,910	1,909	1,907	1,905
Total Wholesale and Retail Sales to Customers	**44,642**	**44,641**	**44,641**	**44,640**	**44,638**	**44,636**

DRAFT Region M Major Water Provider (MWP) Existing Sales and Transfers

Brownsville Irrigation District - WWP	Water Volumes (acre-feet per year)					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Wholesale Contract Demands	35,483	35,483	35,483	35,483	35,483	35,483
Total Projected Wholesale Contract and Retail Demands	**35,483**	**35,483**	**35,483**	**35,483**	**35,483**	**35,483**
Surface Water Sales to Wholesale Customers	12,091	12,085	12,078	12,063	12,068	12,017
Total Wholesale and Retail Sales to Customers	**12,091**	**12,085**	**12,078**	**12,063**	**12,068**	**12,017**

Cameron County Irrigation District 10 - WWP	Water Volumes (acre-feet per year)					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Wholesale Contract Demands	25,114	25,114	25,114	25,114	25,114	25,114
Total Projected Wholesale Contract and Retail Demands	**25,114**	**25,114**	**25,114**	**25,114**	**25,114**	**25,114**
Surface Water Sales to Wholesale Customers	9,111	9,104	9,097	9,082	9,059	9,034
Total Wholesale and Retail Sales to Customers	**9,111**	**9,104**	**9,097**	**9,082**	**9,059**	**9,034**

Cameron County Irrigation District 2 - WWP	Water Volumes (acre-feet per year)					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Wholesale Contract Demands	165,802	165,802	165,802	165,802	165,802	165,802
Total Projected Wholesale Contract and Retail Demands	**165,802**	**165,802**	**165,802**	**165,802**	**165,802**	**165,802**
Surface Water Sales to Wholesale Customers	59,763	59,727	58,890	58,805	58,684	58,551
Total Wholesale and Retail Sales to Customers	**59,763**	**59,727**	**58,890**	**58,805**	**58,684**	**58,551**

Cameron County Irrigation District 6 - WWP	Water Volumes (acre-feet per year)					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Wholesale Contract Demands	78,235	78,235	78,235	78,235	78,235	78,235
Total Projected Wholesale Contract and Retail Demands	**78,235**	**78,235**	**78,235**	**78,235**	**78,235**	**78,235**
Surface Water Sales to Wholesale Customers	29,839	29,819	29,799	29,752	29,685	29,611
Total Wholesale and Retail Sales to Customers	**29,839**	**29,819**	**29,799**	**29,752**	**29,685**	**29,611**

Delta Lake Irrigation District - WWP	Water Volumes (acre-feet per year)					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Wholesale Contract Demands	99,256	99,192	99,035	98,888	98,679	98,450
Total Projected Wholesale Contract and Retail Demands	**99,256**	**99,192**	**99,035**	**98,888**	**98,679**	**98,450**
Surface Water Sales to Wholesale Customers	69,185	69,140	68,999	68,897	68,749	68,588
Total Wholesale and Retail Sales to Customers	**69,185**	**69,140**	**68,999**	**68,897**	**68,749**	**68,588**

DRAFT Region M Major Water Provider (MWP) Existing Sales and Transfers

Donna Irrigation District-Hidalgo County 1 - WWP	Water Volumes (acre-feet per year)					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Wholesale Contract Demands	44,584	44,555	44,527	44,461	44,366	44,263
Total Projected Wholesale Contract and Retail Demands	**44,584**	**44,555**	**44,527**	**44,461**	**44,366**	**44,263**
Surface Water Sales to Wholesale Customers	31,655	31,635	31,615	31,567	31,500	31,427
Total Wholesale and Retail Sales to Customers	**31,655**	**31,635**	**31,615**	**31,567**	**31,500**	**31,427**

Eagle Pass - WUG	Water Volumes (acre-feet per year)					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Retail WUG Demands	9,579	10,192	10,713	11,180	11,644	12,107
Total Projected Wholesale Contract and Retail Demands	**9,579**	**10,192**	**10,713**	**11,180**	**11,644**	**12,107**
Surface Water Sales to Retail Customers	10,621	10,621	10,621	10,621	10,621	10,621
Total Wholesale and Retail Sales to Customers	**10,621**	**10,621**	**10,621**	**10,621**	**10,621**	**10,621**

East Rio Hondo WSC - WUG/WWP	Water Volumes (acre-feet per year)					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Retail WUG Demands	3,636	4,290	4,978	5,499	5,781	6,076
Projected Wholesale Contract Demands	215	215	215	215	215	215
Total Projected Wholesale Contract and Retail Demands	**3,851**	**4,505**	**5,193**	**5,714**	**5,996**	**6,291**
Groundwater Sales to Retail Customers	896	896	896	896	896	896
Surface Water Sales to Retail Customers	4,764	4,764	3,964	3,964	3,964	3,964
Surface Water Sales to Wholesale Customers	215	215	215	215	215	215
Total Wholesale and Retail Sales to Customers	**5,875**	**5,875**	**5,075**	**5,075**	**5,075**	**5,075**

Edinburg - WUG/WWP	Water Volumes (acre-feet per year)					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Retail WUG Demands	11,209	12,114	12,727	12,925	13,124	13,323
Total Projected Wholesale Contract and Retail Demands	**11,209**	**12,114**	**12,727**	**12,925**	**13,124**	**13,323**
Surface Water Sales to Retail Customers	10,758	10,758	10,758	10,758	10,758	10,758
Total Wholesale and Retail Sales to Customers	**10,758**	**10,758**	**10,758**	**10,758**	**10,758**	**10,758**

Harlingen - WUG/WWP	Water Volumes (acre-feet per year)					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Retail WUG Demands	14,830	15,149	15,288	15,248	15,208	15,166

DRAFT Region M Major Water Provider (MWP)
Existing Sales and Transfers

Projected Wholesale Contract Demands	598	598	598	486	486	487
Total Projected Wholesale Contract and Retail Demands	**15,428**	**15,747**	**15,886**	**15,734**	**15,694**	**15,653**
Reuse Sales to Retail Customers	1,120	1,120	1,120	1,120	1,120	1,120
Surface Water Sales to Retail Customers	19,838	19,837	19,837	19,840	19,840	19,839
Surface Water Sales to Wholesale Customers	511	511	511	399	399	399
Total Wholesale and Retail Sales to Customers	**21,469**	**21,468**	**21,468**	**21,359**	**21,359**	**21,358**

Harlingen Irrigation District-Cameron County 1 - WWP	**Water Volumes (acre-feet per year)**					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Wholesale Contract Demands	75,356	75,323	75,290	75,212	75,102	74,981
Total Projected Wholesale Contract and Retail Demands	**75,356**	**75,323**	**75,290**	**75,212**	**75,102**	**74,981**
Surface Water Sales to Wholesale Customers	60,854	60,825	60,795	60,614	60,514	60,406
Total Wholesale and Retail Sales to Customers	**60,854**	**60,825**	**60,795**	**60,614**	**60,514**	**60,406**

Hidalgo County Irrigation District 1 - WWP	**Water Volumes (acre-feet per year)**					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Wholesale Contract Demands	91,403	91,356	91,310	91,202	91,048	90,880
Total Projected Wholesale Contract and Retail Demands	**91,403**	**91,356**	**91,310**	**91,202**	**91,048**	**90,880**
Surface Water Sales to Wholesale Customers	75,022	74,983	74,943	74,851	74,718	74,573
Total Wholesale and Retail Sales to Customers	**75,022**	**74,983**	**74,943**	**74,851**	**74,718**	**74,573**

Hidalgo County Irrigation District 16 - WWP	**Water Volumes (acre-feet per year)**					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Wholesale Contract Demands	17,161	17,151	17,142	17,121	17,089	17,055
Total Projected Wholesale Contract and Retail Demands	**17,161**	**17,151**	**17,142**	**17,121**	**17,089**	**17,055**
Surface Water Sales to Wholesale Customers	12,185	12,178	12,171	12,155	12,133	12,109
Total Wholesale and Retail Sales to Customers	**12,185**	**12,178**	**12,171**	**12,155**	**12,133**	**12,109**

Hidalgo County Irrigation District 2 - WWP	**Water Volumes (acre-feet per year)**					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Wholesale Contract Demands	96,404	96,363	96,323	96,227	96,091	95,940
Total Projected Wholesale Contract and Retail Demands	**96,404**	**96,363**	**96,323**	**96,227**	**96,091**	**95,940**
Surface Water Sales to Wholesale Customers	72,303	72,273	72,242	72,171	72,068	71,955
Total Wholesale and Retail Sales to Customers	**72,303**	**72,273**	**72,242**	**72,171**	**72,068**	**71,955**

Hidalgo County Irrigation District 6 - WWP	**Water Volumes (acre-feet per year)**

DRAFT Region M Major Water Provider (MWP) Existing Sales and Transfers

Data Description	2030	2040	2050	2060	2070	2080
Projected Wholesale Contract Demands	24,878	24,868	24,858	24,835	24,802	24,766
Total Projected Wholesale Contract and Retail Demands	**24,878**	**24,868**	**24,858**	**24,835**	**24,802**	**24,766**
Surface Water Sales to Wholesale Customers	18,656	18,649	18,642	18,626	18,603	18,577
Total Wholesale and Retail Sales to Customers	**18,656**	**18,649**	**18,642**	**18,626**	**18,603**	**18,577**

Hidalgo County WID 3 - WWP	**Water Volumes (acre-feet per year)**					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Wholesale Contract Demands	20,825	20,822	20,820	20,813	20,804	20,795
Total Projected Wholesale Contract and Retail Demands	**20,825**	**20,822**	**20,820**	**20,813**	**20,804**	**20,795**
Surface Water Sales to Wholesale Customers	18,759	18,757	18,754	18,749	18,740	18,732
Total Wholesale and Retail Sales to Customers	**18,759**	**18,757**	**18,754**	**18,749**	**18,740**	**18,732**

Hidalgo-Cameron County Irrigation District 9 - WWP	**Water Volumes (acre-feet per year)**					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Wholesale Contract Demands	87,414	87,362	87,310	87,189	87,016	86,825
Total Projected Wholesale Contract and Retail Demands	**87,414**	**87,362**	**87,310**	**87,189**	**87,016**	**86,825**
Surface Water Sales to Wholesale Customers	61,191	61,153	61,117	61,031	60,911	60,778
Total Wholesale and Retail Sales to Customers	**61,191**	**61,153**	**61,117**	**61,031**	**60,911**	**60,778**

La Feria Irrigation District-Cameron County 3 - WWP	**Water Volumes (acre-feet per year)**					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Wholesale Contract Demands	39,536	39,510	39,485	39,425	39,339	39,244
Total Projected Wholesale Contract and Retail Demands	**39,536**	**39,510**	**39,485**	**39,425**	**39,339**	**39,244**
Surface Water Sales to Wholesale Customers	26,145	26,227	26,310	26,469	26,711	26,846
Total Wholesale and Retail Sales to Customers	**26,145**	**26,227**	**26,310**	**26,469**	**26,711**	**26,846**

Laguna Madre Water District - WUG/WWP	**Water Volumes (acre-feet per year)**					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Retail WUG Demands	4,638	4,745	4,787	4,771	4,754	4,736
Projected Wholesale Contract Demands	118	118	118	118	118	118
Total Projected Wholesale Contract and Retail Demands	**4,756**	**4,863**	**4,905**	**4,889**	**4,872**	**4,854**
Surface Water Sales to Retail Customers	7,513	7,513	7,513	7,513	7,513	7,513
Surface Water Sales to Wholesale Customers	118	118	118	118	118	118
Total Wholesale and Retail Sales to Customers	**7,631**	**7,631**	**7,631**	**7,631**	**7,631**	**7,631**

DRAFT Region M Major Water Provider (MWP) Existing Sales and Transfers

Laredo - WUG/WWP	Water Volumes (acre-feet per year)					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Retail WUG Demands	41,831	43,292	43,794	43,349	42,899	42,444
Projected Wholesale Contract Demands	1,632	1,631	1,630	1,627	1,623	1,617
Total Projected Wholesale Contract and Retail Demands	**43,463**	**44,923**	**45,424**	**44,976**	**44,522**	**44,061**
Reuse Sales to Retail Customers	773	773	773	773	773	773
Surface Water Sales to Retail Customers	59,201	59,201	59,201	59,201	59,201	59,201
Surface Water Sales to Wholesale Customers	1,632	1,631	1,630	1,627	1,623	1,617
Total Wholesale and Retail Sales to Customers	**61,606**	**61,605**	**61,604**	**61,601**	**61,597**	**61,591**

McAllen - WUG/WWP	Water Volumes (acre-feet per year)					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Retail WUG Demands	38,276	42,409	46,441	47,673	48,924	50,195
Projected Wholesale Contract Demands	3,650	3,650	3,650	3,650	3,650	3,650
Total Projected Wholesale Contract and Retail Demands	**41,926**	**46,059**	**50,091**	**51,323**	**52,574**	**53,845**
Groundwater Sales to Retail Customers	1,120	1,120	1,120	1,120	1,120	1,120
Reuse Sales to Retail Customers	2,251	2,251	2,251	2,251	2,251	2,251
Surface Water Sales to Retail Customers	33,544	33,544	31,744	31,744	31,744	31,744
Reuse Sales to Wholesale Customers	3,295	3,295	3,295	3,295	3,295	3,295
Surface Water Sales to Wholesale Customers	355	355	355	355	355	355
Total Wholesale and Retail Sales to Customers	**40,565**	**40,565**	**38,765**	**38,765**	**38,765**	**38,765**

Military Highway WSC - WUG/WWP	Water Volumes (acre-feet per year)					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Retail WUG Demands	6,530	6,560	6,585	6,684	6,784	6,887
Projected Wholesale Contract Demands	35	35	35	35	35	35
Total Projected Wholesale Contract and Retail Demands	**6,565**	**6,595**	**6,620**	**6,719**	**6,819**	**6,922**
Groundwater Sales to Retail Customers	6,807	6,807	6,807	6,807	6,807	6,807
Surface Water Sales to Retail Customers	735	735	735	735	735	735
Groundwater Sales to Wholesale Customers	25	25	25	25	25	25
Surface Water Sales to Wholesale Customers	10	10	10	10	10	10
Total Wholesale and Retail Sales to Customers	**7,577**	**7,577**	**7,577**	**7,577**	**7,577**	**7,577**

Mission - WUG/WWP	Water Volumes (acre-feet per year)					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**

DRAFT Region M Major Water Provider (MWP) Existing Sales and Transfers

Projected Retail WUG Demands	18,065	19,030	19,716	20,190	20,672	21,159
Total Projected Wholesale Contract and Retail Demands	**18,065**	**19,030**	**19,716**	**20,190**	**20,672**	**21,159**
Surface Water Sales to Retail Customers	18,400	18,400	18,399	18,398	18,397	18,395
Total Wholesale and Retail Sales to Customers	**18,400**	**18,400**	**18,399**	**18,398**	**18,397**	**18,395**

North Alamo WSC - WUG/WWP	**Water Volumes (acre-feet per year)**					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Retail WUG Demands	35,294	38,813	41,086	41,486	41,887	42,288
Projected Wholesale Contract Demands	2,042	2,042	2,042	2,042	2,042	2,042
Total Projected Wholesale Contract and Retail Demands	**37,336**	**40,855**	**43,128**	**43,528**	**43,929**	**44,330**
Groundwater Sales to Retail Customers	9,892	10,074	10,094	10,094	10,094	10,094
Surface Water Sales to Retail Customers	12,515	12,515	12,514	12,512	12,510	12,506
Groundwater Sales to Wholesale Customers	842	842	842	842	842	842
Surface Water Sales to Wholesale Customers	1,148	1,148	1,148	1,148	1,148	1,148
Total Wholesale and Retail Sales to Customers	**24,397**	**24,579**	**24,598**	**24,596**	**24,594**	**24,590**

Pharr - WUG	**Water Volumes (acre-feet per year)**					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Retail WUG Demands	9,135	9,698	10,105	10,313	10,523	10,736
Total Projected Wholesale Contract and Retail Demands	**9,135**	**9,698**	**10,105**	**10,313**	**10,523**	**10,736**
Groundwater Sales to Retail Customers	1,400	1,400	1,400	1,400	1,400	1,400
Reuse Sales to Retail Customers	914	970	1,011	1,031	1,052	1,074
Surface Water Sales to Retail Customers	5,018	5,018	5,018	5,018	5,018	5,018
Total Wholesale and Retail Sales to Customers	**7,332**	**7,388**	**7,429**	**7,449**	**7,470**	**7,492**

Rio Grande City - WUG/WWP	**Water Volumes (acre-feet per year)**					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Retail WUG Demands	4,200	4,468	4,676	4,814	4,954	5,096
Projected Wholesale Contract Demands	1,492	1,492	1,492	1,492	1,491	1,491
Total Projected Wholesale Contract and Retail Demands	**5,692**	**5,960**	**6,168**	**6,306**	**6,445**	**6,587**
Surface Water Sales to Retail Customers	3,488	3,488	3,488	3,488	3,488	3,488
Surface Water Sales to Wholesale Customers	959	959	959	959	958	958
Total Wholesale and Retail Sales to Customers	**4,447**	**4,447**	**4,447**	**4,447**	**4,446**	**4,446**

San Benito - WUG	**Water Volumes (acre-feet per year)**					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**

DRAFT Region M Major Water Provider (MWP) Existing Sales and Transfers

Projected Retail WUG Demands	3,249	3,316	3,346	3,336	3,326	3,315
Total Projected Wholesale Contract and Retail Demands	**3,249**	**3,316**	**3,346**	**3,336**	**3,326**	**3,315**
Surface Water Sales to Retail Customers	3,846	4,346	5,326	5,426	5,626	5,626
Total Wholesale and Retail Sales to Customers	**3,846**	**4,346**	**5,326**	**5,426**	**5,626**	**5,626**

San Juan - WUG	**Water Volumes (acre-feet per year)**					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Retail WUG Demands	3,324	3,388	3,451	3,570	3,691	3,815
Total Projected Wholesale Contract and Retail Demands	**3,324**	**3,388**	**3,451**	**3,570**	**3,691**	**3,815**
Groundwater Sales to Retail Customers	1,782	1,782	1,782	1,782	1,782	1,782
Surface Water Sales to Retail Customers	2,960	2,960	2,960	2,960	2,960	2,960
Total Wholesale and Retail Sales to Customers	**4,742**	**4,742**	**4,742**	**4,742**	**4,742**	**4,742**

Sharyland WSC - WUG	**Water Volumes (acre-feet per year)**					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Retail WUG Demands	15,541	16,948	17,867	18,108	18,349	18,589
Total Projected Wholesale Contract and Retail Demands	**15,541**	**16,948**	**17,867**	**18,108**	**18,349**	**18,589**
Surface Water Sales to Retail Customers	17,073	17,073	17,073	17,073	17,073	17,073
Total Wholesale and Retail Sales to Customers	**17,073**	**17,073**	**17,073**	**17,073**	**17,073**	**17,073**

Southmost Regional Water Authority - WWP	**Water Volumes (acre-feet per year)**					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Wholesale Contract Demands	11,537	11,537	11,537	11,537	11,537	11,537
Total Projected Wholesale Contract and Retail Demands	**11,537**	**11,537**	**11,537**	**11,537**	**11,537**	**11,537**
Groundwater Sales to Wholesale Customers	11,537	11,537	11,537	11,537	11,537	11,537
Total Wholesale and Retail Sales to Customers	**11,537**	**11,537**	**11,537**	**11,537**	**11,537**	**11,537**

United Irrigation District - WWP	**Water Volumes (acre-feet per year)**					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Wholesale Contract Demands	61,870	61,870	61,870	61,870	61,870	61,870
Total Projected Wholesale Contract and Retail Demands	**61,870**	**61,870**	**61,870**	**61,870**	**61,870**	**61,870**
Surface Water Sales to Wholesale Customers	42,752	42,748	42,742	42,731	42,715	42,697
Total Wholesale and Retail Sales to Customers	**42,752**	**42,748**	**42,742**	**42,731**	**42,715**	**42,697**

Weslaco - WUG/WWP	**Water Volumes (acre-feet per year)**

DRAFT Region M Major Water Provider (MWP)
Existing Sales and Transfers

Data Description	2030	2040	2050	2060	2070	2080
Projected Retail WUG Demands	5,500	5,624	5,737	5,930	6,127	6,327
Projected Wholesale Contract Demands	175	175	175	175	175	175
Total Projected Wholesale Contract and Retail Demands	**5,675**	**5,799**	**5,912**	**6,105**	**6,302**	**6,502**
Reuse Sales to Retail Customers	770	971	1,052	1,052	1,052	1,052
Surface Water Sales to Retail Customers	5,408	5,408	5,408	5,408	5,408	5,408
Surface Water Sales to Wholesale Customers	175	175	175	175	175	175
Total Wholesale and Retail Sales to Customers	**6,353**	**6,554**	**6,635**	**6,635**	**6,635**	**6,635**

INITIALLY PREPARED PLAN

CHAPTER 4: IDENTIFICATION OF WATER NEEDS

Rio Grande Regional Water Plan

BV PROJECT NO. 411250

PREPARED FOR

Rio Grande Regional Water Planning Group

1 MARCH 2025

BLACK & VEATCH

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acft/yr	Acre-Feet per Year
MAG	Modeled Available Groundwater
MUD	Municipal Utility District
MWP	Major Water Provider
SUD	Special Utility District
TWDB	Texas Water Development Board
WCID	Water Control and Improvement District
WMS	Water Management Strategy
WSC	Water Supply Corporation
WUG	Water User Group
WWP	Wholesale Water Provider

4.0 Identification of Water Needs

4.1 Introduction

The primary emphasis of the regional water supply planning process established by Senate Bill 1 is the identification of current and future water needs and the development of strategies for meeting those needs. This chapter describes the projected needs determined from the demands described in Chapter 2 and supplies discussed in Chapter 3.

The objective is to identify which Water User Groups (WUGs) will have a need, herein defined as a shortage between projected demands and supplies. Drought year needs may be the result of any combination of the following scenarios, among others:

- High drought year demand;
- Long-term demand growth;
- Limited supplies, either:
  - Contractually, as in municipal water rights, or
  - Hydraulically, as with irrigation water rights,
- Limitations of existing infrastructure, as with well-field or treatment plan capacity; or
- Unreliable supplies.

WUG needs are shown herein, and an evaluation of Major Water Provider (MWP) demand, supply, and need is included in Appendix 4B.

Needs were identified for each of the six types of WUG: municipal, irrigation, livestock, manufacturing, steam-electric power generation, and mining. Chapter 2 describes the methodology for demand projections for each WUG type, and Chapter 3 discusses the approach for determining existing supplies. For each WUG (each municipal utility WUG and each countywide aggregate for the other five types of users), the supplies and the demands are compared to estimate the needs. Surpluses, where the currently available supplies exceed demands, are shown as a zero in the needs evaluations. This ensures that a surplus for one location does not automatically cancel out a shortage for another entity. For any surplus that is moved from one entity/geographical area to another, a Water Management Strategy (WMS) will be identified in Chapter 5.

A second-tier needs analysis, which shows needs remaining after the recommended conservation and direct reuse WMS are accounted for, is included in Appendix 4A.

For Wholesale Water Providers (WWPs) that are also WUGs, their needs are shown according to the supplies or portions of supplies that have been identified to meet their WUG needs. WWP supplies to other WUGs are included as a supply for that WUG. WWPs that do not have a demand associated with them independent of the WUG they supply are not shown herein.

4.2 Regional Needs Summary

4.2.1 Regional Needs by Water User Group Category

Figure 4-1 displays the total regional needs for Region M, where most needs are from irrigation. This is to be expected, as the irrigation demand projections are based on estimated use in a year where supplies are not limited from the reservoirs and little rainfall occurs, or the highest demand scenario; whereas the supplies are based on the drought of record. This shortage will be partially addressed with supply increase through improvements to the irrigation district conveyance systems. Growers also manage low water years through on-farm efficiency measures. Both strategies are discussed in detail in Chapter 5. Table 4-1 summarizes the water needs by WUG type.

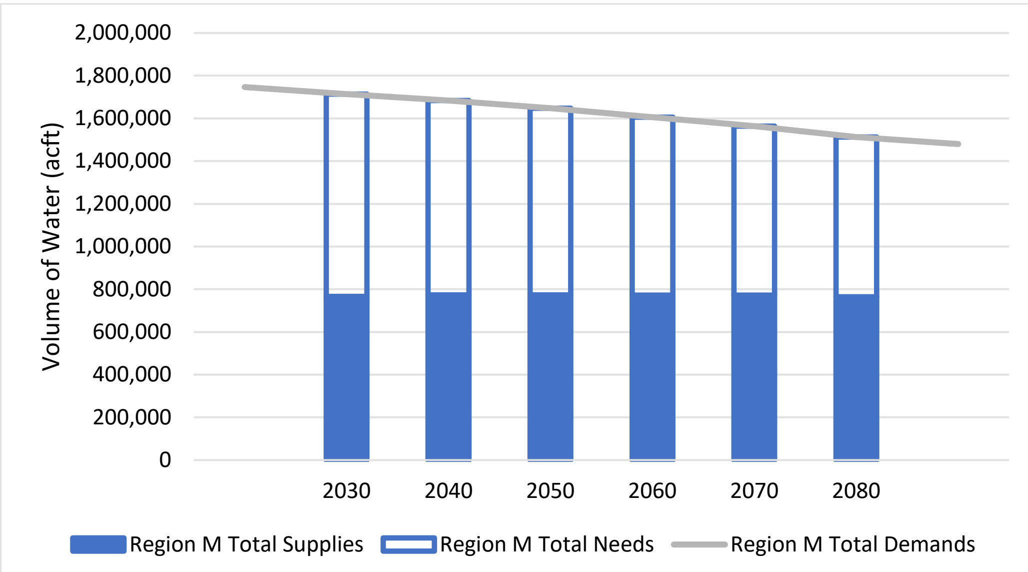

Figure 4-1 Total Regional Needs, Shown as a Portion of Total Demands (acft/yr)[1]

Table 4-1 Water Needs by Water User Group Type (acft/yr)

WUG	2030	2040	2050	2060	2070	2080
Irrigation Needs	919,013	873,548	828,086	783,070	738,360	693,854
Municipal Needs	24,355	32,442	42,823	46,375	50,400	54,449
Mining Needs	3,604	3,605	3,606	3,608	3,675	-
Steam-Electric Power Needs	--	--	--	--	--	--
Manufacturing Needs	--	--	--	1	5	9
Livestock Needs	--	--	--	--	--	--
Total Needs	**946,972**	**909,595**	**874,515**	**833,054**	**792,440**	**748,312**
Dash (--) indicates surplus for the associated WUG type decade.						

[1] Region M Total Supplies illustrated on figure do not include individual WUG surplus supplies.

Municipal needs are significant and increase as the population increases over the planning horizon. While one-time purchases of water, rather than contractual agreements or purchase of water rights, are often used as a stopgap measure, this is not a reliable drought year supply strategy. Chapter 5 recommends the purchase of water rights, as well as development of new sources, conservation, and other strategies to address current and future needs of municipal WUG and WWPs.

Industrial users (mining, steam-electric, and manufacturing) supplies were evaluated using data provided to the Texas Water Development Board (TWDB) and the Texas Commission on Environmental Quality regarding groundwater wells, surface water use, and purchase of water from public water supplies. Needs in these categories will likely also require increased cooperation with municipalities for reuse of wastewater effluent as well as conservation and water efficiency measures. Strategies for meeting future water needs are discussed in Chapter 5.

4.2.2 Regional Needs by County

The needs in Region M follow a similar distribution as the demands, focused heavily in Cameron and Hidalgo Counties, as shown in Table 4-2. Some needs are anticipated in each county in 2030, which will be evaluated individually in following sections. Jim Hogg County exhibits surplus supplies, as noted with the dashes in Table 4-2.

Table 4-2 Needs by County (acft/yr)

County	2030	2040	2050	2060	2070	2080
Cameron	364,901	347,179	329,406	312,357	295,794	279,304
Hidalgo	448,863	435,464	424,071	405,086	386,301	367,632
Jim Hogg	--	--	--	--	--	--
Maverick	25,192	23,241	21,381	19,939	18,589	13,510
Starr	23,449	23,239	22,928	22,519	22,141	21,770
Webb	4,465	3,662	3,169	2,821	2,485	2,149
Willacy	76,389	73,259	70,161	67,085	64,038	61,007
Zapata	3,713	3,551	3,399	3,247	3,092	2,940
Total Needs	**946,972**	**909,595**	**874,515**	**833,054**	**792,440**	**748,312**
Dash (--) indicates surplus for the associated county decade.						

4.3 Municipal Needs

The population of Region M has been growing at a slightly higher rate than the rest of Texas. The demand distribution is heavily concentrated in Cameron and Hidalgo counties and in the Laredo area in Webb County. Current supplies are estimated to be less than the 2030 demands for municipalities. As noted earlier, in some cases, this indicates that drought-year demands exceed normal supplies, and that need is regularly met by short-term contracts for water. Other municipalities may experience persistent shortage, especially those communities that rely solely on groundwater or utilities with infrastructure limitations.

The need for municipal water is depicted in the blue outline box on Figure 4-2 and increases to approximately 85 percent of the total demand by 2080. The population centers are shown on Figure 4-3. Figure 4-4 displays each county's portion of the total regional municipal needs. Municipal demands for each county are discussed in the following sections. Chapter 5 will discuss WMSs that have been identified to address projected municipal needs.

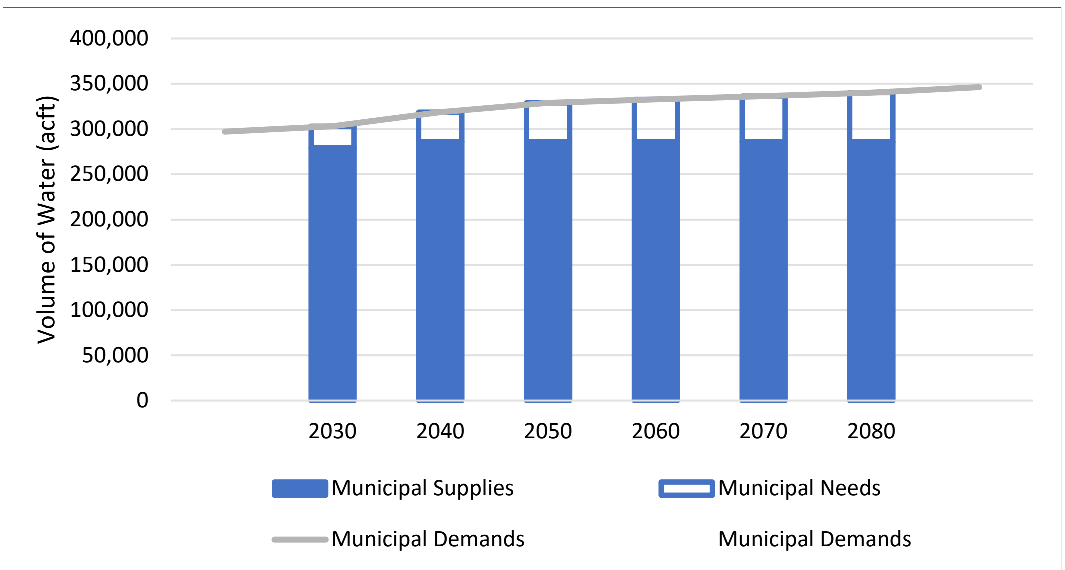

Figure 4-2 Municipal Needs, Shown as a Portion of Municipal Demands (acft/yr)[2]

[2] Region M Municipal Supplies illustrated on figure do not include individual WUG surplus supplies.

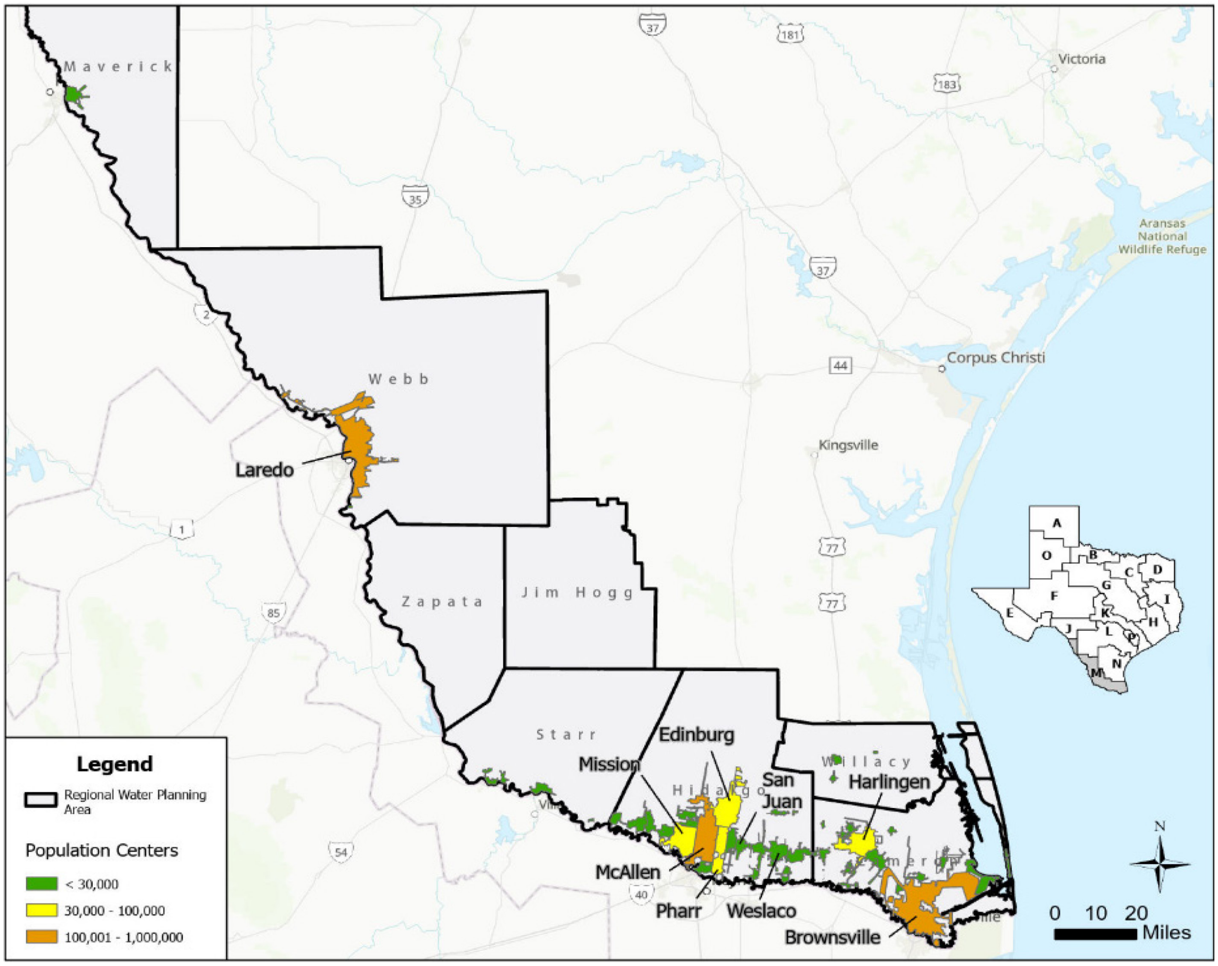

Figure 4-3 Population and Municipal Demand Centers

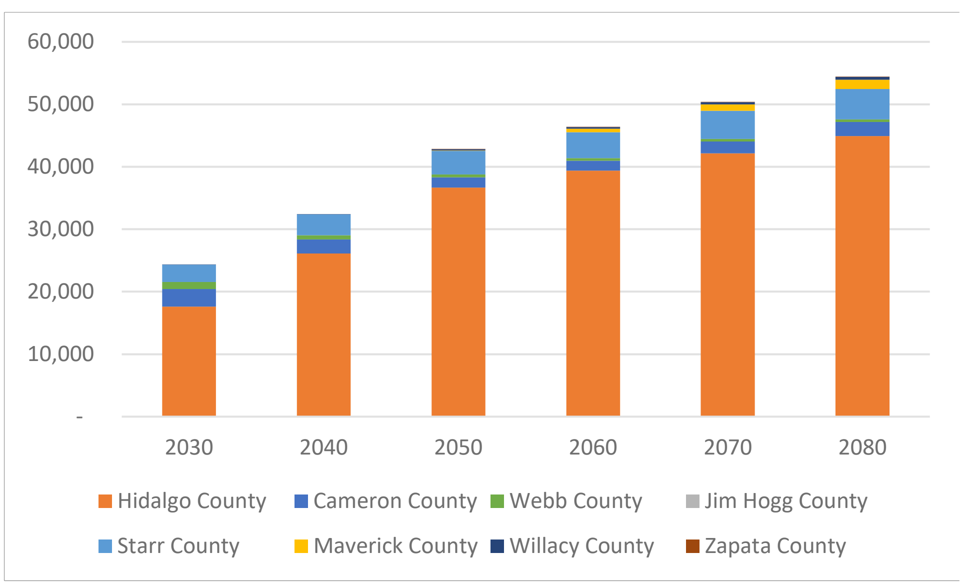

Figure 4-4 Municipal Needs, Shown by County (acft/yr)

4.3.1 Major Water Providers

MWP needs are based on the WUG demands of the MWP, if applicable, and the contract demand of customers, which may not be representative of the customer's full demand. MWP supplies are based on what is available for use, but in some cases supply surplus may be representative of system losses, as in the case of irrigation districts.

Detailed MWP needs information is included in Appendix 4B.

4.3.2 Cameron County Municipal Needs

Cameron County is projected to have the second-largest share of municipal needs, behind Hidalgo County, shown in Table 4-3.

Table 4-3 Cameron County Municipal Needs Projections (acft/yr)

Entity	2030	2040	2050	2060	2070	2080
Brownsville PUB	--	--	--	--	--	--
Combes	--	--	--	--	--	--
County-Other, Cameron*	2,434	1,561	638	--	--	--
East Rio Hondo Water Supply Corporation (WSC)	--	--	118	639	921	1,216
El Jardin WSC	185	211	224	220	216	212
Harlingen	--	--	--	--	--	--
La Feria	--	--	--	--	--	--
Laguna Madre Water District	--	--	--	--	--	--
Los Fresnos	--	--	--	--	--	--
Military Highway WSC	55	142	180	165	149	132
North Alamo WSC	126	143	150	147	145	143
Olmito WSC	--	--	--	--	--	--
Palm Valley	--	--	--	--	--	--
Primera	25	185	295	379	471	522
Rio Hondo	--	--	--	--	--	--
San Benito	--	--	--	--	--	--
Santa Rosa	--	--	--	--	--	--
Valley Municipal Utility District (MUD) 2	--	--	--	--	--	--
Total	**2,825**	**2,242**	**1,605**	**1,550**	**1,902**	**2,225**

Dash (--) indicates surplus for the associated WUG decade.
*Cameron "County-Other" includes public water supplies in Indian Lake and La Mirada Country Estates.

Most of the entities within Cameron County are at least in part served by irrigation districts and surface water. For this source, the most common limiting factor is water rights and the efficiency of conveyance infrastructure. Groundwater development has increased in Cameron County, which in many cases requires advanced treatment such as reverse osmosis. In these cases, the cost of extraction and treatment of groundwater can be a limiting factor, which impacts the rate of development of new well fields and treatment facilities.

The adopted modeled available groundwater (MAG) for Cameron County in this planning cycle did not differ significantly from the availability in the previous (2021) Region M water plan. This plan shows reduced supplies for some WUGs because supplies are required to be limited by the MAG in the Regional Water Plan. Reduction in actual supplies for Cameron County groundwater users is not planned or expected, and the joint groundwater planning process has not indicated any known concern about a reduction in groundwater availability in Cameron County.

4.3.3 Hidalgo County Municipal Needs

Hidalgo County has the largest share of municipal needs in the region, shown in Table 4-4. Within the county, almost all the municipalities are served by irrigation districts, with some groundwater. Therefore, the majority of the supplies are limited by the water rights that are held by each entity, as well as the efficiency of the conveyance infrastructure.

Table 4-4 Hidalgo County Municipal Needs Projections (acft/yr)

Entity	2030	2040	2050	2060	2070	2080
Agua SUD	--	--	--	--	--	--
Alamo	--	--	--	--	--	--
County-Other, Hidalgo*	964	--	--	--	--	--
Donna	--	--	--	--	--	--
Edcouch	--	--	--	--	--	--
Edinburg	451	1,356	1,969	2,167	2,366	2,565
Elsa	--	--	--	--	--	--
Hidalgo	--	--	--	--	--	--
Hidalgo County MUD 1	--	--	--	--	--	17
La Joya	232	269	294	308	323	337
La Villa	--	30	56	53	50	47
McAllen	1,361	5,494	11,326	12,558	13,809	15,080
Mercedes	--	--	--	--	--	--
Military Highway WSC	--	--	--	--	--	--
Mission	--	630	1,317	1,792	2,275	2,764
North Alamo WSC	12,797	16,056	18,254	18,625	18,993	19,362
Pharr	1,803	2,310	2,676	2,864	3,053	3,244

Entity	2030	2040	2050	2060	2070	2080
San Juan	--	--	--	--	--	--
Sharyland WSC	--	--	794	1,035	1,276	1,516
Weslaco	--	--	--	--	--	--
Total	**17,608**	**26,145**	**36,686**	**39,402**	**42,145**	**44,932**

Dash (--) indicates surplus for the associated WUG decade.

*Hidalgo County-Other includes the public water systems in Llano Grande Lake Park East, Llano Grande Lake Park West, Trails End Mobile Home Park, and Quiet Village II.

4.3.4 Jim Hogg County Municipal Needs

Jim Hogg County has little municipal demand and shows no municipal need. WUGs in Jim Hogg County do not have direct access to Rio Grande water with current infrastructure. The current municipal WUG is Jim Hogg County Water Control and Improvement District (WCID) 2.The limiting factor for groundwater supplies can be both the existing well field capacities as well as the characteristics of the aquifer(s).

4.3.5 Maverick County Municipal Needs

The Maverick County WUG does have municipal need from 2030 through 2080, as detailed in Table 4-5. Eagle Pass is the only incorporated city in Maverick County. The total population of Maverick County, according to the 2020 census, was 57,887. Maverick County WCID No. 1 serves some of these unincorporated areas. Maverick County's population is concentrated along the Rio Grande, so the limiting factor on supplies is typically water rights.

Table 4-5 Maverick County Municipal Needs Projections (acft/yr)

Entity	2030	2040	2050	2060	2070	2080
County-Other, Maverick	--	--	--	--	--	--
Eagle Pass	--	--	92	559	1,023	1,486
Maverick County	--	--	--	--	--	--
Total	**0**	**0**	**92**	**559**	**1,023**	**1,486**

Dash (--) indicates surplus for the associated WUG decade.

4.3.6 Starr County Municipal Needs

Municipal needs in Starr County are shown in Table 4-6. Starr County's population is concentrated along the Rio Grande, so the limiting factor on supplies is likely to be water rights. The primary need in Starr County is Rio Grande City, which is more than double some of the other entities needs from this county. Some areas in northeastern Starr County are experiencing dropping water levels, which require new or deepened wells.

Table 4-6 Starr County Municipal Needs Projections (acft/yr)

Entity	2030	2040	2050	2060	2070	2080
Agua SUD	--	--	--	--	--	--
County-Other, Starr	215	217	231	282	337	392
El Sauz WSC	62	76	87	91	95	99
El Tanque WSC	24	--	--	--	--	--
La Grulla	867	961	1,035	1,082	1,130	1,178
Rio Grande City	712	980	1,188	1,326	1,466	1,608
Rio WSC	193	337	433	433	431	429
Roma	--	--	--	67	156	247
Union WSC	691	749	799	845	892	939
Total	**2,764**	**3,320**	**3,773**	**4,126**	**4,507**	**4,892**
Dash (--) indicates surplus for the associated WUG decade.						

4.3.7 Webb County Municipal Needs

Webb County is the largest county in Region M but is relatively sparsely populated outside of Laredo and the cities south of Laredo along the Rio Grande. The population of Webb County, according to the 2020 census, is approximately 267,114, of which 96 percent is in Laredo. Limitations on access to water in this county are related to water rights, availability of groundwater, and infrastructure with which to access groundwater. Table 4-7 summarizes municipal needs projections in Webb County.

Table 4-7 Webb County Municipal Needs Projections (acft/yr)

Entity	2030	2040	2050	2060	2070	2080
County-Other, Webb*	1,117	643	154	154	160	161
Laredo	--	--	--	--	--	--
Mirando City WSC	--	--	--	--	--	--
Webb County	--	--	302	276	250	223
Total	**1,117**	**643**	**456**	**430**	**410**	**384**
Dash (--) indicates surplus for the associated WUG decade. *Webb County-Other includes public water systems in Bruni Rural, Los Botines, and Oilton Rural WSCs.						

4.3.8 Willacy County Municipal Needs

Willacy County, although not on the Rio Grande, is primarily supplied by water diverted from the river in Cameron and Hidalgo counties and delivered to users in Willacy County via irrigation districts. Needs projections for Willacy County are shown in Table 4-8.

Table 4-8 Willacy County Municipal Needs Projections (acft/yr)

Entity	2030	2040	2050	2060	2070	2080
County-Other, Willacy	--	--	--	--	--	--
Lyford	--	--	--	--	--	--
North Alamo WSC	--	25	74	108	145	183
Port Mansfield Public Utility District	40	67	102	156	219	292
Raymondville	--	--	--	--	--	--
Sebastian MUD	--	--	--	--	--	--
Total	**40**	**92**	**176**	**264**	**364**	**475**
Dash (--) indicates surplus for the associated WUG decade.						

4.3.9 Zapata County Municipal Needs

Zapata County accounts for a small portion of the region's municipal needs, but Zapata County's need accounts for almost all of its demands projected for 2030, shown in Table 4-9. Little groundwater pumping is documented in Zapata County.

Table 4-9 Zapata County Municipal Needs Projections (acft/yr)

Entity	2030	2040	2050	2060	2070	2080
County-Other, Zapata	--	--	11	20	26	32
Falcon Rural WSC	--	--	--	--	--	--
San Ygnacio & Ramireño	--	--	--	--	--	--
Siesta Shores WCID	--	--	--	--	--	--
Zapata County	--	--	--	--	--	--
Zapata County WCID-Hwy 16 East	--	--	--	--	--	--
Total	**0**	**0**	**11**	**20**	**26**	**32**
Dash (--) indicates surplus for the associated WUG decade.						

4.4 Irrigation Needs

Irrigation is the largest water user in Region M and also has the largest need. This is because of how the needs are calculated: using a year with maximum demand and minimum supply because irrigation surface water rights are filled only after all domestic, municipal, and industrial water is set aside. The portion of demands that is met and the resulting needs are shown on Figure 4-5. A detailed discussion on how irrigation demands are estimated is included in Chapter 2, and more information about how water is allocated on the Rio Grande is included in Chapter 3.

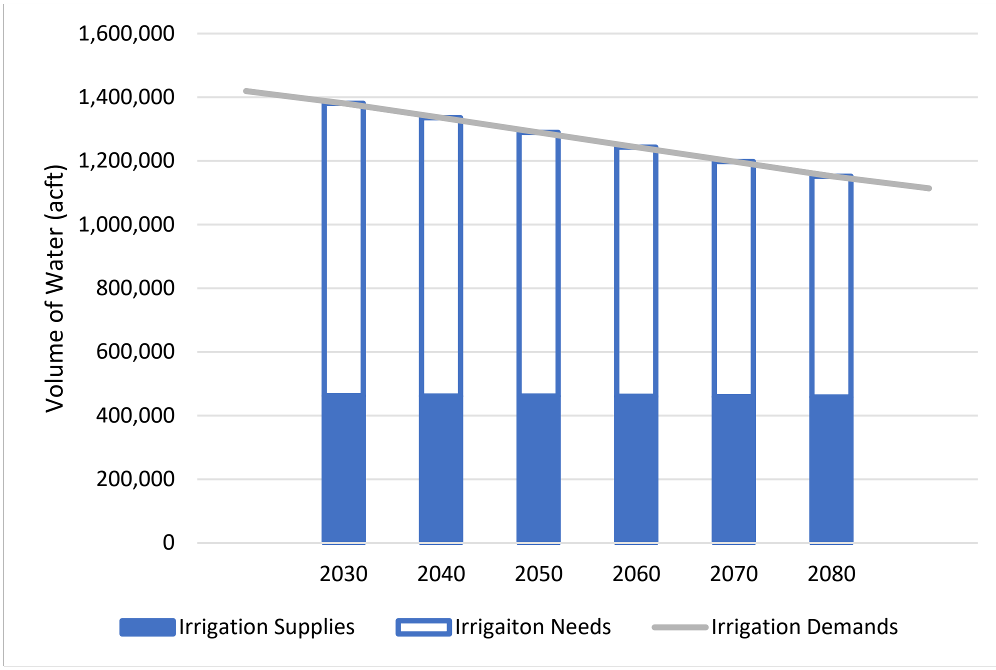

Figure 4-5 Irrigation Needs, Shown as a Portion of Irrigation Demands (acft/yr)[3]

Irrigation needs, shown in Table 4-10, are the highest in Cameron and Hidalgo counties, where there is the most heavily irrigated farmland. Needs are projected to decrease slightly as a result of decreasing demand. Increased efficiency and conservation on-farm may alleviate some of the impacts of drought on productivity for farmers. These needs represent the extent of shortage anticipated by farmers in years of limited supply.

Table 4-10 Irrigation Needs Projections, by County and River Basin (acft/yr)

County	Basin	2030	2040	2050	2060	2070	2080
Cameron	Nueces-Rio Grande	340,153	324,043	307,937	291,963	276,061	260,256
Cameron	Rio Grande	21,923	20,894	19,864	18,844	17,831	16,823
Hidalgo	Nueces-Rio Grande	414,119	393,058	371,993	351,157	330,482	309,879
Hidalgo	Rio Grande	17,135	16,261	15,392	14,527	13,674	12,821

[3] Region M Irrigation Supplies illustrated on figure do not include individual surplus supplies.

County	Basin	2030	2040	2050	2060	2070	2080
Jim Hogg	Nueces-Rio Grande	-	-	-	-	-	-
Jim Hogg	Rio Grande	-	-	-	-	-	-
Maverick	Rio Grande	21,588	19,636	17,683	15,771	13,886	12,015
Starr	Rio Grande	20,685	19,919	19,155	18,393	17,634	16,878
Webb	Rio Grande	3,348	3,019	2,689	2,367	2,052	1,742
Willacy	Nueces-Rio Grande	76,349	73,167	69,985	66,821	63,674	60,532
Zapata	Rio Grande	3,713	3,551	3,388	3,227	3,066	2,908
Total		**919,013**	**873,548**	**828,086**	**783,070**	**738,360**	**693,854**
Dash (--) indicates surplus for the associated irrigation decade.							

4.5 Steam Electric Power Generation Needs

The current supplies for steam electric power generation meet approximately 96 percent of the 2030 demands (Figure 4-6). This stems, in part, from the anticipated near-term growth of power generation demands, the likelihood of some short-term contractual water, and from increasingly efficient power generation in terms of consumptive water use. This will be discussed in Chapter 5 as part of the Industrial Implementation of Best Management Practices Water Management Strategy for addressing the needs of steam electric power generation. Table 4-11 shows that there are no projected steam electric needs.

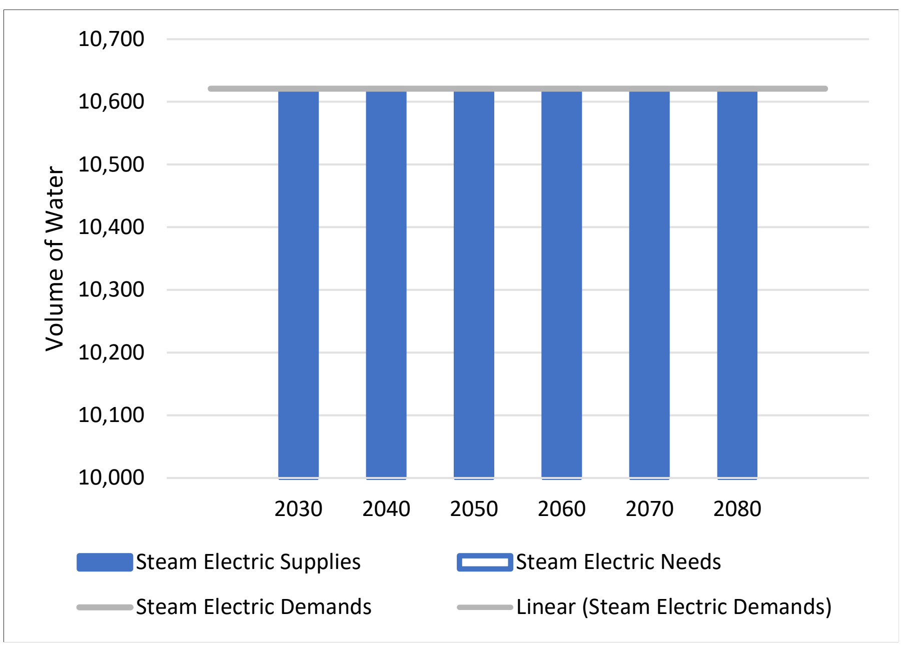

Figure 4-6 Steam Electric Needs, Shown as a Portion of Steam Electric Demands (acft/yr)[4]

[4] Region M Steam Electric Supplies illustrated on figure do not include individual surplus supplies.

Table 4-11 Steam Electric Needs Projections, by County and River Basin (acft/yr)

County	Basin	2030	2040	2050	2060	2070	2080
Cameron	Nueces-Rio Grande	--	--	--	--	--	--
Cameron	Rio Grande	--	--	--	--	--	--
Hidalgo	Nueces-Rio Grande	--	--	--	--	--	--
Hidalgo	Rio Grande	--	--	--	--	--	--
Webb	Rio Grande	--	--	--	--	--	--
Total		--	--	--	--	--	--
Dash (--) indicates surplus for the associated Steam Electric Power decade.							

4.6 Mining Needs

Current mining supplies appear to meet about 60 percent of the 2030 demands for mining water (Figure 4-7). This is in part because mining water rights to Rio Grande water are subject to decreased reliability in drought years, so the estimates of availability are significantly lower than what is available in a normal year. Because of reporting limitations, additional mining supplies from groundwater might exceed the MAG values for some aquifer/county/river basin areas. Mining needs are shown in Table 4-12.

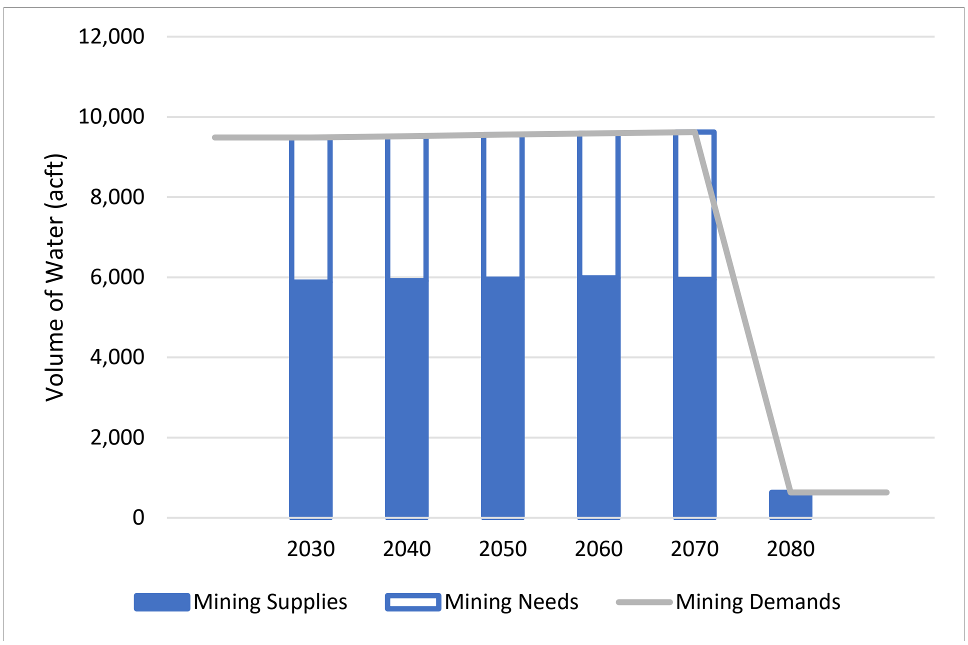

Figure 4-7 Mining Needs, Shown as a Portion of Mining Demands (acft/yr)[5]

[5] Region M Mining Supplies illustrated on figure do not include individual surplus supplies.

Table 4-12 Mining Needs Projections, by County and River Basin (acft/yr)

County	Basin	2030	2040	2050	2060	2070	2080
Cameron	Nueces-Rio Grande	--	--	--	--	--	--
Hidalgo	Nueces-Rio Grande	--	--	--	--	--	--
Hidalgo	Rio Grande	--	--	--	--	--	--
Jim Hogg	Nueces-Rio Grande	--	--	--	--	--	--
Jim Hogg	Rio Grande	--	--	--	--	--	--
Maverick	Nueces	17	17	17	17	81	--
Maverick	Rio Grande	3,587	3,588	3,589	3,591	3,594	--
Starr	Nueces-Rio Grande	--	--	--	--	--	--
Starr	Rio Grande	--	--	--	--	--	--
Webb	Nueces	--	--	--	--	--	--
Webb	Nueces-Rio Grande	--	--	--	--	--	--
Webb	Rio Grande	--	--	--	--	--	--
Willacy	Nueces-Rio Grande	--	--	--	--	--	--
Zapata	Rio Grande	--	--	--	--	--	--
Total		**3,604**	**3,605**	**3,606**	**3,608**	**3,675**	**--**
Dash (--) indicates surplus for the associated Mining decade.							

As discussed in Chapter 2, the mining, oil, and gas industry has very few requirements for reporting the volumes of groundwater used. This is an impediment to evaluating current and future availabilities and may result in over-allocation of some aquifers.

4.7 Manufacturing Needs

Manufacturing needs are shown on Figure 4-8 and in Table 4-13. Water demand associated with manufacturing is met by both groundwater and surface water and comprises a relatively small portion of the regional demand and need. Current supplies meet 100 percent of 2030-2050 projected demands.

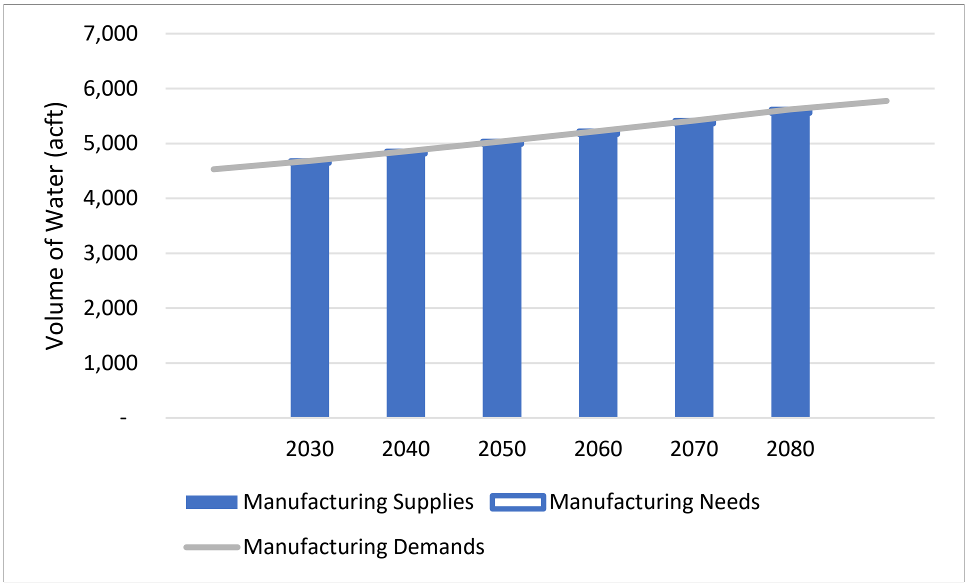

Figure 4-8 Manufacturing Needs, Shown as a Portion of Manufacturing Demands (acft/yr)[6]

Table 4-13 Manufacturing Needs Projections, by County and River Basin (acft/yr)

County	Basin	2030	2040	2050	2060	2070	2080
Cameron	Nueces-Rio Grande	--	--	--	--	--	--
Hidalgo	Nueces-Rio Grande	--	--	--	--	--	--
Hidalgo	Rio Grande	--	--	--	--	--	--
Jim Hogg	Nueces-Rio Grande	--	--	--	--	--	--
Maverick	Rio Grande	--	--	--	1	5	9
Starr	Rio Grande	--	--	--	--	--	--
Webb	Nueces	--	--	--	--	--	--
Webb	Rio Grande	--	--	--	--	--	--
Total		--	--	--	**1**	**5**	**9**
Dash (--) indicates surplus for the associated Manufacturing decade.							

[6] Region M Manufacturing Supplies illustrated on figure do not include individual surplus supplies.

4.8 Livestock Needs

Livestock demands are met by numerous groundwater wells, ephemeral streams and ponds, as well as surface water diversions, often classified together with lawn watering contracts or referred to herein as livestock local supplies. These supplies are expected to be sufficient to meet the needs of the (stable) livestock demand, and therefore, livestock has no needs (Figure 4-9). In particular areas, providing sufficient water in a drought year may be difficult, but overall, ranchers are expected to manage their livestock within the available supplies.

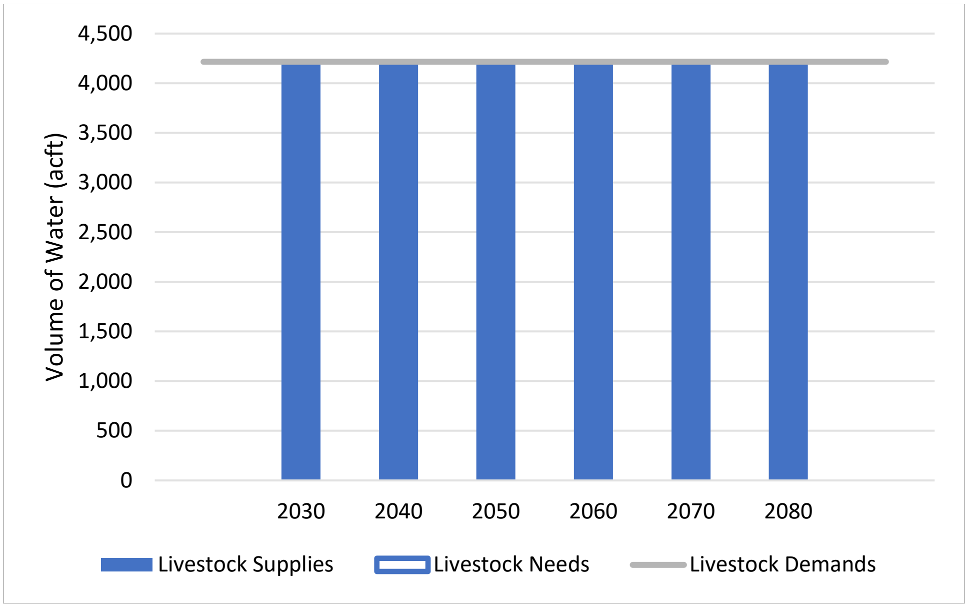

Figure 4-9 Livestock Needs, Shown as a Portion of Livestock Demands (acft/yr)[7]

4.9 Secondary Needs Analysis

Needs that remain after conservation and reuse WMS that have been applied are considered second-tier needs. Detailed secondary needs estimates for WUGs are included in Appendix 4A. An evaluation of Major Water Provider (MWP) second tier needs is included in Appendix 4B.

A TWDB social and economic impacts evaluation of projected water shortages if no WMS are implemented can be found in Chapter 6.

[7] Region M Livestock Supplies illustrated on figure do not include individual surplus supplies.

Appendix 4A. Relevant Reports from the 2027 Regional and State Water Planning Database (DB27)

DRAFT Region M Water User Group (WUG) Needs or Surplus

WUG supplies and projected demands are entered for each of a WUG's region-county-basin divisions. The needs shown in the WUG Needs/Surplus report are calculated by first deducting the WUG split's projected demand from its total existing water supply volume. If the WUG split has a greater existing supply volume than projected demand in any given decade, this amount is considered a surplus volume. Surplus volumes are shown as positive values, and needs are shown as negative values in parentheses.

			Water Supply Needs or Surplus (acre-feet per year)					
WUG Name	County	Basin	2030	2040	2050	2060	2070	2080
Brownsville	Cameron	Nueces-Rio Grande	10,000	9,312	9,018	9,116	9,215	9,316
Combes	Cameron	Nueces-Rio Grande	402	397	395	396	397	398
East Rio Hondo WSC	Cameron	Nueces-Rio Grande	2,024	1,370	(118)	(639)	(921)	(1,216)
El Jardin WSC	Cameron	Nueces-Rio Grande	(184)	(209)	(222)	(218)	(214)	(210)
Harlingen	Cameron	Nueces-Rio Grande	6,128	5,808	5,669	5,712	5,752	5,793
La Feria	Cameron	Nueces-Rio Grande	513	598	690	893	1,196	1,400
Laguna Madre Water District	Cameron	Nueces-Rio Grande	2,875	2,768	2,726	2,742	2,759	2,777
Los Fresnos	Cameron	Nueces-Rio Grande	479	466	461	463	465	467
Military Highway WSC	Cameron	Nueces-Rio Grande	(49)	(135)	(173)	(158)	(142)	(125)
North Alamo WSC	Cameron	Nueces-Rio Grande	(126)	(143)	(150)	(147)	(145)	(143)
Olmito WSC	Cameron	Nueces-Rio Grande	339	307	288	276	263	248
Palm Valley	Cameron	Nueces-Rio Grande	30	25	23	24	25	26
Primera	Cameron	Nueces-Rio Grande	(25)	(185)	(295)	(379)	(471)	(522)
Rio Hondo	Cameron	Nueces-Rio Grande	499	497	496	496	497	497
San Benito	Cameron	Nueces-Rio Grande	597	1,030	1,980	2,090	2,300	2,311
Santa Rosa	Cameron	Nueces-Rio Grande	365	360	358	359	360	361
Valley MUD 2	Cameron	Nueces-Rio Grande	257	267	277	298	320	324
County-Other	Cameron	Nueces-Rio Grande	(2,434)	(1,561)	(638)	151	672	1,131
Manufacturing	Cameron	Nueces-Rio Grande	519	502	484	466	447	427

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

DRAFT Region M Water User Group (WUG) Needs or Surplus

			Water Supply Needs or Surplus (acre-feet per year)					
WUG Name	**County**	**Basin**	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Livestock	Cameron	Nueces-Rio Grande	130	130	130	130	130	130
Irrigation	Cameron	Nueces-Rio Grande	(340,153)	(324,043)	(307,937)	(291,963)	(276,061)	(260,256)
Brownsville	Cameron	Rio Grande	62	54	52	52	53	55
El Jardin WSC	Cameron	Rio Grande	(1)	(2)	(2)	(2)	(2)	(2)
Military Highway WSC	Cameron	Rio Grande	(6)	(7)	(7)	(7)	(7)	(7)
Valley MUD 2	Cameron	Rio Grande	35	35	37	38	39	39
Steam Electric Power	Cameron	Rio Grande	0	0	0	0	0	0
Livestock	Cameron	Rio Grande	19	19	19	19	19	19
Irrigation	Cameron	Rio Grande	(21,923)	(20,894)	(19,864)	(18,844)	(17,831)	(16,823)
Agua SUD	Hidalgo	Nueces-Rio Grande	1,219	763	444	299	152	5
Alamo	Hidalgo	Nueces-Rio Grande	1,015	965	914	820	724	626
Donna	Hidalgo	Nueces-Rio Grande	919	803	720	661	603	545
Edcouch	Hidalgo	Nueces-Rio Grande	43	62	70	56	41	26
Edinburg	Hidalgo	Nueces-Rio Grande	(451)	(1,356)	(1,969)	(2,167)	(2,366)	(2,565)
Elsa	Hidalgo	Nueces-Rio Grande	60	109	133	97	60	23
Hidalgo	Hidalgo	Nueces-Rio Grande	216	308	252	211	170	128
Hidalgo County MUD 1	Hidalgo	Nueces-Rio Grande	62	48	34	18	0	(17)
La Joya	Hidalgo	Nueces-Rio Grande	(195)	(225)	(245)	(256)	(268)	(280)
La Villa	Hidalgo	Nueces-Rio Grande	11	(30)	(56)	(53)	(50)	(47)
McAllen	Hidalgo	Nueces-Rio Grande	(1,361)	(5,494)	(11,326)	(12,558)	(13,809)	(15,080)
Mercedes	Hidalgo	Nueces-Rio Grande	1,300	1,288	1,266	1,205	1,142	1,078
Military Highway WSC	Hidalgo	Nueces-Rio Grande	1,016	1,073	1,085	972	857	738
Mission	Hidalgo	Nueces-Rio Grande	335	(630)	(1,317)	(1,792)	(2,275)	(2,764)

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DRAFT Region M Water User Group (WUG) Needs or Surplus

			Water Supply Needs or Surplus (acre-feet per year)					
WUG Name	**County**	**Basin**	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
North Alamo WSC	Hidalgo	Nueces-Rio Grande	(12,797)	(16,056)	(18,254)	(18,625)	(18,993)	(19,362)
Pharr	Hidalgo	Nueces-Rio Grande	(1,803)	(2,310)	(2,676)	(2,864)	(3,053)	(3,244)
San Juan	Hidalgo	Nueces-Rio Grande	1,418	1,354	1,291	1,172	1,051	927
Sharyland WSC	Hidalgo	Nueces-Rio Grande	1,532	125	(794)	(1,035)	(1,276)	(1,516)
Weslaco	Hidalgo	Nueces-Rio Grande	678	755	723	530	333	133
County-Other	Hidalgo	Nueces-Rio Grande	1	200	418	406	392	379
Manufacturing	Hidalgo	Nueces-Rio Grande	789	646	497	343	183	17
Mining	Hidalgo	Nueces-Rio Grande	1,309	1,279	1,253	1,225	1,197	1,166
Steam Electric Power	Hidalgo	Nueces-Rio Grande	0	0	0	0	0	0
Livestock	Hidalgo	Nueces-Rio Grande	57	73	73	73	73	73
Irrigation	Hidalgo	Nueces-Rio Grande	(414,119)	(393,058)	(371,993)	(351,157)	(330,482)	(309,879)
Agua SUD	Hidalgo	Rio Grande	192	170	155	148	141	134
Hidalgo	Hidalgo	Rio Grande	4	3	2	2	1	0
La Joya	Hidalgo	Rio Grande	(37)	(44)	(49)	(52)	(55)	(57)
Military Highway WSC	Hidalgo	Rio Grande	51	51	52	51	50	49
County-Other	Hidalgo	Rio Grande	(965)	103	1,279	1,210	1,139	1,066
Manufacturing	Hidalgo	Rio Grande	18	16	14	12	10	8
Mining	Hidalgo	Rio Grande	10	13	12	11	10	12
Livestock	Hidalgo	Rio Grande	71	55	55	55	55	55
Irrigation	Hidalgo	Rio Grande	(17,135)	(16,261)	(15,392)	(14,527)	(13,674)	(12,821)
Jim Hogg County WCID 2	Jim Hogg	Nueces-Rio Grande	938	946	958	970	983	995
County-Other	Jim Hogg	Nueces-Rio Grande	7	9	13	14	18	21
Manufacturing	Jim Hogg	Nueces-Rio Grande	10	8	6	4	2	0
Mining	Jim Hogg	Nueces-Rio Grande	0	0	0	0	0	0
Livestock	Jim Hogg	Nueces-Rio Grande	0	0	0	0	0	0

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DRAFT Region M Water User Group (WUG) Needs or Surplus

			Water Supply Needs or Surplus (acre-feet per year)					
WUG Name	**County**	**Basin**	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Irrigation	Jim Hogg	Nueces-Rio Grande	0	9	19	28	38	47
County-Other	Jim Hogg	Rio Grande	7	7	7	8	8	8
Livestock	Jim Hogg	Rio Grande	2	2	2	2	2	2
Irrigation	Jim Hogg	Rio Grande	0	2	4	6	8	11
County-Other	Maverick	Nueces	3	4	5	5	5	6
Mining	Maverick	Nueces	(17)	(17)	(17)	(17)	(81)	0
Livestock	Maverick	Nueces	0	0	0	0	0	0
Eagle Pass	Maverick	Rio Grande	1,042	429	(92)	(559)	(1,023)	(1,486)
Maverick County	Maverick	Rio Grande	394	279	200	197	194	193
County-Other	Maverick	Rio Grande	9	66	102	125	141	151
Manufacturing	Maverick	Rio Grande	11	7	3	(1)	(5)	(9)
Mining	Maverick	Rio Grande	(3,587)	(3,588)	(3,589)	(3,591)	(3,594)	1,217
Livestock	Maverick	Rio Grande	0	0	0	0	0	0
Irrigation	Maverick	Rio Grande	(21,588)	(19,636)	(17,683)	(15,771)	(13,886)	(12,015)
County-Other	Starr	Nueces-Rio Grande	(8)	(10)	(14)	(25)	(37)	(48)
Mining	Starr	Nueces-Rio Grande	17	14	11	7	4	1
Livestock	Starr	Nueces-Rio Grande	57	57	57	57	57	57
Agua SUD	Starr	Rio Grande	8	7	6	6	6	5
El Sauz WSC	Starr	Rio Grande	(62)	(76)	(87)	(91)	(95)	(99)
El Tanque WSC	Starr	Rio Grande	(24)	3	25	41	56	69
La Grulla	Starr	Rio Grande	(867)	(961)	(1,035)	(1,082)	(1,130)	(1,178)
Rio Grande City	Starr	Rio Grande	(712)	(980)	(1,188)	(1,326)	(1,466)	(1,608)
Rio WSC	Starr	Rio Grande	(193)	(337)	(433)	(433)	(431)	(429)
Roma	Starr	Rio Grande	257	129	21	(67)	(156)	(247)
Union WSC	Starr	Rio Grande	(691)	(749)	(799)	(845)	(892)	(939)
County-Other	Starr	Rio Grande	(207)	(207)	(217)	(257)	(300)	(344)
Manufacturing	Starr	Rio Grande	15	12	9	6	3	0
Mining	Starr	Rio Grande	16	12	8	6	3	0
Livestock	Starr	Rio Grande	0	0	0	0	0	0
Irrigation	Starr	Rio Grande	(20,685)	(19,919)	(19,155)	(18,393)	(17,634)	(16,878)
Webb County	Webb	Nueces	76	2	(67)	(63)	(61)	(57)
County-Other	Webb	Nueces	(22)	(10)	2	2	2	2
Manufacturing	Webb	Nueces	30	28	27	26	24	23
Mining	Webb	Nueces	100	108	118	121	127	1,979
Livestock	Webb	Nueces	0	0	0	0	0	0

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DRAFT Region M Water User Group (WUG) Needs or Surplus

			Water Supply Needs or Surplus (acre-feet per year)					
WUG Name	**County**	**Basin**	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
County-Other	Webb	Nueces-Rio Grande	(198)	(90)	22	22	21	21
Livestock	Webb	Nueces-Rio Grande	0	0	0	0	0	0
Laredo	Webb	Rio Grande	18,143	16,682	16,180	16,625	17,075	17,530
Mirando City WSC	Webb	Rio Grande	41	40	40	40	40	41
Webb County	Webb	Rio Grande	752	241	(235)	(213)	(189)	(166)
County-Other	Webb	Rio Grande	(897)	(543)	(178)	(178)	(183)	(184)
Manufacturing	Webb	Rio Grande	39	38	36	34	33	31
Mining	Webb	Rio Grande	212	224	233	239	245	2,497
Steam Electric Power	Webb	Rio Grande	0	0	0	0	0	0
Livestock	Webb	Rio Grande	0	0	0	0	0	0
Irrigation	Webb	Rio Grande	(3,348)	(3,019)	(2,689)	(2,367)	(2,052)	(1,742)
Lyford	Willacy	Nueces-Rio Grande	402	411	418	424	428	431
North Alamo WSC	Willacy	Nueces-Rio Grande	36	(25)	(74)	(108)	(145)	(183)
Port Mansfield PUD	Willacy	Nueces-Rio Grande	(40)	(67)	(102)	(156)	(219)	(292)
Raymondville	Willacy	Nueces-Rio Grande	2,610	2,634	2,650	2,661	2,667	2,664
Sebastian MUD	Willacy	Nueces-Rio Grande	109	118	125	130	134	137
County-Other	Willacy	Nueces-Rio Grande	487	489	532	611	710	830
Mining	Willacy	Nueces-Rio Grande	0	0	0	0	0	0
Livestock	Willacy	Nueces-Rio Grande	112	112	17	17	17	17
Irrigation	Willacy	Nueces-Rio Grande	(76,349)	(73,167)	(69,985)	(66,821)	(63,674)	(60,532)
Falcon Rural WSC	Zapata	Rio Grande	239	253	264	271	277	282
Siesta Shores WCID	Zapata	Rio Grande	156	154	154	157	159	161
Zapata County	Zapata	Rio Grande	505	484	483	502	522	542
Zapata County San Ygnacio & Ramireño	Zapata	Rio Grande	221	231	239	245	249	253
Zapata County WCID-Hwy 16 East	Zapata	Rio Grande	341	339	339	341	342	344
County-Other	Zapata	Rio Grande	23	3	(11)	(20)	(26)	(32)

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DRAFT Region M Water User Group (WUG) Needs or Surplus

			Water Supply Needs or Surplus (acre-feet per year)					
WUG Name	**County**	**Basin**	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Mining	Zapata	Rio Grande	2	2	2	2	2	2
Livestock	Zapata	Rio Grande	0	0	0	0	0	0
Irrigation	Zapata	Rio Grande	(3,713)	(3,551)	(3,388)	(3,227)	(3,066)	(2,908)

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Appendix 4B. Major Water Providers Summary

Agua SUD	**Use Type**	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population		**66,231**	**71,088**	**74,224**	**75,649**	**77,086**	**78,536**
WUG Demand	Municipal	7,126	7,605	7,940	8,092	8,246	8,401
WWP Supplies		**8,545**	**8,545**	**8,545**	**8,545**	**8,545**	**8,545**
WWP Need/Surplus		**1,419**	**940**	**605**	**453**	**299**	**144**
Irrigation District Conservation		382	762	1,144	1,525	1,905	2,286
West WWTP Indirect Potable Reuse		-	1,120	1,120	1,120	1,120	1,120
New Supplies from Conservation and Reuse WMS		**382**	**1,882**	**2,264**	**2,645**	**3,025**	**3,406**
Second-Tier Needs/Surplus		**1,801**	**2,822**	**2,869**	**3,098**	**3,324**	**3,550**

Alamo		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population		**19,549**	**20,026**	**20,404**	**21,105**	**21,819**	**22,550**
WUG Demand	Municipal	2,638	2,688	2,739	2,833	2,929	3,027
WWP Supplies		**3,653**	**3,653**	**3,653**	**3,653**	**3,653**	**3,653**
WWP Need/Surplus		**1,015**	**965**	**914**	**820**	**724**	**626**
Irrigation District Conservation		104	209	313	418	522	626
New Supplies from Conservation and Reuse WMS		**104**	**209**	**313**	**418**	**522**	**626**
Second-Tier Needs/Surplus		**1,119**	**1,174**	**1,227**	**1,238**	**1,246**	**1,252**

Bayview Irrigation District No. 11		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
County-Other, Cameron – Contract Demand	Municipal	183	183	183	183	183	183
Irrigation, Cameron – Contract Demand	Irrigation	16,978	16,978	16,978	16,978	16,978	16,978
WWP Demand		**17,161**	**17,161**	**17,161**	**17,161**	**17,161**	**17,161**
County-Other, Cameron – Sale/Transfer	Municipal	124	124	124	124	124	124
Irrigation, Cameron – Sale/Transfer	Irrigation	4,604	4,601	4,597	4,589	4,578	4,565
WWP Supplies		**4,728**	**4,725**	**4,721**	**4,713**	**4,702**	**4,689**
County-Other, Cameron	Municipal	59	59	59	59	59	59
Irrigation, Cameron	Irrigation	12,374	12,377	12,381	12,389	12,400	12,413
WWP Need/Surplus		**(12,433)**	**(12,436)**	**(12,440)**	**(12,448)**	**(12,459)**	**(12,472)**
Irrigation District Conservation		255	510	765	1,020	1,275	1,530
New Supplies from Conservation and Reuse WMS		**255**	**510**	**765**	**1,020**	**1,275**	**1,530**
Second-Tier Needs/Surplus		**(12,178)**	**(11,926)**	**(11,675)**	**(11,428)**	**(11,184)**	**(10,942)**

Brownsville PUB		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population		**191,689**	**196,629**	**198,396**	**197,812**	**197,213**	**196,600**
WUG Demand	Municipal	32,212	32,908	33,204	33,106	33,006	32,903
El Jardin WSC – Contract Demand	Municipal	1,200	1,200	1,200	1,200	1,200	1,200
Cameron County Irrigation – Contract Demand	Irrigation	1,783	1,783	1,783	1,783	1,783	1,783

Cameron County Manufacturing – Contract Demand	Manufacturing	292	292	292	292	292	292
Steam Electric Power Generation, Cameron County – Contract Demand	Steam Electric Power	165	165	165	165	165	165
WWP Demand		**35,652**	**36,348**	**36,644**	**36,546**	**36,446**	**36,343**
WUG Supply	Municipal	42,274	42,274	42,274	42,274	42,274	42,274
El Jardin WSC – Sale/Transfer	Municipal	1,200	1,200	1,200	1,200	1,200	1,200
Cameron County Irrigation – Sale/Transfer	Irrigation	711	710	710	709	707	705
Cameron County Manufacturing – Sale/Transfer	Manufacturing	292	292	292	292	292	292
Steam Electric Power Generation, Cameron County – Sale/Transfer	Steam Electric Power	165	165	165	165	165	165
WWP Supplies		**44,642**	**44,641**	**44,641**	**44,640**	**44,638**	**44,636**
WUG Need	Municipal	10,062	9,366	9,070	9,168	9,268	9,371
El Jardin WSC	Municipal	-	-	-	-	-	-
Cameron County Irrigation	Irrigation	(1,072)	(1,073)	(1,073)	(1,074)	(1,076)	(1,078)
Cameron County Manufacturing	Manufacturing	-	-	-	-	-	-
Steam Electric Power Generation, Cameron County	Steam Electric Power	-	-	-	-	-	-
WWP Need/Surplus		**8,990**	**8,293**	**7,997**	**8,094**	**8,192**	**8,293**
Advanced Municipal Conservation		3,225	4,650	6,114	7,447	8,706	9,890
Irrigation District Conservation		2	5	7	10	13	15
Southside WWTP Potable Reuse		-	-	3,360	3,360	3,360	3,360
Indirect Potable Reuse		4,480	4,480	4,480	4,480	4,480	4,480
New Supplies from Conservation and Reuse WMS		**7,707**	**9,135**	**13,961**	**15,297**	**16,559**	**17,745**
Second-Tier Needs/Surplus		**16,697**	**17,428**	**21,958**	**23,391**	**24,751**	**26,038**

Brownsville Irrigation District		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Brownsville – Contract Demand	Municipal	1,200	1,200	1,200	1,200	1,200	1,200
County-Other, Cameron – Contract Demand	Municipal	334	334	334	334	334	334
Hidalgo County WID 3 – Contract Demand	Wholesale Water Provider	2,000	2,000	2,000	2,000	2,000	2,000
Irrigation, Cameron – Contract Demand	Irrigation	31,949	31,949	31,949	31,949	31,949	31,949
WWP Demand		**35,483**	**35,483**	**35,483**	**35,483**	**35,483**	**35,483**
Brownsville – Sale/Transfer	Municipal	1,200	1,200	1,200	1,200	1,200	1,200
County-Other, Cameron – Sale/Transfer	Municipal	227	227	227	227	227	227
Hidalgo County WID 3 – Sale/Transfer	Wholesale Water Provider	2,000	2,000	2,000	2,000	2,000	2,000
Irrigation, Cameron – Sale/Transfer	Irrigation	8,664	8,658	8,651	8,636	8,641	8,590
WWP Supplies		**12,091**	**12,085**	**12,078**	**12,063**	**12,068**	**12,017**
Brownsville	Municipal	-	-	-	-	-	-
County-Other, Cameron	Municipal	(107)	(107)	(107)	(107)	(107)	(107)
Hidalgo County WID 3	Wholesale Water Provider	-	-	-	-	-	-
Irrigation, Cameron	Irrigation	(23,285)	(23,291)	(23,298)	(23,313)	(23,308)	(23,359)
WWP Need/Surplus		**(23,392)**	**(23,398)**	**(23,405)**	**(23,420)**	**(23,415)**	**(23,466)**

Irrigation District Conservation		608	1,216	1,823	2,431	3,039	3,647
New Supplies from Conservation and Reuse WMS		**608**	**1,216**	**1,823**	**2,431**	**3,039**	**3,647**
Second-Tier Needs/Surplus		**(22,784)**	**(22,182)**	**(21,582)**	**(20,989)**	**(20,376)**	**(19,819)**

Cameron County Irrigation District No. 2		2030	2040	2050	2060	2070	2080
Cameron County Other – Contract Demand	Municipal	750	750	750	750	750	750
East Rio Hondo WSC – Contract Demand	Municipal	5,521	5,521	5,521	5,521	5,521	5,521
Cameron County Irrigation – Contract Demand	Irrigation	151,536	151,536	151,536	151,536	151,536	151,536
Cameron County Manufacturing – Contract Demand	Manufacturing	192	192	192	192	192	192
Rio Hondo – Contract Demand	Municipal	771	771	771	771	771	771
San Benito – Contract Demand	Municipal	7,032	7,032	7,032	7,032	7,032	7,032
WWP Demand		**165,802**	**165,802**	**165,802**	**165,802**	**165,802**	**165,802**
Cameron County Other – Sale/Transfer	Municipal	600	600	600	600	600	600
East Rio Hondo WSC – Sale/Transfer	Municipal	4,417	4,417	3,617	3,617	3,617	3,617
Cameron County Irrigation – Sale/Transfer	Irrigation	48,349	48,313	48,276	48,191	48,070	47,937
Cameron County Manufacturing – Sale/Transfer	Manufacturing	154	154	154	154	154	154
Rio Hondo – Sale/Transfer	Municipal	617	617	617	617	617	617
San Benito – Sale/Transfer	Municipal	5,626	5,626	5,626	5,626	5,626	5,626
WWP Supplies		**59,763**	**59,727**	**58,890**	**58,805**	**58,684**	**58,551**
Cameron County Other	Municipal	(150)	(150)	(150)	(150)	(150)	(150)
East Rio Hondo WSC	Municipal	(1,104)	(1,104)	(1,904)	(1,904)	(1,904)	(1,904)
Cameron County Irrigation	Irrigation	(103,187)	(103,223)	(103,260)	(103,345)	(103,466)	(103,599)
Cameron County Manufacturing	Manufacturing	(38)	(38)	(38)	(38)	(38)	(38)
Rio Hondo	Municipal	(154)	(154)	(154)	(154)	(154)	(154)
San Benito	Municipal	(1,406)	(1,406)	(1,406)	(1,406)	(1,406)	(1,406)
WWP Need/Surplus		**(106,039)**	**(106,075)**	**(106,912)**	**(106,997)**	**(107,118)**	**(107,251)**
Irrigation District Conservation		1,248	2,497	3,745	4,994	6,242	7,491
New Supplies from Conservation and Reuse WMS		**1,248**	**2,497**	**3,745**	**4,994**	**6,242**	**7,491**
Second-Tier Needs/Surplus		**(104,791)**	**(103,578)**	**(103,167)**	**(102,003)**	**(100,876)**	**(99,760)**

Cameron County Irrigation District No. 3 - La Feria		2030	2040	2050	2060	2070	2080
Cameron County Other – Contract Demand	Municipal	900	900	900	900	900	900
Cameron County Irrigation – Contract Demand	Irrigation	34,220	34,194	34,169	34,109	34,023	33,928
La Feria – Contract Demand	Municipal	3,000	3,000	3,000	3,000	3,000	3,000
Santa Rosa – Contract Demand	Municipal	900	900	900	900	900	900
Sebastian MUD – Contract Demand	Municipal	300	300	300	300	300	300
Siesta Shores WCID – Contract Demand	Municipal	216	216	216	216	216	216
WWP Demand		**39,536**	**39,510**	**39,485**	**39,425**	**39,339**	**39,244**

Cameron County Other	Municipal	612	612	612	612	612	612
Cameron County Irrigation	Irrigation	23,270	23,252	23,235	23,194	23,136	23,071
La Feria	Municipal	1,300	1,400	1,500	1,700	2,000	2,200
Santa Rosa	Municipal	612	612	612	612	612	612
Sebastian MUD	Municipal	204	204	204	204	204	204
Siesta Shores WCID	Municipal	147	147	147	147	147	147
WWP Supplies		**26,145**	**26,227**	**26,310**	**26,469**	**26,711**	**26,846**
Cameron County Other	Municipal	(288)	(288)	(288)	(288)	(288)	(288)
Cameron County Irrigation	Irrigation	(10,950)	(10,942)	(10,934)	(10,915)	(10,887)	(10,857)
La Feria	Municipal	(1,700)	(1,600)	(1,500)	(1,300)	(1,000)	(800)
Santa Rosa	Municipal	(288)	(288)	(288)	(288)	(288)	(288)
Sebastian MUD	Municipal	(96)	(96)	(96)	(96)	(96)	(96)
Siesta Shores WCID	Municipal	(69)	(69)	(69)	(69)	(69)	(69)
WWP Need/Surplus		**(13,391)**	**(13,283)**	**(13,175)**	**(12,956)**	**(12,628)**	**(12,398)**
Irrigation District Conservation		1,455	2,911	4,366	5,822	7,277	8,733
New Supplies from Conservation and Reuse WMS		**1,455**	**2,911**	**4,366**	**5,822**	**7,277**	**8,733**
Second-Tier Needs/Surplus		**(11,936)**	**(10,372)**	**(8,809)**	**(7,134)**	**(5,351)**	**(3,665)**

Cameron County ID No. 6		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Brownsville PUB – Contract Demand	Municipal	300	300	300	300	300	300
Cameron County Irrigation District 10	Wholesale Water Provider	25,414	25,414	25,414	25,414	25,414	25,414
Cameron County Irrigation – Contract Demand	Irrigation	49,565	49,565	49,565	49,565	49,565	49,565
Los Fresnos – Contract Demand	Municipal	1,051	1,051	1,051	1,051	1,051	1,051
Cameron County Manufacturing – Contract Demand	Manufacturing	20	20	20	20	20	20
Olmito WSC – Contract Demand	Municipal	1,885	1,885	1,885	1,885	1,885	1,885
WWP Demand		**78,235**	**78,235**	**78,235**	**78,235**	**78,235**	**78,235**
Brownsville PUB	Municipal	255	255	255	255	255	255
Cameron County Irrigation District 10	Wholesale Water Provider	10,210	10,203	10,196	10,178	10,153	10,126
Cameron County Irrigation	Irrigation	16,802	16,789	16,776	16,747	16,705	16,658
Los Fresnos	Municipal	893	893	893	893	893	893
Cameron County Manufacturing	Manufacturing	14	14	14	14	14	14
Olmito WSC	Municipal	1,665	1,665	1,665	1,665	1,665	1,665
WWP Supplies		**29,839**	**29,819**	**29,799**	**29,752**	**29,685**	**29,611**
Brownsville PUB	Municipal	(45)	(45)	(45)	(45)	(45)	(45)
Cameron County Irrigation District 10	Wholesale Water Provider	(15,204)	(15,211)	(15,218)	(15,236)	(15,261)	(15,288)
Cameron County Irrigation	Irrigation	(32,763)	(32,776)	(32,789)	(32,818)	(32,860)	(32,907)
Los Fresnos	Municipal	(158)	(158)	(158)	(158)	(158)	(158)
Cameron County Manufacturing	Manufacturing	(6)	(6)	(6)	(6)	(6)	(6)

Olmito WSC	Municipal	(220)	(220)	(220)	(220)	(220)	(220)
WWP Need/Surplus		**(48,396)**	**(48,416)**	**(48,436)**	**(48,483)**	**(48,550)**	**(48,624)**
Irrigation District Conservation		272	543	815	1,086	1,358	1,629
New Supplies from Conservation and Reuse WMS		**272**	**543**	**815**	**1,086**	**1,358**	**1,629**
Second-Tier Needs/Surplus		**(48,124)**	**(47,873)**	**(47,621)**	**(47,397)**	**(47,192)**	**(46,995)**

Cameron County ID No. 10		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Bayvirew Irrigation District 11	Wholesale Water Provider	17,161	17,161	17,161	17,161	17,161	17,161
Cameron County Irrigation – Contract Demand	Irrigation	7,953	7,953	7,953	7,953	7,953	7,953
WWP Demand		**25,114**	**25,114**	**25,114**	**25,114**	**25,114**	**25,114**
Bayvirew Irrigation District 11	Wholesale Water Provider	6,954	6,949	6,944	6,932	6,915	6,896
Cameron County Irrigation	Irrigation	2,157	2,155	2,153	2,150	2,144	2,138
WWP Supplies		**9,111**	**9,104**	**9,097**	**9,082**	**9,059**	**9,034**
Bayvirew Irrigation District 11	Wholesale Water Provider	(10,207)	(10,212)	(10,217)	(10,229)	(10,246)	(10,265)
Cameron County Irrigation	Irrigation	(5,796)	(5,798)	(5,800)	(5,803)	(5,809)	(5,815)
WWP Need/Surplus		**(16,003)**	**(16,010)**	**(16,017)**	**(16,032)**	**(16,055)**	**(16,080)**
Irrigation District Conservation		372	744	1,115	1,487	1,859	2,231
New Supplies from Conservation and Reuse WMS		372	744	1,115	1,487	1,859	2,231
Second-Tier Needs/Surplus		**(15,631)**	**(15,266)**	**(14,902)**	**(14,545)**	**(14,196)**	**(13,849)**

Delta Lake ID		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Willacy County-Other - Contract Demand	Municipal	100	100	100	100	100	100
Engelman Irrigation District	Wholesale Water Provider	6,872	6,866	6,861	6,849	6,832	6,813
Hidalgo County Irrigation – Contract Demand	Irrigation	39,655	39,625	39,595	39,525	39,426	39,316
Willacy County Irrigation – Contract Demand	Irrigation	30,283	30,260	30,238	30,184	30,108	30,025
Willacy County Livestock – Contract Demand	Livestock	235	235	140	140	140	140
Lyford - Contract Demand	Municipal	980	980	980	980	980	980
North Alamo WSC - Contract Demand	Municipal	8,727	8,727	8,727	8,727	8,727	8,727
Raymondville - Contract Demand	Municipal	5,894	5,894	5,894	5,894	5,894	5,894
Valley Acres Irrigation District	Wholesale Water Provider	6,510	6,505	6,500	6,489	6,472	6,455
WWP Demand		**99,256**	**99,192**	**99,035**	**98,888**	**98,679**	**98,450**
Willacy County-Other	Municipal	65	65	65	65	65	65
Engelman Irrigation District	Wholesale Water Provider	6,872	6,866	6,861	6,849	6,832	6,813
Hidalgo County Irrigation	Irrigation	25,765	25,746	25,726	25,681	25,617	25,546
Willacy County Irrigation	Irrigation	19,684	19,669	19,654	19,620	19,570	19,516
Willacy County Livestock	Livestock	235	235	140	140	140	140
Lyford	Municipal	637	637	637	637	637	637
North Alamo WSC	Municipal	5,673	5,673	5,673	5,673	5,673	5,673

Raymondville	Municipal	3,744	3,744	3,743	3,743	3,743	3,743
Valley Acres Irrigation District	Wholesale Water Provider	6,510	6,505	6,500	6,489	6,472	6,455
WWP Supplies		**69,185**	**69,140**	**68,999**	**68,897**	**68,749**	**68,588**
Willacy County-Other	Municipal	(35)	(35)	(35)	(35)	(35)	(35)
Engelman Irrigation District	Wholesale Water Provider	-	-	-	-	-	-
Hidalgo County Irrigation	Irrigation	(13,890)	(13,879)	(13,869)	(13,844)	(13,809)	(13,770)
Willacy County Irrigation	Irrigation	(10,599)	(10,591)	(10,584)	(10,564)	(10,538)	(10,509)
Willacy County Livestock	Livestock	-	-	-	-	-	-
Lyford	Municipal	(343)	(343)	(343)	(343)	(343)	(343)
North Alamo WSC	Municipal	(3,054)	(3,054)	(3,054)	(3,054)	(3,054)	(3,054)
Raymondville	Municipal	(2,150)	(2,150)	(2,151)	(2,151)	(2,151)	(2,151)
Valley Acres Irrigation District	Wholesale Water Provider	-	-	-	-	-	-
WWP Need/Surplus		**(30,071)**	**(30,052)**	**(30,036)**	**(29,991)**	**(29,930)**	**(29,862)**
Irrigation District Conservation		4,222	8,444	12,666	16,888	21,110	25,331
New Supplies from Conservation and Reuse WMS		**4,222**	**8,444**	**12,666**	**16,888**	**21,110**	**25,331**
Second-Tier Needs/Surplus		**(25,849)**	**(21,608)**	**(17,370)**	**(13,103)**	**(8,820)**	**(4,531)**

Donna Irrigation District-Hidalgo County #1		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Hidalgo County-Other	Municipal	2,690	2,690	2,690	2,690	2,690	2,690
Donna - Contract Demand	Municipal	4,381	4,381	4,381	4,381	4,380	4,380
Hidalgo County Irrigation – Contract Demand	Irrigation	37,513	37,484	37,456	37,390	37,296	37,193
WWP Demand		**44,584**	**44,555**	**44,527**	**44,461**	**44,366**	**44,263**
Hidalgo County-Other	Municipal	1,910	1,910	1,910	1,910	1,910	1,910
Donna	Municipal	3,111	3,111	3,111	3,110	3,110	3,110
Hidalgo County Irrigation	Irrigation	26,634	26,614	26,594	26,547	26,480	26,407
WWP Supplies		**31,655**	**31,635**	**31,615**	**31,567**	**31,500**	**31,427**
Hidalgo County-Other	Municipal	(780)	(780)	(780)	(780)	(780)	(780)
Donna	Municipal	(1,270)	(1,270)	(1,270)	(1,271)	(1,270)	(1,270)
Hidalgo County Irrigation	Irrigation	(10,879)	(10,870)	(10,862)	(10,843)	(10,816)	(10,786)
WWP Need/Surplus		**(12,929)**	**(12,920)**	**(12,912)**	**(12,894)**	**(12,866)**	**(12,836)**
Irrigation District Conservation		1,412	2,824	4,235	5,647	7,059	8,471
New Supplies from Conservation and Reuse WMS		**1,412**	**2,824**	**4,235**	**5,647**	**7,059**	**8,471**
Second-Tier Needs/Surplus		**(11,517)**	**(10,096)**	**(8,677)**	**(7,247)**	**(5,807)**	**(4,365)**

Eagle Pass		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population		**58,692**	**62,688**	**65,889**	**68,762**	**71,614**	**74,461**
WUG Demand	Municipal	9,579	10,192	10,713	11,180	11,644	12,107
WWP Supplies		**10,621**	**10,621**	**10,621**	**10,621**	**10,621**	**10,621**

WWP Need/Surplus		**1,042**	**429**	**(92)**	**(559)**	**(1,023)**	**(1,486)**
Advanced Municipal Conservation		960	1,450	1,982	2,523	3,077	3,641
New Supplies from Conservation and Reuse WMS		**960**	**1,450**	**1,982**	**2,523**	**3,077**	**3,641**
Second-Tier Needs/Surplus		**2,002**	**1,879**	**1,890**	**1,964**	**2,054**	**2,155**

East Rio Hondo WSC		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population		**26,908**	**31,911**	**37,034**	**40,909**	**43,001**	**45,200**
WUG Demand	Municipal	3,636	4,290	4,978	5,499	5,781	6,076
Cameron County Other – Contract Demand	Municipal	182	182	182	182	182	182
Military Highway WSC - Contract Demand	Municipal	33	33	33	33	33	33
WWP Demand		**3,851**	**4,505**	**5,193**	**5,714**	**5,996**	**6,291**
WUG Supply	Municipal	5,660	5,660	4,860	4,860	4,860	4,860
Cameron County Other	Municipal	182	182	182	182	182	182
Military Highway WSC	Municipal	33	33	33	33	33	33
WWP Supplies		**5,875**	**5,875**	**5,075**	**5,075**	**5,075**	**5,075**
WUG Needs	Municipal	2,239	1,585	97	(424)	(706)	(1,001)
Cameron County Other	Municipal	-	-	-	-	-	-
Military Highway WSC	Municipal	-	-	-	-	-	-
WWP Need/Surplus		**2,024**	**1,370**	**(118)**	**(639)**	**(921)**	**(1,216)**
Advanced Municipal Conservation		182	397	684	995	1,282	1,585
Irrigation District Conservation		96	192	288	381	474	570
New Supplies from Conservation and Reuse WMS		**278**	**589**	**972**	**1,376**	**1,756**	**2,155**
Second-Tier Needs/Surplus		**2,302**	**1,959**	**854**	**737**	**835**	**939**

Edinburg		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population		**85,768**	**93,195**	**97,911**	**99,436**	**100,966**	**102,501**
WUG Demand	Municipal	11,209	12,114	12,727	12,925	13,124	13,323
WWP Supplies		**10,758**	**10,758**	**10,758**	**10,758**	**10,758**	**10,758**
WWP Need/Surplus		**(451)**	**(1,356)**	**(1,969)**	**(2,167)**	**(2,366)**	**(2,565)**
Advanced Municipal Conservation		564	1,122	1,760	2,344	2,911	3,472
Irrigation District Conservation		443	888	1,330	1,774	2,218	2,662
Reuse Water for Cooling Tower and Landscaping Use		-	3,920	3,920	3,920	3,920	3,920
New Supplies from Conservation and Reuse WMS		1,007	5,930	7,010	8,038	9,049	10,054
Second-Tier Needs/Surplus		**556**	**4,574**	**5,041**	**5,871**	**6,683**	**7,489**

Harlingen		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population		**85,744**	**87,959**	**88,766**	**88,532**	**88,296**	**88,057**

WUG Demand	Municipal	14,830	15,149	15,288	15,248	15,208	15,166
East Rio Hondo WSC – Contract Demand	Municipal	336	336	336	224	224	224
Cameron County Manufacturing – Contract Demand	Irrigation	112	112	112	112	112	113
Cameron County Irrigation – Contract Demand	Manufacturing	150	150	150	150	150	150
WWP Demand		**15,428**	**15,747**	**15,886**	**15,734**	**15,694**	**15,653**
WUG Supply	Municipal	20,958	20,957	20,957	20,960	20,960	20,959
East Rio Hondo WSC	Municipal	336	336	336	224	224	224
Cameron County Manufacturing	Irrigation	25	25	25	25	25	25
Cameron County Irrigation	Manufacturing	150	150	150	150	150	150
WWP Supplies		**21,469**	**21,468**	**21,468**	**21,359**	**21,359**	**21,358**
WUG Need	Municipal	6,128	5,808	5,669	5,712	5,752	5,793
East Rio Hondo WSC	Municipal	-	-	-	-	-	-
Cameron County Manufacturing	Irrigation	(87)	(87)	(87)	(87)	(87)	(88)
Cameron County Irrigation	Manufacturing	-	-	-	-	-	-
WWP Need/Surplus		**6,041**	**5,721**	**5,582**	**5,625**	**5,665**	**5,705**
Advanced Municipal Conservation		1,480	2,134	2,809	3,427	4,012	4,563
Irrigation District Conservation		199	400	599	801	1,000	1,199
New Supplies from Conservation and Reuse WMS		**1,679**	**2,534**	**3,408**	**4,228**	**5,012**	**5,762**
Second-Tier Needs/Surplus		**7,720**	**8,255**	**8,990**	**9,853**	**10,677**	**11,467**

Harlingen ID No. 1		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Combes – Contract Demand	Municipal	796	796	796	796	796	796
East Rio Hondo – Contract Demand	Municipal	345	345	345	345	345	345
Harlingen – Contract Demand	Municipal	28,737	28,737	28,737	28,737	28,737	28,737
Cameron County Irrigation – Contract Demand	Irrigation	43,959	43,926	43,893	43,815	43,705	43,584
Military Highway WSC – Contract Demand	Municipal	806	806	806	806	806	806
Palm Valley – Contract Demand	Municipal	313	313	313	313	313	313
Primera – Contract Demand	Municipal	400	400	400	400	400	400
WWP Demand		**75,356**	**75,323**	**75,290**	**75,212**	**75,102**	**74,981**
Combes	Municipal	677	677	677	677	677	677
East Rio Hondo	Municipal	293	293	293	293	293	293
Harlingen	Municipal	21,307	21,306	21,304	21,189	21,183	21,178
Cameron County Irrigation	Irrigation	37,365	37,337	37,309	37,243	37,149	37,046
Military Highway WSC	Municipal	606	606	606	606	606	606
Palm Valley	Municipal	266	266	266	266	266	266
Primera	Municipal	340	340	340	340	340	340
WWP Supplies		**60,854**	**60,825**	**60,795**	**60,614**	**60,514**	**60,406**
Combes	Municipal	(119)	(119)	(119)	(119)	(119)	(119)

East Rio Hondo	Municipal	(52)	(52)	(52)	(52)	(52)	(52)
Harlingen	Municipal	(7,430)	(7,431)	(7,433)	(7,548)	(7,554)	(7,559)
Cameron County Irrigation	Irrigation	(6,594)	(6,589)	(6,584)	(6,572)	(6,556)	(6,538)
Military Highway WSC	Municipal	(200)	(200)	(200)	(200)	(200)	(200)
Palm Valley	Municipal	(47)	(47)	(47)	(47)	(47)	(47)
Primera	Municipal	(60)	(60)	(60)	(60)	(60)	(60)
WWP Need/Surplus		**(14,502)**	**(14,498)**	**(14,495)**	**(14,598)**	**(14,588)**	**(14,575)**
Irrigation District Conservation		600	1,200	1,800	2,400	3,000	3,600
New Supplies from Conservation and Reuse WMS		**600**	**1,200**	**1,800**	**2,400**	**3,000**	**3,600**
Second-Tier Needs/Surplus		**(13,902)**	**(13,298)**	**(12,695)**	**(12,198)**	**(11,588)**	**(10,975)**

Harlingen and Cameron County Irrigation District No. 9		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Edcouch – Contract Demand	Municipal	465	465	465	465	465	464
Elsa – Contract Demand	Municipal	1,089	1,089	1,089	1,088	1,088	1,087
Irrigation, Cameron – Contract Demand	Irrigation	5,082	5,078	5,074	5,065	5,052	5,038
Irrigation, Hidalgo – Contract Demand	Irrigation	63,588	63,540	63,492	63,381	63,221	63,046
La Villa – Contract Demand	Municipal	362	362	362	362	362	362
Mercedes – Contract Demand	Municipal	3,239	3,239	3,239	3,239	3,239	3,239
North Alamo WSC – Contract Demand	Municipal	5,613	5,613	5,613	5,613	5,613	5,613
Weslaco – Contract Demand	Municipal	7,976	7,976	7,976	7,976	7,976	7,976
WWP Demand		**87,414**	**87,362**	**87,310**	**87,189**	**87,016**	**86,825**
Edcouch	Municipal	326	326	325	325	325	325
Elsa	Municipal	763	762	762	762	761	761
Irrigation, Cameron	Irrigation	3,557	3,554	3,552	3,545	3,537	3,527
Irrigation, Hidalgo	Irrigation	44,512	44,478	44,445	44,366	44,255	44,132
La Villa	Municipal	254	254	254	254	254	254
Mercedes	Municipal	2,267	2,267	2,267	2,267	2,267	2,267
North Alamo WSC	Municipal	3,929	3,929	3,929	3,929	3,929	3,929
Weslaco	Municipal	5,583	5,583	5,583	5,583	5,583	5,583
WWP Supplies		**61,191**	**61,153**	**61,117**	**61,031**	**60,911**	**60,778**
Edcouch	Municipal	(139)	(139)	(140)	(140)	(140)	(139)
Elsa	Municipal	(326)	(327)	(327)	(326)	(327)	(326)
Irrigation, Cameron	Irrigation	(1,525)	(1,524)	(1,522)	(1,520)	(1,515)	(1,511)
Irrigation, Hidalgo	Irrigation	(19,076)	(19,062)	(19,047)	(19,015)	(18,966)	(18,914)
La Villa	Municipal	(108)	(108)	(108)	(108)	(108)	(108)
Mercedes	Municipal	(972)	(972)	(972)	(972)	(972)	(972)
North Alamo WSC	Municipal	(1,684)	(1,684)	(1,684)	(1,684)	(1,684)	(1,684)
Weslaco	Municipal	(2,393)	(2,393)	(2,393)	(2,393)	(2,393)	(2,393)

WWP Need/Surplus		**(26,223)**	**(26,209)**	**(26,193)**	**(26,158)**	**(26,105)**	**(26,047)**
Irrigation District Conservation		2,915	5,830	8,745	11,661	14,576	17,491
New Supplies from Conservation and Reuse WMS		**2,915**	**5,830**	**8,745**	**11,661**	**14,576**	**17,491**
Second-Tier Needs/Surplus		**(23,308)**	**(20,379)**	**(17,448)**	**(14,497)**	**(11,529)**	**(8,556)**

Hidalgo County Irrigation District No. 1		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Edinburg – Contract Demand	Municipal	10,847	10,847	10,847	10,847	10,847	10,847
Hidalgo County Irrigation District 13	Wholesale Water Provider	1,738	1,736	1,735	1,732	1,728	1,723
Hidalgo County MUD 1 – Contract Demand	Municipal	813	813	813	812	811	811
Hidalgo County Irrigation – Contract Demand	Irrigation	29,543	29,520	29,498	29,446	29,372	29,291
McAllen – Contract Demand	Municipal	4,000	4,000	4,000	4,000	4,000	4,000
North Alamo WSC - Contract Demand	Municipal	1,400	1,400	1,400	1,400	1,400	1,400
Santa Cruz Irrigation District 15	Wholesale Water Provider	30,728	30,706	30,683	30,631	30,556	30,474
Sharyland WSC – Contract Demand	Municipal	9,881	9,881	9,881	9,881	9,881	9,881
Steam-Electric Power, Hidalgo – Contract Demand	Steam Electric Power	2,453	2,453	2,453	2,453	2,453	2,453
WWP Demand		**91,403**	**91,356**	**91,310**	**91,202**	**91,048**	**90,880**
Edinburg	Municipal	7,701	7,701	7,701	7,701	7,701	7,701
Hidalgo County Irrigation District 13	Wholesale Water Provider	1,738	1,736	1,735	1,732	1,728	1,723
Hidalgo County MUD 1	Municipal	577	577	577	577	576	576
Irrigation, Hidalgo	Irrigation	20,975	20,960	20,944	20,907	20,854	20,796
McAllen	Municipal	2,840	2,840	2,840	2,840	2,840	2,840
North Alamo WSC	Municipal	994	994	994	994	994	994
Santa Cruz Irrigation District 15	Wholesale Water Provider	30,728	30,706	30,683	30,631	30,556	30,474
Sharyland WSC	Municipal	7,016	7,016	7,016	7,016	7,016	7,016
Steam-Electric Power, Hidalgo	Steam Electric Power	2,453	2,453	2,453	2,453	2,453	2,453
WWP Supplies		**75,022**	**74,983**	**74,943**	**74,851**	**74,718**	**74,573**
Edinburg	Municipal	(3,146)	(3,146)	(3,146)	(3,146)	(3,146)	(3,146)
Hidalgo County Irrigation District 13	Wholesale Water Provider	-	-	-	-	-	-
Hidalgo County MUD 1	Municipal	(236)	(236)	(236)	(235)	(235)	(235)
Irrigation, Hidalgo	Irrigation	(8,568)	(8,560)	(8,554)	(8,539)	(8,518)	(8,495)
McAllen	Municipal	(1,160)	(1,160)	(1,160)	(1,160)	(1,160)	(1,160)
North Alamo WSC	Municipal	(406)	(406)	(406)	(406)	(406)	(406)
Santa Cruz Irrigation District 15	Wholesale Water Provider	-	-	-	-	-	-
Sharyland WSC	Municipal	(2,865)	(2,865)	(2,865)	(2,865)	(2,865)	(2,865)
Steam-Electric Power, Hidalgo	Steam Electric Power	-	-	-	-	-	-
WWP Need/Surplus		**(16,381)**	**(16,373)**	**(16,367)**	**(16,351)**	**(16,330)**	**(16,307)**
Irrigation District Conservation		2,886	5,772	8,658	11,543	14,429	17,315
New Supplies from Conservation and Reuse WMS		**2,886**	**5,772**	**8,658**	**11,543**	**14,429**	**17,315**

Second-Tier Needs/Surplus		**(13,495)**	**(10,601)**	**(7,709)**	**(4,808)**	**(1,901)**	**1,008**

Hidalgo County Irrigation District No. 2		2030	2040	2050	2060	2070	2080
Alamo – Contract Demand	Municipal	4,175	4,175	4,175	4,175	4,175	4,175
Edinburg – Contract Demand	Municipal	4,003	4,003	4,003	4,003	4,003	4,003
Hidalgo County WID 3	Wholesale Water Provider	220	220	220	219	219	218
Irrigation, Hidalgo – Contract Demand	Irrigation	52,841	52,801	52,762	52,669	52,536	52,391
McAllen – Contract Demand	Municipal	22,450	22,450	22,450	22,450	22,450	22,450
North Alamo WSC - Contract Demand	Municipal	3,491	3,490	3,489	3,487	3,484	3,479
Pharr – Contract Demand	Municipal	6,691	6,691	6,691	6,691	6,691	6,691
San Juan – Contract Demand	Municipal	2,533	2,533	2,533	2,533	2,533	2,533
WWP Demand		**96,404**	**96,363**	**96,323**	**96,227**	**96,091**	**95,940**
Alamo	Municipal	3,131	3,131	3,131	3,131	3,131	3,131
Edinburg	Municipal	3,002	3,002	3,002	3,002	3,002	3,002
Hidalgo County WID 3	Wholesale Water Provider	165	165	165	165	164	164
Irrigation, Hidalgo	Irrigation	39,631	39,601	39,571	39,502	39,402	39,293
McAllen	Municipal	16,838	16,838	16,838	16,838	16,838	16,838
North Alamo WSC	Municipal	2,618	2,618	2,617	2,615	2,613	2,609
Pharr	Municipal	5,018	5,018	5,018	5,018	5,018	5,018
San Juan	Municipal	1,900	1,900	1,900	1,900	1,900	1,900
WWP Supplies		**72,303**	**72,273**	**72,242**	**72,171**	**72,068**	**71,955**
Alamo	Municipal	(1,044)	(1,044)	(1,044)	(1,044)	(1,044)	(1,044)
Edinburg	Municipal	(1,001)	(1,001)	(1,001)	(1,001)	(1,001)	(1,001)
Hidalgo County WID 3	Wholesale Water Provider	(55)	(55)	(55)	(54)	(55)	(54)
Irrigation, Hidalgo	Irrigation	(13,210)	(13,200)	(13,191)	(13,167)	(13,134)	(13,098)
McAllen	Municipal	(5,612)	(5,612)	(5,612)	(5,612)	(5,612)	(5,612)
North Alamo WSC	Municipal	(873)	(872)	(872)	(872)	(871)	(870)
Pharr	Municipal	(1,673)	(1,673)	(1,673)	(1,673)	(1,673)	(1,673)
San Juan	Municipal	(633)	(633)	(633)	(633)	(633)	(633)
WWP Need/Surplus		**(24,101)**	**(24,090)**	**(24,081)**	**(24,056)**	**(24,023)**	**(23,985)**
Irrigation District Conservation		2,588	5,176	7,763	10,351	12,939	15,527
New Supplies from Conservation and Reuse WMS		**2,588**	**5,176**	**7,763**	**10,351**	**12,939**	**15,527**
Second-Tier Needs/Surplus		**(21,513)**	**(18,914)**	**(16,318)**	**(13,705)**	**(11,084)**	**(8,458)**

Hidalgo County Irrigation District No. 6		2030	2040	2050	2060	2070	2080
Agua SUD - Contract Demand	Municipal	8,329	8,329	8,329	8,329	8,329	8,329
Irrigation, Hidalgo – Contract Demand	Irrigation	13,126	13,116	13,106	13,083	13,050	13,014
Steam-Electric Power, Hidalgo – Contract Demand	Steam Electric Power	3,423	3,423	3,423	3,423	3,423	3,423

Total		**24,878**	**24,868**	**24,858**	**24,835**	**24,802**	**24,766**
Agua SUD	Municipal	5,914	5,914	5,914	5,914	5,914	5,914
Irrigation, Hidalgo	Irrigation	9,319	9,312	9,305	9,289	9,266	9,240
Steam-Electric Power, Hidalgo	Steam Electric Power	3,423	3,423	3,423	3,423	3,423	3,423
WWP Supplies		**18,656**	**18,649**	**18,642**	**18,626**	**18,603**	**18,577**
Agua SUD	Municipal	(2,415)	(2,415)	(2,415)	(2,415)	(2,415)	(2,415)
Irrigation, Hidalgo	Irrigation	(3,807)	(3,804)	(3,801)	(3,794)	(3,784)	(3,774)
Steam-Electric Power, Hidalgo	Steam Electric Power	-	-	-	-	-	-
WWP Need/Surplus		**(6,222)**	**(6,219)**	**(6,216)**	**(6,209)**	**(6,199)**	**(6,189)**
Irrigation District Conservation		679	1,359	2,038	2,718	3,397	4,076
New Supplies from Conservation and Reuse WMS		**679**	**1,359**	**2,038**	**2,718**	**3,397**	**4,076**
Second-Tier Needs/Surplus		**(5,543)**	**(4,860)**	**(4,178)**	**(3,491)**	**(2,802)**	**(2,113)**

Hidalgo County Irrigation District No. 16		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Agua SUD – Contract Demand	Municipal	4,205	4,205	4,205	4,205	4,205	4,205
Irrigation, Hidalgo – Contract Demand	Irrigation	12,263	12,253	12,244	12,223	12,192	12,158
La Joya – Contract Demand	Municipal	513	513	513	513	513	513
Livestock, Hidalgo – Contract Demand	Livestock	100	100	100	100	100	100
Mining, Hidalgo – Contract Demand	Mining	80	80	80	80	79	79
WWP Demand		**17,161**	**17,151**	**17,142**	**17,121**	**17,089**	**17,055**
Agua SUD	Municipal	2,986	2,986	2,986	2,986	2,986	2,986
Irrigation, Hidalgo	Irrigation	8,707	8,700	8,693	8,678	8,656	8,632
La Joya	Municipal	364	364	364	364	364	364
Livestock, Hidalgo	Livestock	71	71	71	71	71	71
Mining, Hidalgo	Mining	57	57	57	56	56	56
WWP Supplies		**12,185**	**12,178**	**12,171**	**12,155**	**12,133**	**12,109**
Agua SUD	Municipal	(1,219)	(1,219)	(1,219)	(1,219)	(1,219)	(1,219)
Irrigation, Hidalgo	Irrigation	(3,556)	(3,553)	(3,551)	(3,545)	(3,536)	(3,526)
La Joya	Municipal	(149)	(149)	(149)	(149)	(149)	(149)
Livestock, Hidalgo	Livestock	(29)	(29)	(29)	(29)	(29)	(29)
Mining, Hidalgo	Mining	(23)	(23)	(23)	(24)	(23)	(23)
WWP Need/Surplus		**(4,976)**	**(4,973)**	**(4,971)**	**(4,966)**	**(4,956)**	**(4,946)**
Irrigation District Conservation		543	1,087	1,630	2,174	2,717	3,260
New Supplies from Conservation and Reuse WMS		**543**	**1,087**	**1,630**	**2,174**	**2,717**	**3,260**
Second-Tier Needs/Surplus		**(4,433)**	**(3,886)**	**(3,341)**	**(2,792)**	**(2,239)**	**(1,686)**

Hidalgo County Water Improvement District (WID) No. 3*		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Irrigation, Hidalgo – Contract Demand	Irrigation	3,576	3,573	3,571	3,564	3,555	3,546

McAllen - Contract Demand	Municipal	17,209	17,209	17,209	17,209	17,209	17,209
Mining, Hidalgo – Contract Demand	Mining	40	40	40	40	40	40
WWP Demand		**20,825**	**20,822**	**20,820**	**20,813**	**20,804**	**20,795**
Irrigation, Hidalgo		3,235	3,233	3,230	3,225	3,216	3,208
McAllen		15,488	15,488	15,488	15,488	15,488	15,488
Mining, Hidalgo		36	36	36	36	36	36
WWP Supplies		**18,759**	**18,757**	**18,754**	**18,749**	**18,740**	**18,732**
Irrigation, Hidalgo		(341)	(340)	(341)	(339)	(339)	(338)
McAllen		(1,721)	(1,721)	(1,721)	(1,721)	(1,721)	(1,721)
Mining, Hidalgo		(4)	(4)	(4)	(4)	(4)	(4)
WWP Need/Surplus		**(2,066)**	**(2,065)**	**(2,066)**	**(2,064)**	**(2,064)**	**(2,063)**
New Supplies from Conservation and Reuse WMS		-	-	-	-	-	-
Second-Tier Needs/Surplus		(2,066)	(2,065)	(2,066)	(2,064)	(2,064)	(2,063)

***In January 2025, Hidalgo County Water Improvement District No. 3 and Santa Cruz Water Control and Improvement District No. 15 consolidated into Hidalgo County Consolidated Water Control and Improvement District.**

Laguna Madre Water District		2030	2040	2050	2060	2070	2080
Population		**11,100**	**11,384**	**11,484**	**11,445**	**11,405**	**11,362**
WUG Demand	Municipal	4,638	4,745	4,787	4,771	4,754	4,736
Manufacturing, Cameron – Contract Demand	Manufacturing	118	118	118	118	118	118
WWP Demand		**4,756**	**4,863**	**4,905**	**4,889**	**4,872**	**4,854**
WUG Supplies	Municipal	7,513	7,513	7,513	7,513	7,513	7,513
Manufacturing, Cameron	Manufacturing	118	118	118	118	118	118
WWP Supplies		**7,631**	**7,631**	**7,631**	**7,631**	**7,631**	**7,631**
WUG Needs	Municipal	2,875	2,768	2,726	2,742	2,759	2,777
Manufacturing, Cameron	Manufacturing	-	-	-	-	-	-
WWP Need/Surplus		**2,875**	**2,768**	**2,726**	**2,742**	**2,759**	**2,777**
Advanced Municipal Conservation		464	893	1,289	1,634	1,941	2,213
New Supplies from Conservation and Reuse WMS		**464**	**893**	**1,289**	**1,634**	**1,941**	**2,213**
Second-Tier Needs/Surplus		3,339	3,661	4,015	4,376	4,700	4,990

Laredo		2030	2040	2050	2060	2070	2080
Population		**267,373**	**277,989**	**281,208**	**278,353**	**275,465**	**272,541**
WUG Demand	Municipal	41,831	43,292	43,794	43,349	42,899	42,444
Irrigation, Webb – Contract Demand	Irrigation	1,436	1,435	1,434	1,431	1,427	1,421
Manufacturing, Webb – Contract Demand	Manufacturing	100	100	100	100	100	100
Mining, Webb – Contract Demand	Mining	66	66	66	66	66	66
Steam-Electric Power, Webb – Contract Demand	Steam Electric Power	30	30	30	30	30	30

WWP Demand		**43,463**	**44,923**	**45,424**	**44,976**	**44,522**	**44,061**
WUG Supply	Municipal	59,974	59,974	59,974	59,974	59,974	59,974
Irrigation, Webb	Irrigation	1,436	1,435	1,434	1,431	1,427	1,421
Manufacturing, Webb	Manufacturing	100	100	100	100	100	100
Mining, Webb	Mining	66	66	66	66	66	66
Steam-Electric Power, Webb	Steam Electric Power	30	30	30	30	30	30
WWP Supplies		**61,606**	**61,605**	**61,604**	**61,601**	**61,597**	**61,591**
WUG Needs	Municipal	18,143	16,682	16,180	16,625	17,075	17,530
Irrigation, Webb	Irrigation	-	-	-	-	-	-
Manufacturing, Webb	Manufacturing	-	-	-	-	-	-
Mining, Webb	Mining	-	-	-	-	-	-
Steam-Electric Power, Webb	Steam Electric Power	-	-	-	-	-	-
WWP Need/Surplus		**18,143**	**16,682**	**16,180**	**16,625**	**17,075**	**17,530**
Advanced Municipal Conservation		2,088	4,026	6,058	7,867	9,544	11,091
South Laredo WWTP Potable Reuse		-	3,360	3,360	4,480	4,480	4,480
New Supplies from Conservation and Reuse WMS		2,088	7,386	9,418	12,347	14,024	15,571
Second-Tier Needs/Surplus		**20,231**	**24,068**	**25,598**	**28,972**	**31,099**	**33,101**

McAllen		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population		**165,587**	**184,057**	**201,554**	**206,901**	**212,332**	**217,849**
WUG Demand	Municipal	38,276	42,409	46,441	47,673	48,924	50,195
Edinburg - Contract Demand	Municipal	55	55	55	55	55	55
Hidalgo County Manufacturing – Contract Demand	Manufacturing	300	300	300	300	300	300
Hidalgo County Steam-Electric Power – Contract Demand	Steam Electric Power	3,295	3,295	3,295	3,295	3,295	3,295
WWP Demand		**41,926**	**46,059**	**50,091**	**51,323**	**52,574**	**53,845**
WUG Supply	Municipal	36,915	36,915	35,115	35,115	35,115	35,115
Edinburg	Municipal	55	55	55	55	55	55
Manufacturing, Hidalgo	Manufacturing	300	300	300	300	300	300
Steam-Electric Power, Hidalgo	Steam Electric Power	3,295	3,295	3,295	3,295	3,295	3,295
WWP Supplies		**40,565**	**40,565**	**38,765**	**38,765**	**38,765**	**38,765**
WUG Need	Municipal	(1,361)	(5,494)	(11,326)	(12,558)	(13,809)	(15,080)
Edinburg	Municipal	-	-	-	-	-	-
Manufacturing, Hidalgo	Manufacturing	-	-	-	-	-	-
Steam-Electric Power, Hidalgo	Steam Electric Power	-	-	-	-	-	-
WWP Need/Surplus		**(5,011)**	**(9,144)**	**(14,976)**	**(16,208)**	**(17,459)**	**(18,730)**
Advanced Municipal Conservation		3,832	7,958	12,485	16,293	18,337	20,375
Irrigation District Conservation		782	1,563	2,345	3,127	3,908	4,691
Direct Potable Reuse		-	3,880	3,880	6,060	6,060	6,060

New Supplies from Conservation and Reuse WMS		**4,614**	**13,401**	**18,710**	**25,480**	**28,305**	**31,126**
Second-Tier Needs/Surplus		**(397)**	**4,257**	**3,734**	**9,272**	**10,846**	**12,396**

Military Highway WSC		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population		**44,216**	**44,633**	**44,795**	**45,466**	**46,151**	**46,852**
WUG Demand	Municipal	6,530	6,560	6,585	6,684	6,784	6,887
San Juan - Contract Demand	Municipal	35	35	35	35	35	35
WWP Demand		**6,565**	**6,595**	**6,620**	**6,719**	**6,819**	**6,922**
WUG Supply	Municipal	7,542	7,542	7,542	7,542	7,542	7,542
San Juan	Municipal	35	35	35	35	35	35
WWP Supplies		**7,577**	**7,577**	**7,577**	**7,577**	**7,577**	**7,577**
WUG Need	Municipal	1,012	982	957	858	758	655
San Juan	Municipal	-	-	-	-	-	-
WWP Need/Surplus		**1,012**	**982**	**957**	**858**	**758**	**655**
Advanced Municipal Conservation		324	611	910	1,214	1,511	1,802
Irrigation District Conservation		6	12	18	23	29	35
New Supplies from Conservation and Reuse WMS		**330**	**623**	**928**	**1,237**	**1,540**	**1,837**
Second-Tier Needs/Surplus		**1,342**	**1,605**	**1,885**	**2,095**	**2,298**	**2,492**

Mission		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population		**88,336**	**93,383**	**96,747**	**99,076**	**101,437**	**103,831**
WUG Demand	Municipal	18,065	19,030	19,716	20,190	20,672	21,159
WWP Supplies		**18,400**	**18,400**	**18,399**	**18,398**	**18,397**	**18,395**
WWP Need/Surplus		**335**	**(630)**	**(1,317)**	**(1,792)**	**(2,275)**	**(2,764)**
Advanced Municipal Conservation		1,808	3,559	5,292	6,162	7,026	7,889
Irrigation District Conservation		181	361	541	722	902	1,083
Potable Reuse		-	3,920	3,920	3,920	3,920	3,920
New Supplies from Conservation and Reuse WMS		**1,989**	**7,840**	**9,753**	**10,804**	**11,848**	**12,892**
Second-Tier Needs/Surplus		**2,324**	**7,210**	**8,436**	**9,012**	**9,573**	**10,128**

North Alamo WSC		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population		**221,808**	**244,842**	**259,180**	**261,706**	**264,231**	**266,768**
WUG Demand	Municipal	35,294	38,813	41,086	41,486	41,887	42,288
Port Mansfield PUD - Contract Demand	Municipal	150	150	150	150	150	150
Primera - Contract Demand	Municipal	205	205	205	205	205	205
San Juan - Contract Demand	Municipal	1,687	1,687	1,687	1,687	1,687	1,687
WWP Demand		**37,336**	**40,855**	**43,128**	**43,528**	**43,929**	**44,330**
WUG Supply	Municipal	22,407	22,589	22,608	22,606	22,604	22,600

Port Mansfield PUD	Municipal	98	98	98	98	98	98
Primera	Municipal	205	205	205	205	205	205
San Juan	Municipal	1,687	1,687	1,687	1,687	1,687	1,687
WWP Supplies		**24,397**	**24,579**	**24,598**	**24,596**	**24,594**	**24,590**
WUG Need	Municipal	(12,887)	(16,224)	(18,478)	(18,880)	(19,283)	(19,688)
Port Mansfield PUD	Municipal	(52)	(52)	(52)	(52)	(52)	(52)
Primera	Municipal	-	-	-	-	-	-
San Juan	Municipal	-	-	-	-	-	-
WWP Need/Surplus		**(12,939)**	**(16,276)**	**(18,530)**	**(18,932)**	**(19,335)**	**(19,740)**
Advanced Municipal Conservation		3,541	5,518	7,612	9,386	11,105	12,765
Irrigation District Conservation		354	713	1,067	1,424	1,779	2,137
New Supplies from Conservation and Reuse WMS		**3,895**	**6,231**	**8,679**	**10,810**	**12,884**	**14,902**
Second-Tier Needs/Surplus		**(9,044)**	**(10,045)**	**(9,851)**	**(8,122)**	**(6,451)**	**(4,838)**

Pharr		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population		**85,215**	**91,086**	**94,908**	**96,862**	**98,836**	**100,833**
WUG Demand		9,135	9,698	10,105	10,313	10,523	10,736
WWP Supplies		**7,332**	**7,388**	**7,429**	**7,449**	**7,470**	**7,492**
WWP Need/Surplus		**(1,803)**	**(2,310)**	**(2,676)**	**(2,864)**	**(3,053)**	**(3,244)**
Advanced Municipal Conservation		458	883	1,377	1,633	1,666	1,700
Irrigation District Conservation		167	335	502	669	836	1,004
Raw Water Augmentation Potable Reuse		-	3,360	3,360	3,360	3,360	3,360
New Supplies from Conservation and Reuse WMS		**625**	**4,578**	**5,239**	**5,662**	**5,862**	**6,064**
Second-Tier Needs/Surplus		**(1,178)**	**2,268**	**2,563**	**2,798**	**2,809**	**2,820**

Rio Grande City		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population		**17,880**	**19,073**	**19,959**	**20,549**	**21,147**	**21,751**
WUG Demand	Municipal	4,200	4,468	4,676	4,814	4,954	5,096
El Sauz - Contract Demand	Municipal	163	163	163	163	163	163
El Tanque - Contract Demand	Municipal	276	276	276	276	276	276
Rio WSC - Contract Demand	Municipal	1,053	1,053	1,053	1,053	1,052	1,052
WWP Demand		**5,692**	**5,960**	**6,168**	**6,306**	**6,445**	**6,587**
WUG Supply	Municipal	3,488	3,488	3,488	3,488	3,488	3,488
El Sauz WSC	Municipal	98	98	98	98	98	98
El Tanque WSC	Municipal	205	205	205	205	205	205
Rio WSC	Municipal	1,687	1,687	1,687	1,687	1,687	1,687
WWP Supplies		**5,478**	**5,478**	**5,478**	**5,478**	**5,478**	**5,478**
WUG Need	Municipal	(712)	(980)	(1,188)	(1,326)	(1,466)	(1,608)

El Sauz WSC	Municipal	(65)	(65)	(65)	(65)	(65)	(65)
El Tanque WSC	Municipal	(71)	(71)	(71)	(71)	(71)	(71)
Rio WSC	Municipal	634	634	634	634	635	635
WWP Need/Surplus		**(214)**	**(482)**	**(690)**	**(828)**	**(967)**	**(1,109)**
Advanced Municipal Conservation		421	840	1,260	1,649	1,860	2,072
New Supplies from Conservation and Reuse WMS		**421**	**840**	**1,260**	**1,649**	**1,860**	**2,072**
Second-Tier Needs/Surplus		**207**	**358**	**570**	**821**	**893**	**963**

San Benito		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population		**25,980**	**26,650**	**26,890**	**26,810**	**26,730**	**26,646**
WUG Demand		3,249	3,316	3,346	3,336	3,326	3,315
WWP Supplies		**3,846**	**4,346**	**5,326**	**5,426**	**5,626**	**5,626**
WWP Need/Surplus		**597**	**1,030**	**1,980**	**2,090**	**2,300**	**2,311**
Irrigation District Conservation		118	234	352	469	586	703
New Supplies from Conservation and Reuse WMS		**118**	**234**	**352**	**469**	**586**	**703**
Second-Tier Needs/Surplus		**715**	**1,264**	**2,332**	**2,559**	**2,886**	**3,014**

San Juan		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population		**23,805**	**24,380**	**24,837**	**25,693**	**26,565**	**27,455**
WUG Demand		3,324	3,388	3,451	3,570	3,691	3,815
WWP Supplies		**4,742**	**4,742**	**4,742**	**4,742**	**4,742**	**4,742**
WWP Need/Surplus		**1,418**	**1,354**	**1,291**	**1,172**	**1,051**	**927**
Irrigation District Conservation		63	127	190	253	317	380
Direct Potable Reuse		-	-	1,120	1,120	1,120	1,120
New Supplies from Conservation and Reuse WMS		**63**	**127**	**1,310**	**1,373**	**1,437**	**1,500**
Second-Tier Needs/Surplus		**1,481**	**1,481**	**2,601**	**2,545**	**2,488**	**2,427**

Sharyland WSC		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population		**88,944**	**97,326**	**102,604**	**103,989**	**105,371**	**106,749**
WUG Demand		15,541	16,948	17,867	18,108	18,349	18,589
WWP Supplies		**17,073**	**17,073**	**17,073**	**17,073**	**17,073**	**17,073**
WWP Need/Surplus		**1,532**	**125**	**(794)**	**(1,035)**	**(1,276)**	**(1,516)**
Advanced Municipal Conservation		1,553	3,168	4,064	4,817	5,554	6,273
Irrigation District Conservation		500	998	1,500	1,999	2,499	2,998
New Supplies from Conservation and Reuse WMS		**2,053**	**4,166**	**5,564**	**6,816**	**8,053**	**9,271**
Second-Tier Needs/Surplus		**3,585**	**4,291**	**4,770**	**5,781**	**6,777**	**7,755**

Southmost Regional Water Authority		2030	2040	2050	2060	2070	2080
Brownsville PUB - Contract Demand	Municipal	10,719	10,719	10,719	10,719	10,719	10,719
Los Fresnos - Contract Demand	Municipal	286	286	286	286	286	286
Manufacturing, Cameron - Contract Demand	Manufacturing	242	242	242	242	242	242
Valley MUD - Contract Demand	Municipal	290	290	290	290	290	290
WWP Demand		**11,537**	**11,537**	**11,537**	**11,537**	**11,537**	**11,537**
Brownsville PUB	Municipal	10,719	10,719	10,719	10,719	10,719	10,719
Los Fresnos	Municipal	286	286	286	286	286	286
Manufacturing, Cameron	Manufacturing	242	242	242	242	242	242
Valley MUD 2	Municipal	290	290	290	290	290	290
WWP Supplies		**11,537**	**11,537**	**11,537**	**11,537**	**11,537**	**11,537**
Brownsville PUB	Municipal	-	-	-	-	-	-
Los Fresnos	Municipal	-	-	-	-	-	-
Manufacturing, Cameron	Manufacturing	-	-	-	-	-	-
Valley MUD 2	Municipal	-	-	-	-	-	-
WWP Need/Surplus		**-**	**-**	**-**	**-**	**-**	**-**
New Supplies from Conservation and Reuse WMS		**-**	**-**	**-**	**-**	**-**	**-**
Second-Tier Needs/Surplus		**-**	**-**	**-**	**-**	**-**	**-**

United Irrigation District		2030	2040	2050	2060	2070	2080
Irrigation, Hidalgo	Irrigation	17,500	17,500	17,500	17,500	17,500	17,500
McAllen - Contract Demand	Municipal	11,250	11,250	11,250	11,250	11,250	11,250
Mission - Contract Demand	Municipal	22,700	22,700	22,700	22,700	22,700	22,700
Sharyland WSC - Contract Demand	Municipal	10,420	10,420	10,420	10,420	10,420	10,420
WWP Demand		**61,870**	**61,870**	**61,870**	**61,870**	**61,870**	**61,870**
Irrigation, Hidalgo	Irrigation	5,932	5,928	5,923	5,913	5,898	5,882
McAllen	Municipal	9,563	9,563	9,563	9,563	9,563	9,563
Mission	Municipal	18,400	18,400	18,399	18,398	18,397	18,395
Sharyland WSC	Municipal	8,857	8,857	8,857	8,857	8,857	8,857
WWP Supplies		**42,752**	**42,748**	**42,742**	**42,731**	**42,715**	**42,697**
Irrigation, Hidalgo	Irrigation	(11,568)	(11,572)	(11,577)	(11,587)	(11,602)	(11,618)
McAllen	Municipal	(1,687)	(1,687)	(1,687)	(1,687)	(1,687)	(1,687)
Mission	Municipal	(4,300)	(4,300)	(4,301)	(4,302)	(4,303)	(4,305)
Sharyland WSC	Municipal	(1,563)	(1,563)	(1,563)	(1,563)	(1,563)	(1,563)
WWP Need/Surplus		**(19,118)**	**(19,122)**	**(19,128)**	**(19,139)**	**(19,155)**	**(19,173)**
Irrigation District Conservation		469	939	1,408	1,878	2,347	2,816
New Supplies from Conservation and Reuse WMS		**469**	**939**	**1,408**	**1,878**	**2,347**	**2,816**
Second-Tier Needs/Surplus		**(18,649)**	**(18,183)**	**(17,720)**	**(17,261)**	**(16,808)**	**(16,357)**

Weslaco		2030	2040	2050	2060	2070	2080
Population		**32,414**	**33,279**	**33,948**	**35,089**	**36,253**	**37,441**
WUG Demand	Municipal	5,500	5,624	5,737	5,930	6,127	6,327
Military Highway WSC - Contract Demand	Municipal	175	175	175	175	175	175
WWP Demand		**5,675**	**5,799**	**5,912**	**6,105**	**6,302**	**6,502**
WUG Supply	Municipal	6,178	6,379	6,460	6,460	6,460	6,460
Military Highway WSC - Contract Demand	Municipal	175	175	175	175	175	175
WWP Supplies		**6,353**	**6,554**	**6,635**	**6,635**	**6,635**	**6,635**
WUG Need	Municipal	678	755	723	530	333	133
Military Highway WSC - Contract Demand	Municipal	-	-	-	-	-	-
WWP Need/Surplus		**678**	**755**	**723**	**530**	**333**	**133**
Advanced Municipal Conservation		551	797	1,060	1,335	1,615	1,902
Irrigation District Conservation		266	532	798	1,063	1,330	1,595
North WWTP Potable Reuse		-	-	1,120	1,120	1,120	1,120
New Supplies from Conservation and Reuse WMS		**817**	**1,329**	**2,978**	**3,518**	**4,065**	**4,617**
Second-Tier Needs/Surplus		**1,495**	**2,084**	**3,701**	**4,048**	**4,398**	**4,750**

INITIALLY PREPARED PLAN

CHAPTER 5: EVALUATION AND RECOMMENDATION OF WATER MANAGEMENT STRATEGIES

Rio Grande Regional Water Plan

B&V PROJECT NO. 411250

PREPARED FOR

Rio Grande Regional Water Planning Group

1 MARCH 2025

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acft	Acre-Feet
acft/yr	Acre-Feet per Year
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASR	Aquifer Storage and Recovery
BMP	Best Management Practice
BOD	Biochemical Oxygen Demand
CBOD	Carbonaceous Biochemical Oxygen Demand
CCID	Cameron County Irrigation District
CFU	Colony-Farming Unit
DFC	Desired Future Conditions
DMI	Domestic, Municipal, and Industrial
DOT	Department of Transportation
EAP	Emergency Action Plan
EMST	Ecological Mapping System of Texas
ERHWSC	East Rio Hondo Water Supply Corporation
GCD	Groundwater Conservation District
GIS	Geographic Information System
GMA	Groundwater Management Area
GPCD	Gallons per Capita per Day
HB	House Bill
HCID	Hidalgo County Irrigation District
IBWC	International Boundary and Water Commission
ID	Irrigation District
MAG	Modeled Available Groundwater
mg/L	Milligrams per Liter
mgd	Million Gallons per Day
MUD	Municipal Utility District
NAWSC	North Alamo Water Supply Corporation
NRG	Nueces-Rio Grande
NTU	Nephelometric Turbidity Units
NWI	National Wetlands Inventory
O&M	Operations and Maintenance
ppm	Parts per Million
psi	Pounds per Square Inch
PUB	Public Utilities Board
PVC	polyvinyl chloride

RGRWPG	Rio Grande Regional Water Planning Group
RO	Reverse Osmosis
ROW	Right-of-Way
RWP	Regional Water Plan
RWPA	Regional Water Planning Area
RWPG	Regional Water Planning Group
SB	Senate Bill
SCADA	Supervisory Control and Data Acquisition
SRWA	Southmost Regional Water Authority
SUD	Special Utility District
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TDS	Total Dissolved Solids
TML	Texas Municipal League
TPWD	Texas Parks and Wildlife Department
TSSWCB	Texas State Soil and Water Conservation Board
TWDB	Texas Water Development Board
UCM	Unified Cost Model
UF	Ultrafiltration
USACE	U.S. Army Corps of Engineers
USDA	United States Department of Agriculture
UTPA	University of Texas Pan America
WAM	Water Availability Model
WCAC	Water Conservation Advisory Council
WCID	Water Control and Improvement District
WMS	Water Management Strategy
WMSP	Water Management Strategy Project
WSC	Water Supply Corporation
WSOC	Water Supply Option Contracts
WTP	Water Treatment Plant
WUG	Water User Group
WWP	Wholesale Water Provider
WWTP	Wastewater Treatment Plant

5.0 Evaluation and Recommendation of Water Management Strategies

5.1 Potentially Feasible Water Management Strategies

Water management strategies (WMSs) were evaluated and updated in this Region M Regional Water Plan (RWP). The following chapter describes the process to identify potentially feasible WMSs, the evaluation of potentially feasible WMS, selection of recommended WMSs to meet future needs, and the implementation status of recommended WMSs that meet certain requirements.

Subsection 5.1.1 describes this process for identifying potentially feasible WMSs. Section 5.2 describes the evaluations for all recommended WMSs for each water user group (WUG) and irrigation district (ID), sorted by WMS category and WUG/ID. Section 5.3 describes alternative strategies and their evaluations, which are also considered potentially feasible and should be considered alternative recommendations, sorted by WMS category and WUG. Section 5.4 describes projects of interest that do not meet the Texas Water Development Board (TWDB) criteria to be a WMS but were considered by the Regional Water Planning Group (RWPG) during this planning process. These projects were submitted by sponsors with the potential to be part of suitable WMSs in the future. Section 5.5 discusses the implementation of several recommended WMSs that meet certain requirements.

5.1.1 Process to Identify Potentially Feasible WMSs

An RWPG is tasked with evaluating all potentially feasible WMSs and recommending selected strategies to meet current and future needs in the region. Before a RWPG begins the process of identifying potentially feasible WMSs, RWPGs must document the process by which it will list all possible WMSs and identify the strategies that are potentially feasible for meeting a need in the region.

On November 1, 2023, the Rio Grande RWPG, after asking for public comments, considered and approved a documented process to identify potentially feasible WMSs for the 2026 Regional Water Planning Cycle. The approved process is as follows:

1. Current water planning information, including specific WMSs of interest, will be solicited from WUGs and Wholesale Water Providers (WWPs) in Fall 2023.
    a. Solicitation of planning information will include the recommended WMSs in the 2021 Regional Water Plan.
    b. WUGs/WWPs will be encouraged to classify each WMS on their 2021 Plan list as included or rejected for the 2026 Planning Cycle and provide comments, and also to list additional WMSs that will be new for the 2026 Planning Cycle.
2. A list of potential WMSs will be prepared based on an initial technical evaluation and needs analysis and the comments received, which will be available for consideration by the RWPG by early 2024.
3. Additional WMSs may be brought forth to the RWPG for consideration until May 2024.
4. The list of potential WMSs will be further considered to identify "potentially feasible" or "not potentially feasible" WMSs for WUGs and WWPs with identified water needs.

The request for WMS from stakeholders took place beginning in November of 2023, with follow-up taking place over the next 12 months. Municipal utilities and IDs submitted most of the new projects and strategies or requested to carry over projects and strategies from the 2021 Plan. The submitted costs, projected yield, feasibility, and impacts were evaluated for accuracy, consistency, and compliance with TWDB rules and guidance where that information was available; where information was not available, assumptions were made and documented.

The WMS components that are included in this RWP are limited to projects that increase water supplies or reduce water losses. Infrastructure components associated with internal system improvements that do not make any additional water available to meet needs are not included in the RWP as WMSs.

Using the documented process identified above, the Rio Grande RWPG identified Potentially Feasible WMSs for the 2026 RWP. Appendix 5A provides a list of potentially feasible WMS for WUGs with needs. This list of potentially feasible strategies includes the following:

- Advanced Municipal Conservation
- Irrigation District Conservation
- Agricultural (On-Farm) Conservation
- Industrial Conservation
- Conversion of Water Right Classification
- New or Expanded Surface Water Treatment
- New or Expanded Distribution and Transmission Facilities Resulting in Increased Supplies
- Storage Reservoirs
- New or Expanded Fresh Groundwater Supply
- New or Expanded Brackish Groundwater Desalination
- Seawater Desalination
- Reuse
- Biological Control of Arundo Donax
- Drought Management
- Aquifer Storage and Recovery
- Regional Water Supply Facilities

The potentially feasible WMSs were evaluated using the Unified Cost Model (UCM), which was updated in April of 2024 and checked for accuracy, consistency, and compliance with source availability limitations. When specific project cost estimates were available, that was processed through the UCM and used to provide costs in September 2023 dollars.

ID Conservation, Advanced Municipal Conservation, and Municipal Drought Management were considered as potentially feasible WMSs for nearly any WUG with an identified need. These WMSs were subsequently recommended across the region on the basis of criteria described in those sections. The projected water saved through drought management, ID conservation improvements and Advanced Municipal Conservation was first subtracted from each WUG's need to obtain a revised need after conservation. If a need still existed, additional WMSs were considered for the WUG. In cases where two or more alternatives were available without significant negative impacts, an evaluation process was used to select the most appropriate WMS.

The WMS or portfolio of strategies, with sufficient yield to meet the needs after conservation and drought management, were recommended for each WUG and any additional viable WMS was listed as alternative recommended strategies. Only WMSs with insufficient information or major feasibility concerns were evaluated but not recommended.

In accordance with Chapter 31 of the Texas Administrative Code (TAC), Chapter 358.3 (19), the plan development was guided by the principal that designated water quality and related uses as shown in the state water quality management plan shall be improved or maintained. The state water quality management plan is developed and maintained by the Texas Commission on Environmental Quality (TCEQ) and can be found at the following weblink: https://www.tceq.texas.gov/permitting/wqmp.

5.1.2 Description of Water Management Strategy Evaluation Process

Each potentially feasible WMS was evaluated on the basis of net quantity of water, reliability, financial costs, and environmental factors, which includes environmental and cultural considerations. Environmental considerations also include impacts to agricultural resources.

Subsections in Chapter 5.2 and 5.3 include detailed evaluations for each of the potentially feasible WMSs. Only projects that increase supplies to users can be included as potentially feasible WMSs.

Net Quantity of Water

Analyses of WMSs yields were performed under drought of record conditions. Firm yields were determined by considering Senate Bill 3 environmental flow standards adopted in 30 TAC §298 and other recommended WMSs to ensure that no WMSs relied on the same water availability volume or rendered multiple WMSs mutually exclusive.

Strategy Water Loss

Anticipated strategy water losses are taken into account and reported for each WMS type. For some WMSs, the percent water loss was calculated, and the information is included in each WMS evaluation. The following provides a summary of anticipated strategy water losses.

- Conservation: Water conservation strategies are assumed to have no associated water losses. In some instances, projects are intended to decrease the water loss for existing infrastructure.
- Drought Management: Drought management strategies are assumed to have no associated water losses.
- Conversion of Water Rights: Strategies involving conversions, transfers, or purchases of water rights are assumed to have no additional water losses associated with the use of existing infrastructure.
- New or Expanded Surface Water Treatment: Facilities expansion including new infrastructure such as pump stations and transmission pipelines are assumed to have negligible water losses.
- New or Expanded Distribution and Transmission Facilities Resulting in Increased Supplies: Infrastructure and distribution systems increase supplies through reducing water losses. This water management strategy is assumed to have negligible water losses.
- Direct Reuse: Direct reuse or recycled water strategies are assumed to have minimal water losses.

- Indirect Reuse: Indirect reuse is assumed to have minimal losses since the yield already incorporates any water lost due to transportation, evaporation, seepage, and channel or other associated carriage losses.
- New or Expanded Fresh Groundwater: Groundwater expansion strategies that assume additional yield from existing infrastructure have no additional water losses associated with them. Groundwater expansion, development, and importation strategies that require new infrastructure are assumed to have negligible water losses.
- New or Expanded Brackish Groundwater Desalination and Seawater Desalination: Desalination strategies include water loss associated with desalination treatment technologies and disposal of brine concentrate. Each desalination WMS has a calculated percent water loss indicated in the WMS evaluation.
- Aquifer Storage and Recovery (ASR): ASR strategies have losses due to recovery efficiency from the aquifer. Due to minimal specific studies completed at this point in Region M, this water management strategy is assumed to have negligible water losses. However, modeling and feasibility studies are recommended for entities interested in ASR.
- On/Off-channel Storage Reservoirs: Surface water strategies that include new on/off-channel reservoirs have water losses associated with evaporation. If water is transmitted via open channel canals, there are also water losses associated with evaporation. Water availability modeling used to determine firm yields of the reservoirs take evaporation into consideration.
- Biological Control of *A. donax*: Brush control water management strategies are intended to increase available surface and groundwater supplies through the selective control of brush species that are detrimental to water conservation, thus significantly reducing water losses.

Financial Costs

Financial costs were evaluated using the UCM developed by the TWDB. Capital costs, debt service, annual operations and maintenance (O&M) costs, and unit costs of water are shown in the 2026 RWP in September 2023 dollars. Costs do not include distribution of water within a WUG after treatment.

Costs were evaluated using the UCM, and certain assumptions were made in each project unless specifically listed otherwise. The debt service is the application of capital budgeting to service the debt over the life of the loan. The loan period used for a reservoir was 40 years and the loan period for all other types of strategies was 20 years. An annual interest rate for project financing was assumed to be 3.5 percent in accordance with TWDB guidance.

For the Municipal Drought Management WMS (Refer to Section 5.2.2), the costs were evaluated using the TWDB Drought Management Tool, which estimates the economic costs of foregone water use.

Environmental Impacts

Environmental impacts were evaluated for each potentially feasible WMS based on information provided by sponsors, available published information, maps and recent aerial photography, including available geographic information system (GIS) shapefiles. The project locations shown on maps in this chapter are conceptual in nature and are not meant to represent actual locations of facilities. Siting of facilities are subject to studies, designs, engineering, and/or contract negotiations to be determined by the project's sponsor later. Therefore, as projects enter the detailed design phases, it should be noted that potential environmental impacts identified in this analysis could be avoided or reduced through such approaches as facility layout or alignment adjustments, changes in construction methods, and construction timing. Environmental considerations assessed, where applicable, include:

- Acres impacted permanently;
- Construction impacted acreage;
- Inundation acreage;
- Agricultural resources impacted;
- Wetland impact;
- Habitat impacted acreage;
- Threatened and endangered species count (see Appendix 5B for a list of species by county);
- Cultural resources impact;
- Environmental water needs;
- Effect of upstream development on bays, estuaries, and arms of the Gulf of Mexico;
- Reduction in wastewater treatment plant (WWTP) effluent;
- Volume of brine;
- TDS of brine; and
- Reliability.

Impacts to Agricultural Resources

Data was obtained from the Texas Parks and Wildlife Department (TPWD) Ecological Mapping System of Texas (EMST) and compiled with WMS projects into a GIS using ArcGIS software. Environmental datasets were overlaid on defined conceptual project boundaries or alignments for each WMS to determine potential project effects on vegetation and land use. For Region M, the vegetation and land use from the TPWD EMST was identified as: (1) row crops; (2) grass farms; and (3) orchards.

Reliability

Reliability is an assessment of the availability of the specified water quantity to the user over time. If the quantity of water is available to the user all the time, then the strategy has a high reliability. If the quantity of water is contingent on other factors, reliability will be lower. The Rio Grande RWPG developed a reliability evaluation matrix (Table 5-1) that was used in conjunction with other implementation considerations to quantify the reliability of WMSs. Each WMS evaluation includes an assessment of reliability.

Table 5-1 Reliability Evaluation Matrix

Score	Reliability
1	Low
2	Low to Medium
3	Medium
4	Medium to High
5	High

Environmental Water Needs

The TCEQ has established environmental flow standards in 30 TAC §298 relating to the management of water resources in the state for the purpose of supporting a sound ecological environment in river basins and bay systems. The TCEQ has adopted environmental flow standards for the Rio Grande and its associated tributaries and bays to ensure environmental water needs are met. These adopted environmental flow standards are incorporated into the TCEQ's full authorization water availability model (WAM), which also includes all water rights and permitted reservoir capacities. Potentially feasible WMSs in the 2026 RWP were evaluated to determine water availability(s) and WMS firm yield(s)/firm diversion(s) using an unmodified TCEQ WAM. This analysis reflects conditions under which an associated permit application would be evaluated by the TCEQ. As such, potentially feasible water management strategies included in this plan are assumed to have little to no effect (score of zero on a 0-5 scale) on environmental water needs, as they are already taken into consideration as part of the adopted environmental flow standards in the WAM analysis and will not compromise the environmental flow standards as established by 30 TAC §298.

Third-Party Social and Economic Impacts from Voluntary Redistribution of Water

The 2026 RWP is based, in part, on voluntary transfer or redistribution of water resources to meet projected needs. Voluntary redistribution is the acquisition of water by willing buyers from willing sellers, subject to conditions of existing groundwater management plans and rules of applicable groundwater conservation districts (GCDs), in the case of groundwater supplies, and subject to existing surface water permits and water available from such permits. Refer to Chapters 3.1 and 3.2 for descriptions of methods used in determining quantities of groundwater and surface water available to meet projected water demands in the 2026 RWP.

Voluntary transfers of water include the underlying principles that (1) projected needs of a local area are met before consideration is given to movement of water from rural and agricultural areas to meet projected needs at more distant locations; (2) compensation will be made to water owners for water to meet projected needs of others; and (3) an evaluation is made of the social and economic impacts of voluntary transfers of water from rural and agricultural areas.

In the development of the 2026 RWP, the following principles have been followed: (1) water conservation has been the first WMS recommended to meet projected needs (shortages) of WUGs; and (2) all other recommended WMSs including movement of water from rural and agricultural areas must be based on the voluntary transfer concept and principles. The WMSs of the 2026 RWP were selected and sized in compliance with desired future conditions (DFCs) and modeled available groundwater (MAG) requirements to limit impacts upon the supplies of water projected to be needed for use in rural and agricultural areas. In addition, the costing of each WMS includes estimated payments to landowners from which groundwater would be obtained and to holders of surface water rights to clearly reflect that implementation of these WMSs would include compensation of the owners of the water by those who would obtain and use the water (i.e., the willing seller-willing buyer condition underlying the voluntary transfer concept).

Counties may have projected needs for additional water supply (or have projected surpluses less than the volume associated with the recommended WMS); therefore, third-party economic impacts of redistribution may occur as future supply alternatives to local groundwater are developed. Implementation of the recommended WMSs could result in (1) drawdown of the water table, increasing local area pump lifts in the aquifer areas from which groundwater would be obtained; and would (2) provide payments to landowners for groundwater and to holders of surface water permits for use of surface water at rates negotiated between buyer and seller. Voluntary redistribution of water from rural and agricultural areas is likely to result in reduction of areas engaged in active crop production, and/or changes in crop species and productivity.

In addition, implementation of recommended WMSs can be expected to result in construction and associated expenditures in local areas where such projects are constructed, but neither the economic benefits of such expenditures, nor the subsequent economic development that might result from such expenditures, are estimated in this plan.

5.1.3 Potential for ASR Projects to Meet Significant Identified Needs

In accordance with 31 TAC Section 357.34(h), if a Regional Water Planning Area (RWPA) has significant identified water needs, the RWPG shall provide a specific assessment of the potential for ASR projects to meet those needs. At the August 7, 2024, RWPG meeting, the Rio Grande RWPG defined the threshold of significant water needs to be a municipal WUG with an identified need of 10,000 acre-feet per year (acft/yr) or greater. WUGs meeting this definition in the 2026 RWP by 2080 include McAllen and North Alamo Water Supply Corporation (WSC). At this point in time, the respective WUGs above and the Rio Grande RWPG have determined that ASR is an infeasible and cost-prohibitive strategy to increase water supplies in the region. During this planning cycle, only Eagle Pass requested to carry over an ASR Project from the 2021 Plan, and no new ASR projects were requested. Because Eagle Pass is currently looking at other options they consider more feasible, the Eagle Pass ASR Project is included in the 2026 RWP as an alternative WMS, which is further described in Section 5.3.6.

5.1.4 Index of Entities with Links to Recommended and Alternative Water Management Strategies

The following table provides links to the various recommended and alternative water management strategies for each WUG and Irrigation District in Region M. Because the chapter is organized by WMS category, this table is provided to assist in identifying the strategies for a particular entity. The table is in alphabetical order, by entity.

Table 5-2 Index Summary of Each Entity's Recommended and/or Alternative Water Management Strategies With Links

Entity	Strategy Name	Section
Agua SUD	Irrigation District Conservation	5.2.1.2
Agua SUD	Drought Management	5.2.2
Agua SUD	Conversion/Purchase of Surface Water Rights	5.2.3
Agua SUD	West WWTP Indirect Potable Reuse	5.2.5.2.1
Agua SUD	Brackish Groundwater Desalination	5.2.10.1
Alamo	Irrigation District Conservation	5.2.1.2
Alamo	Drought Management	5.2.2
Alamo	Conversion/Purchase of Surface Water Rights	5.2.3
Alamo	Fresh Groundwater Well	5.2.9.1
Alamo	Brackish Groundwater Desalination	5.2.10.2
Bayview Irrigation District	Irrigation District Conservation	5.2.1.2
Bayview Irrigation District	Conversion/Purchase of Surface Water Rights	5.2.3
Brownsville	Advanced Municipal Conservation	5.2.1.1
Brownsville	Irrigation District Conservation	5.2.1.2
Brownsville	Drought Management	5.2.2
Brownsville	Conversion/Purchase of Surface Water Rights	5.2.3
Brownsville	Southside WWTP Potable Reuse	5.2.5.2.2
Brownsville	Indirect Potable Reuse	5.2.5.2.3
Brownsville	Banco Morales Reservoir	5.2.8.1
Brownsville	Brownsville/Matamoros Weir and Reservoir (Alternative)	5.3.3.1
Brownsville	Seawater Desalination Demonstration and Implementation (Alternative)	5.3.5.1
Brownsville Irrigation District	Irrigation District Conservation	5.2.1.2
Brownsville Irrigation District	Conversion/Purchase of Surface Water Rights	5.2.3
Cameron County Irrigation District No. 2	Irrigation District Conservation	5.2.1.2
Cameron County Irrigation District No. 2	Conversion/Purchase of Surface Water Rights	5.2.3
Cameron County Irrigation District No. 6	Irrigation District Conservation	5.2.1.2
Cameron County Irrigation District No. 6	Conversion/Purchase of Surface Water Rights	5.2.3
Cameron County W.I.D No. 10	Irrigation District Conservation	5.2.1.2
Cameron County W.I.D No. 10	Conversion/Purchase of Surface Water Rights	5.2.3

Entity	Strategy Name	Section
Combes	Irrigation District Conservation	5.2.1.2
Combes	Conversion/Purchase of Surface Water Rights	5.2.3
County-Other, Cameron	Advanced Municipal Conservation	5.2.1.1
County-Other, Cameron	Irrigation District Conservation	5.2.1.2
County-Other, Cameron	Conversion/Purchase of Surface Water Rights	5.2.3
County-Other, Cameron	Expanded Fresh Groundwater Supply	5.2.9.2
County-Other, Hidalgo	Advanced Municipal Conservation	5.2.1.1
County-Other, Hidalgo	Irrigation District Conservation	5.2.1.2
County-Other, Hidalgo	Conversion/Purchase of Surface Water Rights	5.2.3
County-Other, Maverick	Irrigation District Conservation	5.2.1.2
County-Other, Maverick	Conversion/Purchase of Surface Water Rights	5.2.3
County-Other, Starr	Advanced Municipal Conservation	5.2.1.1
County-Other, Starr	Conversion/Purchase of Surface Water Rights	5.2.3
County-Other, Starr	Additional Fresh Groundwater Wells	5.2.9.3
County-Other, Webb	Advanced Municipal Conservation	5.2.1.1
County-Other, Webb	Conversion/Purchase of Surface Water Rights	5.2.3
County-Other, Webb	Additional Fresh Groundwater Wells	5.2.9.4
County-Other, Willacy	Irrigation District Conservation	5.2.1.2
County-Other, Willacy	Conversion/Purchase of Surface Water Rights	5.2.3
County-Other, Zapata	Advanced Municipal Conservation	5.2.1.1
County-Other, Zapata	Conversion/Purchase of Surface Water Rights	5.2.3
Delta Lake Irrigation District	Irrigation District Conservation	5.2.1.2
Delta Lake Irrigation District	Conversion/Purchase of Surface Water Rights	5.2.3
Donna	Irrigation District Conservation	5.2.1.2
Donna	Drought Management	5.2.2
Donna	Conversion/Purchase of Surface Water Rights	5.2.3
Donna	WTP Expansion	5.2.6.1
Donna Irrigation District Hidalgo Co. No. 1	Irrigation District Conservation	5.2.1.2
Donna Irrigation District Hidalgo Co. No. 1	Conversion/Purchase of Surface Water Rights	5.2.3
Eagle Pass	Advanced Municipal Conservation	5.2.1.1
Eagle Pass	Drought Management	5.2.2
Eagle Pass	Conversion/Purchase of Surface Water Rights	5.2.3
Eagle Pass	Brackish Groundwater Desalination	5.2.10.3

Entity	Strategy Name	Section
Eagle Pass	Aquifer Storage and Recovery (Alternative)	5.3.6.1
East Rio Hondo WSC	Advanced Municipal Conservation	5.2.1.1
East Rio Hondo WSC	Irrigation District Conservation	5.2.1.2
East Rio Hondo WSC	Drought Management	5.2.2
East Rio Hondo WSC	Conversion/Purchase of Surface Water Rights	5.2.3
East Rio Hondo WSC	North Harlingen Surface WTP Phase I	5.2.6.2
East Rio Hondo WSC	FM 2925 Transmission Line	5.2.7.1
East Rio Hondo WSC	North Cameron Regional WTP Wellfield Expansion	5.2.10.4
East Rio Hondo WSC	Brackish Desalination Wellfield and RO at NRWTP and MASWTP	5.2.10.5
East Rio Hondo WSC	Expansion of MASWTP	5.2.10.6
East Rio Hondo WSC	North Harlingen Surface WTP Phase II with IBT (Alternative)	5.3.2.1
Edcouch	Irrigation District Conservation	5.2.1.2
Edcouch	New Fresh Groundwater Supply	5.2.9.5
Edcouch	Conversion/Purchase of Surface Water Rights	5.2.3
Edinburg	Advanced Municipal Conservation	5.2.1.1
Edinburg	Irrigation District Conservation	5.2.1.2
Edinburg	Drought Management	5.2.2
Edinburg	Conversion/Purchase of Surface Water Rights	5.2.3
Edinburg	Reuse Water for Cooling Tower and Landscaping Use	5.2.5.1.1
El Jardin WSC	Advanced Municipal Conservation	5.2.1.1
El Jardin WSC	Irrigation District Conservation	5.2.1.2
El Jardin WSC	Drought Management	5.2.2
El Jardin WSC	Conversion/Purchase of Surface Water Rights	5.2.3
El Jardin WSC	Distribution Pipeline Replacement	5.2.7.2
El Sauz WSC	Drought Management	5.2.2
El Sauz WSC	Advanced Municipal Conservation	5.2.1.1
El Sauz WSC	Conversion/Purchase of Surface Water Rights	5.2.3
El Tanque WSC	Advanced Municipal Conservation	5.2.1.1
El Tanque WSC	Drought Management	5.2.2
El Tanque WSC	Conversion/Purchase of Surface Water Rights	5.2.3
Elsa	Irrigation District Conservation	5.2.1.2
Elsa	WTP Expansion and Interconnect to Engleman ID (Alternative)	5.3.2.2
Elsa	Conversion/Purchase of Surface Water Rights	5.2.3

Entity	Strategy Name	Section
Engleman Irrigation District	Irrigation District Conservation	5.2.1.2
Engleman Irrigation District	Conversion/Purchase of Surface Water Rights	5.2.3
Falcon Rural WSC	Advanced Municipal Conservation	5.2.1.1
Falcon Rural WSC	Conversion/Purchase of Surface Water Rights	5.2.3
Harlingen	Advanced Municipal Conservation	5.2.1.1
Harlingen	Irrigation District Conservation	5.2.1.2
Harlingen	Drought Management	5.2.2
Harlingen	Conversion/Purchase of Surface Water Rights	5.2.3
Harlingen Irrigation District No. 1	Irrigation District Conservation	5.2.1.2
Harlingen Irrigation District No. 1	Conversion/Purchase of Surface Water Rights	5.2.3
Hidalgo	Drought Management	5.2.2
Hidalgo	Conversion/Purchase of Surface Water Rights	5.2.3
Hidalgo	Expand Existing Fresh Groundwater Wells	5.2.9.6
Hidalgo and Cameron Counties Irrigation District No. 9	Irrigation District Conservation	5.2.1.2
Hidalgo and Cameron Counties Irrigation District No. 9	Conversion/Purchase of Surface Water Rights	5.2.3
Hidalgo County Drainage District No. 1	Regional Water Supply Facilities	5.2.1.2
Hidalgo County Irrigation District No. 1	Irrigation District Conservation	5.2.1.2
Hidalgo County Irrigation District No. 1	Conversion/Purchase of Surface Water Rights	5.2.3
Hidalgo County Irrigation District No. 13	Irrigation District Conservation	5.2.1.2
Hidalgo County Irrigation District No. 13	Conversion/Purchase of Surface Water Rights	5.2.3
Hidalgo County Irrigation District No. 16	Irrigation District Conservation	5.2.1.2
Hidalgo County Irrigation District No. 16	Conversion/Purchase of Surface Water Rights	5.2.3
Hidalgo County Irrigation District No. 2	Irrigation District Conservation	5.2.1.2
Hidalgo County Irrigation District No. 2	Conversion/Purchase of Surface Water Rights	5.2.3
Hidalgo County Irrigation District No. 5	Irrigation District Conservation	5.2.1.2
Hidalgo County Irrigation District No. 5	Conversion/Purchase of Surface Water Rights	5.2.3

Entity	Strategy Name	Section
Hidalgo County Irrigation District No. 6	Irrigation District Conservation	5.2.1.2
Hidalgo County Irrigation District No. 6	Service Area Expansion	5.2.7.3
Hidalgo County Irrigation District No. 6	Conversion/Purchase of Surface Water Rights	5.2.3
Hidalgo County MUD 1	Irrigation District Conservation	5.2.1.2
Hidalgo County MUD 1	Drought Management	5.2.2
Hidalgo County MUD 1	Conversion/Purchase of Surface Water Rights	5.2.3
Hidalgo County Water Improvement District No. 18	Irrigation District Conservation	5.2.1.2
Hidalgo County Water Improvement District No. 18	Conversion/Purchase of Surface Water Rights	5.2.3
Hidalgo County Water Improvement District No. 19	Irrigation District Conservation	5.2.1.2
Hidalgo County Water Improvement District No. 19	Conversion/Purchase of Surface Water Rights	5.2.3
Hidalgo County Water Improvement District No. 3*	Irrigation District Conservation	5.2.1.2
Hidalgo County Water Improvement District No. 3*	Conversion/Purchase of Surface Water Rights	5.2.3
Irrigation, Cameron	Irrigation District Conservation	5.2.1.2
Irrigation, Cameron	On-Farm Irrigation Conservation	5.2.1.3
Irrigation, Cameron	Biological Control of Arundo Donax	5.2.4
Irrigation, Hidalgo	Irrigation District Conservation	5.2.1.2
Irrigation, Hidalgo	On-Farm Irrigation Conservation	5.2.1.3
Irrigation, Hidalgo	Biological Control of Arundo Donax	5.2.4
Irrigation, Jim Hogg	On-Farm Irrigation Conservation	5.2.1.3
Irrigation, Maverick	Irrigation District Conservation	5.2.1.2
Irrigation, Maverick	On-Farm Irrigation Conservation	5.2.1.3
Irrigation, Maverick	Biological Control of Arundo Donax	5.2.4
Irrigation, Starr	On-Farm Irrigation Conservation	5.2.1.3
Irrigation, Starr	Biological Control of Arundo Donax	5.2.4
Irrigation, Webb	On-Farm Irrigation Conservation	5.2.1.3
Irrigation, Webb	Biological Control of Arundo Donax	5.2.4
Irrigation, Willacy	Irrigation District Conservation	5.2.1.2
Irrigation, Willacy	On-Farm Irrigation Conservation	5.2.1.3
Irrigation, Willacy	Biological Control of Arundo Donax	5.2.4

Entity	Strategy Name	Section
Irrigation, Zapata	On-Farm Irrigation Conservation	5.2.1.3
Irrigation, Zapata	Biological Control of Arundo Donax	5.2.4
La Feria	Irrigation District Conservation	5.2.1.2
La Feria	Conversion/Purchase of Surface Water Rights	5.2.3
La Feria	Water Well with RO Unit	5.2.10.7
La Feria	Non-Potable Reuse (Alternative)	5.3.1.2
La Feria Irrigation District, Cameron County No. 3	Irrigation District Conservation	5.2.1.2
La Feria Irrigation District, Cameron County No. 3	Conversion/Purchase of Surface Water Rights	5.2.3
La Grulla	Advanced Municipal Conservation	5.2.1.1
La Grulla	Drought Management	5.2.2
La Grulla	Conversion/Purchase of Surface Water Rights	5.2.3
La Joya	Advanced Municipal Conservation	5.2.1.1
La Joya	Irrigation District Conservation	5.2.1.2
La Joya	Drought Management	5.2.2
La Joya	Conversion/Purchase of Surface Water Rights	5.2.3
La Villa	Advanced Municipal Conservation	5.2.1.1
La Villa	Irrigation District Conservation	5.2.1.2
La Villa	Drought Management	5.2.2
La Villa	Conversion/Purchase of Surface Water Rights	5.2.3
Laguna Madre Water District	Advanced Municipal Conservation	5.2.1.1
Laguna Madre Water District	Drought Management	5.2.2
Laguna Madre Water District	Conversion/Purchase of Surface Water Rights	5.2.3
Laguna Madre Water District	Seawater Desalination Plant	5.2.11.1
Laredo	Advanced Municipal Conservation	5.2.1.1
Laredo	Drought Management	5.2.2
Laredo	Conversion/Purchase of Surface Water Rights	5.2.3
Laredo	South Laredo WWTP Potable Reuse	5.2.5.2.4
Laredo	El Pico WTP Expansion Phases 1-4 (Alternative)	5.3.2.3
Los Fresnos	Irrigation District Conservation	5.2.1.2
Los Fresnos	Conversion/Purchase of Surface Water Rights	5.2.3
Lyford	Irrigation District Conservation	5.2.1.2
Lyford	Conversion/Purchase of Surface Water Rights	5.2.3
Lyford	Brackish Groundwater Desalination	5.2.10.8

Entity	Strategy Name	Section
Manufacturing, Cameron	Industrial Conservation	5.2.1.4
Manufacturing, Hidalgo	Industrial Conservation	5.2.1.4
Manufacturing, Maverick	Industrial Conservation	5.2.1.4
Manufacturing, Starr	Industrial Conservation	5.2.1.4
Manufacturing, Webb	Industrial Conservation	5.2.1.4
Maverick County	Conversion/Purchase of Surface Water Rights	5.2.3
Maverick County Water Improvement District	Irrigation District Conservation	5.2.1.2
Maverick County Water Improvement District	Conversion/Purchase of Surface Water Rights	5.2.3
McAllen	Advanced Municipal Conservation	5.2.1.1
McAllen	Irrigation District Conservation	5.2.1.2
McAllen	Drought Management	5.2.2
McAllen	Conversion/Purchase of Surface Water Rights	5.2.3
McAllen	Direct Potable Reuse	5.2.5.2.5
McAllen	Raw Waterline Project with HCID No. 1	5.2.7.4
McAllen	Brackish Groundwater Desalination	5.2.10.9
McAllen	Expand Fresh Groundwater Phases I and II (Alternative)	5.3.4.1
Mercedes	Irrigation District Conservation	5.2.1.2
Mercedes	Drought Management	5.2.2
Mercedes	Conversion/Purchase of Surface Water Rights	5.2.3
Mercedes	Expanded Existing Fresh Groundwater Supply (Alternative)	5.3.4.2
Military Highway WSC	Advanced Municipal Conservation	5.2.1.1
Military Highway WSC	Irrigation District Conservation	5.2.1.2
Military Highway WSC	Drought Management	5.2.2
Military Highway WSC	Conversion/Purchase of Surface Water Rights	5.2.3
Military Highway WSC	Expanded Fresh Groundwater Supply (Alternative)	5.3.4.3
Mining, Cameron	Irrigation District Conservation	5.2.1.2
Mining, Hidalgo	Industrial Conservation	5.2.1.4
Mining, Jim Hogg	Industrial Conservation	5.2.1.4
Mining, Maverick	Industrial Conservation	5.2.1.4
Mining, Starr	Industrial Conservation	5.2.1.4
Mining, Webb	Industrial Conservation	5.2.1.4
Mining, Zapata	Industrial Conservation	5.2.1.4

Entity	Strategy Name	Section
Mirando City WSC	Conversion/Purchase of Surface Water Rights	5.2.3
Mission	Advanced Municipal Conservation	5.2.1.1
Mission	Irrigation District Conservation	5.2.1.2
Mission	Drought Management	5.2.2
Mission	Conversion/Purchase of Surface Water Rights	5.2.3
Mission	Potable Reuse	5.2.5.2.6
Mission	Brackish Groundwater Desalination	5.2.10.10
North Alamo WSC	Advanced Municipal Conservation	5.2.1.1
North Alamo WSC	Irrigation District Conservation	5.2.1.2
North Alamo WSC	Drought Management	5.2.2
North Alamo WSC	Conversion/Purchase of Surface Water Rights	5.2.3
North Alamo WSC	Delta WTP Expansion	5.2.6.3
North Alamo WSC	Delta Area Brackish Groundwater Desalination	5.2.10.11
North Alamo WSC	WTP No. 5 Expansion (Alternative)	5.3.2.4
Olmito WSC	Advanced Municipal Conservation	5.2.1.1
Olmito WSC	Irrigation District Conservation	5.2.1.2
Olmito WSC	Conversion/Purchase of Surface Water Rights	5.2.3
Olmito WSC	WTP Expansion	5.2.6.4
Palm Valley	Advanced Municipal Conservation	5.2.1.1
Palm Valley	Irrigation District Conservation	5.2.1.2
Palm Valley	Conversion/Purchase of Surface Water Rights	5.2.3
Pharr	Advanced Municipal Conservation	5.2.1.1
Pharr	Irrigation District Conservation	5.2.1.2
Pharr	Drought Management	5.2.2
Pharr	Conversion/Purchase of Surface Water Rights	5.2.3
Pharr	Raw Water Augmentation Potable Reuse	5.2.5.2.7
Port Mansfield PUD	Advanced Municipal Conservation	5.2.1.1
Port Mansfield PUD	Irrigation District Conservation	5.2.1.2
Port Mansfield PUD	Drought Management	5.2.2
Port Mansfield PUD	Conversion/Purchase of Surface Water Rights	5.2.3
Primera	Irrigation District Conservation	5.2.1.2
Primera	Drought Management	5.2.2
Primera	Conversion/Purchase of Surface Water Rights	5.2.3
Primera	RO WTP with Groundwater Well	5.2.10.12
Raymondville	Irrigation District Conservation	5.2.1.2

Entity	Strategy Name	Section
Raymondville	Conversion/Purchase of Surface Water Rights	5.2.3
Rio Grande City	Advanced Municipal Conservation	5.2.1.1
Rio Grande City	Drought Management	5.2.2
Rio Grande City	Conversion/Purchase of Surface Water Rights	5.2.3
Rio Hondo	Irrigation District Conservation	5.2.1.2
Rio Hondo	Conversion/Purchase of Surface Water Rights	5.2.3
Rio Hondo	Non-Potable Wastewater Effluent Reuse	5.2.5.1.2
Rio Hondo	Emergency Interconnects	5.2.7.5
Rio Hondo	New Fresh Groundwater Supply	5.2.9.7
Rio WSC	Advanced Municipal Conservation	5.2.1.1
Rio WSC	Drought Management	5.2.2
Rio WSC	Conversion/Purchase of Surface Water Rights	5.2.3
Roma	Advanced Municipal Conservation	5.2.1.1
Roma	Drought Management	5.2.2
Roma	Conversion/Purchase of Surface Water Rights	5.2.3
San Benito	Irrigation District Conservation	5.2.1.2
San Benito	Drought Management	5.2.2
San Benito	Conversion/Purchase of Surface Water Rights	5.2.3
San Benito	Brackish Groundwater Blending	5.2.10.13
San Benito	Non-Potable Reuse (Alternative)	5.3.1.3
San Benito	Direct Potable Reuse (Alternative)	5.3.1.4
San Juan	Irrigation District Conservation	5.2.1.2
San Juan	Drought Management	5.2.2
San Juan	Conversion/Purchase of Surface Water Rights	5.2.3
San Juan	Direct Potable Reuse	5.2.5.2.8
San Juan	Brackish Groundwater Desalination	5.2.10.14
San Juan	WTP 1 Expansion with Brackish Groundwater Desalination	5.2.10.15
Santa Cruz Irrigation District No. 15*	Irrigation District Conservation	5.2.1.2
Santa Cruz Irrigation District No. 15*	Conversion/Purchase of Surface Water Rights	5.2.3
Santa Rosa	Irrigation District Conservation	5.2.1.2
Santa Rosa	Conversion/Purchase of Surface Water Rights	5.2.3
Sebastian MUD	Conversion/Purchase of Surface Water Rights	5.2.3
Sharyland WSC	Advanced Municipal Conservation	5.2.1.1

Entity	Strategy Name	Section
Sharyland WSC	Irrigation District Conservation	5.2.1.2
Sharyland WSC	Drought Management	5.2.2
Sharyland WSC	Conversion/Purchase of Surface Water Rights	5.2.3
Sharyland WSC	Well and RO Unit at WTP 2	5.2.10.16
Sharyland WSC	Well and RO Unit at WTP 3	5.2.10.17
Siesta Shores WCID	Irrigation District Conservation	5.2.1.2
Siesta Shores WCID	Conversion/Purchase of Surface Water Rights	5.2.3
Southmost Regional Water Authority	Brackish Groundwater Desalination Wellfield Expansion	5.2.10.18
Southmost Regional Water Authority	Phase 3 Wellfield Optimization and WTP Expansion	5.2.10.19
Southmost Regional Water Authority	Phase 4 SRWA Wellfield and WTP Expansion	5.2.10.20
Steam-Electric, Cameron	Irrigation District Conservation	5.2.1.2
Steam-Electric, Cameron	Industrial Conservation	5.2.1.4
Steam-Electric, Hidalgo	Industrial Conservation	5.2.1.4
Steam-Electric, Webb	Industrial Conservation	5.2.1.4
Union WSC	Advanced Municipal Conservation	5.2.1.1
Union WSC	Drought Management	5.2.2
Union WSC	Conversion/Purchase of Surface Water Rights	5.2.3
United Irrigation District	Irrigation District Conservation	5.2.1.2
United Irrigation District	Conversion/Purchase of Surface Water Rights	5.2.3
Valley Acres Irrigation District	Irrigation District Conservation	5.2.1.2
Valley Acres Irrigation District	Conversion/Purchase of Surface Water Rights	5.2.3
Valley MUD 2	Advanced Municipal Conservation	5.2.1.1
Valley MUD 2	Conversion/Purchase of Surface Water Rights	5.2.3
Webb County	Advanced Municipal Conservation	5.2.1.1
Webb County	Drought Management	5.2.2
Webb County	Expanded Fresh Groundwater Supply	5.2.9.8
Webb County	Conversion/Purchase of Surface Water Rights	5.2.3
Weslaco	Advanced Municipal Conservation	5.2.1.1
Weslaco	Irrigation District Conservation	5.2.1.2
Weslaco	Drought Management	5.2.2
Weslaco	Conversion/Purchase of Surface Water Rights	5.2.3
Weslaco	North WWTP Potable Reuse	5.2.5.2.9
Weslaco	Groundwater Development and Blending	5.2.9.9

Entity	Strategy Name	Section
Zapata County	Advanced Municipal Conservation	5.2.1.1
Zapata County	Drought Management	5.2.2
Zapata County	Conversion/Purchase of Surface Water Rights	5.2.3
Zapata County San Ygnacio and Ramireño	Advanced Municipal Conservation	5.2.1.1
Zapata County San Ygnacio and Ramireño	Conversion/Purchase of Surface Water Rights	5.2.3
Zapata County WCID-Hwy 16 East	Advanced Municipal Conservation	5.2.1.1
Zapata County WCID-Hwy 16 East	Conversion/Purchase of Surface Water Rights	5.2.3

*In January 2025, Hidalgo County Water Improvement District No. 3 and Santa Cruz Water Control and Improvement District No. 15 consolidated into Hidalgo County Consolidated Water Control and Improvement District.

Water management strategies, projects, and management supply factor reports can all be found by linking to https://www3.twdb.texas.gov/apps/SARA/reports/list and entering '2026 Regional Water Plan' into the "Report Name" field to filter to all DB27 reports associated with the 2026 Regional Water Plans. Reports associated with this chapter include:

- Recommended WUG Water Management Strategies (WMS).
- Recommended Projects Associated with WMSs.
- Alternative WUG WMSs.
- Alternative Projects Associated with WMSs.
- WUG Management Supply Factor.

5.2 Recommended Water Management Strategies

The primary emphasis of the regional water planning effort is the development of regional water management strategies sufficient to meet the projected needs of WUGs throughout the state. Water needs are determined by comparing user group water demands to the water supplies available to that user group. The following sections present information concerning the identification, evaluation, and selection of specific water management strategies to meet specific projected water supply shortages for Region M. If a project sponsor wishes to be considered for certain types of State funding, the project that the funding is requested for must be included in the Regional and State Water Plan. It should be noted that local plans that are not inconsistent with the regional water supply plan are also eligible to apply for certain types of TWDB financial assistance to implement those local plans even though they have not been specifically recommended in this plan.

The identified water needs presented in Chapter 4 are based on MAG volumes and conservative surface water availability estimates, which assume only water available during a repeat of the worst Drought of Record (DOR), that all water rights are being fully and simultaneously utilized and exclude water available on an interruptible basis and water available as a result of municipal return flows. The water management strategies are intended to alleviate these projected water supply shortages (water needs).

Appendix 5C provides a list of the recommended water management strategies by WUG and/or MWP and their resulting supply balance. Appendix 5D contains the TWDB Costing Tool Cost Summary for each applicable strategy. In accordance with 31 TAC §357.34(e)(3)(A), regional and state water plans are not to include the cost of distribution of water within a water user group service area.

5.2.1 Water Conservation

The 2026 Rio Grande Regional Water Plan is required to have a subsection of Chapter 5 that discusses all recommended conservation strategies. Conservation is recommended as a water management strategy for Irrigation, Manufacturing, Mining, and Steam-Electric WUGs, and for the majority of Irrigation Districts and municipal utilities in the region. The RWPG recognizes the need for financial assistance for implementing conservation requiring infrastructure improvements.

Recent and Recommended Water Conservation Legislation and Policies

Since the last "Water Conservation Advisory Council Report to the 88th Texas Legislature (2022)," the Texas State Legislature made a significant investment in water infrastructure through the passage of Senate Bill (SB) 28 and Senate Joint Resolution (SJR) 75 providing for the creation of the Texas Water Fund. In addition, SB 30 authorized a one-time, $1 billion supplemental appropriation of general revenue to the Texas Water Fund, contingent on enactment of SB 28 and approval of SJR 75 by voters. Proposition 6 (the proposition for SJR 75), creating the Texas Water Fund to assist in financing water projects in Texas, passed on November 7, 2023, with more than 77 percent in favor. The Texas Water Fund, managed by TWDB, prioritizes investment in water loss mitigation and other water strategies. The 88th Legislative Session also established the TexMesonet Hydrometeorology Network and created the TexMesonet Advisory Committee through House Bill (HB) 2759 to support a statewide evapotranspiration (ET) network.

The recent report, "Water Conservation Advisory Council Report to the 89th Texas Legislature (2024)," has recommended the following two additional legislations:

1. The Council recommends that the Texas Legislature replenish funding in the Agricultural Water Conservation Fund sufficient to support the TWDB's grant and loan program for a total of $15,000,000 for the next 10 years.
2. Increase appropriations by $1,200,000 for the biennium to the TWDB to develop and support a statewide ET network within the TexMesonet. Funding will be used for:
    - Up to 2.5 new full-time equivalent staff positions;
    - Contracting a study on existing TexMesonet weather stations regarding siting requirements to calculate ET (study of fetch);
    - Resources to update existing sites to accommodate ET measurements; and
    - Grants and/or contracts with agencies to provide technical assistance.

5.2.1.1 Advanced Municipal Water Conservation

Water conservation is defined as methods and practices that reduce demand for water supply, increase the efficiency of supply, or use facilities so that available supply is conserved and made available for future use. All public water suppliers are required by the TAC Rule Section 288.2 to submit a Drought Contingency and Water Conservation Plan to the TCEQ for approval. These plans must include a utility profile including population and water use data (total gallons per capita per day (GPCD) and residential), 5-year and 10-year target-specific water savings goals, and conservation strategies to meet those goals. For the purposes of planning, municipal conservation is distinguished by two approaches: water loss mitigation and water use reduction. Water loss mitigation comprises the means to determine and control of real water loss through distribution system pipeline repair and replacement. Water use reduction includes but is not limited to: metering devices to measure and account for the amount of water diverted from the supply source; a program for universal metering of both customer and public uses of water; and programs for continuing public education.

In 2001, the Texas Legislature amended the Texas Water Code to require RWPGs to consider water conservation and drought management strategies for every entity with a projected water shortage (need). The Water Conservation Implementation Task Force was created by SB 1094 to identify water conservation best management practices (BMPs) and develop a BMP Guide for use by RWPGs and utilities.[1] In 2007, the task force was succeeded by the Water Conservation Advisory Council (WCAC) by the 80th Texas Legislature with the passage of SB 3 and HB 4. The primary roles of the WCAC include monitoring trends in water conservation implementation and technologies for potential inclusion as BMPs. Since its inception, the WCAC has continually worked with TWDB and TCEQ to update the "Best Management Practices Guide." BMPs contained in the BMP Guide are voluntary efficiency measures that save a quantifiable amount of water, either directly or indirectly, and can be implemented within a specific time frame. [2]

The current TWDB municipal water demand projections account for expected water savings caused by the implementation of the 1991 State Water Efficient Plumbing Act, which established minimum standards for plumbing fixtures sold in Texas. The standards for new plumbing fixtures, as specified by the State Water Efficient Plumbing Act and updated by the TCEQ, are shown in Table 5-3. The TCEQ has established rules requiring the labeling of both plumbing fixtures and water-using appliances sold in Texas. The labels must specify the rates of flow for plumbing fixtures and lawn sprinklers, and the amounts of water used per cycle for clothes washers and dishwashers.

In 2009, the Texas Legislature enacted HB 2667, establishing new minimum standards for plumbing fixtures sold in Texas beginning in 2014. HB 2667 clarifies and sets out the national standards of the American Society of Mechanical Engineers (ASME) and American National Standards Institute (ANSI) by which plumbing fixtures will be produced and tested. This bill establishes a phase-in of high efficiency plumbing fixtures brought into Texas, which allowed manufacturers the time to change their production and retailers the opportunity to turn over their inventory. HB 2667 creates an exemption for those manufacturers that volunteer to register their products with the United States Environmental Protection Agency's WaterSense Program, which should result in additional water savings. This bill also repeals the TCEQ certification process for plumbing fixtures since the plumbing fixtures must meet national certification and testing procedures.

TCEQ has established rules to reflect this new change in law. The 2009 law required that by January 2014, all toilets use no more than 1.28 gallons per flush (20 percent savings from the 1991, 1.6 gallons per flush standard). Assuming an average frequency of per-person toilet use in households of 5.1

[1] Water Conservation Implementation Task Force. Report to the 79th Legislature, Texas Water Development Board, Special Report. Austin, Texas. November 2004.

[2] "Best Management Practices for Municipal Water Users." Texas Water Development Board. Austin, Texas. May 2019.

and a per-use savings of 0.32 gallons per use, the supplementary savings of adopting high-efficiency toilets is 1.63 GPCD. This change is also reflected in Table 5-3.

Table 5-3 Standards for Plumbing Fixtures[3]

Fixture	Standard
Toilets*	1.28 gallons per flush
Shower Heads	2.50 gpm at 80 psi
Urinals	0.50 gallons per flush
Faucet Aerators	2.20 gpm at 60 psi
Drinking Water Fountains	Self-closing valve
* Bill 2667 of the 81st Texas Legislature, 2009	

The TWDB has estimated that the effect of the new plumbing fixtures in dwellings, offices, and public places will be a reduction in per capita water use in comparison to what would have occurred with previous generations of plumbing fixtures shown in Table 5-4.

Table 5-4 Water Conservation Potentials of Low Flow Plumbing Fixtures

	Water Savings (gpcd)		
Plumbing Fixture	Pre-1995 Average Use to 1995 Standard	Pre-1995 Average Use to 1995 Standard	Pre-1995 Average Use to 1995 Standard
Showerheads*	13.0	NA	1.86
Toilets - residential	10.5	12.1	1.6
Toilets and urinals – commercial**	7.06	8.41	1.35
Showerheads*	13.0	NA	1.86
* Savings values shown assume 8 minutes per shower and 6.5 showers per person per week. ** Savings values shown assume state-level gender employee proportions and 6 days/week use for commercial toilet and urinal use.			

With respect to the RWP, any additional projected water savings from conservation programs must be listed as a separate WMS. The savings projected by the TWDB include complete replacement of existing plumbing fixtures to water-efficient fixtures by the year 2045. The projections also assume that all new construction includes water-efficient plumbing fixtures. It is important when including a retrofit program as a WMS to not double-count water savings, as savings caused by retrofits are already included in the base water demand projections.

Entities must submit a water conservation plan if the following occur: [4]

[3] Title 30, Texas Administrative Code Section 290.252; 30 TAC, Chapter 290, Subchapter G; and Texas Health and Safety Code 372.

[4] "Evaluation of Best Management Practices in Certain Water Conservation Plans," Biennial Report to the Texas Legislature, 85th Legislative Session. Texas Water Development Board. 2017.

- The entity is a retail public water supplier with 3,300 or more connections;
- The entity is applying to the TWDB for financial assistance of more than $500,000; or
- The entity has certain surface water rights through the TCEQ.

The Rio Grande RWPG has considered these water conservation plans from each WUG, as necessary, to inform conservation WMSs and other recommendations.

The link below contains model water conservation plans for the following types of water users:

- Municipal Water Use by Public Water Supplier
- Wholesale Public Water Suppliers
- Industrial Use
- Mining Use
- Agricultural Uses

https://www.tceq.texas.gov/permitting/water_rights/wr_technical-resources/conserve.html#whattoinclude

Outdoor Water Use

In 2018, the Texas Living Waters Project published the "Water Conservation by the Yard: A Statewide Analysis of Outdoor Water Savings Potential," which detailed regional and statewide projected conservation savings based on effective outdoor watering education, technology, and restrictions. According to the Texas Living Waters Project, restricting outdoor water use to no more than twice per week can alone achieve much of the projected conservation savings in the 2017 State Water Plan efficiently utilizing the following limits:

- Number of days/week residents can water;
- Hours during which residents can irrigate; and
- Specific water delivering technologies.

The Texas Living Waters Project reported an estimated savings potential of twice per week outdoor watering restrictions ranges from 3.5 (low effort) to 8.5 (high effort) percent of total municipal demand. The Texas Living Waters Project research indicates that education and enforcement have a direct impact on the effectiveness of outdoor watering restrictions.

Municipal Water Conservations Goals

Advanced Municipal Water Conservation is considered for every municipal WUG in Region M. For every municipal WUG with a projected need or a per capita water use rate greater than 140 GPCD, municipal conservation yield and costs were recommended. Regardless of need, conservation is not recommended for WUGs with a GPCD less than 80. Primera is the only WUG exhibiting needs with a Base GPCD less than 80 (79). While Primera exhibits a municipal need, their low GPCD does not suggest additional savings are achievable through conservation.

For entities that have projected needs, the usage reduction rate was based on the current GPCD. Entities with needs and a GPCD greater than 140 GPCD were assigned a 10 percent usage reduction per decade. After the 140 GPCD goal was achieved, or for entities with a need and a GPCD below 140, the decadal reduction was set to 5 percent. A minimum value of 80 GPCD was fixed. Once the minimum value was reached, entities were projected to stop reducing their GPCD. Table 5-5 shows the projected GPCD goals for recommended municipal WUGs.

It is encouraged that entities without needs that have a per capita water use rate under 140 GPCD implement advanced water conservation, but they were not recommended a specific advanced conservation WMS, as goals were not assigned to them, and no yield or costs were determined.

Table 5-5 2026 Region M Advanced Municipal Water Conservation Goals (GPCD)

WUG	County	Baseline (GPCD)	Projected GPCD Goals					
			2030	2040	2050	2060	2070	2080
Brownsville	Cameron	154	135	128	122	116	110	105
County-Other, Cameron	Cameron	147	128	121	115	109	104	99
County-Other, Hidalgo	Hidalgo	109	99	94	89	85	81	80
County-Other, Starr	Starr	115	104	99	94	90	85	81
County-Other, Webb	Webb	105	95	90	86	81	80	80
County-Other, Zapata	Zapata	127	115	109	103	98	93	89
Eagle Pass	Maverick	150	131	125	118	112	107	102
East Rio Hondo WSC	Cameron	125	115	109	104	98	93	89
Edinburg	Hidalgo	121	111	105	100	95	90	86
El Jardin WSC	Cameron	102	91	87	83	80	80	80
El Sauz WSC	Starr	91	83	80	80	80	80	80
El Tanque WSC	Starr	134	123	117	111	106	100	95
Falcon Rural WSC	Zapata	169	148	134	127	121	115	109
Harlingen	Cameron	159	139	132	126	119	113	108
Hidalgo County MUD 1	Hidalgo	92	83	80	80	80	80	80
La Grulla	Starr	161	141	127	121	115	109	104
La Joya	Hidalgo	116	106	101	96	91	87	82
La Villa	Hidalgo	100	91	87	82	80	80	80
Laguna Madre Water District	Cameron	378	336	302	272	245	220	198
Laredo	Webb	144	133	126	120	114	108	103
McAllen	Hidalgo	211	186	167	150	135	129	122
Military Highway WSC	Cameron	136	125	119	113	107	102	97
Mission	Hidalgo	187	164	148	133	126	120	114
North Alamo WSC	Cameron	146	128	121	115	110	104	99
Olmito WSC	Cameron	166	145	131	124	118	112	107

WUG	County	Baseline (GPCD)	Projected GPCD Goals					
			2030	2040	2050	2060	2070	2080
Palm Valley	Cameron	166	145	130	124	118	112	106
Pharr	Hidalgo	100	91	86	82	80	80	80
Port Mansfield PUD	Willacy	350	310	279	251	226	204	183
Rio Grande City	Starr	214	189	170	153	138	131	124
Rio WSC	Starr	93	85	81	80	80	80	80
Roma	Starr	108	99	94	89	85	80	80
Sharyland WSC	Hidalgo	160	140	126	120	114	108	103
Union WSC	Starr	157	138	131	124	118	112	106
Valley MUD 2	Cameron	286	253	228	205	185	166	150
Webb County	Webb	107	98	93	88	84	80	80
Weslaco	Hidalgo	156	136	130	123	117	111	106
Zapata County	Zapata	166	146	131	125	118	112	107
Zapata County San Ygnacio & Ramireño	Zapata	170	149	134	127	121	115	109
Zapata County WCID-Hwy 16 East	Zapata	266	237	213	192	173	155	140

The new GPCD for each decade was used along with the WUG population to determine the revised water demands for each decade. These values were subtracted from the original water demands to determine the amount of water conserved in each decade.

Two strategies – water loss mitigation and water use reduction – are recommended to reach the target GPCDs. The respective yields of total volume of water that could be conserved (demand reduction) are shown in Table 5-6 and Table 5-7.

Table 5-6 2026 Region M Projected Total Demand Reduction from Water Loss Mitigation (acft/yr)

WUG	COUNTY	Water Loss Mitigation Demand Reduction (acft/yr)[1]					
		2030	2040	2050	2060	2070	2080
Brownsville	Cameron	322	329	332	331	330	329
Eagle Pass	Maverick	96	102	107	112	116	121
East Rio Hondo WSC	Cameron	36	43	50	55	58	61
Edinburg	Hidalgo	112	121	127	129	131	133
El Jardin WSC	Cameron	14	14	14	14	14	14

WUG	COUNTY	Water Loss Mitigation Demand Reduction (acft/yr)[1]					
		2030	2040	2050	2060	2070	2080
El Sauz WSC	Starr	2	2	2	2	2	2
El Tanque WSC	Starr	2	2	2	1	1	1
Falcon Rural WSC	Zapata	2	1	0	0	0	0
Harlingen	Cameron	148	151	153	152	152	152
Hidalgo County MUD 1	Hidalgo	5	5	5	6	6	6
La Grulla	Starr	44	16	16	17	17	18
La Joya	Hidalgo	6	6	7	7	7	7
La Villa	Hidalgo	2	3	3	3	3	3
Laguna Madre Water District	Cameron	139	142	144	143	143	142
Laredo	Webb	418	433	438	433	429	424
McAllen	Hidalgo	1,148	1,272	1,393	477	489	502
Military Highway WSC	Cameron	65	66	66	67	68	69
Mission	Hidalgo	542	571	197	202	207	212
North Alamo WSC	Cameron	353	388	411	415	419	423
Olmito WSC	Cameron	40	14	14	14	14	14
Palm Valley	Cameron	7	2	2	2	2	2
Pharr	Hidalgo	91	97	101	103	105	107
Port Mansfield PUD	Willacy	4	5	6	8	10	12
Rio Grande City	Starr	126	134	140	48	50	51
Rio WSC	Starr	8	10	10	10	10	10
Roma	Starr	25	26	27	28	29	30
Sharyland WSC	Hidalgo	466	169	179	181	183	186
Union WSC	Starr	12	13	13	14	14	15
Valley MUD 2	Cameron	29	30	30	30	30	30
Webb County	Webb	15	21	26	26	26	25
Weslaco	Hidalgo	55	56	57	59	61	63
Zapata County	Zapata	55	19	19	18	18	18
Zapata County San Ygnacio & Ramireño	Zapata	2	1	0	0	0	0

WUG	COUNTY	Water Loss Mitigation Demand Reduction (acft/yr)[1]					
		2030	2040	2050	2060	2070	2080
Zapata County WCID-Hwy 16 East	Zapata	5	5	5	5	5	2

[1] Water Loss Mitigation is not recommended for County-Other WUGs.

Table 5-7 2026 Region M Projected Total Demand Reduction from Water Use Reduction (acft/yr)

WUG	County	Water Use Reduction Demand Reduction (acft/yr)					
		2030	2040	2050	2060	2070	2080
Brownsville	Cameron	2,903	4,321	5,782	7,116	8,376	9,561
County-Other, Cameron	Cameron	423	475	451	373	301	204
County-Other, Hidalgo	Hidalgo	160	178	77	115	160	184
County-Other, Starr	Starr	26	50	77	112	150	190
County-Other, Webb	Webb	70	80	57	76	82	82
County-Other, Zapata	Zapata	8	17	26	36	45	55
Eagle Pass	Maverick	864	1,348	1,875	2,411	2,961	3,520
East Rio Hondo WSC	Cameron	146	354	634	940	1,224	1,524
Edinburg	Hidalgo	452	1,001	1,633	2,215	2,780	3,339
El Jardin WSC	Cameron	53	113	177	213	213	212
El Sauz WSC	Starr	7	12	13	13	13	13
El Tanque WSC	Starr	8	14	19	24	26	28
Falcon Rural WSC	Zapata	5	9	10	10	10	9
Harlingen	Cameron	1,332	1,983	2,656	3,275	3,860	4,411
Hidalgo County MUD 1	Hidalgo	21	36	37	37	39	40
La Grulla	Starr	102	274	355	429	504	579
La Joya	Hidalgo	24	53	84	115	146	176
La Villa	Hidalgo	10	22	38	44	43	43
Laguna Madre Water District	Cameron	325	751	1,145	1,491	1,798	2,071
Laredo	Webb	1,670	3,593	5,620	7,434	9,115	10,667
McAllen	Hidalgo	2,684	6,686	11,092	15,816	17,848	19,873

WUG	County	Water Use Reduction Demand Reduction (acft/yr)					
		2030	2040	2050	2060	2070	2080
Military Highway WSC	Cameron	259	545	844	1,147	1,443	1,733
Mission	Hidalgo	1,266	2,988	5,095	5,960	6,819	7,677
North Alamo WSC	Cameron	3,188	5,130	7,201	8,971	10,686	12,342
Olmito WSC	Cameron	92	239	298	355	410	463
Palm Valley	Cameron	17	43	53	62	71	79
Pharr	Hidalgo	367	786	1,276	1,530	1,561	1,593
Port Mansfield PUD	Willacy	10	26	48	79	119	170
Rio Grande City	Starr	295	706	1,120	1,601	1,810	2,021
Rio WSC	Starr	32	78	92	93	92	92
Roma	Starr	99	216	349	479	612	640
Sharyland WSC	Hidalgo	1,087	2,999	3,885	4,636	5,371	6,087
Union WSC	Starr	111	170	235	299	365	431
Valley MUD 2	Cameron	68	157	240	312	376	433
Webb County	Webb	60	172	335	443	536	531
Weslaco	Hidalgo	496	741	1,003	1,276	1,554	1,839
Zapata County	Zapata	128	327	402	470	530	587
Zapata County San Ygnacio & Ramireño	Zapata	5	9	10	10	11	11
Zapata County WCID-Hwy 16 East	Zapata	11	25	39	50	60	72

Costs were calculated to include a variety of conservation measures. The TWDB Cost Estimating Tool methodology was used to determine project costs, annual costs, and unit costs once the facility costs were developed.

As deteriorating infrastructure can have high rates of water loss, water loss mitigation is recommended through leak detection and repair and utility water audits. It is assumed that none of the distribution line replacements for this water conservation strategy are subject to adopted utility standard minimum size requirements that exceed two standard pipe diameters. Costs for leak detection and repair were estimated assuming 2 percent of the individual WUG's pipeline is replaced each decade over the planning horizon. Implementing this conservation strategy would reduce approximately 1-3 percent of the WUG's demand. Water loss is discussed further in Chapter 1.

The following table provides the estimated costs for municipal conservation (water loss mitigation). The high unit cost reflects the cost of water main replacement.

Table 5-8 Estimated Costs for Water Loss Mitigation WMS

WUG	County	Water Loss Mitigation			
		Facility Cost ($)	Project Cost ($)	Annual Cost ($)	Unit Cost ($/ACFT)
Brownsville	Cameron	$19,827,000	$27,042,000	$533,333	$1,606
Eagle Pass	Maverick	$13,311,000	$18,154,000	$358,000	$2,959
East Rio Hondo WSC	Cameron	$12,340,000	$16,830,000	$332,000	$5,443
Edinburg	Hidalgo	$13,033,000	$17,776,000	$350,667	$2,637
El Jardin WSC	Cameron	$3,050,000	$4,160,000	$82,000	$5,857
El Sauz WSC	Starr	$164,000	$226,000	$4,333	$2,167
El Tanque WSC	Starr	$164,000	$226,000	$4,333	$2,167
Falcon Rural WSC	Zapata	$82,000	$113,000	$2,167	$1,083
Harlingen	Cameron	$14,281,000	$19,477,000	$384,167	$2,511
Hidalgo County MUD 1	Hidalgo	$971,000	$1,324,000	$26,167	$4,361
La Grulla	Starr	$1,525,000	$2,080,000	$41,000	$932
La Joya	Hidalgo	$693,000	$945,000	$18,667	$2,667
La Villa	Hidalgo	$277,000	$378,000	$7,500	$2,500
Laguna Madre Water District	Cameron	$3,882,000	$5,295,000	$104,500	$726
Laredo	Webb	$32,306,000	$44,062,000	$869,000	$1,984
McAllen	Hidalgo	$20,659,000	$28,177,000	$555,667	$399
Military Highway WSC	Cameron	$3,605,000	$4,916,000	$97,000	$1,406
Mission	Hidalgo	$13,172,000	$17,966,000	$354,333	$621
North Alamo WSC	Cameron	$97,057,000	$132,375,000	$2,610,667	$6,172
Olmito WSC	Cameron	$1,109,000	$1,513,000	$29,833	$746
Palm Valley	Cameron	$82,000	$113,000	$2,167	$310
Pharr	Hidalgo	$11,092,000	$15,129,000	$298,333	$2,788
Port Mansfield PUD	Willacy	$821,000	$1,132,000	$22,000	$1,833
Rio Grande City	Starr	$2,357,000	$3,215,000	$63,333	$452
Rio WSC	Starr	$1,525,000	$2,080,000	$41,000	$4,100
Roma	Starr	$3,189,000	$4,350,000	$85,833	$2,861
Sharyland WSC	Hidalgo	$13,172,000	$17,966,000	$354,333	$760
Union WSC	Starr	$1,387,000	$1,892,000	$37,333	$2,489

WUG	County	Water Loss Mitigation			
		Facility Cost ($)	Project Cost ($)	Annual Cost ($)	Unit Cost ($/ACFT)
Valley MUD 2	Cameron	$832,000	$1,135,000	$22,333	$744
Webb County	Webb	$832,000	$1,135,000	$22,333	$859
Weslaco	Hidalgo	$3,882,000	$5,295,000	$104,500	$1,659
Zapata County	Zapata	$2,773,000	$3,782,000	$74,667	$1,358
Zapata County San Ygnacio & Ramireño	Zapata	$164,000	$226,000	$4,333	$2,167
Zapata County WCID-Hwy 16 East	Zapata	$1,969,000	$2,715,000	$53,000	$10,600

Water use reduction includes installation of advanced metering infrastructure and non-capital efforts to reduce the consumption of water.

Smart meters were assumed a cost of $330 per home, with the assumption that 100 percent of homes would implement this strategy over the planning horizon. Implementing this conservation strategy would reduce approximately 1-5 percent of the demand.

Remaining conservation measures were assumed to be non-capital approaches, which could include both labor and materials associated with implementing standards, incentives, and outreach. Many of the non-capital cost measures include, but are not limited to, drought tolerant landscape, public education and outreach – including school programs, rebate and incentive programs – local ordinances that increase water efficiency by customers, support of legislation that increases water efficiency in plumbing products and appliances at both the State and Federal level, increased water efficiency in utility operations, and conservation-oriented rate structures. Conservation measures for non-capital approaches were included in the annual costs at an average of $305/acft of water savings.

The following table provides the estimated costs for municipal conservation (water use reduction). The unit cost is presented as an average, with some conservation measures being more expensive and some being less.

Table 5-9 Estimated Costs for Water Use Reduction WMS

WUG	County	Water Use Reduction			
		Facility Cost ($)	Project Cost ($)	Annual Cost ($)	Unit Cost ($/ACFT)
Brownsville	Cameron	$21,626,000	$29,028,000	$6,305,760	$660
County-Other, Cameron	Cameron	$472,000	$634,000	$210,505	$443
County-Other, Hidalgo	Hidalgo	$770,000	$1,034,000	$177,680	$966
County-Other, Starr	Starr	$654,000	$878,000	$161,815	$852
County-Other, Webb	Webb	$433,000	$581,000	$93,790	$1,144

WUG	County	Water Use Reduction			
		Facility Cost ($)	Project Cost ($)	Annual Cost ($)	Unit Cost ($/ACFT)
County-Other, Zapata	Zapata	$174,000	$233,000	$44,165	$803
Eagle Pass	Maverick	$8,191,000	$10,994,000	$2,358,695	$670
East Rio Hondo WSC	Cameron	$4,972,000	$6,674,000	$1,248,215	$819
Edinburg	Hidalgo	$11,275,000	$15,134,000	$2,797,830	$838
El Jardin WSC	Cameron	$1,431,000	$1,920,000	$291,695	$1,369
El Sauz WSC	Starr	$232,000	$312,000	$40,355	$3,104
El Tanque WSC	Starr	$82,000	$110,000	$21,235	$758
Falcon Rural WSC	Zapata	$16,000	$22,000	$6,050	$605
Harlingen	Cameron	$9,686,000	$13,001,000	$2,861,995	$649
Hidalgo County MUD 1	Hidalgo	$672,000	$902,000	$118,370	$2,959
La Grulla	Starr	$1,113,000	$1,494,000	$351,105	$606
La Joya	Hidalgo	$619,000	$831,000	$151,545	$861
La Villa	Hidalgo	$291,000	$390,000	$59,505	$1,352
Laguna Madre Water District	Cameron	$1,250,000	$1,678,000	$761,370	$368
Laredo	Webb	$29,980,000	$40,241,000	$7,963,115	$747
McAllen	Hidalgo	$23,963,000	$32,164,000	$9,775,155	$492
Military Highway WSC	Cameron	$5,154,000	$6,918,000	$1,339,520	$773
Mission	Hidalgo	$11,421,000	$15,330,000	$4,119,825	$537
North Alamo WSC	Cameron	$29,344,000	$39,387,000	$8,371,295	$678
Olmito WSC	Cameron	$865,000	$1,162,000	$276,945	$598
Palm Valley	Cameron	$147,000	$197,000	$47,485	$601
Pharr	Hidalgo	$11,092,000	$14,888,000	$2,243,230	$1,408
Port Mansfield PUD	Willacy	$111,000	$149,000	$64,055	$377
Rio Grande City	Starr	$2,393,000	$3,212,000	$986,850	$488
Rio WSC	Starr	$1,158,000	$1,554,000	$212,315	$2,283
Roma	Starr	$2,835,000	$3,805,000	$644,050	$1,006
Sharyland WSC	Hidalgo	$11,742,000	$15,761,000	$3,694,805	$607
Union WSC	Starr	$956,000	$1,283,000	$280,880	$652
Valley MUD 2	Cameron	$347,000	$466,000	$172,815	$399

WUG	County	Water Use Reduction			
		Facility Cost ($)	Project Cost ($)	Annual Cost ($)	Unit Cost ($/ACFT)
Webb County	Webb	$2,428,000	$3,259,000	$547,550	$1,022
Weslaco	Hidalgo	$4,119,000	$5,529,000	$1,206,680	$656
Zapata County	Zapata	$1,092,000	$1,466,000	$349,545	$595
Zapata County San Ygnacio & Ramireño	Zapata	$18,000	$24,000	$6,355	$578
Zapata County WCID-Hwy 16 East	Zapata	$59,000	$79,000	$30,350	$422

Environmental Impacts of Recommended Advanced Municipal Water Conservation Strategies

Potential environment impacts for Advanced Municipal Water Conservation strategies have been identified and categorized as described below. The letters identifying each section correspond to the headings in Table 5-10.

A. Acres Impacted Permanently

Acres impacted permanently refers to the total amount of area that will be permanently impacted because of the implementation of a strategy. Water loss mitigation and water use reductions have no permanent impacts on acreage.

B. Construction Impacted Acreage

Temporary environmental impacts may be seen during construction activities, such as increased air and noise pollution, and land disturbance activities. However, these effects are typical of any construction project. Pipeline replacement under water loss mitigation assumes the acreage impacted is equivalent to the ROW easements required; it is assumed 50-feet for ROW.

C. Agricultural Resources Impacted Acreage

Agricultural resources impact acreage is a consolidation of vegetation and land use types specific to Region – row crops, grass farms, and orchards – identified in the TPWD EMST. This GIS mapping data was overlain WMS locations to estimate the agricultural impact acreage from the implementation of the associated strategy. As municipal water conservation strategies are applied to already developed acreage, there is no impact to agricultural resources.

D. Wetland Impact

The wetland impact refers to the probability that implementation of a WMS will affect a wetland. The location of wetlands in the Region was determined using the NWI located at http://www.fws.gov/wetlands/Data/Mapper.html.

A strategy received a "1" if all or part of the strategy is located in a wetland or if it is in close proximity to where construction activities are likely to impact the wetland. All other strategies received zeros. If the exact location of project is unknown it was given a zero because it was assumed that it would be located on a site that would not affect and wetland.

E. Habitat Impacted Acreage

Habitat impacted acreage refers to how the strategy will impact the habitat of the local area. The more area that is impacted because of the implementation of the strategy, the more the habitat of the area will be disrupted. Therefore, it was assumed that the permanent acreage impacted for a WMS is what would impact habitats.

F. Cultural Resources Impact

Cultural resources impact 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, including locations; buildings; and features with scientific, cultural, or historic value. It is assumed that no WMSs negatively affect cultural resources. Mitigation costs are included for strategies that require infrastructure so it is assumed that none would be built in a location or way that disrupts culturally sensitive location.

G. Reliability

Reliability is an assessment of the availability of the specified water quantity to the user over time. If the quantity of water is available to the user all the time, then the strategy has a high reliability. If the quantity of water is contingent on other factors, reliability will be lower. Since these strategies are a demand reduction or supply efficiency increase, the reliability is high (reliability score = 5).

H. Bays, Estuaries, and Arms of the Gulf of Mexico

The environmental effects due to implementation of upstream WMS projects on bays, estuaries, and arms of the Gulf of Mexico are quantitatively assessed and reported. Water bodies designated as classified segments by the TCEQ that are within or downstream of Region M include the Brownsville Ship Channel, South Bay, Laguna Madre, and Gulf of Mexico. Effects to these water bodies were quantified by estimating whether the project is anticipated to decrease freshwater inflow in these classified water bodies.

A WMS project received a "1" if it is expected to decrease freshwater inflow into a classified water body. If a strategy were to increase freshwater inflow or otherwise have little to no impact on inflows, then the project would receive a zero.

A summary of the identified and quantified environmental impacts for recommended advanced municipal conservation strategies is presented in Table 5-10.

Table 5-10 Environmental Impacts for Recommended Advanced Municipal Water Conservation Strategies

Entity	WMS Name	Yield*	A	B	C	D	E	F	G	H
Brownsville	Advanced Municipal Water Conservation	3,225	0	520	0	0	0	0	5	1
County-Other, Cameron	Advanced Municipal Water Conservation	423	0	0	0	0	0	0	5	1

Entity	WMS Name	Yield*	A	B	C	D	E	F	G	H
County-Other, Hidalgo	Advanced Municipal Water Conservation	160	0	0	0	0	0	0	5	1
County-Other, Starr	Advanced Municipal Water Conservation	26	0	0	0	0	0	0	5	1
County-Other, Webb	Advanced Municipal Water Conservation	70	0	0	0	0	0	0	5	1
County-Other, Zapata	Advanced Municipal Water Conservation	8	0	0	0	0	0	0	5	1
Eagle Pass	Advanced Municipal Water Conservation	960	0	349	0	0	0	0	5	1
East Rio Hondo WSC	Advanced Municipal Water Conservation	182	0	324	0	0	0	0	5	1
Edinburg	Advanced Municipal Water Conservation	564	0	342	0	0	0	0	5	1
El Jardin WSC	Advanced Municipal Water Conservation	67	0	80	0	0	0	0	5	1
El Sauz WSC	Advanced Municipal Water Conservation	9	0	7	0	0	0	0	5	1
El Tanque WSC	Advanced Municipal Water Conservation	10	0	7	0	0	0	0	5	1
Falcon Rural WSC	Advanced Municipal Water Conservation	7	0	4	0	0	0	0	5	1
Harlingen	Advanced Municipal Water Conservation	1,480	0	375	0	0	0	0	5	1
Hidalgo County MUD 1	Advanced Municipal Water Conservation	26	0	25	0	0	0	0	5	1
La Grulla	Advanced Municipal Water Conservation	146	0	40	0	0	0	0	5	1
La Joya	Advanced Municipal Water Conservation	30	0	18	0	0	0	0	5	1
La Villa	Advanced Municipal Water Conservation	12	0	7	0	0	0	0	5	1
Laguna Madre Water District	Advanced Municipal Water Conservation	464	0	102	0	0	0	0	5	1
Laredo	Advanced Municipal Water Conservation	2,088	0	847	0	0	0	0	5	1
McAllen	Advanced Municipal Water Conservation	3,832	0	542	0	0	0	0	5	1

Entity	WMS Name	Yield*	A	B	C	D	E	F	G	H
Military Highway WSC	Advanced Municipal Water Conservation	324	0	95	0	0	0	0	5	1
Mission	Advanced Municipal Water Conservation	1,808	0	345	0	0	0	0	5	1
North Alamo WSC	Advanced Municipal Water Conservation	3,541	0	2,545	0	0	0	0	5	1
Olmito WSC	Advanced Municipal Water Conservation	132	0	29	0	0	0	0	5	1
Palm Valley	Advanced Municipal Water Conservation	24	0	4	0	0	0	0	5	1
Pharr	Advanced Municipal Water Conservation	458	0	291	0	0	0	0	5	1
Port Mansfield PUD	Advanced Municipal Water Conservation	14	0	36	0	0	0	0	5	1
Rio Grande City	Advanced Municipal Water Conservation	421	0	62	0	0	0	0	5	1
Rio WSC	Advanced Municipal Water Conservation	40	0	40	0	0	0	0	5	1
Roma	Advanced Municipal Water Conservation	124	0	84	0	0	0	0	5	1
Sharyland WSC	Advanced Municipal Water Conservation	1,553	0	345	0	0	0	0	5	1
Union WSC	Advanced Municipal Water Conservation	123	0	36	0	0	0	0	5	1
Valley MUD 2	Advanced Municipal Water Conservation	97	0	22	0	0	0	0	5	1
Webb County	Advanced Municipal Water Conservation	75	0	22	0	0	0	0	5	1
Weslaco	Advanced Municipal Water Conservation	551	0	102	0	0	0	0	5	1
Zapata County	Advanced Municipal Water Conservation	183	0	73	0	0	0	0	5	1
Zapata County San Ygnacio & Ramireño	Advanced Municipal Water Conservation	7	0	7	0	0	0	0	5	1
Zapata County WCID-Hwy 16 East	Advanced Municipal Water Conservation	16	0	87	0	0	0	0	5	1

* Indicates first decade of implementation yield (acft/yr).

5.2.1.2 Irrigation District Water Conservation

IDs carry over 85 percent of the water that is used from the Rio Grande system in Region M. These districts deliver water for all categories of water user. Most IDs have similar components: initial pump stations to divert water from the river, some storage in either off-channel reservoirs or in the main canals, and canal and/or pipeline networks that deliver water to farmland and municipal utilities for treatment and distribution. Most systems measure the water supplied to farmers using a flow rate estimate from delivery pipe rather than metering, which makes accurate volumetric pricing difficult.

Infrastructure and distribution systems increase supplies through reduction of losses and removing infrastructure bottlenecks that have limited the amount of water that can be supplies.

The ID systems require significant regular maintenance to mitigate losses and can benefit from more proactive improvements like gate and meter automation. Districts may experience losses in the range of 10 to 40 percent of the water that they divert. ID improvements include conservation measures, which directly reduce measurable losses, and operational improvements like automated gates and increased off-channel storage. Per TWDB rules, ID conservation yield is estimated for a drought year. ID improvements represent a group of low-cost WMS for Region M that decrease losses and improve service.

The ID conservation WMSs submitted via surveys over the past three planning cycles were used to form the basis of a general ID conservation WMS for all IDs. ID conservation strategies include the following:

- Canal lining (new linings and replacement of damaged linings);
- Installation or replacement of pipeline, including interconnects between IDs where IDs are capable of serving new WUG or measurable efficiency gains are achieved; and
- General repairs and improvements, including new metering and controls, which can include installation of automated system controls, meters and supervisory control and data acquisition (SCADA) systems where implementation leads to measurable efficiency gains.

All WMSs were assumed to apply to the first decade of planning, 2030, unless noted otherwise. The total annual estimated potential water savings in 2080 for all the WMSs submitted was 136,702 acft. The amount of water that can be conserved per ID was calculated based on estimates of current conveyance efficiency and a maximum efficiency of 90 percent.[5] These savings are passed proportionally to ID customers; this allocation split is shown under each ID.

Table 5-11 Irrigation District Conservation Water Savings (acft/yr)

Irrigation District	2030	2040	2050	2060	2070	2080
Bayview Irrigation District	**255**	**510**	**765**	**1,020**	**1,275**	**1,530**
County-Other, Cameron	7	13	20	27	34	40
Irrigation, Cameron	248	496	744	990	1,234	1,477
Unallocated	0	1	1	3	7	13
Brownsville Irrigation District	**608**	**1,216**	**1,823**	**2,431**	**3,039**	**3,647**

[5] For comparison, the public water supply systems in Region M average approximately 73 percent efficiency, with about 27 percent losses caused by leaks and breakage in their systems.

Irrigation District	2030	2040	2050	2060	2070	2080
County-Other, Cameron	12	24	37	49	61	73
El Jardin	44	88	132	176	220	264
Irrigation, Cameron	467	934	1,399	1,863	2,322	2,779
Unallocated	85	170	255	343	436	531
Cameron County Irrigation District No. 2, San Benito	**1,248**	**2,497**	**3,745**	**4,994**	**6,242**	**7,491**
County-Other, Cameron	10	20	30	40	50	60
ERHWSC	92	184	276	369	460	553
Irrigation, Cameron	1,012	2,023	3,032	4,036	5,032	6,022
Manufacturing, Cameron	3	6	10	13	16	19
Rio Hondo	13	26	39	51	64	77
San Benito	118	234	352	469	586	703
Unallocated	0	4	6	16	34	57
Cameron County Irrigation District No. 6, Los Fresnos	**272**	**543**	**815**	**1,086**	**1,358**	**1,629**
Brownsville	2	5	7	10	13	15
Manufacturing, Cameron	0	0	0	1	1	1
Irrigation, Cameron	161	321	482	641	800	957
Los Fresnos	9	18	26	35	44	53
Olmito	16	32	47	62	78	94
Unallocated	84	167	253	337	422	509
Cameron County W.I.D No. 10, Rutherford Harding	**372**	**632**	**748**	**864**	**978**	**1,092**
Irrigation, Cameron	116	232	348	464	578	692
Unallocated	256	400	400	400	400	400
Delta Lake Irrigation District	**4,222**	**8,444**	**12,666**	**16,888**	**21,110**	**25,331**
County-Other, Willacy	4	8	13	17	21	25
Irrigation, Hidalgo	1,652	3,302	4,949	6,588	8,214	9,829
Irrigation, Willacy	1262	2522	3780	5031	6273	7506
Lyford	40	82	122	164	204	246
Port Mansfield	6	13	19	25	31	38
Raymondville	240	480	720	960	1200	1440

Irrigation District	2030	2040	2050	2060	2070	2080
Unallocated	1,018	2,037	3,063	4,103	5,167	6,247
Donna Irrigation District Hidalgo Co. No. 1	**1,412**	**2,824**	**4,235**	**5,647**	**7,059**	**8,471**
County-Other, Hidalgo	85	170	256	341	426	511
Donna	139	277	416	555	693	832
Irrigation, Hidalgo	1188	2374	3558	4736	5905	7067
Unallocated	0	3	5	15	35	61
Engleman Irrigation District	**218**	**435**	**653**	**870**	**1,088**	**1,306**
Irrigation, Hidalgo	218	435	652	868	1082	1294
Unallocated	0	0	1	2	6	12
Harlingen Irrigation District No. 1	**600**	**1,200**	**1,800**	**2,400**	**3,000**	**3,600**
Combes	7	13	20	26	33	40
ERHWSC	4	8	12	12	14	17
Harlingen	199	400	599	801	1,000	1,199
Irrigation, Cameron	378	755	1,133	1,511	1,883	2,254
Military Highway	6	12	18	23	29	35
Palm Valley	3	5	8	10	13	16
Primera	3	7	10	13	17	20
Unallocated	0	0	0	4	11	19
Hidalgo and Cameron Counties Irrigation District No. 9, Mercedes	**2,915**	**5,830**	**8,745**	**11,661**	**14,576**	**17,491**
Edcouch	16	31	47	62	78	93
Elsa	36	73	109	145	181	217
Irrigation, Cameron	169	339	507	675	842	1,008
Irrigation, Hidalgo	2,120	4,236	6,349	8,451	10,537	12,609
La Villa	12	25	36	48	60	73
Mercedes	108	216	324	432	540	648
NAWSC	187	374	561	748	935	1,123
Weslaco	266	532	798	1,063	1,330	1,595
Unallocated	1	4	14	37	73	125
Hidalgo County Irrigation District No. 1, Edinburg	**1,789**	**3,576**	**5,221**	**6,075**	**6,928**	**7,780**

Irrigation District	2030	2040	2050	2060	2070	2080
Edinburg	343	687	1,030	1,374	1,717	2,061
Hidalgo MUD	26	52	77	103	129	154
Irrigation, Hidalgo	936	1,870	2,662	2,662	2,662	2,662
McAllen	127	253	380	507	633	760
NAWSC	44	89	133	177	222	266
Sharyland	313	625	939	1,252	1,565	1,877
Unallocated	0	0	0	0	0	0
Hidalgo County Irrigation District No. 2, San Juan	**2,588**	**5,176**	**7,763**	**10,351**	**12,939**	**15,527**
Alamo	104	209	313	418	522	626
Edinburg	100	201	300	400	501	601
Irrigation, Hidalgo	1,321	2,640	3,957	5,267	6,567	7,859
McAllen	561	1,123	1,684	2,245	2,806	3,368
NAWSC	86	175	261	349	435	523
Pharr	167	335	502	669	836	1,004
San Juan	63	127	190	253	317	380
Unallocated	186	366	556	750	955	1,166
Hidalgo County Irrigation District No. 5, Progresso	**183**	**366**	**549**	**732**	**915**	**1,098**
Irrigation, Hidalgo	183	366	548	730	910	1,089
Unallocated	0	0	1	2	5	9
Hidalgo County Irrigation District No. 6, Mission 6	**679**	**1,359**	**2,037**	**2,712**	**2,776**	**2,776**
Agua SUD	264	528	792	1,055	1,055	1,055
Irrigation, Hidalgo	415	831	1,245	1,657	1,721	1,721
Unallocated	0	0	0	0	0	0
Hidalgo County Irrigation District No. 13	**55**	**110**	**165**	**220**	**275**	**330**
Irrigation, Hidalgo	55	110	165	219	274	327
Unallocated	0	0	0	1	1	3
Hidalgo County Irrigation District No. 16, Mission	**543**	**1,087**	**1,630**	**2,174**	**2,717**	**3,260**
Agua SUD	118	234	352	470	586	704

Irrigation District	2030	2040	2050	2060	2070	2080
Irrigation, Hidalgo	409	819	1,229	1,634	2,038	2,439
La Joya	16	33	49	65	81	97
Unallocated	0	1	0	5	12	20
Hidalgo County Water Improvement District No. 3*	**0**	**0**	**0**	**0**	**0**	**0**
Hidalgo County Water Improvement District No. 18	**1**	**2**	**2**	**3**	**4**	**5**
Irrigation, Hidalgo	1	2	2	3	4	5
Unallocated	0	0	0	0	0	0
Hidalgo County Water Improvement District No. 19, Sharyland	**101**	**202**	**304**	**405**	**506**	**607**
Irrigation, Hidalgo	101	202	303	404	503	602
Unallocated	0	0	1	1	3	5
La Feria Irrigation District, Cameron County No. 3	**1,455**	**2,911**	**4,366**	**5,822**	**7,277**	**8,733**
County-Other, Cameron	33	66	99	132	165	198
Irrigation, Hidalgo	1,255	2,508	3,759	5,003	6,238	7,464
La Feria	121	242	363	484	605	726
Santa Rosa	33	66	99	132	165	198
Siesta Shores	9	20	29	38	49	58
Unallocated	4	9	17	33	55	89
Maverick County Water Improvement District	**2,136**	**4,272**	**6,408**	**8,544**	**10,680**	**12,816**
County Other- Maverick	35	72	107	142	177	212
Irrigation, Maverick	2,062	4,121	6,177	8,222	10,252	12,268
Unallocated	39	79	124	180	251	336
Santa Cruz Irrigation District No. 15*	**1,781**	**3,562**	**5,343**	**7,124**	**8,905**	**9,255**
Irrigation, Hidalgo	1,493	2,984	4,472	5,952	7,422	8,430
NAWSC	37	75	112	150	187	225
Sharyland	100	200	300	400	500	600
Unallocated	151	303	459	622	796	0
United Irrigation District	**469**	**939**	**1,408**	**1,878**	**2,347**	**2,816**
Irrigation, Hidalgo	58	116	174	232	289	346

Irrigation District	2030	2040	2050	2060	2070	2080
McAllen	94	187	281	375	469	563
Mission	181	361	541	722	902	1,083
Sharyland	87	173	261	347	434	521
Unallocated	49	102	151	202	253	303
Valley Acres Irrigation District	**127**	**125**	**124**	**121**	**115**	**111**
Irrigation, Cameron	16	16	16	16	16	16
Irrigation, Hidalgo	111	109	108	105	99	95
Unallocated	0	0	0	0	0	0
TOTAL	**24,029**	**47,818**	**71,315**	**94,022**	**116,109**	**136,702**

*In January 2025, Hidalgo County Water Improvement District No. 3 and Santa Cruz Water Control and Improvement District No. 15 consolidated into Hidalgo County Consolidated Water Control and Improvement District.

Table 5-12 shows the estimated cost per acft of water conserved or stored by WMS Category. Because ID improvements decrease costs associated with O&M of facilities, O&M costs are shown as $0. Table 5-13 estimates the cost of the strategy to the ID, assuming it takes the full planning horizon to realize the yields.

Table 5-12 Estimated Cost per Acre-Foot of Water Conserved by Water Management Strategy

	Canal Lining	Pipeline Installation	General Repairs and Improvements
O&M Cost per acft	$0	$0	$0
Capital Cost per acft	$8,258	$5,220	$9,140

Table 5-13 Irrigation District Conservation WMS Costs

No.	WUG	Total Cost of Facilities	Total Cost of Project	Annual Cost	Annual Cost of Water ($ per acft)
1	Bayview Irrigation District	$10,676,000	$14,881,000	$597,000	$390
2	Brownsville Irrigation District	$25,449,000	$35,473,000	$1,422,000	$390
3	Cameron County Irrigation District No. 2, San Benito	$52,278,000	$72,869,000	$2,921,000	$390
4	Cameron County Irrigation District No. 6, Los Fresnos	$11,369,000	$15,848,000	$635,000	$390
5	Cameron County W.I.D No. 10, Rutherford Harding	$7,621,000	$10,622,000	$426,000	$390

No.	WUG	Total Cost of Facilities	Total Cost of Project	Annual Cost	Annual Cost of Water ($ per acft)
6	Delta Lake Irrigation District	$176,782,000	$246,411,000	$9,878,000	$390
7	Donna Irrigation District Hidalgo Co. No. 1	$59,117,000	$82,401,000	$3,303,000	$390
8	Engleman Irrigation District	$9,112,000	$12,701,000	$509,000	$390
9	Harlingen Irrigation District No. 1	$25,124,000	$35,019,000	$1,404,000	$390
10	Hidalgo and Cameron Counties Irrigation District No. 9, Mercedes	$122,065,000	$170,143,000	$6,821,000	$390
11	Hidalgo County Irrigation District No. 1, Edinburg	$54,295,000	$75,680,000	$3,034,000	$390
12	Hidalgo County Irrigation District No. 2, San Juan	$108,358,000	$151,037,000	$6,055,000	$390
13	Hidalgo County Irrigation District No. 5, Progresso	$7,666,000	$10,685,000	$428,000	$390
14	Hidalgo County Irrigation District No. 6, Mission 6	$19,373,000	$27,004,000	$1,083,000	$390
15	Hidalgo County Irrigation District No. 13	$2,304,000	$3,211,000	$129,000	$391
16	Hidalgo County Irrigation District No. 16, Mission	$22,754,000	$31,716,000	$1,271,000	$390
17	Hidalgo County Water Improvement District No. 3*	$-	$-	$-	$-
18	Hidalgo County Water Improvement District No. 18	$34,000	$48,000	$2,000	$400
19	Hidalgo County Water Improvement District No. 19, Sharyland	$4,239,000	$5,908,000	$237,000	$390
20	La Feria Irrigation District, Cameron County No. 3	$60,945,000	$84,950,000	$3,406,000	$390
21	Maverick County Water Improvement District	$89,439,000	$124,666,000	$4,998,000	$390
22	Santa Cruz Irrigation District No. 15*	$64,588,000	$90,028,000	$3,609,000	$390
23	United Irrigation District	$19,655,000	$27,396,000	$1,098,000	$390

No.	WUG	Total Cost of Facilities	Total Cost of Project	Annual Cost	Annual Cost of Water ($ per acft)
24	Valley Acres Irrigation District	$886,000	$1,236,000	$50,000	$390

*In January 2025, Hidalgo County Water Improvement District No. 3 and Santa Cruz Water Control and Improvement District No. 15 consolidated into Hidalgo County Consolidated Water Control and Improvement District.

It is intended that these IDs should implement any water conservation strategies, including, but not limited to: metering; control automation; gates; canal lining; repair of canal lining; pipeline installation; district interconnects; or any other strategy that provides provide beneficial, measurable conservation improvements to the ID.

Canal Lining and Installation or Replacement of Pipeline

Most district conveyance systems are predominantly earthen or lined canals, which can vary significantly in their efficiency depending on how well they are maintained and the type of soil or lining. Buried pipelines may also vary in efficiency depending on their condition. Many of the WMSs that were submitted cited studies by Dr. Guy Fipps and Dr. Rister at AgriLife, which attempted to measure seepage losses in a number of the IDs in the Lower Rio Grande Valley.

To determine a unit amount of water conserved per mile for canal lining and pipeline replacement strategies, results from seepage tests performed in the region were used. Seepage rates were obtained from TWRI Technical Reports that described seepage tests performed on canals for each of the IDs that submitted a canal lining or pipeline replacement strategy. Seepage results for both concrete-lined canals and earthen canals were averaged and used as the annual water conserved per mile for IDs that did not have any applicable seepage tests performed. It was assumed that the amount of water loss caused by evaporation is negligible; therefore, the same values for water conserved per mile were used for both canal lining and pipeline replacement strategies.

General Repairs and Improvements

All repairs that result in increased supplies available to end users, reduced losses, and/or improved operations are recommended for all IDs.

Metering and Controls

In accordance with TCEQ Watermaster rules, IDs in Region M meter water from the Rio Grande as it is pumped out of the river, but do not typically meter water provided to irrigators or for domestic water use for lawn watering and livestock. Canal riders, employees of the district, drive along the canals to verify that only users who requested water are withdrawing from the canals and estimate the amount of water delivered. In many cases the canal riders are also responsible for manually opening and closing headgates and turning pumps on and off.

In most districts, agricultural water deliveries are measured in "irrigations," which are considered to be between 4- to 8-inches of water over each irrigated acre, depending on the district, and are monitored by canal riders on the basis of the estimated flow rate and time that a headgate is open and/or measured water depths at some point in the field. There are significant losses associated with manual operations of district conveyance systems and the inaccuracies associated with visual observations of how much water is diverted. Additionally, metering could provide an incentive for (and data to support) conservation through charging a volumetric rate for water.

One analysis of water conservation implications of meters was conducted as part of the Rio Grande Initiative in cooperation with the Harlingen Irrigation District.[6] This project consisted of installing meters at farm irrigation delivery site locations serving 50 percent of the irrigated acreage in the district. The information generated by the meters provided flow data used for volumetric pricing and to improve the management of water delivery to end users. Installation and applications of meters at farm gate suggested annual water savings of 27 percent of the average annual water delivered to the affected area. Implementation of volumetric pricing enabled the district not only to manage the system and charge end users more accurately, but also to create an incentive for farmers to reduce their water use.

Another component of this analysis focused on the installation and use of meters and telemetry equipment in the district canals. The information generated by the meters and telemetry system provided flow data required to balance the distribution of water within the delivery canals. That is, information was generated regarding what areas were being irrigated and how much water was being supplied to each of these areas. The resulting improved management sought to minimize the over-delivery of water (i.e., waste), which has been estimated as high as 40 percent. Reducing the amount of water pumped also reduces the energy required and associated costs. This strategy was projected to save 3 percent of water diverted annually.

Education and Evaluation

The process of evaluating existing infrastructure for efficiency is ongoing in the IDs. There is a need for more data and a more consistent approach to measuring system losses across districts for comparison purposes. There is a significant opportunity for increased education of the staff, management, and leadership of each district. A comprehensive review of existing policies, rules, funding mechanisms, and programs that can or do address IDs may be useful.

Although water savings as a result of education and evaluation programs have not been quantified, and are therefore not included as a recommended WMS, the RGRWPG recognizes the importance of education for all parties operating and depending on IDs, and continued efforts to evaluate the existing infrastructure.

5.2.1.2.1 Environmental Impacts of Recommended Irrigation District Water Conservation Strategies

Potential environment impacts for Irrigation District water conservation strategies have been identified and categorized as described below. The letters identifying each section correspond to the headings in Table 5-14.

[6] Texas Water Resources Institute Report TR-202. October 2002. *Efficient Irrigation for Water Conservation in the Rio Grande Basin*, (also known as the Rio Grande Basin Initiative, or RGBI). 2001. The initiative is administered through the US Department of Agriculture's National Institute of Food and Agriculture under Agreement No. 2010-34461-20677 and Agreement No. 2010-45049-20713, and the Texas Water Resources Institute, which is part of the Texas A&M AgriLife Extension Service, Texas A&M AgriLife Research, and the College of Agriculture and Life Sciences at Texas A&M University.

A. Acres Impacted Permanently

Acres impacted permanently refers to the total amount of area that will be permanently impacted because of the implementation of a strategy. The following conservative assumptions were made (unless more detailed information for a specific was available):

- The acreage impacted for pipelines is equivalent to the right-of-way (ROW) easements required; it is assumed 50 feet for ROW unless otherwise known.
- It is assumed that canal lining, general improvements, and metering have no permanently impacted acreage.

B. Construction Impacted Acreage

Temporary environmental impacts may be seen during construction activities, such as increased air and noise pollution, and land disturbance activities. However, these effects are typical of any construction project. For ID conservation, impacted acreage was calculated with the following assumptions:

- The acreage impacted for pipelines and canal linings is equivalent to the ROW easements required; it is assumed 50-feet for ROW unless otherwise known.
- Unless otherwise known, the length of pipeline and canal lining projects is assumed using the calculated average value of 411 AF-conserved/mile of improvement.
- General improvements (canal gate replacements, SCADA, and other improvements) have an assumed 50-feet ROW and 50-feet project construction length.

C. Inundation Acreage

The inundation acreage applies to reservoirs only and is equal to the amount of land that will be inundated by the construction of the reservoir.

D. Agricultural Resources Impacted Acreage

Agricultural resources impact acreage is a consolidation of vegetation and land use types specific to Region – row crops, grass farms, and orchards - identified in the TPWD EMST. This GIS mapping data was overlain WMS locations to estimate the agricultural impact acreage from the implementation of the associated strategy.

E. Wetland Impact

The wetland impact refers to the probability that implementation of a WMS will affect a wetland. The location of wetlands in the region was determined using the National Wetlands Inventory (NWI) located at http://www.fws.gov/wetlands/Data/Mapper.html.

A strategy received a "1" if all or part of the strategy is located in a wetland or if it is close enough to where construction activities are likely to impact the wetland. All other strategies received zeros. If the exact location of project is unknown, it was given a zero because it was assumed that it would be located on a site that would not affect any wetland.

F. Habitat Impacted Acreage

Habitat impacted acreage refers to how the strategy will impact the habitat of the local area. The more area that is impacted because of the implementation of the strategy, the more the habitat of the area

will be disrupted. Therefore, it was assumed that the permanent acreage impacted for a WMS is what would impact habitats.

G. Threatened and Endangered Species Count

Threatened and endangered species count refers to how the strategy will impact those species in the area once implemented. This impact was quantified based on the number of federally-listed threatened and endangered species located within the county of the strategy. The number of threatened and endangered species came from the Texas Parks and Wildlife Department (TPWD) Rare, Threatened, and Endangered Species of Texas database (http://tpwd.texas.gov/gis/rtest/).

H. Cultural Resources Impact

Cultural resources impact 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, including locations; buildings; and features with scientific, cultural, or historic value. It is assumed that no WMSs negatively affect cultural resources. Mitigation costs are included for strategies that require infrastructure, so it is assumed that none would be built in a location or way that disrupts culturally sensitive locations.

I. Reliability

Reliability is an assessment of the availability of the specified water quantity to the user over time. If the quantity of water is available to the user all the time, then the strategy has a high reliability. If the quantity of water is contingent on other factors, reliability will be lower. This strategy was developed in accordance with WAM and/or MAG values for the appropriate area. As such, WMSs associated with new/improved infrastructure or distribution system or facilities expansions are considered to be reliable supply (reliability score = 5) that will not compromise the DFCs as established by the MAG or the environmental flow standards as established by 30 TAC §298. The reliability of on/off-channel reservoirs is also projected to be high (reliability score = 5).

J. Bays, Estuaries, and Arms of the Gulf of Mexico

The environmental effects due to implementation of upstream WMS projects on bays, estuaries, and arms of the Gulf of Mexico are quantitatively assessed and reported. Water bodies designated as classified segments by the TCEQ that are within or downstream of Region M include the Brownsville Ship Channel, South Bay, Laguna Madre, and the Gulf of Mexico. Effects to these water bodies were quantified by estimating whether the project is anticipated to decrease freshwater inflow in these classified water bodies.

A WMS project received a "1" if it is expected to decrease freshwater inflow into a classified water body. If a strategy were to increase freshwater inflow or otherwise have little to no impact on inflows, then the project would receive a zero.

A summary of the identified and quantified environmental impacts for recommended Irrigation District water conservation strategies is presented in Table 5-14.

Table 5-14 Environmental Impacts of Recommended Irrigation District Water Conservation Strategies

Entity	Yield	A	B	C	D	E	F	G	H	I	J
Bayview ID	1,530	10	20	0	0	1	10	25	0	5	1
Brownsville ID	3,647	24	49	0	0	1	24	25	0	5	1
Cameron County ID No. 2, San Benito	7,491	50	101	0	0	1	50	25	0	5	1
Cameron County ID No. 6, Los Fresnos	1,629	11	22	0	0	1	11	25	0	5	1
Cameron County Water Improvement District No. 10, Rutherford Harding	2,231	15	30	0	0	1	15	25	0	5	1
Delta Lake ID	25,331	168	341	0	0	1	168	25	0	5	1
Donna ID Hidalgo Co. No. 1	8,471	56	114	0	0	1	56	8	0	5	1
Engelman ID	1,306	9	18	0	0	1	9	8	0	5	1
Harlingen ID No. 1	3,600	24	49	0	0	1	24	25	0	5	1
Hidalgo and Cameron Counties ID No. 9, Mercedes	7,491	116	235	0	0	1	116	28	0	5	1
Hidalgo County ID No. 1, Edinburg	17,315	115	233	0	0	1	115	8	0	5	1
Hidalgo County ID No. 2, San Juan	15,527	103	209	0	0	1	103	8	0	5	1
Hidalgo County ID No. 5, Progresso	1,098	7	14	0	0	1	7	8	0	5	1
Hidalgo County ID No. 6, Mission 6	4,076	27	55	0	0	1	27	8	0	5	1
Hidalgo County ID No. 13	330	2	4	0	0	1	2	8	0	5	1
Hidalgo County ID No. 16, Mission	3,260	22	45	0	0	1	22	8	0	5	1
Hidalgo County Water Improvement District No. 3*	0	0	0	0	0	1	0	8	0	5	1
Hidalgo County Water Improvement District No. 18	5	0	0	0	0	1	0	8	0	5	1
Hidalgo County Water Improvement District No. 19, Sharyland	607	4	8	0	0	1	4	8	0	5	1
La Feria ID, Cameron County No. 3	8,733	58	118	0	0	1	58	25	0	5	1

Entity	Yield	A	B	C	D	E	F	G	H	I	J
Maverick County Water Improvement District	12,816	85	172	0	0	1	85	3	0	5	1
Santa Cruz ID No. 15*	10,686	71	144	0	0	1	71	8	0	5	1
United ID	2,816	19	39	0	0	1	19	8	0	5	1
Valley Acres ID	1,237	8	16	0	0	1	8	28	0	5	1

*In January 2025, Hidalgo County Water Improvement District No. 3 and Santa Cruz Water Control and Improvement District No. 15 consolidated into Hidalgo County Consolidated Water Control and Improvement District.

5.2.1.3 On-Farm Irrigation Conservation

On-farm conservation measures can be grouped into the following categories: water use management practices, land management systems, on-farm water delivery systems, water district delivery systems, and tailwater recovery systems. Water district delivery system improvements, including conveyance infrastructure, metering, and telemetry, are discussed in detail in Section 5.2.1.2 and addressed as a separate WMS. However, for farmland in IDs, the operational effectiveness and efficiency of the IDs are necessary to reap the full benefits of on-farm measures. On-farm efficiency depends on timely delivery of water and adequate head to push water across a field. For these farmers, the incentive to conserve water is largely based on the ID, and their ability to volumetrically price water.

Water use management practices include scheduling irrigations and measuring water used or soil moisture, including on-farm audits. For irrigators relying on Rio Grande water, scheduling irrigations on the basis of soil moisture metering is difficult because of the delay between when a farmer requests water and the time that it is actually available to use, which can be up to 5 to 7 days. However, metering of irrigation water, either short-term as a part of an on-farm water audit or long-term as a management strategy, is recommended where physically and economically feasible. Common practice currently is for districts to send an employee to monitor diversions, estimating the amount of water used based on how long a headgate is open or measuring water depth at certain locations. Where metering is implemented by the ID so that water can be volumetrically priced, farmers have an incentive for reducing their use of water and both the districts and the farmer can manage water more carefully.

Land management systems include laser leveling, brush control, conversion of irrigated farmland to dry-land farmland, and furrow dikes or narrow-border citrus, which is discussed in more detail below. Each of these strategies addresses how to manage farmland so that available water is used to maximum effect. Conversion of irrigated farmland to dry land farming generally equates to lower value and/or yield but can be a valuable tool if drought is anticipated and the water available to a farm is consolidated on a high-value crop. Crop selection based on market values, water demand, and acreage can be made so that farmers are best able to respond to drought.

On-farm water delivery system improvements limit losses in the conveyance of water to the crop and apply water precisely where it is needed for each type of plant. This includes surge valves, which can increase the uniformity of water application across a field, lining on-farm canals or use of poly-pipe, and drip or sprinkler systems. For irrigators using surface water in Region M, the lack of pressure head on irrigation water is a significant barrier to implementing many water delivery system improvements. Soil type can be a limitation for the use of surge valves, as well as limited pressure head or storage at or near the point of use. Research and demonstration projects on drip irrigation have shown significant increases in yield for some vegetables.

Tailwater recovery systems allow for excess water applied to farmland to be put to beneficial use. In place in much of the Lower Rio Grande Valley, tailwaters are collected in drainage canals, which discharge to the Arroyo Colorado, which may be utilized by other users downstream. Although this water tends to have high dissolved solids content, it is used for crops that can withstand high salinity and for other uses, including aquaculture. Treatment of tailwaters to potable standards is generally costly but may be appropriate where there are few alternatives.

These measures are considered on-farm conservation measures, but in most cases implementation of these measures in a drought year increases the potential yield of a crop per acre-foot of water but may not reduce irrigator's overall demand for water. When water is available in a drought year, farmers are likely to use it. Making better use of the water that is available is critical to helping farmers through drought, and the Region M Planning Group recommends continued research, education, demonstration, and large-scale implementation of these and any other irrigation conservation measures that farmers find to be appropriate.

A select subset of on-farm water conservation strategies, which were developed based on input from stakeholders and ID, are discussed in detail below. These are strategies that are of particular interest to the region, although the full range of BMP described in TWDB literature are recommended where appropriate.[7] On-farm conservation is recommended for all irrigators in the planning area (Table 5-15). The On-Farm Irrigation Conservation WMS was developed based on the described categories.

- Water use management practices (e.g., scheduling, moisture metering, and on-farm audits) were assumed to be implemented across the region such that 25 percent of potential water savings have already been made. Five (5) percent efficiency gains were estimated for the remaining 75 percent over the planning horizon.
- Land management systems (e.g., laser leveling, narrow border citrus, and furrow dikes) were assumed to be 25 percent implemented, and the strategy estimates a 10 percent efficiency gain over the remaining 75 percent of irrigation water use over the planning horizon.
- On-farm water delivery systems (e.g., poly-pipe, surge valves, drip, sprinkler) were estimated to impart a 10 percent efficiency gain on 10 percent of irrigation water usage in 2030, for which that technology is appropriate and not already in place.

ID conveyance improvements were not included in the general on-farm conservation WMS but are addressed in Section 5.2.1.2.

[7] Texas Water Development Board. BMPs for Agricultural Water users. http://www.twdb.texas.gov/conservation/BMPs/Ag/index.asp. Accessed 2024.

Table 5-15 Decadal On-Farm Conservation Water Savings by County and River Basin for Irrigation

County	Basin	2030 Demand Projections (acft/yr)	Management Practices (acft/yr)	Land Management Systems (acft/yr)	On-Farm Water Delivery Systems (acft/yr)	Total Savings (acft/yr)
Cameron	Nueces-Rio Grande	488,773	3,055	6,110	815	9,980
Cameron	Rio Grande	31,199	195	390	52	637
Hidalgo	Nueces-Rio Grande	640,071	4,000	8,001	1,067	13,068
Hidalgo	Rio Grande	26,489	166	331	44	541
Jim Hogg	Nueces-Rio Grande	282	2	3	1	6
Jim Hogg	Rio Grande	66	0	1	0	1
Maverick	Nueces	59,725	373	747	100	1,220
Starr	Rio Grande	23,109	144	289	39	472
Webb	Rio Grande	10,090	63	126	17	206
Willacy	Nueces-Rio Grande	96,412	603	1,205	161	1,969
Zapata	Rio Grande	4,936	31	62	8	101

It was assumed that it would take the duration of the planning horizon to realize the strategy yields. In September 2023 dollars, water use management practices were estimated to cost approximately $610 per acft/yr to implement, land management systems were estimated to cost approximately $2,438 per acft/yr to implement, and on-farm water delivery systems were estimated to cost approximately $73 per acft/yr to implement. Table 5-16 provides estimated costs.

Table 5-16 On-Farm Irrigation WMS Costs

WUG	Total Cost of Facilities	Total Cost of Project	Annual Cost	Annual Cost of Water ($ per acft)
Irrigation, Cameron	$17,891,000	$24,014,000	$2,887,466	$1,159
Irrigation, Hidalgo	$22,933,000	$30,782,000	$3,701,275	$1,159
Irrigation, Jim Hogg	$11,000	$14,000	$1,726	$863
Irrigation, Maverick	$2,056,000	$2,760,000	$331,807	$1,157
Irrigation, Starr	$795,000	$1,068,000	$128,385	$1,155
Irrigation, Webb	$347,000	$466,000	$56,016	$1,155

WUG	Total Cost of Facilities	Total Cost of Project	Annual Cost	Annual Cost of Water ($ per acft)
Irrigation, Willacy	$3,317,000	$4,452,000	$535,324	$1,158
Irrigation, Zapata	$171,000	$229,000	$27,514	$1,171

Narrow-Border Citrus Irrigation

Narrow border flood irrigation, a subcomponent of land management systems, provides an alternative to the traditional pan flooding method of irrigation commonly used by citrus growers in the Lower Rio Grande Valley. This method is a cost-effective and easy to implement option that involves erecting narrow berms of soil between existing rows of citrus trees to direct and contain irrigation water directly in the root-zone of trees. This method can save about 35 percent of the water required for traditional flood irrigation. Currently, it is estimated that 10 percent of citrus growers in the Lower Rio Grande Valley have implemented the narrow border flood irrigation practice.

This practice has many benefits in addition to water and cost savings, including faster water channeling rates, higher water use efficiency in trees, reduced water in areas prone to weed growth, and fertilizer retention in the root-zone. The narrow border flood method can also be used in conjunction with other practices such as raised beds, denser plantings, and mesh groundcover than can enhance water use efficiency and water savings.

Based on TWDB irrigation water use records by crop between 2012 and 2021, the overall orchard acreage (assumed to be all citrus in Region M) increased by approximately 4,850 acres, and water use averaged 4.1 feet per acre. Assuming 10 percent increase in implementation per decade, the following on-farm conservation gains could be made in the counties where citrus is a prevalent crop. Because these gains are more easily quantifiable, they were used as a component in the estimates for the general on-farm WMS in Table 5-17.

Table 5-17 Narrow Border Citrus Water Savings

County	10-Year Average (ac)	10-Year Average (acft/ac)	First Decade Implementation (ac)	Potential Water Conserved per decade (acft)
Cameron	3,800	3.7	380	495
Hidalgo	6,700	4.5	670	1,065
Maverick	5,960	3.8	596	794
Webb	260	2.5	26	22
Willacy	500	3.4	50	59
Total	**17,220**	**4.1**	**1,722**	**2,443**

Drip Irrigation

Texas A&M AgriLife Research worked with producers and others to estimate the conservation and economic implications of drip irrigation for onions, cotton, sugarcane, and citrus. Based on farmer experience and surveys, drip irrigation is expected to reduce the water demand for certain crops, ranging from 2.5 acre-inches for cotton, 11 acre-inches for sugarcane, 17.8 acre-inches for onions, and up to 45 acre-inches for citrus. However, drip irrigation is expensive to install with very limited life resulting in the expected net returns to a farmer being negative for all except citrus. Additionally, the ID must maintain a fully charged canal for a longer period of time to supply a farmer for drip irrigation, which can cause additional losses in the overall system. The irrigation method used for comparison for this analysis was typical irrigation or gravity flow and flood. Drip irrigation is only an economically effective irrigation practice for citrus. Citrus conserved water and increased net revenue, as compared to flood-irrigated acres.[8] It was assumed that only water delivery improvements that were less expensive than the cost of water would be considered as composite costs in the general on-farm conservation WMS.

Dry Year Option Contracts

An approach to water marketing known as "dry year options" or "water supply option contracts" (WSOC) may reduce the impact on agricultural production while providing drought supplies for other uses. This concept involves temporary transfers of irrigation water to provide secure water supplies to non-agricultural users during droughts. This option would transfer water to other users when needed while preserving the water for agriculture during normal water supply situations. In Texas, WSOC is typically practiced in the Edwards Aquifer area to provide water for endangered species and San Antonio water users during drought. However, the implementation of this type of strategy would require significant changes to the current operating system of the Rio Grande, and the possibility of unintended consequences should be thoroughly evaluated before moving forward.

A WSOC as defined here is a formal contract or agreement between a farmer or a group of farmers and an urban water provider or authority to transfer water temporarily from agriculture to urban or another use, during occasional critical drought periods so that the purchaser secures a source of drought water supply. The farmer or ID does not relinquish ownership of the water right and retains access to the water supply during normal supply situations. In financial exchange market terminology, the holder of an option contract has the right to buy the commodity or stock (in this case, water) at a specified price, termed the striking or exercise price, from the seller of the option. The seller of the option is guaranteeing future delivery under specified conditions and price. In exchange for guaranteeing future delivery of the commodity at a set price, a further premium above the exercise price, called the option price, may be paid to the seller.[9] WSOC requirements are as follows:

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[8] Wilbourn, Brant 1987- (2012). Economic Analysis of Alternative Irrigation Technologies: Texas Lower Rio Grande Valley. Master's thesis, Texas A&M University. Available electronically from https://oaktrust.library.tamu.edu/handle/1969.1/148057.

[9] Contract Terms and Provisions: *Contract terms and provisions are important to identify and protect the rights of both parties. The exercise price is the cost each time (season/year) the option is exercised. This represents the payment to the farmer or the ID for the net value of foregone agricultural production or loss in district revenue. The present value cost of a water-option contract is the sum of the costs to exercise the option (take the water) multiplied by the expected number of times of option exercise plus any cost appreciation/depreciation of the value of the alternative source plus any payments to the seller to hold the option (option price), each discounted to present value.*

Agricultural enterprise and water valuation models can be used to estimate foregone benefits to the farmer or ID. Actual exercise payments need to be negotiated based on both party's perceptions of transfer losses and benefits. Advance notification that the option is to be exercised should be given to the seller for planning purposes so that

The water supply must be reliable enough to provide sufficient water for the option use in drought years and plentiful enough in average years to supply the agricultural use.

Property rights must be definable and transferrable for market exchange. As with water right purchases, the amount of water transferred must be adjusted for conveyance and field losses to protect third parties (return flow water users).

Agricultural operations must be capable of being temporarily suspended or crop production under dryland conditions. This requirement limits option contracts primarily to annual crop operations and will exclude most livestock operations, perennial crops such as orchards, and contract crops such as sugar cane.

Both buyer and seller must have realistic knowledge of water use values and alternative water supply costs.

The probability and severity of drought (the expected frequency of exercising the option) must be able to be estimated within acceptable limits of risk for both parties.

Total option contract costs, including both transaction costs of negotiating and adjudicating the temporary transfer of water, and the costs of transporting the water to the point of intake of the purchaser, must be less than the costs of the next most costly water supply alternative of the purchaser.

The Lower Rio Grande Valley and Region M have some unique institutional, hydrologic, and economic conditions that would need to be addressed to provide seller and buyer incentives to enter into WSOC. Unlike many other areas of the Western United States, water rights are held by the IDs rather than farmers. Given this and the generally low price of agricultural water farmers have little incentive to conserve water (except in drought) and lack the ability to sell water conserved by more efficient irrigation methods or fallowing land such as for WSOC payments. While there is the potential for IDs to enter into a WSOC with another user, IDs would need to work with farmers and pass through exercise payments to make WSOCs feasible from the point of view of the farmer. Also, with the generally low cost of ID water, the purchase of this water may be the lowest cost to urban providers and other users compared to alternative sources such as desalination or reuse.

Urban demand has the highest priority in drought conditions and therefore urban communities may feel little need to have WSOCs unless there is concern about the agricultural community and/or ID welfare.

The program involves a target time early enough that a farmer can make cropping decisions for the growing season and an option price is offered to secure that if needed water can be called. Then during the year, if the drought is sufficient that water is needed from the farmer, a preset price for delivery is

certain variable production costs can be avoided. Shorter advance notice raises seller costs with an associated higher level of reimbursement required. A flexible quantity provision may be required because of variations in drought water allocation, but the minimum acceptable delivery should be specified. Escalator clauses can be used to adjust contract prices protecting sellers from the effects of inflation.
Option exercise cost is the farmer's offering price for water delivery/foregoing delivery and would be site-specific, depending on the types of crops grown, quantity and cost of irrigation water, production costs, yields, and crop prices on the specific farms. The exercise cost also needs to be sufficient to cover any fixed production costs that might be incurred because the water supply was temporarily relinquished, and irrigated crop production ceased. These additional costs include the opportunity costs of family labor and management, taxes, depreciation on durable equipment, and cash overhead.

paid and the farmer forgoes irrigation. In the event the water is not needed, it is available to the farmer. This suggests a cropping decision that can be irrigated but also can be produced dryland (rain-fed) in case the option is exercised.

Implementation Issues

On the agricultural side, conservation savings would not result in a reduction of capital expenditures but a forced expenditure of funding to garner any savings. There is a finite upper limit to the amount of money that can be spent to conserve agricultural water and still be supported by agricultural income, as individual producers are responsible for implementation. The high cost of conservation and the lack of funds to pay for it make large-scale conservation projects unlikely.

As SWIFT funding is not eligible for individual producers, full implementation depends on funding from various grant and loan programs:

- TWDB's Agricultural Water Conservation Grants Program offers grants for projects that support agricultural irrigation conservation strategies in alignment with the state water plan and demonstrate agricultural water conservation best management practices, such as irrigation systems improvements, demonstrations and technology transfer, and equipment cost share grant programs. Applications must be submitted by a political subdivision such as GCDs or River Authorities. These entities can serve as sponsors or facilitators to pass funding through to local producers. More information can be found at https://www.twdb.texas.gov/financial/programs/awcg/index.asp.
- The Texas Department of Agriculture (TDA) hosts a series of grant, loan, and cost share assistance programs for agricultural producers which can be found at https://texasagriculture.gov/Grants-Services/Grants-and-Services.
- Through the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), the Environmental Quality Incentive Program (EQIP) have made the costs of improvements more reasonable for farmers. More information can be found at https://www.nrcs.usda.gov/programs-initiatives/eqip-environmental-quality-incentives.
- Through partnerships for Climate-Smart Commodities, the USDA is providing technical and financial assistance to producers to implement climate-smart production practices on a voluntary basis on working lands. More information can be found at https://www.usda.gov/climate-solutions/climate-smart-commodities.
- The Water Quality Management Plan (WQMP) program, administered by the Texas State Soil and Water Conservation Board (TSSWCB), develops site-specific, voluntary plans specially crafted for agricultural or silvicultural lands approved by local Soil and Water Conservation Districts (SWCDs). TSSWCB offers financial assistance for implementation in the form of cost-share funding. To identify the appropriate TSSWCB Regional Office administering the WQMPs, visit www.tsswcb.texas.gov/contact-us/regional-office-service-areas.

Other programs, such as the Texas A&M AgriLife Extension Service's FARM Assistance, offer additional, non-financial support for farmers. FARM Assistance provides individual producers with a statistically-based strategic financial analysis that is unique to the participant's operation. The data garnered from these analyses provide Texas A&M AgriLife Extension Service with insight on the agricultural industry and enables research to help industry groups, policymakers, and individuals identify trends and gauge impacts at the industry-level.

5.2.1.3.1 Environmental Impacts of Recommended On-Farm Irrigation Conservation Strategies

Potential environment impacts for on-farm conservation have been identified and categorized as described below. The letters identifying each section correspond to the headings in Table 5-18.

A. Acres Impacted

Acres impacted permanently refers to the total amount of area that will be impacted because of the implementation of a strategy. It was assumed that the acreage impacted was equal to the number of acres irrigated in the most recent year of data, which would be 2021 for this planning cycle.

B. Agricultural Resources Impacted Acreage

Agricultural resources impact acreage is a consolidation of vegetation and land use types specific to Region – row crops, grass farms, and orchards – identified in the TPWD EMST. This GIS mapping data was overlain WMS locations to estimate the agricultural impact acreage from the implementation of the associated strategy.

C. Wetland Impact

The wetland impact refers to the probability that implementation of a WMS will affect a wetland. The location of wetlands in the region was determined using the NWI located at http://www.fws.gov/wetlands/Data/Mapper.html.

A strategy received a 1 if all or part of the strategy is located in a wetland or if it is in close proximity to where construction activities are likely to impact the wetland. All other strategies received zeros. If the exact location of project is unknown it was given a zero because it was assumed that it would be located on a site that would not affect and wetland. It is possible that excess runoff from irrigation could augment wetlands.

D. Habitat Impacted Acreage

Habitat impacted acreage refers to how the strategy will impact the habitat of the local area. It is assumed that no habitat will be affected by on-farm conservation because the land is already cultivated; therefore, there is no habitat to be affected.

E. Threatened and Endangered Species Count

Threatened and endangered species count refers to how the strategy will impact those species in the area once implemented. The species impact was quantified based on the number of federally-listed threatened and endangered species located within the county of the strategy. The number of threatened and endangered species came from the TPWD Rare, Threatened, and Endangered Species of Texas database (http://tpwd.texas.gov/gis/rtest/).

F. Cultural Resources Impact

Cultural resources impact 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, which also include locations; buildings; and features with scientific, cultural, or historic value. It is assumed that on-farm conservation does not negatively affect cultural resources because the land is already cultivated.

G. Reliability

Reliability is an assessment of the availability of the specified water quantity to the user over time. If the quantity of water is available to the user all the time, then the strategy has a high reliability. If the quantity of water is contingent on other factors, reliability will be lower. Since these strategies are a demand reduction or supply efficiency increase, the reliability is high (reliability score = 5).

H. Bays, Estuaries, and Arms of the Gulf of Mexico

The environmental effects due to implementation of upstream WMS projects on bays, estuaries, and arms of the Gulf of Mexico are quantitatively assessed and reported. Water bodies designated as classified segments by the TCEQ that are within or downstream of Region M include the Brownsville Ship Channel, South Bay, Laguna Madre, and Gulf of Mexico. Effects to these water bodies were quantified by estimating whether the project is anticipated to decrease freshwater inflow in these classified water bodies.

A WMS project received a "1" if it is expected to decrease freshwater inflow into a classified water body. If a strategy were to increase freshwater inflow or otherwise have little to no impact on inflows, then the project would receive a zero.

A summary of the identified and quantified environmental impacts for recommended on-farm irrigation conservation projects is presented in Table 5-18.

Table 5-18 Environmental Impacts of Recommended On-Farm Irrigation Conservation Strategies

Entity	Total Savings (acft/yr)	A	B	C	D	E	F	G	H
Irrigation, Cameron	10,617	104,440	0	0	0	25	0	5	1
Irrigation, Hidalgo	13,609	177,750	0	0	0	8	0	5	1
Irrigation, Jim Hogg	7	140	0	0	0	3	0	5	1
Irrigation, Maverick	1,220	20,080	0	0	0	3	0	5	1
Irrigation, Starr	472	3,280	0	0	0	8	0	5	1
Irrigation, Webb	206	630	0	0	0	4	0	5	1
Irrigation, Willacy	1,969	21,290	0	0	0	22	0	5	1
Irrigation, Zapata	101	1,530	0	0	0	7	0	5	1

5.2.1.4 Industrial Conservation

Implementation of BMPs for industrial users is recommended for every manufacturing, mining, and steam electric power user in Region M. The TWDB Water Conservation Implementation Task Force recommended strategies for industrial users to conserve water in the "Best Management Practices for Industrial Water Users" guidance.[10] The guide provides BMPs for specific industries, as well as general BMPs that are recommended for any type of industrial user. The BMPs provided include the following:

- Conservation Analysis and Planning
  - Cost Effectiveness Analysis.
  - Industrial Site-Specific Conservation.
  - Industrial Water Audit.
- Educational Practices
  - Management and Employee Programs.
- System Operations
  - Boiler and Stream Systems.
  - Industrial Alternative Sources and Reuse of Process Water.
  - Industrial Sub-metering.
  - Industrial Water Waste Reduction.
  - Refrigeration.
  - Rinsing/Cleaning.
  - Water Treatment.
- Cooling Systems Management
  - Cooling Systems (Other than Cooling Towers).
  - Cooling Towers.
  - Once-Through Cooling.
- Landscaping
  - Industrial Facility Landscaping.

The BMP guidance describes water audits as the initial way for industrial water users to increase water efficiency. It is assumed that all of the users for which this strategy is recommended will, at a minimum, perform a water audit. On average, the range of water savings from implementing water audits is between 10 to 35 percent. Therefore, 10 percent of the water demand of each manufacturing, mining, and steam electric power WUG is used to estimate the amount of water conserved per decade by implementing BMPs. Industrial water conservation values are summarized in Table 5-19.

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[10] Water Conservation Implementation Task Force, "Water Conservation Best Management Practices: Best Management Practices for Industrial Water Users," February 2013.

Table 5-19 2026 Region M Industrial Water Conservation Savings from Implementation of Industrial BMPs (acft/yr)

WUG	Industrial Water Conservation Savings (acft/yr)					
	2030	2040	2050	2060	2070	2080
Cameron Manufacturing	46	48	50	51	53	55
Cameron Steam-Electric Power	17	17	17	17	17	17
Hidalgo Manufacturing	393	407	422	438	454	471
Hidalgo Mining	23	26	29	31	34	36
Hidalgo Steam-Electric Power	1,033	1,033	1,033	1,033	1,033	1,033
Jim Hogg Mining	1	1	1	1	1	1
Maverick Manufacturing	10	10	11	11	11	12
Maverick Mining	490	490	490	490	490	0
Starr Manufacturing	8	8	9	9	9	10
Starr Mining	19	20	21	21	22	22
Webb Manufacturing	8	8	8	9	9	9
Webb Mining	414	414	415	415	415	3
Webb Steam-Electric Power	13	13	13	13	13	13
Zapata Mining	1	1	1	1	1	1

Development of costs for industrial water conservation assume that only cost-positive measures will be implemented, or the costs to implement the best management practices are less than the cost of water saved. Costs also assume that an average water demand of 1,000 acft/yr would equate to a $10,000 water audit cost, with a minimum cost of $2,000; that one audit will occur every five years, and implementation will occur by 2030. Estimated total annual costs are summarized in Table 5-20.

Table 5-20 2026 Total Annual Costs from Implementation of Best Management Practices

WUG	Total Annual Costs ($/year)					
	2030	2040	2050	2060	2070	2080
Cameron Manufacturing	$920	$960	$1,000	$1,020	$1,060	$1,100
Cameron Steam-Electric Power	$400	$400	$400	$400	$400	$400
Hidalgo Manufacturing	$7,860	$8,140	$8,440	$8,760	$9,080	$9,420
Hidalgo Mining	$460	$520	$580	$620	$680	$720
Hidalgo Steam-Electric Power	$20,660	$20,660	$20,660	$20,660	$20,660	$20,660
Jim Hogg Mining	$400	$400	$400	$400	$400	$400
Maverick Manufacturing	$400	$400	$400	$400	$400	$400

WUG	Total Annual Costs ($/year)					
	2030	2040	2050	2060	2070	2080
Maverick Mining	$9,800	$9,800	$9,800	$9,800	$9,800	$0
Starr Manufacturing	$400	$400	$400	$400	$400	$400
Starr Mining	$400	$400	$420	$420	$440	$440
Webb Manufacturing	$400	$400	$400	$400	$400	$400
Webb Mining	$8,280	$8,280	$8,300	$8,300	$8,300	$0
Webb Steam-Electric Power	$400	$400	$400	$400	$400	$400
Zapata Mining	$400	$400	$400	$400	$400	$400

5.2.1.4.1 Environmental Impacts of Recommended Industrial Conservation Strategies

A. Acres Impacted Permanently

Acres impacted permanently refers to the total amount of area that will be permanently impacted because of the implementation of a strategy. The following conservative assumptions were made (unless more detailed information for a specific was available):

- No permanent acres are impacted for industrial conservation because the strategy will occur on land already used for industrial purposes.

B. Construction Impacted Acreage

Temporary environmental impacts may be seen during construction activities, such as increased air and noise pollution, and land disturbance activities. However, these effects are typical of any construction project. The construction impacted acreage was estimated as 1 acre.

C. Agricultural Resources Impacted Acreage

Agricultural resources impact acreage is a consolidation of vegetation and land use types specific to Region – row crops, grass farms, and orchards - identified in the TPWD EMST. This GIS mapping data was overlain WMS locations to estimate the agricultural impact acreage from the implementation of the associated strategy.

D. Wetland Impact

The wetland impact refers to the probability that implementation of a WMS will affect a wetland. The location of wetlands in the Region was determined using the NWI located at http://www.fws.gov/wetlands/Data/Mapper.html.

A strategy received a "1" if all or part of the strategy is located in a wetland or if it is close enough to where construction activities are likely to impact the wetland. All other strategies received zeros. If the exact location of project is unknown it was given a zero because it was assumed that it would be located on a site that would not affect and wetland.

E. Habitat Impacted Acreage

Habitat impacted acreage refers to how the strategy will impact the habitat of the local area. The more area that is impacted because of the implementation of the strategy, the more the habitat of the area will be disrupted. Therefore, it was assumed that the permanent acreage impacted for a WMS is what would impact habitats.

F. Cultural Resources Impact

Cultural resources impact 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, including locations; buildings; and features with scientific, cultural, or historic value. It is assumed that no WMSs negatively affect cultural resources. Mitigation costs are included for strategies that require infrastructure so it is assumed that none would be built in a location or way that disrupts culturally sensitive locations.

G. Reliability

Reliability is an assessment of the availability of the specified water quantity to the user over time. If the quantity of water is available to the user all the time, then the strategy has a high reliability. If the quantity of water is contingent on other factors, reliability will be lower. Since these strategies are a demand reduction or supply efficiency increase, the reliability is high (reliability score = 5).

H. Bays, Estuaries, and Arms of the Gulf of Mexico

The environmental effects due to implementation of upstream WMS projects on bays, estuaries, and arms of the Gulf of Mexico are quantitatively assessed and reported. Water bodies designated as classified segments by the TCEQ that are within or downstream of Region M include the Brownsville Ship Channel, South Bay, Laguna Madre, and Gulf of Mexico. Effects to these water bodies were quantified by estimating whether the project is anticipated to decrease freshwater inflow in these classified water bodies.

A WMS project received a "1" if it is expected to decrease freshwater inflow into a classified water body. If a strategy were to increase freshwater inflow or otherwise have little to no impact on inflows, then the project would receive a zero.

A summary of the identified and quantified environmental impacts for recommended industrial conservation strategies is presented in Table 5-21.

Table 5-21 Environmental Impacts for Recommended Industrial Conservation Strategies

Entity	WMS Name	Yield*	A	B	C	D	E	F	G	H
Cameron Manufacturing	Industrial Conservation	46	0	1	0	0	0	0	5	1
Cameron Steam-Electric Power	Industrial Conservation	17	0	1	0	0	0	0	5	1
Hidalgo Manufacturing	Industrial Conservation	393	0	1	0	0	0	0	5	1
Hidalgo Mining	Industrial Conservation	23	0	1	0	0	0	0	5	1
Hidalgo Steam-Electric Power	Industrial Conservation	1,033	0	1	0	0	0	0	5	1

Entity	WMS Name	Yield*	A	B	C	D	E	F	G	H
Jim Hogg Mining	Industrial Conservation	1	0	1	0	0	0	0	5	1
Maverick Manufacturing	Industrial Conservation	10	0	1	0	0	0	0	5	1
Maverick Mining	Industrial Conservation	490	0	1	0	0	0	0	5	1
Starr Manufacturing	Industrial Conservation	8	0	1	0	0	0	0	5	1
Starr Mining	Industrial Conservation	19	0	1	0	0	0	0	5	1
Webb Manufacturing	Industrial Conservation	8	0	1	0	0	0	0	5	1
Webb Mining	Industrial Conservation	414	0	1	0	0	0	0	5	1
Webb Steam-Electric Power	Industrial Conservation	13	0	1	0	0	0	0	5	1
Zapata Mining	Industrial Conservation	1	0	1	0	0	0	0	5	1
* Indicates first decade of implementation yield (acft/yr)										

5.2.2 Municipal Drought Management

TAC, Chapter 357 Regional Water Planning Guidelines, states that "Regional water plan development shall include an evaluation of all WMSs the regional water planning group determines to be potentially feasible, including drought management measures including water demand management [357.7(a)(7)(B)]." Region M defines drought management as the periodic activation of approved drought contingency plans resulting in short-term demand reduction. An entity may make the conscious decision not to develop firm water supplies greater than or equal to projected water demands with the understanding that demands will have to be reduced or go unmet during times of drought. Using this rationale, an economic impact of not meeting projected water demands can be estimated and compared with the costs of other potentially feasible WMSs in terms of annual unit costs.

Figure 5-1 is a water supply planning example of the visual methodology completed in the 2017 State Water Plan. For each municipal WUG with an identified shortage or need during the planning period, a future water supply plan was developed consisting of one or more WMSs. In each case, the planned future water supply was greater than the projected dry weather demand to allow for drought more severe than the drought of record, uncertainty in water demand projections, and/or available supply from recommended WMSs. This difference between planned water supply and projected dry weather demand is called management supply in Region M.

Figure 5-2 illustrates how a drought management WMS could alter the planning paradigm for WUGs with projected needs. Instead of identifying WMSs to meet the projected need, planned water supply remains below the projected dry weather water demand. The difference between these two lines represents the drought management WMS. Under this concept, the water demand of a WUG would be reduced by activating a drought contingency plan to reduce demands, resulting in unmet needs. This strategy of demand reduction could negate the need for WMSs to meet the full projected need of the WUG. Using this approach, the WUG is planning to manage water shortages through drought contingency plan activation if needed. This concept is more fully illustrated on Figure 5-3, which depicts that, in any given year, the actual demand may be above or below the planned supply. During times where the demand exceeds supply, the WUG would experience shortages and incur associated economic impacts.

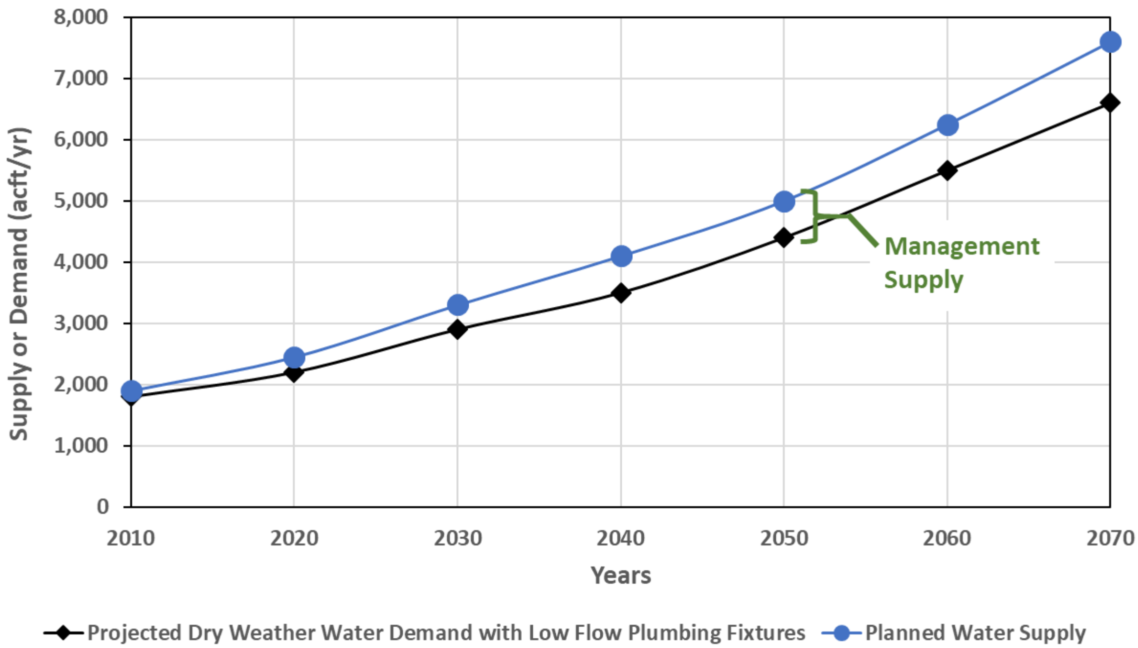

Figure 5-1 Example - Typical Water Supply Planning

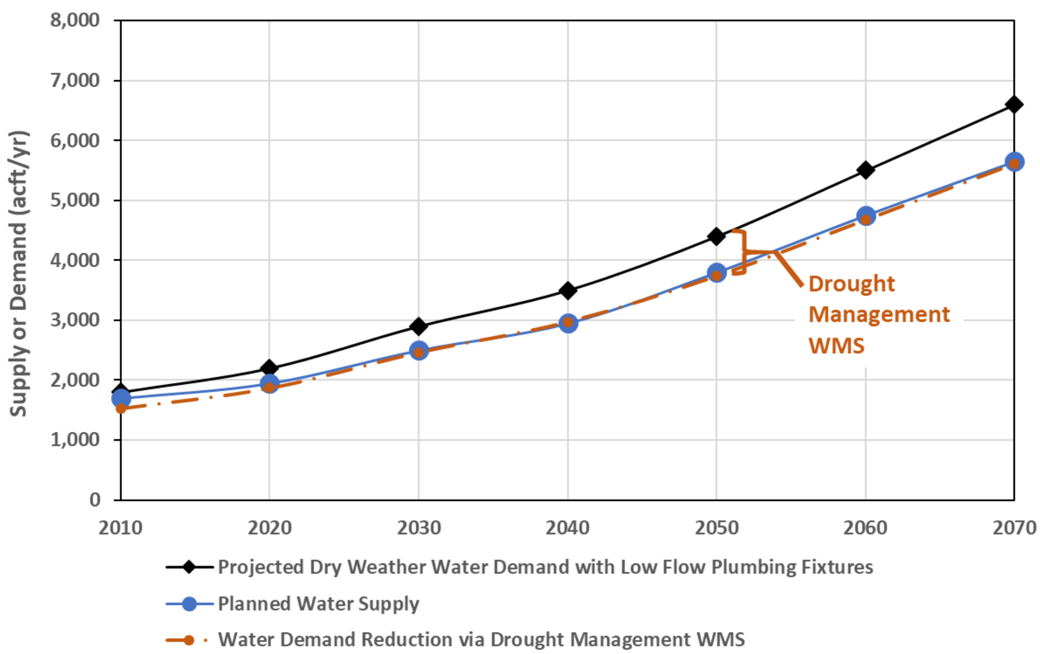

Figure 5-2 Example - Drought Management Water Management Strategy Planning Application

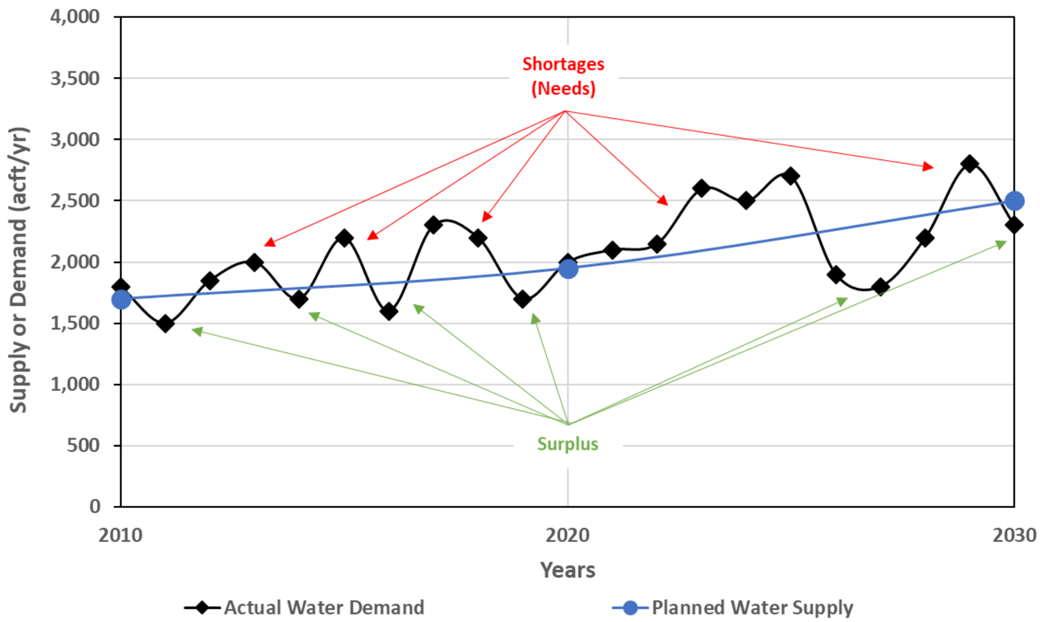

Figure 5-3 Example - Annual Water Demand and Planned Water Supply

5.2.2.1 Municipal Drought Management Strategy Methodology

On March 4, 2024, the TWDB released the Drought Management Costing Tool to estimate socioeconomic impacts and evaluate economic impact of the water volumes reduced by implementation of drought management strategies for the 2026 RWPs. As described in the TWDB provided Drought Management Costing Tool User Manual, "…the primary purpose of the tool is to provide WUG-level lost consumer surplus estimates and the expected household-level residential reductions in available water use associated with policy-imposed restrictions or reduction on residential outdoor water use." The tool utilizes various inputs – *user supplied percentage reductions in use; census household size data; population projections; and Texas Municipal League (TML) price and quantity data* – to estimate reductions in water use and consumer costs (Figure 5-4). The following subsections summarize the components and features that comprise the drought management costing tool. More details can be found in the TWDB user manual.

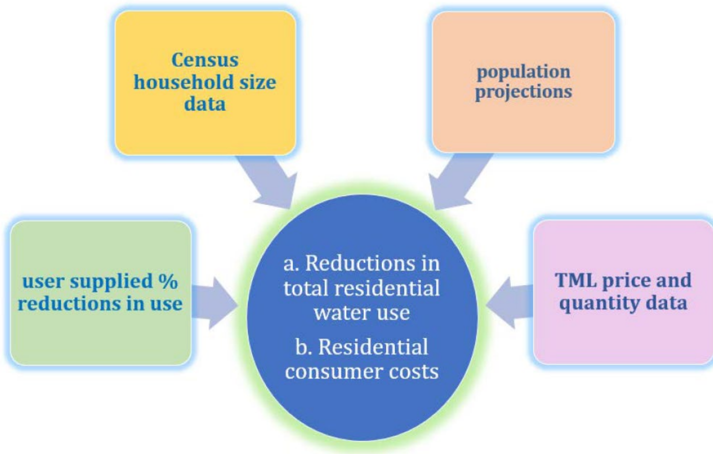

Figure 5-4 Costing Data and Output (TWDB, 2024)

5.2.2.2 Texas Municipal League Data

The TML generated water demand curves for WUGs from the 2023 annual cost and usage surveys. Parameters that were used included population, fees for 5,000 and 10,000 gallons of usages, and average monthly gallon usage for each household in the WUGs associated cities. This data was compiled to determine the expected price for the average monthly water use for the WUGs.

5.2.2.3 Analysis Assumptions

The following are the key assumptions in the development of the drought management costing tool (TWDB, 2024):

1. The relevant demand functions are only for residential outdoor water use. Historical studies have revealed that approximately 30 percent of residential use within the state is for outdoor water use. Therefore, this tool only allows potential reductions less than or equal to 30 percent of normal water use because of drought management strategies.
2. A representative value of -0.5 was assumed for the outdoor water demand.
3. Only residential water use reductions are examined. Available data did not support similar estimates for commercial water use.
4. County-Other WUGs are not included in this costing tool.
5. Year 2020 household size data (WUG-specific where possible) are employed to determine the number of households in each decade, based on the Board-adopted projected populations. These baseline household sizes are not assumed to adjust over time.
6. Baseline data from TML for average monthly prices and quantities (per household) from the years 2020-2023 was used in developing the demand functions for the various WUGs. Where possible, WUG-specific data were used. Proxy values based on planning region and three city size classifications were assigned to WUGs with no TML survey results.
7. Final lost consumer surplus estimates are expressed in year 2023 dollars to be consistent with the water management strategy costing requirements in the 2027 State Water Plan.

5.2.2.4 Use of the Costing Tool

The Microsoft Excel based tool is composed of the following three major components (tabs within the Excel workbook; TWDB, 2023):

1. **Data Entry:** User data entry form for decade-specific desired reductions in water use by region and WUG;
2. **Final Summary:** A summary of the key parameters and final cost (economic impact) and water savings estimates; and
3. **Population and Households:** Reference tab with background information on the number of households based on the 2020 census data and the Board-adopted 2030-2080 WUG and region level population projections.

For the intents and purposes of the Rio Grande RWPG and the Drought Management WMS, only total annual water reduction (acft) and total annual cost (in 2023 dollars) data for the Region M WUGs were obtained from the drought management costing tool. Total annual water reduction by WUG is described in Subsection 5.2.2.5 and detailed in Table 5-22. Total annual cost is described in Subsection 5.2.2.6 and detailed in Table 5-23.

5.2.2.5 Yield from Drought Management Strategy

TWDB defines *Total Annual Water Reduction* in the costing tool user manual as "… all household water use due to drought management plan implementation based on percentage of reduction," which is estimated via the following:

$$\frac{\left[\left(\frac{population}{household\ size}\right) * 12 * (monthly\ reduction\ in\ gallons)\right]}{325{,}851\,\frac{gal}{acft}}\ [\textbf{in acft}].$$

The Rio Grande RWPG selected 5 percent demand reduction for applicable WUGs beginning in 2030; water savings (demand reduction) are summarized in Table 5-22.

Table 5-22 2026 Region M Drought Management 5 Percent Demand Reduction (acft/yr)

WUG	5% Demand Reduction (acft/yr)					
	2030	2040	2050	2060	2070	2080
Agua SUD	209	224	234	239	243	248
Alamo	89	91	92	96	99	102
Brownsville	661	678	684	682	680	678
Donna	71	75	78	80	82	84
Eagle Pass	217	232	244	255	265	276
East Rio Hondo WSC	102	121	140	155	163	171
Edinburg	431	469	492	500	508	515
El Jardin WSC	127	131	132	131	131	131

WUG	5% Demand Reduction (acft/yr)					
	2030	2040	2050	2060	2070	2080
El Sauz WSC	4	5	5	5	5	5
El Tanque WSC	4	4	3	3	3	2
Harlingen	346	355	358	357	356	355
Hidalgo	50	52	54	56	57	58
Hidalgo County MUD 1	22	23	23	24	25	25
La Grulla	61	65	68	70	72	74
La Joya	16	17	18	18	18	19
La Villa	17	20	22	22	21	21
Laguna Madre Water District	45	46	47	47	46	46
Laredo	1,264	1,315	1,330	1,316	1,303	1,289
McAllen	987	1,097	1,202	1,234	1,266	1,299
Mercedes	43	44	44	46	48	49
Military Highway WSC	150	152	152	155	157	159
Mission	610	645	668	684	700	717
North Alamo WSC	770	850	900	909	917	926
Pharr	398	425	443	452	461	471
Port Mansfield PUD	2	2	3	3	4	5
Primera	24	31	35	39	43	45
Rio Grande City	48	52	54	56	57	59
Rio WSC	28	34	37	37	37	37
Roma	59	62	65	67	69	71
San Benito	72	74	74	74	74	74
San Juan	88	90	92	95	98	102
Sharyland WSC	309	338	357	361	366	371
Union WSC	26	27	28	29	30	31
Webb County	38	54	68	67	66	66
Weslaco	101	104	106	110	113	117
Zapata County	38	39	39	38	38	38

5.2.2.6 Drought Management Strategy Costs

TWDB defines *Consumer Surplus* in the costing tool user manual as the difference between how much one is willing to pay and what they actually have to pay," which is estimated via the following:

$$(average\ unit\ cost\ per\ acft) * (annual\ water\ reduction)\ [\mathbf{in\ 2023}\ \$].$$

Total annual cost can also be defined as the economic impact of not meeting projected water demands. The Rio Grande RWPG selected 5 percent demand reduction for applicable WUGs beginning in 2030; total annual costs are summarized in Table 5-23.

Table 5-23 2026 Region M Drought Management 5 Percent Demand Reduction Annual Lost Consumer Surplus (2023 dollars)

	5% Demand Reduction Annual Lost Consumer Surplus ($/year)					
WUG	2030	2040	2050	2060	2070	2080
Agua SUD	$25,809	$27,702	$28,924	$29,479	$30,039	$30,604
Alamo	$7,152	$7,327	$7,465	$7,722	$7,983	$8,250
Brownsville	$75,949	$77,906	$78,606	$78,375	$78,137	$77,894
Donna	$6,136	$6,489	$6,725	$6,885	$7,048	$7,214
Eagle Pass	$26,840	$28,668	$30,132	$31,445	$32,750	$34,052
East Rio Hondo WSC	$12,583	$14,923	$17,319	$19,131	$20,109	$21,137
Edinburg	$23,916	$25,987	$27,302	$27,727	$28,154	$28,582
El Jardin WSC	$15,728	$16,134	$16,280	$16,234	$16,189	$16,140
El Sauz WSC	$686	$751	$795	$813	$830	$848
El Tanque WSC	$655	$571	$499	$444	$395	$352
Harlingen	$19,769	$20,280	$20,466	$20,412	$20,358	$20,303
Hidalgo	$6,139	$6,479	$6,706	$6,872	$7,039	$7,209
Hidalgo County MUD 1	$2,701	$2,800	$2,873	$2,960	$3,048	$3,139
La Grulla	$5,411	$5,782	$6,056	$6,232	$6,410	$6,590
La Joya	$1,603	$1,709	$1,778	$1,817	$1,855	$1,894
La Villa	$629	$749	$821	$813	$805	$796
Laguna Madre Water District	$5,583	$5,726	$5,776	$5,756	$5,736	$5,715
Laredo	$69,495	$72,254	$73,091	$72,349	$71,598	$70,838
McAllen	$58,998	$65,579	$71,813	$73,718	$75,653	$77,619
Mercedes	$4,397	$4,462	$4,522	$4,693	$4,866	$5,044
Military Highway WSC	$18,578	$18,753	$18,822	$19,103	$19,391	$19,686

	5% Demand Reduction Annual Lost Consumer Surplus ($/year)					
WUG	2030	2040	2050	2060	2070	2080
Mission	$32,443	$34,297	$35,533	$36,388	$37,255	$38,134
North Alamo WSC	$88,477	$97,665	$103,384	$104,392	$105,399	$106,411
Pharr	$31,998	$34,202	$35,637	$36,371	$37,112	$37,862
Port Mansfield PUD	$284	$339	$411	$523	$651	$801
Primera	$1,769	$2,283	$2,625	$2,887	$3,176	$3,335
Rio Grande City	$3,925	$4,187	$4,381	$4,511	$4,642	$4,774
Rio WSC	$3,507	$4,154	$4,572	$4,571	$4,565	$4,555
Roma	$5,768	$6,096	$6,348	$6,555	$6,764	$6,977
San Benito	$7,377	$7,567	$7,635	$7,613	$7,590	$7,566
San Juan	$10,889	$11,152	$11,362	$11,753	$12,152	$12,559
Sharyland WSC	$38,167	$41,764	$44,029	$44,623	$45,216	$45,808
Union WSC	$3,181	$3,343	$3,471	$3,590	$3,711	$3,834
Webb County	$4,729	$6,627	$8,375	$8,291	$8,206	$8,120
Weslaco	$10,506	$10,786	$11,003	$11,373	$11,750	$12,135
Zapata County	$4,724	$4,794	$4,795	$4,746	$4,696	$4,643

5.2.2.7 Environmental Impacts of Recommended Drought Management Strategies

Potential environment impacts for municipal drought management have been identified and categorized as described below. The letters identifying each section correspond to the headings in Table 5-24. A 5 percent demand reduction was identified as a base drought management scenario for the applicable WUGs.

A. Acres Impacted Permanently

Acres impacted permanently refers to the total amount of area that will be permanently impacted because of the implementation of a strategy. There is no physical project associated with this WMS, and therefore no impacted acreage.

B. Construction Impacted Acreage

There is no anticipated construction associated with municipal drought management, and therefore no impacted acreage.

C. Agricultural Resources Impacted Acreage

Agricultural resources impact acreage is a consolidation of vegetation and land use types specific to Region – row crops, grass farms, and orchards - identified in the TPWD EMST. This GIS mapping data was overlain WMS locations to estimate the agricultural impact acreage from the implementation of the associated strategy.

D. Wetland Impact

The wetland impact refers to the probability that implementation of a WMS will affect a wetland. The location of wetlands in the Region was determined using the NWI located at http://www.fws.gov/wetlands/Data/Mapper.html.

This strategy would have no impact on wetlands.

E. Habitat Impacted Acreage

Habitat impacted acreage refers to how the strategy will impact the habitat of the local area. The more area that is impacted because of the implementation of the strategy, the more the habitat of the area will be disrupted. This strategy would have no impact on habitat.

F. Cultural Resources Impact

Cultural resources impact 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, including locations; buildings; and features with scientific, cultural, or historic value. This strategy would have no impact on cultural resources.

G. Reliability

Reliability is an assessment of the availability of the specified water quantity to the user over time. If the quantity of water is available to the user all the time, then the strategy has a high reliability. If the quantity of water is contingent on other factors, reliability will be lower. The reliability of these water management strategies is considered to be medium (reliability score = 3).

H. Bays, Estuaries, and Arms of the Gulf of Mexico

The environmental effects due to implementation of upstream WMS projects on bays, estuaries, and arms of the Gulf of Mexico are quantitatively assessed and reported. Water bodies designated as classified segments by the TCEQ that are within or downstream of Region M include the Brownsville Ship Channel, South Bay, Laguna Madre, and Gulf of Mexico. Effects to these water bodies were quantified by estimating whether the project is anticipated to decrease freshwater inflow in these classified water bodies.

A WMS project received a "1" if it is expected to decrease freshwater inflow into a classified water body. If a strategy were to increase freshwater inflow or otherwise have little to no impact on inflows, then the project would receive a zero.

A summary of the identified and quantified environmental impacts for municipal drought management is presented in Table 5-24. Additionally, it should be noted that because drought management reduces demand, this type of strategy decreases the amount of water that is discharged from a WWTP.

Table 5-24 Environmental Impacts for Recommended Municipal Drought Management

Entity	WMS Name	5% Demand Reduction*	A	B	C	D	E	F	G	H
Agua SUD	Drought Management	209	0	0	0	0	0	0	3	1
Alamo	Drought Management	89	0	0	0	0	0	0	3	1
Brownsville	Drought Management	661	0	0	0	0	0	0	3	1
Donna	Drought Management	71	0	0	0	0	0	0	3	1
Eagle Pass	Drought Management	217	0	0	0	0	0	0	3	1
ERHWSC	Drought Management	102	0	0	0	0	0	0	3	1
Edinburg	Drought Management	431	0	0	0	0	0	0	3	1
El Jardin WSC	Drought Management	127	0	0	0	0	0	0	3	1
El Sauz WSC	Drought Management	4	0	0	0	0	0	0	3	1
El Tanque WSC	Drought Management	4	0	0	0	0	0	0	3	1
Harlingen	Drought Management	346	0	0	0	0	0	0	3	1
Hidalgo	Drought Management	50	0	0	0	0	0	0	3	1
Hidalgo County MUD No. 1	Drought Management	22	0	0	0	0	0	0	3	1
La Grulla	Drought Management	61	0	0	0	0	0	0	3	1
La Joya	Drought Management	16	0	0	0	0	0	0	3	1
La Villa	Drought Management	17	0	0	0	0	0	0	3	1
Laguna Madre Water District	Drought Management	45	0	0	0	0	0	0	3	1
Laredo	Drought Management	1,264	0	0	0	0	0	0	3	1
McAllen	Drought Management	987	0	0	0	0	0	0	3	1
Mercedes	Drought Management	43	0	0	0	0	0	0	3	1
Military Highway WSC	Drought Management	150	0	0	0	0	0	0	3	1
Mission	Drought Management	610	0	0	0	0	0	0	3	1
NAWSC	Drought Management	770	0	0	0	0	0	0	3	1
Pharr	Drought Management	398	0	0	0	0	0	0	3	1
Port Mansfield PUD	Drought Management	2	0	0	0	0	0	0	3	1
Primera	Drought Management	24	0	0	0	0	0	0	3	1
Rio Grande City	Drought Management	48	0	0	0	0	0	0	3	1

Entity	WMS Name	5% Demand Reduction*	A	B	C	D	E	F	G	H
Rio WSC	Drought Management	28	0	0	0	0	0	0	3	1
Roma	Drought Management	59	0	0	0	0	0	0	3	1
San Benito	Drought Management	72	0	0	0	0	0	0	3	1
San Juan	Drought Management	88	0	0	0	0	0	0	3	1
Sharyland WSC	Drought Management	309	0	0	0	0	0	0	3	1
Union WSC	Drought Management	26	0	0	0	0	0	0	3	1
Webb County	Drought Management	38	0	0	0	0	0	0	3	1
Weslaco	Drought Management	101	0	0	0	0	0	0	3	1
Zapata County	Drought Management	38	0	0	0	0	0	0	3	1
*Indicates demand reduced by 5 percent for 2030 (acft/yr).										

5.2.3 Conversion of Water Right Classification

Over the planning horizon it is expected that there will be increased urban and suburban development and increased pressure on the existing water supplies. Irrigation demands are expected to decrease as a result of these pressures and associated urbanization of land. In some cases, where water is owned by an individual farmer, there may be a point at which the conversion of irrigated farmland to dry-land farming will make economic sense based on the price of water. According to the TCEQ rules, if an irrigation water right is converted to a domestic, municipal, and industrial (DMI) water right, the maximum authorized diversion is reduced to 50 percent for Class A and 40 percent for Class B.

For the purpose of this plan, it was assumed that the historical rate of conversion of water rights from irrigation to municipal is indicative of the decrease in irrigation demand. The urbanization rate was calculated for each county based on the rate at which irrigation demand decreases per decade beginning with 2030 to 2040. The water rights made available via reduction of agricultural supplies – defined as exclusion – were assumed to be converted for DMI use.

Table 5-25 details the projected agricultural demands, the rate at which water rights are converted in each county, the reduction in irrigation supplies, and the reduction in irrigated acreage, assuming that each acre of land that is irrigated has an associated 2.5 acft of water rights. Although there is measured historical urbanization for Jim Hogg County, these measurements were not considered statistically reliable based on the amount of total urbanization water rights.

Table 5-25 Urbanization Rates and Available Converted Water Rights Per County

	2030	2040	2050	2060	2070	2080
Cameron County						
Agricultural Demands	519,972	502,725	485,479	468,233	450,987	433,744
Exclusion Rate	3.43%	3.55%	3.68%	3.82%	3.98%	3.98%
Reduction in Agricultural Supplies (Cumulative)	6,843	13,680	20,511	27,331	34,132	40,645
Reduction in Irrigated Acreage (Cumulative)	6,948	13,896	20,844	27,792	34,738	41,409
Hidalgo County						
Agricultural Demands	666,560	644,451	622,343	600,236	578,127	556,024
Exclusion Rate	3.43%	3.55%	3.68%	3.82%	3.98%	3.98%
Reduction in Agricultural Supplies (Cumulative)	9,983	19,958	29,926	39,876	49,799	59,299
Reduction in Irrigated Acreage (Cumulative)	10,155	20,310	30,464	40,620	50,772	60,521
Jim Hogg County						
Agricultural Demands	348	337	325	314	302	290
Exclusion Rate	3.26%	3.69%	3.50%	3.97%	4.14%	4.14%
Reduction in Agricultural Supplies (Cumulative)	0	0	0	0	0	0
Reduction in Irrigated Acreage (Cumulative)	0	0	0	0	0	0
Maverick County						
Agricultural Demands	59,725	57,744	55,763	53,782	51,801	49,820
Exclusion Rate	3.43%	3.55%	3.68%	3.82%	3.98%	3.98%
Reduction in Agricultural Supplies (Cumulative)	1,945	3,889	5,832	7,771	9,705	11,557
Reduction in Irrigated Acreage (Cumulative)	1,981	3,961	5,942	7,922	9,903	11,804
Starr County						
Agricultural Demands	23,109	22,342	21,576	20,809	20,043	19,277
Exclusion Rate	3.43%	3.55%	3.69%	3.82%	3.97%	3.97%

	2030	2040	2050	2060	2070	2080
Reduction in Agricultural Supplies (Cumulative)	78	156	233	311	388	462
Reduction in Irrigated Acreage (Cumulative)	107	215	322	429	536	639
Webb County						
Agricultural Demands	10,090	9,756	9,421	9,086	8,752	8,417
Exclusion Rate	3.42%	3.56%	3.69%	3.82%	3.98%	3.98%
Reduction in Agricultural Supplies (Cumulative)	182	364	546	727	908	1,081
Reduction in Irrigated Acreage (Cumulative)	215	431	648	863	1,079	1,286
Willacy County						
Agricultural Demands	96,412	93,215	90,017	86,819	83,621	80,424
Exclusion Rate	3.43%	3.55%	3.68%	3.82%	3.98%	3.98%
Reduction in Agricultural Supplies (Cumulative)	2,410	4,819	7,226	9,629	12,025	14,319
Reduction in Irrigated Acreage (Cumulative)	2,424	4,848	7,273	9,697	12,121	14,448
Zapata County						
Agricultural Demands	4,936	4,773	4,609	4,445	4,281	4,117
Exclusion Rate	3.42%	3.56%	3.69%	3.83%	3.98%	3.98%
Reduction in Agricultural Supplies (Cumulative)	39	78	117	157	196	233
Reduction in Irrigated Acreage (Cumulative)	56	112	168	224	280	333
Region M Total						
Region M, Total Reduction in Agricultural Supplies (Cumulative)	21,480	42,944	64,391	85,801	107,152	127,596
Region M, Total Reduction in Irrigated Acreage (Cumulative)	21,886	43,773	65,660	87,547	109,429	130,442

For municipal WUGs with recommended strategies that required additional water rights to be feasible (such as expansion of a surface WTP) were allocated urbanized water rights to accompany those strategies. Additionally, the strategy for acquisition of water rights through urbanization was evaluated for all municipal WUGs either to meet any needs prior to 2080, or for inclusion to have consistency with the RWP in case an entity chooses to pursue conversion of surface water rights. In situations where a municipality is currently served by an ID that is expected to be urbanized, water rights from the specific ID were identified to be sold, if sufficient water rights were available.

A unit capital cost of approximately $3,043/acft has been estimated as the market value for this planning cycle. However, under Subchapter O of Chapter 49 Texas Water Code, a municipal supplier can buy water rights to the net irrigable acres in a subdivision at 68 percent of the market value. Therefore, if a strategy calls for a municipal water provider to purchase water rights from an ID that serves them, the urbanized land is within the jurisdiction of the provider, then this reduced rate could apply. Any costs associated with the delivery of water rates are assumed to be insignificant and are not included.

Each converted water right sold to an entity through a recommended WMS has been identified as either being sold through an ID from urbanized land within their service area or through converted water rights from land within a part of a county that is not served by an ID (unaffiliated). It should be noted that this one possible method for entities to receive urbanized water rights; however, there are multiple ways each user could purchase them. Table 5-26 through Table 5-30 present the potential distribution of converted water rights through the Conversion/Purchase of Surface Water Rights WMS for the purposes of the 2026 RWP. This table does not obligate any user to convert/purchase from another user.

Table 5-26 EXAMPLE - Cameron County Irrigation Districts Converted Water Rights Distribution (acft/yr)

	Converted WR					
	2030	2040	2050	2060	2070	2080
Bayview ID						
DMI Supplies from Conversion	209	439	690	963	1,257	1,562
Purchased DMI Supplies						
North Alamo WSC	176	176	176	176	176	176
Remaining Unassigned DMI Supplies	33	263	514	787	1,081	1,386
Brownsville ID						
DMI Supplies from Conversion	393	826	1,299	1,812	2,365	2,939
Purchased DMI Supplies						
El Jardin WSC	0	50	50	50	50	50
Remaining Unassigned DMI Supplies	**393**	**776**	**1,249**	**1,762**	**2,315**	**2,889**

	Converted WR					
	2030	2040	2050	2060	2070	2080
Cameron County Irrigation District (CCID) No. 2						
DMI Supplies from Conversion	2,123	4,332	6,629	9,011	11,480	13,943
Purchased DMI Supplies						
County-Other, Cameron	1,423	1,423	1,423	1,423	1,423	1,423
Rio Hondo	0	50	50	50	50	50
San Benito	0	50	50	50	50	50
Valley MUD 2	0	50	50	50	50	50
Remaining Unassigned DMI Supplies	**700**	**2,759**	**5,056**	**7,438**	**9,907**	**12,370**
CCID No. 6 (Los Fresnos)						
DMI Supplies from Conversion	730	1,474	2,232	3,004	3,790	4,560
Purchased DMI Supplies						
Brownsville	0	50	50	50	50	50
Laguna Madre Water District	0	50	50	50	50	50
Laredo	0	50	50	50	50	50
Los Fresnos	0	50	50	50	50	50
North Alamo WSC	730	730	730	730	730	730
Remaining Unassigned DMI Supplies	**0**	**544**	**1,302**	**2,074**	**2,860**	**3,630**
Harlingen ID						
DMI Supplies from Conversion	1,745	3,524	5,336	7,183	9,062	10,904
Purchased DMI Supplies						
Combes	0	50	50	50	50	50
East Rio Hondo WSC	560	560	560	560	560	560
Harlingen	0	50	50	50	50	50
Military Highway WSC	0	50	50	50	50	50
North Alamo WSC	1,184	1,184	1,184	1,184	1,184	1,184
Palm Valley	0	50	50	50	50	50
Primera	1	154	260	340	428	477
Remaining Unassigned DMI Supplies	**0**	**1,426**	**3,132**	**4,899**	**6,690**	**8,483**

	Converted WR					
	2030	2040	2050	2060	2070	2080
La Feria ID (CCID No. 3)						
DMI Supplies from Conversions	1,055	2,218	3,488	4,867	6,353	7,895
Purchased DMI Supplies						
La Feria	0	50	50	50	50	50
North Alamo WSC	1,000	1,000	1,000	1,000	1,000	1,000
Santa Rosa	0	50	50	50	50	50
Sebastian MUD	0	50	50	50	50	50
Siesta Shores WCID	0	50	50	50	50	50
Remaining Unassigned DMI Supplies	**55**	**1,018**	**2,288**	**3,667**	**5,153**	**6,695**

Table 5-27 EXAMPLE - Hidalgo County Irrigation Districts Converted Water Rights Distribution (acft/yr)

	Converted WR					
	2030	2040	2050	2060	2070	2080
Donna ID / Hidalgo County Irrigation District (HCID) No. 1						
DMI Supplies from Conversion	1,203	2,508	3,916	5,427	7,040	8,698
Purchased DMI Supplies						
Donna	950	2,240	2,240	2,240	2,240	2,240
Remaining Unassigned DMI Supplies	**253**	**268**	**1,676**	**3,187**	**4,800**	**6,458**
HCID No. 9						
DMI Supplies from Conversion	2,179	4,555	7,129	9,902	12,872	15,934
Purchased DMI Supplies						
County-Other, Hidalgo	306	306	306	306	306	306
Edcouch	0	50	50	50	50	50
El Sauz WSC	49	57	67	71	75	79
Elsa	0	50	50	50	50	50
La Villa	0	50	50	50	50	50
Mercedes	0	50	50	50	50	50
North Alamo WSC	1,814	2,064	3,745	3,746	3,747	3,748

	Converted WR					
	2030	2040	2050	2060	2070	2080
Weslaco	0	50	50	50	50	50
Remaining Unassigned DMI Supplies	**10**	**1,878**	**2,761**	**5,529**	**8,494**	**11,551**
HCID No. 1 (Edinburg)						
DMI Supplies from Conversion	950	1,980	3,092	4,285	5,559	6,868
Purchased DMI Supplies						
Edinburg	0	50	50	50	50	50
El Tanque WSC	10	10	10	10	10	10
Hidalgo County MUD 1	0	50	50	50	50	50
La Grulla	660	660	660	660	660	660
McAllen	0	50	50	50	50	50
Rio Grande City	243	243	243	243	243	243
Sharyland WSC	0	50	50	50	50	50
Remaining Unassigned DMI Supplies	**37**	**867**	**1,979**	**3,172**	**4,446**	**5,755**
HCID No. 2 (San Juan)						
DMI Supplies from Conversion	37	867	1,979	3,172	4,446	5,755
Purchased DMI Supplies						
Alamo	0	50	50	50	50	50
Pharr	947	947	947	947	947	947
San Juan	0	50	50	50	50	50
Union WSC	542	542	542	542	542	542
Remaining Unassigned DMI Supplies	**324**	**2,153**	**4,199**	**6,363**	**8,643**	**10,956**
HCID No. 6 (Mission No. 6)						
DMI Supplies from Conversion	419	873	1,363	1,889	2,451	3,028
Purchased DMI Supplies						
Agua SUD	0	870	869	868	867	866
Remaining Unassigned DMI Supplies	**419**	**3**	**494**	**1,021**	**1,584**	**2,162**
HCID No. 16 (Mission No. 16)						
DMI Supplies from Conversion	391	816	1,274	1,765	2,290	2,829

	Converted WR					
	2030	2040	2050	2060	2070	2080
Purchased DMI Supplies						
La Joya	186	193	185	168	152	135
Rio WSC	125	215	294	294	294	294
Remaining Unassigned DMI Supplies	**80**	**408**	**795**	**1,303**	**1,844**	**2,400**
HCWID No. 3 (McAllen No. 3)						
DMI Supplies from Conversions	141	281	422	562	703	838
Purchased DMI Supplies						
Roma	0	50	50	50	50	50
Zapata County	0	50	50	50	50	50
Remaining Unassigned DMI Supplies	**141**	**181**	**322**	**462**	**603**	**738**
Santa Cruz ID No. 15						
DMI Supplies from Conversion	835	1,798	2,890	4,110	5,458	6,889
Purchased DMI Supplies						
North Alamo WSC	835	835	835	835	835	835
Remaining Unassigned DMI Supplies	**0**	**1,798**	**2,890**	**4,110**	**5,458**	**6,889**
United ID						
DMI Supplies from Conversion	506	1,022	1,548	2,083	2,629	3,163
Purchased DMI Supplies						
Mission	0	50	50	50	50	50
North Alamo WSC	455	455	455	455	455	455
Remaining Unassigned DMI Supplies	**51**	**517**	**1,043**	**1,578**	**2,124**	**2,658**

Table 5-28 EXAMPLE - Maverick County Irrigation Districts Converted Water Rights Distribution (acft/yr)

	Converted WR					
	2030	2040	2050	2060	2070	2080
Maverick County ID						
DMI Supplies from Conversion	1,664	3,508	5,532	7,736	10,121	12,601

	Converted WR					
	2030	2040	2050	2060	2070	2080
Purchased DMI Supplies						
County-Other, Maverick	0	50	50	50	50	50
Eagle Pass	0	50	50	50	50	50
Maverick County	0	50	50	50	50	50
Olmito WSC	1,120	1,120	1,120	1,120	1,120	1,120
Remaining Unassigned DMI Supplies	**544**	**2,238**	**4,262**	**6,466**	**8,851**	**11,331**

Table 5-29 EXAMPLE - Willacy County Irrigation Districts Converted Water Rights Distribution (acft/yr)

	Converted WR					
	2030	2040	2050	2060	2070	2080
Delta Lake ID						
DMI Supplies from Conversion	2,084	4,419	7,005	9,843	12,930	16,161
Purchased DMI Supplies						
County-Other, Willacy	0	50	50	50	50	50
Lyford	0	50	50	50	50	50
North Alamo WSC	0	4,230	4,229	4,228	4,227	4,226
Port Mansfield PUD	24	34	45	66	86	105
Raymondville	0	50	50	50	50	50
Remaining Unassigned DMI Supplies	**2,060**	**5**	**2,581**	**5,399**	**8,467**	**11,680**

Table 5-30 EXAMPLE - Unaffiliated Converted Water Rights Distribution (acft/yr)

	Converted WR					
	2030	2040	2050	2060	2070	2080
Cameron County (Unaffiliated)						
DMI Supplies from Conversion	588	1,177	1,765	2,353	2,942	3,507
Purchased DMI Supplies						
County-Other, Cameron	588	588	588	588	588	588

	Converted WR					
	2030	2040	2050	2060	2070	2080
Remaining Unassigned DMI Supplies	**0**	**589**	**1,177**	**1,765**	**2,354**	**2,919**
Hidalgo County (Unaffiliated)						
DMI Supplies from Conversion	499	998	1,497	1,996	2,495	2,974
Purchased DMI Supplies						
Agua SUD	0	250	251	252	253	254
County-Other, Hidalgo	499	499	499	499	499	499
Hidalgo	0	50	50	50	50	50
Remaining Unassigned DMI Supplies	**0**	**199**	**697**	**1,195**	**1,693**	**2,171**
Webb County (Unaffiliated)						
DMI Supplies from Conversion	1,661	1,761	1,859	1,956	2,050	2,058
Purchased DMI Supplies						
County-Other, Starr	76	76	76	76	76	76
County-Other, Webb	697	697	697	697	697	697
Mirando City WSC	0	50	50	50	50	50
Webb County	0	50	50	50	50	50
Zapata County San Ygnacio & Ramireño	0	50	50	50	50	50
Zapata County WCID-Hwy 16 East	0	50	50	50	50	50
Remaining Unassigned DMI Supplies	**888**	**838**	**936**	**1,033**	**1,127**	**1,135**
Starr County (Unaffiliated)						
DMI Supplies from Conversion	113	226	339	452	565	674
Purchased DMI Supplies						
County-Other, Starr	113	113	113	113	113	113
Remaining Unassigned DMI Supplies	**0**	**113**	**226**	**339**	**452**	**561**
Zapata County (Unaffiliated)						
DMI Supplies from Conversion	58	116	174	232	290	346
Purchased DMI Supplies						
County-Other, Zapata	0	50	50	50	50	50

	Converted WR					
	2030	2040	2050	2060	2070	2080
Falcon Rural WSC	0	50	50	50	50	50
Remaining Unassigned DMI Supplies	**58**	**16**	**74**	**132**	**190**	**246**

5.2.3.1 Environmental Impacts of Recommended Conversion of Water Right Classification Strategies

Potential environment impacts for Conversion/Purchase of Surface Water Rights WMSs have been identified below. The largest impact from urbanization of irrigation water rights is the land that is no longer irrigated. Table 5-25 quantifies the reduction of irrigated acreage per county. The reduction of irrigated acreage was estimated as the amount of urbanized water rights divided by 2.5, based on the standard authorization per acre. It was assumed that the permanent acreage impacted is the same as would impact habitats in the local area.

Agricultural Resources Impacted Acreage

Agricultural resources impact acreage is a consolidation of vegetation and land use types specific to Region – row crops, grass farms, and orchards - identified in the TPWD EMST. This GIS mapping data was overlain WMS locations to estimate the agricultural impact acreage from the implementation of the associated strategy. Given that the Conversion/Purchase of Surface Water Rights WMS is an acquisition of water rights with no infrastructure, this WMS as a whole has zero acres agricultural resources impacted.

Reliability

Reliability is an assessment of the availability of the specified water quantity to the user over time. If the quantity of water is available to the user all the time, then the strategy has a high reliability. If the quantity of water is contingent on other factors, reliability will be lower. The reliability of conversion and purchase of surface water rights strategies is expected to be medium (reliability score = 3) because of uncertainty involved in purchasing existing permits and changing the type of use to municipal use. There could be competing development that may impact the reliability of securing sufficient permits from willing sellers.

Bays, Estuaries, and Arms of the Gulf of Mexico

The environmental effects due to implementation of conversion/purchase of surface water rights on bays, estuaries, and arms of the Gulf of Mexico are quantitatively not expected to directly impact inflows into a classified water body. Therefore, these WMS projects are assumed to have a score of zero.

5.2.4 Biological Control of Arundo Donax

Brush control is the process of removing non-native brush from the banks along rivers and streams and upland areas to reduce water consumption by vegetation and increase stream flows and groundwater availability. In 2017, the Texas State Soil and Water Conservation Board (TSSWCB) published the Water Supply Enhancement Program Annual Report, which detailed the efforts and execution of the TSSWCB projects throughout Texas. The report includes: the revised State Water Supply Enhancement Plan; feasibility studies; project allocations and request for proposals; conservation planning and program outreach; and assessment of Regional Water Planning Groups and the State Water Plan. Following initial successful brush control treatments, the TSSWCB found through 12 status reviews that the various target species did not grow above the 5 percent canopy requirement and thus did not warrant further treatment. These reviews were conducted 3 years after initial treatment. The second set of reviews will be conducted 8 to 9 years after the initial treatment. According to the annual report, implementation of the Water Supply Enhancement Program for Texas projects that removal of approximately 30,200 acres of non-native brush will enhance water yield by 9,364 acft/yr.[11] For Region M, brush control is recommended generally, but the removal of *Arundo donax* (*A. donax;* Carrizo cane/giant reed) has been the focus in saving water and increasing supply to waterways in the Rio Grande.

A. donax is an invasive water-using weed that infests the riparian areas of the Lower Rio Grande Basin. It grows up to 30 feet tall (typically 18 to 24 feet) and at a rate of up to 4 inches per day. This invasive weed is native to Mediterranean Europe, where various insect species naturally control the reed's growth. *A. donax* is a heavy water user, with estimates of up to 5.0 acft of water per acre per year.

Most control measures, including fire and mechanical, accelerated the spread of the plant. Chemicals can be temporarily effective but are very costly ($5,000 per acre) and may impact water quality for both U.S. and Mexican supplies. *A. donax* specific insects have been imported by USDA, evaluated, permitted and released in the United States and Mexico for biological control: *Tetramesa romana* (gall wasp); *Rhizaspidiotus donacis* (scale); and *Lasioptera donacis* (leafminer). Research studies conducted by USDA and Texas A&M University showed that moderate levels of attack by the biocontrol agents should reduce water use of *A. donax*.

Research conducted in 2009 by Emily Seawright (Texas A&M, Dept of Ag. Economics) was based on a 50-year program of biological releases of insects targeting *A. donax* and thus reducing the water consumption of the plant. The analysis was based on increasing levels of biological control agents over time reaching an equilibrium much as exists in Spain today. The agents were expected to achieve 67 percent control of size and acreage of Arundo over the 50-year period. The reduction in water consumption by *A. donax* was offset somewhat by water use of emerging native riparian vegetation, and the additional water would be shared equally between the United States and Mexico. For cost analysis, it was assumed that the saved water would be used for irrigation purposes based on the Rio Grande Watermaster rules.

Five (5) years post release of the *A. donax* gall wasp, *Tetramesa romana*, into the riparian habitats of the lower Rio Grande River, changes in the health of *A. donax* were documented. These changes in plant attributes were fairly consistent along the study area of 558 river miles between Del Rio and Brownsville, Texas, and support the hypothesis that the *A. donax* wasp has had a significant impact as a biological control agent. Plant attributes were measured prior to release in 10 quadrats at each of 10 field sites in 2007, and measured again at the same undisturbed sites, 5 years after the release of *T. romana*, in 2014. Aboveground biomass of *A. donax* decreased on average by 22 percent across the 10 sites. This decline in biomass was negatively correlated to increased total numbers of *T. romana* exit holes in main and lateral shoots per site in 2014 compared to 2007. Changes in biomass, live shoot density and shoot lengths (especially the positive effect of galling on main and lateral shoot mortality), appear to be leading to a consistent decline of *A. donax*. Economically, this reduction in *A. donax* biomass is estimated to be saving $4.4 million per year in agricultural water. Measurements in 2015,

[11] Texas State Soil and Water Conservation Board. "Water Supply Enhancement Program – 2017 Annual Report." TSSWCB. https://www.tsswcb.texas.gov/programs/water-supply-enhancement-program. 2018.

2017, and 2019 showed additional reduction in biomass up to 44 percent, especially between Laredo and Brownsville where annual temperatures are high.[12] A conservative 32 percent reduction in biomass has been estimated for Region M as a whole. Additional impacts are expected as populations of the wasp increase and as other biological control agents such as the *A. donax* scale, *Rhizaspidiotus donacis*, become more widespread.[13]

The establishment of *A. donax* wasp in the lower Rio Grande River is producing multiple environmental, political, and water conservation benefits. The wasp has also been established in Mexico, including the tributary rivers in Mexico.[14] The reduction in *A. donax* biomass will likely allow native flora and fauna to return, which has many multi-trophic benefits environmentally.[15] Reduction in biomass increases within stand visibility, which allows for safer and more effective law enforcement activities along the international border.[16]

Potential water conservation benefits were estimated at the start of the program by Seawright et al. (2009). A current estimate was calculated using the Seawright model for water conservation and value attributable to the 22 percent reduction in biomass. This suggests a water savings of 6,593 acft because of reduced consumptive use by *A. donax*, accounting for water used by regrowth of native riparian plants. Since the United States receives about 2/9 of this water, availability to the United States would be 2,183 acft. This water, available annually, will increase over time, as will the effectiveness and expansion of the biological control agents. It is assumed that 80 percent of the total water saved through biological control will be above the Amistad or Falcon Reservoirs in the Rio Grande Watershed, thus making that water available as a supply for irrigators; estimated for drought of record conditions (Table 5-31).

Table 5-31 Firm Yield of Biological Control of *A. donax*, and Resulting Supplies (acft/year)

Firm Yield	2030	2040	2050	2060	2070	2080
Total Region M Savings	*3,175*	*3,175*	*3,175*	*3,175*	*3,175*	*3,175*
Savings Upstream of Reservoirs	*2,539*	*2,539*	*2,539*	*2,539*	*2,539*	*2,539*
Irrigation Supply Distribution						
Irrigation, Cameron	955	955	955	955	955	955
Irrigation, Hidalgo	1,226	1,226	1,226	1,226	1,226	1,226
Irrigation, Maverick	110	110	110	110	110	110
Irrigation, Starr	43	43	43	43	43	43
Irrigation, Webb	19	19	19	19	19	19
Irrigation, Willacy	178	178	178	178	178	178
Irrigation, Zapata	9	9	9	9	9	9

[12] Goolsby et al. 2015, Moran et al. 2017, Marshall et al. 2018.
[13] Goolsby et al. 2019.
[14] Martinez Jimenez et al. 2017.
[15] Racelis 2012a.
[16] Goolsby et al. 2017.

The annual value of the water in agriculture for the Bi-National Rio Grande Valley is an estimated $917,808, where the US portion is $303,848 and 1 acft is valued at $139. Given increasing water issues in the region, and an estimated current market price of $3,043/acft, the value of the water savings for the United States would be approximately $4.4 million per year. Impacts from the *A. donax* wasp and other biological control agents are expected to increase the environmental, political, and economic benefits realized by the biological control program. The costs for operating and monitoring the biological controls program are estimated in Table 5-32.

Table 5-32 Biological Control of *A. donax* Estimated Costs

	2030	2040	2050	2060	2070	2080
Water Saved (acft/yr)	2,539	2,539	2,539	2,539	2,539	2,539
Cost per acre-foot ($)	$14	$14	$14	$14	$14	$14
Total Cost (2023)	$35,568	$35,568	$35,568	$35,568	$35,568	$35,568

5.2.4.1 Environmental Impacts of Recommended Biological Control of *A. donax* Strategies

A. Acres Impacted Permanently

Acres impacted permanently refers to the total amount of area that will be permanently impacted because of the implementation of a strategy. For Brush Control/Bio-Control of *A. donax,* the acres impacted are the acres removed of the invasive species.

B. Construction Impacted Acreage

Temporary environmental impacts may be seen during construction activities, such as increased air and noise pollution, and land disturbance activities. However, these effects are typical of any construction project. Based on the release of the bio-control agents and minimal capacity to measure and monitor the brush control process, the construction impacted acreage was estimated to be 10 percent of the acres impacted permanently.

C. Agricultural Resources Impacted Acreage

Agricultural resources impact acreage is a consolidation of vegetation and land use types specific to Region – row crops, grass farms, and orchards - identified in the TPWD EMST. This GIS mapping data was overlain WMS locations to estimate the agricultural impact acreage from the implementation of the associated strategy.

D. Wetland Impact

The wetland impact refers to the probability that implementation of a WMS will affect a wetland. The location of wetlands in the Region was determined using the NWI located at http://www.fws.gov/wetlands/Data/Mapper.html.

A strategy received a "1" if all or part of the strategy is located in a wetland or if it is close enough to where construction activities are likely to impact the wetland. All other strategies received zeros. If the exact location of project is unknown it was given a zero because it was assumed that it would be located on a site that would not affect and wetland.

E. Habitat Impacted Acreage

Habitat impacted acreage refers to how the strategy will impact the habitat of the local area. The more area that is impacted because of the implementation of the strategy, the more the habitat of the area will be disrupted. Therefore, it was assumed that the permanent acreage impacted for a WMS is what would impact habitats.

F. Cultural Resources Impact

Cultural resources impact 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, including locations; buildings; and features with scientific, cultural, or historic value. It is assumed that no WMSs negatively affect cultural resources. Mitigation costs are included for strategies that require infrastructure so it is assumed that none would be built in a location or way that disrupts culturally sensitive locations.

G. Reliability

Reliability is an assessment of the availability of the specified water quantity to the user over time. If the quantity of water is available to the user all the time, then the strategy has a high reliability. If the quantity of water is contingent on other factors, reliability will be lower. The supplies from these strategies are considered to be of low reliability since the brush must be continually treated to continue to provide additional supplies.

H. Bays, Estuaries, and Arms of the Gulf of Mexico

The environmental effects due to implementation of upstream WMS projects on bays, estuaries, and arms of the Gulf of Mexico are quantitatively assessed and reported. Water bodies designated as classified segments by the TCEQ that are within or downstream of Region M include the Brownsville Ship Channel, South Bay, Laguna Madre, and Gulf of Mexico. Effects to these water bodies were quantified by estimating whether the project is anticipated to decrease freshwater inflow in these classified water bodies.

A WMS project received a "1" if it is expected to decrease freshwater inflow into a classified water body. If a strategy were to increase freshwater inflow or otherwise have little to no impact on inflows, then the project would receive a zero.

A summary of the identified and quantified environmental impacts for recommended Biological Control of *A. donax* is presented in Table 5-33.

Table 5-33 Environmental Impacts for Implementation of Biological Control of A. donax

Entity	Yield*	A	B	C	D	E	F	G	H
Irrigation, Cameron	955	191	19	0	1	191	0	1	0
Irrigation, Hidalgo	1,226	245	25	0	1	245	0	1	0
Irrigation, Jim Hogg	1	0	0	0	1	0	0	1	0
Irrigation, Maverick	110	22	2	0	1	22	0	1	0
Irrigation, Starr	43	9	1	0	1	9	0	1	0

Irrigation, Webb	19	4	0	0	1	4	0	1	0
Irrigation, Willacy	178	35	4	0	1	35	0	1	0
Irrigation, Zapata	9	2	0	0	1	2	0	1	0
* Indicates first decade of implementation yield (acft/yr).									

5.2.5 Reuse

Wastewater reuse is defined as the types of projects that utilize treated wastewater effluent as a replacement for water supply, reducing the overall demand for fresh water supply. Wastewater reuse can be classified into two major types, defined by how the reuse water is handled. Direct reuse involves introducing treated wastewater directly from a wastewater plant to the place of use. For example, piping treated wastewater from a wastewater treatment plant (WWTP) to a golf course. Indirect reuse involves discharging treated wastewater to an environmental buffer like a river, aquifer, or lake for subsequent use. Virtually any water supply entity with a WWTP could pursue a reuse alternative, provided that downstream water rights do not have a claim for the entire return flow. Both direct and indirect wastewater reuse can be applied to potable and non-potable uses.

5.2.5.1 Non-Potable Reuse

Wastewater reuse is most commonly used for non-potable (not for drinking) purposes, such as agriculture, landscape, public parks, and golf course irrigation. Other non-potable applications include cooling water for power plants and oil refineries, industrial process water, toilet flushing, dust control, construction activities, concrete mixing, and artificial lakes. For the purposes of this plan, non-potable supplies are limited to meeting 25 percent of municipal need but can be sold to non-municipal WUGs to meet up to 100 percent of their demands.

The wastewater reuse WMS is feasible if several factors are taken into consideration: (1) the location of wastewater treatment facilities relative to the location of potential users of reclaimed water; (2) the level of treatment and quality of the reclaimed water; (3) the water quality requirements for particular use; and (4) the public acceptance of reuse.

State regulatory requirements for non-potable reuse of reclaimed water place constraints on both the types of uses considered acceptable and the manner in which reclaimed water is managed and used. Wastewater reuse quality and system design requirements are regulated by TCEQ by 30 TAC Section 210. TCEQ allows the following two types of non-potable reuse as defined by the use of the water and the required water quality:

- Type I – Use of reclaimed water where contact between humans or food crops and the reclaimed water is likely; and
- Type II – Use of reclaimed water where contact between humans or food crops and the reclaimed water is unlikely.

Current TCEQ criteria for non-potable reuse water are shown in Table 5-34.

Table 5-34 Quality Standards for Reclaimed Water on a 30-Day Average

Parameter	Allowable Level
Type I Reuse	
BOD5 or CBOD5	5 mg/L
Turbidity	3 NTU
Fecal Coliform	20 CFU/100 mL* 75 CFU/100 mL**
Enterococci	4 CFU/100 mL* 9 CFU/100 mL**
Type II Reuse – For a system other than a pond	
BOD5	20 mg/L
Or CBOD5	15 mg/L
Fecal Coliform	200 CFU/100 mL* 800 CFU/100 mL**
Enterococci	35 CFU/100 mL* 89 CFU/100 mL**
Type II Reuse – For a pond	
BOD5	30 mg/L
Fecal Coliform	200 CFU/100 mL* 800 CFU/100 mL**
Enterococci	35 CFU/100 mL* 89 CFU/100 mL**
BOD - biochemical oxygen demand CBOD - carbonaceous biochemical oxygen demand CFU - colony-farming unit mg/L - milligrams per liter mL - milliliter NTU - nephelometric turbidity units * 30-day geometric mean ** Maximum single grab sample	

Non-potable reuse was evaluated for those entities that identified it as a desired WMS, and for some WUGs where no other water supplies were available to meet needs. In each case, the demands of the end user were evaluated to verify that the supply was only considered where a demand would have otherwise been filled by municipal water, either raw or treated. The yield was limited to meet no more than 25 percent of the WUG's demand in any decade. There were five non-potable reuse projects evaluated for the 2026 planning cycle. Two are included as recommended water management strategies, and the other three are included as alternative strategies in Section 5.3.1. The following are the recommended strategies:

- Edinburg – Non-Potable Reuse.
- Rio Hondo – Non-Potable Reuse.

Environmental impacts are described in Section 5.2.5.3.

5.2.5.1.1 Edinburg – Reuse Water for Cooling Tower and Landscaping Usage

Project Source

This strategy was submitted by the Edinburg to the RWPG.

Description

For this direct non-potable reuse strategy, Edinburg would provide the University of Texas Pan America (UTPA) with reuse water from their WWTP. UTPA would use the reclaimed water for non-potable needs such as cooling water makeup and landscape irrigation. A map of the approximate alignment for the Edinburg WWTP non-potable reuse line is shown on Figure 5-5.

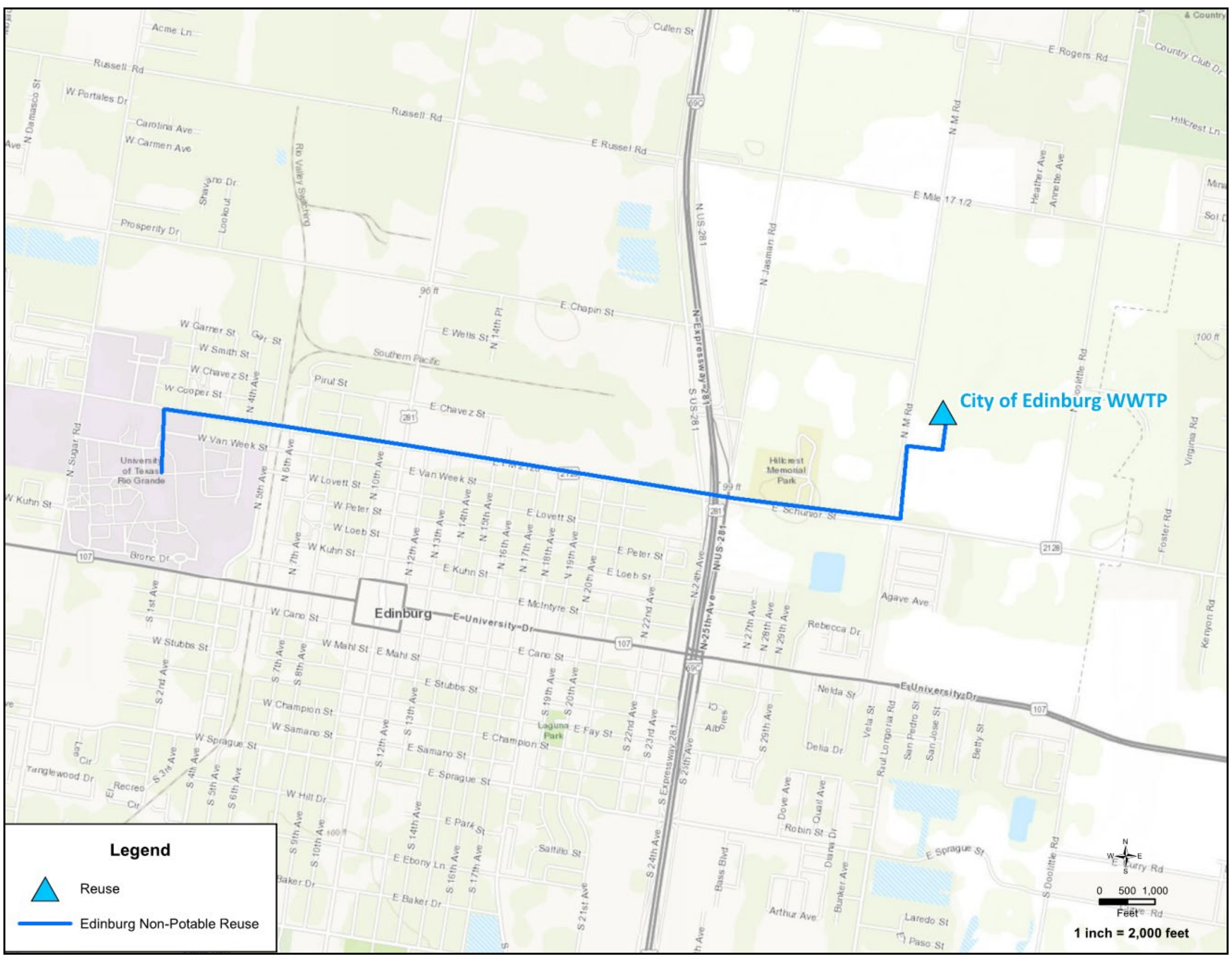

Figure 5-5 Edinburg WWTP Non-Potable Reuse Project Location

Available Supply

The Edinburg WWTP currently supplies approximately 3.5 million gallons per day (mgd) of reuse water. It has the capacity to provide an additional 3.5 mgd, or 3,920 acft/yr, of reclaimed water to be used by UTPA. It is likely that additional reuse water would be available in future years; however, that is outside of the scope of this specific strategy. Non-potable water in this RWP is accounted for as addressing a maximum of 25 percent of the city's demands, and the remainder is sold to manufacturing. Because this project recently has been put on hold, the online date has been moved to 2040.

Engineering and Costing

This strategy involves construction of a pump station and pipeline to convey the reclaimed water from the WWTP to the UTPA campus. It was assumed that some additional tertiary treatment at the plant would also be installed. It is assumed that the construction period would be 1 year.

Table 5-35 outlines the project costs developed in the UCM. Treatment Level 1 was used in the UCM to provide a cost estimate for the small amount of additional treatment that may be required. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

Approval for a reclaimed water system is needed from TCEQ. Construction of the new pipeline may also include any of the following permits: USACE Section 404 permit; TPWD sand, shell, gravel, and marl permit; TPDES Storm Water Pollution Prevention Plan; Texas DOT ROW permit.

Table 5-35 Edinburg – Non-Potable Reuse Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$14,770,000	$20,488,000	$2,526,000	$644	$278

5.2.5.1.2 Rio Hondo – Non-Potable Wastewater Effluent Reuse

Project Source

This strategy was submitted by Rio Hondo to the RWPG.

Description

Rio Hondo proposes a non-potable reuse project to utilize effluent from its WWTP. The proposed pipeline alignment is shown on Figure 5-6.

Available Supply

The WWTP is expected to have a capacity of 450 acft/yr; however, the non-potable supply expected to meet Rio Hondo's needs is limited to 25 percent of demands. Therefore, the supply expected to come online by 2040 is 30 acft/yr and stay constant through 2080.

Figure 5-6 Rio Hondo Non-Potable WWTP Effluent Reuse Project

Engineering and Costing

Additional treatment for the WWTP effluent would include treatment to Type 2 standards. The concentrate waste would be disposed with the remainder of the effluent that is discharged from the plant. A new pump station at the WWTP site, 6" transmission pipeline, and 30,000-gallon ground storage tank would be constructed. It is assumed that the construction period would be 2 years. Table 5-36 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

Implementation of a non-potable reuse project would require approval by TCEQ. Construction of the new pipeline may also include any of the following permits: USACE Section 404 permit; TPWD sand, shell, gravel, and marl permit; TPDES Storm Water Pollution Prevention Plan; Texas DOT ROW permit.

Table 5-36 Rio Hondo – Non-Potable Reuse Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$2,563,000	$3,861,000	$333,000	$11,100	$2,033

5.2.5.2 Potable Reuse

Potable reuse of reclaimed water refers to the intentional reuse of highly treated wastewater effluent as a supplemental source of water supply for potable use. Indirect potable reuse is practiced in Texas where surface water supplies are deliberately augmented with wastewater effluent. The general steps in indirect potable reuse are as follows:

1. Wastewater is treated at a conventional WWTP.
2. The water is again treated through microfiltration, ultrafiltration, and/or reverse osmosis (RO).
3. The treated water is returned to the natural environment and mixes with other waters for an extended period of time.
4. The blended water is sent to a WTP for conventional water treatment.
5. The water is stored and pumped to distribution.

The TCEQ is currently in the process of establishing the requirements for both indirect and direct potable reuse. In 2012, TWDB funded a study to assess the potential for direct potable reuse in Texas and develop a resource document that provides scientific and technical information for the implementation of direct potable reuse.[17] The final version of the report was released in April 2015. There are three direct potable reuse projects to date in Texas. The City of Wichita Falls, the City of Big Spring, and El Paso Water Utilities[18] have all implemented direct potable reuse projects. Each of the three cities were issued permits from the TCEQ following extensive testing of the drinking water.

All of the potable reuse strategies recommended in this RWP are considered direct reuse because none of the strategies have sufficient evidence that the reuse water would be retained in a natural environmental buffer for what would be considered an extended amount of time. By TWDB definition, indirect reuse refers to water that is returned to a natural water body such that an additional permit is required to access that water after buffering.

The wastewater reuse WMS is feasible if several factors are taken into consideration: (1) the location of wastewater treatment facilities relative to the location of potential surface waters and water treatment facilities; (2) the level of treatment and quality of the reclaimed water; and (3) public acceptance of reuse. There were thirteen potable reuse projects evaluated for the 2026 planning cycle. Twelve were carried over from the 2021 planning cycle and one is new. Twelve are included as recommended water management strategies, and the other one is included as an alternative strategy in Section 5.3.1. The following are the recommended strategies:

- Agua SUD – West WWTP Indirect Potable Reuse.
- Brownsville Public Utilities Board – Indirect Potable Reuse
- Brownsville Public Utilities Board – Southside WWTP Phase I and Phase II.
- Laredo – South Laredo Creek WWTP Phase I and Phase II.
- McAllen – Direct Potable Reuse.
- Mission – Potable Reuse.

[17] http://www.twdb.texas.gov/innovativewater/reuse/projects/directpotable/index.asp.
[18] http://www.twdb.texas.gov/publications/shells/WaterReuse.pdf.

- Pharr – Indirect Potable Reuse
- San Juan – Potable Reuse.
- Weslaco - Weslaco North WWTP Potable Reuse.

Environmental impacts are described in Section 5.2.5.3.

5.2.5.2.1 Agua SUD – West WWTP Indirect Potable Reuse

Project Source

This strategy was submitted by Agua SUD to the RWPG.

Description

The Agua SUD owns the West Agua WWTP, located in Sullivan City, Texas. Currently there is no reuse water supplied from the existing WWTP. This indirect potable reuse strategy involves reuse water being pumped from the WWTP to the raw water supply reservoir located at Agua SUD's Abram's WTP to supplement raw water from the Rio Grande. Tertiary treatment would be required at the WWTP prior to pumping the treated effluent to the raw water supply reservoir. A map of the approximate locations of the Agua SUD reuse line is shown on Figure 5-7.

Available Supply

The West Agua WWTP produces 1.4 mgd of reclaimed water. Based on demand projections for Agua SUD, it is anticipated that the effluent flow will increase to 2 mgd by 2040. Project calculations assume 60 percent of the effluent stream will be treated and that the maximum produced water volume is 50 percent of the effluent stream, considering membrane recovery rates. The resulting supply for the project was determined to be 1,120 acft/yr by 2040.

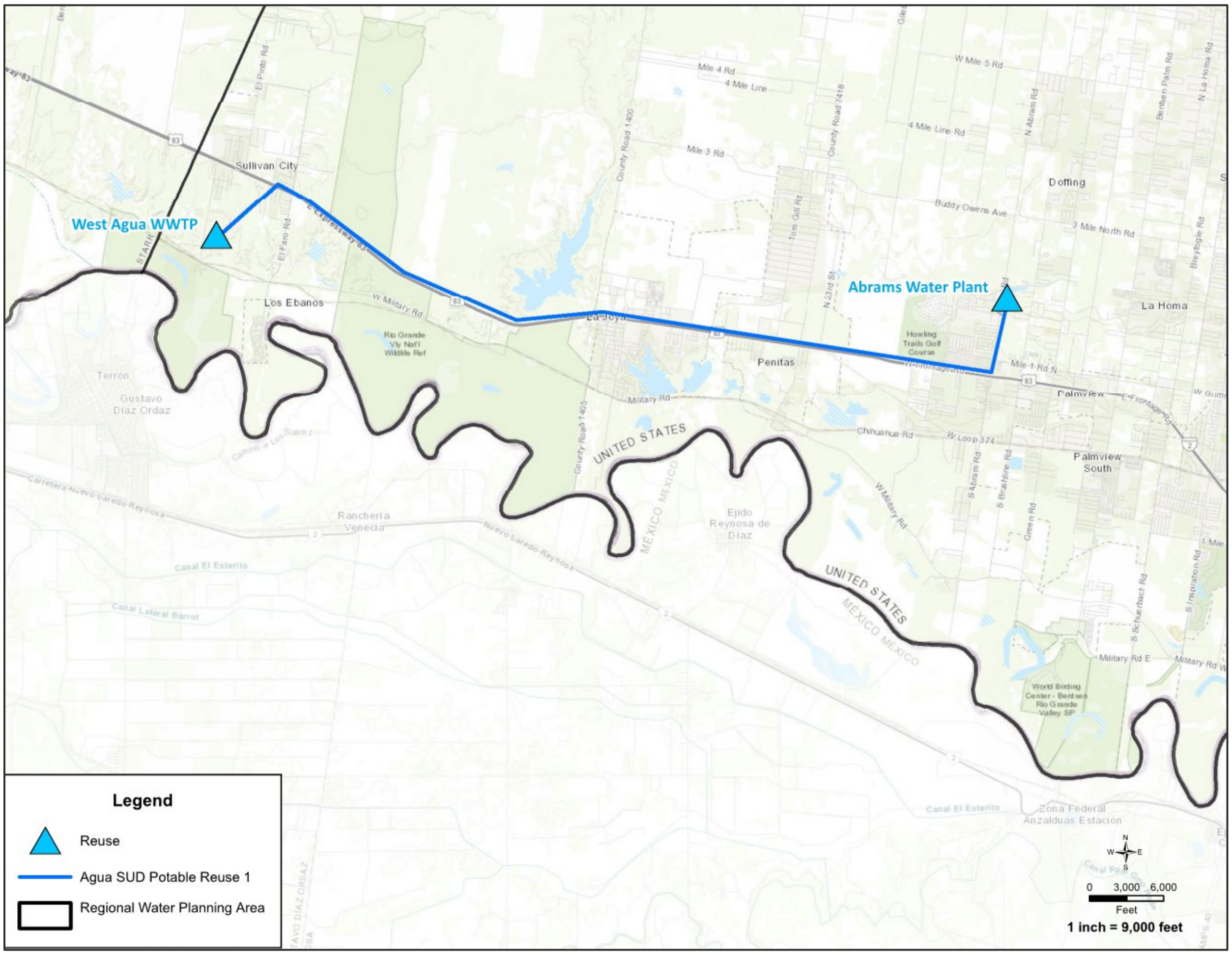

Figure 5-7 Agua SUD West WWTP Indirect Potable Reuse Project Location

Engineering and Costing

The Agua SUD potable reuse option would include one new pump stations and a 10” pipeline to transfer the treated effluent from the WWTP to the raw water supply reservoir. Additional tertiary treatment would be needed at the WWTP. It is assumed that the construction period would be 2 years.

Table 5-37 outlines the project costs developed in the UCM. It was assumed that filtration at the WWTP will be needed in addition to membrane treatment; therefore, Treatment Level 2, Simple Filtration, was used in the UCM. The existing plant footprints were assumed to have adequate space for the additional treatment and pump stations, so land acquisition is not required at the WWTP. An 11-mile pipeline and pump station to transfer the treated effluent to the raw water supply reservoir was included. In addition, a 1 MG ground storage tank with a roof was included. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

Implementation of a potable reuse project would require approval by TCEQ. Any requirements developed by TCEQ for potable reuse by the time this project is constructed would need to be met. Construction of the new pipelines may also include any of the following permits: U.S. Army Corps of Engineers (USACE) Section 404 permit; TPWD sand, shell, gravel, and marl permit; TPDES Storm Water Pollution Prevention Plan; Texas DOT ROW permit. Additionally, local public opinion of potable reuse would have to be considered and a public relations campaign may be required.

Table 5-37 Agua SUD – West WWTP Indirect Potable Reuse Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$26,990,000	$38,987,000	$3,570,000	$3,188	$740

5.2.5.2.2 Brownsville – Southside WWTP Potable Reuse

Project Source

This strategy was originally identified by the RWPG, but Brownsville has requested to keep it in the plan this cycle.

Description

This direct potable reuse strategy is to pump treated effluent from the Brownville Southside WWTP to the Brownsville WTP No. 2. A map of the recommended potable reuse strategy is shown on Figure 5-8.

Available Supply

Based on recorded WWTP flows, the annual average flow for Brownsville Southside WWTP is 12.8 mgd. Approximately half of that flow is assumed to be available on a consistent basis; therefore, 6.4 mgd, or 7,168 acft/yr, would be the maximum volume to be produced for potable reuse in 2030. For this two phased WMS, Brownsville's Southside WWTP will produce 3,360 acft/yr of potable water in 2050 and expand to produce a total of 5,040 acft/yr in 2070.

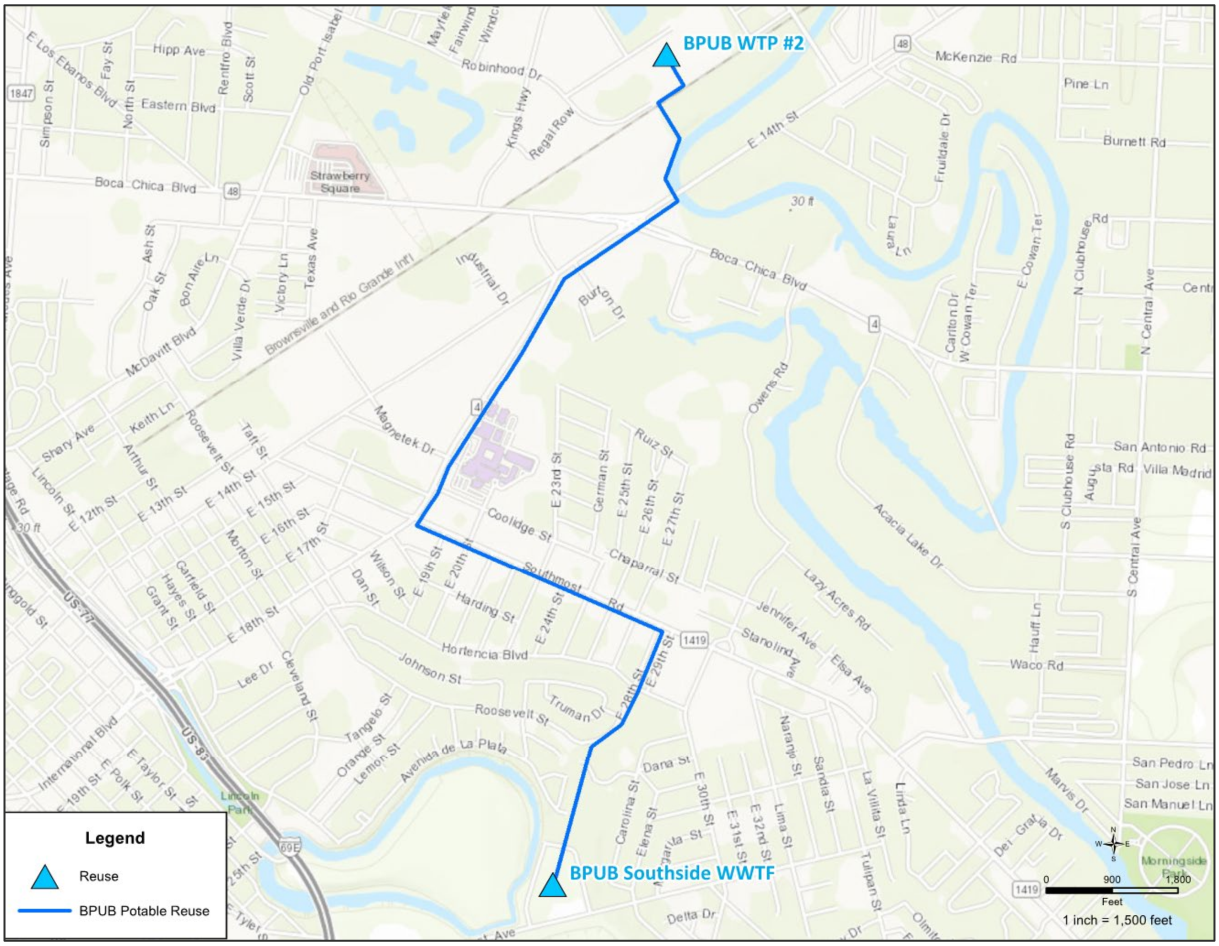

Figure 5-8 Brownsville Southside WWTP Potable Reuse Pipeline Location

Engineering and Costing

Additional treatment for the WWTP effluent would include microfiltration, RO, and advanced oxidation. The concentrate waste would be disposed with the remainder of the effluent that is discharged from the plant. A new pump station at the WWTP site and a pipeline to convey the reuse water to Brownsville WTP No. 2 would be constructed. The 18", 3-mile pipeline and pump station would be built to handle the full build out flow during the first phase, but the treatment facilities would be expanded during Phase II construction. It is assumed that the construction period would be 1 year for each phase. Table 5-38 and Table 5-39 outline the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

Implementation of a direct potable reuse project would require approval by TCEQ. Any requirements developed by TCEQ for potable reuse by the time this project is constructed would need to be met. Additionally, local public opinion of potable reuse would have to be considered and a public relations campaign may be required.

Table 5-38 Brownsville – Southside WWTP Potable Reuse Phase I Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$37,770,000	$52,618,000	$7,408,000	$2,205	$1,104

Table 5-39 Brownsville – Southside WWTP Potable Reuse Phase II Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$15,819,000	$22,050,000	$3,502,000	$2,085	$1,161

5.2.5.2.3 Brownsville – Indirect Potable Reuse

Project Source

This strategy was requested by Brownsville during the 2026 planning cycle.

Description

This indirect potable reuse strategy is to pipe treated effluent from the Brownville Robindale WWTP and outfall in the Resaca De La Guerra, and then be pulled out for treatment at the Brownsville WTP No. 2. A map of the recommended indirect potable reuse strategy is shown on Figure 5-9.

Available Supply

The Robindale WWTP has average effluent flows of 8 mgd. Approximately half of that flow is assumed to be available for reuse; therefore, 4 mgd, or 4,480 acft/yr, would be the maximum volume to be produced for potable reuse in 2030, and that volume would be carried through 2080.

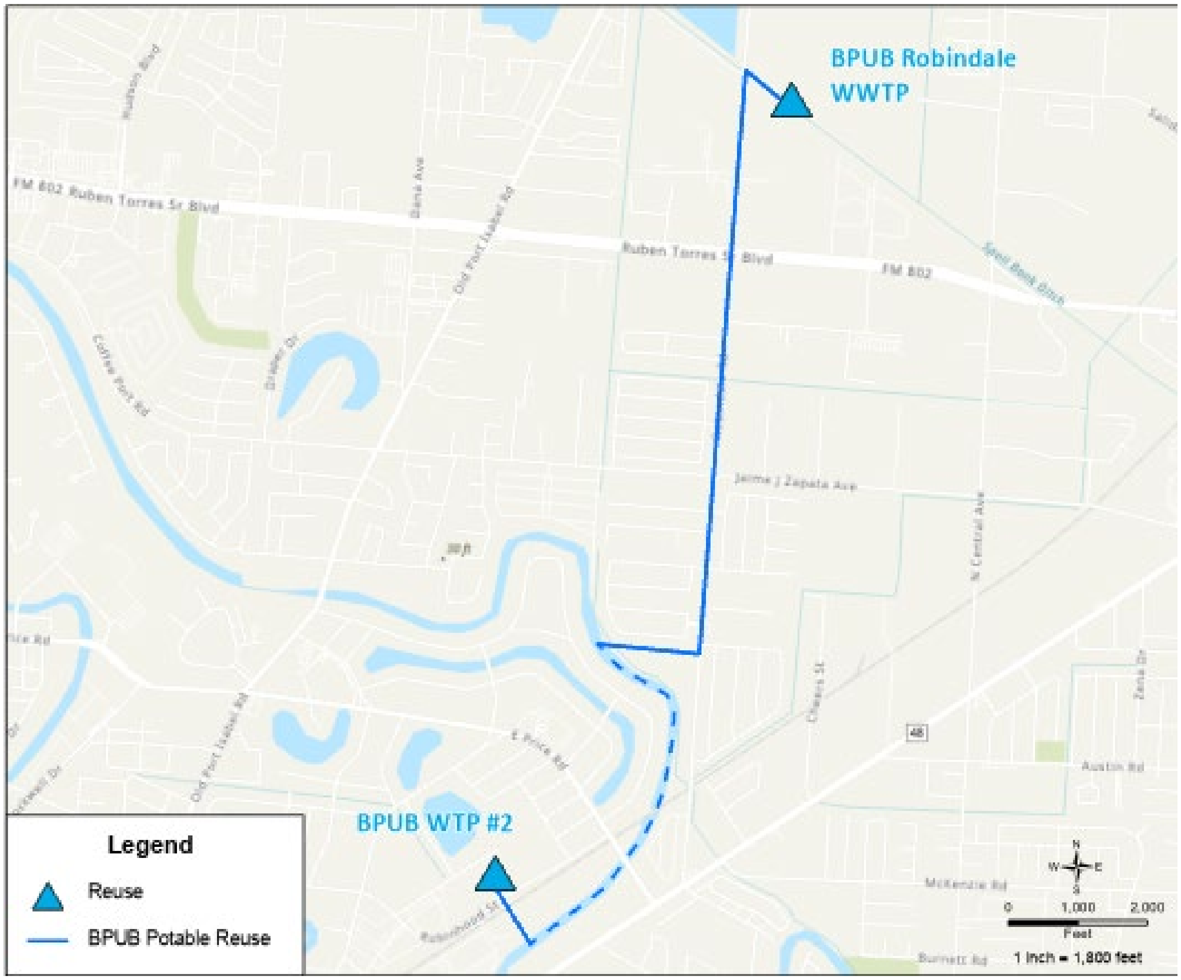

Figure 5-9 Brownsville Indirect Potable Reuse Pipeline Location

Engineering and Costing

Advanced treatment for the WWTP effluent before leaving the WWTP site would likely be needed, but Brownsville is currently exploring what type would work best. The concentrate waste would be disposed with the remainder of the effluent that is discharged from the plant. A new pump station at the WWTP site and a 16”, 8,500-foot-long pipeline would be constructed to convey the reuse water to an outfall in the Resaca De La Guerra, although there is currently an existing pipeline owned by Brownsville Irrigation District (ID) that is in proximity to the conveyance pathway and Brownsville Public Utilities Board (PUB) has contacted the ID about potentially using that pipeline instead. The effluent will travel approximately 6,000 feet down the Resaca where it will be pulled out through an existing intake to Brownsville WTP No. 2. Once at Brownsville WTP No. 2, some additional brackish desalination treatment may be needed. This additional treatment is included as part of the costs. Because both the WWTP and the WTP have space available for additional treatment and pumping, no land acquisition costs are assumed for those components. It is assumed that the construction period would be 2 years. Table 5-40 outlines the project costs developed in the UCM The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

Implementation of an indirect potable reuse project would require approval by TCEQ. Any requirements developed by TCEQ for potable reuse by the time this project is constructed would need to be met. Construction of the new pipeline may also include any of the following permits: USACE Section 404 permit; TPWD sand, shell, gravel, and marl permit; TPDES Storm Water Pollution Prevention Plan; Texas DOT ROW permit. Additionally, local public opinion of indirect potable reuse would have to be considered and a public relations campaign may be required.

Table 5-40 Brownsville – Indirect Potable Reuse Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$74,693,000	$107,403,000	$17,849,000	$3,984	$2,298

5.2.5.2.4 Laredo – South Laredo WWTP Potable Reuse

Project Source

This strategy was submitted by Laredo to the RWPG during the 2021 regional water planning process and has been updated for the 2026 planning cycle.

Description

This direct potable reuse strategy is to pump treated effluent from the South Laredo WWTP to the Laredo Jefferson WTP. The approximate alignment of the South Laredo WWTP potable reuse pipeline is shown on Figure 5-10.

Available Supply

After the completion of WWTP expansion, the annual average flow for the South Laredo Creek WWTP will be an estimated 18 mgd. Approximately half of the flow is assumed to be available on a consistent basis. The WWTP currently provides 0.1 mgd of non-potable reuse; therefore, 6.9 mgd or 7,728 acft/yr, is available for indirect potable reuse. Phase 1 of this strategy will produce 3,360 acft/yr in 2040. Phase II of this strategy will produce a total of 4,480 acft/yr of reuse water in 2060 to meet Laredo's future needs.

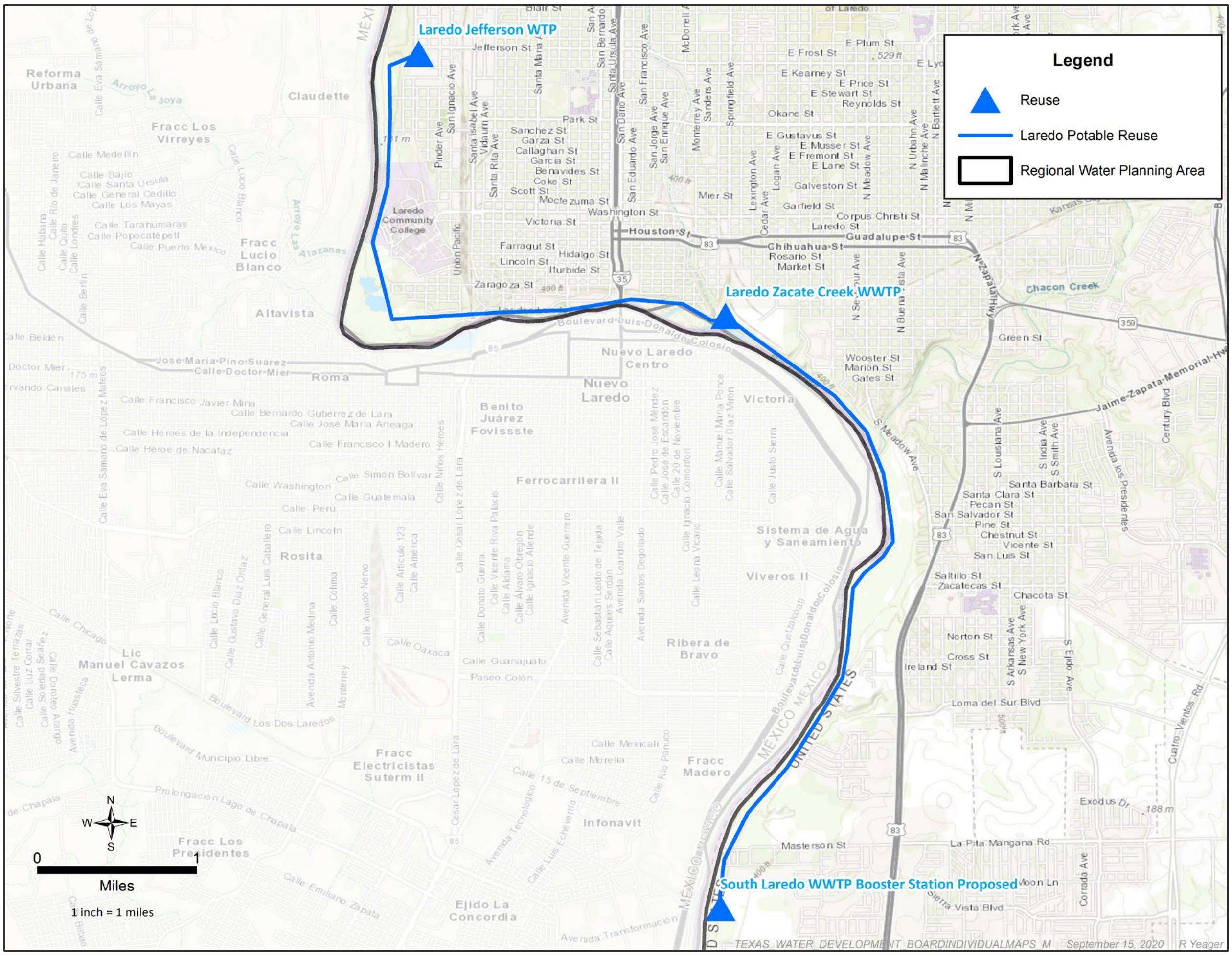

Figure 5-10 South Laredo WWTP Potable Reuse Pipeline Project Location

Engineering and Costing

Additional treatment for the WWTP effluent would include microfiltration, RO, and advanced oxidation. The concentrate waste would be disposed with the remainder of the effluent that is discharged from the plant. A new pump station and 1 MGD ground storage tank at the South Laredo WWTP site and a 16" pipeline, which is sized sufficiently for both phases, to convey the reuse water to Jefferson WTP, would be constructed. During Phase II construction, the pump station and treatment would be expanded to ultimate build out capacity. It is assumed that the construction period for each phase would be 2 years. Phase I would begin providing supply in the 2040 decade, and Phase II in the 2060 decade. Table 5-41 through Table 5-42 outline the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

Implementation of a direct potable reuse project would require approval by TCEQ. Any requirements developed by TCEQ for potable reuse by the time this project is constructed would need to be met. Additionally, local public opinion of potable reuse would have to be taken into account and a public relations campaign may be required.

Table 5-41 Laredo – South Laredo WWTP Potable Reuse Phase I Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$49,578,000	$71,438,000	$8,961,000	$2,667	$1,174

Table 5-42 Laredo – South Laredo WWTP Potable Reuse Phase II Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$12,850,000	$18,473,000	$2,769,000	$2,472	$1,313

5.2.5.2.5 McAllen – Direct Potable Reuse

Project Source

This strategy was originally identified by the RWPG, but McAllen requested to keep it as a recommended strategy for the 2026 planning cycle.

Description

This direct potable reuse strategy is to pump treated effluent from the McAllen WWTP to the McAllen WTP. The estimate route for the North WWTP potable reuse pipeline is shown on Figure 5-11. Because the North WWTP already provides non-potable reuse, depending on the amount of reuse available, the treated effluent may end up coming from the South WWTP. For costing purposes, the North WWTP was assumed.

Available Supply

Based on recorded WWTP flows, the current annual average flow for McAllen North WWTP is 11.25 mgd. It is assumed that up to half of the effluent flow will be available for potable reuse. This project assumes that approximately 3,880 acft/yr of potable reuse will be produced by 2040.

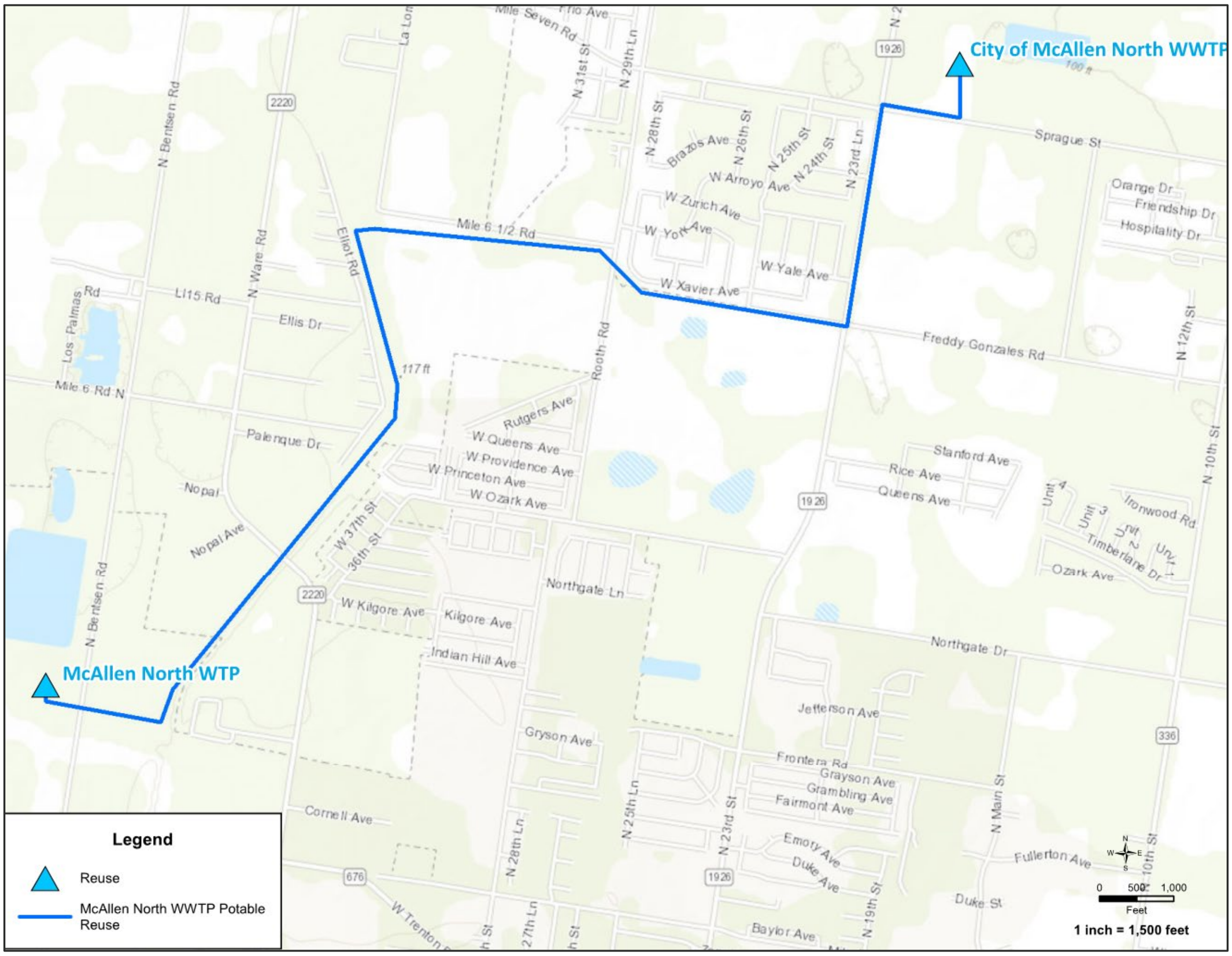

Figure 5-11 McAllen Direct Potable Reuse Pipeline Project Location

Engineering and Costing

Additional treatment for the WWTP effluent would include microfiltration, RO, and advanced oxidation. The concentrate waste would be disposed with the remainder of the effluent that is discharged from the plant. Along with the treatment, a new pump station and 3 mgd ground storage tank at the WWTP site and an 18" pipeline to convey the reuse water to McAllen WTP would be constructed. It is assumed that the construction period would be 2 years.

Table 5-43 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

Implementation of a direct potable reuse project would require approval by TCEQ. Any requirements developed by TCEQ for potable reuse by the time this project is constructed would need to be met. Additionally, local public opinion of potable reuse would have to be taken into account and a public relations campaign may be required.

Table 5-43 McAllen – Direct Potable Reuse Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$43,387,000	$62,443,000	$8,611,000	$2,219	$1,088

5.2.5.2.6 Mission –Potable Reuse

Project Source

This strategy was identified by the RWPG.

Description

This strategy is for the City of Mission to use wastewater effluent for direct potable reuse. Effluent from the Mission WWTP will be pumped to the South WTP for conventional treatment after it has gone through advanced treatment. The estimate route of the Mission WWTP Potable Reuse Pipeline is shown on Figure 5-12.

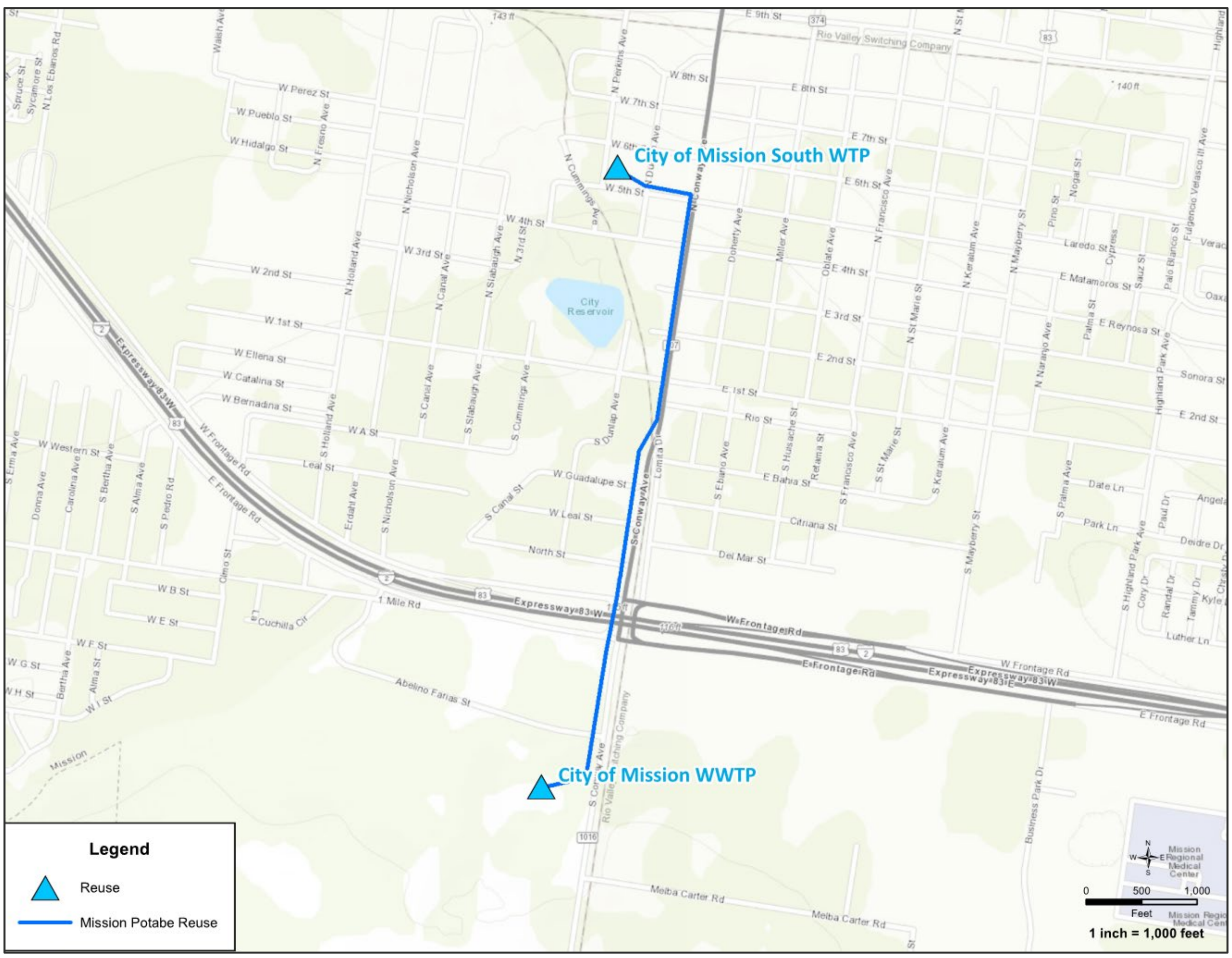

Figure 5-12 Mission WWTP Potable Reuse Project Location

Available Supply

The Mission WWTP currently treats 13.5 mgd on average. It is assumed approximately half of the effluent flow can be produced for potable reuse. Mission could utilize the available effluent to supply an additional 3.5 mgd, or 3,920 acft/yr, of water starting in 2040. It is assumed that 20 percent of the influent water would be lost through the treatment process; therefore, 4,700 acft/yr of wastewater effluent would be used.

Engineering and Costing

Additional treatment for the WWTP effluent would include microfiltration, RO, and advanced oxidation. The concentrate waste would be disposed with the remainder of the effluent that is discharged from the plant. Along with the treatment, a new pump station and 2 MG ground storage tank at the WWTP site and a 16" pipeline to convey the reuse water to the WTP would be constructed. It is assumed that the construction period would be 2 years. Table 5-44 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

Implementation of a direct potable reuse project would require approval by TCEQ. Any requirements developed by TCEQ for potable reuse by the time this project is constructed would need to be met. Additionally, local public opinion of potable reuse would have to be taken into account and a public relations campaign may be required.

Table 5-44 Mission – Potable Reuse Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$38,520,000	$55,415,000	$8,053,000	$2,054	$1,060

5.2.5.2.7 Pharr – Raw Water Augmentation Potable Reuse

Project Source

This strategy was submitted by the Pharr to the RWPG.

Description

This direct potable reuse strategy is to augment the Pharr's raw water supply with reuse water. A portion of the WWTP effluent would be treated to near drinking water standards, stored in a buffering pond, and then pumped to a raw water storage pond where it would mix with raw Rio Grande water supplied by Hidalgo County ID No. 2. This strategy was presented to and approved by TWDB in a Water Reuse Priority and Implementation Plan Report, prepared in September 2011. The approximate alignment of the Pharr WWTP potable reuse pipeline for the Raw Water Reservoir Augmentation WMS is shown on Figure 5-13.

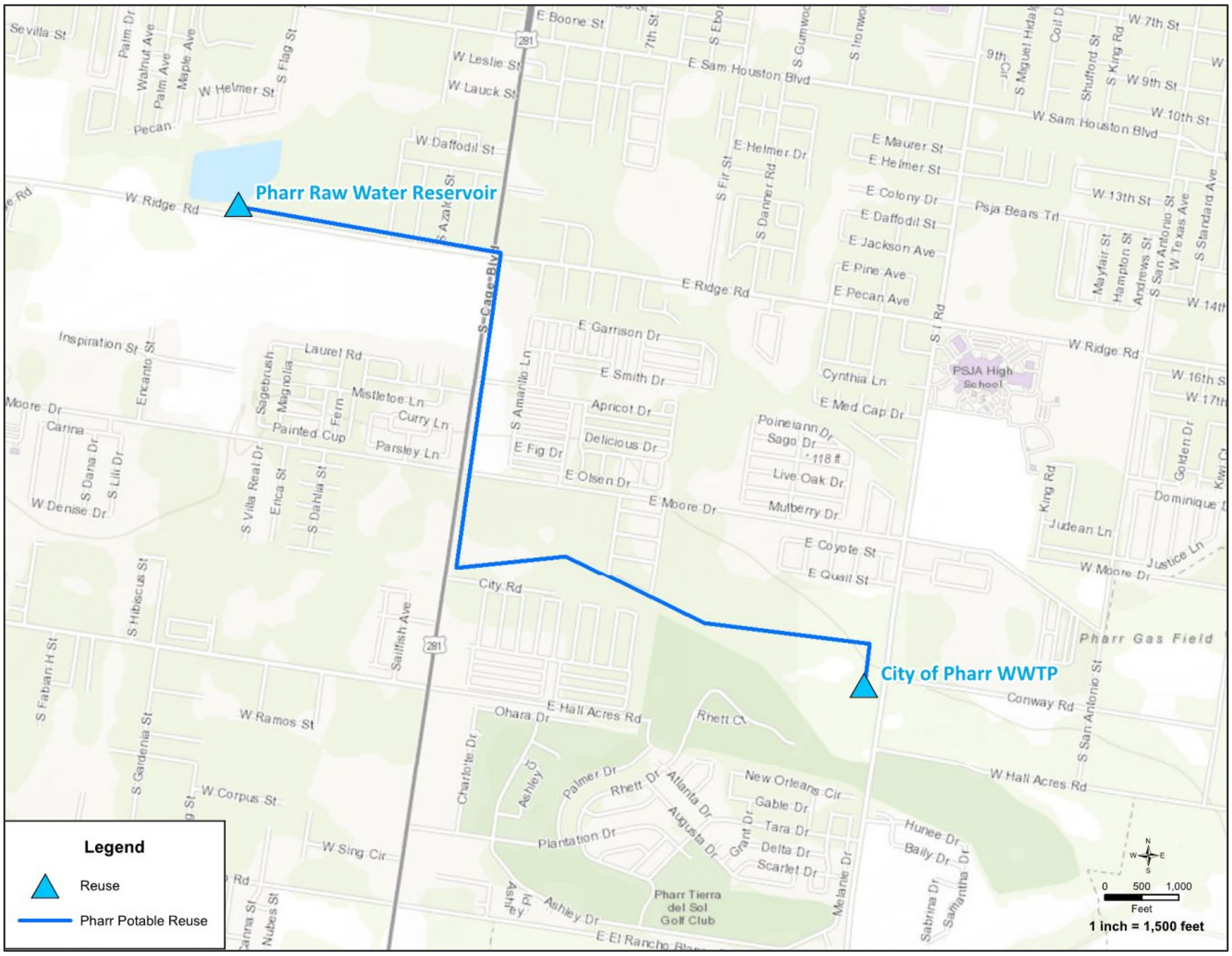

Figure 5-13 Pharr Raw Water Reservoir Augmentation Potable Reuse Project Location

Available Supply

The current plant flow of the Pharr WWTP is 6 mgd. This project would produce 3 mgd of that flow, based on planning assumptions that no more than fifty percent of wastewater effluent will be supplied by reuse. The total available supply for this strategy is 3 mgd, or 3,360 acft/yr, and is assumed to come online by 2040. It is assumed that 20 percent of the influent water would be lost through the treatment process; therefore, 4,030 acft/yr of wastewater effluent would be used.

Engineering and Costing

The components of this project include an advanced reclaimed WTP, storage pond, and pump station to be constructed next to the existing WWTP on City owned land. A 16" pipeline is also required to convey the reclaimed water to the raw water storage pond near the WTP. The advanced treatment plant will consist of membrane filtration, RO, and ultraviolet disinfection (Advanced Treatment Level 1). Concentrate disposal from the treatment processes would be discharged to the Arroyo Colorado with the traditional WWTP discharge. It is assumed that the construction period would be 1.5 years.

Land acquisition costs are limited to the pipeline route since the other infrastructure components will be built on City-owned land. Table 5-45 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

Final design of the indirect potable reuse project would require approval by TCEQ. Any requirements developed by TCEQ for potable reuse by the time this project is constructed would need to be met. Construction of the new pipeline may also include any of the following permits: USACE Section 404 permit; TPWD sand, shell, gravel, and marl permit; TPDES Storm Water Pollution Prevention Plan; Texas DOT ROW permit. Additionally, local public opinion of potable reuse would have to be taken into account and a public relations campaign may be required.

Table 5-45 Pharr – Raw Water Augmentation Potable Reuse Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$37,965,000	$53,850,000	$7,373,000	$2,194	$1,104

5.2.5.2.8 San Juan – Direct Potable Reuse

Project Source

This strategy was submitted by San Juan to the RWPG during the 2021 regional water planning process.

Description

This strategy is for the City of San Juan to use wastewater effluent for direct potable reuse. It is assumed effluent from the San Juan WWTP would be pumped to the city's WTP for conventional treatment after it has gone through advanced treatment.

Available Supply

Based on the revised water demand projections for the 2026 cycle, the San Juan WWTP effluent is assumed to produce approximately 1,120 acft/yr for potable reuse, which is approximately 30 percent of the total water demand. Based on an assessment of the City of San Juan's demands and needs, this strategy is anticipated to be implemented in the 2050 decade.

Engineering and Costing

Additional treatment for the WWTP effluent would include microfiltration, RO, and advanced oxidation. The concentrate waste would be disposed with the remainder of the effluent that is discharged from the plant. A new pump station and 0.5 MG ground storage tank at the WWTP site and an 8", 1-mile pipeline to convey the reuse water to the WTP would be constructed. It is assumed that the construction period would be 2 years. Table 5-46 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

Implementation of a direct potable reuse project would require approval by TCEQ. Any requirements developed by TCEQ for potable reuse by the time this project is constructed would need to be met.

Additionally, local public opinion of potable reuse would have to be taken into account and a public relations campaign may be required.

Table 5-46 San Juan – Direct Potable Reuse Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$16,115,000	$23,305,000	$3,173,000	$2,833	$1,371

5.2.5.2.9 Weslaco– North WWTP Potable Reuse

Project Source

This strategy was identified by the RWPG.

Description

This direct potable reuse strategy is to pump treated effluent from the Weslaco North WWTP to the Weslaco WTP. The approximate alignment of the North WWTP potable reuse pipeline is shown on Figure 5-14.

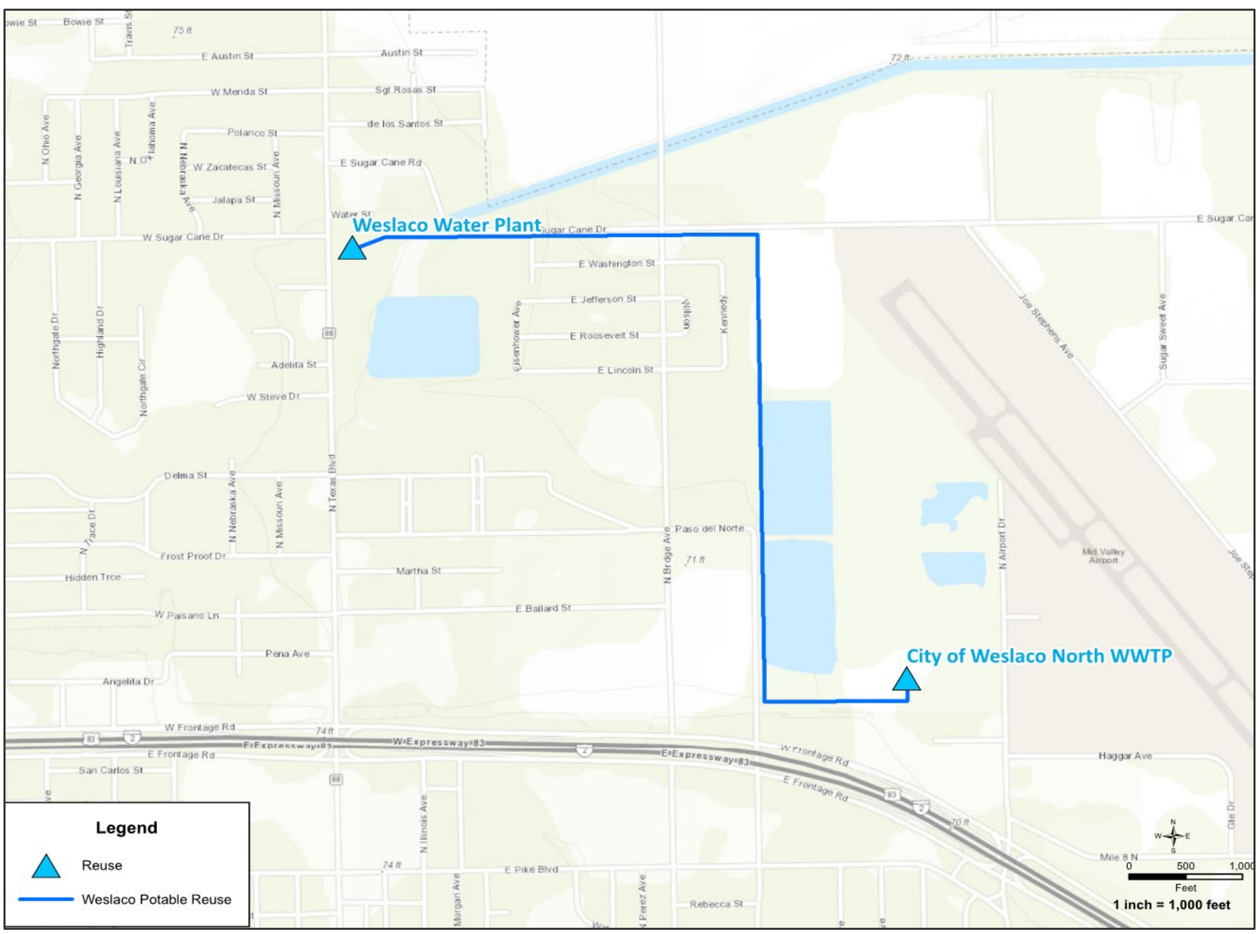

Figure 5-14 Weslaco North WWTP Potable Reuse Pipeline Project Location

Available Supply

Based on the projected water demands for Weslaco for the 2026 planning cycle, it is anticipated that up to 1,120 acft/yr of potable reuse could be supplied beginning in 2050.

Engineering and Costing

Additional treatment for the WWTP effluent would include microfiltration, RO, and advanced oxidation. The concentrate waste would be disposed with the remainder of the effluent that is discharged from the plant. A new pump station and 0.5 MG ground storage tank at the WWTP site and an 8", 1-mile pipeline to convey the reuse water to the Weslaco WTP would be constructed. It is assumed that the construction period would be 2 years. Table 5-47 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

Implementation of a potable reuse project would require approval by TCEQ. Any requirements developed by TCEQ for potable reuse by the time this project is constructed would need to be met. Additionally, local public opinion of potable reuse would have to be taken into account and a public relations campaign may be required.

Table 5-47 Weslaco – North WWTP Potable Reuse Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$15,706,000	$22,720,000	$3,101,000	$2,769	$1,342

5.2.5.3 Environmental Impacts of Recommended Reuse Strategies

Potential environment impacts for recommended reuse strategies have been identified and categorized as described below. The letters identifying each section correspond to the headings in Table 5-48.

A. Acres Impacted Permanently

Acres impacted permanently refers to the total amount of area that will be permanently impacted because of the implementation of a strategy. The following conservative assumptions were made (unless more detailed information for a specific facility was available):

- The acres impacted for pipelines is equivalent to the ROW easements required; it is assumed 100-feet for ROW unless otherwise known; and
- WTP impacts are estimated using UCM, which is based on the plant capacity.

B. Construction Impacted Acreage

Temporary environmental impacts may be seen during construction activities, such as increased air and noise pollution, and land disturbance activities. However, these effects are typical of any construction project. The construction impacted acreage was estimated as 110 percent (rounded up to a whole number) of the permanently impacted acreage.

C. Agricultural Resources Impacted Acreage

Agricultural resources impact acreage is a consolidation of vegetation and land use types specific to Region – row crops, grass farms, and orchards - identified in the TPWD EMST. This GIS mapping data was overlain WMS locations to estimate the agricultural impact acreage from the implementation of the associated strategy.

D. Wetland Impact

The wetland impact refers to the probability that implementation of a WMS will affect a wetland. The location of wetlands in the region was determined using the NWI located at http://www.fws.gov/wetlands/Data/Mapper.html.

A strategy received a "1" if all or part of the strategy is located in a wetland or if it is in close proximity to where construction activities are likely to impact the wetland. All other strategies received zeros. If the exact location of project is unknown it was given a zero because it was assumed that it would be located on a site that would not affect and wetland.

E. Habitat Impacted Acreage

Habitat impacted acreage refers to how the strategy will impact the habitat of the local area. The more area that is impacted because of the implementation of the strategy, the more the habitat of the area will be disrupted. Therefore, it was assumed that the permanent acreage impacted for a WMS is what would impact habitats.

F. Threatened and Endangered Species Count

Threatened and endangered species count refers to how the strategy will impact those species in the area once implemented. The species impact was quantified based on the number of federally-listed threatened and endangered species located within the county of the strategy. The number of threatened and endangered species came from the TPWD Rare, Threatened, and Endangered Species of Texas database (http://tpwd.texas.gov/gis/rtest/).

G. Cultural Resources Impact

Cultural resources impact 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, which also include locations; buildings; and features with scientific, cultural, or historic value. It is assumed that no WMSs negatively affect cultural resources. Mitigation costs are included for strategies that require infrastructure so it is assumed that none would be built in a location or way that disrupts culturally sensitive locations.

H. Reduction in WWTP Effluent (acft/yr)

Environmental impacts may be seen because of lower WWTP effluent flows to the discharge streams for wastewater effluent reuse strategies. These impacts could include the following:

- Decreases to the stream flow/level.
- Change in the water quality by reducing the organic levels.
- Effects to fish and wildlife that inhabit the streams.

I. Reliability

Reliability is an assessment of the availability of the specified water quantity to the user over time. If the quantity of water is available to the user all the time, then the strategy has a high reliability. If the quantity of water is contingent on other factors, reliability will be lower. Supply amounts for this strategy were developed based on estimates of water use and related return flows to specific wastewater treatment plants. Where applicable, consideration was given for specific minimum by-pass flow requirements where required by water rights. This strategy is considered highly reliable (reliability score = 5). There is potential for the reuse supplies to develop at a faster or slower rate, depending on the volume of return flows.

J. Bays, Estuaries, and Arms of the Gulf of Mexico

The environmental effects due to implementation of upstream WMS projects on bays, estuaries, and arms of the Gulf of Mexico are quantitatively assessed and reported. Water bodies designated as classified segments by the TCEQ that are within or downstream of Region M include the Brownsville Ship Channel, South Bay, Laguna Madre, and Gulf of Mexico. Effects to these water bodies were quantified by estimating whether the project is anticipated to decrease freshwater inflow in these classified water bodies.

A WMS project received a "1" if it is expected to decrease freshwater inflow into a classified water body. If a strategy were to increase freshwater inflow or otherwise have little to no impact on inflows, then the project would receive a zero.

A summary of the identified and quantified environmental impacts for the recommended reuse projects is presented in Table 5-48.

Table 5-48 Environmental Impacts of Recommended Reuse Strategies

Entity	WMS Name	Yield*	A	B	C	D	E	F	G	H	I	J
Non-Potable												
Edinburg	Reuse Water for Cooling Tower and Landscaping Usage	3,920	43	47	1	0	43	8	0	3,920	5	1
Rio Hondo	Non-Potable Wastewater Effluent Reuse	30	25	28	0	0	25	25	0	30	5	1
Potable												
Agua SUD	West WWTP Indirect Potable Reuse	1,120	140	154	19	0	140	8	0	1,120	5	1
Brownsville	Indirect Potable Reuse	4,480	16	17	0	1	16	25	0	4,480	5	1
Brownsville	Southside WWTP Potable Wastewater Effluent Reuse (Phase 1)	3,360	43	47	0	0	43	25	0	3,360	5	1
Brownsville	Southside WWTP Potable Wastewater Effluent Reuse (Phase 2)	5,040	43	47	0	0	43	25	0	5,040	5	1
Laredo	South Laredo WWTP Potable Wastewater Effluent Reuse (Phase 1)	3,360	43	47	0	0	43	4	0	3,360	5	1
Laredo	South Laredo WWTP Potable Wastewater Effluent Reuse (Phase 2)	6,720	43	47	0	0	43	4	0	6,720	5	1
McAllen	Direct Potable Reuse	3,880	45	50	3	0	45	8	0	3,880	5	1

Entity	WMS Name	Yield*	A	B	C	D	E	F	G	H	I	J
Mission	Potable Reuse	3,920	19	21	0	0	19	8	0	3,920	5	1
Pharr	Raw Water Augmentation Potable Reuse	3,360	38	42	1	0	38	8	0	3,360	5	1
San Juan	Potable Reuse	1,120	42	47	0	0	42	8	0	1,120	5	1
Weslaco	North WWTP Potable Wastewater Effluent Reuse	1,120	15	17	0	0	15	8	0	1,120	5	1
* First decade of implementation yield (acft/yr).												

5.2.6 New or Expanded Surface Water Treatment

New or expanded surface water treatment strategies refers to developing additional surface water treatment infrastructure (treatment plants) to remove bottlenecks that have limited the amount of water that can be supplied.

For the 2026 planning cycle, projects from the previous cycle were carried forward and modified as needed. Four of the strategies are recommended and four are alternative strategies discussed in Subsection 5.3.2. The recommended strategies include:

- Donna – WTP Expansion.
- East Rio Hondo WSC – North Harlingen Surface WTP Phase I.
- North Alamo WSC – Delta WTP Expansion Phase I and II.
- Olmito WSC – WTP Expansion.

Environmental impacts are described in Section 5.2.6.5.

5.2.6.1 Donna – WTP Expansion

Project Source

This strategy was submitted by Donna to the RWPG.

Description

This strategy is for the expansion of the WTP of Donna. The treatment plant is currently under violation for capacity with TCEQ and needs to be expanded. The WMS includes increased WTP capacity, acquisition of water rights, new storage reservoir (approximately 260 acft), and new raw water pump station (i.e., new raw water reservoir and raw water pump station storage improvements).

The existing WTP currently relies on an existing irrigation canal for raw water, but the canal is unreliable, and the plant has seen recent raw water shortages. Constructing a raw water reservoir, primarily for storage, at the plant and a raw water pump station for conveyance to the proposed reservoir will supply the utility with a reliable raw water source.

Available Supply

This strategy would expand the WTP from 4 mgd to 6 mgd, supplying an additional 2,240 acft/yr of drinking water. Based on projected demands, the WTP would initially supply 950 acft/yr by 2030 and increase to full capacity from 2040 onward.

Engineering and Costing

Costs for this strategy from the UCM include WTP expansion, storage reservoir, intake from the reservoir, pipeline to and from the reservoir, and a pump station. The plant has enough land area for expansion, so land acquisition for the WTP was not included in the costing model. It is assumed that the construction period for this strategy is 2 years.

Costs for this project do not include the purchase of water rights available through voluntary conversion of irrigation rights. Those costs are included for Donna under the Conversion of Surface Water Rights water management strategy.

Table 5-49 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

No major implementation issues are expected for this strategy. As with any project, necessary state and federal permits must be obtained before construction can begin.

Table 5-49 Donna – WTP Expansion Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$30,023,000	$43,167,000	$3,818,000	$1,704	$571

5.2.6.2 East Rio Hondo WSC – North Harlingen Surface WTP Phase I

Project Source

This strategy was submitted by East Rio Hondo WSC (ERHWSC) to the RWPG during the 2016 Regional Water Planning process.

Description

This strategy is to construct a new surface WTP just west of Rio Hondo and pipeline so that raw water would be pumped from Harlingen ID. The pipeline would reduce losses currently experienced in conveyance to treatment, and treatment capacity will be sufficient to handle current and future surface water rights.

Available Supply

The pump station and treatment plant would be designed for 3.5 mgd capacity. The plant will treat approximately 3,200 acft/yr of water rights currently owned by ERHWSC, and an estimated 560 acft/yr of additional water rights available through conversion of irrigation water rights. For the intents and purposes of the plan, based on information provided by ERHWSC for the 2026 planning cycle, 560 acft/yr is accounted for in the supply balance, based on assumed loss reduction. This strategy is assumed to be online by 2030.

Engineering and Costing

Costs for this strategy from the UCM include a new water treatment plant, an intake from the irrigation canal, a pump station and 5-mile pipeline (sized for potential full buildout), land acquisition, and pipeline

ROW for Phase I of the strategy. Costs associated with the purchase of surface water rights is included separately under the Conversion of Surface Water Rights water management strategy. It is assumed that the construction period for this strategy is 1 year for Phase I. Table 5-50 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

The availability of surface water rights required to supply the treatment plant is a potential implementation issue.

Table 5-50 East Rio Hondo WSC – North Harlingen Surface WTP Phase I Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$54,205,000	$75,778,000	$8,738,000	$15,604	$6,093

5.2.6.3 North Alamo WSC – Delta WTP Expansion

Project Source

This strategy was submitted by North Alamo WSC (NAWSC) to the RWPG during the 2016 Regional Water Planning Process.

Description

This strategy is for the expansion of Delta WTP. The expansion would serve residents within the Edcouch, Elsa, La Villa, Monte Alto, and surrounding areas. It would also provide the NAWSC the ability to utilize other water districts as a source of push water for delivery of water in times of drought.

Available Supply

The expansion of Delta WTP would provide NAWSC with the ability to treat an additional 4,480 acft/yr of drinking water in Phase I, and 6,160 acft/yr in Phase II. Phase I would be constructed in 2040 and Phase II would occur in 2050. Conversion of Water Rights is required for this supply.

Engineering and Costing

Costs for this strategy from the UCM include the WTP expansion only. It is assumed that the WTP expansion can occur on existing owned land and no land acquisition is needed. It is assumed that the construction period for each phase is one year. Costs associated with purchasing water rights are included separately under the Conversion of Surface Water Rights water management strategy. Table 5-51 outlines the project costs developed in the UCM. for Phase I, and Phase II is presented in Table 5-52. The full UCM project cost estimate summaries are provided in Appendix 5D.

Implementation Issues

As with any project, necessary state and federal permits must be obtained before construction can begin.

Table 5-51 North Alamo WSC – Delta WTP Expansion Phase I Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$14,620,000	$20,379,000	$2,608,000	$582	$262

Table 5-52 North Alamo WSC – Delta WTP Expansion Phase II Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$8,706,000	$12,135,000	$1,677,000	$998	$490

5.2.6.4 Olmito WSC – WTP Expansion

Project Source

This strategy was submitted by Olmito WSC to the RWPG during the 2021 regional water planning process and they confirmed they are still requesting to include it for the 2026 planning cycle.

Description

This strategy is for the expansion of Olmito WSC's WTP from 2 mgd to 3 mgd. The WTP is currently at an estimated 82% capacity with 2,830 connections. Before Olmito WSC reaches a TCEQ violation of 85% capacity (2,951 connections), Olmito WSC plans to expand their WTP.

Available Supply

The expansion of the WTP would provide Olmito WSC with an additional 1,120 acft/yr, which would require Conversion of Water Rights for this supply. Olmito WSC is currently in the planning phase of this project and so this strategy has an implementation decade of 2030.

Engineering and Costing

Costs for this strategy from the UCM include the WTP expansion. It is assumed that the expansion can fit on land currently owned by Olmito WSC, so no land acquisition costs are included. Costs for purchasing water rights is included separately under the Conversion of Surface Water Rights water management strategy. It is assumed that the construction period is one year. Table 5-53 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

As with any project, necessary state and federal permits must be obtained before construction can begin.

Table 5-53 Olmito WSC – WTP Expansion Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$7,523,000	$10,490,000	$1,490,000	$1,330	$671

5.2.6.5 Environmental Impacts of Recommended New or Expanded Surface Water Treatment Strategies

Potential environment impacts for water infrastructure systems strategies have been identified and categorized as described below. The letters identifying each section correspond to the headings in Table 5-54.

A. Acres Impacted Permanently

Acres impacted permanently refers to the total amount of area that will be permanently impacted because of the implementation of a strategy. The following conservative assumptions were made (unless more detailed information for a specific was available):

- The acreage impacted for pipelines is equivalent to the right-of-way (ROW) easements required; it is assumed 50 feet for ROW unless otherwise known.
- WTP impacts are estimated using UCM, which is based on the plant type and capacity.

B. Construction Impacted Acreage

Temporary environmental impacts may be seen during construction activities, such as increased air and noise pollution, and land disturbance activities. However, these effects are typical of any construction project. The construction impacted acreage was estimated as 110 percent (rounded up to a whole number) of the permanently impacted acreage.

C. Inundation Acreage

The inundation acreage applies to reservoirs only and is equal to the amount of land that will be inundated by the construction of the reservoir.

D. Agricultural Resources Impacted Acreage

Agricultural resources impact acreage is a consolidation of vegetation and land use types specific to Region – row crops, grass farms, and orchards - identified in the TPWD EMST. This GIS mapping data was overlain WMS locations to estimate the agricultural impact acreage from the implementation of the associated strategy.

E. Wetland Impact

The wetland impact refers to the probability that implementation of a WMS will affect a wetland. The location of wetlands in the region was determined using the National Wetlands Inventory (NWI) located at http://www.fws.gov/wetlands/Data/Mapper.html.

A strategy received a "1" if all or part of the strategy is located in a wetland or if it is close enough to where construction activities are likely to impact the wetland. All other strategies received zeros. If the exact location of project is unknown, it was given a zero because it was assumed that it would be located on a site that would not affect any wetland.

F. Habitat Impacted Acreage

Habitat impacted acreage refers to how the strategy will impact the habitat of the local area. The more area that is impacted because of the implementation of the strategy, the more the habitat of the area will be disrupted. Therefore, it was assumed that the permanent acreage impacted for a WMS is what would impact habitats.

G. Threatened and Endangered Species Count

Threatened and endangered species count refers to how the strategy will impact those species in the area once implemented. This impact was quantified based on the number of federally-listed threatened and endangered species located within the county of the strategy. The number of threatened and endangered species came from the Texas Parks and Wildlife Department (TPWD) Rare, Threatened, and Endangered Species of Texas database (http://tpwd.texas.gov/gis/rtest/).

H. Cultural Resources Impact

Cultural resources impact 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, including locations; buildings; and features with scientific, cultural, or historic value. It is assumed that no WMSs negatively affect cultural resources. Mitigation costs are included for strategies that require infrastructure, so it is assumed that none would be built in a location or way that disrupts culturally sensitive locations.

I. Reliability

Reliability is an assessment of the availability of the specified water quantity to the user over time. If the quantity of water is available to the user all the time, then the strategy has a high reliability. If the quantity of water is contingent on other factors, reliability will be lower. This strategy was developed in accordance with WAM and/or MAG values for the appropriate area. As such, WMSs associated with new/improved infrastructure or distribution system or facilities expansions are considered to be reliable supply (reliability score = 5) that will not compromise the DFCs as established by the MAG or the environmental flow standards as established by 30 TAC §298.

J. Bays, Estuaries, and Arms of the Gulf of Mexico

The environmental effects due to implementation of upstream WMS projects on bays, estuaries, and arms of the Gulf of Mexico are quantitatively assessed and reported. Water bodies designated as classified segments by the TCEQ that are within or downstream of Region M include the Brownsville Ship Channel, South Bay, Laguna Madre, and the Gulf of Mexico. Effects to these water bodies were quantified by estimating whether the project is anticipated to decrease freshwater inflow in these classified water bodies.

A WMS project received a "1" if it is expected to decrease freshwater inflow into a classified water body. If a strategy were to increase freshwater inflow or otherwise have little to no impact on inflows, then the project would receive a zero.

A summary of the identified and quantified environmental impacts for recommended new or expanded surface water treatment is presented in Table 5-54.

Table 5-54 Environmental Impacts of Recommended New or Expanded Surface Water Treatment Strategies

Entity	WMS Name	Yield*	A	B	C	D	E	F	G	H	I	J
Donna	WTP Expansion**	950	31	34	0	1	0	31	8	0	5	1
ERHWSC	Surface WTP Phase I	800	68	75	0	4	0	68	25	0	5	1
NAWSC	Delta WTP Expansion	4,480	2	3	0	0	0	2	8	0	5	1
Olmito WSC	WTP Expansion	1,120	1	2	0	0	0	1	25	0	5	1

*First decade of implementation yield (acft/yr).

** Donna – WTP Expansion includes New Raw Water Reservoir and Raw Water Pump Station

5.2.7 New or Expanded Distribution and Transmission Facilities Resulting in Increased Supplies

New or expanded distribution and transmission facilities increase supplies through reduction of losses and movement of water to areas of growth where it previously wasn't provided. Because these projects are particular to the municipal utility systems, these projects were evaluated individually on the basis of available information. Five recommended strategies were carried forward from the 2021 Plan and updated to reflect current conditions. The five recommended strategies include:

- East Rio Hondo WSC – FM 2925 Transmission Line.
- El Jardin WSC – Distribution Pipeline Replacement
- HCID No. 6 – Service Area Expansion
- McAllen – Raw Waterline Project with HCID No. 1.
- Rio Hondo – Emergency Interconnects.

Environmental impacts are described in Section 5.2.7.6.

5.2.7.1 East Rio Hondo WSC – FM 2925 Transmission Line

Project Source

This strategy was submitted by ERHWSC to the RWPG during the 2016 Regional Water Planning Process.

Description

This strategy is for the installation of a potable water line from the ERHWSC distribution system to Arroyo City. The existing Arroyo Water Supply Corporation (AWSC) WTP was decommissioned because of cryptosporidium BIN2 categorization. Construction of this waterline would provide treated water to Arroyo City, replacing the supply from the decommissioned WTP. This strategy was identified in the ERHWSC Master Plan to decommission the AWSC WTP and provide a potable water source to Arroyo City. The approximate location of the FM 2825 Transmission Main is shown on Figure 5-15.

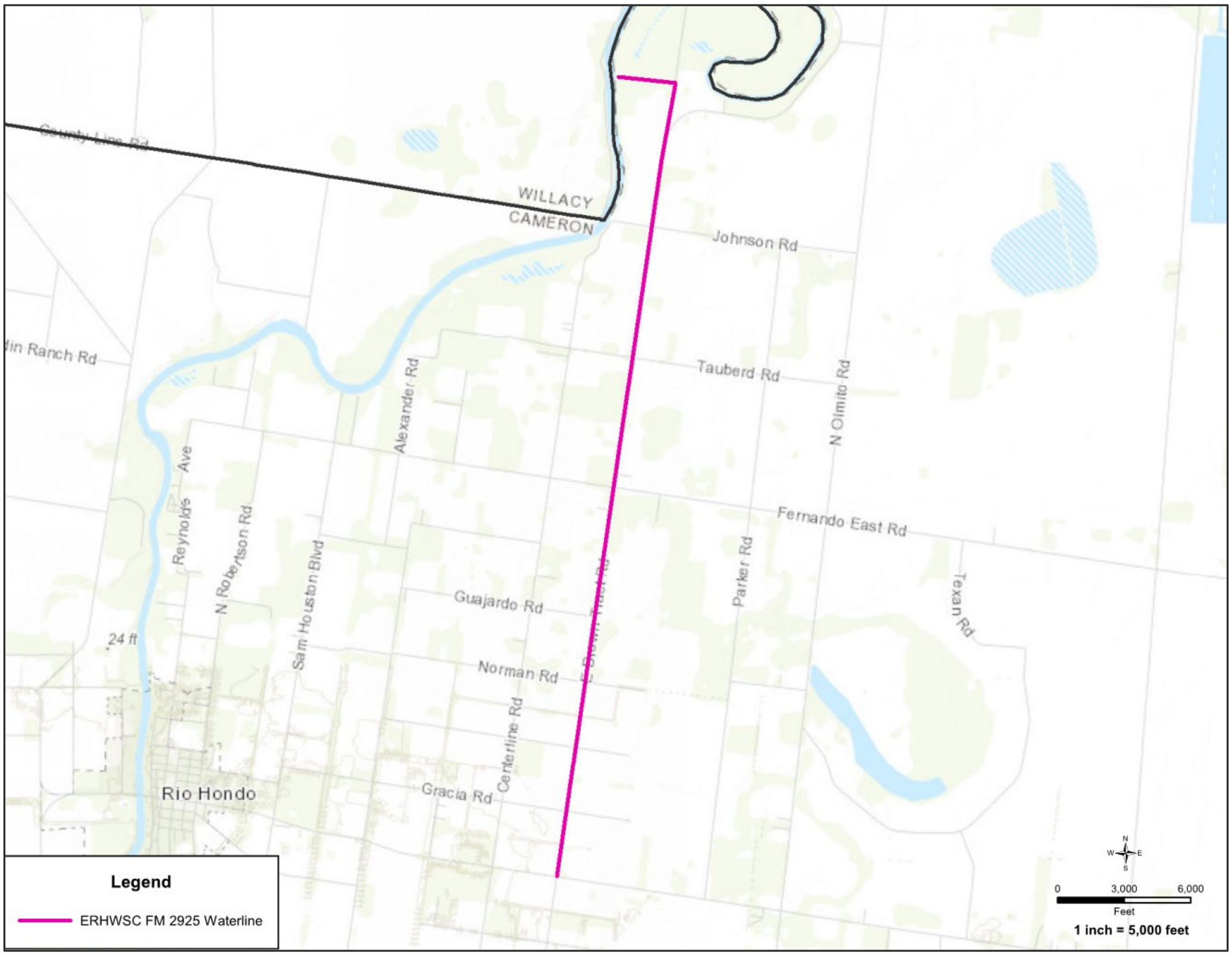

Figure 5-15 ERHWSC FM 2925 Transmission Line

Available Supply

This strategy will eliminate the losses associated with the current conveyance of supplies to Arroyo City. The drought year water savings is estimated at 30 acft/yr, with the project planned to be online by 2040.

Engineering and Costing

Costs for this strategy from the UCM include a pump station, pipeline, and land acquisition for pipeline ROW. It is assumed that the construction period for this strategy is one year. Table 5-55 the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

No major implementation issues are anticipated for this strategy. Utility crossing permits and easements would be required for several entities including Texas Department of Transportation (DOT), Cameron County, Cameron County Drainage District, and Cameron County ID.

Table 5-55 East Rio Hondo WSC – FM 2925 Transmission Line Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$14,023,000	$20,283,000	$1,589,000	$52,967	$5,400

5.2.7.2 El Jardin WSC – Distribution Pipeline Replacement

Project Source

This strategy was submitted by El Jardin WSC to the RWPG.

Description

This strategy is to replace approximately 313,910 linear feet of substandard water mains within the existing distribution system. The WSC's distribution system was constructed in the mid-1960s and many of the original pipes are still being used today. This strategy would replace many of the 2, 3, 4, and 6-inch pipes that are leaking and possibly broken with 8-inch polyvinyl chloride (PVC) pipe. Leak detection and repair measures are included under Advanced Municipal Conservation, Section 5.2.1.1, but because this includes an increase in pipe size, rather than just replacing the same size pipe, it is being included as a separate project.

Available Supply

El Jardin WSC estimates that at least 3.6 million gallons of treated water (11 acft/yr) could be saved each year with this strategy. It is assumed this strategy will be online by 2040.

Engineering and Costing

Costs for this strategy from the UCM only include the cost of pipeline. No land acquisition was assumed, but surveying and environmental studies for the pipeline routes were. Additionally, no O&M for the pipelines are assumed because there would not be additional costs beyond what there are now, with possibly less O&M required. It is assumed that the construction period for this strategy is 2 years. Table 5-56 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

No significant implementation issues are associated with this strategy. Permits would be required by Cameron County and TX DOT.

Table 5-56 El Jardin WSC – Distribution Pipeline Replacement Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$56,398,000	$80,692,000	$5,678,100	$516,191	$9

5.2.7.3 HCID No. 6 – Service Area Expansion

Project Source

This strategy was submitted by HCID NO. 6 to the RWPG.

Description

In addition to general ID improvements, HCID No. 6 has plans to expand its service area in order to continue delivering to Agua SUD's customers as development occurs in the area.

Available Supply

New supplies that will be delivered via this WMS Project are included in the Conversion of Water Rights WMS for Agua SUD (refer to Section 5.2.3). It is assumed that infrastructure along with the surface water rights purchase will be online by 2040 and can provide a minimum of 1,120 acft/yr to Agua SUD.

Engineering and Costing

Infrastructure included in the service area expansion are a 400 acft reservoir for storage, a raw water pump station, and expanding the existing HCID No. 6 conveyance system. Costs associated with this WMS Project were calculated by increasing costs provided by the ID to September 2023 $ and are summarized in Table 5-57. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

No major implementation issues are anticipated for this strategy. Utility crossing permits and easements would be required for several entities.

Table 5-57 HCID No. 6 – Service Area Expansion Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$17,572,000	$24,007,000	$1,725,000	$1,540	$211

5.2.7.4 McAllen – Raw Waterline Project with HCID No. 1

Project Source

This strategy was submitted by the McAllen to the RWPG.

Description

This strategy is for the construction of a raw water transmission line from HCID No. 1 to McAllen's North WTP. The raw water transmission line would provide the WTP with a second source of raw water from the irrigation canal, an important redundancy that does not currently exist. A map of the proposed pipeline alignment is shown on Figure 5-16.

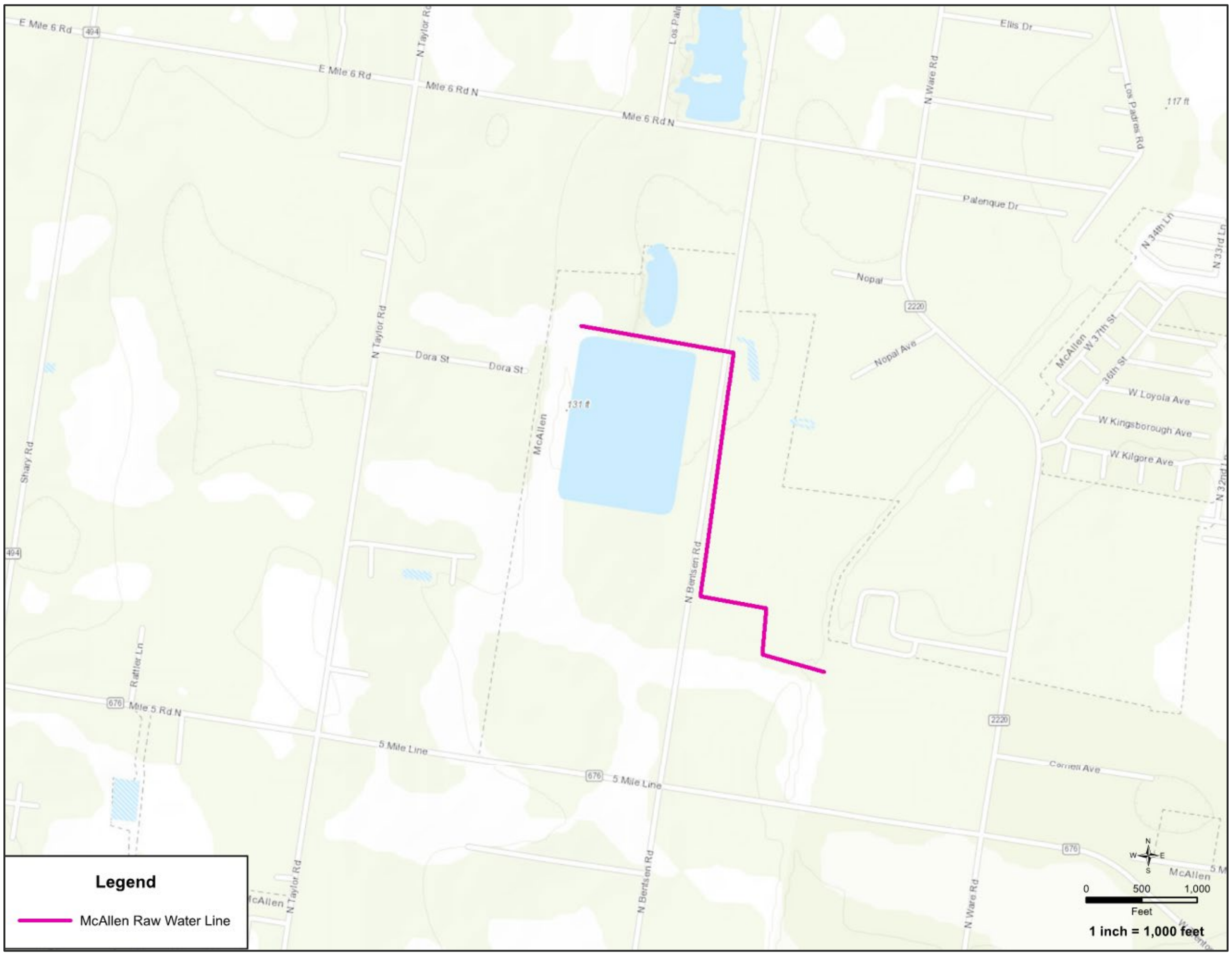

Figure 5-16 McAllen HCID No. 1 Raw Water Pipeline Project Location

Available Supply

Executed water rights and the raw water transmission line will provide McAllen with 800 acft/yr beginning in the 2030 decade.

Engineering and Costing

Costs for this strategy from the UCM include a pump station, pipeline, and land acquisition for pipeline ROW. Table 5-58 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

The project is completely within the service area limits of McAllen and no major issues are known at this time. Construction of the new pipeline may include any of the following permits: USACE Section 404 permit; TPWD sand, shell, gravel, and marl permit; TPDES Storm Water Pollution Prevention Plan; Texas DOT ROW permit. Additionally, easement acquisition may be required for the pipeline route.

Table 5-58 McAllen – Raw Waterline Project with HCID No. 1 Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$1,554,000	$2,258,000	$198,000	$248	$50

5.2.7.5 Rio Hondo – Emergency Interconnects

Project Source

This strategy was submitted by Rio Hondo to the RWPG during the 2016 Regional Water Planning process.

Description

This strategy is to construct a treated water delivery source to ERHWSC and a raw water pipeline to Harlingen ID to alleviate shortages in dry months caused by push water issues.

Available Supply

The emergency interconnect would have the capacity to provide 1 mgd (1,120 acft/yr) of treated water from ERHWSC, and 1 mgd (1,120 acft/yr) of raw water from Harlingen ID. However, Rio Hondo is only expected to use the emergency interconnect for a portion of each drought year and so supplies are based on 30 days of raw water and 30 days of treated water per year, or 20 acft/yr, per the demand projections for this planning cycle.

Engineering and Costing

Costs for this strategy from the UCM include a pump station, pipeline, land acquisition, and pipeline ROW for each emergency connect. It is assumed that the construction period for this strategy is 1 year. Table 5-59 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

No major implementation issues are anticipated for this strategy.

Table 5-59 Rio Hondo – Emergency Interconnects Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$5,231,000	$7,551,000	$635,600	$31,780	$5,280

5.2.7.6 Environmental Impacts of Recommended Distribution and Transmission Facilities Strategies

Potential environment impacts for water distribution systems strategies have been identified and categorized as described below. The letters identifying each section correspond to the headings in Table 5-60.

A. Acres Impacted Permanently

Acres impacted permanently refers to the total amount of area that will be permanently impacted because of the implementation of a strategy. The following conservative assumptions were made (unless more detailed information for a specific was available):

- The acreage impacted for pipelines is equivalent to the right-of-way (ROW) easements required; it is assumed 50 feet for ROW unless otherwise known.

B. Construction Impacted Acreage

Temporary environmental impacts may be seen during construction activities, such as increased air and noise pollution, and land disturbance activities. However, these effects are typical of any construction project. The construction impacted acreage was estimated as 110 percent (rounded up to a whole number) of the permanently impacted acreage.

C. Inundation Acreage

The inundation acreage applies to reservoirs only and is equal to the amount of land that will be inundated by the construction of the reservoir.

D. Agricultural Resources Impacted Acreage

Agricultural resources impact acreage is a consolidation of vegetation and land use types specific to Region – row crops, grass farms, and orchards - identified in the TPWD EMST. This GIS mapping data was overlain WMS locations to estimate the agricultural impact acreage from the implementation of the associated strategy.

E. Wetland Impact

The wetland impact refers to the probability that implementation of a WMS will affect a wetland. The location of wetlands in the region was determined using the National Wetlands Inventory (NWI) located at http://www.fws.gov/wetlands/Data/Mapper.html.

A strategy received a "1" if all or part of the strategy is located in a wetland or if it is close enough to where construction activities are likely to impact the wetland. All other strategies received zeros. If the exact location of project is unknown, it was given a zero because it was assumed that it would be located on a site that would not affect any wetland.

F. Habitat Impacted Acreage

Habitat impacted acreage refers to how the strategy will impact the habitat of the local area. The more area that is impacted because of the implementation of the strategy, the more the habitat of the area will be disrupted. Therefore, it was assumed that the permanent acreage impacted for a WMS is what would impact habitats.

G. Threatened and Endangered Species Count

Threatened and endangered species count refers to how the strategy will impact those species in the area once implemented. This impact was quantified based on the number of federally-listed threatened and endangered species located within the county of the strategy. The number of threatened and endangered species came from the Texas Parks and Wildlife Department (TPWD) Rare, Threatened, and Endangered Species of Texas database (http://tpwd.texas.gov/gis/rtest/).

H. Cultural Resources Impact

Cultural resources impact 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, including locations; buildings; and features with scientific, cultural, or historic value. It is assumed that no WMSs negatively affect cultural resources. Mitigation costs are included for strategies that require infrastructure, so it is assumed that none would be built in a location or way that disrupts culturally sensitive locations.

I. Reliability

Reliability is an assessment of the availability of the specified water quantity to the user over time. If the quantity of water is available to the user all the time, then the strategy has a high reliability. If the quantity of water is contingent on other factors, reliability will be lower. This strategy was developed in accordance with WAM and/or MAG values for the appropriate area. As such, WMSs associated with new/improved infrastructure or distribution system or facilities expansions are considered to be reliable supply (reliability score = 5) that will not compromise the DFCs as established by the MAG or the environmental flow standards as established by 30 TAC §298.

J. Bays, Estuaries, and Arms of the Gulf of Mexico

The environmental effects due to implementation of upstream WMS projects on bays, estuaries, and arms of the Gulf of Mexico are quantitatively assessed and reported. Water bodies designated as classified segments by the TCEQ that are within or downstream of Region M include the Brownsville Ship Channel, South Bay, Laguna Madre, and the Gulf of Mexico. Effects to these water bodies were quantified by estimating whether the project is anticipated to decrease freshwater inflow in these classified water bodies.

A WMS project received a "1" if it is expected to decrease freshwater inflow into a classified water body. If a strategy were to increase freshwater inflow or otherwise have little to no impact on inflows, then the project would receive a zero.

A summary of the identified and quantified environmental impacts for recommended distribution and transmission projects is presented in Table 5-60.

Table 5-60 Environmental Impacts of Recommended Distribution and Transmission Strategies

Entity	WMS Name	Yield*	A	B	C	D	E	F	G	H	I	J
ERHWSC	FM 2925 Water Transmission Line	30	142	156	0	32	0	142	25	0	5	0
El Jardin WSC	Distribution Pipeline Replacement	11	790	869	0	0	0	790	25	0	5	0

Entity	WMS Name	Yield*	A	B	C	D	E	F	G	H	I	J
HCID No. 6	Service Area Expansion	1,120	Unk**	Unk**	Unk**	Unk**	0	Unk**	8	0	5	0
McAllen	Raw Water Line Project	800	15	17	0	2	0	15	8	0	5	0
Rio Hondo	Emergency Interconnects	70	40	44	0	0	0	40	25	0	5	0

*First decade of implementation yield (acft/yr).
**These impacts are unknown due to the fact that costs were provided without infrastructure lengths or footprints provided.

5.2.8 Storage Reservoirs

Storage reservoirs include both on-channel and off-channel new storage in the region. In some cases, other strategy categories contain projects that also include small storage ponds/reservoirs that are included within the larger project. They are not included in this section.

There are four off-channel reservoirs that are included as recommended strategies in the 2026 Plan. One of them, the Banco Morales Reservoir, is included in this section.

The other three (Delta "Panchita" Reservoir, Santa Cruz Reservoir, and Engleman Reservoir) are included with water treatment plants and fall under a regional type of strategy called the Delta Region Water Management Supply. The description for those three are in Section 5.2.12 Regional Water Supply Facilities.

There is also one alternative storage reservoir strategy that is described in Section 5.3.3.

Details for the hydrologic models used for evaluating storage reservoir water management strategies are listed in Table 5-61

Table 5-61 Details for Hydrologic Models Used for Evaluating Storage Reservoir Strategies

Model Name	Version Date	Input/Output Files Used	Date Model Used	Comments
TCEQ Rio Grande Run 3	10/1/2023	RG3.dat, RG3.dis, RG3.flo, RG3.his, RG3.fad, RG3.eva	Late 2024	Brownsville Weir set to Firm Yield (all other at authorized demand) and Banco Morales OCR Added as Described in Strategy Description
		RG3.out then numerous Tables *.tou		
		July 2022 version of the SIM and TABLES executables.		
		1-RG3-BMFY-2030 2-RG3-BMFY-2040 3-RG3-BMFY-2050 4-RG3-BMFY-2060 5-RG3-BMFY-2070 6-RG3-BMFY-2080		

Model Name	Version Date	Input/Output Files Used	Date Model Used	Comments
TCEQ Nueces-Rio Grande Coastal WAM Run 3	10/1/2023	NRG3.dat, NRG3.dis, NRG3.flo, NRG3.his, NRG3.fad, NRG3.eva NRG3.out then numerous Tables *.tou July 2022 version of the SIM and TABLES executables. 7-NRG3-DL-UD	Late 2024	Delta Reservoir Project set to Yield with all associated Delta Reservoir water right authorizations operated with relative priority Upstream to Downstream. All other at authorized demand.
TCEQ Nueces-Rio Grande Coastal WAM Run 3	10/1/2023	NRG3.dat, NRG3.dis, NRG3.flo, NRG3.his, NRG3.fad, NRG3.eva NRG3.out then numerous Tables *.tou July 2022 version of the SIM and TABLES executables. 8-NRG3-DL-DU	Late 2024	Delta Reservoir Project set to Yield with all associated Delta Reservoir water right authorizations operated with relative priority Downstream to Upstream. All other at authorized demand.

5.2.8.1 Brownsville PUB – Banco Morales Reservoir

Project Source

This strategy was submitted by Brownsville to the RWPG during the 2016 Regional Water Planning process and has been updated in each planning cycle since.

Description

This strategy is for the construction of an off-channel raw water reservoir to capture excess water from the lower Rio Grande that currently flows into the Gulf of Mexico. Water is currently released from the Falcon Dam with no opportunity to capture water at a downstream location in the event of rain or changed conditions. The reservoir would be located between the existing International Boundary and Water Commission (IBWC) levee system and the City of Brownsville's levee along the Rio Grande, adjacent to BPUB's WTP No. 1.

Available Supply

In addition to other water rights, BPUB currently has authorization to divert up to 40,000 acft/yr of excess flows from the Rio Grande under TCEQ Permit No. 1838. Excess flows are defined as all U.S. waters passing the Brownsville stream flow gauging station above a base flow rate of 25 cfs. This proposed strategy would add an additional 400 million gallons (1,227 acft) of storage capacity for the excess flows, resulting in a total storage capacity of 616 million gallons. The Rio Grande Water Availability Model (WAM) includes an evaluation of the drought year reliability for the Permit No. 1838. For the 2026 planning cycle, the Rio Grande WAM has been updated with naturalized flows through

2018 and a new drought-of-record period, as well as the correction of an error related to Permit No. 1838 that was in previous versions of the WAM. As a result, the estimated firm yield of 140 acft/yr is much lower than in previous plans, although more water would be available in non-drought years. Planned implementation is before 2040.

Engineering and Costing

The UCM was used to determine estimate costs for construction and maintenance of the reservoir. It is assumed that the construction period for this strategy is 1 year. The proposed site of the Banco Morales Reservoir is adjacent to the two existing reservoirs and the existing river pump station; therefore, piping system can be used to fill the new reservoir. The Banco will require pumping facilities to pump out of the reservoir and a transmission line to the Water Plant 1 intake and reservoir pump station intake. Both intakes are adjacent to the existing reservoir. This cost estimate is representative of 60 acres for the Reservoir foot-print and conservation pool, as well as a pump station and transmission line. Table 5-62 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

BPUB will need complete the environmental compliance requirements and obtain a federal 404 permit authorization. BPUB would operate this project in conjunction with their existing flows diversion Permit No. 1838, which authorizes diversions of excess flows from the Rio Grande of 40,000 acft/yr.

Banco Morales Reservoir has several environmental issues that have been raised as concerns. Most notable include impacts on water quality (i.e., increased salinity) within the reservoir caused by evaporative losses, increased risk of flooding, and potential impacts to habitat from reservoir construction and inundation. However, many of the environmental issues that have been raised regarding the Banco Morales Reservoir may be addressed through the Section 404/10 Federal permitting process and preparation of an Emergency Action Plan (EAP) through the TCEQ.

Table 5-62 Brownsville PUB – Banco Morales Reservoir Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$9,906,000	$14,638,000	$899,000	$6,421	$1,200

5.2.8.2 Environmental Impacts of Recommended Storage Reservoir Strategies

Potential environment impacts for reservoir storage systems strategies have been identified and categorized as described below. The letters identifying each section correspond to the headings in Table 5-63.

A. Acres Impacted Permanently

Acres impacted permanently refers to the total amount of area that will be permanently impacted because of the implementation of a strategy. The following conservative assumptions were made (unless more detailed information for a specific was available):

- The acreage impacted for pipelines is equivalent to the right-of-way (ROW) easements required; it is assumed 50 feet for ROW unless otherwise known.

- WTP impacts are estimated using UCM, which is based on the plant type and capacity.

B. Construction Impacted Acreage

Temporary environmental impacts may be seen during construction activities, such as increased air and noise pollution, and land disturbance activities. However, these effects are typical of any construction project. The construction impacted acreage was estimated as 110 percent (rounded up to a whole number) of the permanently impacted acreage.

C. Inundation Acreage

The inundation acreage applies to reservoirs only and is equal to the amount of land that will be inundated by the construction of the reservoir.

D. Agricultural Resources Impacted Acreage

Agricultural resources impact acreage is a consolidation of vegetation and land use types specific to Region – row crops, grass farms, and orchards - identified in the TPWD EMST. This GIS mapping data was overlain WMS locations to estimate the agricultural impact acreage from the implementation of the associated strategy.

E. Wetland Impact

The wetland impact refers to the probability that implementation of a WMS will affect a wetland. The location of wetlands in the region was determined using the National Wetlands Inventory (NWI) located at http://www.fws.gov/wetlands/Data/Mapper.html.

A strategy received a "1" if all or part of the strategy is located in a wetland or if it is close enough to where construction activities are likely to impact the wetland. All other strategies received zeros. If the exact location of project is unknown, it was given a zero because it was assumed that it would be located on a site that would not affect any wetland.

F. Habitat Impacted Acreage

Habitat impacted acreage refers to how the strategy will impact the habitat of the local area. The more area that is impacted because of the implementation of the strategy, the more the habitat of the area will be disrupted. Therefore, it was assumed that the permanent acreage impacted for a WMS is what would impact habitats.

G. Threatened and Endangered Species Count

Threatened and endangered species count refers to how the strategy will impact those species in the area once implemented. This impact was quantified based on the number of federally-listed threatened and endangered species located within the county of the strategy. The number of threatened and endangered species came from the Texas Parks and Wildlife Department (TPWD) Rare, Threatened, and Endangered Species of Texas database (http://tpwd.texas.gov/gis/rtest/).

H. Cultural Resources Impact

Cultural resources impact 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, including locations; buildings; and features with scientific, cultural, or historic value. It is assumed that no WMSs negatively affect cultural resources. Mitigation costs are included for strategies that require infrastructure, so it is assumed that none would be built in a location or way that disrupts culturally sensitive locations.

I. Reliability

Reliability is an assessment of the availability of the specified water quantity to the user over time. If the quantity of water is available to the user all the time, then the strategy has a high reliability. If the quantity of water is contingent on other factors, reliability will be lower. This strategy was developed in accordance with WAM and/or MAG values for the appropriate area. As such, WMSs associated with new/improved infrastructure or distribution system or facilities expansions are considered to be reliable supply (reliability score = 5) that will not compromise the DFCs as established by the MAG or the environmental flow standards as established by 30 TAC §298. The reliability of on/off-channel reservoirs is also projected to be high (reliability score = 5).

J. Bays, Estuaries, and Arms of the Gulf of Mexico

The environmental effects due to implementation of upstream WMS projects on bays, estuaries, and arms of the Gulf of Mexico are quantitatively assessed and reported. Water bodies designated as classified segments by the TCEQ that are within or downstream of Region M include the Brownsville Ship Channel, South Bay, Laguna Madre, and the Gulf of Mexico. Effects to these water bodies were quantified by estimating whether the project is anticipated to decrease freshwater inflow in these classified water bodies.

A WMS project received a "1" if it is expected to decrease freshwater inflow into a classified water body. If a strategy were to increase freshwater inflow or otherwise have little to no impact on inflows, then the project would receive a zero.

A summary of the identified and quantified environmental impacts for recommended and alternative municipal infrastructure is presented in Table 5-63.

Table 5-63 Environmental Impacts of Recommended Storage Reservoir Strategies

Entity	WMS Name	Yield*	A	B	C	D	E	F	G	H	I	J
Storage												
Recommended												
Brownsville PUB	Banco Morales Reservoir	140	60	66	60	0	0	60	25	0	5	1
*First decade of implementation yield (acft/yr).												

5.2.9 New or Expanded Fresh Groundwater Supply

While there is not abundant fresh groundwater available in Region M, there are numerous entities and individuals that rely on minimally treated groundwater to meet their needs. For example, this includes cities that are farther from the Rio Grande and with surface water distribution networks that have few alternative sources and have identified portions of the aquifer(s) that produce acceptable water for municipal use without advanced treatment technology.

In some cases, where there appears to be additional available fresh groundwater, further development of that source is recommended, within the MAG values for the applicable aquifer. In many instances this is the recommendation for County-Other entities, where domestic wells are distributed over a large area and pump small amounts for a single household, although there are planned communities within Webb County that will fall under County-Other as well.

For the 2026 planning cycle, nine recommended fresh groundwater strategies were carried over from the 2021 cycle, with updates made as needed. Three others were carried over as alternative strategies and are described in Section 5.3.4. The recommended fresh groundwater strategies include:

- Alamo – Fresh Groundwater Well.
- County-Other, Cameron – Expanded Fresh Groundwater Supply.
- County-Other, Starr – Additional Fresh Groundwater Wells.
- County-Other, Webb – Additional Fresh Groundwater Wells.
- Edcouch – New Fresh Groundwater Supply
- Hidalgo – Expand Existing Fresh Groundwater Wells
- Rio Hondo – New Fresh Groundwater Supply
- Webb County Water Utility – Expanded Fresh Groundwater Supply
- Weslaco – Groundwater Development and Blending

Environmental impacts are described in Section 5.2.9.10.

5.2.9.1 Alamo – Fresh Groundwater Well

Project Source

This strategy was submitted by Alamo to the RWPG.

Description

This strategy is to provide additional groundwater to Alamo with the installation of a groundwater well. The city operates a 5 mgd conventional WTP supplied by an existing well. The new well will be located approximately 1,000 feet from the existing well. It is assumed that the salinity of the new well will be similar to the existing well, so desalination treatment will not be needed.

Available Supply

It is estimated that the new groundwater well could provide an additional 1 mgd (1,120 acft/yr) to the WTP of the city. This supply would come from the Gulf Coast Aquifer System in Hidalgo County. There is sufficient supply within the MAG to support this project.

Engineering and Costing

Costs for this strategy from the UCM include groundwater well pumping, well field piping, land acquisition, and operations and maintenance. It is assumed that the construction period for this strategy is 1 year. Table 5-64 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

No implementation issues have been identified. There is no Groundwater Conservation District within the Alamo water service area.

Table 5-64 Alamo – Fresh Groundwater Well Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$1,714,000	$2,411,000	$210,000	$188	$36

5.2.9.2 County-Other, Cameron – Expanded Fresh Groundwater Supply

Project Source

This strategy was recommended in the 2016 RWP and has been updated by the RWPG.

Description

This strategy is to provide additional supply to County-Other, Cameron with the installation of fresh groundwater wells.

Available Yield

This strategy allows for the development of 2,500 acft/yr of groundwater from the Gulf Coast Aquifer System in Cameron County, beginning in 2030. This supply is within the stated groundwater availability for Cameron County.

Engineering and Costing

The UCM was utilized to develop estimated costs for this strategy in September 2023 dollars based on assumptions about the individual wells. The wells were costed with a capacity of 350 gpm. Well piping and land acquisition were also included in the cost estimate, although in some cases those may not be needed if the well is for a private homeowner. Disinfection treatment was also included. Table 5-65 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

No major implementation issues are expected for this strategy. Construction of the new groundwater wells and piping may also include a TCEQ well drilling permit, purchase of land, and a TXDOT right-of-way permit. There is no Groundwater Conservation District in Cameron County.

Table 5-65 County-Other, Cameron – Expanded Fresh Groundwater Supply Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$7,918,000	$11,549,000	$1,080,000	$432	$107

5.2.9.3 County-Other, Starr – Additional Fresh Groundwater Wells

Project Source

This strategy was identified by the RWPG and continues to be included for the 2026 Plan.

Description

This strategy is to provide additional supply to County-Other, Starr with fresh groundwater wells.

Available Yield

The available supply is 400 acft/yr beginning in 2030. This supply is available from the Gulf Coast Aquifer System in Starr County.

Engineering and Costing

The UCM was utilized to develop estimated costs for this strategy based on assumptions about the individual wells. Five wells were costed with a capacity of 50 gpm, including well construction, studies, land acquisition, and O&M, assuming limited well field piping. Disinfection treatment cost was included. Table 5-66 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

No major implementation issues are expected for this strategy. Construction of the new groundwater wells and piping may require a TCEQ well drilling permit, as well as coordination with and approval from the Starr Groundwater Conservation District.

Table 5-66 County-Other, Starr – Additional Fresh Groundwater Wells Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$1,216,000	$1,718,000	$182,000	$455	$153

5.2.9.4 County-Other, Webb – Additional Fresh Groundwater Wells

Project Source

This strategy was identified by the RWPG and updated to incorporate new developments for the 2026 Plan.

Description

This strategy is to provide additional supply to County-Other, Webb with the installation of fresh groundwater wells.

Available Yield

Based on preliminary needs estimates for County-Other, Webb, and information about two new development projects north of Laredo, a total of 1,120 acft/yr has been identified for supply beginning in 2030. It is assumed that 560 acft/yr will come from the Carrizo-Wilcox Aquifer in Webb County and the other 560 acft/yr will come from the Yegua-Jackson Aquifer in Webb County.

Engineering and Costing

UCM was used to estimate costs on the basis of the project requirements shown below. Eight wells were costed with a capacity of 200 gpm, including well construction, field piping, disinfection treatment, a ground storage tank, studies, land acquisition, and O&M. Table 5-67 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

No major implementation issues are expected for this strategy. Construction of new groundwater wells may also include a TCEQ well drilling permit, and wells for domestic use are encouraged to perform water quality testing. There is no groundwater conservation district in Webb County.

Table 5-67 County-Other, Webb – Additional Fresh Groundwater Wells Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$12,617,000	$18,353,000	$1,504,000	$1,343	$190

5.2.9.5 Edcouch – New Fresh Groundwater Supply

Project Source

This strategy was submitted by Edcouch to the RWPG in the 2016 planning cycle.

Description

This strategy is for the construction of a groundwater well and raw water transmission line to deliver water to the existing 1.5 mgd WTP. Edcouch currently receives raw water from the Rio Grande through the canal system operated by HCID No. 9. This strategy would ensure a reliable secondary source of raw water for Edcouch in case of limited supplies through the ID.

Edcouch anticipates drilling a pilot well and conducting a water quality study to ensure that the present water treatment processes at the existing WTP can treat the new water supply. After testing, Edcouch will identify if additional treatment would be needed at the WTP.

Available Supply

The project includes two 350 gpm wells, which are assumed to operate approximately 50 percent of the time. The wells would be located in the Gulf Coast Aquifer System in Hidalgo County. These wells would supply 500 acft of groundwater per year to supplement the existing raw surface water supply beginning in 2030.

Engineering and Costing

Costs for this strategy from the UCM include a well pump, well field piping, a 4-mile transmission line, disinfection treatment, and land acquisition. It is assumed that the construction period for this strategy is 2 years. Table 5-68 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

No major implementation issues are associated with this strategy. Edcouch would need to receive permits from the TCEQ. The Edcouch service area is not within a groundwater conservation district.

Table 5-68 Edcouch – New Fresh Groundwater Supply Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$6,395,000	$9,529,000	$801,000	$1,602	$262

5.2.9.6 Hidalgo – Expand Existing Fresh Groundwater Wells

Project Source

This strategy was recommended in the 2016 RWP and updated by the RWPG.

Description

This strategy is to provide additional supply to Hidalgo with the installation of additional fresh groundwater wells.

Available Supply

The proposed groundwater wells would provide 300 acft/yr in 2040 from the Gulf Coast Aquifer System in Hidalgo County.

Engineering and Costing

Costs for this strategy from the UCM include groundwater well pumping, well field piping, land acquisition, and water disinfection. It is assumed that the construction period for this strategy is 1 year. Table 5-69 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

No major implementation issues are expected for this strategy. Varying groundwater quality in the Gulf Coast Aquifer is a concern, but freshwater wells are productive in the area near Hidalgo. All recommended groundwater pumping is guided by the MAG values. Construction of the new groundwater well and piping may also include a TCEQ well drilling permit, purchase of land, and a Texas DOT ROW permit. There is no groundwater conservation district within the Hidalgo service area.

Table 5-69 Hidalgo – Expand Existing Fresh Groundwater Wells Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$2,612,000	$3,811,000	$325,000	$1,083	$190

5.2.9.7 Rio Hondo – New Fresh Groundwater Supply

Project Source

This strategy was submitted by Rio Hondo to the RWPG.

Description

This strategy is for the construction of two alternating 750 gpm wells for redundancy and O&M purposes. The well siting will be on Rio Hondo-owned property based on the area hydrogeology, acquisition feasibility, construction feasibility, regulatory compliance, hydraulic considerations, environmental factors, and cost. A water transmission line will be routed from the new wells to the existing raw water reservoirs.

Available Supply

This project was sized to access 1 mgd (1,120 acft/yr) of fresh groundwater from the Gulf Coast Aquifer System in Cameron County. The Gulf Coast Aquifer in Cameron County is showing some MAG-limited issues this planning cycle, due to high demand for new groundwater projects resulting from surface water availability issues. As a result, while the project is expected to come online by 2030, the full yield will not be available until 2060. Table 5-70 outlines the available project yield for each decade.

Table 5-70 Rio Hondo – Project Yield Available (acft/yr) Under the MAG, by Decade

2030	2040	2050	2060	2070	2080
1,040	988	1,106	1,120	1,120	1,120

Engineering and Costing

Costs for this strategy from the UCM include two groundwater wells, well field piping, a 1-mile transmission line and pump station, and land acquisition (for the transmission line only). It is assumed that the construction period for this strategy is 1 year. Table 5-71 outlines the project costs developed in the UCM. The last column in the table shows the annual unit cost of the water, based on the MAG-limited available yield for 2030. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

The yield of the project will need to stay within the MAG, particularly during the first few decades of implementation. There is no GCD within the service area of Rio Hondo.

Table 5-71 Rio Hondo – New Fresh Groundwater Supply Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water – Ultimate ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)	Annual Cost of Water – First Decade Online ($ per acft)
$6,177,000	$8,738,000	$729,000	$651	$103	$701

5.2.9.8 Webb County Water Utility – Expanded Fresh Groundwater Supply

Project Source

This strategy was submitted by Webb County Water Utility during the 2021 regional water planning process.

Description

This strategy is to provide additional supply to Webb County Water Utility with the rehabilitation of the utility's WTP and groundwater system.

Available Yield

Due to MAG limitations, this strategy would provide up to 180 acft/yr from the Carrizo-Wilcox Aquifer in Webb County starting in the 2030 decade.

Engineering and Costing

Costs for this strategy from the UCM include groundwater well pumping, well field piping, land acquisition, and water disinfection. It is assumed the construction / rehabilitation period for this strategy is one year.

UCM was used to estimate costs on the basis of the project requirements shown below. Two wells were costed with a capacity of 200 gpm, including well construction, well field piping, disinfection treatment, studies, land acquisition, and O&M. Table 5-72 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

No major implementation issues are expected for this strategy. Construction of new groundwater wells may also include a TCEQ well drilling permit, and wells for domestic use are encouraged to perform water quality testing. There is no groundwater conservation district in Webb County.

Table 5-72 Webb County Water Utility – Expanded Fresh Groundwater Supply Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$2,467,000	$3,549,000	$299,000	$1,661	$272

5.2.9.9 Weslaco – Groundwater Development and Blending

Project Source

This strategy was submitted by Weslaco to the RWPG.

Description

This strategy is for the construction of a groundwater well to supplement the drinking water supply of Weslaco. They plan to blend the groundwater with treated drinking water. Weslaco is currently supplied with raw water from Hidalgo and Cameron Counties ID No. 9. This strategy would provide them with an alternate source of water, especially during times of drought. Possible well site locations still need to be evaluated and it is anticipated that a pilot well and water quality study will be required.

Available Supply

It is anticipated that 0.5 mgd (560 acft/yr) would be produced from the well in the Gulf Coast Aquifer System in Hidalgo County, beginning in 2030.

Engineering and Costing

Costs for this strategy from the UCM include a 400 gpm well and pump, well field piping, and land acquisition. It is assumed that the construction period for this strategy is 1 year. Table 5-73 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

As with any project, necessary state and federal permits must be obtained before construction can begin. There is no groundwater conservation district within the Weslaco service area.

Table 5-73 Weslaco – Groundwater Development and Blending Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$1,343,000	$1,943,000	$157,000	$280	$36

5.2.9.10 Environmental Impacts of Recommended Fresh Groundwater Strategies

Potential environment impacts for fresh groundwater strategies have been identified and categorized as described below. The letters identifying each section correspond to the headings in Table 5-74.

A. Acres Impacted Permanently

Acres impacted permanently refer to the total amount of area that will be permanently impacted because of the implementation of a strategy. The following conservative assumptions were made (unless more detailed information for a specific was available):

- The acres impacted for pipelines is equivalent to the ROW easements required; it is assumed 100-feet for ROW unless otherwise known.
- WTP impacts are estimated using UCM, which is based on the plant capacity.
- The impact of wells and wellfields are given by the UCM, which includes 0.5 acre per well.

B. Construction Impacted Acreage

Temporary environmental impacts may be seen during construction activities, such as increased air and noise pollution, and land disturbance activities. However, these effects are typical of any construction project. The construction impacted acreage was estimated as 110 percent (rounded up to a whole number) of the permanently impacted acreage.

C. Agricultural Resources Impacted Acreage

Agricultural resources impact acreage is a consolidation of vegetation and land use types specific to Region – row crops, grass farms, and orchards - identified in the TPWD EMST. This GIS mapping data was overlain WMS locations to estimate the agricultural impact acreage from the implementation of the associated strategy.

D. Wetland Impact

The wetland impact refers to the probability that implementation of a WMS will affect a wetland. The location of wetlands in the Region was determined using the NWI located at http://www.fws.gov/wetlands/Data/Mapper.html.

A strategy received a "1" if all or part of the strategy is located in a wetland or if it is close enough to where construction activities are likely to impact the wetland. All other strategies received zeros. If the exact location of project is unknown it was given a zero because it was assumed that it would be located on a site that would not affect and wetland.

E. Habitat Impacted Acreage

Habitat impacted acreage refers to how the strategy will impact the habitat of the local area. The more area that is impacted because of the implementation of the strategy, the more the habitat of the area will be disrupted. Therefore, it was assumed that the permanent acreage impacted for a WMS is what would impact habitats.

F. Threatened and Endangered Species Count

Threatened and endangered species count refers to how the strategy will impact those species in the area once implemented. This impact was quantified based on the number of federally-listed threatened and endangered species located within the county of the strategy. The number of threatened and endangered species came from the TPWD Rare, Threatened, and Endangered Species of Texas database (http://tpwd.texas.gov/gis/rtest/).

G. Cultural Resources Impact

Cultural resources impact 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, including locations, buildings, and features with scientific, cultural, or historic value. It is assumed that no WMSs negatively affect cultural resources. Mitigation costs are included for strategies that require infrastructure so it is assumed that none would be built in a location or way that disrupts culturally sensitive locations.

H. Reliability

Reliability is an assessment of the availability of the specified water quantity to the user over time. If the quantity of water is available to the user all the time, then the strategy has a high reliability. If the quantity of water is contingent on other factors, reliability will be lower. These strategies were developed in accordance with MAG values for the appropriate aquifer and county. As such, most are considered to be reliable supply (reliability score = 5) that will not compromise the DFCs as established by the relevant GCD (where applicable) and groundwater management area (GMA). Some of the strategies may score slightly lower in reliability due to availability of hydrogeologic information from existing nearby wells, potential of differing well productivity and water quality, potential impacts to natural resources and aquifer competition or restrictions.

I. Bays, Estuaries, and Arms of the Gulf of Mexico

The environmental effects due to implementation of upstream WMS projects on bays, estuaries, and arms of the Gulf of Mexico are quantitatively assessed and reported. Water bodies designated as classified segments by the TCEQ that are within or downstream of Region M include the Brownsville Ship Channel, South Bay, Laguna Madre, and Gulf of Mexico. Effects to these water bodies were quantified by estimating whether the project is anticipated to decrease freshwater inflow in these classified water bodies.

A WMS project received a "1" if it is expected to decrease freshwater inflow into a classified water body. If a strategy were to increase freshwater inflow or otherwise have little to no impact on inflows, then the project would receive a zero.

A summary of the identified and quantified environmental impacts for recommended and alternative fresh groundwater projects is presented in Table 5-74.

Table 5-74 Environmental Impacts of Recommended Fresh Groundwater Strategies

Entity	WMS Name	Yield*	A	B	C	D	E	F	G	H	I
Alamo	Groundwater Well	1,120	5	6	0	0	5	8	0	5	0
County-Other, Cameron	Expand Groundwater Supply	2,500	32	35	0	0	32	25	0	5	0
County-Other, Starr	Additional Groundwater Wells	400	8	9	0	0	8	8	0	5	0
County-Other, Webb	Additional Groundwater Wells	1,120	75	82	0	0	75	4	0	5	0
Edcouch	New Groundwater Supply	500	61	67	0	0	61	8	0	4	0
Hidalgo	Expand Existing Groundwater Wells	300	5	6	1	0	5	8	0	4	0
Rio Hondo	New Groundwater Supply	1,120	1	1	0	0	1	25	0	3	0
Webb County Water Utility	Expanded Groundwater Supply	180	10	11	0	0	10	4	0	4	0
Weslaco	Groundwater Blending	560	5	6	0	0	5	8	0	4	0
*First decade of implementation yield (acft/yr)											

5.2.10 New or Expanded Brackish Groundwater Desalination

Desalination is the process of removing dissolved solids and other minerals from brackish and saline groundwater, and seawater. TWDB classifies brackish groundwater as groundwater with a total dissolved solids (TDS) content between 1,000 and 10,000 parts per million (ppm), while saline groundwater exceeds 10,000 ppm of TDS (TWDB, 2019). The most common method of treatment is membrane technology, but there are other technologies, including thermal processes such as multistage flash distillation, multiple-effect distillation, and vapor compression. Thermal processes are energy intense and are more common in the Middle East where fuels are more abundant.

The prevalent membrane technology is RO, which forces saline water through semi-permeable membranes to separate into fresh water and highly concentrated briny byproduct. For high TDS, RO is more energy intensive and has a lower yield of permeate, or fresh water. A typical pressure for seawater with 35,000 mg/L could be in excess of 1,000 pounds per square inch (psi). This is in contrast to less than 200 psi for 3,000 mg/L TDS groundwater. The higher TDS treatment plants yield less than 50 percent of the water supplied. The remaining 50 percent is highly saline residual, which generally requires disposal and can add significant costs to a project. Conversely, lower salinity brackish water facilities are able to produce an 80 percent to 20 percent, fresh water to residual concentrate. Surface water intakes will require additional pretreatment of suspended solids prior to the RO treatment. The TWDB recommends the following for all desalination projects:

- Feasibility studies;
- Consideration of regional-scale projects;
- Assessment of combined uses of seawater and brackish groundwater sources as a means of enhancing the cost-competitiveness of a desalination project;
- Identification and assessment of regional partnerships, including local entities experienced in desalination research;
- Identification and assessment of water transfers resulting from net new water created by a desalination project that could enhance the benefits of the project to other large water users/municipalities;
- Consider approaches to structuring such transfers and draft agreements that would be required to secure their implementation;
- Identification and assessment of likely power sources and potential for co-located facility; and
- Assessment of project funding and development alternatives.

For the 2026 planning cycle, thirteen recommended brackish groundwater desalination strategies were carried over from the 2021 cycle, with updates made as needed, and seven new strategies were evaluated. All twenty strategies are identified as recommended for this planning cycle, although some have MAG-limited yields in earlier decades. The recommended brackish groundwater desalination strategies include:

- Agua SUD – Brackish Groundwater Desalination Phase I and II.
- Alamo – Brackish Groundwater Desalination.
- Eagle Pass – Brackish Groundwater Desalination.
- East Rio Hondo WSC – North Cameron Regional WTP Wellfield Expansion.
- East Rio Hondo WSC – Brackish Desalination Wellfield and RO at NRWTP and MASWTP.
- East Rio Hondo WSC – Expansion of MASWTP.
- La Feria – Water Well with RO Unit.
- Lyford – Brackish Groundwater Desalination.

- McAllen – Brackish Groundwater Desalination.
- Mission – Brackish Groundwater Desalination.
- North Alamo WSC – Delta Area Brackish Groundwater Desalination.
- Primera – RO WTP with Groundwater Well.
- San Benito – Brackish Groundwater Blending.
- San Juan – Brackish Groundwater Desalination.
- San Juan – WTP 1 Expansion with Brackish Groundwater Desalination.
- Sharyland WSC – Well and RO Unit at WTP 2.
- Sharyland WSC – Well and RO Unit at WTP 3.
- Southmost RWA – Brackish Groundwater Desalination Wellfield Expansion.
- Southmost RWA – Phase 3 SRWA Wellfield Optimization and WTP Expansion.
- Southmost RWA – Phase 4 SRWA Wellfield and WTP Expansion.

Environmental impacts are described in Section 5.2.10.21.

5.2.10.1 Agua SUD – Brackish Groundwater Desalination

Project Source

This strategy was submitted by Agua Special Utility District (Agua SUD) to the RWPG for the 2026 RWP.

Description

Agua SUD primarily relies on surface water sources to meet its drinking water needs. To diversify the district's water portfolio, Agua SUD plans to conduct a feasibility study aimed at establishing groundwater as an alternative source via the Gulf Coast Aquifer System in Hidalgo County. This strategy is to drill a new brackish groundwater well field and constructing a new RO WTP to treat the brackish water to potable drinking water standards. An injection well is included for disposal of brine concentrate.

Available Supply

The first phase of the new brackish groundwater project is sized to pump 3,500 acft/yr and supply 2,800 acft/yr starting in the 2030 decade. The second phase of the project is sized to pump an additional 3,500 acft/yr starting in the 2050 decade. Assuming a RO efficiency of 80%, this strategy would require pumping 7,000 acft/yr of raw water, resulting in the 5,600 acft/yr total yield for both phases (20% water loss).

Engineering and Costing

Costs for this strategy from the UCM include groundwater well pumping, well field piping, land acquisition, and water treatment. It is assumed that the construction period for this strategy is 1.5 years. Table 5-75 and Table 5-76 outline the project costs developed in the UCM for Phase I and Phase II, respectively. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

No major implementation issues are expected for this strategy. Approval for additional concentrate disposal will be needed from TCEQ. Construction of the new groundwater well and piping may also include purchase of land and a Texas DOT ROW permit. There is no groundwater conservation district within the Agua SUD service area.

Table 5-75 Agua SUD – Brackish Groundwater Desalination Phase I Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$46,518,000	$66,173,000	$11,405,000	$4,073	$2,411

Table 5-76 Agua SUD – Brackish Groundwater Desalination Phase II Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$46,518,000	$66,173,000	$11,405,000	$4,073	$2,411

5.2.10.2 Alamo – Brackish Groundwater Desalination

Project Source

This strategy was recommended in the 2011 RWP and updated by the RWPG.

Description

This strategy is to drill a new brackish groundwater well from the Gulf Coast Aquifer System in Hidalgo County and construct a new RO WTP to treat the brackish water to potable drinking water standards. An injection well is included for disposal of brine concentrate.

Available Supply

This strategy would provide an additional 0.8 mgd of drinking water supply to Alamo by 2030. Assuming a RO efficiency of 80%, this strategy would require pumping 1,120 acft/yr of raw water, resulting in the 896 acft/yr yield (20% water loss).

Engineering and Costing

Costs for this strategy from the UCM include groundwater well pumping, well field piping, land acquisition, and brackish desalination water treatment with a concentrate injection well. It is assumed that the construction period for this strategy is 1.5 years. Table 5-77 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

No major implementation issues are expected for this strategy. Approval for additional concentrate disposal will be needed from TCEQ. Construction of the new groundwater well and piping may also include purchase of land and a Texas DOT ROW permit. There is no groundwater conservation district within the Alamo service area.

Table 5-77 Alamo – Brackish Groundwater Desalination Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$26,468,000	$37,573,000	$7,380,000	$8,237	$5,286

5.2.10.3 Eagle Pass – Brackish Groundwater Desalination

Project Source

This strategy was submitted by Eagle Pass to the RWPG.

Description

Eagle Pass is currently exploring options for developing groundwater as a water source and is looking at potential wellfield sites in multiple counties. This strategy is for the construction of nine 750 gpm production wells and four 300 gpm injection wells for brine disposal, a 30-mile transmission pipeline, and a 4.7 mgd brackish desalination WTP. This project is planned to include 2 wellfields; the first in Maverick County with two production wells, WTP, and four injection wells, and the second approximately 30 miles away in Kinney County (Region J). The planned 30-mile transmission pipeline will deliver water produced from the Kinney County wellfield to the WTP on site in Maverick County. Considerations based on the area hydrogeology, acquisition feasibility, construction feasibility, regulatory compliance, hydraulic considerations, environmental factors, and cost. The project is expected to come online by 2030.

Available Supply

This project is designed to provide a total of 4.65 mgd (5,210 acft/yr) of treated water from the Carrizo-Wilcox Aquifer in Maverick and the Edwards-Trinity-Plateau, Pecos Valley, and Trinity Aquifers in the Rio Grande Basin in Kinney County (Region J). Eagle Pass is also looking at a potential source for this strategy in Maverick County known as the Maverick Basin, but there is currently not enough information known about this particular source to determine a firm yield, so this strategy uses the Carrizo-Wilcox Aquifer instead.

For the Maverick County wellfield, assuming an RO efficiency of 80%, this strategy would require pumping 263 acft/yr of raw water, resulting in the 210 acft/yr yield (20% water loss). Similarly, for the Kinney County wellfield, assuming an RO efficiency of 80%, this strategy would require pumping 6,250 acft/yr of raw water, resulting in the 5,000 acft/yr yield (20% water loss). Table 5-78 outlines the project supply yield for each decade.

Table 5-78 Eagle Pass Brackish Groundwater Desalination Project Yield Available (acft/yr) Under the MAG, by Decade

	2030	2040	2050	2060	2070	2080
Maverick County Supply Yield	210	210	210	210	210	210

Kinney County Supply Yield	5,000	5,000	5,000	5,000	5,000	5,000
Total Supply	5,210	5,210	5,210	5,210	5,210	5,210

Engineering and Costing

Costs from the UCM for this strategy include production and injection wells, groundwater well pumping, well field piping, transmission line, water treatment plant, land acquisition, and permitting. O&M costs were estimated for the well and operating the desalination facility at capacity. It is assumed that the construction period would be no longer than 1 year. Table 5-79 outlines the project cost developed in the UCM.

Implementation Issues

This project develops a wellfield outside of Region M. Coordination with Region J and the Groundwater Conservation District in Kinney County will be needed. The yield of the project will need to stay within the MAG. Approval for additional concentrate disposal will be needed from TCEQ. Construction of the new groundwater well and piping may also include purchase of land and a TXDOT right-of-way permit.

Table 5-79 Eagle Pass – Brackish Groundwater Desalination Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$130,647,000	$181,710,000	$23,367,000	$4,485	$2,034

5.2.10.4 East Rio Hondo WSC – North Cameron Regional WTP Wellfield Expansion

Project Source

This strategy was submitted by ERHWSC to the RWPG on behalf of ERHWSC.

Description

This strategy is for the addition of two 2,300 gpm groundwater wells and a 20-inch, 10.5 mile transmission line to increase the brackish water supply to the existing North Cameron Regional RO WTP. The WTP is located between the cities of Santa Rosa and Combes, increasing supplies to the ERHWSC systems. ERHWSC's supply would be delivered by the completed Bean Road Transmission Line.

Available Supply

The North Cameron Regional desalination plant currently treats 1.15 mgd of brackish water supplied by one groundwater well. The WTP has the capacity to treat 2.70 mgd raw water, and this strategy would supply the additional 1.55 mgd of brackish water from the Gulf Coast Aquifer in Cameron County needed to bring the plant to full capacity. No additional treatment is necessary. Assuming an RO efficiency of 80%, this strategy would require pumping 1,736 acft/yr of raw water, resulting in the 1,389 acft/yr yield (20% water loss). This strategy is expected to be online by 2030. The Gulf Coast Aquifer in Cameron County is showing some MAG-limited issues this planning cycle, due to high demand for new groundwater projects resulting from surface water availability issues. Table 5-80 outlines the project yield for each decade. The available yield varies depending on MAG. The table shows both the requested yield for the project, as well as the available yield that accounts for these MAG limitations.

Table 5-80 East Rio Hondo WSC North Cameron Regional WTP Wellfield Expansion Project Yield (acft/yr), by Decade

	2030	2040	2050	2060	2070	2080
Requested Yield	1,389	1,389	1,389	1,389	1,389	1,389
Available Yield under MAG	1,290	1,225	1,371	1,389	1,389	1,389

Engineering and Costing

Capital costs from the UCM for this strategy include groundwater well pumping, well field piping, transmission line, ground storage tank, land acquisition, and permitting. O&M costs were estimated for the well and operating the desalination facility at capacity. It is assumed that the construction period would be no longer than 1 year. Table 5-81 outlines the project cost developed in the UCM. Infrastructure was sized to deliver the sponsor requested yield, but because the project is MAG limited the annual unit cost was calculated using the available yield in the first decade of implementation. The last column in the table shows the annual unit cost of the water, based on the MAG-limited available yield for 2030. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

No major implementation issues are expected for this strategy. Approval for additional concentrate disposal will be needed from TCEQ. Construction of the new groundwater well and piping may also include purchase of land and a TXDOT right-of-way permit.

Table 5-81 East Rio Hondo WSC – North Cameron Regional WTP Wellfield Expansion Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water – Ultimate ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)	Annual Cost of Water – First Decade Online ($ per acft)
$25,848,000	$35,856,000	$2,804,000	$2,019	$202	$2,174

5.2.10.5 East Rio Hondo WSC – Brackish Desalination Wellfield and RO at NRWTP and MASWTP

Project Source

This strategy was submitted by East Rio Hondo WSC (ERHWSC) to the RWPG.

Description

This strategy is for the construction of six 1,000 gpm production wells and three 300 gpm injection wells for brine disposal a 4 mgd expansion to the Martha Ann Simpson WTP (MASWTP) and a 1.6 mgd expansion to the Nelson Road WTP (NRWTP). The well siting will be near NRWTP and MASWTP based on the area hydrogeology, acquisition feasibility, construction feasibility, regulatory compliance, hydraulic considerations, environmental factors, and cost. The project is expected to come online by 2040.

Available Supply

This project was sized with a peaking factor of 2 to provide 2.8 mgd (3,136 acft/yr) on average and have peak production of 5.6 mgd (6,272 acft/yr) of brackish groundwater from the Gulf Coast Aquifer System in Cameron County. Assuming an RO efficiency of 80%, this strategy would require pumping 3,920 acft/yr of raw water on average, resulting in the 3,136 acft/yr yield (20% water loss). The Gulf Coast Aquifer in Cameron County is showing some MAG-limited issues this planning cycle, due to high demand for new groundwater projects resulting from surface water availability issues. Table 5-82 outlines the project yield for each decade. The available yield varies depending on MAG. The table shows both the requested yield for the project, as well as the available yield that accounts for these MAG limitations.

Table 5-82 East Rio Hondo WSC – Brackish Desalination Wellfield and RO at NRWTP and MASWTP Project Yield (acft/yr), by Decade

	2030	2040	2050	2060	2070	2080
Requested Yield	-	3,136	3,136	3,136	3,136	3,136
Available Yield under MAG	-	2,766	3,096	3,136	3,136	3,136

Engineering and Costing

Costs from the UCM for this strategy include production and injection wells, groundwater well pumping, well field piping, two water treatment plant expansions, land acquisition, and permitting. O&M costs were estimated for the well and operating the desalination facility at capacity. It is assumed that the construction period would be no longer than 1 year. Infrastructure was sized to deliver the sponsor requested yield, but because the project is MAG limited the annual unit cost was calculated using the available yield in the first decade of implementation. Table 5-83 outlines the project costs developed in the UCM. The last column in the table shows the annual unit cost of the water, based on the MAG-limited available yield for 2040. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

The yield of the project will need to stay within the MAG, particularly during the first few decades of implementation. There is no GCD within the service area of East Rio Hondo WSC. Approval for additional concentrate disposal will be needed from TCEQ. Construction of the new groundwater well and piping may also include purchase of land and a TXDOT right-of-way permit.

Table 5-83 East Rio Hondo WSC – Brackish Desalination Wellfield and RO at NRWTP and MASWTP Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water – Ultimate ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)	Annual Cost of Water – First Decade Online ($ per acft)
$79,212,000	$110,697,000	$21,747,000	$6,935	$4,451	$7,862

5.2.10.6 East Rio Hondo WSC – Expansion of MASWTP

Project Source

This strategy was submitted by East Rio Hondo WSC (ERHWSC) to the RWPG.

Description

This strategy is for the construction of two 2,000 gpm wells, one 300gpm injection well for concentrate disposal, and a 1 mgd expansion to the Martha Ann Simpson WTP (MASWTP). The well siting will be near the MASWTP property based on the area hydrogeology, acquisition feasibility, construction feasibility, regulatory compliance, hydraulic considerations, environmental factors, and cost. The project is expected to come online in the 2040 decade.

Available Supply

This project was sized to produce 1 mgd (1,120 acft/yr) of brackish groundwater from the Gulf Coast Aquifer System in Cameron County. Assuming an RO efficiency of 80%, this strategy would require pumping 1,400 acft/yr of raw water, resulting in the 1,120 acft/yr yield (20% water loss). The Gulf Coast Aquifer in Cameron County is showing some MAG-limited issues this planning cycle, due to high demand for new groundwater projects resulting from surface water availability issues. Table 5-84 outlines the project yield for each decade. The available yield varies depending on MAG. The table shows both the requested yield for the project, as well as the available yield that accounts for these MAG limitations.

Table 5-84 East Rio Hondo WSC Expansion of MASWTP Project Yield (acft/yr), by Decade

	2030	2040	2050	2060	2070	2080
Requested Yield	-	1,120	1,120	1,120	1,120	1,120
Available Yield under MAG	-	988	1,106	1,120	1,120	1,120

Engineering and Costing

Costs from the UCM for this strategy include production wells and injection wells, groundwater well pumping, well field piping, WTP expansion, land acquisition, and permitting. O&M costs were estimated for the well and operating the desalination facility at capacity. It is assumed that the construction period would be no longer than 1 year. Infrastructure was sized to deliver the sponsor requested yield, but because the project is MAG limited the annual unit cost was calculated using the available yield in the first decade of implementation. Table 5-85 outlines the project costs developed in the UCM. The last column in the table shows the annual unit cost of the water, based on the MAG-limited available yield for 2040. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

The yield of the project will need to stay within the MAG, particularly during the first few decades of implementation. There is no GCD within the service area of East Rio Hondo WSC. Approval for additional concentrate disposal will be needed from TCEQ. Construction of the new groundwater well and piping may also include purchase of land and a TXDOT right-of-way permit.

Table 5-85 East Rio Hondo WSC – Expansion of MASWTP Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water – Ultimate ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)	Annual Cost of Water – First Decade Online ($ per acft)
$11,169,000	$15,652,000	$1,913,000	$1,708	$725	$1,936

5.2.10.7 La Feria – Water Well with RO Unit

Project Source

This strategy was submitted by La Feria to the RWPG in 2021 and updated by the RWPG.

Description

This strategy is to provide additional drinking water supply from the Gulf Coast Aquifer System in Cameron County to the La Feria with the installation of a groundwater well, high-pressure RO system, and an injection well for disposal of brine concentrate. Water produced from the RO system will then go to the utility's WTP for conventional treatment. A location adjacent to the WTP is proposed for the well to limit the well field piping that is needed. La Feria has already drilled a pilot well and confirmed that water supply is available at approximately 500 feet below ground surface. This strategy is anticipated for the 2030 decade.

Available Supply

On the basis of the pilot well information, the city believes the groundwater well can pump 1.25 mgd to produce 1.0 mgd of water from the RO unit. Based on the approval of the non-MAG portion of Cameron County, La Feria would be able to access 1,120 acft/yr. Assuming an RO efficiency of 80%, this strategy would require pumping 1,400 acft/yr of raw water, resulting in the 1,120 acft/yr yield (20% water loss).

Engineering and Costing

Costs for this strategy from the UCM include groundwater well pumping, well field piping, land acquisition, and water treatment. It is assumed that the construction period for this strategy is one year. Table 5-86 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

No major implementation issues are expected for this strategy. Approval for additional concentrate disposal will be needed from TCEQ. Construction of the new groundwater well and piping may also include purchase of land and a TXDOT right-of-way permit. There is no groundwater conservation district within the La Feria service area.

Table 5-86 La Feria – Water Well with RO Unit Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$28,386,000	$39,709,000	$7,565,000	$6,754	$4,260

5.2.10.8 Lyford – Brackish Groundwater Desalination

Project Source

This strategy was submitted by Lyford in the 2021 Plan and updated by the RWPG.

Description

This strategy is to install a groundwater well and RO membrane water treatment facility to provide an alternate source of water for Lyford. The proposed location would be adjacent to the city's WTP where the water would receive conventional treatment after the RO process.

Available Supply

This strategy would provide an additional 0.5 mgd of drinking water supply to the city in 2040. Assuming a RO efficiency of 80%, this strategy would require pumping 700 acft/yr of raw water, resulting in the 560 acft/yr yield (20% water loss).

Engineering and Costing

Costs for this strategy from the UCM include groundwater well pumping, well field piping, land acquisition, water treatment, and an injection well for disposal of brine concentrate. Based on the BRACS study, well depth is estimated at 1,000 feet below ground surface. The well is sized to pump 125 percent of the produced water supply to account for treatment efficiency. It is assumed that the construction period for this strategy is 1 year. Table 5-87 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

No major implementation issues are expected for this strategy. Approval for concentrate disposal will be needed from TCEQ. Construction of the new groundwater well and piping may also include purchase of land if there is not adequate room at the WTP site. There is no groundwater conservation district within the Lyford service area.

Table 5-87 Lyford – Brackish Groundwater Desalination Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$15,464,000	$21,611,000	$3,913,000	$6,988	$4,271

5.2.10.9 McAllen – Brackish Groundwater Desalination

Project Source

This strategy was recommended in the 2011 RWP and updated by the RWPG.

Description

This strategy is for drilling four new groundwater wells from the Gulf Coast Aquifer System in Hidalgo County and constructing a new RO WTP to treat the brackish water to potable drinking water standards. An injection well is included for disposal of brine concentrate.

Available Supply

Based on preliminary needs estimates for McAllen, the new brackish groundwater plant is sized for 6 mgd of treatment, which will yield 6,720 acft/yr beginning in the 2030 decade. Assuming a RO efficiency of 80%, this strategy would require pumping 8,400 acft/yr of raw water, resulting in the 6,720 acft/yr yield (20% water loss).

Engineering and Costing

Costs for this strategy from the UCM include groundwater well pumping, well field piping, land acquisition, and water treatment. It is assumed that the construction period for this strategy is 1.5 years. Table 5-88 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

No major implementation issues are expected for this strategy. Approval for additional concentrate disposal will be needed from TCEQ. Construction of the new groundwater well and piping may also include purchase of land and a Texas DOT ROW permit. There is no groundwater conservation district within the McAllen service area.

Table 5-88 McAllen – Brackish Groundwater Desalination Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$67,303,000	$95,598,000	$17,809,000	$2,650	$1,649

5.2.10.10 Mission – Brackish Groundwater Desalination

Project Source

This strategy was recommended in the 2016 RWP and updated by the RWPG.

Description

This strategy is for drilling three new brackish groundwater wells in the Gulf Coast Aquifer System in Hidalgo County and constructing a new RO WTP to treat the brackish water to potable drinking water standards. An injection well is included for disposal of brine concentrate.

Available Supply

Based on preliminary needs estimates for Mission, the new brackish groundwater plant would treat 3 mgd (3,360 acft/yr) and produce 2,688 acft/yr. Assuming an RO efficiency of 80%, this strategy would require pumping 3,360 acft/yr of raw water, resulting in the 2,688 acft/yr yield (20% water loss). This project is anticipated to be online by 2030.

Engineering and Costing

Costs for this strategy from the UCM include groundwater well pumping, well field piping, land acquisition, and water treatment. It is assumed that the construction period for this strategy is 1.5 years. Table 5-89 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

No major implementation issues are expected for this strategy. Approval for additional concentrate disposal will be needed from TCEQ. Construction of the new groundwater well and piping may also include purchase of land and a Texas DOT ROW permit. There is no groundwater conservation district within the Mission service area.

Table 5-89 Mission – Brackish Groundwater Desalination Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$45,681,000	$63,913,000	$11,794,000	$4,388	$2,715

5.2.10.11 North Alamo WSC – Delta Area Brackish Groundwater Desalination

Project Source

This strategy was originally recommended during the 2016 regional water planning process, which initially had an implementation decade of 2060. NAWSC submitted this strategy for recommendation during the 2021 planning cycle.

Description

As provided by NAWSC, the Delta Area Brackish Groundwater Desalination Plant will pump 2,800 acft/yr from the Gulf Coast Aquifer in Cameron County. This strategy will serve the residents of Hargill, Monte Alto, La Sara, and surrounding areas in NAWSC's service area.

Available Supply

Assuming an 80% membrane recovery rate – pumping 2,800 acft/yr of raw water, the Delta Area Brackish Groundwater Desalination Plant would produce 2,240 acft/yr beginning in the 2030 decade. The Gulf Coast Aquifer in Cameron County is showing some MAG-limited issues this planning cycle, due to high demand for new groundwater projects resulting from surface water availability issues. Table 5-90 outlines the project yield for each decade. The available yield varies depending on MAG. The table shows both the requested yield for the project, as well as the available yield that accounts for these MAG limitations.

Table 5-90 North Alamo WSC Delta Area Brackish Groundwater Desalination Project Yield (acft/yr), by Decade

	2030	2040	2050	2060	2070	2080
Requested Yield	2,240	2,240	2,240	2,240	2,240	2,240
Available Yield under MAG	2,080	1,976	2,211	2,240	2,240	2,240

Engineering and Costing

Costs for this strategy from the UCM include the desalination plant, well field, and injection well for disposal of brine concentrate. It is assumed that the construction period for each phase is two years. Table 5-91 outlines the project costs developed in the UCM. The last column in the table shows the annual unit cost of the water, based on the MAG-limited available yield for 2030. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

No major implementation issues are expected for this strategy. Approval for concentrate disposal will be needed from TCEQ. Construction of groundwater well(s) and piping may also include purchase of land and a TXDOT right-of-way permit. There is no groundwater conservation district within the North Alamo WSC service area.

Table 5-91 North Alamo WSC – Delta Area Brackish Groundwater Desalination Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water – Ultimate ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)	Annual Cost of Water – First Decade Online ($ per acft)
$36,130,000	$50,511,000	$9,585,000	$4,279	$2,692	$4,851

5.2.10.12 Primera – RO WTP with Groundwater Well

Project Source

This strategy was submitted by Primera in the 2021 Plan and updated by the RWPG.

Description

This strategy is for the construction of a new RO WTP with ground storage and a groundwater well in the Gulf Coast Aquifer System in Cameron County. Primera is currently supplied with drinking water from the North Cameron Regional Water Project WTP and Harlingen. This strategy would allow Primera to have its own drinking water source by 2030.

Available Supply

Due to the approval and increased availability of the Non-MAG portion in Cameron County, Primera is able to access up to 1,120 acft/yr through this strategy. Assuming a RO efficiency of 80%, this strategy would require pumping 1,400 acft/yr of raw water, resulting in the 1,120 acft/yr yield (20% water loss).

Engineering and Costing

Costs for this strategy from the UCM include well field pumping, well field piping, water treatment, land acquisition, and an injection well for disposal of brine concentrate. More information on the proposed location of the plant and existing distribution system is needed to include costs for pipelines. Membrane treatment efficiency is assumed to be 80 percent, so the wells and well field piping are designed for 1,400 acft/yr. It is assumed that the construction period would be 1.5 years. Table 5-92 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

A pilot well and water quality study will be needed. There is no groundwater conservation district within the Primera service area.

Table 5-92 Primera – RO WTP with Groundwater Well Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$32,317,000	$45,926,000	$8,041,000	$7,179	$4,295

5.2.10.13 San Benito – Brackish Groundwater Blending

Project Source

This strategy was submitted by San Benito in the 2021 Plan and updated by the RWPG.

Description

This strategy is for the construction of one groundwater well from the Gulf Coast Aquifer System and raw water collection lines to supplement San Benito's water supply . The brackish groundwater will be mixed with the current surface water source at 10 percent to 15 percent the average daily demand. The city plans to construct the well at the WTP No. 2 site.

Available Supply

Based on the availability of the Non-MAG portion of the Gulf Coast Aquifer System in Cameron County, San Benito is able to access a total of 0.5 mgd for a well operating at 500 gpm. The project yields 560 acft/yr starting in the 2030 decade.

Engineering and Costing

Costs for this strategy from the UCM include groundwater wells, well field piping, and pipeline right-of-way. It is assumed that the construction period for this strategy is 1 year. Table 5-93 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

Construction of the new groundwater wells and piping may also include purchase of land and a Texas DOT ROW permit. It is anticipated that a pilot well and water quality study will be needed to implement this strategy. There is no groundwater conservation district within the San Benito service area.

Table 5-93 San Benito – Brackish Groundwater Blending Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$971,000	$1,399,000	$120,000	$214	$39

5.2.10.14 San Juan – Brackish Groundwater Desalination

Project Source

This strategy was submitted by San Juan in the 2021 Plan and updated by the RWPG.

Description

This strategy is to install a groundwater well and RO membrane water treatment facility to provide an alternate source of water for San Juan.

Available Supply

This strategy would provide an additional 1.0 mgd (1,120 acft/yr) of drinking water supply to San Juan by the 2030 decade. Assuming a RO efficiency of 80%, this strategy would require pumping 1,400 acft/yr of raw water from the Gulf Coast Aquifer System in Hidalgo County, resulting in the 1,120 acft/yr yield (20% water loss).

Engineering and Costing

Costs for this strategy from the UCM include groundwater well pumping, well field piping, land acquisition, water treatment, and a concentrate injection well. Based on the BRACS study, well depth is estimated at 1,000 feet below ground surface. The well is sized to pump 125 percent of the produced water supply to account for treatment efficiency. It is assumed that the construction period for this strategy is 1 year. Table 5-94 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

No major implementation issues are expected for this strategy. Approval for concentrate disposal will be needed from TCEQ. Construction of the new groundwater well and piping may also include purchase of land if there is not adequate room at the WTP site. There is no groundwater conservation district within the service area of San Juan.

Table 5-94 San Juan – Brackish Groundwater Desalination Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$28,746,000	$40,253,000	$7,626,000	$6,809	$4,280

5.2.10.15 San Juan – WTP 1 Expansion with Brackish Groundwater Desalination

Project Source

This strategy was submitted by San Juan in the 2021 Plan and updated by the RWPG.

Description

This strategy consists of expanding and upgrading WTP No. 1 and installing groundwater wells with membrane treatment.

Available Supply

The project as submitted included 3 mgd (3,360 acft/yr) of brackish groundwater treatment capacity from the Gulf Coast Aquifer System in Hidalgo County. Assuming an RO efficiency of 80%, this strategy would require pumping 4,200 acft/yr of raw water, resulting in the 3,360 acft/yr yield (20% water loss).

Engineering and Costing

The components of this project include four new groundwater wells, well field piping, and membrane filters. The brackish desalination treatment plant will consist of membrane filtration. It is assumed that concentrate disposal from the treatment processes would be discharged to surface water; it is assumed that the construction period would be 1.5 years. Treatment Level 4 was used on the UCM spreadsheet to estimate the costs for addition of the new membrane filters. Table 5-95 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

Approval for concentrate disposal will be needed from TCEQ. Construction of the groundwater well may also include purchase of land and a Texas DOT ROW permit. As with any project, necessary state and federal permits must be obtained before construction can begin. There is no groundwater conservation district within the service area of San Juan.

Table 5-95 San Juan – WTP 1 Expansion with Brackish Groundwater Desalination Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$45,870,000	$65,264,000	$11,966,000	$3,561	$2,195

5.2.10.16 Sharyland WSC – Well and RO Unit at WTP 2

Project Source

This strategy was submitted by Sharyland WSC in the 2021 Plan and updated by the RWPG.

Description

This strategy is to provide additional supply to Sharyland WSC WTP No. 2 with the installation of a groundwater well and high-pressure RO system. An injection well is included for disposal of brine concentrate.

Available Supply

The proposed groundwater well is sized to pump 1,125 acft/yr from the Gulf Coast Aquifer System in Hidalgo County and the RO system would provide the WTP No. 2 with 900 acft/yr of supply. This assumes an 80 percent membrane recovery rate. Assuming a RO efficiency of 80%, this strategy would require pumping 1,125 acft/yr of raw water, resulting in the 900 acft/yr yield (20% water loss). The project is anticipated to be online by 2040.

Engineering and Costing

Costs for this strategy from the UCM include groundwater well pumping, well field piping, water treatment, and land acquisition. It is assumed that the construction period would be 1 year. Table 5-96 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

No major implementation issues are expected for this strategy. Approval for concentrate disposal will be needed from TCEQ. Construction of a groundwater well and piping may also include purchase of land and a Texas DOT ROW permit. There is no groundwater conservation district within the Sharyland WSC service area.

Table 5-96 Sharyland WSC – Well and RO Unit at WTP 2 Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$27,423,000	$38,480,000	$6,567,000	$7,297	$4,289

5.2.10.17 Sharyland WSC – Well and RO Unit at WTP 3

Project Source

This strategy was submitted by Sharyland WSC in the 2021 Plan and updated by the RWPG.

Description

This strategy is to provide additional supply to Sharyland WSC WTP No. 3 with the installation of a groundwater well and high-pressure RO system. An injection well is included for disposal of brine concentrate. WTP No. 3 has been recently completed.

Available Supply

The proposed groundwater well is sized to pump 1,125 acft/yr from the Gulf Coast Aquifer System in Hidalgo County and the system would provide the WTP No. 3 with 900 acft/yr of supply. This assumes an 80% membrane recovery rate (20% water loss). The project is anticipated to be online by 2040.

Engineering and Costing

Costs for this strategy from the UCM include well field pumping, well field piping, water treatment, and land acquisition. Slightly to moderately saline groundwater was assumed to be available at approximately 800 feet below ground surface for cost estimation purposes. It is assumed that the construction period would be 1 year. Table 5-97 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

No major implementation issues are expected for this strategy. Approval for concentrate disposal will be needed from TCEQ. Construction of a groundwater well and piping may also include purchase of land and a Texas DOT ROW permit. There is no groundwater conservation district within the Sharyland WSC service area.

Table 5-97 Sharyland WSC – Well and RO Unit at WTP 3 Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$27,423,000	$38,480,000	$6,567,000	$7,297	$4,289

5.2.10.18 Southmost RWA – Brackish Groundwater Desalination Wellfield Expansion

Project Source

This strategy was submitted by Southmost Regional Water Authority (SRWA) to the RWPG.

Description

This strategy is for the expansion of the SRWA brackish groundwater wells. No additional treatment is required for this expansion. The expansion consists of 2 new wells and a 24-inch transmission line to connect new wellfield to existing wellfield pump station. SRWA already own the property on which the new wellfield is planned to be located. This WMS is planned for the 2030 decade.

Available Supply

Depending on groundwater availability in the Gulf Coast Aquifer in Cameron County and given the current WTP RO efficiency of 75%, the two new wells included in this strategy would require pumping 1,294 acft/yr of raw water, resulting in the 980 acft/yr (0.87 MGD) yield (25% water loss). However, due to high demand for new groundwater projects resulting from surface water availability issues, production from the new wells included in this strategy will be limited by the MAG in the earlier decades, therefore the available yield varies depending on the MAG. Table 5-98 shows both the requested yield for the project, as well as the available yield that accounts for these MAG limitations.

Table 5-98 SRWA Brackish Well Field Expansion Yield (acft/yr), by Decade

	2030	2040	2050	2060	2070	2080
Requested Yield	980	980	980	980	980	980
Available Yield under MAG	901	856	958	980	980	980

Engineering and Costing

Capital costs from the UCM for this strategy include wellfield, groundwater well pumping, well field piping, transmission line, and permitting. O&M costs were estimated for the well and operating the desalination facility at capacity. It is assumed that the construction period would be no longer than 1 year. Infrastructure was sized to deliver the sponsor requested yield, but because the project is MAG limited the annual unit cost was calculated using the available yield in the first decade of implementation. Table 5-99 outlines the project costs developed in the UCM. The last column in the table shows the annual unit cost of the water, based on the MAG-limited available yield for 2030. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

No major implementation issues are expected for this strategy. The yield of the project will need to stay within the MAG, particularly during the first few decades of implementation. Approval for additional concentrate disposal will be needed from TCEQ. Construction of the new groundwater well and piping may also include purchase of land and a TXDOT right-of-way permit. There is no groundwater conservation district within the SRWA service area.

Table 5-99 Southmost RWA – Brackish Groundwater Desalination Wellfield Expansion Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water – Ultimate ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)	Annual Cost of Water – First Decade Online ($ per acft)
$3,292,000	$4,605,000	$395,000	$403	$73	$483

5.2.10.19 Southmost RWA – Phase 3 SRWA Wellfield Optimization and WTP Expansion

Project Source

This strategy was submitted by Southmost Regional Water Authority (SRWA) to the RWPG.

Description

This strategy is for Phase 3 Brackish Well Field Optimization and Expansion of the SRWA brackish groundwater wells and water treatment plant. The project includes reconstruction of 20 existing wells, the addition of 2 new wells, and an expansion to the WTP to produce an additional 2.2MGD of treated water. Phase 3 is planned to be online by the 2030 decade.

Available Supply

The wellfield optimization, expanded wellfield, and WTP expansion could produce an additional 2.2 MGD (2,464 acft/yr) of treated water. Optimization of 20 existing wells and the WTP is anticipated to improve water production and supply approximately 1.33 MGD (1,484 acft/yr); whereas the wellfield expansion was designed to supply an additional 0.87 MGD (980 acft/yr).

Table 5-100 SRWA Phase 3 Brackish Well Field Optimization and Expansion Yield

Component	Supply
Infrastructure Optimization	1,484 acft/yr
Wellfield Expansion	980 acft/yr
Total Supply	2,464 acft/yr

Depending on groundwater availability in the Gulf Coast Aquifer in Cameron County, the two new wells are designed to produce 980 acft/yr yield. However, production from the new wells included in this strategy will be limited by the MAG in the earlier decades, therefore the available yield varies depending on MAG. Table 5-101 shows both the requested yield for the expanded wellfield, as well as the available yield that accounts for these MAG limitations. Expanded wellfield infrastructure was designed using the current WTP RO efficiency of 75%.

Table 5-101 SRWA Phase 3 Brackish Well Field Expansion Project Yield (acft/yr)

	2030	2040	2050	2060	2070	2080
Requested Yield	980	980	980	980	980	980
Available Yield	888	828	963	980	980	980

Engineering and Costing

Capital costs from the UCM for this strategy include well reconstruction, new groundwater production wells, groundwater well pumping, well field piping, WTP expansion, and permitting. O&M costs were estimated for the well and operating the desalination facility at capacity. It is assumed that the construction period would be no longer than 1 year. Table 5-102 outlines the project costs developed in the UCM. The last column in the table shows the annual unit cost of the water, based on the MAG-limited available yield for 2030. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

No major implementation issues are expected for this strategy. Approval for additional concentrate disposal will be needed from TCEQ. Construction of the new groundwater well and piping may also include purchase of land and a TXDOT right-of-way permit. There is no groundwater conservation district within the SRWA service area.

Table 5-102 Southmost RWA – Phase 3 Brackish Well Field Expansion Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water – Ultimate ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)	Annual Cost of Water – First Decade Online ($ per acft)
$45,258,000	$63,112,000	$10,769,000	$4,371	$2,568	$4,540

5.2.10.20 Southmost RWA – Phase 4 SRWA Wellfield and WTP Expansion

Project Source

This strategy was submitted by Southmost Regional Water Authority (SRWA) to the RWPG.

Description

This strategy is for Phase 4 Expansion of the SRWA brackish groundwater wells and water treatment plant. Phase 4 is planned to be online by the 2030 decade.

Available Supply

Depending on groundwater availability in the Gulf Coast Aquifer in Cameron County, the wellfield and WTP expansion could be between 12.5 to 20 MGD. For the 2026 RWP, the project is requesting a yield of 12.5 MGD. Given the current WTP RO efficiency of 75%, this strategy would require pumping 18,480 acft/yr of raw water, resulting in the 14,000 acft/yr yield (25% water loss). However, this strategy is limited by the MAG, therefore the available yield varies depending on MAG. The table below shows both the requested yield for the project, as well as the available yield that accounts for these MAG limitations.

Table 5-103 SRWA Phase 4 Brackish Well Field and WTP Expansion Project Yield (acft/yr)

	2030	2040	2050	2060	2070	2080
Requested Yield	14,000	14,000	14,000	14,000	14,000	14,000
Available Yield	12,840	12,177	13,678	13,860	13,860	13,860

Engineering and Costing

Capital costs from the UCM for this strategy include groundwater production well, pumping, well field piping, transmission line and pump station, water treatment plant expansion, land acquisition, and permitting. O&M costs were estimated for the well and operating the desalination facility at capacity. It is assumed that the construction period would be no longer than 1 year. Table 5-104 outlines the project costs developed in the UCM. The last column in the table shows the annual unit cost of the water, based on the MAG-limited available yield for 2030. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

No major implementation issues are expected for this strategy. Approval for additional concentrate disposal will be needed from TCEQ. Construction of the new groundwater well and piping may also include purchase of land and a TXDOT right-of-way permit. There is no groundwater conservation district within the SRWA service area.

Table 5-104 Southmost RWA – Phase 4 SRWA Wellfield and WTP Expansion Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water – Ultimate ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)	Annual Cost of Water – First Decade Online ($ per acft)
$126,956,000	$177,392,000	$31,056,000	$2,218	$1,327	$2,268

5.2.10.21 Environmental Impacts of Recommended Brackish Groundwater Strategies

Potential environment impacts for recommended brackish groundwater desalination strategies have been identified and categorized as described below. The letters identifying each section correspond to the headings in Table 5-105.

A. Acres Impacted Permanently

Acres impacted permanently refer to the total amount of area that will be permanently impacted because of the implementation of a strategy. The following conservative assumptions were made (unless more detailed information for a specific was available):

- The acres impacted for pipelines is equivalent to the ROW easements required; it is assumed 100-feet for ROW unless otherwise known.
- WTP impacts are estimated using UCM, which is based on the plant capacity.
- The impact of wells and wellfields are given by the UCM, which includes 0.5 acre per well.

B. Construction Impacted Acreage

Temporary environmental impacts may be seen during construction activities, such as increased air and noise pollution, and land disturbance activities. However, these effects are typical of any construction project. The construction impacted acreage was estimated as 110 percent (rounded up to a whole number) of the permanently impacted acreage.

C. Agricultural Resources Impacted Acreage

Agricultural resources impact acreage is a consolidation of vegetation and land use types specific to Region – row crops, grass farms, and orchards - identified in the TPWD EMST. This GIS mapping data was overlain WMS locations to estimate the agricultural impact acreage from the implementation of the associated strategy.

D. Wetland Impact

The wetland impact refers to the probability that implementation of a WMS will affect a wetland. The location of wetlands in the region was determined using the NWI located at http://www.fws.gov/wetlands/Data/Mapper.html.

A strategy received a "1" if all or part of the strategy is located in a wetland or if it is close enough to where construction activities are likely to impact the wetland. All other strategies received zeros. If the exact location of project is unknown it was given a zero because it was assumed that it would be located on a site that would not affect and wetland.

E. Habitat Impacted Acreage

Habitat impacted acreage refers to how the strategy will impact the habitat of the local area. The more area that is impacted because of the implementation of the strategy, the more the habitat of the area will be disrupted. Therefore, it was assumed that the permanent acreage impacted for a WMS is what would impact habitats.

F. Threatened and Endangered Species Count

Threatened and endangered species count refers to how the strategy will impact those species in the area once implemented. This impact was quantified based on the number of federally-listed threatened and endangered species located within the county of the strategy. The number of threatened and endangered species came from the TPWD Rare, Threatened, and Endangered Species of Texas database (http://tpwd.texas.gov/gis/rtest/).

G. Cultural Resources Impact

Cultural resources impact 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, including locations; buildings; and features with scientific, cultural, or historic value. It is assumed that no WMSs negatively affect cultural resources. Mitigation costs are included for strategies that require infrastructure so it is assumed that none would be built in a location or way that disrupts culturally sensitive locations.

H. Volume of Brine (acft)

The volume of brine quantifies the amount of brine concentrate from the desalination process that is released as surface water discharge. It is assumed that brackish groundwater desalination plants are 80 percent efficient, unless otherwise stated, so 20 percent of the amount of water pumped from the aquifer is discharged as brine concentrate.

I. TDS of Brine (mg/L)

The TDS of brine provides the concentrate of the brine discharge. This number was calculated by assuming that the raw brackish groundwater has a TDS of 3,500 mg/L. A TDS of 0 mg/L was used for the finished water.

J. Reliability

Reliability is an assessment of the availability of the specified water quantity to the user over time. If the quantity of water is available to the user all the time, then the strategy has a high reliability. If the quantity of water is contingent on other factors, reliability will be lower. Each desalination water management strategy was assessed on their reliability, varying between medium to high, contingent on factors such as the ability to desalinate and dispose reject water or availability of hydrogeologic studies in the area to determine suitability of formations for new wells.

K. Bays, Estuaries, and Arms of the Gulf of Mexico

The environmental effects due to implementation of upstream WMS projects on bays, estuaries, and arms of the Gulf of Mexico are quantitatively assessed and reported. Water bodies designated as classified segments by the TCEQ that are within or downstream of Region M include the Brownsville Ship Channel, South Bay, Laguna Madre, and Gulf of Mexico. Effects to these water bodies were quantified by estimating whether the project is anticipated to decrease freshwater inflow in these classified water bodies.

A WMS project received a "1" if it is expected to decrease freshwater inflow into a classified water body. If a strategy were to increase freshwater inflow or otherwise have little to no impact on inflows, then the project would receive a zero.

A summary of the identified and quantified environmental impacts for recommended brackish groundwater desalination projects is presented in Table 5-105.

Table 5-105 Environmental Impacts of Recommended Brackish Groundwater Desalination Strategies

Entity	WMS Name	Yield*	A	B	C	D	E	F	G	H	I	J	K
Agua SUD	Brackish Groundwater Desalination (Phase 1)	2,800	21	23	0	0	21	8	0	700	17,500	5	0
Agua SUD	Brackish Groundwater Desalination (Phase 2)	2,800	21	23	0	0	21	8	0	700	17,500	5	0

Entity	WMS Name	Yield*	A	B	C	D	E	F	G	H	I	J	K
Alamo	Brackish Groundwater Desalination	896	6	7	0	0	6	8	0	224	17,500	5	0
Eagle Pass	Brackish Groundwater Desalination	5,210	145	160	24	0	145	3	0	1,303	17,500	5	0
ERHWSC	North Cameron Regional WTP Wellfield Expansion	1,290	49	54	4	0	49	25	0	322	17,500	3	0
ERHWSC	Brackish Desal Wellfield and RO at NRWTP and MASWTP	2,766	16	18	16	0	16	25	0	784	17,500	3	0
ERHWSC	Expansion of MASWTP	988	4	5	0	0	4	25	0	280	17,500	3	0
La Feria	Water Well with RO Unit	1,120	1	2	0	0	1	25	0	280	17,500	3	0
Lyford	Brackish Groundwater Well and Desalination	560	5	6	0	0	5	22	0	140	17,500	5	0
McAllen	Brackish Groundwater Desalination Treatment	6,720	19	21	0	0	19	8	0	1,680	17,500	5	0
Mission	Brackish Groundwater Desalination Plant	2,688	18	20	0	0	18	8	0	672	17,500	5	0
NAWSC	Delta Area Brackish Groundwater Desalination Plant	2,080	9	10	1	0	9	25	0	560	17,500	3	0
Primera	RO WTP with Groundwater Well	1,120	1	1	0	0	1	8	0	280	17,500	5	0
San Benito	Brackish Groundwater Blending	560	3	4	3	0	3	25	0	0	0	3	0
San Juan	Brackish Groundwater Desalination	1,120	1	2	0	0	7	8	0	280	17,500	5	0

Entity	WMS Name	Yield*	A	B	C	D	E	F	G	H	I	J	K
San Juan	WTP 1 Expansion with Brackish Groundwater Desalination	3,360	19	21	2	0	19	8	0	840	17,500	3	0
Sharyland WSC	Well and RO Unit at WTP 2	900	7	8	0	0	7	8	0	225	17,500	5	0
Sharyland WSC	Well and RO Unit at WTP 3	900	7	8	1	0	7	8	0	225	17,500	5	0
Southmost RWA	Brackish Groundwater Desalination Wellfield Expansion	901	0	0	0	0	0	25	0	314	14,000	3	0
Southmost RWA	Phase 3 SRWA Wellfield and WTP Expansion	2,372	0	0	0	0	0	25	0	821	14,000	3	0
Southmost RWA	Phase 4 SRWA Wellfield and WTP Expansion	12,840	7	8	0	0	7	25	0	4,480	14,000	3	0
*First decade of implementation yield (acft/yr).													

5.2.11 Seawater Desalination

Seawater desalination still remains one of the more expensive WMSs, but costs have declined over the years as technology has advanced. In addition, as population and water demand grow, there continue to be limits to available resources inland, while seawater has a seemingly vast supply. Texas does not yet have a seawater desalination plant for municipal purposes, but there are multiple currently in the works along the Texas coast.

For the 2026 planning cycle, one recommended seawater desalination strategy was carried over from the 2021 cycle, with updates made. There are also two alternative strategies that were carried over from the 2021 Plan which are included in the alternative strategy Section 5.3.5. Additionally, a third seawater desalination strategy was considered by the Rio Grande RWPG this cycle but was ultimately not included as recommended or alternative. That strategy is mentioned in Section 5.4.

The recommended seawater desalination strategy included for the 2026 planning cycle is:

- Laguna Madre Water District – Seawater Desalination Plant.

5.2.11.1 Laguna Madre Water District – Seawater Desalination Plant

Project Source

This strategy was submitted by Laguna Madre Water District during the 2021 regional water planning process and updated for this planning cycle using Laguna Madre's 2024 Feasibility Study.

Description

This strategy is for the full implementation of the 1.0 mgd seawater desalination pilot study conducted and completed in August 2010. This strategy includes full-scale components for the 5 mgd project like the intake system, concentrate disposal system, and land acquisition. This project is anticipated to be online by the 2030 decade.

Available Supply

This strategy would improve the seawater desalination pilot study facility to provide a supply of approximately 5.0 mgd of drinking water (5,600 acft/yr) by 2030.

Engineering and Costing

This strategy includes an intake structure, piping, land acquisition, and treatment. The infrastructure was sized based on an RO efficiency of 50 percent. Table 5-106 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

Financing a full-scale seawater desalination facility is a major implementation issue. A 12-month, 1 mgd pilot plant study was completed in December 2009 with a final report published in August 2010 by NRS Engineering Water Solutions (TWDB, 2019). A feasibility study for the 5 mgd Port Isabel Seawater Desalination Treatment Facility was submitted to the U.S. Bureau of Reclamation in 2024 in support of the Title XVI Program for federal grant consideration.

Table 5-106 Laguna Madre Water District – Seawater Desalination Plant Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$91,039,000	$127,001,000	$21,396,000	$3,821	$2,226

5.2.11.2 Environmental Impacts of Recommended Seawater Desalination Strategies

Potential environment impacts for recommended seawater desalination strategies have been identified and categorized as described below. The letters identifying each section correspond to the headings in Table 5-107.

A. Acres Impacted Permanently

Acres impacted permanently refer to the total amount of area that will be permanently impacted because of the implementation of a strategy. The following conservative assumptions were made (unless more detailed information for a specific was available):

- The acres impacted for pipelines is equivalent to the ROW easements required; it is assumed 100-feet for ROW unless otherwise known.
- WTP impacts are estimated using UCM, which is based on the plant capacity.

B. Construction Impacted Acreage

Temporary environmental impacts may be seen during construction activities, such as increased air and noise pollution, and land disturbance activities. However, these effects are typical of any construction project. The construction impacted acreage was estimated as 110 percent (rounded up to a whole number) of the permanently impacted acreage.

C. Agricultural Resources Impacted Acreage

Agricultural resources impact acreage is a consolidation of vegetation and land use types specific to Region – row crops, grass farms, and orchards - identified in the TPWD EMST. This GIS mapping data was overlain WMS locations to estimate the agricultural impact acreage from the implementation of the associated strategy.

D. Wetland Impact

The wetland impact refers to the probability that implementation of a WMS will affect a wetland. The location of wetlands in the region was determined using the NWI located at http://www.fws.gov/wetlands/Data/Mapper.html.

A strategy received a "1" if all or part of the strategy is located in a wetland or if it is close enough to where construction activities are likely to impact the wetland. All other strategies received zeros. If the exact location of project is unknown it was given a zero because it was assumed that it would be located on a site that would not affect and wetland.

E. Habitat Impacted Acreage

Habitat impacted acreage refers to how the strategy will impact the habitat of the local area. The more area that is impacted because of the implementation of the strategy, the more the habitat of the area will be disrupted. Therefore, it was assumed that the permanent acreage impacted for a WMS is what would impact habitats.

F. Threatened and Endangered Species Count

Threatened and endangered species count refers to how the strategy will impact those species in the area once implemented. This impact was quantified based on the number of federally-listed threatened and endangered species located within the county of the strategy. The number of threatened and endangered species came from the TPWD Rare, Threatened, and Endangered Species of Texas database (http://tpwd.texas.gov/gis/rtest/).

G. Cultural Resources Impact

Cultural resources impact 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, including locations; buildings; and features with scientific, cultural, or historic value. It is assumed that no WMSs negatively affect cultural resources. Mitigation costs are included for strategies that require infrastructure so it is assumed that none would be built in a location or way that disrupts culturally sensitive locations.

H. Volume of Brine (acft)

The volume of brine quantifies the amount of brine concentrate from the desalination process that is released as surface water discharge. An efficiency of 50 percent was assumed for seawater desalination.

I. TDS of Brine (mg/L)

The TDS of brine provides the concentrate of the brine discharge. This number was calculated by assuming that the TDS of the seawater is 35,000 mg/L. A TDS of 0 mg/L was used for the finished water.

J. Reliability

Reliability is an assessment of the availability of the specified water quantity to the user over time. If the quantity of water is available to the user all the time, then the strategy has a high reliability. If the quantity of water is contingent on other factors, reliability will be lower. Each desalination water management strategy was assessed on their reliability, varying between medium to high, contingent on factors such as the ability to desalinate and dispose reject water.

K. Bays, Estuaries, and Arms of the Gulf of Mexico

The environmental effects due to implementation of upstream WMS projects on bays, estuaries, and arms of the Gulf of Mexico are quantitatively assessed and reported. Water bodies designated as classified segments by the TCEQ that are within or downstream of Region M include the Brownsville Ship Channel, South Bay, Laguna Madre, and Gulf of Mexico. Effects to these water bodies were quantified by estimating whether the project is anticipated to decrease freshwater inflow in these classified water bodies.

A WMS project received a "1" if it is expected to decrease freshwater inflow into a classified water body. If a strategy were to increase freshwater inflow or otherwise have little to no impact on inflows, then the project would receive a zero.

A summary of the identified and quantified environmental impacts for recommended seawater desalination projects is presented in Table 5-107.

Table 5-107 Environmental Impacts of Recommended Seawater Desalination Strategies

Entity	WMS Name	Yield*	A	B	C	D	E	F	G	H	I	J	K
Laguna Madre Water District	Seawater Desalination Plant	5,600	12	13	0	1	12	25	0	5,600	70,000	5	0
*First decade of implementation yield (acft/yr).													

5.2.12 Regional Water Supply Facilities

The TWDB encourages the consideration and development of water management strategies that can meet needs on a regional level. The Rio Grande RWPG has recommended one water management strategy for the 2026 planning cycle that includes a system of off-channel reservoirs, water treatment plants, and transmission lines that could provide water supplies to entities within and outside of Hidalgo County. This project is the Delta Region Water Management Supply strategy, sponsored by Hidalgo County Drainage District #1 (HCDD #1).

5.2.12.1 HCDD#1 – Delta Region Water Management Supply

Project Source

A version of this strategy had been included in the 2016 RGRWP as a recommended strategy but was not included in the 2021 RGRWP until it was requested to be added as an amendment to the 2021 RGRWP. It was requested by HCDD #1 to be included for the 2026 planning cycle.

Description

This strategy is to construct three reservoirs in northeastern Hidalgo County to capture tailwaters and precipitation runoff for beneficial use. Each proposed reservoir in this strategy is separated into a different Water Management Strategy Project (WMSP): the Delta "Panchita" Reservoir (235 acft capacity, online 2030), the Santa Cruz Reservoir (4,621 acft capacity, online 2040), and the Engleman Reservoir (280 acft capacity, online 2050). These reservoirs will allow for better control and management of flows in the drainage network and will allow for the drainage district to treat and distribute a portion of the flows for sale to potential customers.

Available Supply

The reservoirs are all in the Delta Watershed, which is distinct from other portions of the Nueces-Rio Grande Basin and will not impact downstream water rights. Recently established environmental flow requirements for the Nueces-Rio Grande Basin do not place any limitations on the drainageways that will be impacted by this strategy.

Kennedy Resource Company performed the Water Availability Modeling (WAM) analysis to determine the firm yield of each reservoir. The current version of the TCEQ Nueces-Rio Grande (NRG) Full Authorization WAM, dated October 23, 2023, was used to determine the firm yield. To assess the reservoirs' firm yields using the most updated version of the TCEQ NRG Full Authorization WAM, edits were required to include project off-channel reservoirs and return flows available for diversion by HCDD #1 permit 13195.

Because the reservoirs will be operated as a single system, operating procedures can impact the firm yields for each reservoir. For purposes of inclusion in the 2026 Regional Water Plan, an operating scenario entitled, "Fully Utilized Panchita Reservoir" (with return flows) was utilized to determine firm yields. The Fully Utilized Panchita Reservoir operating procedure assumes the Panchita Reservoir has senior priority, diverting up to its full permitted amount. Any remaining water not diverted, or not reserved for use at Panchita Reservoir, could be diverted by the Santa Cruz and Engleman Reservoirs, which have junior priority. While the water use permit used for this strategy only has one priority date, the NRG Full Authorization WAM was modified by changing each reservoir's priority date (by one day) and revising the order of the proposed reservoir diversions. Changes to the priority dates in the WAM were done to simulate either a junior or senior date when compared to the other project reservoirs.

Changes to the permit priority dates will not impact priority order with any other water permits in the project watershed. The TWDB acknowledges these operational changes do not impact other water rights in the basin. Further, the TWDB approved this approach to modify priority dates as part of the hydrologic variance process for the 2026 planning cycle.

The firm yields were analyzed without return flows included. Without return flows, the individual reservoir firm yield is 9,200 acft/yr for the Delta “Panchita” Reservoir, 7,800 acft/yr for the Santa Cruz Reservoir, and 900 acft/yr for the Engleman Reservoir. However, project yield is limited by water treatment plant capacity for two of the three reservoirs. The Delta “Panchita” Reservoir will provide 5,600 acft/yr when it comes online in 2030. The Santa Cruz Reservoir will provide an additional 5,600 acft/yr when it comes online in 2040. The Engleman Reservoir will further provide an additional 900 acft/yr when it comes online in 2050.

Engineering and Costing

Costs for each project within this strategy were developed using the TWDB Uniform Costing Model (UCM) and include land acquisition, the reservoir, an intake and pump station, transmission pipeline (distance estimated for costing purposes as an end user has not been identified at this time), and advanced water treatment facility with micro-filtration and reverse osmosis. It is assumed that the construction period for this strategy is 2 years for each reservoir. Table 5-108 outlines the project costs developed in the UCM for the Delta “Panchita” Reservoir, Table 5-109 outlines the project costs developed in the UCM for the Santa Cruz Reservoir, and Table 5-110 outlines the project costs developed in the UCM for the Engleman Reservoir. The costs shown are in September 2023 dollars. The full UCM project cost estimate summaries are provided in Appendix 5D.

Implementation Issues

The main implementation issue for the three reservoirs and future water treatment plants would be funding for the projects. State and federal permits must be obtained before construction can begin, potentially including a Section 404, Clean Water Act Permit. Additionally, the project may need to comply with the National Environmental Policy Act if federal funding is involved and with the Endangered Species Act if any threatened and endangered species are impacted. However, the project has received a non-jurisdictional determination from the U.S. Army Corps of Engineers.

The project would divert and use water from drainageways, channels, and canals within the Delta Watershed. This project captures and beneficially uses tailwaters and precipitation runoff, which would otherwise discharge into the Laguna Madre. Diversion of water for this project is unlikely to cause significant, detrimental impacts to key parameters of water quality for the drainageways and downstream water bodies to the Laguna Madre. In fact, the "Environmental Flows Recommendations Report", prepared by Rio Grande, Rio Grande Estuary, and Lower Laguna Madre Basin and Bay Expert Science Team, indicates that a reduction in freshwater entering the Laguna Madre would benefit the natural aquatic plant life by maintaining the salinity. The project will use advanced water treatment, including micro-filtration and reverse osmosis. If disposed in the drainage canals, the brine concentrate could increase levels of total dissolved solids in the receiving stream.

The Delta Region Water Management Supply Strategy currently has Memoranda of Understanding with two Irrigation Districts, Engleman and Delta Lake. The largest potential impact on cultural resources associated with this strategy comes from pipeline construction and operation. Therefore, pipelines should follow existing and shared rights-of-way whenever possible to minimize the area of disturbance.

Table 5-108 HCDD #1 – Delta Region Water Management Supply Delta "Panchita" Reservoir Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$61,580,000	$89,113,000	$12,110,000	$2,163	$1,072

Table 5-109 HCDD #1 – Delta Region Water Management Supply Santa Cruz Reservoir Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$79,234,000	$120,121,000	$14,051,000	$2,509	$1,126

Table 5-110 HCDD #1 – Delta Region Water Management Supply Engleman Reservoir Project Costs

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$22,934,000	$33,665,000	$3,644,000	$4,049	$1,601

5.2.12.2 Environmental Impacts of Recommended Regional Water Supply Facilities Strategies

Potential environment impacts for regional water supply facilities strategies have been identified and categorized as described below. The letters identifying each section correspond to the headings in Table 5-111.

A. Acres Impacted Permanently

Acres impacted permanently refers to the total amount of area that will be permanently impacted because of the implementation of a strategy. The following conservative assumptions were made (unless more detailed information for a specific was available):

- The acreage impacted for pipelines is equivalent to the right-of-way (ROW) easements required; it is assumed 50 feet for ROW unless otherwise known.
- WTP impacts are estimated using UCM, which is based on the plant type and capacity.

B. Construction Impacted Acreage

Temporary environmental impacts may be seen during construction activities, such as increased air and noise pollution, and land disturbance activities. However, these effects are typical of any construction project. The construction impacted acreage was estimated as 110 percent (rounded up to a whole number) of the permanently impacted acreage.

C. Inundation Acreage

The inundation acreage applies to reservoirs only and is equal to the amount of land that will be inundated by the construction of the reservoir.

D. Agricultural Resources Impacted Acreage

Agricultural resources impact acreage is a consolidation of vegetation and land use types specific to Region – row crops, grass farms, and orchards - identified in the TPWD EMST. This GIS mapping data was overlain WMS locations to estimate the agricultural impact acreage from the implementation of the associated strategy.

E. Wetland Impact

The wetland impact refers to the probability that implementation of a WMS will affect a wetland. The location of wetlands in the region was determined using the National Wetlands Inventory (NWI) located at http://www.fws.gov/wetlands/Data/Mapper.html.

A strategy received a "1" if all or part of the strategy is located in a wetland or if it is close enough to where construction activities are likely to impact the wetland. All other strategies received zeros. If the exact location of project is unknown, it was given a zero because it was assumed that it would be located on a site that would not affect any wetland.

F. Habitat Impacted Acreage

Habitat impacted acreage refers to how the strategy will impact the habitat of the local area. The more area that is impacted because of the implementation of the strategy, the more the habitat of the area will be disrupted. Therefore, it was assumed that the permanent acreage impacted for a WMS is what would impact habitats.

G. Threatened and Endangered Species Count

Threatened and endangered species count refers to how the strategy will impact those species in the area once implemented. This impact was quantified based on the number of federally-listed threatened and endangered species located within the county of the strategy. The number of threatened and endangered species came from the Texas Parks and Wildlife Department (TPWD) Rare, Threatened, and Endangered Species of Texas database (http://tpwd.texas.gov/gis/rtest/).

H. Cultural Resources Impact

Cultural resources impact 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, including locations; buildings; and features with scientific, cultural, or historic value. It is assumed that no WMSs negatively affect cultural resources. Mitigation costs are included for strategies that require infrastructure, so it is assumed that none would be built in a location or way that disrupts culturally sensitive locations.

I. Reliability

Reliability is an assessment of the availability of the specified water quantity to the user over time. If the quantity of water is available to the user all the time, then the strategy has a high reliability. If the quantity of water is contingent on other factors, reliability will be lower. This strategy was developed in accordance with WAM and/or MAG values for the appropriate area. As such, WMSs associated with new/improved infrastructure or distribution system or facilities expansions are considered to be reliable supply (reliability score = 5) that will not compromise the DFCs as established by the MAG or the environmental flow standards as established by 30 TAC §298. The reliability of on/off-channel reservoirs is also projected to be high (reliability score = 5).

J. Bays, Estuaries, and Arms of the Gulf of Mexico

The environmental effects due to implementation of upstream WMS projects on bays, estuaries, and arms of the Gulf of Mexico are quantitatively assessed and reported. Water bodies designated as classified segments by the TCEQ that are within or downstream of Region M include the Brownsville Ship Channel, South Bay, Laguna Madre, and the Gulf of Mexico. Effects to these water bodies were quantified by estimating whether the project is anticipated to decrease freshwater inflow in these classified water bodies.

A WMS project received a "1" if it is expected to decrease freshwater inflow into a classified water body. If a strategy were to increase freshwater inflow or otherwise have little to no impact on inflows, then the project would receive a zero.

A summary of the identified and quantified environmental impacts for recommended and alternative municipal infrastructure is presented in Table 5-111.

Table 5-111 Environmental Impacts of Recommended Regional Water Supply Facilities Strategies

Entity	WMS Name	Yield*	A	B	C	D	E	F	G	H	I	J
HCDD #1	Delta Region Water Management Supply	5,600	557	613	468	0	1	557	8	0	5	1
*First decade of implementation yield (acft/yr).												

5.3 Alternative Water Management Strategies

This section of Chapter 5 presents the evaluation of alternative water management strategies (WMS). Alternative WMSs are defined as a fully evaluated WMS that may be substituted into a Regional Water Plan if a recommended WMS is no longer recommended. In some cases, alternative strategies are included as alternative because they are identified as a “Plan B” for a project sponsor. In other cases, it is because the yield volumes are larger than what can be justified under existing water availability or the RWPG feels it does not meet their criteria for a recommended WMS, such as due to high cost or significant environmental impacts.

5.3.1 Reuse (Alternative)

Wastewater reuse is defined as the types of projects that utilize treated wastewater effluent as a replacement for water supply, reducing the overall demand for fresh water supply. Wastewater reuse can be classified into two major types, defined by how the reuse water is handled. Direct reuse involves introducing treated wastewater directly from a wastewater plant to the place of use. For example, piping treated wastewater from a wastewater treatment plant (WWTP) to a golf course. Indirect reuse involves discharging treated wastewater to an environmental buffer like a river, aquifer, or lake for subsequent use. Virtually any water supply entity with a WWTP could pursue a reuse alternative, provided that downstream water rights do not have a claim for the entire return flow. Both direct and indirect wastewater reuse can be applied to potable and non-potable uses. See Subsections 5.2.5.1 and 5.2.5.2 for additional details on non-potable and potable reuse.

Four water management strategies have been included as alternative strategies in the 2026 Plan. Three are non-potable and one is potable. They are included as follows:

- Agua SUD – Non-Potable Reuse.
- La Feria – Non-Potable Reuse.
- San Benito – Non-Potable Reuse.
- San Benito – Direct Potable Reuse.

Environmental impacts are described in Section 5.2.1.5.

5.3.1.1 Agua SUD – Non-Potable Reuse (Alternative)

Project Source

This strategy was submitted by the Agua SUD to the RWPG.

Description

The Agua SUD owns one WWTP (West Agua WWTP) which is located in Sullivan City, Texas. This direct non-potable reuse strategy is to provide Type II reclaimed water currently produced at the West Agua WWTP to individual customers with a need for reuse water.

Available Supply

Because there were no specific customers or uses identified for the non-potable reuse, it was assumed that only 5 percent of Agua SUD's 2030 WUG demand could be met by non-potable reuse. Therefore, this strategy was sized to produce 350 acft/yr, beginning in 2030.

Engineering and Costing

Costs for this strategy from the UCM include tertiary treatment at the WWTP and storage. The submitted strategy discussed having customers receive the reclaimed water at the WWTP; therefore, no pumping or piping costs were included. It is assumed the storage will fit on the existing property, so no land acquisition costs were included. Table 5-112 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

Approval for a reclaimed water system is needed from TCEQ.

Table 5-112 Agua SUD – Non-Potable Reuse Project Costs (Alternative)

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$4,566,000	$6,366,000	$901,000	$2,574	$1,294

5.3.1.2 La Feria – Non-Potable Reuse (Alternative)

Project Source

This strategy was submitted by La Feria to the RWPG and has been adapted from the 2016 RWP.

Description

La Feria currently uses wastewater effluent to fill three small lakes in the city's Nature Park. This direct non-potable reuse strategy involves adding tertiary treatment to the WWTP and using additional effluent to irrigate the native vegetation at the park.

Available Supply

The WWTP has a rated capacity of 1.25 mgd and a 2013 daily average of 0.38 mgd. A portion of the WWTP effluent is already conveyed to Nature Park, so according to current flows, an additional 0.155 mgd could be available. Because demand projections for La Feria are fairly flat this planning cycle, the projected limitation of reuse water available is the additional 0.155 mgd, or 170 acft/yr. This WMS could enable a supply volume of 50 acft/yr in 2030, increasing to a full supply of 170 acft/yr in 2040.

Although a certain amount of water is available to use for irrigation; because the plants at Nature Park are native vegetation, no additional irrigation should be required for them. Therefore, this management strategy is not recommended and is listed as an alternative because it does not necessarily displace any the demand shown for La Feria.

Engineering and Costing

To establish this management strategy, tertiary treatment would be added to the WWTP and additional pumping and piping would be needed to convey the reclaimed water to the park. Stainless steel disk, cloth media filters would be installed to further treat the wastewater effluent. A ground storage tank would also be included to provide one day's worth of storage. It is assumed that the construction period would be 1 year.

Table 5-113 outlines the project costs developed in the UCM. Treatment Level 2 was used on the UCM spreadsheet to estimate the costs for addition of the cloth media filters. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

TCEQ approval for a reclaimed water system is needed. Construction of the new pipeline may also include any of the following permits: USACE Section 404 permit; TPWD sand, shell, gravel, and marl permit; TPDES Storm Water Pollution Prevention Plan; and TXDOT right-of-way permit.

Table 5-113 La Feria – Non-Potable Reuse Project Costs (Alternative)

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$3,938,000	$5,620,000	$627,000	$3,688	$3,938,000

5.3.1.3 San Benito– Non-Potable Reuse (Alternative)

Project Source

This strategy was submitted by the San Benito to the RWPG.

Description

This indirect non-potable reuse strategy involves diverting a portion of WWTP effluent to a canal for irrigation use. A map depicting the approximate alignment of the reuse pipeline is shown on Figure 5-17.

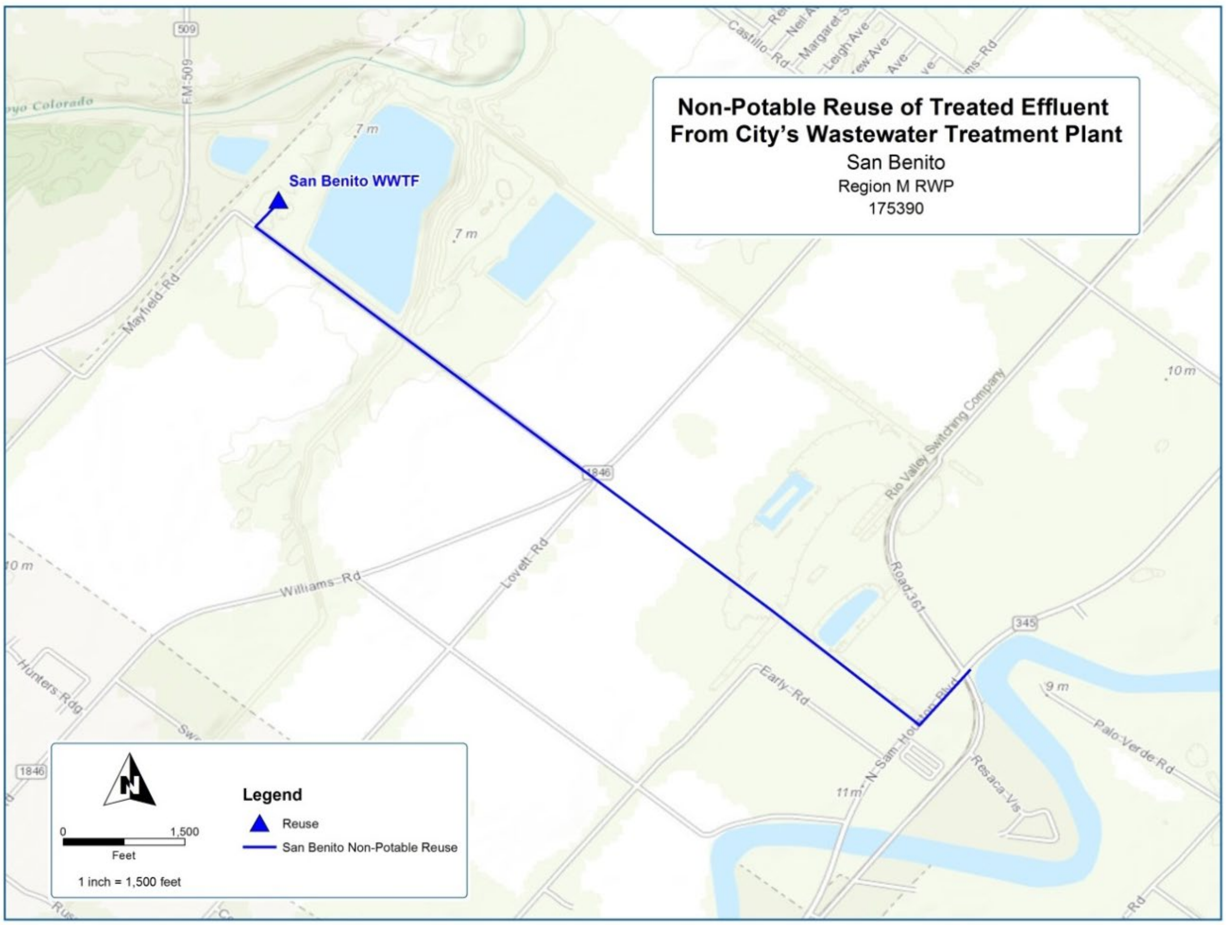

Figure 5-17 San Benito - Non-Potable Reuse Pipeline Location

Available Supply

The San Benito WWTP currently discharges 2.3 mgd of effluent into a minor stream that feeds the Arroyo Colorado. Of this, 1,120 acft/yr would be diverted and used to supplement the flows in the irrigation canal for Cameron County Irrigation use. It is assumed this strategy would be implemented beginning in 2030 and carried through to 2080.

Engineering and Costing

This project would require modifications to the WWTP's effluent pump station and a new pipeline. It is assumed that the construction period would be 1 year. No additional treatment is assumed. Table 5-114 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

TCEQ approval for a reclaimed water system is needed. Construction of the new pipeline may also include any of the following permits: USACE Section 404 permit; TPWD sand, shell, gravel, and marl permit; TPDES Storm Water Pollution Prevention Plan; and TXDOT right-of-way permit.

Use of any ID canals to convey recycled water (specifically Cameron County ID No. 2 listed here), would require a permit from the ID.

Table 5-114 San Benito – Non-Potable Reuse Project Costs (Alternative)

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$2,967,000	$4,233,000	$370,000	$330	$66

5.3.1.4 San Benito – Direct Potable Reuse (Alternative)

Project Source

This strategy was submitted by the San Benito to the RWPG.

Description

A modular WTP would be built to provide additional treatment for the treated wastewater effluent to bring it to potable water standards. The direct potable reuse water would then serve potable water needs for the north portion of San Benito.

Available Supply

The San Benito WWTP currently discharges 2.3 mgd of effluent into a minor stream. Due to the projected slow growth in demand this planning cycle, it is assumed that 1 mgd, or 1,120 acft/yr, would be produced from the modular treatment plant by 2040 and kept constant throughout the planning cycle.

Engineering and Costing

This project consists of a new modular advanced WTP, pump station, 3-mile, 8" transmission pipeline, and storage tank to bring the reuse water into the utility's distribution system. It is assumed that the construction period would be 2 years. Table 5-115 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

TCEQ approval for a reclaimed water system is needed. Construction of the new pipelines may also include any of the following permits: USACE Section 404 permit; TPWD sand, shell, gravel, and marl permit; TPDES Storm Water Pollution Prevention Plan; and TXDOT right-of-way permit. Additionally, local public opinion of potable reuse would have to be taken into account and a public relations campaign may be required.

Table 5-115 San Benito – Direct Potable Reuse Project Costs (Alternative)

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$19,410,000	$28,025,000	$3,533,000	$3,154	$1,396

5.3.1.5 Environmental Impacts of Alternative Reuse Strategies

Potential environment impacts for alternative reuse strategies have been identified and categorized as described below. The letters identifying each section correspond to the headings in Table 5-116.

A. Acres Impacted Permanently

Acres impacted permanently refers to the total amount of area that will be permanently impacted because of the implementation of a strategy. The following conservative assumptions were made (unless more detailed information for a specific facility was available):

- The acres impacted for pipelines is equivalent to the ROW easements required; it is assumed 100-feet for ROW unless otherwise known; and
- WTP impacts are estimated using UCM, which is based on the plant capacity.

B. Construction Impacted Acreage

Temporary environmental impacts may be seen during construction activities, such as increased air and noise pollution, and land disturbance activities. However, these effects are typical of any construction project. The construction impacted acreage was estimated as 110 percent (rounded up to a whole number) of the permanently impacted acreage.

C. Agricultural Resources Impacted Acreage

Agricultural resources impact acreage is a consolidation of vegetation and land use types specific to Region – row crops, grass farms, and orchards - identified in the TPWD EMST. This GIS mapping data was overlain WMS locations to estimate the agricultural impact acreage from the implementation of the associated strategy.

D. Wetland Impact

The wetland impact refers to the probability that implementation of a WMS will affect a wetland. The location of wetlands in the region was determined using the NWI located at http://www.fws.gov/wetlands/Data/Mapper.html.

A strategy received a "1" if all or part of the strategy is located in a wetland or if it is in close proximity to where construction activities are likely to impact the wetland. All other strategies received zeros. If the exact location of project is unknown it was given a zero because it was assumed that it would be located on a site that would not affect and wetland.

E. Habitat Impacted Acreage

Habitat impacted acreage refers to how the strategy will impact the habitat of the local area. The more area that is impacted because of the implementation of the strategy, the more the habitat of the area will be disrupted. Therefore, it was assumed that the permanent acreage impacted for a WMS is what would impact habitats.

F. Threatened and Endangered Species Count

Threatened and endangered species count refers to how the strategy will impact those species in the area once implemented. The species impact was quantified based on the number of federally-listed threatened and endangered species located within the county of the strategy. The number of threatened and endangered species came from the TPWD Rare, Threatened, and Endangered Species of Texas database (http://tpwd.texas.gov/gis/rtest/).

G. Cultural Resources Impact

Cultural resources impact 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, which also include locations; buildings; and features with scientific, cultural, or historic value. It is assumed that no WMSs negatively affect cultural resources. Mitigation costs are included for strategies that require infrastructure so it is assumed that none would be built in a location or way that disrupts culturally sensitive locations.

H. Reduction in WWTP Effluent (acft/yr)

Environmental impacts may be seen because of lower WWTP effluent flows to the discharge streams for wastewater effluent reuse strategies. These impacts could include the following:

- Decreases to the stream flow/level.
- Change in the water quality by reducing the organic levels.
- Effects to fish and wildlife that inhabit the streams.

I. Reliability

Reliability is an assessment of the availability of the specified water quantity to the user over time. If the quantity of water is available to the user all the time, then the strategy has a high reliability. If the quantity of water is contingent on other factors, reliability will be lower. Supply amounts for this strategy were developed based on estimates of water use and related return flows to specific wastewater treatment plants. Where applicable, consideration was given for specific minimum by-pass flow requirements where required by water rights. This strategy is considered highly reliable (reliability score = 5). There is potential for the reuse supplies to develop at a faster or slower rate, depending on the volume of return flows.

J. Bays, Estuaries, and Arms of the Gulf of Mexico

The environmental effects due to implementation of upstream WMS projects on bays, estuaries, and arms of the Gulf of Mexico are quantitatively assessed and reported. Water bodies designated as classified segments by the TCEQ that are within or downstream of Region M include the Brownsville Ship Channel, South Bay, Laguna Madre, and Gulf of Mexico. Effects to these water bodies were quantified by estimating whether the project is anticipated to decrease freshwater inflow in these classified water bodies.

A WMS project received a "1" if it is expected to decrease freshwater inflow into a classified water body. If a strategy were to increase freshwater inflow or otherwise have little to no impact on inflows, then the project would receive a zero.

A summary of the identified and quantified environmental impacts for alternative reuse projects is presented in Table 5-116.

Table 5-116 Environmental Impacts of Alternative Reuse Strategies

Entity	WMS Name	Yield*	A	B	C	D	E	F	G	H	I	J
Agua SUD	Non-Potable Wastewater Effluent Reuse**	350	140	154	0	0	140	8	0	350	5	1
La Feria	Non-Potable Wastewater Effluent Reuse**	50	13	15	0	0	13	25	0	170	5	1
San Benito	Non-Potable Wastewater Effluent Reuse**	1,120	32	35	0	0	32	25	0	1120	5	1
San Benito	Potable Wastewater Effluent Reuse**	1,120	44	48	0	0	44	25	0	1120	5	1
* First decade of implementation yield (acft/yr).												

5.3.2 New or Expanded Surface Water Treatment (Alternative)

New or expanded surface water treatment strategies refers to developing additional surface water treatment infrastructure (treatment plants) to remove bottlenecks that have limited the amount of water that can be supplied.

For the 2026 planning cycle, projects from the previous cycle were carried forward and modified as needed. The four alternative strategies include:

- East Rio Hondo WSC – North Harlingen Surface WTP Phase II with IBT.
- Elsa – WTP Expansion and Interconnect to Engleman ID
- Laredo – El Pico WTP Expansion Phases 1-4
- North Alamo WSC – WTP No. 5 Expansion

Environmental impacts are described in Section 5.3.2.5.

5.3.2.1 East Rio Hondo WSC – North Harlingen Surface WTP Phase II with IBT (Alternative)

Project Source

This strategy was submitted by ERHWSC to the RWPG concurrently with the recommended Phase I portion of the project during the 2016 regional water planning process.

Description

Phase II includes a WTP expansion, with inter-basin transfer of surface water with a proposed implementation decade of 2050.

Available Supply

The treatment plant expansions would be designed for an additional 2.3 mgd capacity. Through Phase II, the surface WTP would treat approximately 3,760 acft/yr from the Phase I portion and an additional 2,500 acft/yr, that requires up to 2,500 acft of converted irrigation water rights.

Engineering and Costing

As detailed above, costs for this strategy from the UCM include expanding the WTP, with inter-basin transfer of surface water. The pipeline and pump station were assumed to be built full-size during Phase I, so no additional costs are included for those items. Costs associated with the purchase of surface water rights is included under the Conversion of Surface Water Rights water management strategy. No additional land acquisition is assumed for this phase. It is assumed that the construction period for this strategy is 1 year. Because of the needs of ERHWSC, only Phase I is recommended, and Phase II has remained an alternative this planning cycle. Table 5-117 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

The availability of surface water rights required to supply the treatment plant expansion is a potential implementation issue.

Table 5-117 East Rio Hondo WSC – North Harlingen Surface WTP Phase II with IBT Project Costs (Alternative)

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$10,599,000	$14,775,000	$1,975,000	$790	$374

5.3.2.2 Elsa – WTP Expansion and Interconnect to Engleman ID (Alternative)

Project Source

This strategy was submitted by Elsa to the RWPG during the 2016 regional water planning process.

Description

This strategy is for an interconnect between Elsa and Engleman ID. Hidalgo County ID No. 9 is currently the sole source for Elsa raw water. This strategy would provide Elsa with a reliable second source of raw water in case of drought or when a supply is down for an extended period of time for system repairs. It also includes an expansion of Elsa's WTP.

Available Supply

Based on updated demand projections for the 2026 planning cycle, this strategy would expand Elsa's WTP by 1 mgd (1,120 acft/yr) by the 2030 decade.

Engineering and Costing

Costs for this strategy from the UCM include a 1 mgd WTP expansion, a 10”, 2.4-mile pipeline, and pipeline right-of-way. It is assumed that the construction period for this strategy is 1 year. Table 5-118 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

No implementation issues have been identified at this time.

Table 5-118 Elsa – WTP Expansion and Interconnect to Engleman ID Project Costs (Alternative)

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$10,089,000	$14,207,000	$1,795,000	$1,603	$711

5.3.2.3 Laredo – El Pico WTP Expansion Phases 1-4 (Alternative)

5.3.2.3.1 Laredo - El Pico Water Treatment Plant – Phase 1 Expansion

Project Source

This strategy was submitted by Laredo to the RWPG during the 2016 regional water planning process.

Description

This strategy is for the expansion of the El Pico WTP from 20 mgd to 45 mgd. This expansion would occur by 2030.

Available Supply

Expanding the plant would supply an additional 25 mgd (28,000 acft/yr) of drinking water.

Engineering and Costing

Costs for this strategy from the UCM include only water treatment expansion and land acquisition. It is assumed that the construction period for this strategy is 1.5 years. Table 5-119 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

Necessary state and federal permits must be obtained before construction can begin. Additionally, an available surface water supply would need to be assured for the capacity of this expansion. Laredo’s existing supplies should be able to supply the needed water for this expansion.

Table 5-119 Laredo - El Pico Water Treatment Plant – Phase 1 Expansion Project Costs (Alternative)

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$57,022,000	$80,900,000	$9,684,000	$346	$143

5.3.2.3.2 Laredo - El Pico Water Treatment Plant – Phase 2 Expansion

Project Source

This strategy was submitted by Laredo to the RWPG during the 2016 regional water planning process.

Description

This strategy is to expand the El Pico WTP from 45 mgd to 70 mgd. This expansion would occur by 2040.

Available Supply

Expanding the plant would supply an additional 25 mgd (28,000 acft/yr) of drinking water.

Engineering and Costing

Costs for this strategy from the UCM include only water treatment expansion and land acquisition. It is assumed that the construction period for this strategy is 1.5 years. Table 5-120 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

As with any project, necessary state and federal permits must be obtained before construction can begin. Additionally, an available surface water supply would need to be assured for the capacity of this expansion. Existing supplies plus the purchase of available surface water rights should meet the supply needed.

Table 5-120 Laredo - El Pico Water Treatment Plant – Phase 2 Expansion Project Costs (Alternative)

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$57,022,000	$80,900,000	$9,684,000	$346	$143

5.3.2.3.3 Laredo - El Pico Water Treatment Plant – Phase 3 Expansion

Project Source

This strategy was submitted by Laredo to the RWPG during the 2016 regional water planning process.

Description

This strategy is to expand the El Pico WTP from 70 mgd to 100 mgd. This expansion would occur by 2060.

Available Supply

Expanding the plant would supply an additional 30 mgd (33,600 acft/yr) of drinking water.

Engineering and Costing

Costs for this strategy from the UCM include only water treatment expansion and land acquisition, assuming 1.5 years for construction. Table 5-121 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

As with any project, necessary state and federal permits must be obtained before construction can begin. Additionally, an available surface water supply would need to be assured for the capacity of this expansion. There should be available surface water rights for purchase in the 2060 decade that would meet the supply needs.

Table 5-121 Laredo - El Pico Water Treatment Plant – Phase 3 Expansion Project Costs (Alternative)

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$66,425,000	$94,247,000	$11,281,000	$336	$138

5.3.2.3.4 Laredo - El Pico Water Treatment Plant – Phase 4 Expansion

Project Source

This strategy was submitted by Laredo to the RWPG during the 2016 regional water planning process.

Description

This strategy is to expand the El Pico WTP from 100 mgd to 130 mgd by 2080.

Available Supply

Expanding the plant would supply an additional 30 mgd (33,600 acft/yr) of drinking water.

Engineering and Costing

Costs for this strategy from the UCM include only water treatment expansion and land acquisition, and 1.5 years assumed for construction. Table 5-122 details the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

As with any project, necessary state and federal permits must be obtained before construction can begin. Additionally, an available surface water supply would need to be assured for the capacity of this expansion. By 2080, there should be available surface water rights for purchase that can supply this project.

Table 5-122 Laredo - El Pico Water Treatment Plant – Phase 4 Expansion Project Costs (Alternative)

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$66,425,000	$94,247,000	$11,281,000	$336	$138

5.3.2.4 North Alamo WSC – WTP No. 5 Expansion (Alternative)

Project Source

This strategy was originally submitted by NAWSC to the RWPG during the 2016 regional water planning process.

Description

This strategy is for the expansion of WTP No. 5 and a 16-inch waterline. The expansion would serve residents within the Weslaco, Donna, Alamo, and surrounding areas. This strategy would also hydraulically interconnect the NAWSC distribution system, allowing for utilization of other water districts in time of drought for push water. It would also provide the NAWSC the ability to utilize other water districts as a source of push water for delivery of water in times of drought. Acquisition of surface water rights through urbanization is required for this strategy.

Available Supply

The expansion of WTP No. 5 would provide NAWSC with capacity to treat an additional 4 mgd of drinking water. In 2030, it is assumed the water rights are available for the plant to supply the full treatment capacity of 4,480 acft/yr. However, because of supplies from other sources and strategies, this strategy is now an alternative for this planning cycle.

Engineering and Costing

Costs for this strategy from the UCM include a 4 mgd WTP expansion, a pump station, and a 16”, 4.2-mile pipeline. Costs associated with the purchase of water rights is included separately under the Conversion of Surface Water Rights water management strategy. Land acquisition costs are only assumed for pipeline right-of-way. It is assumed that the construction period for this strategy is 1 year. Table 5-123 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

The project would be constructed within existing easements and rights-of-way; however, as with any project, necessary state and federal permits must be obtained before construction can begin.

Table 5-123 North Alamo WSC – WTP No. 5 Expansion Project Costs (Alternative)

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$23,422,000	$32,799,000	$3,704,000	$827	$313

5.3.2.5 Environmental Impacts of Alternative New or Expanded Surface Water Treatment Strategies

Potential environment impacts for alternative water infrastructure systems strategies have been identified and categorized as described below. The letters identifying each section correspond to the headings in Table 5-124.

A. Acres Impacted Permanently

Acres impacted permanently refers to the total amount of area that will be permanently impacted because of the implementation of a strategy. The following conservative assumptions were made (unless more detailed information for a specific was available):

- The acreage impacted for pipelines is equivalent to the right-of-way (ROW) easements required; it is assumed 50 feet for ROW unless otherwise known.
- WTP impacts are estimated using UCM, which is based on the plant type and capacity.

B. Construction Impacted Acreage

Temporary environmental impacts may be seen during construction activities, such as increased air and noise pollution, and land disturbance activities. However, these effects are typical of any construction project. The construction impacted acreage was estimated as 110 percent (rounded up to a whole number) of the permanently impacted acreage.

C. Inundation Acreage

The inundation acreage applies to reservoirs only and is equal to the amount of land that will be inundated by the construction of the reservoir.

D. Agricultural Resources Impacted Acreage

Agricultural resources impact acreage is a consolidation of vegetation and land use types specific to Region – row crops, grass farms, and orchards - identified in the TPWD EMST. This GIS mapping data was overlain WMS locations to estimate the agricultural impact acreage from the implementation of the associated strategy.

E. Wetland Impact

The wetland impact refers to the probability that implementation of a WMS will affect a wetland. The location of wetlands in the region was determined using the National Wetlands Inventory (NWI) located at http://www.fws.gov/wetlands/Data/Mapper.html.

A strategy received a "1" if all or part of the strategy is located in a wetland or if it is close enough to where construction activities are likely to impact the wetland. All other strategies received zeros. If the exact location of project is unknown, it was given a zero because it was assumed that it would be located on a site that would not affect any wetland.

F. Habitat Impacted Acreage

Habitat impacted acreage refers to how the strategy will impact the habitat of the local area. The more area that is impacted because of the implementation of the strategy, the more the habitat of the area will be disrupted. Therefore, it was assumed that the permanent acreage impacted for a WMS is what would impact habitats.

G. Threatened and Endangered Species Count

Threatened and endangered species count refers to how the strategy will impact those species in the area once implemented. This impact was quantified based on the number of federally-listed threatened and endangered species located within the county of the strategy. The number of threatened and endangered species came from the Texas Parks and Wildlife Department (TPWD) Rare, Threatened, and Endangered Species of Texas database (http://tpwd.texas.gov/gis/rtest/).

H. Cultural Resources Impact

Cultural resources impact 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, including locations; buildings; and features with scientific, cultural, or historic value. It is assumed that no WMSs negatively affect cultural resources. Mitigation costs are included for strategies that require infrastructure, so it is assumed that none would be built in a location or way that disrupts culturally sensitive locations.

I. Reliability

Reliability is an assessment of the availability of the specified water quantity to the user over time. If the quantity of water is available to the user all the time, then the strategy has a high reliability. If the quantity of water is contingent on other factors, reliability will be lower. This strategy was developed in accordance with WAM and/or MAG values for the appropriate area. As such, WMSs associated with new/improved infrastructure or distribution system or facilities expansions are considered to be reliable supply (reliability score = 5) that will not compromise the DFCs as established by the MAG or the environmental flow standards as established by 30 TAC §298.

J. Bays, Estuaries, and Arms of the Gulf of Mexico

The environmental effects due to implementation of upstream WMS projects on bays, estuaries, and arms of the Gulf of Mexico are quantitatively assessed and reported. Water bodies designated as classified segments by the TCEQ that are within or downstream of Region M include the Brownsville Ship Channel, South Bay, Laguna Madre, and the Gulf of Mexico. Effects to these water bodies were quantified by estimating whether the project is anticipated to decrease freshwater inflow in these classified water bodies.

A WMS project received a "1" if it is expected to decrease freshwater inflow into a classified water body. If a strategy were to increase freshwater inflow or otherwise have little to no impact on inflows, then the project would receive a zero.

A summary of the identified and quantified environmental impacts for alternative new or expanded surface water treatment infrastructure is presented in Table 5-124.

Table 5-124 Environmental Impacts of Alternative New or Expanded Surface Water Treatment Strategies

Entity	WMS Name	Yield*	A	B	C	D	E	F	G	H	I	J
ERHWSC	Surface WTP Phase II with Inter-Basin Transfer of Surface Water	2,500	2	3	0	0	0	1	25	0	5	1
Elsa	WTP Expansion and Interconnect to Engleman ID	1,120	1	2	0	0	0	1	8	0	5	1
Laredo	El Pico WTP Expansion (Phase 1-4)	28,000	13	14	0	0	0	13	4	0	5	1
NAWSC	Expansion of WTP No. 5	4,480	2	3	0	0	0	2	8	0	5	1
*First decade of implementation yield (acft/yr).												

5.3.3 Storage Reservoirs (Alternative)

Storage reservoirs include both on-channel and off-channel new storage in the region. In some cases, other strategy categories contain projects that also include small storage ponds/reservoirs that are included within the larger project. They are not included in this section.

There is one alternative storage reservoir strategy included for the 2026 planning cycle, which is the Brownsville/Matamoros Weir and Reservoir.

5.3.3.1 Brownsville PUB – Brownsville/Matamoros Weir and Reservoir (Alternative)

Project Source

This strategy was submitted by Brownsville to the RWPG during the 2016 regional water planning process.

Description

This strategy is for the construction of a weir and on-channel reservoir to capture and store excess river flow for an additional water supply in the lower Rio Grande Valley. The weir and reservoir would be located about four miles southeast of Brownsville. This project is on hold pending approval from Mexico.

Available Supply

BPUB currently has authorization to divert up to 40,000 acft/yr of "excess flows" from the Rio Grande under TCEQ Permit No. 1838. Excess flows are defined as all US waters passing the Brownsville gauging station above 25 cfs. Excess US river flows will be impounded in the Brownsville Reservoir under BPUB's TCEQ water rights Permit No. 5259. . For the 2026 planning cycle, the Rio Grande WAM has been updated with naturalized flows through 2018 and a new drought-of-record period, as well as the correction of an error related to Permit No. 1838 that was in previous versions of the WAM. As a result, the estimated firm yield of 2,035 acft/yr is much lower than in previous plans. Planned implementation is before 2040.

Engineering and Costing

Costs for this strategy from the UCM include an on-channel reservoir (using a weir) and land acquisition. It is assumed that the construction period for this strategy is one year. This cost estimate is representative of 300 acres for the Reservoir footprint and conservation pool. Table 5-125 outlines the project costs developed in the UCM. The full UCM project cost estimate summary is provided in Appendix 5D.

Implementation Issues

Environmental issues include impacts on water quality (i.e., increased salinity) within and downstream of the reservoir, impacts to aquatic and riparian habitat as a result of changes in downstream flow and salinity patterns, potential impacts to habitat from reservoir construction and inundation, potential adverse impacts to the Audubon Society's Sabal Palm Sanctuary, and increased risk of flooding. The project sponsors have indicated their intent to operate the proposed project to mitigate these concerns; resource advocates remain concerned about these issues.

TCEQ issued a water right permit for the Brownsville Weir and Reservoir Project in 2000. This permit authorizes the construction of the Brownsville Weir on the Rio Grande and impoundment of 6,000 acft of Rio Grande water in the Brownsville Reservoir. Special conditions included in this permit require the BPUB to (1) pass a minimum flow of 25 cfs when water is being impounded, (2) pass sufficient water through the reservoir to satisfy demands of downstream water rights holders as directed by the Rio Grande Watermaster, (3) monitor salinity in the Rio Grande downstream of the weir near the riverine/estuarine interface (23.6 river miles upstream from the mouth of the river) and only impound water in the reservoir when the measured salinity is less than an established low salinity condition, and (4) consult with the TCEQ, TPWD, USFWS, and other appropriate agencies to develop and implement an acceptable mitigation plan for the overall Brownsville Weir and Reservoir Project.

The mitigation plan for the project will be developed and finalized through the Section 404/10 process under the authority of the Galveston District of the Corps of Engineers. Environmental issues that have been raised must be satisfactorily addressed through the Section 404/10 federal permitting process and through the IBWC project approval process in order for the project to be authorized. The IBWC will be the lead agency for all discussions and dealings with Mexico that depend on the Section 404/10 permit.

Table 5-125 Brownsville PUB – Brownsville/Matamoros Weir and Reservoir Project Costs (Alternative)

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$9,173,000	$16,569,000	$914,000	$449	$68

5.3.3.2 Environmental Impacts of Alternative Storage Reservoir Strategies

Potential environment impacts for storage reservoir strategies have been identified and categorized as described below. The letters identifying each section correspond to the headings in Table 5-126.

A. Acres Impacted Permanently

Acres impacted permanently refers to the total amount of area that will be permanently impacted because of the implementation of a strategy. The following conservative assumptions were made (unless more detailed information for a specific was available):

- The acreage impacted for pipelines is equivalent to the right-of-way (ROW) easements required; it is assumed 50 feet for ROW unless otherwise known.
- WTP impacts are estimated using UCM, which is based on the plant type and capacity.

B. Construction Impacted Acreage

Temporary environmental impacts may be seen during construction activities, such as increased air and noise pollution, and land disturbance activities. However, these effects are typical of any construction project. The construction impacted acreage was estimated as 110 percent (rounded up to a whole number) of the permanently impacted acreage.

C. Inundation Acreage

The inundation acreage applies to reservoirs only and is equal to the amount of land that will be inundated by the construction of the reservoir.

D. Agricultural Resources Impacted Acreage

Agricultural resources impact acreage is a consolidation of vegetation and land use types specific to Region – row crops, grass farms, and orchards - identified in the TPWD EMST. This GIS mapping data was overlain WMS locations to estimate the agricultural impact acreage from the implementation of the associated strategy.

E. Wetland Impact

The wetland impact refers to the probability that implementation of a WMS will affect a wetland. The location of wetlands in the region was determined using the National Wetlands Inventory (NWI) located at http://www.fws.gov/wetlands/Data/Mapper.html.

A strategy received a "1" if all or part of the strategy is located in a wetland or if it is close enough to where construction activities are likely to impact the wetland. All other strategies received zeros. If the exact location of project is unknown, it was given a zero because it was assumed that it would be located on a site that would not affect any wetland.

F. Habitat Impacted Acreage

Habitat impacted acreage refers to how the strategy will impact the habitat of the local area. The more area that is impacted because of the implementation of the strategy, the more the habitat of the area will be disrupted. Therefore, it was assumed that the permanent acreage impacted for a WMS is what would impact habitats.

G. Threatened and Endangered Species Count

Threatened and endangered species count refers to how the strategy will impact those species in the area once implemented. This impact was quantified based on the number of federally-listed threatened and endangered species located within the county of the strategy. The number of threatened and endangered species came from the Texas Parks and Wildlife Department (TPWD) Rare, Threatened, and Endangered Species of Texas database (http://tpwd.texas.gov/gis/rtest/).

H. Cultural Resources Impact

Cultural resources impact 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, including locations; buildings; and features with scientific, cultural, or historic value. It is assumed that no WMSs negatively affect cultural resources. Mitigation costs are included for strategies that require infrastructure, so it is assumed that none would be built in a location or way that disrupts culturally sensitive locations.

I. Reliability

Reliability is an assessment of the availability of the specified water quantity to the user over time. If the quantity of water is available to the user all the time, then the strategy has a high reliability. If the quantity of water is contingent on other factors, reliability will be lower. This strategy was developed in accordance with WAM and/or MAG values for the appropriate area. As such, WMSs associated with new/improved infrastructure or distribution system or facilities expansions are considered to be reliable supply (reliability score = 5) that will not compromise the DFCs as established by the MAG or the environmental flow standards as established by 30 TAC §298. The reliability of on/off-channel reservoirs is also projected to be high (reliability score = 5).

J. Bays, Estuaries, and Arms of the Gulf of Mexico

The environmental effects due to implementation of upstream WMS projects on bays, estuaries, and arms of the Gulf of Mexico are quantitatively assessed and reported. Water bodies designated as classified segments by the TCEQ that are within or downstream of Region M include the Brownsville Ship Channel, South Bay, Laguna Madre, and the Gulf of Mexico. Effects to these water bodies were quantified by estimating whether the project is anticipated to decrease freshwater inflow in these classified water bodies.

A WMS project received a "1" if it is expected to decrease freshwater inflow into a classified water body. If a strategy were to increase freshwater inflow or otherwise have little to no impact on inflows, then the project would receive a zero.

A summary of the identified and quantified environmental impacts for alternative storage reservoirs is presented in Table 5-126.

Table 5-126 Environmental Impacts of Alternative Storage Reservoir Strategies

Entity	WMS Name	Yield*	A	B	C	D	E	F	G	H	I	J
Brownsville PUB	Brownsville/Matamoros Weir and Reservoir	19,176	300	330	300	0	0	300	25	0	5	1
*First decade of implementation yield (acft/yr).												

5.3.4 New or Expanded Fresh Groundwater Supply (Alternative)

While there is not abundant fresh groundwater available in Region M, there are numerous entities and individuals that rely on minimally treated groundwater to meet their needs. For example, this includes cities that are farther from the Rio Grande and with surface water distribution networks that have few alternative sources and have identified portions of the aquifer(s) that produce acceptable water for municipal use without advanced treatment technology.

For the 2026 planning cycle, three alternative fresh groundwater strategies were carried over from the 2021 cycle, with updates made as needed. The alternative fresh groundwater strategies include:

- McAllen – Expand Fresh Groundwater Phases I and II.

- Mercedes – Expanded Existing Fresh Groundwater Supply.
- Military Highway WSC – Expand Fresh Groundwater.

Environmental impacts are described in Section 5.3.4.4.

5.3.4.1 McAllen – Expand Fresh Groundwater Phases I and II (Alternative)

Project Source

This strategy was recommended in the 2016 RWP and has been updated by the RWPG.

Description

This strategy is to provide additional supply to McAllen with the installation of additional fresh groundwater wells.

Available Supply

The proposed groundwater wells would provide 500 acft/yr from the Gulf Coast Aquifer System in Hidalgo County in Phase I, beginning in 2030, and a total of 1,500 acft/yr once Phase II is implemented by 2060.

Engineering and Costing

This project includes costing for wellfields, including pumps and piping, and disinfection treatment. It is assumed that the construction period for this strategy is 1 years for each phase. Table 5-127 and Table 5-128 outline the project costs developed in the UCM for Phase I and Phase II, respectively. The full UCM project cost estimate summaries are provided in Appendix 5D.

Implementation Issues

No major implementation issues are expected for this strategy. Construction of the new groundwater well and piping may also include a TCEQ well drilling permit, purchase of land, and a TXDOT right-of-way permit. There is no groundwater conservation district within the McAllen service area.

Table 5-127 McAllen – Expand Fresh Groundwater Phase I Project Costs (Alternative)

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$1,309,000	$1,874,000	$190,000	$380	$116

Table 5-128 McAllen – Expand Fresh Groundwater Phase II Project Costs (Alternative)

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$2,663,000	$3,808,000	$367,000	$367	$99

5.3.4.2 Mercedes – Expanded Existing Fresh Groundwater Supply (Alternative)

Project Source

This strategy was recommended in the 2016 RWP and has been updated by the RWPG.

Description

This strategy is to provide additional supply to Mercedes with an additional groundwater well.

Available Supply

The proposed groundwater well would provide 560 acft/yr from the Gulf Coast Aquifer System in Hidalgo County, beginning in 2030.

Engineering and Costing

This project includes costing for wellfields, including pumps and piping, and disinfection treatment. Costs for this strategy from the UCM assumed that the construction period is 1 year. Table 5-129 outlines the project costs developed in the UCM. The full UCM project cost estimate summaries are provided in Appendix 5D.

Implementation Issues

No major implementation issues are expected for this strategy. Construction of the new groundwater well and piping may also include a TCEQ well drilling permit, purchase of land, and a TXDOT right-of-way permit. There is no groundwater conservation district within the Mercedes service area.

Table 5-129 Mercedes – Expanded Existing Fresh Groundwater Supply Project Costs (Alternative)

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$1,358,000	$1,944,000	$197,000	$352	$107

5.3.4.3 Military Highway WSC – Expand Fresh Groundwater Supply

Project Source

This strategy was recommended in the 2016 RWP and has been updated by the RWPG.

Description

This strategy is to provide additional supply to Military Highway WSC in Hidalgo County with the installation of additional fresh groundwater wells.

Available Supply

The proposed groundwater wells would provide 560 acft/yr in 2030 from the Gulf Coast Aquifer System in Hidalgo County.

Engineering and Costing

Costs for this strategy from the UCM include a 350 gpm well with pump, well field piping, land acquisition, and water disinfection. It is assumed that the construction period for this strategy is 1 year per phase. Table 5-130 outlines the project costs developed in the UCM. The full UCM project cost estimate summaries are provided in Appendix 5D.

Implementation Issues

No major implementation issues are expected for this strategy. Construction of the new groundwater well and piping may also include a TCEQ well drilling permit, purchase of land, and a TXDOT right-of-way permit. There is no groundwater conservation district within the Military Highway WSC service area.

Table 5-130 Military Highway WSC – Expand Fresh Groundwater Supply Project Costs (Alternative)

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$1,358,000	$1,944,000	$197,000	$352	$107

5.3.4.4 Environmental Impacts of Alternative Fresh Groundwater Strategies

Potential environment impacts for alternative fresh groundwater strategies have been identified and categorized as described below. The letters identifying each section correspond to the headings in Table 5-131.

A. Acres Impacted Permanently

Acres impacted permanently refer to the total amount of area that will be permanently impacted because of the implementation of a strategy. The following conservative assumptions were made (unless more detailed information for a specific was available):

- The acres impacted for pipelines is equivalent to the ROW easements required; it is assumed 100-feet for ROW unless otherwise known.
- WTP impacts are estimated using UCM, which is based on the plant capacity.
- The impact of wells and wellfields are given by the UCM, which includes 0.5 acre per well.

B. Construction Impacted Acreage

Temporary environmental impacts may be seen during construction activities, such as increased air and noise pollution, and land disturbance activities. However, these effects are typical of any construction project. The construction impacted acreage was estimated as 110 percent (rounded up to a whole number) of the permanently impacted acreage.

C. Agricultural Resources Impacted Acreage

Agricultural resources impact acreage is a consolidation of vegetation and land use types specific to Region – row crops, grass farms, and orchards - identified in the TPWD EMST. This GIS mapping data was overlain WMS locations to estimate the agricultural impact acreage from the implementation of the associated strategy.

D. Wetland Impact

The wetland impact refers to the probability that implementation of a WMS will affect a wetland. The location of wetlands in the Region was determined using the NWI located at http://www.fws.gov/wetlands/Data/Mapper.html.

A strategy received a "1" if all or part of the strategy is located in a wetland or if it is close enough to where construction activities are likely to impact the wetland. All other strategies received zeros. If the exact location of project is unknown it was given a zero because it was assumed that it would be located on a site that would not affect and wetland.

E. Habitat Impacted Acreage

Habitat impacted acreage refers to how the strategy will impact the habitat of the local area. The more area that is impacted because of the implementation of the strategy, the more the habitat of the area will be disrupted. Therefore, it was assumed that the permanent acreage impacted for a WMS is what would impact habitats.

F. Threatened and Endangered Species Count

Threatened and endangered species count refers to how the strategy will impact those species in the area once implemented. This impact was quantified based on the number of federally-listed threatened and endangered species located within the county of the strategy. The number of threatened and endangered species came from the TPWD Rare, Threatened, and Endangered Species of Texas database (http://tpwd.texas.gov/gis/rtest/).

G. Cultural Resources Impact

Cultural resources impact 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, including locations, buildings, and features with scientific, cultural, or historic value. It is assumed that no WMSs negatively affect cultural resources. Mitigation costs are included for strategies that require infrastructure so it is assumed that none would be built in a location or way that disrupts culturally sensitive locations.

H. Reliability

Reliability is an assessment of the availability of the specified water quantity to the user over time. If the quantity of water is available to the user all the time, then the strategy has a high reliability. If the quantity of water is contingent on other factors, reliability will be lower. These strategies were developed in accordance with MAG values for the appropriate aquifer and county. As such, most are considered to be reliable supply (reliability score = 5) that will not compromise the DFCs as established by the relevant GCD (where applicable) and GMA. Some of the strategies may score slightly lower in reliability due to availability of hydrogeologic information from existing nearby wells, potential of differing well productivity and water quality, potential impacts to natural resources and aquifer competition or restrictions.

I. Bays, Estuaries, and Arms of the Gulf of Mexico

The environmental effects due to implementation of upstream WMS projects on bays, estuaries, and arms of the Gulf of Mexico are quantitatively assessed and reported. Water bodies designated as classified segments by the TCEQ that are within or downstream of Region M include the Brownsville Ship Channel, South Bay, Laguna Madre, and Gulf of Mexico. Effects to these water bodies were quantified by estimating whether the project is anticipated to decrease freshwater inflow in these classified water bodies.

A WMS project received a "1" if it is expected to decrease freshwater inflow into a classified water body. If a strategy were to increase freshwater inflow or otherwise have little to no impact on inflows, then the project would receive a zero.

A summary of the identified and quantified environmental impacts for recommended and alternative fresh groundwater projects is presented in Table 5-131.

Table 5-131 Environmental Impacts of Alternative Fresh Groundwater Strategies

Entity	WMS Name	Yield*	A	B	C	D	E	F	G	H	I
McAllen	Expand Existing Groundwater Supply (Phase I-II)	500	9	10	0	0	9	8	0	5	0
Mercedes	Expand Existing Groundwater Supply	560	3	3	0	0	3	8	0	5	0
Military Highway WSC	Expand Existing Groundwater Wells (Hidalgo County)	560	3	3	0	0	3	8	0	5	0
*First decade of implementation yield (acft/yr)											

5.3.5 Seawater Desalination (Alternative)

Seawater desalination still remains one of the more expensive WMSs, but costs have declined over the years as technology has advanced. In addition, as population and water demand grow, there continue to be limits to available resources inland, while seawater has a seemingly vast supply. Texas does not yet have a seawater desalination plant for municipal purposes, but there are multiple currently in the works along the Texas coast.

For the 2026 planning cycle, two alternative seawater desalination strategy were carried over from the 2021 cycle, with updates made.

The alternative seawater desalination strategies included for the 2026 planning cycle are:

- Brownsville PUB – Seawater Desalination Demonstration.
- Brownsville PUB – Seawater Desalination Implementation.

These two strategies are combined together below, but have separate project costs. Environmental impacts are described in Section 5.3.5.2.

5.3.5.1 Brownsville PUB – Seawater Desalination Demonstration and Implementation (Alternative)

Project Source

This strategy was submitted by the City of Brownsville to the RWPG during the 2016 regional water planning process.

Description

This strategy is for the construction of a 2.5 mgd seawater desalination facility on the south shore of the Brownsville Ship Channel. In anticipation of a future expansion to a 25 mgd facility, this strategy includes some full-scale components like the intake system, concentrate disposal system, and land acquisition.

Available Supply

This strategy would start with a desalination demonstration in 2030, supplying 2.5 mgd (2,800 acft/yr) of drinking water. It is assumed that the full-scale, 25 mgd (28,000 acft/yr) desalination facility will be constructed by 2060 when Brownsville's drinking water demand exceeds its current water treatment capacity. A breakdown of the supplies is summarized in Table 5-132.

Table 5-132 Brownsville - Seawater Desalination Demonstration and Implementation WMS Supplies (acft/yr), by Decade (Alternative)

Brownsville	2030	2040	2050	2060	2070	2080
Brownsville	2,603	2,603	2,603	26,022	26,022	26,022
El Jardin WSC	108	108	108	1,081	1,081	1,081
Manufacturing, Cameron	56	56	56	565	565	565
Steam-Electric Power, Cameron	33	33	33	332	332	332
Total WMS Supply	**2,800**	**2,800**	**2,800**	**28,000**	**28,000**	**28,000**

Engineering and Costing

This strategy includes two separate costs. One cost is for the initial 2.5 mgd demonstration, including an intake structure, piping, land acquisition, and treatment. The second cost includes the facility expansion to 25 mgd, including expanded intake structure and pipeline. Infrastructure was sized assuming a treatment efficiency of 50 percent.

This strategy proposes construction and implementation of alternative energy generation facilities, including wind generation and landfill gas reclamation. These options could not be incorporated into the UCM and are not included in the costs presented. Table 5-133 and Table 5-134 outline the project costs developed in the UCM. The full UCM project cost estimate summaries are provided in Appendix 5D.

Implementation Issues

Financing a full-scale seawater desalination facility is a major implementation issue. The BPUB is researching potential federal, state, and local funding sources to help finance this strategy.

Table 5-133 Brownsville – Seawater Desalination Demonstration Project Costs (Alternative)

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$51,060,000	$71,260,000	$11,914,000	$4,255	$2,465

Table 5-134 Brownsville – Seawater Desalination Implementation Project Costs (Alternative)

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$318,823,000	$444,378,000	$75,464,000	$2,995	$1,755

5.3.5.2 Environmental Impacts of Alternative Seawater Desalination Strategies

Potential environment impacts for alternative seawater desalination strategies have been identified and categorized as described below. The letters identifying each section correspond to the headings in Table 5-135.

A. Acres Impacted Permanently

Acres impacted permanently refer to the total amount of area that will be permanently impacted because of the implementation of a strategy. The following conservative assumptions were made (unless more detailed information for a specific was available):

- The acres impacted for pipelines is equivalent to the ROW easements required; it is assumed 100-feet for ROW unless otherwise known.
- WTP impacts are estimated using UCM, which is based on the plant capacity.

B. Construction Impacted Acreage

Temporary environmental impacts may be seen during construction activities, such as increased air and noise pollution, and land disturbance activities. However, these effects are typical of any construction project. The construction impacted acreage was estimated as 110 percent (rounded up to a whole number) of the permanently impacted acreage.

C. Agricultural Resources Impacted Acreage

Agricultural resources impact acreage is a consolidation of vegetation and land use types specific to Region – row crops, grass farms, and orchards - identified in the TPWD EMST. This GIS mapping data was overlain WMS locations to estimate the agricultural impact acreage from the implementation of the associated strategy.

D. Wetland Impact

The wetland impact refers to the probability that implementation of a WMS will affect a wetland. The location of wetlands in the region was determined using the NWI located at http://www.fws.gov/wetlands/Data/Mapper.html.

A strategy received a "1" if all or part of the strategy is located in a wetland or if it is close enough to where construction activities are likely to impact the wetland. All other strategies received zeros. If the exact location of project is unknown it was given a zero because it was assumed that it would be located on a site that would not affect and wetland.

E. Habitat Impacted Acreage

Habitat impacted acreage refers to how the strategy will impact the habitat of the local area. The more area that is impacted because of the implementation of the strategy, the more the habitat of the area

will be disrupted. Therefore, it was assumed that the permanent acreage impacted for a WMS is what would impact habitats.

F. Threatened and Endangered Species Count

Threatened and endangered species count refers to how the strategy will impact those species in the area once implemented. This impact was quantified based on the number of federally-listed threatened and endangered species located within the county of the strategy. The number of threatened and endangered species came from the TPWD Rare, Threatened, and Endangered Species of Texas database (http://tpwd.texas.gov/gis/rtest/).

G. Cultural Resources Impact

Cultural resources impact 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, including locations; buildings; and features with scientific, cultural, or historic value. It is assumed that no WMSs negatively affect cultural resources. Mitigation costs are included for strategies that require infrastructure so it is assumed that none would be built in a location or way that disrupts culturally sensitive locations.

H. Volume of Brine (acft)

The volume of brine quantifies the amount of brine concentrate from the desalination process that is released as surface water discharge. An efficiency of 50 percent was assumed for seawater desalination.

I. TDS of Brine (mg/L)

The TDS of brine provides the concentrate of the brine discharge. This number was calculated by assuming that the TDS of the seawater is 35,000 mg/L. A TDS of 0 mg/L was used for the finished water for both types of desalination.

J. Reliability

Reliability is an assessment of the availability of the specified water quantity to the user over time. If the quantity of water is available to the user all the time, then the strategy has a high reliability. If the quantity of water is contingent on other factors, reliability will be lower. Each desalination water management strategy was assessed on their reliability, varying between medium to high, contingent on factors such as the ability to desalinate and dispose reject water.

K. Bays, Estuaries, and Arms of the Gulf of Mexico

The environmental effects due to implementation of upstream WMS projects on bays, estuaries, and arms of the Gulf of Mexico are quantitatively assessed and reported. Water bodies designated as classified segments by the TCEQ that are within or downstream of Region M include the Brownsville Ship Channel, South Bay, Laguna Madre, and Gulf of Mexico. Effects to these water bodies were quantified by estimating whether the project is anticipated to decrease freshwater inflow in these classified water bodies.

A WMS project received a "1" if it is expected to decrease freshwater inflow into a classified water body. If a strategy were to increase freshwater inflow or otherwise have little to no impact on inflows, then the project would receive a zero.

A summary of the identified and quantified environmental impacts for alternative seawater desalination projects is presented in Table 5-135.

Table 5-135 Environmental Impacts of Alternative Seawater Desalination Strategies

Entity	WMS Name	Yield*	A	B	C	D	E	F	G	H	I	J	K
Brownsville	Seawater Desalination Demonstration	2,800	7	8	0	1	7	25	0	2,800	70,000	4	0
Brownsville	Seawater Desalination Implementation	28,000	17	19	0	1	17	25	0	28,000	70,000	5	0
*First decade of implementation yield (acft/yr).													

5.3.6 Aquifer Storage and Recovery (Alternative)

ASR can be an effective way to assist a water user in management of its water resources and to access a reliable water supply during times of drought. The concept is a water storage system located in an underground aquifer. Water can be pumped into the aquifer when there is excess available and recovered through the same wellfield when it is needed. ASR has benefits over surface water storage because there are no evaporative losses, it does not lose storage capacity because of sedimentation, it requires a smaller footprint, and environmental issues associated with land inundation are minimized. The TAC requires water to meet primary drinking water standards prior to injection and continue to meet the standards while in storage. Therefore, in many circumstances, the water can be pumped straight to the distribution system to meet peak demands and cost savings can be realized by sizing other water facilities to meet average demands.

In 2019, the 86th Texas Legislature passed HB 721, which directs the TWDB to conduct a statewide survey of various aquifers to identify suitability for ASR projects. Additionally, the 86th Texas Legislature passed HB 720, which allows unappropriated water, including storm water and floodwater, to be appropriated for aquifer and ASR projects.[19] ASR is growing to be popular across the state of Texas.

Determination of the specific ASR location is important because an aquifer with suitable storage conditions must be identified and permitted. Geologic assessments must be performed for the proposed wellfield site to determine its suitability. Also, it is preferable to locate the ASR near the water source and/or distribution system to minimize conveyance costs.

Only one ASR project was carried over from the 2021 regional water planning process: Eagle Pass ASR Project. However, due to costs and minimal studies near Eagle Pass, this project remains an alternative WMS. No new ASR projects were submitted for the 2026 planning cycle.

Although there are no specific ASR strategies recommended in the 2026 Regional Water Plan, the Rio Grande RWPG does recommend that municipalities consider ASR in the future. Studies on groundwater in Region M, including the Brackish Water in the Gulf Coast Aquifer; Lower Rio Grande Valley, Texas (BRACS) report, should be used to determine the feasibility of ASR for entities that are considering the

[19] Texas Water Development Board. "Aquifer Storage and Recovery." http://www.twdb.texas.gov/innovativewater/asr/index.asp. 2019.

strategy.[20] The BRACS study contains preliminary evaluations of hydraulic characteristics of the Gulf Coast Aquifer at certain locations in the Lower Rio Grande Valley. the TWDB has funded preliminary ASR feasibility studies for the Brownsville PUB (1997) and the City of Laredo (1999)[21] and Eagle Pass has indicated their interest in a study. Although the studies indicated that ASR is feasible and recommended further investigation, the municipalities chose not to continue evaluation of the technology. The Rio Grande RWPG encourages Brownsville and Laredo to continue to assess ASR and other municipalities to consider the strategy.

5.3.6.1 Eagle Pass – Aquifer Storage and Recovery (Alternative)

Project Source

This strategy was submitted by Eagle Pass to the RWPG.

Description

This strategy is for using ASR for Eagle Pass.

Available Supply

The supply for this WMS will come from Eagle Pass's current supplies, although in the future additional water management strategies may need to be implemented to provide additional supply. When the entity has a surplus of water supplies, the excess water will be injected into the aquifer for storage, assumed to be the Carrizo-Wilcox Aquifer. When Eagle Pass is experiencing water shortage or drought conditions, water can be recovered from the aquifer and delivered throughout its system. For the purposes of this plan, it is assumed the ASR project will have a capacity of 3,360 acft/yr that would be available by 2040. The strategy water loss of ASR water is assumed to be zero for the purpose of this WMS modeling, but further study is recommended.

Engineering and Costing

Costs for this strategy from the UCM include a new WTP, land acquisition, and a new well field with dual purpose well pumps for both injecting surplus water and recovering the stored water, and well field piping. It is assumed that the construction period for this strategy is 1.5 years. Table 5-136 outlines the project costs developed in the UCM. The full UCM project cost estimate summaries are provided in Appendix 5D.

Implementation Issues

Additional studies will need to be conducted for the feasibility of the project. Appropriate TCEQ permitting is required. Construction of the new groundwater well and piping may also include purchase of land and a TXDOT right-of-way permit.

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[20] John E. Meyer, P.G., Andrea Croskrey, Matthew R. Wise, P.G., Sanjeev Kalaswad, Ph.D., P.G. "Brackish Water in the Gulf Coast Aquifer; Lower Rio Grande Valley, Texas." Texas Water Development Board. 2013.
[21] Matthew Webb. "Aquifer Storage and Recovery in Texas: 2015." TWDB Technical Note 15-04. 2015.

Table 5-136 Eagle Pass – Aquifer Storage and Recovery Project Costs (Alternative)

Facilities Cost	Total Project Cost	Annual Cost	Annual Cost of Water ($ per acft)	Annual Cost of Water After Debt Service ($ per acft)
$56,922,000	$81,870,000	$8,812,000	$2,623	$908

5.3.6.2 Environmental Impacts of Alternative ASR Strategies

The environmental impacts for the alternative Eagle ASR project is discussed below.

A. Acres Impacted Permanently

Acres impacted permanently refers to the total amount of area that will be permanently impacted because of the implementation of a strategy. The following conservative assumptions were made (unless more detailed information for a specific facility was available):

- The acres impacted for pipelines is equivalent to the ROW easements required; it is assumed 100-feet for ROW unless otherwise known;
- WTP impacts are estimated using UCM, which is based on the plant capacity; and
- Wellfield impacts are estimated using the UCM, which is based on the proposed wellfield.

B. Construction Impacted Acreage

Temporary environmental impacts may be seen during construction activities, such as increased air and noise pollution, and land disturbance activities. However, these effects are typical of any construction project. The construction impacted acreage was estimated as 110 percent (rounded up to a whole number) of the permanently impacted acreage.

C. Agricultural Resources Impacted Acreage

Agricultural resources impact acreage is a consolidation of vegetation and land use types specific to Region – row crops, grass farms, and orchards – identified in the TPWD EMST. This GIS mapping data was overlain WMS locations to estimate the agricultural impact acreage from the implementation of the associated strategy.

D. Wetland Impact

The wetland impact refers to the probability that implementation of a WMS will affect a wetland. The location of wetlands in the region was determined using the NWI located at http://www.fws.gov/wetlands/Data/Mapper.html.

A strategy received a "1" if all or part of the strategy is located in a wetland or if it is in close proximity to where construction activities are likely to impact the wetland. All other strategies received zeros. If the exact location of project is unknown it was given a zero because it was assumed that it would be located on a site that would not affect and wetland.

E. Habitat Impacted Acreage

Habitat impacted acreage refers to how the strategy will impact the habitat of the local area. The more area that is impacted because of the implementation of the strategy, the more the habitat of the area

will be disrupted. Therefore, it was assumed that the permanent acreage impacted for a WMS is what would impact habitats.

F. Threatened and Endangered Species Count

Threatened and endangered species count refers to how the strategy will impact those species in the area once implemented. The species impact was quantified based on the number of federally-listed threatened and endangered species located within the county of the strategy. The number of threatened and endangered species came from the TPWD Rare, Threatened, and Endangered Species of Texas database (http://tpwd.texas.gov/gis/rtest/).

G. Cultural Resources Impact

Cultural resources impact 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, which also include locations; buildings; and features with scientific, cultural, or historic value. It is assumed that no WMSs negatively affect cultural resources. Mitigation costs are included for strategies that require infrastructure so it is assumed that none would be built in a location or way that disrupts culturally sensitive locations.

H. Reliability

Reliability is an assessment of the availability of the specified water quantity to the user over time. If the quantity of water is available to the user all the time, then the strategy has a high reliability. If the quantity of water is contingent on other factors, reliability will be lower. Successful ASR development is highly reliable (reliability score = 5). 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.

I. Bays, Estuaries, and Arms of the Gulf of Mexico

The environmental effects due to implementation of upstream WMS projects on bays, estuaries, and arms of the Gulf of Mexico are quantitatively assessed and reported. Water bodies designated as classified segments by the TCEQ that are within or downstream of Region M include the Brownsville Ship Channel, South Bay, Laguna Madre, and Gulf of Mexico. Effects to these water bodies were quantified by estimating whether the project is anticipated to decrease freshwater inflow in these classified water bodies.

A WMS project received a "1" if it is expected to decrease freshwater inflow into a classified water body. If a strategy were to increase freshwater inflow or otherwise have little to no impact on inflows, then the project would receive a zero.

A summary of the identified and quantified environmental impacts for alternative ASR strategies is presented in Table 5-137.

Table 5-137 Environmental Impacts of Alternative ASR Strategies

Entity	WMS Name	Yield*	A	B	C	D	E	F	G	H	I
Eagle Pass	Eagle Pass ASR Project	3,360	2	3	0	0	2	3	0	5	0
*First decade of implementation yield (acft/yr).											

5.4 Considered Water Management Strategies

The TWDB rules require the RWPG to evaluate all potentially feasible water management strategies to meet the Region's identified demand deficits. Feasibility is based on evaluation criteria established by the TWDB and the RWPG including project cost, unit cost, yield, reliability, environmental impact, local preference, and institutional constraints. In some cases, water management strategies were identified or requested and evaluated, but after initial evaluation, were determined by the RWPG or in some cases the potential project sponsor to not be suitable for consideration at this time or the project sponsor decided to no longer include them.

Considered, but not recommended or alternative, strategies include:

- Seawater Desalination project submitted by South Texas Water Private Utilities, LLC.

5.5 Implementation of Certain Water Management Strategies

This subsection is a new requirement for inclusion in the 2026 Regional Water Plans. The purpose of this new subsection is to document the implementation status of certain WMSs that are recommended in the plan to demonstrate the feasibility of each recommended strategy to be fully implemented by the online decade documented in the Regional Water Plan.

The implementation status must be documented for the following types of recommended WMSs with any online planning decade:

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

The status includes key milestones achieved, such as when a WMS sponsor took an affirmative vote or other action to make expenditures necessary to apply for permits and/or perform planning, design, or construction. A table is included in Appendix 5E, which documents these key milestones. The appendix also includes graphics that display the full planning horizon (2030 to 2080) and separate graphical timelines for each project that includes major anticipated, future implementation milestones. The projects that meet the above requirements include:

- Brownsville – Southside WWTP Potable Reuse
- Southmost RWA - Southmost RWA Phase 4 SRWA Wellfield and WTP Expansion
- Laguna Madre Water District – Seawater Desalination Plant

Appendix 5A. Potentially Feasible WMSs for WUGs with Needs

Appendix 5A: Potentially Feasible Water Management Strategies Considered

Every WUG Entity with an Identified Need		**WMSs to be considered by statute[1]**												**Additional WMSs to be considered by rule**								
WUG Name	Maximum need 2030-2080 (af/yr)	conservation - water use reduction	conservation - water loss mitigation	drought management	reuse	management of existing supplies	development of large-scale marine seawater or brackish groundwater	conjunctive use	acquisition of available existing supplies	development of new supplies	development of regional water supply or regional management of water supply facilities	voluntary transfer of water (including regional water banks, sales, leases, options, subordination agreements, and financing agreements)	emergency transfer of water under Section 11.139	system optimization, reallocation of reservoir storage to new uses, contracts, water marketing, enhancement of yield, improvement of water quality	new surface water supply	new groundwater supply	brush management; precipitation enhancement	interbasin transfers of surface water	aquifer storage and recovery	cancellation of water rights	rainwater harvesting	other (biological control of Arundo Donax)
Eagle Pass	-1,486	PF	PF	PF	nPF	nPF	PF	nPF	nPF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	PF	nPF	nPF	nPF
East Rio Hondo WSC	-1,216	PF	PF	PF	nPF	PF	PF	nPF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF
Edinburg	-2,565	PF	PF	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
El Jardin WSC	-224	PF	PF	PF	nPF	PF	nPF	nPF	PF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
El Sauz WSC	-99	PF	PF	PF	nPF	PF	nPF	nPF	PF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
El Tanque WSC	-24	PF	PF	PF	nPF	PF	nPF	nPF	PF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
Hidalgo County MUD 1	-17	PF	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
La Grulla	-1,178	PF	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
La Joya	-337	PF	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
La Villa	-56	PF	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
McAllen	-15,080	PF	PF	PF	PF	PF	PF	nPF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF
Military Highway WSC	-180	PF	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
Mission	-2,764	PF	PF	PF	PF	nPF	PF	nPF	nPF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF
North Alamo WSC	-19,688	PF	PF	PF	nPF	PF	PF	nPF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF
Pharr	-3,244	PF	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
Port Mansfield PUD	-292	PF	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
Primera	-522	PF	PF	PF	nPF	nPF	PF	nPF	nPF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF
Rio Grande City	-1,608	PF	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
Rio WSC	-433	PF	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
Roma	-247	PF	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
Sharyland WSC	-1,516	PF	PF	PF	nPF	PF	PF	nPF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF
Union WSC	-939	PF	PF	PF	nPF	PF	nPF	nPF	PF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
Webb County	-302	PF	PF	PF	nPF	nPF	nPF	nPF	nPF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF
County-Other, Cameron	-2,434	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF
Irrigation, Cameron	-362,076	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF
County-Other, Hidalgo	-964	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF
Irrigation, Hidalgo	-431,254	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF
Mining, Maverick	-3,675	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
Manufacturing, Maverick	-9	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
Irrigation, Maverick	-21,588	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF
County-Other, Starr	-392	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF
Irrigation, Starr	-20,685	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF
County-Other, Webb	-1,117	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF
Irrigation, Webb	-3,348	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF
Irrigation, Willacy	-76,439	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF
County-Other, Zapata	-32	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
Irrigation, Zapata	-3,713	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF

[1] Texas Water Code §16.053(e)(5)

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

PF = considered 'potentially feasible' and therefore evaluated

(all pertinent information for WMS evaluations must be presented in the regional water plan, including for WMSs considered potentially feasible but not recommended)

Appendix 5B. Threatened and Endangered Species by County

County	Taxon	Scientific Name	Common Name	USESA	Description
Cameron	Birds	Falco femoralis septentrionalis	northern aplomado falcon	E	Open country, especially savanna and open woodland, and sometimes in very barren areas; grassy plains and valleys with scattered mesquite, yucca, and cactus; nests in old stick nests of other bird species
Cameron	Birds	Laterallus jamaicensis	black rail	T	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Salt, brackish, and freshwater marshes, pond borders, wet meadows, and grassy swamps; nests in or along edge of marsh, sometimes on damp ground, but usually on mat of previous years dead grasses; nest usually hidden in marsh grass or at base of Salicornia
Cameron	Birds	Charadrius melodus	piping plover	T	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Beaches, sandflats, and dunes along Gulf Coast beaches and adjacent offshore islands. Also spoil islands in the Intracoastal Waterway. Based on the November 30, 1992 Section 6 Job No. 9.1, Piping Plover and Snowy Plover Winter Habitat Status Survey, algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. Sand flats often appear to be preferred over algal flats when both are available, but large portions of sand flats along the Texas coast are available only during low-very low tides and are often completely unavailable during extreme high tides or strong north winds. Beaches appear to serve as a secondary habitat to the flats associated with the primary bays, lagoons, and inter-island passes. Beaches are rarely used on the southern Texas coast, where bayside habitat is always available, and are abandoned as bayside habitats become available on the central and northern coast. However, beaches are probably a vital habitat along the central and northern coast (i.e. north of Padre Island) during periods of extreme high tides that cover the flats. Optimal site characteristics appear to be large in area, sparsely vegetated, continuously available or in close proximity to secondary habitat, and with limited human disturbance.
Cameron	Birds	Calidris canutus rufa	rufa red knot	T	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Habitat: Primarily seacoasts on tidal flats and beaches, herbaceous wetland, and Tidal flat/shore. Bolivar Flats in Galveston County, sandy beaches Mustang Island, few on outer coastal and barrier beaches, tidal mudflats and salt marshes.
Cameron	Birds	Coccyzus americanus	yellow-billed cuckoo	T	In Texas, the populations of concern are found breeding in riparian areas in the Trans Pecos (know as part of the Western Distinct Population Segment). It is the Western DPS that is on the U.S. ESA threatened list and includes the Texas counties Brewster, Culberson, El Paso, Hudspeth, Jeff Davis, and Presidio. Riparian woodlands below 6,000' in elevation consisting of cottonwoods and willows are prime habitat. This species is a long-distant migrant that summers in Texas, but winters mainly in South America. Breeding birds of the Trans Pecos populations typically arrive on their breeding grounds possibly in late April but the peak arrival time is in May. Threats to preferred habitat include hydrologic changes that don't promote the regeneration of cottonwoods and willows, plus livestock browsing and trampling of sapling trees in sensitive riparian areas.
Cameron	Fish	Carcharhinus longimanus	oceanic whitetip shark	T	Habitat description is not available at this time.
Cameron	Fish	Pristis pectinata	smalltooth sawfish	E	Different life history stages have different patterns of habitat use: young of year, Age 1, and Age 2 are dependent upon shallow (<1m), eurahayline waters with red mangrove lined shoreline (Norton et al. 2012). These age classes are often found found very close to shore over muddy and sandy bottoms in sheltered bays, on shallow banks, and in estuaries or river mouths. These age classes can tolerate a wide range of salinities, but will move in and out of protected areas (estuaries) due to changes in flow and salinity (Poulakis and Seitz 2011). Larger juveniles may occupy greater depth strata in areas further from shore as they consistently occupy marine waters. Adult sawfish are encountered in various habitat types (mangrove, oyster reef, seagrass, and coral), in varying salinity regimes and temperatures, and at various water depths, feed on a variety of fish species. Adult female sawfish return to protected estuarine areas to give birth.
Cameron	Fish	Manta birostris	giant manta ray	T	Gulf of Mexico
Cameron	Mammals	Physeter macrocephalus	sperm whale	E	Inhabits tropical, subtropical, and temperate waters world wide, avoiding icey waters. Distribution is highly dependent on their food source (squids, sharks, skates, and fish), breeding, and composition of the pod. In general, this species migrates from north to south in the winter and south to north in the summer; however, individuals in tropical and temperate waters don't seem to migrate at all. Routinely dive to catch their prey (2,000-10,000 feet) and generally occupies water at least 3,300 feet deep near ocean trenches.
Cameron	Mammals	Balaenoptera physalus	finback whale	E	Inhabit tropical, subtropical, temperate, and subpolar waters worldwide, but are less common in the tropics preferring cooler water. Commonly found in deep, offshore waters and migrate in the open ocean from the poles (feeding grounds) to warmer waters in the winter to give birth. They feed on krill, squid, and small schooling fish sometimes with other baleen whale species. They are very rare in the Gulf of Mexico and reported sightings are likely vagrants (Witt et al. 2011).
Cameron	Mammals	Balaenoptera borealis	sei whale	E	Gulf of Mexico
Cameron	Mammals	Balaenoptera musculus	blue whale	E	Inhabits tropical, subtropical, temperate, and subpolar waters worldwide, but are infrequently sighted in the Gulf of Mexico. They migrate seasonally between summer feeding grounds and winter breeeding grounds, but specifics vary. Commonly observed at the surface in open ocean.
Cameron	Mammals	Balaenoptera ricei	Rice's whale	E	Gulf of Mexico
Cameron	Mammals	Megaptera novaeangliae	humpback whale	E	Inhabits tropical, subtropical, temperate, and subpolar waters world wide. Migrate up to 5,000 miles between colder water (feeding grounds) and warmer water (calving grounds) each year. They will use both open ocean and coastal waters, sometimes including inshore areas such as bays, and are often found near the surface; however, this species is rare in the Gulf of Mexico. The northwest Atlantic/Gulf of Mexico distinct population segment is not considered at risk of extinction and is not listed as Endangered on the Endangered Species Act.
Cameron	Mammals	Eubalaena glacialis	North Atlantic right whale	E	Inhabits subtropical and temperate waters in the northern Atlantic. Commonly found in coastal waters or clsoe to the continental shelf near the surface. They migrate from feeding grounds in cooler waters (Canada and New England) to warmer waters of the southeast US (South Carolina, Georgia, and Florida) to give birth in the fall/winter - both areas are identified as critical habitat by NOAA-NMFS. Nursery areas are in shallow, coastal waters. This species is very rare in the Gulf of Mexico and the few reported sightings are likely vagrants (Ward-Geiger etal 2011).
Cameron	Mammals	Leopardus pardalis	ocelot	E	Restricted to mesquite-thorn scrub and live-oak mottes; avoids open areas. Dense mixed brush below four feet; thorny shrublands; dense chaparral thickets; breeds and raises young June-November.
Cameron	Mammals	Trichechus manatus	West Indian manatee	T	Large rivers, brackish water bays, coastal waters. Warm waters of the tropics, in rivers and brackish bays but may also survive in salt water habitats. Very sensitive to cold water temperatures. Rarely occurring as far north as Texas. Gulf and bay system; opportunistic, aquatic herbivore.
Cameron	Reptiles	Caretta caretta	loggerhead sea turtle	T	Inhabits tropical, subtropical, and temperate waters worldwide, including the Gulf of Mexico. They migrate from feeding grounds to nesting beaches/barrier islands and some nesting does occur in Texas (April to September). Beaches that are narrow, steeply sloped, with coarse-grain sand are preffered for nesting. Newly hatched individuals depend on floating alage/seaweed for protection and foraging, which eventually transport them offshore and into open ocean. Juveniles and young adults spend their lives in open ocean, offshore before migrating to coastal areas to breed and nest. Foraging areas for adults include shallow continental shelf waters.
Cameron	Reptiles	Chelonia mydas	green sea turtle	T	Inhabits tropical, subtropical, and temperate waters worldwide, including the Gulf of Mexico. Adults and juveniles occupy inshore and nearshore areas, including bays and lagoons with reefs and seagrass. They migrate from feeding grounds (open ocean) to nesting grounds (beaches/barrier islands) and some nesting does occur in Texas (April to September). Adults are herbivorous feeding on sea grass and seaweed; juveniles are omnivorous feeding initially on marine invertebrates, then increasingly on sea grasses and seaweeds.
Cameron	Reptiles	Eretmochelys imbricata	Atlantic hawksbill sea turtle	E	Inhabit tropical and subtropical waters worldwide, in the Gulf of Mexico, especially Texas. Hatchling and juveniles are found in open, pelagic ocean and closely associated with floating lgae/seagrass mats. Juveniles then migrate to shallower, coastal areas, mainly coral reefs and rocky areas, but also in bays and estuaries near mangroves when reefs are absent; seldom in water lmore than 65 feet deep. They feed on sponges, jellyfish, sea urchins, molluscs, and crustaceans. Nesting occurs from April to November high up on the beach where there is vegetation for cover and little or no sand. Some migrate, but others stay close to foraging areas - females are philopatric.

County	Taxon	Scientific Name	Common Name	USESA	Description
Cameron	Reptiles	Lepidochelys kempii	Kemp's Ridley sea turtle	E	Inhabits tropical, subtropical, and temperate waters of the northwestern Atlantic Ocean and Gulf of Mexico. Adults are found in coastal waters with muddy or sandy bottoms. Some males migrate between feeding grounds and breeeding grounds, but some don't. Females migrate between feeding and nesting areas, often returning to the same destinations. Nesting in Texas occurs on a smaller scale compared to other areas (i.e. Mexico). Hatchlings are quickly swept out to open water and are rarely found nearshore. Similarly, juveniles often congregate near floating algae/seagrass mats offshore, and move into nearshore, coastal, neritic areas after 1-2 years and remain until they reach maturity. They feed primarily on crabs, but also snails, clams, other crustaceans and plants, juveniles feed on sargassum and its associated fauna; nests April through August
Cameron	Reptiles	Dermochelys coriacea	leatherback sea turtle	E	Inhabit tropical, subtropical, and temperate waters worldwide, including the Gulf of Mexico. Nesting is not common in Texas (March to July). Most pelagic of the seaturtles with the longest migration (>10,000 miles) between nesting and foraging sites. Are able to dive to depths of 4,000 feet. They are omnivorous, showing a preference for jellyfish.
Cameron	Mollusks	Popenaias popeii	Texas hornshell	E	Occurs in small streams to large rivers in slow to moderate current, often residing in rock crevices, travertine shelves, and under large boulders, where small-grained material, such as clay, silt, or sand gathers. Can also occur in riffles that are clean swept of soft silt; not known from reservoirs (Carman 2007; Inoue et al. 2014; Randklev et al. 2017b; Randklev et al. forthcoming). [Mussels of Texas 2019]
Cameron	Plants	Ambrosia cheiranthifolia	South Texas ambrosia	E	Grasslands and mesquite-dominated shrublands on various soils ranging from heavy clays to lighter textured sandy loams, mostly over the Beaumont Formation on the Coastal Plain; in modified unplowed sites such as railroad and highyway right-of-ways, cemeteries, mowed fields, erosional areas along small creeks; Perennial; Flowering July-November
Cameron	Plants	Ayenia limitaris	Texas ayenia	E	Subtropical thorn woodland or tall shrubland on loamy soils of the Rio Grande Delta; known site soils include well-drained, calcareous, sandy clay loam (Hidalgo Series) and neutral to moderately alkaline, fine sandy loam (Willacy Series); also under or among taller shrubs in thorn woodland/thorn shrubland; flowering throughout the year with sufficient rainfall
Hidalgo	Birds	Charadrius melodus	piping plover	T	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Beaches, sandflats, and dunes along Gulf Coast beaches and adjacent offshore islands. Also spoil islands in the Intracoastal Waterway. Based on the November 30, 1992 Section 6 Job No. 9.1, Piping Plover and Snowy Plover Winter Habitat Status Survey, algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. Sand flats often appear to be preferred over algal flats when both are available, but large portions of sand flats along the Texas coast are available only during low-very low tides and are often completely unavailable during extreme high tides or strong north winds. Beaches appear to serve as a secondary habitat to the flats associated with the primary bays, lagoons, and inter-island passes. Beaches are rarely used on the southern Texas coast, where bayside habitat is always available, and are abandoned as bayside habitats become available on the central and northern coast. However, beaches are probably a vital habitat along the central and northern coast (i.e. north of Padre Island) during periods of extreme high tides that cover the flats. Optimal site characteristics appear to be large in area, sparsely vegetated, continuously available or in close proximity to secondary habitat, and with limited human disturbance.
Hidalgo	Birds	Coccyzus americanus	yellow-billed cuckoo	T	In Texas, the populations of concern are found breeding in riparian areas in the Trans Pecos (know as part of the Western Distinct Population Segment). It is the Western DPS that is on the U.S. ESA threatened list and includes the Texas counties Brewster, Culberson, El Paso, Hudspeth, Jeff Davis, and Presidio. Riparian woodlands below 6,000' in elevation consisting of cottonwoods and willows are prime habitat. This species is a long-distant migrant that summers in Texas, but winters mainly in South America. Breeding birds of the Trans Pecos populations typically arrive on their breeding grounds possibly in late April but the peak arrival time is in May. Threats to preferred habitat include hydrologic changes that don't promote the regeneration of cottonwoods and willows, plus livestock browsing and trampling of sapling trees in sensitive riparian areas.
Hidalgo	Birds	Glaucidium brasilianum cactorum	cactus ferruginous pygmy-owl	T	Riparian trees, brush, palm, and mesquite thickets; during day also roosts in small caves and recesses on slopes of low hills; breeding April to June
Hidalgo	Mammals	Leopardus pardalis	ocelot	E	Restricted to mesquite-thorn scrub and live-oak mottes; avoids open areas. Dense mixed brush below four feet; thorny shrublands; dense chaparral thickets; breeds and raises young June-November.
Hidalgo	Mollusks	Popenaias popeii	Texas hornshell	E	Occurs in small streams to large rivers in slow to moderate current, often residing in rock crevices, travertine shelves, and under large boulders, where small-grained material, such as clay, silt, or sand gathers. Can also occur in riffles that are clean swept of soft silt; not known from reservoirs (Carman 2007; Inoue et al. 2014; Randklev et al. 2017b; Randklev et al. forthcoming). [Mussels of Texas 2019]
Hidalgo	Plants	Astrophytum asterias	star cactus	E	Gravelly clays or loams, possibly of the Catarina Series (deep, droughty, saline clays), over the Catahoula and Frio formations, on gentle slopes and flats in sparsely vegetated openings between shrub thickets within mesquite grasslands or mesquite-blackbrush thorn shrublands; plants sink into or below ground during dry periods; flowering from mid March-May, may also flower in warmer months after sufficient rainfall, flowers most reliably in early April; fruiting mid April-June
Hidalgo	Plants	Manihot walkerae	Walker's manioc	E	Periphery of native brush in sandy loam; also on caliche cuestas?; flowering April-September (following rains?)
Hidalgo	Plants	Ayenia limitaris	Texas ayenia	E	Subtropical thorn woodland or tall shrubland on loamy soils of the Rio Grande Delta; known site soils include well-drained, calcareous, sandy clay loam (Hidalgo Series) and neutral to moderately alkaline, fine sandy loam (Willacy Series); also under or among taller shrubs in thorn woodland/thorn shrubland; flowering throughout the year with sufficient rainfall
Jim Hogg	Birds	Coccyzus americanus	yellow-billed cuckoo	T	In Texas, the populations of concern are found breeding in riparian areas in the Trans Pecos (know as part of the Western Distinct Population Segment). It is the Western DPS that is on the U.S. ESA threatened list and includes the Texas counties Brewster, Culberson, El Paso, Hudspeth, Jeff Davis, and Presidio. Riparian woodlands below 6,000' in elevation consisting of cottonwoods and willows are prime habitat. This species is a long-distant migrant that summers in Texas, but winters mainly in South America. Breeding birds of the Trans Pecos populations typically arrive on their breeding grounds possibly in late April but the peak arrival time is in May. Threats to preferred habitat include hydrologic changes that don't promote the regeneration of cottonwoods and willows, plus livestock browsing and trampling of sapling trees in sensitive riparian areas.
Jim Hogg	Mammals	Leopardus pardalis	ocelot	E	Restricted to mesquite-thorn scrub and live-oak mottes; avoids open areas. Dense mixed brush below four feet; thorny shrublands; dense chaparral thickets; breeds and raises young June-November.
Jim Hogg	Plants	Thymophylla tephroleuca	ashy dogweed	E	Grasslands with scattered shrubs; most sites on sands or sandy loams on level or very gently rolling topography over Eocene strata of the Laredo Formation; flowering March-May depending to some extent on rainfall
Maverick	Birds	Coccyzus americanus	yellow-billed cuckoo	T	In Texas, the populations of concern are found breeding in riparian areas in the Trans Pecos (know as part of the Western Distinct Population Segment). It is the Western DPS that is on the U.S. ESA threatened list and includes the Texas counties Brewster, Culberson, El Paso, Hudspeth, Jeff Davis, and Presidio. Riparian woodlands below 6,000' in elevation consisting of cottonwoods and willows are prime habitat. This species is a long-distant migrant that summers in Texas, but winters mainly in South America. Breeding birds of the Trans Pecos populations typically arrive on their breeding grounds possibly in late April but the peak arrival time is in May. Threats to preferred habitat include hydrologic changes that don't promote the regeneration of cottonwoods and willows, plus livestock browsing and trampling of sapling trees in sensitive riparian areas.
Maverick	Mammals	Leopardus pardalis	ocelot	E	Restricted to mesquite-thorn scrub and live-oak mottes; avoids open areas. Dense mixed brush below four feet; thorny shrublands; dense chaparral thickets; breeds and raises young June-November.
Maverick	Mollusks	Popenaias popeii	Texas hornshell	E	Occurs in small streams to large rivers in slow to moderate current, often residing in rock crevices, travertine shelves, and under large boulders, where small-grained material, such as clay, silt, or sand gathers. Can also occur in riffles that are clean swept of soft silt; not known from reservoirs (Carman 2007; Inoue et al. 2014; Randklev et al. 2017b; Randklev et al. forthcoming). [Mussels of Texas 2019]
Starr	Birds	Coccyzus americanus	yellow-billed cuckoo	T	In Texas, the populations of concern are found breeding in riparian areas in the Trans Pecos (know as part of the Western Distinct Population Segment). It is the Western DPS that is on the U.S. ESA threatened list and includes the Texas counties Brewster, Culberson, El Paso, Hudspeth, Jeff Davis, and Presidio. Riparian woodlands below 6,000' in elevation consisting of cottonwoods and willows are prime habitat. This species is a long-distant migrant that summers in Texas, but winters mainly in South America. Breeding birds of the Trans Pecos populations typically arrive on their breeding grounds possibly in late April but the peak arrival time is in May. Threats to preferred habitat include hydrologic changes that don't promote the regeneration of cottonwoods and willows, plus livestock browsing and trampling of sapling trees in sensitive riparian areas.
Starr	Mammals	Leopardus pardalis	ocelot	E	Restricted to mesquite-thorn scrub and live-oak mottes; avoids open areas. Dense mixed brush below four feet; thorny shrublands; dense chaparral thickets; breeds and raises young June-November.

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Starr	Plants	Asclepias prostrata	prostrate milkweed	E	Grasslands or openings in shrublands on loamy fine sands and fine sandy loams of the Copita, Hebbronville, and possibly other soil series occurring over the Laredo, Yegua, and other Eocene formations; also in Loreto caliche sand plain in Tamaulipas; flowering April-October, but may be sporadic and dependent on rainfall
Starr	Plants	Thymophylla tephroleuca	ashy dogweed	E	Grasslands with scattered shrubs; most sites on sands or sandy loams on level or very gently rolling topography over Eocene strata of the Laredo Formation; flowering March-May depending to some extent on rainfall
Starr	Plants	Physaria thamnophila	Zapata bladderpod	E	Open, thorn shrublands on shallow, well-drained sandy loams and sandstone outcrops of Eocene origin, including the Jackson Group and Yegua and Laredo formations; the known sites soils are mapped as Zapata, Maverick, Catarina, or Copita Series; flowering usually February-April, but also summer or fall depending on rainfall
Starr	Plants	Astrophytum asterias	star cactus	E	Gravelly clays or loams, possibly of the Catarina Series (deep, droughty, saline clays), over the Catahoula and Frio formations, on gentle slopes and flats in sparsely vegetated openings between shrub thickets within mesquite grasslands or mesquite-blackbrush thorn shrublands; plants sink into or below ground during dry periods; flowering from mid March-May, may also flower in warmer months after sufficient rainfall, flowers most reliably in early April; fruiting mid April-June
Starr	Plants	Manihot walkerae	Walker's manioc	E	Periphery of native brush in sandy loam; also on caliche cuestas?; flowering April-September (following rains?)
Webb	Birds	Coccyzus americanus	yellow-billed cuckoo	T	In Texas, the populations of concern are found breeding in riparian areas in the Trans Pecos (know as part of the Western Distinct Population Segment). It is the Western DPS that is on the U.S. ESA threatened list and includes the Texas counties Brewster, Culberson, El Paso, Hudspeth, Jeff Davis, and Presidio. Riparian woodlands below 6,000' in elevation consisting of cottonwoods and willows are prime habitat. This species is a long-distant migrant that summers in Texas, but winters mainly in South America. Breeding birds of the Trans Pecos populations typically arrive on their breeding grounds possibly in late April but the peak arrival time is in May. Threats to preferred habitat include hydrologic changes that don't promote the regeneration of cottonwoods and willows, plus livestock browsing and trampling of sapling trees in sensitive riparian areas.
Webb	Mammals	Leopardus pardalis	ocelot	E	Restricted to mesquite-thorn scrub and live-oak mottes; avoids open areas. Dense mixed brush below four feet; thorny shrublands; dense chaparral thickets; breeds and raises young June-November.
Webb	Mollusks	Popenaias popeii	Texas hornshell	E	Occurs in small streams to large rivers in slow to moderate current, often residing in rock crevices, travertine shelves, and under large boulders, where small-grained material, such as clay, silt, or sand gathers. Can also occur in riffles that are clean swept of soft silt; not known from reservoirs (Carman 2007; Inoue et al. 2014; Randklev et al. 2017b; Randklev et al. forthcoming). [Mussels of Texas 2019]
Webb	Plants	Thymophylla tephroleuca	ashy dogweed	E	Grasslands with scattered shrubs; most sites on sands or sandy loams on level or very gently rolling topography over Eocene strata of the Laredo Formation; flowering March-May depending to some extent on rainfall
Willacy	Birds	Falco femoralis septentrionalis	northern aplomado falcon	E	Open country, especially savanna and open woodland, and sometimes in very barren areas; grassy plains and valleys with scattered mesquite, yucca, and cactus; nests in old stick nests of other bird species
Willacy	Birds	Charadrius melodus	piping plover	T	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Beaches, sandflats, and dunes along Gulf Coast beaches and adjacent offshore islands. Also spoil islands in the Intracoastal Waterway. Based on the November 30, 1992 Section 6 Job No. 9.1, Piping Plover and Snowy Plover Winter Habitat Status Survey, algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. Sand flats often appear to be preferred over algal flats when both are available, but large portions of sand flats along the Texas coast are available only during low-very low tides and are often completely unavailable during extreme high tides or strong north winds. Beaches appear to serve as a secondary habitat to the flats associated with the primary bays, lagoons, and inter-island passes. Beaches are rarely used on the southern Texas coast, where bayside habitat is always available, and are abandoned as bayside habitats become available on the central and northern coast. However, beaches are probably a vital habitat along the central and northern coast (i.e. north of Padre Island) during periods of extreme high tides that cover the flats. Optimal site characteristics appear to be large in area, sparsely vegetated, continuously available or in close proximity to secondary habitat, and with limited human disturbance.
Willacy	Birds	Calidris canutus rufa	rufa red knot	T	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Habitat: Primarily seacoasts on tidal flats and beaches, herbaceous wetland, and Tidal flat/shore. Bolivar Flats in Galveston County, sandy beaches Mustang Island, few on outer coastal and barrier beaches, tidal mudflats and salt marshes.
Willacy	Birds	Coccyzus americanus	yellow-billed cuckoo	T	In Texas, the populations of concern are found breeding in riparian areas in the Trans Pecos (know as part of the Western Distinct Population Segment). It is the Western DPS that is on the U.S. ESA threatened list and includes the Texas counties Brewster, Culberson, El Paso, Hudspeth, Jeff Davis, and Presidio. Riparian woodlands below 6,000' in elevation consisting of cottonwoods and willows are prime habitat. This species is a long-distant migrant that summers in Texas, but winters mainly in South America. Breeding birds of the Trans Pecos populations typically arrive on their breeding grounds possibly in late April but the peak arrival time is in May. Threats to preferred habitat include hydrologic changes that don't promote the regeneration of cottonwoods and willows, plus livestock browsing and trampling of sapling trees in sensitive riparian areas.
Willacy	Birds	Glaucidium brasilianum cactorum	cactus ferruginous pygmy-owl	T	Riparian trees, brush, palm, and mesquite thickets; during day also roosts in small caves and recesses on slopes of low hills; breeding April to June
Willacy	Fish	Carcharhinus longimanus	oceanic whitetip shark	T	Habitat description is not available at this time.
Willacy	Fish	Manta birostris	giant manta ray	T	Gulf of Mexico
Willacy	Mammals	Physeter macrocephalus	sperm whale	E	Inhabits tropical, subtropical, and temperate waters world wide, avoiding icey waters. Distribution is highly dependent on their food source (squids, sharks, skates, and fish), breeding, and composition of the pod. In general, this species migrates from north to south in the winter and south to north in the summer; however, individuals in tropical and temperate waters don't seem to migrate at all. Routinely dive to catch their prey (2,000-10,000 feet) and generally occupies water at least 3,300 feet deep near ocean trenches.
Willacy	Mammals	Balaenoptera physalus	finback whale	E	Inhabit tropical, subtropical, temperate, and subpolar waters worldwide, but are less common in the tropics preferring cooler water. Commonly found in deep, offshore waters and migrate in the open ocean from the poles (feeding grounds) to warmer waters in the winter to give birth. They feed on krill, squid, and small schooling fish sometimes with other baleen whale species. They are very rare in the Gulf of Mexico and reported sightings are likely vagrants (Witt et al. 2011).
Willacy	Mammals	Balaenoptera borealis	sei whale	E	Gulf of Mexico
Willacy	Mammals	Balaenoptera musculus	blue whale	E	Inhabits tropical, subtropical, temperate, and subpolar waters worldwide, but are infrequently sighted in the Gulf of Mexico. They migrate seasonally between summer feeding grounds and winter breeeding grounds, but specifics vary. Commonly observed at the surface in open ocean.
Willacy	Mammals	Balaenoptera ricei	Rice's whale	E	Gulf of Mexico
Willacy	Mammals	Megaptera novaeangliae	humpback whale	E	Inhabits tropical, subtropical, temperate, and subpolar waters world wide. Migrate up to 5,000 miles between colder water (feeding grounds) and warmer water (calving grounds) each year. They will use both open ocean and coastal waters, sometimes including inshore areas such as bays, and are often found near the surface; however, this species is rare in the Gulf of Mexico. The northwest Atlantic/Gulf of Mexico distinct population segment is not considered at risk of extinction and is not listed as Endangered on the Endangered Species Act.
Willacy	Mammals	Eubalaena glacialis	North Atlantic right whale	E	Inhabits subtropical and temperate waters in the northern Atlantic. Commonly found in coastal waters or clsoe to the continental shelf near the surface. They migrate from feeding grounds in cooler waters (Canada and New England) to warmer waters of the southeast US (South Carolina, Georgia, and Florida) to give birth in the fall/winter - both areas are identified as critical habitat by NOAA-NMFS. Nursery areas are in shallow, coastal waters. This species is very rare in the Gulf of Mexico and the few reported sightings are likely vagrants (Ward-Geiger etal 2011).
Willacy	Mammals	Leopardus pardalis	ocelot	E	Restricted to mesquite-thorn scrub and live-oak mottes; avoids open areas. Dense mixed brush below four feet; thorny shrublands; dense chaparral thickets; breeds and raises young June-November.

County	Taxon	Scientific Name	Common Name	USESA	Description
Willacy	Mammals	Trichechus manatus	West Indian manatee	T	Large rivers, brackish water bays, coastal waters. Warm waters of the tropics, in rivers and brackish bays but may also survive in salt water habitats. Very sensitive to cold water temperatures. Rarely occurring as far north as Texas. Gulf and bay system; opportunistic, aquatic herbivore.
Willacy	Reptiles	Caretta caretta	loggerhead sea turtle	T	Inhabits tropical, subtropical, and temperate waters worldwide, including the Gulf of Mexico. They migrate from feeding grounds to nesting beaches/barrier islands and some nesting does occur in Texas (April to September). Beaches that are narrow, steeply sloped, with coarse-grain sand are preffered for nesting. Newly hatched individuals depend on floating alage/seaweed for protection and foraging, which eventually transport them offshore and into open ocean. Juveniles and young adults spend their lives in open ocean, offshore before migrating to coastal areas to breed and nest. Foraging areas for adults include shallow continental shelf waters.
Willacy	Reptiles	Chelonia mydas	green sea turtle	T	Inhabits tropical, subtropical, and temperate waters worldwide, including the Gulf of Mexico. Adults and juveniles occupy inshore and nearshore areas, including bays and lagoons with reefs and seagrass. They migrate from feeding grounds (open ocean) to nesting grounds (beaches/barrier islands) and some nesting does occur in Texas (April to September). Adults are herbivorous feeding on sea grass and seaweed; juveniles are omnivorous feeding initially on marine invertebrates, then increasingly on sea grasses and seaweeds.
Willacy	Reptiles	Eretmochelys imbricata	Atlantic hawksbill sea turtle	E	Inhabit tropical and subtropical waters worldwide, in the Gulf of Mexico, especially Texas. Hatchling and juveniles are found in open, pelagic ocean and closely associated with floating lgae/seagrass mats. Juveniles then migrate to shallower, coastal areas, mainly coral reefs and rocky areas, but also in bays and estuaries near mangroves when reefs are absent; seldom in water lmore than 65 feet deep. They feed on sponges, jellyfish, sea urchins, molluscs, and crustaceans. Nesting occurs from April to November high up on the beach where there is vegetation for cover and little or no sand. Some migrate, but others stay close to foraging areas - females are philopatric.
Willacy	Reptiles	Lepidochelys kempii	Kemp's Ridley sea turtle	E	Inhabits tropical, subtropical, and temperate waters of the northwestern Atlantic Ocean and Gulf of Mexico. Adults are found in coastal waters with muddy or sandy bottoms. Some males migrate between feeding grounds and breeeding grounds, but some don't. Females migrate between feeding and nesting areas, often returning to the same destinations. Nesting in Texas occurs on a smaller scale compared to other areas (i.e. Mexico). Hatchlings are quickly swept out to open water and are rarely found nearshore. Similarly, juveniles often congregate near floating algae/seagrass mats offshore, and move into nearshore, coastal, neritic areas after 1-2 years and remain until they reach maturity. They feed primarily on crabs, but also snails, clams, other crustaceans and plants, juveniles feed on sargassum and its associated fauna; nests April through August.
Willacy	Reptiles	Dermochelys coriacea	leatherback sea turtle	E	Inhabit tropical, subtropical, and temperate waters worldwide, including the Gulf of Mexico. Nesting is not common in Texas (March to July). Most pelagic of the seaturtles with the longest migration (>10,000 miles) between nesting and foraging sites. Are able to dive to depths of 4,000 feet. They are omnivorous, showing a preference for jellyfish.
Willacy	Plants	Ayenia limitaris	Texas ayenia	E	Subtropical thorn woodland or tall shrubland on loamy soils of the Rio Grande Delta; known site soils include well-drained, calcareous, sandy clay loam (Hidalgo Series) and neutral to moderately alkaline, fine sandy loam (Willacy Series); also under or among taller shrubs in thorn woodland/thorn shrubland; flowering throughout the year with sufficient rainfall
Zapata	Birds	Coccyzus americanus	yellow-billed cuckoo	T	In Texas, the populations of concern are found breeding in riparian areas in the Trans Pecos (know as part of the Western Distinct Population Segment). It is the Western DPS that is on the U.S. ESA threatened list and includes the Texas counties Brewster, Culberson, El Paso, Hudspeth, Jeff Davis, and Presidio. Riparian woodlands below 6,000' in elevation consisting of cottonwoods and willows are prime habitat. This species is a long-distant migrant that summers in Texas, but winters mainly in South America. Breeding birds of the Trans Pecos populations typically arrive on their breeding grounds possibly in late April but the peak arrival time is in May. Threats to preferred habitat include hydrologic changes that don't promote the regeneration of cottonwoods and willows, plus livestock browsing and trampling of sapling trees in sensitive riparian areas.
Zapata	Mammals	Leopardus pardalis	ocelot	E	Restricted to mesquite-thorn scrub and live-oak mottes; avoids open areas. Dense mixed brush below four feet; thorny shrublands; dense chaparral thickets; breeds and raises young June-November.
Zapata	Mollusks	Popenaias popeii	Texas hornshell	E	Occurs in small streams to large rivers in slow to moderate current, often residing in rock crevices, travertine shelves, and under large boulders, where small-grained material, such as clay, silt, or sand gathers. Can also occur in riffles that are clean swept of soft silt; not known from reservoirs (Carman 2007; Inoue et al. 2014; Randklev et al. 2017b; Randklev et al. forthcoming). [Mussels of Texas 2019]
Zapata	Plants	Asclepias prostrata	prostrate milkweed	E	Grasslands or openings in shrublands on loamy fine sands and fine sandy loams of the Copita, Hebbronville, and possibly other soil series occurring over the Laredo, Yegua, and other Eocene formations; also in Loreto caliche sand plain in Tamaulipas; flowering April-October, but may be sporadic and dependent on rainfall
Zapata	Plants	Thymophylla tephroleuca	ashy dogweed	E	Grasslands with scattered shrubs; most sites on sands or sandy loams on level or very gently rolling topography over Eocene strata of the Laredo Formation; flowering March-May depending to some extent on rainfall
Zapata	Plants	Physaria thamnophila	Zapata bladderpod	E	Open, thorn shrublands on shallow, well-drained sandy loams and sandstone outcrops of Eocene origin, including the Jackson Group and Yegua and Laredo formations; the known sites soils are mapped as Zapata, Maverick, Catarina, or Copita Series; flowering usually February-April, but also summer or fall depending on rainfall
Zapata	Plants	Astrophytum asterias	star cactus	E	Gravelly clays or loams, possibly of the Catarina Series (deep, droughty, saline clays), over the Catahoula and Frio formations, on gentle slopes and flats in sparsely vegetated openings between shrub thickets within mesquite grasslands or mesquite-blackbrush thorn shrublands; plants sink into or below ground during dry periods; flowering from mid March-May, may also flower in warmer months after sufficient rainfall, flowers most reliably in early April; fruiting mid April-June

Appendix 5C. Water Supply Balances for WUGs and MWPs

Agua SUD	Use Type	2030	2040	2050	2060	2070	2080
Population		66,231	71,088	74,224	75,649	77,086	78,536
WUG Demand	Municipal	7,126	7,605	7,940	8,092	8,246	8,401
WWP Supplies		8,545	8,545	8,545	8,545	8,545	8,545
WWP Need/Surplus		1,419	940	605	453	299	144
Irrigation District Conservation		382	762	1,144	1,525	1,905	2,286
Drought Management		209	224	234	239	243	248
Conversion/Purchase of Surface Water Rights		-	1,120	1,120	1,120	1,120	1,120
West WWTP Indirect Potable Reuse		-	1,120	1,120	1,120	1,120	1,120
Brackish Groundwater Desalination		2,800	2,800	5,600	5,600	5,600	5,600
New Supplies from WMS		**3,391**	**6,026**	**9,218**	**9,604**	**9,988**	**10,374**
Balance After WMS		4,810	6,966	9,823	10,057	10,287	10,518

Alamo		2030	2040	2050	2060	2070	2080
Population		19,549	20,026	20,404	21,105	21,819	22,550
WUG Demand	Municipal	2,638	2,688	2,739	2,833	2,929	3,027
WWP Supplies		3,653	3,653	3,653	3,653	3,653	3,653
WWP Need/Surplus		1,015	965	914	820	724	626
Irrigation District Conservation		104	209	313	418	522	626
Drought Management		89	91	92	96	99	102
Conversion/Purchase of Surface Water Rights		-	50	50	50	50	50
Fresh Groundwater Well		1,120	1,120	1,120	1,120	1,120	1,120
Brackish Groundwater Desalination		896	896	896	896	896	896
New Supplies from WMS		**2,209**	**2,366**	**2,471**	**2,580**	**2,687**	**2,794**
Balance After WMS		3,224	3,331	3,385	3,400	3,411	3,420

Bayview Irrigation District No. 11		2030	2040	2050	2060	2070	2080
County-Other, Cameron – Contract Demand	Municipal	183	183	183	183	183	183
Irrigation, Cameron – Contract Demand	Irrigation	16,978	16,978	16,978	16,978	16,978	16,978
WWP Demand		17,161	17,161	17,161	17,161	17,161	17,161
County-Other, Cameron – Sale/Transfer	Municipal	124	124	124	124	124	124
Irrigation, Cameron – Sale/Transfer	Irrigation	4,604	4,601	4,597	4,589	4,578	4,565
WWP Supplies		4,728	4,725	4,721	4,713	4,702	4,689
County-Other, Cameron	Municipal	59	59	59	59	59	59

Irrigation, Cameron	Irrigation	12,374	12,377	12,381	12,389	12,400	12,413
WWP Need/Surplus		**(12,433)**	**(12,436)**	**(12,440)**	**(12,448)**	**(12,459)**	**(12,472)**
Irrigation District Conservation		255	510	765	1,020	1,275	1,530
Conversion/Purchase of Surface Water Rights		176	176	176	176	176	176
New Supplies from WMS		**431**	**686**	**941**	**1,196**	**1,451**	**1,706**
Balance After WMS		**(12,002)**	**(11,750)**	**(11,499)**	**(11,252)**	**(11,008)**	**(10,766)**

Brownsville PUB		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population		**191,689**	**196,629**	**198,396**	**197,812**	**197,213**	**196,600**
WUG Demand	Municipal	32,212	32,908	33,204	33,106	33,006	32,903
El Jardin WSC – Contract Demand	Municipal	1,200	1,200	1,200	1,200	1,200	1,200
Cameron County Irrigation – Contract Demand	Irrigation	1,783	1,783	1,783	1,783	1,783	1,783
Cameron County Manufacturing – Contract Demand	Manufacturing	292	292	292	292	292	292
Steam Electric Power Generation, Cameron County – Contract Demand	Steam Electric Power	165	165	165	165	165	165
WWP Demand		**35,652**	**36,348**	**36,644**	**36,546**	**36,446**	**36,343**
WUG Supply	Municipal	42,274	42,274	42,274	42,274	42,274	42,274
El Jardin WSC – Sale/Transfer	Municipal	1,200	1,200	1,200	1,200	1,200	1,200
Cameron County Irrigation – Sale/Transfer	Irrigation	711	710	710	709	707	705
Cameron County Manufacturing – Sale/Transfer	Manufacturing	292	292	292	292	292	292
Steam Electric Power Generation, Cameron County – Sale/Transfer	Steam Electric Power	165	165	165	165	165	165
WWP Supplies		**44,642**	**44,641**	**44,641**	**44,640**	**44,638**	**44,636**
WUG Need	Municipal	10,062	9,366	9,070	9,168	9,268	9,371
El Jardin WSC	Municipal	-	-	-	-	-	-
Cameron County Irrigation	Irrigation	(1,072)	(1,073)	(1,073)	(1,074)	(1,076)	(1,078)
Cameron County Manufacturing	Manufacturing	-	-	-	-	-	-
Steam Electric Power Generation, Cameron County	Steam Electric Power	-	-	-	-	-	-
WWP Need/Surplus		**8,990**	**8,293**	**7,997**	**8,094**	**8,192**	**8,293**
Advanced Municipal Conservation		3,225	4,650	6,114	7,447	8,706	9,890
Irrigation District Conservation		2	5	7	10	13	15
Drought Management		661	678	684	682	680	678
Conversion/Purchase of Surface Water Rights		-	50	50	50	50	50
Southside WWTP Potable Reuse		-	-	3,360	3,360	3,360	3,360
Indirect Potable Reuse		4,480	4,480	4,480	4,480	4,480	4,480
Banco Morales Reservoir		-	140	140	140	140	140

New Supplies from WMS		**8,368**	**10,003**	**14,835**	**16,169**	**17,429**	**18,613**
Balance After WMS		**17,358**	**18,296**	**22,832**	**24,263**	**25,621**	**26,906**

Brownsville Irrigation District		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Brownsville – Contract Demand	Municipal	1,200	1,200	1,200	1,200	1,200	1,200
County-Other, Cameron – Contract Demand	Municipal	334	334	334	334	334	334
Hidalgo County WID 3 – Contract Demand	Wholesale Water Provider	2,000	2,000	2,000	2,000	2,000	2,000
Irrigation, Cameron – Contract Demand	Irrigation	31,949	31,949	31,949	31,949	31,949	31,949
WWP Demand		**35,483**	**35,483**	**35,483**	**35,483**	**35,483**	**35,483**
Brownsville – Sale/Transfer	Municipal	1,200	1,200	1,200	1,200	1,200	1,200
County-Other, Cameron – Sale/Transfer	Municipal	227	227	227	227	227	227
Hidalgo County WID 3 – Sale/Transfer	Wholesale Water Provider	2,000	2,000	2,000	2,000	2,000	2,000
Irrigation, Cameron – Sale/Transfer	Irrigation	8,664	8,658	8,651	8,636	8,641	8,590
WWP Supplies		**12,091**	**12,085**	**12,078**	**12,063**	**12,068**	**12,017**
Brownsville	Municipal	-	-	-	-	-	-
County-Other, Cameron	Municipal	(107)	(107)	(107)	(107)	(107)	(107)
Hidalgo County WID 3	Wholesale Water Provider	-	-	-	-	-	-
Irrigation, Cameron	Irrigation	(23,285)	(23,291)	(23,298)	(23,313)	(23,308)	(23,359)
WWP Need/Surplus		**(23,392)**	**(23,398)**	**(23,405)**	**(23,420)**	**(23,415)**	**(23,466)**
Irrigation District Conservation		608	1,216	1,823	2,431	3,039	3,647
Conversion/Purchase of Surface Water Rights		-	50	50	50	50	50
New Supplies from WMS		**608**	**1,266**	**1,873**	**2,481**	**3,089**	**3,697**
Balance After WMS		**(22,784)**	**(22,132)**	**(21,532)**	**(20,939)**	**(20,326)**	**(19,769)**

Cameron County Irrigation District No. 2		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Cameron County Other – Contract Demand	Municipal	750	750	750	750	750	750
East Rio Hondo WSC – Contract Demand	Municipal	5,521	5,521	5,521	5,521	5,521	5,521
Cameron County Irrigation – Contract Demand	Irrigation	151,536	151,536	151,536	151,536	151,536	151,536
Cameron County Manufacturing – Contract Demand	Manufacturing	192	192	192	192	192	192
Rio Hondo – Contract Demand	Municipal	771	771	771	771	771	771
San Benito – Contract Demand	Municipal	7,032	7,032	7,032	7,032	7,032	7,032
WWP Demand		**165,802**	**165,802**	**165,802**	**165,802**	**165,802**	**165,802**
Cameron County Other – Sale/Transfer	Municipal	600	600	600	600	600	600
East Rio Hondo WSC – Sale/Transfer	Municipal	4,417	4,417	3,617	3,617	3,617	3,617

Cameron County Irrigation – Sale/Transfer	Irrigation	48,349	48,313	48,276	48,191	48,070	47,937
Cameron County Manufacturing – Sale/Transfer	Manufacturing	154	154	154	154	154	154
Rio Hondo – Sale/Transfer	Municipal	617	617	617	617	617	617
San Benito – Sale/Transfer	Municipal	5,626	5,626	5,626	5,626	5,626	5,626
WWP Supplies		**59,763**	**59,727**	**58,890**	**58,805**	**58,684**	**58,551**
Cameron County Other	Municipal	(150)	(150)	(150)	(150)	(150)	(150)
East Rio Hondo WSC	Municipal	(1,104)	(1,104)	(1,904)	(1,904)	(1,904)	(1,904)
Cameron County Irrigation	Irrigation	(103,187)	(103,223)	(103,260)	(103,345)	(103,466)	(103,599)
Cameron County Manufacturing	Manufacturing	(38)	(38)	(38)	(38)	(38)	(38)
Rio Hondo	Municipal	(154)	(154)	(154)	(154)	(154)	(154)
San Benito	Municipal	(1,406)	(1,406)	(1,406)	(1,406)	(1,406)	(1,406)
WWP Need/Surplus		**(106,039)**	**(106,075)**	**(106,912)**	**(106,997)**	**(107,118)**	**(107,251)**
Irrigation District Conservation		1,248	2,497	3,745	4,994	6,242	7,491
Conversion/Purchase of Surface Water Rights		1,423	1,573	1,573	1,573	1,573	1,573
New Supplies from WMS		**2,671**	**4,070**	**5,318**	**6,567**	**7,815**	**9,064**
Balance After WMS		**(103,368)**	**(102,005)**	**(101,594)**	**(100,430)**	**(99,303)**	**(98,187)**

Cameron County Irrigation District No. 3 - La Feria		2030	2040	2050	2060	2070	2080
Cameron County Other – Contract Demand	Municipal	900	900	900	900	900	900
Cameron County Irrigation – Contract Demand	Irrigation	34,220	34,194	34,169	34,109	34,023	33,928
La Feria – Contract Demand	Municipal	3,000	3,000	3,000	3,000	3,000	3,000
Santa Rosa – Contract Demand	Municipal	900	900	900	900	900	900
Sebastian MUD – Contract Demand	Municipal	300	300	300	300	300	300
Siesta Shores WCID – Contract Demand	Municipal	216	216	216	216	216	216
WWP Demand		**39,536**	**39,510**	**39,485**	**39,425**	**39,339**	**39,244**
Cameron County Other	Municipal	612	612	612	612	612	612
Cameron County Irrigation	Irrigation	23,270	23,252	23,235	23,194	23,136	23,071
La Feria	Municipal	1,300	1,400	1,500	1,700	2,000	2,200
Santa Rosa	Municipal	612	612	612	612	612	612
Sebastian MUD	Municipal	204	204	204	204	204	204
Siesta Shores WCID	Municipal	147	147	147	147	147	147
WWP Supplies		**26,145**	**26,227**	**26,310**	**26,469**	**26,711**	**26,846**
Cameron County Other	Municipal	(288)	(288)	(288)	(288)	(288)	(288)
Cameron County Irrigation	Irrigation	(10,950)	(10,942)	(10,934)	(10,915)	(10,887)	(10,857)

La Feria	Municipal	(1,700)	(1,600)	(1,500)	(1,300)	(1,000)	(800)
Santa Rosa	Municipal	(288)	(288)	(288)	(288)	(288)	(288)
Sebastian MUD	Municipal	(96)	(96)	(96)	(96)	(96)	(96)
Siesta Shores WCID	Municipal	(69)	(69)	(69)	(69)	(69)	(69)
WWP Need/Surplus		**(13,391)**	**(13,283)**	**(13,175)**	**(12,956)**	**(12,628)**	**(12,398)**
Irrigation District Conservation		1,455	2,911	4,366	5,822	7,277	8,733
Conversion/Purchase of Surface Water Rights		1,000	1,200	1,200	1,200	1,200	1,200
New Supplies from WMS		**2,455**	**4,111**	**5,566**	**7,022**	**8,477**	**9,933**
Balance After WMS		**(10,936)**	**(9,172)**	**(7,609)**	**(5,934)**	**(4,151)**	**(2,465)**

Cameron County ID No. 6		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Brownsville PUB – Contract Demand	Municipal	300	300	300	300	300	300
Cameron County Irrigation District 10	Wholesale Water Provider	25,414	25,414	25,414	25,414	25,414	25,414
Cameron County Irrigation – Contract Demand	Irrigation	49,565	49,565	49,565	49,565	49,565	49,565
Los Fresnos – Contract Demand	Municipal	1,051	1,051	1,051	1,051	1,051	1,051
Cameron County Manufacturing – Contract Demand	Manufacturing	20	20	20	20	20	20
Olmito WSC – Contract Demand	Municipal	1,885	1,885	1,885	1,885	1,885	1,885
WWP Demand		**78,235**	**78,235**	**78,235**	**78,235**	**78,235**	**78,235**
Brownsville PUB	Municipal	255	255	255	255	255	255
Cameron County Irrigation District 10	Wholesale Water Provider	10,210	10,203	10,196	10,178	10,153	10,126
Cameron County Irrigation	Irrigation	16,802	16,789	16,776	16,747	16,705	16,658
Los Fresnos	Municipal	893	893	893	893	893	893
Cameron County Manufacturing	Manufacturing	14	14	14	14	14	14
Olmito WSC	Municipal	1,665	1,665	1,665	1,665	1,665	1,665
WWP Supplies		**29,839**	**29,819**	**29,799**	**29,752**	**29,685**	**29,611**
Brownsville PUB	Municipal	(45)	(45)	(45)	(45)	(45)	(45)
Cameron County Irrigation District 10	Wholesale Water Provider	(15,204)	(15,211)	(15,218)	(15,236)	(15,261)	(15,288)
Cameron County Irrigation	Irrigation	(32,763)	(32,776)	(32,789)	(32,818)	(32,860)	(32,907)
Los Fresnos	Municipal	(158)	(158)	(158)	(158)	(158)	(158)
Cameron County Manufacturing	Manufacturing	(6)	(6)	(6)	(6)	(6)	(6)
Olmito WSC	Municipal	(220)	(220)	(220)	(220)	(220)	(220)
WWP Need/Surplus		**(48,396)**	**(48,416)**	**(48,436)**	**(48,483)**	**(48,550)**	**(48,624)**
Irrigation District Conservation		272	543	815	1,086	1,358	1,629
Conversion/Purchase of Surface Water Rights		730	980	980	980	980	980

New Supplies from WMS		**1,002**	**1,523**	**1,795**	**2,066**	**2,338**	**2,609**
Balance After WMS		**(47,394)**	**(46,893)**	**(46,641)**	**(46,417)**	**(46,212)**	**(46,015)**

Cameron County ID No. 10		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Bayvirew Irrigation District 11	Wholesale Water Provider	17,161	17,161	17,161	17,161	17,161	17,161
Cameron County Irrigation – Contract Demand	Irrigation	7,953	7,953	7,953	7,953	7,953	7,953
WWP Demand		**25,114**	**25,114**	**25,114**	**25,114**	**25,114**	**25,114**
Bayvirew Irrigation District 11	Wholesale Water Provider	6,954	6,949	6,944	6,932	6,915	6,896
Cameron County Irrigation	Irrigation	2,157	2,155	2,153	2,150	2,144	2,138
WWP Supplies		**9,111**	**9,104**	**9,097**	**9,082**	**9,059**	**9,034**
Bayvirew Irrigation District 11	Wholesale Water Provider	(10,207)	(10,212)	(10,217)	(10,229)	(10,246)	(10,265)
Cameron County Irrigation	Irrigation	(5,796)	(5,798)	(5,800)	(5,803)	(5,809)	(5,815)
WWP Need/Surplus		**(16,003)**	**(16,010)**	**(16,017)**	**(16,032)**	**(16,055)**	**(16,080)**
Irrigation District Conservation		372	744	1,115	1,487	1,859	2,231
New Supplies from WMS		372	744	1,115	1,487	1,859	2,231
Balance After WMS		**(15,631)**	**(15,266)**	**(14,902)**	**(14,545)**	**(14,196)**	**(13,849)**

Delta Lake ID		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Willacy County-Other - Contract Demand	Municipal	100	100	100	100	100	100
Engelman Irrigation District	Wholesale Water Provider	6,872	6,866	6,861	6,849	6,832	6,813
Hidalgo County Irrigation – Contract Demand	Irrigation	39,655	39,625	39,595	39,525	39,426	39,316
Willacy County Irrigation – Contract Demand	Irrigation	30,283	30,260	30,238	30,184	30,108	30,025
Willacy County Livestock – Contract Demand	Livestock	235	235	140	140	140	140
Lyford - Contract Demand	Municipal	980	980	980	980	980	980
North Alamo WSC - Contract Demand	Municipal	8,727	8,727	8,727	8,727	8,727	8,727
Raymondville - Contract Demand	Municipal	5,894	5,894	5,894	5,894	5,894	5,894
Valley Acres Irrigation District	Wholesale Water Provider	6,510	6,505	6,500	6,489	6,472	6,455
WWP Demand		**99,256**	**99,192**	**99,035**	**98,888**	**98,679**	**98,450**
Willacy County-Other	Municipal	65	65	65	65	65	65
Engelman Irrigation District	Wholesale Water Provider	6,872	6,866	6,861	6,849	6,832	6,813
Hidalgo County Irrigation	Irrigation	25,765	25,746	25,726	25,681	25,617	25,546
Willacy County Irrigation	Irrigation	19,684	19,669	19,654	19,620	19,570	19,516
Willacy County Livestock	Livestock	235	235	140	140	140	140
Lyford	Municipal	637	637	637	637	637	637

North Alamo WSC	Municipal	5,673	5,673	5,673	5,673	5,673	5,673
Raymondville	Municipal	3,744	3,744	3,743	3,743	3,743	3,743
Valley Acres Irrigation District	Wholesale Water Provider	6,510	6,505	6,500	6,489	6,472	6,455
WWP Supplies		**69,185**	**69,140**	**68,999**	**68,897**	**68,749**	**68,588**
Willacy County-Other	Municipal	(35)	(35)	(35)	(35)	(35)	(35)
Engelman Irrigation District	Wholesale Water Provider	-	-	-	-	-	-
Hidalgo County Irrigation	Irrigation	(13,890)	(13,879)	(13,869)	(13,844)	(13,809)	(13,770)
Willacy County Irrigation	Irrigation	(10,599)	(10,591)	(10,584)	(10,564)	(10,538)	(10,509)
Willacy County Livestock	Livestock	-	-	-	-	-	-
Lyford	Municipal	(343)	(343)	(343)	(343)	(343)	(343)
North Alamo WSC	Municipal	(3,054)	(3,054)	(3,054)	(3,054)	(3,054)	(3,054)
Raymondville	Municipal	(2,150)	(2,150)	(2,151)	(2,151)	(2,151)	(2,151)
Valley Acres Irrigation District	Wholesale Water Provider	-	-	-	-	-	-
WWP Need/Surplus		**(30,071)**	**(30,052)**	**(30,036)**	**(29,991)**	**(29,930)**	**(29,862)**
Irrigation District Conservation		4,222	8,444	12,666	16,888	21,110	25,331
Conversion/Purchase of Surface Water Rights		24	4,414	4,424	4,444	4,463	4,481
New Supplies from WMS		**4,246**	**12,858**	**17,090**	**21,332**	**25,573**	**29,812**
Balance After WMS		**(25,825)**	**(17,194)**	**(12,946)**	**(8,659)**	**(4,357)**	**(50)**

Donna Irrigation District-Hidalgo County #1		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Hidalgo County-Other	Municipal	2,690	2,690	2,690	2,690	2,690	2,690
Donna - Contract Demand	Municipal	4,381	4,381	4,381	4,381	4,380	4,380
Hidalgo County Irrigation – Contract Demand	Irrigation	37,513	37,484	37,456	37,390	37,296	37,193
WWP Demand		**44,584**	**44,555**	**44,527**	**44,461**	**44,366**	**44,263**
Hidalgo County-Other	Municipal	1,910	1,910	1,910	1,910	1,910	1,910
Donna	Municipal	3,111	3,111	3,111	3,110	3,110	3,110
Hidalgo County Irrigation	Irrigation	26,634	26,614	26,594	26,547	26,480	26,407
WWP Supplies		**31,655**	**31,635**	**31,615**	**31,567**	**31,500**	**31,427**
Hidalgo County-Other	Municipal	(780)	(780)	(780)	(780)	(780)	(780)
Donna	Municipal	(1,270)	(1,270)	(1,270)	(1,271)	(1,270)	(1,270)
Hidalgo County Irrigation	Irrigation	(10,879)	(10,870)	(10,862)	(10,843)	(10,816)	(10,786)
WWP Need/Surplus		**(12,929)**	**(12,920)**	**(12,912)**	**(12,894)**	**(12,866)**	**(12,836)**
Irrigation District Conservation		1,412	2,824	4,235	5,647	7,059	8,471
Conversion/Purchase of Surface Water Rights		950	2,240	2,240	2,240	2,240	2,240

New Supplies from WMS		**2,362**	**5,064**	**6,475**	**7,887**	**9,299**	**10,711**
Balance After WMS		**(10,567)**	**(7,856)**	**(6,437)**	**(5,007)**	**(3,567)**	**(2,125)**

Eagle Pass		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population		**58,692**	**62,688**	**65,889**	**68,762**	**71,614**	**74,461**
WUG Demand	Municipal	9,579	10,192	10,713	11,180	11,644	12,107
WWP Supplies		**10,621**	**10,621**	**10,621**	**10,621**	**10,621**	**10,621**
WWP Need/Surplus		**1,042**	**429**	**(92)**	**(559)**	**(1,023)**	**(1,486)**
Advanced Municipal Conservation		960	1,450	1,982	2,523	3,077	3,641
Drought Management		217	232	244	255	265	276
Conversion/Purchase of Surface Water Rights		-	50	50	50	50	50
Brackish Groundwater Desalination		5,210	5,210	5,210	5,210	5,210	5,210
New Supplies from WMS		**6,387**	**6,942**	**7,486**	**8,038**	**8,602**	**9,177**
Balance After WMS		**7,429**	**7,371**	**7,394**	**7,479**	**7,579**	**7,691**

East Rio Hondo WSC		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population		**26,908**	**31,911**	**37,034**	**40,909**	**43,001**	**45,200**
WUG Demand	Municipal	3,636	4,290	4,978	5,499	5,781	6,076
Cameron County Other – Contract Demand	Municipal	182	182	182	182	182	182
Military Highway WSC - Contract Demand	Municipal	33	33	33	33	33	33
WWP Demand		**3,851**	**4,505**	**5,193**	**5,714**	**5,996**	**6,291**
WUG Supply	Municipal	5,660	5,660	4,860	4,860	4,860	4,860
Cameron County Other	Municipal	182	182	182	182	182	182
Military Highway WSC	Municipal	33	33	33	33	33	33
WWP Supplies		**5,875**	**5,875**	**5,075**	**5,075**	**5,075**	**5,075**
WUG Needs	Municipal	2,239	1,585	97	(424)	(706)	(1,001)
Cameron County Other	Municipal	-	-	-	-	-	-
Military Highway WSC	Municipal	-	-	-	-	-	-
WWP Need/Surplus		**2,024**	**1,370**	**(118)**	**(639)**	**(921)**	**(1,216)**
Advanced Municipal Conservation		182	397	684	995	1,282	1,585
Irrigation District Conservation		96	192	288	381	474	570
Drought Management		102	121	140	155	163	171
Conversion/Purchase of Surface Water Rights		560	560	560	560	560	560
FM 2925 Transmission Line		-	30	30	30	30	30

North Cameron Regional WTP Wellfield Expansion		1,290	1,225	1,371	1,389	1,389	1,389
Brackish Desalination Wellfield and RO at NRWTP and MASWTP		-	2,766	3,096	3,136	3,136	3,136
Expansion of MASWTP		-	988	1,106	1,120	1,120	1,120
New Supplies from WMS		**2,230**	**6,279**	**7,275**	**7,766**	**8,154**	**8,561**
Balance After WMS		**4,254**	**7,649**	**7,157**	**7,127**	**7,233**	**7,345**

Edinburg		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population		**85,768**	**93,195**	**97,911**	**99,436**	**100,966**	**102,501**
WUG Demand	Municipal	11,209	12,114	12,727	12,925	13,124	13,323
WWP Supplies		**10,758**	**10,758**	**10,758**	**10,758**	**10,758**	**10,758**
WWP Need/Surplus		**(451)**	**(1,356)**	**(1,969)**	**(2,167)**	**(2,366)**	**(2,565)**
Advanced Municipal Conservation		564	1,122	1,760	2,344	2,911	3,472
Irrigation District Conservation		443	888	1,330	1,774	2,218	2,662
Drought Management		431	469	492	500	508	515
Conversion/Purchase of Surface Water Rights		-	50	50	50	50	50
Reuse Water for Cooling Tower and Landscaping Use		-	3,920	3,920	3,920	3,920	3,920
New Supplies from WMS		1,438	6,449	7,552	8,588	9,607	10,619
Balance After WMS		**987**	**5,093**	**5,583**	**6,421**	**7,241**	**8,054**

Harlingen		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population		**85,744**	**87,959**	**88,766**	**88,532**	**88,296**	**88,057**
WUG Demand	Municipal	14,830	15,149	15,288	15,248	15,208	15,166
East Rio Hondo WSC – Contract Demand	Municipal	336	336	336	224	224	224
Cameron County Manufacturing – Contract Demand	Irrigation	112	112	112	112	112	113
Cameron County Irrigation – Contract Demand	Manufacturing	150	150	150	150	150	150
WWP Demand		**15,428**	**15,747**	**15,886**	**15,734**	**15,694**	**15,653**
WUG Supply	Municipal	20,958	20,957	20,957	20,960	20,960	20,959
East Rio Hondo WSC	Municipal	336	336	336	224	224	224
Cameron County Manufacturing	Irrigation	25	25	25	25	25	25
Cameron County Irrigation	Manufacturing	150	150	150	150	150	150
WWP Supplies		**21,469**	**21,468**	**21,468**	**21,359**	**21,359**	**21,358**
WUG Need	Municipal	6,128	5,808	5,669	5,712	5,752	5,793
East Rio Hondo WSC	Municipal	-	-	-	-	-	-
Cameron County Manufacturing	Irrigation	(87)	(87)	(87)	(87)	(87)	(88)

Cameron County Irrigation	Manufacturing	-	-	-	-	-	-
WWP Need/Surplus		**6,041**	**5,721**	**5,582**	**5,625**	**5,665**	**5,705**
Advanced Municipal Conservation		1,480	2,134	2,809	3,427	4,012	4,563
Irrigation District Conservation		199	400	599	801	1,000	1,199
Drought Management		346	355	358	357	356	355
Conversion/Purchase of Surface Water Rights		-	50	50	50	50	50
New Supplies from WMS		**2,025**	**2,939**	**3,816**	**4,635**	**5,418**	**6,167**
Balance After WMS		**8,066**	**8,660**	**9,398**	**10,260**	**11,083**	**11,872**

Harlingen ID No. 1		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Combes – Contract Demand	Municipal	796	796	796	796	796	796
East Rio Hondo – Contract Demand	Municipal	345	345	345	345	345	345
Harlingen – Contract Demand	Municipal	28,737	28,737	28,737	28,737	28,737	28,737
Cameron County Irrigation – Contract Demand	Irrigation	43,959	43,926	43,893	43,815	43,705	43,584
Military Highway WSC – Contract Demand	Municipal	806	806	806	806	806	806
Palm Valley – Contract Demand	Municipal	313	313	313	313	313	313
Primera – Contract Demand	Municipal	400	400	400	400	400	400
WWP Demand		**75,356**	**75,323**	**75,290**	**75,212**	**75,102**	**74,981**
Combes	Municipal	677	677	677	677	677	677
East Rio Hondo	Municipal	293	293	293	293	293	293
Harlingen	Municipal	21,307	21,306	21,304	21,189	21,183	21,178
Cameron County Irrigation	Irrigation	37,365	37,337	37,309	37,243	37,149	37,046
Military Highway WSC	Municipal	606	606	606	606	606	606
Palm Valley	Municipal	266	266	266	266	266	266
Primera	Municipal	340	340	340	340	340	340
WWP Supplies		**60,854**	**60,825**	**60,795**	**60,614**	**60,514**	**60,406**
Combes	Municipal	(119)	(119)	(119)	(119)	(119)	(119)
East Rio Hondo	Municipal	(52)	(52)	(52)	(52)	(52)	(52)
Harlingen	Municipal	(7,430)	(7,431)	(7,433)	(7,548)	(7,554)	(7,559)
Cameron County Irrigation	Irrigation	(6,594)	(6,589)	(6,584)	(6,572)	(6,556)	(6,538)
Military Highway WSC	Municipal	(200)	(200)	(200)	(200)	(200)	(200)
Palm Valley	Municipal	(47)	(47)	(47)	(47)	(47)	(47)
Primera	Municipal	(60)	(60)	(60)	(60)	(60)	(60)
WWP Need/Surplus		**(14,502)**	**(14,498)**	**(14,495)**	**(14,598)**	**(14,588)**	**(14,575)**

Irrigation District Conservation		600	1,200	1,800	2,400	3,000	3,600
Conversion/Purchase of Surface Water Rights		1,745	2,098	2,204	2,284	2,372	2,421
New Supplies from WMS		**2,345**	**3,298**	**4,004**	**4,684**	**5,372**	**6,021**
Balance After WMS		**(12,157)**	**(11,200)**	**(10,491)**	**(9,914)**	**(9,216)**	**(8,554)**

Harlingen and Cameron County Irrigation District No. 9		2030	2040	2050	2060	2070	2080
Edcouch – Contract Demand	Municipal	465	465	465	465	465	464
Elsa – Contract Demand	Municipal	1,089	1,089	1,089	1,088	1,088	1,087
Irrigation, Cameron – Contract Demand	Irrigation	5,082	5,078	5,074	5,065	5,052	5,038
Irrigation, Hidalgo – Contract Demand	Irrigation	63,588	63,540	63,492	63,381	63,221	63,046
La Villa – Contract Demand	Municipal	362	362	362	362	362	362
Mercedes – Contract Demand	Municipal	3,239	3,239	3,239	3,239	3,239	3,239
North Alamo WSC – Contract Demand	Municipal	5,613	5,613	5,613	5,613	5,613	5,613
Weslaco – Contract Demand	Municipal	7,976	7,976	7,976	7,976	7,976	7,976
WWP Demand		**87,414**	**87,362**	**87,310**	**87,189**	**87,016**	**86,825**
Edcouch	Municipal	326	326	325	325	325	325
Elsa	Municipal	763	762	762	762	761	761
Irrigation, Cameron	Irrigation	3,557	3,554	3,552	3,545	3,537	3,527
Irrigation, Hidalgo	Irrigation	44,512	44,478	44,445	44,366	44,255	44,132
La Villa	Municipal	254	254	254	254	254	254
Mercedes	Municipal	2,267	2,267	2,267	2,267	2,267	2,267
North Alamo WSC	Municipal	3,929	3,929	3,929	3,929	3,929	3,929
Weslaco	Municipal	5,583	5,583	5,583	5,583	5,583	5,583
WWP Supplies		**61,191**	**61,153**	**61,117**	**61,031**	**60,911**	**60,778**
Edcouch	Municipal	(139)	(139)	(140)	(140)	(140)	(139)
Elsa	Municipal	(326)	(327)	(327)	(326)	(327)	(326)
Irrigation, Cameron	Irrigation	(1,525)	(1,524)	(1,522)	(1,520)	(1,515)	(1,511)
Irrigation, Hidalgo	Irrigation	(19,076)	(19,062)	(19,047)	(19,015)	(18,966)	(18,914)
La Villa	Municipal	(108)	(108)	(108)	(108)	(108)	(108)
Mercedes	Municipal	(972)	(972)	(972)	(972)	(972)	(972)
North Alamo WSC	Municipal	(1,684)	(1,684)	(1,684)	(1,684)	(1,684)	(1,684)
Weslaco	Municipal	(2,393)	(2,393)	(2,393)	(2,393)	(2,393)	(2,393)
WWP Need/Surplus		**(26,223)**	**(26,209)**	**(26,193)**	**(26,158)**	**(26,105)**	**(26,047)**
Irrigation District Conservation		2,915	5,830	8,745	11,661	14,576	17,491

Conversion/Purchase of Surface Water Rights		2,169	2,677	4,368	4,373	4,378	4,383
New Supplies from WMS		**5,084**	**8,507**	**13,113**	**16,034**	**18,954**	**21,874**
Balance After WMS		**(21,139)**	**(17,702)**	**(13,080)**	**(10,124)**	**(7,151)**	**(4,173)**

Hidalgo County Irrigation District No. 1		2030	2040	2050	2060	2070	2080
Edinburg – Contract Demand	Municipal	10,847	10,847	10,847	10,847	10,847	10,847
Hidalgo County Irrigation District 13	Wholesale Water Provider	1,738	1,736	1,735	1,732	1,728	1,723
Hidalgo County MUD 1 – Contract Demand	Municipal	813	813	813	812	811	811
Hidalgo County Irrigation – Contract Demand	Irrigation	29,543	29,520	29,498	29,446	29,372	29,291
McAllen – Contract Demand	Municipal	4,000	4,000	4,000	4,000	4,000	4,000
North Alamo WSC - Contract Demand	Municipal	1,400	1,400	1,400	1,400	1,400	1,400
Santa Cruz Irrigation District 15	Wholesale Water Provider	30,728	30,706	30,683	30,631	30,556	30,474
Sharyland WSC – Contract Demand	Municipal	9,881	9,881	9,881	9,881	9,881	9,881
Steam-Electric Power, Hidalgo – Contract Demand	Steam Electric Power	2,453	2,453	2,453	2,453	2,453	2,453
WWP Demand		**91,403**	**91,356**	**91,310**	**91,202**	**91,048**	**90,880**
Edinburg	Municipal	7,701	7,701	7,701	7,701	7,701	7,701
Hidalgo County Irrigation District 13	Wholesale Water Provider	1,738	1,736	1,735	1,732	1,728	1,723
Hidalgo County MUD 1	Municipal	577	577	577	577	576	576
Irrigation, Hidalgo	Irrigation	20,975	20,960	20,944	20,907	20,854	20,796
McAllen	Municipal	2,840	2,840	2,840	2,840	2,840	2,840
North Alamo WSC	Municipal	994	994	994	994	994	994
Santa Cruz Irrigation District 15	Wholesale Water Provider	30,728	30,706	30,683	30,631	30,556	30,474
Sharyland WSC	Municipal	7,016	7,016	7,016	7,016	7,016	7,016
Steam-Electric Power, Hidalgo	Steam Electric Power	2,453	2,453	2,453	2,453	2,453	2,453
WWP Supplies		**75,022**	**74,983**	**74,943**	**74,851**	**74,718**	**74,573**
Edinburg	Municipal	(3,146)	(3,146)	(3,146)	(3,146)	(3,146)	(3,146)
Hidalgo County Irrigation District 13	Wholesale Water Provider	-	-	-	-	-	-
Hidalgo County MUD 1	Municipal	(236)	(236)	(236)	(235)	(235)	(235)
Irrigation, Hidalgo	Irrigation	(8,568)	(8,560)	(8,554)	(8,539)	(8,518)	(8,495)
McAllen	Municipal	(1,160)	(1,160)	(1,160)	(1,160)	(1,160)	(1,160)
North Alamo WSC	Municipal	(406)	(406)	(406)	(406)	(406)	(406)
Santa Cruz Irrigation District 15	Wholesale Water Provider	-	-	-	-	-	-
Sharyland WSC	Municipal	(2,865)	(2,865)	(2,865)	(2,865)	(2,865)	(2,865)
Steam-Electric Power, Hidalgo	Steam Electric Power	-	-	-	-	-	-

WWP Need/Surplus		**(16,381)**	**(16,373)**	**(16,367)**	**(16,351)**	**(16,330)**	**(16,307)**
Irrigation District Conservation		2,886	5,772	8,658	11,543	14,429	17,315
Conversion/Purchase of Surface Water Rights		913	1,113	1,113	1,113	1,113	1,113
New Supplies from WMS		**3,799**	**6,885**	**9,771**	**12,656**	**15,542**	**18,428**
Balance After WMS		**(12,582)**	**(9,488)**	**(6,596)**	**(3,695)**	**(788)**	**2,121**

Hidalgo County Irrigation District No. 2		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Alamo – Contract Demand	Municipal	4,175	4,175	4,175	4,175	4,175	4,175
Edinburg – Contract Demand	Municipal	4,003	4,003	4,003	4,003	4,003	4,003
Hidalgo County WID 3	Wholesale Water Provider	220	220	220	219	219	218
Irrigation, Hidalgo – Contract Demand	Irrigation	52,841	52,801	52,762	52,669	52,536	52,391
McAllen – Contract Demand	Municipal	22,450	22,450	22,450	22,450	22,450	22,450
North Alamo WSC - Contract Demand	Municipal	3,491	3,490	3,489	3,487	3,484	3,479
Pharr – Contract Demand	Municipal	6,691	6,691	6,691	6,691	6,691	6,691
San Juan – Contract Demand	Municipal	2,533	2,533	2,533	2,533	2,533	2,533
WWP Demand		**96,404**	**96,363**	**96,323**	**96,227**	**96,091**	**95,940**
Alamo	Municipal	3,131	3,131	3,131	3,131	3,131	3,131
Edinburg	Municipal	3,002	3,002	3,002	3,002	3,002	3,002
Hidalgo County WID 3	Wholesale Water Provider	165	165	165	165	164	164
Irrigation, Hidalgo	Irrigation	39,631	39,601	39,571	39,502	39,402	39,293
McAllen	Municipal	16,838	16,838	16,838	16,838	16,838	16,838
North Alamo WSC	Municipal	2,618	2,618	2,617	2,615	2,613	2,609
Pharr	Municipal	5,018	5,018	5,018	5,018	5,018	5,018
San Juan	Municipal	1,900	1,900	1,900	1,900	1,900	1,900
WWP Supplies		**72,303**	**72,273**	**72,242**	**72,171**	**72,068**	**71,955**
Alamo	Municipal	(1,044)	(1,044)	(1,044)	(1,044)	(1,044)	(1,044)
Edinburg	Municipal	(1,001)	(1,001)	(1,001)	(1,001)	(1,001)	(1,001)
Hidalgo County WID 3	Wholesale Water Provider	(55)	(55)	(55)	(54)	(55)	(54)
Irrigation, Hidalgo	Irrigation	(13,210)	(13,200)	(13,191)	(13,167)	(13,134)	(13,098)
McAllen	Municipal	(5,612)	(5,612)	(5,612)	(5,612)	(5,612)	(5,612)
North Alamo WSC	Municipal	(873)	(872)	(872)	(872)	(871)	(870)
Pharr	Municipal	(1,673)	(1,673)	(1,673)	(1,673)	(1,673)	(1,673)
San Juan	Municipal	(633)	(633)	(633)	(633)	(633)	(633)
WWP Need/Surplus		**(24,101)**	**(24,090)**	**(24,081)**	**(24,056)**	**(24,023)**	**(23,985)**

Irrigation District Conservation		2,588	5,176	7,763	10,351	12,939	15,527
Conversion/Purchase of Surface Water Rights		1,489	1,589	1,589	1,589	1,589	1,589
New Supplies from WMS		**4,077**	**6,765**	**9,352**	**11,940**	**14,528**	**17,116**
Balance After WMS		**(20,024)**	**(17,325)**	**(14,729)**	**(12,116)**	**(9,495)**	**(6,869)**

Hidalgo County Irrigation District No. 6		2030	2040	2050	2060	2070	2080
Agua SUD - Contract Demand	Municipal	8,329	8,329	8,329	8,329	8,329	8,329
Irrigation, Hidalgo – Contract Demand	Irrigation	13,126	13,116	13,106	13,083	13,050	13,014
Steam-Electric Power, Hidalgo – Contract Demand	Steam Electric Power	3,423	3,423	3,423	3,423	3,423	3,423
Total		**24,878**	**24,868**	**24,858**	**24,835**	**24,802**	**24,766**
Agua SUD	Municipal	5,914	5,914	5,914	5,914	5,914	5,914
Irrigation, Hidalgo	Irrigation	9,319	9,312	9,305	9,289	9,266	9,240
Steam-Electric Power, Hidalgo	Steam Electric Power	3,423	3,423	3,423	3,423	3,423	3,423
WWP Supplies		**18,656**	**18,649**	**18,642**	**18,626**	**18,603**	**18,577**
Agua SUD	Municipal	(2,415)	(2,415)	(2,415)	(2,415)	(2,415)	(2,415)
Irrigation, Hidalgo	Irrigation	(3,807)	(3,804)	(3,801)	(3,794)	(3,784)	(3,774)
Steam-Electric Power, Hidalgo	Steam Electric Power	-	-	-	-	-	-
WWP Need/Surplus		**(6,222)**	**(6,219)**	**(6,216)**	**(6,209)**	**(6,199)**	**(6,189)**
Irrigation District Conservation		679	1,359	2,038	2,718	3,397	4,076
Service Area Expansion		-	1,120	1,120	1,120	1,120	1,120
Conversion/Purchase of Surface Water Rights		-	870	869	868	867	866
New Supplies from WMS		**679**	**3,349**	**4,027**	**4,706**	**5,384**	**6,062**
Balance After WMS		**(5,543)**	**(2,870)**	**(2,189)**	**(1,503)**	**(815)**	**(127)**

Hidalgo County Irrigation District No. 16		2030	2040	2050	2060	2070	2080
Agua SUD – Contract Demand	Municipal	4,205	4,205	4,205	4,205	4,205	4,205
Irrigation, Hidalgo – Contract Demand	Irrigation	12,263	12,253	12,244	12,223	12,192	12,158
La Joya – Contract Demand	Municipal	513	513	513	513	513	513
Livestock, Hidalgo – Contract Demand	Livestock	100	100	100	100	100	100
Mining, Hidalgo – Contract Demand	Mining	80	80	80	80	79	79
WWP Demand		**17,161**	**17,151**	**17,142**	**17,121**	**17,089**	**17,055**
Agua SUD	Municipal	2,986	2,986	2,986	2,986	2,986	2,986
Irrigation, Hidalgo	Irrigation	8,707	8,700	8,693	8,678	8,656	8,632
La Joya	Municipal	364	364	364	364	364	364

Livestock, Hidalgo	Livestock	71	71	71	71	71	71
Mining, Hidalgo	Mining	57	57	57	56	56	56
WWP Supplies		**12,185**	**12,178**	**12,171**	**12,155**	**12,133**	**12,109**
Agua SUD	Municipal	(1,219)	(1,219)	(1,219)	(1,219)	(1,219)	(1,219)
Irrigation, Hidalgo	Irrigation	(3,556)	(3,553)	(3,551)	(3,545)	(3,536)	(3,526)
La Joya	Municipal	(149)	(149)	(149)	(149)	(149)	(149)
Livestock, Hidalgo	Livestock	(29)	(29)	(29)	(29)	(29)	(29)
Mining, Hidalgo	Mining	(23)	(23)	(23)	(24)	(23)	(23)
WWP Need/Surplus		**(4,976)**	**(4,973)**	**(4,971)**	**(4,966)**	**(4,956)**	**(4,946)**
Irrigation District Conservation		543	1,087	1,630	2,174	2,717	3,260
Conversion/Purchase of Surface Water Rights		311	408	479	462	446	429
New Supplies from WMS		**854**	**1,495**	**2,109**	**2,636**	**3,163**	**3,689**
Balance After WMS		**(4,122)**	**(3,478)**	**(2,862)**	**(2,330)**	**(1,793)**	**(1,257)**

Hidalgo County Water Improvement District (WID) No. 3		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Irrigation, Hidalgo – Contract Demand	Irrigation	3,576	3,573	3,571	3,564	3,555	3,546
McAllen - Contract Demand	Municipal	17,209	17,209	17,209	17,209	17,209	17,209
Mining, Hidalgo – Contract Demand	Mining	40	40	40	40	40	40
WWP Demand		**20,825**	**20,822**	**20,820**	**20,813**	**20,804**	**20,795**
Irrigation, Hidalgo		3,235	3,233	3,230	3,225	3,216	3,208
McAllen		15,488	15,488	15,488	15,488	15,488	15,488
Mining, Hidalgo		36	36	36	36	36	36
WWP Supplies		**18,759**	**18,757**	**18,754**	**18,749**	**18,740**	**18,732**
Irrigation, Hidalgo		(341)	(340)	(341)	(339)	(339)	(338)
McAllen		(1,721)	(1,721)	(1,721)	(1,721)	(1,721)	(1,721)
Mining, Hidalgo		(4)	(4)	(4)	(4)	(4)	(4)
WWP Need/Surplus		**(2,066)**	**(2,065)**	**(2,066)**	**(2,064)**	**(2,064)**	**(2,063)**
Conversion/Purchase of Surface Water Rights		-	100	100	100	100	100
New Supplies from WMS		**-**	**100**	**100**	**100**	**100**	**100**
Balance After WMS		**(2,066)**	**(1,965)**	**(1,966)**	**(1,964)**	**(1,964)**	**(1,963)**

Laguna Madre Water District		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population		**11,100**	**11,384**	**11,484**	**11,445**	**11,405**	**11,362**
WUG Demand	Municipal	4,638	4,745	4,787	4,771	4,754	4,736

Manufacturing, Cameron – Contract Demand	Manufacturing	118	118	118	118	118	118
WWP Demand		**4,756**	**4,863**	**4,905**	**4,889**	**4,872**	**4,854**
WUG Supplies	Municipal	7,513	7,513	7,513	7,513	7,513	7,513
Manufacturing, Cameron	Manufacturing	118	118	118	118	118	118
WWP Supplies		**7,631**	**7,631**	**7,631**	**7,631**	**7,631**	**7,631**
WUG Needs	Municipal	2,875	2,768	2,726	2,742	2,759	2,777
Manufacturing, Cameron	Manufacturing	-	-	-	-	-	-
WWP Need/Surplus		**2,875**	**2,768**	**2,726**	**2,742**	**2,759**	**2,777**
Advanced Municipal Conservation		464	893	1,289	1,634	1,941	2,213
Drought Management		45	46	47	47	46	46
Conversion/Purchase of Surface Water Rights		-	50	50	50	50	50
Seawater Desalination Plant		5,600	5,600	5,600	5,600	5,600	5,600
New Supplies from WMS		**6,109**	**6,589**	**6,986**	**7,331**	**7,637**	**7,909**
Balance After WMS		**8,984**	**9,357**	**9,712**	**10,073**	**10,396**	**10,686**

Laredo		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population		**267,373**	**277,989**	**281,208**	**278,353**	**275,465**	**272,541**
WUG Demand	Municipal	41,831	43,292	43,794	43,349	42,899	42,444
Irrigation, Webb – Contract Demand	Irrigation	1,436	1,435	1,434	1,431	1,427	1,421
Manufacturing, Webb – Contract Demand	Manufacturing	100	100	100	100	100	100
Mining, Webb – Contract Demand	Mining	66	66	66	66	66	66
Steam-Electric Power, Webb – Contract Demand	Steam Electric Power	30	30	30	30	30	30
WWP Demand		**43,463**	**44,923**	**45,424**	**44,976**	**44,522**	**44,061**
WUG Supply	Municipal	59,974	59,974	59,974	59,974	59,974	59,974
Irrigation, Webb	Irrigation	1,436	1,435	1,434	1,431	1,427	1,421
Manufacturing, Webb	Manufacturing	100	100	100	100	100	100
Mining, Webb	Mining	66	66	66	66	66	66
Steam-Electric Power, Webb	Steam Electric Power	30	30	30	30	30	30
WWP Supplies		**61,606**	**61,605**	**61,604**	**61,601**	**61,597**	**61,591**
WUG Needs	Municipal	18,143	16,682	16,180	16,625	17,075	17,530
Irrigation, Webb	Irrigation	-	-	-	-	-	-
Manufacturing, Webb	Manufacturing	-	-	-	-	-	-
Mining, Webb	Mining	-	-	-	-	-	-
Steam-Electric Power, Webb	Steam Electric Power	-	-	-	-	-	-

WWP Need/Surplus		**18,143**	**16,682**	**16,180**	**16,625**	**17,075**	**17,530**
Advanced Municipal Conservation		2,088	4,026	6,058	7,867	9,544	11,091
Drought Management		1,264	1,315	1,330	1,316	1,303	1,289
Conversion/Purchase of Surface Water Rights		-	50	50	50	50	50
South Laredo WWTP Potable Reuse		-	3,360	3,360	4,480	4,480	4,480
New Supplies from WMS		3,352	8,751	10,798	13,713	15,377	16,910
Balance After WMS		**21,495**	**25,433**	**26,978**	**30,338**	**32,452**	**34,440**

McAllen		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population		**165,587**	**184,057**	**201,554**	**206,901**	**212,332**	**217,849**
WUG Demand	Municipal	38,276	42,409	46,441	47,673	48,924	50,195
Edinburg - Contract Demand	Municipal	55	55	55	55	55	55
Hidalgo County Manufacturing – Contract Demand	Manufacturing	300	300	300	300	300	300
Hidalgo County Steam-Electric Power – Contract Demand	Steam Electric Power	3,295	3,295	3,295	3,295	3,295	3,295
WWP Demand		**41,926**	**46,059**	**50,091**	**51,323**	**52,574**	**53,845**
WUG Supply	Municipal	36,915	36,915	35,115	35,115	35,115	35,115
Edinburg	Municipal	55	55	55	55	55	55
Manufacturing, Hidalgo	Manufacturing	300	300	300	300	300	300
Steam-Electric Power, Hidalgo	Steam Electric Power	3,295	3,295	3,295	3,295	3,295	3,295
WWP Supplies		**40,565**	**40,565**	**38,765**	**38,765**	**38,765**	**38,765**
WUG Need	Municipal	(1,361)	(5,494)	(11,326)	(12,558)	(13,809)	(15,080)
Edinburg	Municipal	-	-	-	-	-	-
Manufacturing, Hidalgo	Manufacturing	-	-	-	-	-	-
Steam-Electric Power, Hidalgo	Steam Electric Power	-	-	-	-	-	-
WWP Need/Surplus		**(5,011)**	**(9,144)**	**(14,976)**	**(16,208)**	**(17,459)**	**(18,730)**
Advanced Municipal Conservation		3,832	7,958	12,485	16,293	18,337	20,375
Irrigation District Conservation		782	1,563	2,345	3,127	3,908	4,691
Drought Management		987	1,097	1,202	1,234	1,266	1,299
Conversion/Purchase of Surface Water Rights		-	50	50	50	50	50
Direct Potable Reuse		-	3,880	3,880	6,060	6,060	6,060
Raw Waterline Project with HCID No. 1		800	800	800	800	800	800
Brackish Groundwater Desalination		6,720	6,720	6,720	6,720	6,720	6,720
New Supplies from WMS		**13,121**	**22,068**	**27,482**	**34,284**	**37,141**	**39,995**
Balance After WMS		**8,110**	**12,924**	**12,506**	**18,076**	**19,682**	**21,265**

Military Highway WSC		2030	2040	2050	2060	2070	2080
Population		44,216	44,633	44,795	45,466	46,151	46,852
WUG Demand	Municipal	6,530	6,560	6,585	6,684	6,784	6,887
San Juan - Contract Demand	Municipal	35	35	35	35	35	35
WWP Demand		6,565	6,595	6,620	6,719	6,819	6,922
WUG Supply	Municipal	7,542	7,542	7,542	7,542	7,542	7,542
San Juan	Municipal	35	35	35	35	35	35
WWP Supplies		7,577	7,577	7,577	7,577	7,577	7,577
WUG Need	Municipal	1,012	982	957	858	758	655
San Juan	Municipal	-	-	-	-	-	-
WWP Need/Surplus		1,012	982	957	858	758	655
Advanced Municipal Conservation		324	611	910	1,214	1,511	1,802
Irrigation District Conservation		6	12	18	23	29	35
Drought Management		150	152	152	155	157	159
Conversion/Purchase of Surface Water Rights		-	50	50	50	50	50
New Supplies from WMS		**480**	**825**	**1,130**	**1,442**	**1,747**	**2,046**
Balance After WMS		1,492	1,807	2,087	2,300	2,505	2,701

Mission		2030	2040	2050	2060	2070	2080
Population		88,336	93,383	96,747	99,076	101,437	103,831
WUG Demand	Municipal	18,065	19,030	19,716	20,190	20,672	21,159
WWP Supplies		18,400	18,400	18,399	18,398	18,397	18,395
WWP Need/Surplus		335	(630)	(1,317)	(1,792)	(2,275)	(2,764)
Advanced Municipal Conservation		1,808	3,559	5,292	6,162	7,026	7,889
Irrigation District Conservation		181	361	541	722	902	1,083
Drought Management		610	645	668	684	700	717
Conversion/Purchase of Surface Water Rights		-	50	50	50	50	50
Potable Reuse		-	3,920	3,920	3,920	3,920	3,920
Brackish Groundwater Desalination		2,688	2,688	2,688	2,688	2,688	2,688
New Supplies from WMS		**5,287**	**11,223**	**13,159**	**14,226**	**15,286**	**16,347**
Balance After WMS		5,622	10,593	11,842	12,434	13,011	13,583

North Alamo WSC		2030	2040	2050	2060	2070	2080

Population		**221,808**	**244,842**	**259,180**	**261,706**	**264,231**	**266,768**
WUG Demand	Municipal	35,294	38,813	41,086	41,486	41,887	42,288
Port Mansfield PUD - Contract Demand	Municipal	150	150	150	150	150	150
Primera - Contract Demand	Municipal	205	205	205	205	205	205
San Juan - Contract Demand	Municipal	1,687	1,687	1,687	1,687	1,687	1,687
WWP Demand		**37,336**	**40,855**	**43,128**	**43,528**	**43,929**	**44,330**
WUG Supply	Municipal	22,407	22,589	22,608	22,606	22,604	22,600
Port Mansfield PUD	Municipal	98	98	98	98	98	98
Primera	Municipal	205	205	205	205	205	205
San Juan	Municipal	1,687	1,687	1,687	1,687	1,687	1,687
WWP Supplies		**24,397**	**24,579**	**24,598**	**24,596**	**24,594**	**24,590**
WUG Need	Municipal	(12,887)	(16,224)	(18,478)	(18,880)	(19,283)	(19,688)
Port Mansfield PUD	Municipal	(52)	(52)	(52)	(52)	(52)	(52)
Primera	Municipal	-	-	-	-	-	-
San Juan	Municipal	-	-	-	-	-	-
WWP Need/Surplus		**(12,939)**	**(16,276)**	**(18,530)**	**(18,932)**	**(19,335)**	**(19,740)**
Advanced Municipal Conservation		3,541	5,518	7,612	9,386	11,105	12,765
Irrigation District Conservation		354	713	1,067	1,424	1,779	2,137
Drought Management		770	850	900	909	917	926
Conversion/Purchase of Surface Water Rights		6,194	10,498	12,178	12,178	12,178	12,178
Delta WTP Expansion		-	4,480	6,160	6,160	6,160	6,160
Delta Area Brackish Groundwater Desalination		2,080	1,976	2,211	2,240	2,240	2,240
New Supplies from WMS		**12,939**	**24,035**	**30,128**	**32,297**	**34,379**	**36,406**
Balance After WMS		**-**	**7,759**	**11,598**	**13,365**	**15,044**	**16,666**

Pharr		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population		**85,215**	**91,086**	**94,908**	**96,862**	**98,836**	**100,833**
WUG Demand		9,135	9,698	10,105	10,313	10,523	10,736
WWP Supplies		**7,332**	**7,388**	**7,429**	**7,449**	**7,470**	**7,492**
WWP Need/Surplus		**(1,803)**	**(2,310)**	**(2,676)**	**(2,864)**	**(3,053)**	**(3,244)**
Advanced Municipal Conservation		458	883	1,377	1,633	1,666	1,700
Irrigation District Conservation		167	335	502	669	836	1,004
Drought Management		398	425	443	452	461	471
Conversion/Purchase of Surface Water Rights		947	947	947	947	947	947

Raw Water Augmentation Potable Reuse		-	3,360	3,360	3,360	3,360	3,360
New Supplies from WMS		**1,970**	**5,950**	**6,629**	**7,061**	**7,270**	**7,482**
Balance After WMS		**167**	**3,640**	**3,953**	**4,197**	**4,217**	**4,238**

Rio Grande City		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population		**17,880**	**19,073**	**19,959**	**20,549**	**21,147**	**21,751**
WUG Demand	Municipal	4,200	4,468	4,676	4,814	4,954	5,096
El Sauz - Contract Demand	Municipal	163	163	163	163	163	163
El Tanque - Contract Demand	Municipal	276	276	276	276	276	276
Rio WSC - Contract Demand	Municipal	1,053	1,053	1,053	1,053	1,052	1,052
WWP Demand		**5,692**	**5,960**	**6,168**	**6,306**	**6,445**	**6,587**
WUG Supply	Municipal	3,488	3,488	3,488	3,488	3,488	3,488
El Sauz WSC	Municipal	98	98	98	98	98	98
El Tanque WSC	Municipal	205	205	205	205	205	205
Rio WSC	Municipal	1,687	1,687	1,687	1,687	1,687	1,687
WWP Supplies		**5,478**	**5,478**	**5,478**	**5,478**	**5,478**	**5,478**
WUG Need	Municipal	(712)	(980)	(1,188)	(1,326)	(1,466)	(1,608)
El Sauz WSC	Municipal	(65)	(65)	(65)	(65)	(65)	(65)
El Tanque WSC	Municipal	(71)	(71)	(71)	(71)	(71)	(71)
Rio WSC	Municipal	634	634	634	634	635	635
WWP Need/Surplus		**(214)**	**(482)**	**(690)**	**(828)**	**(967)**	**(1,109)**
Advanced Municipal Conservation		421	840	1,260	1,649	1,860	2,072
Drought Management		48	52	54	56	57	59
Conversion/Purchase of Surface Water Rights		243	243	243	243	243	243
New Supplies from WMS		**712**	**1,135**	**1,557**	**1,948**	**2,160**	**2,374**
Balance After WMS		**498**	**653**	**867**	**1,120**	**1,193**	**1,265**

San Benito		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population		**25,980**	**26,650**	**26,890**	**26,810**	**26,730**	**26,646**
WUG Demand		3,249	3,316	3,346	3,336	3,326	3,315
WWP Supplies		**3,846**	**4,346**	**5,326**	**5,426**	**5,626**	**5,626**
WWP Need/Surplus		**597**	**1,030**	**1,980**	**2,090**	**2,300**	**2,311**
Irrigation District Conservation		118	234	352	469	586	703
Drought Management		72	74	74	74	74	74

Conversion/Purchase of Surface Water Rights		-	50	50	50	50	50
Brackish Groundwater Blending		560	560	560	560	560	560
New Supplies from WMS		**750**	**918**	**1,036**	**1,153**	**1,270**	**1,387**
Balance After WMS		**1,347**	**1,948**	**3,016**	**3,243**	**3,570**	**3,698**

San Juan		2030	2040	2050	2060	2070	2080
Population		**23,805**	**24,380**	**24,837**	**25,693**	**26,565**	**27,455**
WUG Demand		3,324	3,388	3,451	3,570	3,691	3,815
WWP Supplies		**4,742**	**4,742**	**4,742**	**4,742**	**4,742**	**4,742**
WWP Need/Surplus		**1,418**	**1,354**	**1,291**	**1,172**	**1,051**	**927**
Irrigation District Conservation		63	127	190	253	317	380
Drought Management		88	90	92	95	98	102
Conversion/Purchase of Surface Water Rights		-	50	50	50	50	50
Direct Potable Reuse		-	-	1,120	1,120	1,120	1,120
Brackish Groundwater Desalination		3,360	3,360	3,360	3,360	3,360	3,360
WTP 1 Expansion with Brackish Groundwater Desalination		1,120	1,120	1,120	1,120	1,120	1,120
New Supplies from WMS		**4,631**	**4,747**	**5,932**	**5,998**	**6,065**	**6,132**
Balance After WMS		**6,049**	**6,101**	**7,223**	**7,170**	**7,116**	**7,059**

Sharyland WSC		2030	2040	2050	2060	2070	2080
Population		**88,944**	**97,326**	**102,604**	**103,989**	**105,371**	**106,749**
WUG Demand		15,541	16,948	17,867	18,108	18,349	18,589
WWP Supplies		**17,073**	**17,073**	**17,073**	**17,073**	**17,073**	**17,073**
WWP Need/Surplus		**1,532**	**125**	**(794)**	**(1,035)**	**(1,276)**	**(1,516)**
Advanced Municipal Conservation		1,553	3,168	4,064	4,817	5,554	6,273
Irrigation District Conservation		500	998	1,500	1,999	2,499	2,998
Drought Management		309	338	357	361	366	371
Conversion/Purchase of Surface Water Rights		-	50	50	50	50	50
Well and RO Unit at WTP 2		-	900	900	900	900	900
Well and RO Unit at WTP 3		-	900	900	900	900	900
New Supplies from WMS		**2,362**	**6,354**	**7,771**	**9,027**	**10,269**	**11,492**
Balance After WMS		**3,894**	**6,479**	**6,977**	**7,992**	**8,993**	**9,976**

Southmost Regional Water Authority		2030	2040	2050	2060	2070	2080
Brownsville PUB - Contract Demand	Municipal	10,719	10,719	10,719	10,719	10,719	10,719
Los Fresnos - Contract Demand	Municipal	286	286	286	286	286	286
Manufacturing, Cameron - Contract Demand	Manufacturing	242	242	242	242	242	242
Valley MUD - Contract Demand	Municipal	290	290	290	290	290	290
WWP Demand		**11,537**	**11,537**	**11,537**	**11,537**	**11,537**	**11,537**
Brownsville PUB	Municipal	10,719	10,719	10,719	10,719	10,719	10,719
Los Fresnos	Municipal	286	286	286	286	286	286
Manufacturing, Cameron	Manufacturing	242	242	242	242	242	242
Valley MUD 2	Municipal	290	290	290	290	290	290
WWP Supplies		**11,537**	**11,537**	**11,537**	**11,537**	**11,537**	**11,537**
Brownsville PUB	Municipal	-	-	-	-	-	-
Los Fresnos	Municipal	-	-	-	-	-	-
Manufacturing, Cameron	Manufacturing	-	-	-	-	-	-
Valley MUD 2	Municipal	-	-	-	-	-	-
WWP Need/Surplus		**-**	**-**	**-**	**-**	**-**	**-**
Brackish Groundwater Desalination Wellfield Expansion		901	856	958	980	980	980
Phase 3 Wellfield Optimization and WTP Expansion		2,372	2,312	2,447	2,464	2,464	2,464
Phase 4 SRWA Wellfield and WTP Expansion		12,840	12,177	13,678	14,000	14,000	14,000
New Supplies from WMS		**16,113**	**15,345**	**17,083**	**17,444**	**17,444**	**17,444**
Balance After WMS		**16,113**	**15,345**	**17,083**	**17,444**	**17,444**	**17,444**

United Irrigation District		2030	2040	2050	2060	2070	2080
Irrigation, Hidalgo	Irrigation	17,500	17,500	17,500	17,500	17,500	17,500
McAllen - Contract Demand	Municipal	11,250	11,250	11,250	11,250	11,250	11,250
Mission - Contract Demand	Municipal	22,700	22,700	22,700	22,700	22,700	22,700
Sharyland WSC - Contract Demand	Municipal	10,420	10,420	10,420	10,420	10,420	10,420
WWP Demand		**61,870**	**61,870**	**61,870**	**61,870**	**61,870**	**61,870**
Irrigation, Hidalgo	Irrigation	5,932	5,928	5,923	5,913	5,898	5,882
McAllen	Municipal	9,563	9,563	9,563	9,563	9,563	9,563
Mission	Municipal	18,400	18,400	18,399	18,398	18,397	18,395
Sharyland WSC	Municipal	8,857	8,857	8,857	8,857	8,857	8,857
WWP Supplies		**42,752**	**42,748**	**42,742**	**42,731**	**42,715**	**42,697**
Irrigation, Hidalgo	Irrigation	(11,568)	(11,572)	(11,577)	(11,587)	(11,602)	(11,618)

McAllen	Municipal	(1,687)	(1,687)	(1,687)	(1,687)	(1,687)	(1,687)
Mission	Municipal	(4,300)	(4,300)	(4,301)	(4,302)	(4,303)	(4,305)
Sharyland WSC	Municipal	(1,563)	(1,563)	(1,563)	(1,563)	(1,563)	(1,563)
WWP Need/Surplus		**(19,118)**	**(19,122)**	**(19,128)**	**(19,139)**	**(19,155)**	**(19,173)**
Irrigation District Conservation		469	939	1,408	1,878	2,347	2,816
Conversion/Purchase of Surface Water Rights		455	505	505	505	505	505
New Supplies from WMS		**924**	**1,444**	**1,913**	**2,383**	**2,852**	**3,321**
Balance After WMS		**(18,194)**	**(17,678)**	**(17,215)**	**(16,756)**	**(16,303)**	**(15,852)**

Weslaco		**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Population		**32,414**	**33,279**	**33,948**	**35,089**	**36,253**	**37,441**
WUG Demand	Municipal	5,500	5,624	5,737	5,930	6,127	6,327
Military Highway WSC - Contract Demand	Municipal	175	175	175	175	175	175
WWP Demand		**5,675**	**5,799**	**5,912**	**6,105**	**6,302**	**6,502**
WUG Supply	Municipal	6,178	6,379	6,460	6,460	6,460	6,460
Military Highway WSC - Contract Demand	Municipal	175	175	175	175	175	175
WWP Supplies		**6,353**	**6,554**	**6,635**	**6,635**	**6,635**	**6,635**
WUG Need	Municipal	678	755	723	530	333	133
Military Highway WSC - Contract Demand	Municipal	-	-	-	-	-	-
WWP Need/Surplus		**678**	**755**	**723**	**530**	**333**	**133**
Advanced Municipal Conservation		551	797	1,060	1,335	1,615	1,902
Irrigation District Conservation		266	532	798	1,063	1,330	1,595
Drought Management		101	104	106	110	113	117
Conversion/Purchase of Surface Water Rights		-	50	50	50	50	50
North WWTP Potable Reuse		-	-	1,120	1,120	1,120	1,120
Groundwater Development and Blending		560	560	560	560	560	560
New Supplies from WMS		**1,478**	**2,043**	**3,694**	**4,238**	**4,788**	**5,344**
Balance After WMS		**2,156**	**2,798**	**4,417**	**4,768**	**5,121**	**5,477**

Appendix 5D. TWDB Uniform Costing Model Summary Reports

5D.2 Recommended Water Management Strategies

5D.2.1 Water Conservation

5D.2.5 Reuse

5D.2.6 New or Expanded Surface Water Treatment

5D.2.7 New or Expanded Distribution and Transmission Facilities

5D.2.8 Storage Reservoirs

5D.2.9 New or Expanded Fresh Groundwater Supply

5D.2.10 New or Expanded Brackish Groundwater Desalination

2026 Region M
Municipal Conservation - Water Loss Mitigation
Includes leak detection and repair efforts and pipeline replacement throughout planning cycle

WUG	Pipe Replaced (Miles)	Water Loss Mitigation Yield (acft/yr)						Water Loss Mitigation Costs				
		2030	2040	2050	2060	2070	2080	Total Cost of Facilities	Total Cost of Project	Largest Annual Cost	Annual Cost of Water ($ per AF)	Annual Cost of Water ($ per 1,000 gal)
Brownsville	86	322	329	332	331	330	329	$ 19,827,000	$ 27,042,000	$ 533,333	$ 1,606	$ 5
Eagle Pass	58	96	102	107	112	116	121	$ 13,311,000	$ 18,154,000	$ 358,000	$ 2,959	$ 9
East Rio Hondo WSC	53	36	43	50	55	58	61	$ 12,340,000	$ 16,830,000	$ 332,000	$ 5,443	$ 17
Edinburg	56	112	121	127	129	131	133	$ 13,033,000	$ 17,776,000	$ 350,667	$ 2,637	$ 8
El Jardin WSC	13	14	14	14	14	14	14	$ 3,050,000	$ 4,160,000	$ 82,000	$ 5,857	$ 18
El Sauz WSC	1	2	2	2	2	2	2	$ 164,000	$ 226,000	$ 4,333	$ 2,167	$ 7
El Tanque WSC	1	2	2	2	1	1	1	$ 164,000	$ 226,000	$ 4,333	$ 2,167	$ 7
Falcon Rural WSC	1	2	1	-	-	-	-	$ 82,000	$ 113,000	$ 2,167	$ 1,083	$ 3
Harlingen	62	148	151	153	152	152	152	$ 14,281,000	$ 19,477,000	$ 384,167	$ 2,511	$ 8
Hidalgo County MUD 1	4	5	5	5	6	6	6	$ 971,000	$ 1,324,000	$ 26,167	$ 4,361	$ 13
La Grulla	7	44	16	16	17	17	18	$ 1,525,000	$ 2,080,000	$ 41,000	$ 932	$ 3
La Joya	3	6	6	7	7	7	7	$ 693,000	$ 945,000	$ 18,667	$ 2,667	$ 8
La Villa	1	2	3	3	3	3	3	$ 277,000	$ 378,000	$ 7,500	$ 2,500	$ 8
Laguna Madre Water District	17	139	142	144	143	143	142	$ 3,882,000	$ 5,295,000	$ 104,500	$ 726	$ 2
Laredo	140	418	433	438	433	429	424	$ 32,306,000	$ 44,062,000	$ 869,000	$ 1,984	$ 6
McAllen	89	1,148	1,272	1,393	477	489	502	$ 20,659,000	$ 28,177,000	$ 555,667	$ 399	$ 1
Military Highway WSC	16	65	66	66	67	68	69	$ 3,605,000	$ 4,916,000	$ 97,000	$ 1,406	$ 4
Mission	57	542	571	197	202	207	212	$ 13,172,000	$ 17,966,000	$ 354,333	$ 621	$ 2
North Alamo WSC	420	353	388	411	415	419	423	$ 97,057,000	$ 132,375,000	$ 2,610,667	$ 6,172	$ 19
Olmito WSC	5	40	14	14	14	14	14	$ 1,109,000	$ 1,513,000	$ 29,833	$ 746	$ 2
Palm Valley	1	7	2	2	2	2	2	$ 82,000	$ 113,000	$ 2,167	$ 310	$ 1
Pharr	48	91	97	101	103	105	107	$ 11,092,000	$ 15,129,000	$ 298,333	$ 2,788	$ 9
Port Mansfield PUD	6	4	5	6	8	10	12	$ 821,000	$ 1,132,000	$ 22,000	$ 1,833	$ 6
Rio Grande City	10	126	134	140	48	50	51	$ 2,357,000	$ 3,215,000	$ 63,333	$ 452	$ 1
Rio WSC	7	8	10	10	10	10	10	$ 1,525,000	$ 2,080,000	$ 41,000	$ 4,100	$ 13
Roma	14	25	26	27	28	29	30	$ 3,189,000	$ 4,350,000	$ 85,833	$ 2,861	$ 9
Sharyland WSC	57	466	169	179	181	183	186	$ 13,172,000	$ 17,966,000	$ 354,333	$ 760	$ 2
Union WSC	6	12	13	13	14	14	15	$ 1,387,000	$ 1,892,000	$ 37,333	$ 2,489	$ 8
Valley MUD 2	4	29	30	30	30	30	30	$ 832,000	$ 1,135,000	$ 22,333	$ 744	$ 2
Webb County	4	15	21	26	26	26	25	$ 832,000	$ 1,135,000	$ 22,333	$ 859	$ 3
Weslaco	17	55	56	57	59	61	63	$ 3,882,000	$ 5,295,000	$ 104,500	$ 1,659	$ 5
Zapata County	12	55	19	19	18	18	18	$ 2,773,000	$ 3,782,000	$ 74,667	$ 1,358	$ 4
Zapata County San Ygnacio & Ramireño	1	2	1	-	-	-	-	$ 164,000	$ 226,000	$ 4,333	$ 2,167	$ 7
Zapata County WCID-Hwy 16 East	14	5	5	5	5	5	2	$ 1,969,000	$ 2,715,000	$ 53,000	$ 10,600	$ 33

2026 Region M

Municipal Conservation - Water Use Reduction

Includes implementation of advanced metering infrastructure (AMI) in 2030 decade and non-capital reductions throughout planning cycle (includes additional passive conservation through Low Flow Plumbing Fixtures, outdoor water restrictions, customer behavioral engagement software, permanent landscape watering schedule, landscape standards, public outreach and education programs, tiered water rates)

			Water Use Reduction Yield (acft/yr)						Water Use Reduction Costs*						
WUG	**y Recomm**	**Smart Meters Installed**	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**	**Total Cost of Facilities**	**Total Cost of Project**	**Largest Annual Cost**	**Annual Cost of Water ($ per AF)**	**Annual Cost of Water ($ per 1,000 gal)**	**Annual Cost of Water after Debt Service ($ per AF)**	**Annual Cost of Water after Debt Service ($ per 1,000 gal)**
Brownsville	Yes	65,533	2,903	4,321	5,782	7,116	8,376	9,561	$ 21,626,000	$ 29,028,000	$ 6,305,760	$ 660	$ 2.02	$ 330	$ 1.01
County-Other, Cameron	Yes	1,431	423	475	451	373	301	204	$ 472,000	$ 634,000	$ 210,505	$ 443	$ 1.36	$ 330	$ 1.01
County-Other, Hidalgo	Yes	2,332	160	178	77	115	160	184	$ 770,000	$ 1,034,000	$ 177,680	$ 966	$ 2.96	$ 330	$ 1.01
County-Other, Starr	Yes	1,982	26	50	77	112	150	190	$ 654,000	$ 878,000	$ 161,815	$ 852	$ 2.61	$ 330	$ 1.01
County-Other, Webb	Yes	1,313	70	80	57	76	82	82	$ 433,000	$ 581,000	$ 93,790	$ 1,144	$ 3.51	$ 330	$ 1.01
County-Other, Zapata	Yes	527	8	17	26	36	45	55	$ 174,000	$ 233,000	$ 44,165	$ 803	$ 2.46	$ 330	$ 1.01
Eagle Pass	Yes	24,820	864	1,348	1,875	2,411	2,961	3,520	$ 8,191,000	$ 10,994,000	$ 2,358,695	$ 670	$ 2.06	$ 330	$ 1.01
East Rio Hondo WSC	Yes	15,067	146	354	634	940	1,224	1,524	$ 4,972,000	$ 6,674,000	$ 1,248,215	$ 819	$ 2.51	$ 330	$ 1.01
Edinburg	Yes	34,167	452	1,001	1,633	2,215	2,780	3,339	$ 11,275,000	$ 15,134,000	$ 2,797,830	$ 838	$ 2.57	$ 330	$ 1.01
El Jardin WSC	Yes	4,336	53	113	177	213	213	212	$ 1,431,000	$ 1,920,000	$ 291,695	$ 1,369	$ 4.20	$ 330	$ 1.01
El Sauz WSC	Yes	703	7	12	13	13	13	13	$ 232,000	$ 312,000	$ 40,355	$ 3,104	$ 9.53	$ 330	$ 1.01
El Tanque WSC	Yes	248	8	14	19	24	26	28	$ 82,000	$ 110,000	$ 21,235	$ 758	$ 2.33	$ 330	$ 1.01
Falcon Rural WSC	Yes	49	5	9	10	10	10	9	$ 16,000	$ 22,000	$ 6,050	$ 605	$ 1.86	$ 330	$ 1.01
Harlingen	Yes	29,352	1,332	1,983	2,656	3,275	3,860	4,411	$ 9,686,000	$ 13,001,000	$ 2,861,995	$ 649	$ 1.99	$ 330	$ 1.01
Hidalgo County MUD 1	Yes	2,036	21	36	37	37	39	40	$ 672,000	$ 902,000	$ 118,370	$ 2,959	$ 9.08	$ 330	$ 1.01
La Grulla	Yes	3,373	102	274	355	429	504	579	$ 1,113,000	$ 1,494,000	$ 351,105	$ 606	$ 1.86	$ 330	$ 1.01
La Joya	Yes	1,877	24	53	84	115	146	176	$ 619,000	$ 831,000	$ 151,545	$ 861	$ 2.64	$ 330	$ 1.01
La Villa	Yes	882	10	22	38	44	43	43	$ 291,000	$ 390,000	$ 59,505	$ 1,352	$ 4.15	$ 330	$ 1.01
Laguna Madre Water District	Yes	3,787	325	751	1,145	1,491	1,798	2,071	$ 1,250,000	$ 1,678,000	$ 761,370	$ 368	$ 1.13	$ 330	$ 1.01
Laredo	Yes	90,847	1,670	3,593	5,620	7,434	9,115	10,667	$ 29,980,000	$ 40,241,000	$ 7,963,115	$ 747	$ 2.29	$ 330	$ 1.01
McAllen	Yes	72,616	2,684	6,686	11,092	15,816	17,848	19,873	$ 23,963,000	$ 32,164,000	$ 9,775,155	$ 492	$ 1.51	$ 330	$ 1.01
Military Highway WSC	Yes	15,617	259	545	844	1,147	1,443	1,733	$ 5,154,000	$ 6,918,000	$ 1,339,520	$ 773	$ 2.37	$ 330	$ 1.01
Mission	Yes	34,610	1,266	2,988	5,095	5,960	6,819	7,677	$ 11,421,000	$ 15,330,000	$ 4,119,825	$ 537	$ 1.65	$ 330	$ 1.01
North Alamo WSC	Yes	88,923	3,188	5,130	7,201	8,971	10,686	12,342	$ 29,344,000	$ 39,387,000	$ 8,371,295	$ 678	$ 2.08	$ 330	$ 1.01
Olmito WSC	Yes	2,621	92	239	298	355	410	463	$ 865,000	$ 1,162,000	$ 276,945	$ 598	$ 1.84	$ 330	$ 1.01
Palm Valley	Yes	446	17	43	53	62	71	79	$ 147,000	$ 197,000	$ 47,485	$ 601	$ 1.84	$ 330	$ 1.01
Pharr	Yes	33,611	367	786	1,276	1,530	1,561	1,593	$ 11,092,000	$ 14,888,000	$ 2,243,230	$ 1,408	$ 4.32	$ 330	$ 1.01
Port Mansfield PUD	Yes	337	10	26	48	79	119	170	$ 111,000	$ 149,000	$ 64,055	$ 377	$ 1.16	$ 330	$ 1.01
Rio Grande City	Yes	7,250	295	706	1,120	1,601	1,810	2,021	$ 2,393,000	$ 3,212,000	$ 986,850	$ 488	$ 1.50	$ 330	$ 1.01
Rio WSC	Yes	3,508	32	78	92	93	92	92	$ 1,158,000	$ 1,554,000	$ 212,315	$ 2,283	$ 7.01	$ 330	$ 1.01
Roma	Yes	8,590	99	216	349	479	612	640	$ 2,835,000	$ 3,805,000	$ 644,050	$ 1,006	$ 3.09	$ 330	$ 1.01
Sharyland WSC	Yes	35,583	1,087	2,999	3,885	4,636	5,371	6,087	$ 11,742,000	$ 15,761,000	$ 3,694,805	$ 607	$ 1.86	$ 330	$ 1.01
Union WSC	Yes	2,896	111	170	235	299	365	431	$ 956,000	$ 1,283,000	$ 280,880	$ 652	$ 2.00	$ 330	$ 1.01
Valley MUD 2	Yes	1,050	68	157	240	312	376	433	$ 347,000	$ 466,000	$ 172,815	$ 399	$ 1.22	$ 330	$ 1.01
Webb County	Yes	7,358	60	172	335	443	536	531	$ 2,428,000	$ 3,259,000	$ 547,550	$ 1,022	$ 3.13	$ 330	$ 1.01
Weslaco	Yes	12,480	496	741	1,003	1,276	1,554	1,839	$ 4,119,000	$ 5,529,000	$ 1,206,680	$ 656	$ 2.01	$ 330	$ 1.01
Zapata County	Yes	3,308	128	327	402	470	530	587	$ 1,092,000	$ 1,466,000	$ 349,545	$ 595	$ 1.83	$ 330	$ 1.01
Zapata County San Ygnacio & Ramireño	Yes	55	5	9	10	10	11	11	$ 18,000	$ 24,000	$ 6,355	$ 578	$ 1.77	$ 330	$ 1.01
Zapata County WCID-Hwy 16 East	Yes	179	11	25	39	50	60	72	$ 59,000	$ 79,000	$ 30,350	$ 422	$ 1.29	$ 330	$ 1.01

*Facilities and Project costs include the installation of smart meters. Annual costs include also include costs associated with non-capital efforts.

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Edinburg - Non-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***
Intake Pump Stations (0 MGD)	$1,829,000
Transmission Pipeline (16 in. dia., 3 miles)	$10,262,000
Water Treatment Plant (3.5 MGD)	$2,631,000
Integration, Relocations, Backup Generator & Other	$48,000
TOTAL COST OF FACILITIES	**$14,770,000**
- Planning (3%)	$443,000
- Design (7%)	$1,034,000
- Construction Engineering (1%)	$148,000
Legal Assistance (2%)	$295,000
Fiscal Services (2%)	$295,000
Pipeline Contingency (15%)	$1,539,000
All Other Facilities Contingency (20%)	$901,000
Environmental & Archaeology Studies and Mitigation	$131,000
Land Acquisition and Surveying (43 acres)	$288,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$644,000
TOTAL COST OF PROJECT	**$20,488,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$1,438,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$103,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$46,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$868,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (783622 kW-hr @ 0.09 $/kW-hr)	$71,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$2,526,000**
Available Project Yield (acft/yr)	3,920
Annual Cost of Water ($ per acft), based on PF=1	$644
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$278
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$1.98
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.85

KC Jacobson *6/28/2024*

Cost Estimate Summary ***Water Supply Project Option*** ***September 2023 Prices*** ***Rio Hondo WSC - Non-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***
Intake Pump Stations (0 MGD)	$116,000
Transmission Pipeline (6 in. dia., 1.5 miles)	$1,802,000
Storage Tanks (Other Than at Booster Pump Stations)	$75,000
Advanced Water Treatment Facility (0.05 MGD)	$570,000
TOTAL COST OF FACILITIES	**$2,563,000**
- Planning (3%)	$77,000
- Design (7%)	$179,000
- Construction Engineering (1%)	$26,000
Legal Assistance (2%)	$51,000
Fiscal Services (2%)	$51,000
Pipeline Contingency (15%)	$270,000
All Other Facilities Contingency (20%)	$152,000
Environmental & Archaeology Studies and Mitigation	$88,000
Land Acquisition and Surveying (25 acres)	$168,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$236,000
TOTAL COST OF PROJECT	**$3,861,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$272,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$19,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$3,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$39,000
Pumping Energy Costs (1538 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$333,000**
Available Project Yield (acft/yr)	30
Annual Cost of Water ($ per acft), based on PF=1	$11,100
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$2,033
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$34.06
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$6.24
Note: One or more cost element has been calculated externally	
KC Jacobson	*7/1/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Agua SUD - West WWTP 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*
Intake Pump Stations (0 MGD)	$1,231,000
Transmission Pipeline (10 in. dia., 11 miles)	$18,351,000
Storage Tanks (Other Than at Booster Pump Stations)	$1,784,000
Water Treatment Plant (1 MGD)	$5,599,000
Integration, Relocations, Backup Generator & Other	$25,000
TOTAL COST OF FACILITIES	**$26,990,000**
- Planning (3%)	$810,000
- Design (7%)	$1,889,000
- Construction Engineering (1%)	$270,000
Legal Assistance (2%)	$540,000
Fiscal Services (2%)	$540,000
Pipeline Contingency (15%)	$2,753,000
All Other Facilities Contingency (20%)	$1,728,000
Environmental & Archaeology Studies and Mitigation	$376,000
Land Acquisition and Surveying (114 acres)	$713,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$2,378,000
TOTAL COST OF PROJECT	**$38,987,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$2,741,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
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)	$31,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$560,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (402620 kW-hr @ 0.09 $/kW-hr)	$36,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$3,570,000**
Available Project Yield (acft/yr)	1,120
Annual Cost of Water ($ per acft), based on PF=1	$3,188
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$740
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$9.78
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$2.27

Note: One or more cost element has been calculated externally

J Burke *9/17/2024*

Cost Estimate Summary **Water Supply Project Option** **September 2023 Prices** **Brownsville PUB - Southside WWTP Reuse Project - Phase I**	
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 (0 MGD)	$1,936,000
Transmission Pipeline (18 in. dia., 3 miles)	$8,433,000
Advanced Water Treatment Facility (3 MGD)	$27,350,000
Integration, Relocations, Backup Generator & Other	$51,000
TOTAL COST OF FACILITIES	**$37,770,000**
- Planning (3%)	$1,133,000
- Design (7%)	$2,644,000
- Construction Engineering (1%)	$378,000
Legal Assistance (2%)	$755,000
Fiscal Services (2%)	$755,000
Pipeline Contingency (15%)	$1,265,000
All Other Facilities Contingency (20%)	$5,867,000
Environmental & Archaeology Studies and Mitigation	$120,000
Land Acquisition and Surveying (43 acres)	$276,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$1,655,000
TOTAL COST OF PROJECT	**$52,618,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$3,699,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
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)	$48,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$3,501,000
Pumping Energy Costs (833301 kW-hr @ 0.09 $/kW-hr)	$75,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$7,408,000**
Available Project Yield (acft/yr)	3,360
Annual Cost of Water ($ per acft), based on PF=1	$2,205
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$1,104
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$6.77
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$3.39
KC Jacobson	*6/28/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Brownsville PUB - Southside WWTP Reuse Project - 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***
Advanced Water Treatment Facility (1.5 MGD)	$15,819,000
TOTAL COST OF FACILITIES	**$15,819,000**
- Planning (3%)	$475,000
- Design (7%)	$1,107,000
- Construction Engineering (1%)	$158,000
Legal Assistance (2%)	$316,000
Fiscal Services (2%)	$316,000
All Other Facilities Contingency (20%)	$3,164,000
Environmental & Archaeology Studies and Mitigation	$0
Land Acquisition and Surveying (1 acres)	$0
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$695,000
TOTAL COST OF PROJECT	**$22,050,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$1,552,000
Reservoir Debt Service (3.5 percent, 40 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
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$1,950,000
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$3,502,000**
Available Project Yield (acft/yr)	1,680
Annual Cost of Water ($ per acft), based on PF=1	$2,085
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$1,161
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$6.40
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$3.56
KC Jacobson	*6/28/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Brownsville - Indirect 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***
Intake Pump Stations (0 MGD)	$1,977,000
Transmission Pipeline (16 in. dia., 1.6 miles)	$3,861,000
Water Treatment Plant (4 MGD)	$41,891,000
Advanced Water Treatment Facility (4 MGD)	$26,910,000
Integration, Relocations, Backup Generator & Other	$54,000
TOTAL COST OF FACILITIES	**$74,693,000**
- Planning (3%)	$2,241,000
- Design (7%)	$5,229,000
- Construction Engineering (1%)	$747,000
Legal Assistance (2%)	$1,494,000
Fiscal Services (2%)	$1,494,000
Pipeline Contingency (15%)	$579,000
All Other Facilities Contingency (20%)	$14,167,000
Environmental & Archaeology Studies and Mitigation	$103,000
Land Acquisition and Surveying (25 acres)	$104,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$6,552,000
TOTAL COST OF PROJECT	**$107,403,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$7,553,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
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)	$49,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$7,776,000
Advanced Water Treatment Facility	$2,352,000
Pumping Energy Costs (888733 kW-hr @ 0.09 $/kW-hr)	$80,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$17,849,000**
Available Project Yield (acft/yr)	4,480
Annual Cost of Water ($ per acft), based on PF=1	$3,984
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$2,298
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$12.23
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$7.05

Note: One or more cost element has been calculated externally

Jaime Burke *9/27/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Laredo - South Laredo WWTP Potable Reuse Phase I

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 (0 MGD)	$2,269,000
Transmission Pipeline (16 in. dia., 8.7 miles)	$18,050,000
Storage Tanks (Other Than at Booster Pump Stations)	$1,784,000
Advanced Water Treatment Facility (3 MGD)	$27,350,000
Integration, Relocations, Backup Generator & Other	$125,000
TOTAL COST OF FACILITIES	**$49,578,000**
- Planning (3%)	$1,487,000
- Design (7%)	$3,470,000
- Construction Engineering (1%)	$496,000
Legal Assistance (2%)	$992,000
Fiscal Services (2%)	$992,000
Pipeline Contingency (15%)	$2,708,000
All Other Facilities Contingency (20%)	$6,306,000
Environmental & Archaeology Studies and Mitigation	$304,000
Land Acquisition and Surveying (114 acres)	$752,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$4,353,000
TOTAL COST OF PROJECT	**$71,438,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$5,018,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$200,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$57,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$3,501,000
Pumping Energy Costs (2053234 kW-hr @ 0.09 $/kW-hr)	$185,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$8,961,000**
Available Project Yield (acft/yr)	3,360
Annual Cost of Water ($ per acft), based on PF=1	$2,667
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$1,174
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$8.18
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$3.60

Note: One or more cost element has been calculated externally

KC Jacobson *7/1/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Laredo - South Laredo WWTP Reuse Project 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***
Intake Pump Stations (0 MGD)	$864,000
Advanced Water Treatment Facility (1 MGD)	$11,976,000
Integration, Relocations, Backup Generator & Other	$10,000
TOTAL COST OF FACILITIES	**$12,850,000**
- Planning (3%)	$385,000
- Design (7%)	$899,000
- Construction Engineering (1%)	$128,000
Legal Assistance (2%)	$257,000
Fiscal Services (2%)	$257,000
All Other Facilities Contingency (20%)	$2,570,000
Environmental & Archaeology Studies and Mitigation	$0
Land Acquisition and Surveying (42 acres)	$0
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$1,127,000
TOTAL COST OF PROJECT	**$18,473,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$1,299,000
Reservoir Debt Service (3.5 percent, 40 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)	$22,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$1,433,000
Pumping Energy Costs (161431 kW-hr @ 0.09 $/kW-hr)	$15,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$2,769,000**
Available Project Yield (acft/yr)	1,120
Annual Cost of Water ($ per acft), based on PF=1	$2,472
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$1,313
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$7.59
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$4.03

KC Jacobson *7/1/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
McAllen - 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***
Intake Pump Stations (0 MGD)	$1,595,000
Transmission Pipeline (18 in. dia., 3 miles)	$7,254,000
Storage Tanks (Other Than at Booster Pump Stations)	$3,306,000
Advanced Water Treatment Facility (3.5 MGD)	$31,194,000
Integration, Relocations, Backup Generator & Other	$38,000
TOTAL COST OF FACILITIES	**$43,387,000**
- Planning (3%)	$1,302,000
- Design (7%)	$3,037,000
- Construction Engineering (1%)	$434,000
Legal Assistance (2%)	$868,000
Fiscal Services (2%)	$868,000
Pipeline Contingency (15%)	$1,088,000
All Other Facilities Contingency (20%)	$7,227,000
Environmental & Archaeology Studies and Mitigation	$133,000
Land Acquisition and Surveying (45 acres)	$290,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$3,809,000
TOTAL COST OF PROJECT	**$62,443,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$4,391,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$106,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$40,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$4,018,000
Pumping Energy Costs (627435 kW-hr @ 0.09 $/kW-hr)	$56,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$8,611,000**
Available Project Yield (acft/yr)	3,880
Annual Cost of Water ($ per acft), based on PF=0	$2,219
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$1,088
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$6.81
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$3.34

KC Jacobson *7/1/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Mission - 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***
Intake Pump Stations (0 MGD)	$1,393,000
Transmission Pipeline (16 in. dia., 1 miles)	$3,358,000
Storage Tanks (Other Than at Booster Pump Stations)	$2,545,000
Advanced Water Treatment Facility (3.5 MGD)	$31,194,000
Integration, Relocations, Backup Generator & Other	$30,000
TOTAL COST OF FACILITIES	**$38,520,000**
- Planning (3%)	$1,156,000
- Design (7%)	$2,696,000
- Construction Engineering (1%)	$385,000
Legal Assistance (2%)	$770,000
Fiscal Services (2%)	$770,000
Pipeline Contingency (15%)	$504,000
All Other Facilities Contingency (20%)	$7,032,000
Environmental & Archaeology Studies and Mitigation	$73,000
Land Acquisition and Surveying (21 acres)	$128,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$3,381,000
TOTAL COST OF PROJECT	**$55,415,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$3,897,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$59,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$35,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$4,018,000
Pumping Energy Costs (484043 kW-hr @ 0.09 $/kW-hr)	$44,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$8,053,000**
Available Project Yield (acft/yr)	3,920
Annual Cost of Water ($ per acft), based on PF=1	$2,054
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$1,060
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$6.30
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$3.25

KC Jacobson *7/1/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Pharr - Indirect 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***
Off-Channel Storage/Ring Dike (Conservation Pool 43 acft, 14 acres)	$3,571,000
Intake Pump Stations (0 MGD)	$1,618,000
Transmission Pipeline (16 in. dia., 2.5 miles)	$5,386,000
Advanced Water Treatment Facility (3 MGD)	$27,350,000
Integration, Relocations, Backup Generator & Other	$40,000
TOTAL COST OF FACILITIES	**$37,965,000**
- Planning (3%)	$1,139,000
- Design (7%)	$2,658,000
- Construction Engineering (1%)	$380,000
Legal Assistance (2%)	$759,000
Fiscal Services (2%)	$759,000
Pipeline Contingency (15%)	$808,000
All Other Facilities Contingency (20%)	$6,516,000
Environmental & Archaeology Studies and Mitigation	$160,000
Land Acquisition and Surveying (51 acres)	$203,000
Interest During Construction (3.5% for 1.5 years with a 0.5% ROI)	$2,503,000
TOTAL COST OF PROJECT	**$53,850,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$3,424,000
Reservoir Debt Service (3.5 percent, 40 years)	$241,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$54,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$40,000
Dam and Reservoir (1.5% of Cost of Facilities)	$54,000
Water Treatment Plant	$0
Advanced Water Treatment Facility	$3,501,000
Pumping Energy Costs (655921 kW-hr @ 0.09 $/kW-hr)	$59,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$7,373,000**
Available Project Yield (acft/yr)	3,360
Annual Cost of Water ($ per acft), based on PF=1	$2,194
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$1,104
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$6.73
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$3.39

Note: One or more cost element has been calculated externally

KC Jacobson *7/1/2024*

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *San Juan - 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***
Intake Pump Stations (0 MGD)	$1,290,000
Transmission Pipeline (8 in. dia., 1 miles)	$1,416,000
Storage Tanks (Other Than at Booster Pump Stations)	$1,404,000
Advanced Water Treatment Facility (1 MGD)	$11,976,000
Integration, Relocations, Backup Generator & Other	$29,000
TOTAL COST OF FACILITIES	**$16,115,000**
- Planning (3%)	$483,000
- Design (7%)	$1,128,000
- Construction Engineering (1%)	$161,000
Legal Assistance (2%)	$322,000
Fiscal Services (2%)	$322,000
Pipeline Contingency (15%)	$212,000
All Other Facilities Contingency (20%)	$2,940,000
Environmental & Archaeology Studies and Mitigation	$73,000
Land Acquisition and Surveying (20 acres)	$128,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$1,421,000
TOTAL COST OF PROJECT	**$23,305,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$1,638,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$28,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$32,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$1,433,000
Pumping Energy Costs (471453 kW-hr @ 0.09 $/kW-hr)	$42,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$3,173,000**
Available Project Yield (acft/yr)	1,120
Annual Cost of Water ($ per acft), based on PF=1	$2,833
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$1,371
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$8.69
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$4.21
KC Jacobson	*7/1/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Weslaco - North WWTP 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*
Intake Pump Stations (0 MGD)	$935,000
Transmission Pipeline (8 in. dia., 1 miles)	$1,378,000
Storage Tanks (Other Than at Booster Pump Stations)	$1,404,000
Advanced Water Treatment Facility (1 MGD)	$11,976,000
Integration, Relocations, Backup Generator & Other	$13,000
TOTAL COST OF FACILITIES	**$15,706,000**
- Planning (3%)	$471,000
- Design (7%)	$1,099,000
- Construction Engineering (1%)	$157,000
Legal Assistance (2%)	$314,000
Fiscal Services (2%)	$314,000
Pipeline Contingency (15%)	$207,000
All Other Facilities Contingency (20%)	$2,865,000
Environmental & Archaeology Studies and Mitigation	$73,000
Land Acquisition and Surveying (20 acres)	$128,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$1,386,000
TOTAL COST OF PROJECT	**$22,720,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$1,598,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$28,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$23,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$1,433,000
Pumping Energy Costs (206687 kW-hr @ 0.09 $/kW-hr)	$19,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$3,101,000**
Available Project Yield (acft/yr)	1,120
Annual Cost of Water ($ per acft), based on PF=1	$2,769
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$1,342
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$8.50
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$4.12

KC Jacobson *7/1/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Donna - Expanded Surface 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***
Terminal Storage (Conservation Pool 258 acft, 25 acres)	$14,631,000
Intake Pump Stations (2.1 MGD)	$5,186,000
Transmission Pipeline (12 in. dia., 0.3 miles)	$295,000
Water Treatment Plant (2 MGD)	$9,889,000
Integration, Relocations, Backup Generator & Other	$22,000
TOTAL COST OF FACILITIES	**$30,023,000**
- Planning (3%)	$901,000
- Design (7%)	$2,102,000
- Construction Engineering (1%)	$300,000
Legal Assistance (2%)	$600,000
Fiscal Services (2%)	$600,000
Pipeline Contingency (15%)	$44,000
All Other Facilities Contingency (20%)	$5,946,000
Environmental & Archaeology Studies and Mitigation	$9,000
Land Acquisition and Surveying (34 acres)	$7,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$2,635,000
TOTAL COST OF PROJECT	**$43,167,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$1,555,000
Reservoir Debt Service (3.5 percent, 40 years)	$985,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$3,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$130,000
Dam and Reservoir (1.5% of Cost of Facilities)	$219,000
Water Treatment Plant	$893,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (368756 kW-hr @ 0.09 $/kW-hr)	$33,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$3,818,000**
Available Project Yield (acft/yr)	2,240
Annual Cost of Water ($ per acft), based on PF=1	$1,704
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$571
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$5.23
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$1.75

Note: One or more cost element has been calculated externally

KC Jacobson *8/9/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
East Rio Hondo WSC - Surface Water Treatment Plant Phase I

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 (5.9 MGD)	$10,307,000
Transmission Pipeline (20 in. dia., 5 miles)	$8,446,000
Water Treatment Plant (3.5 MGD)	$35,363,000
Integration, Relocations, Backup Generator & Other	$89,000
TOTAL COST OF FACILITIES	**$54,205,000**
- Planning (3%)	$1,626,000
- Design (7%)	$3,794,000
- Construction Engineering (1%)	$542,000
Legal Assistance (2%)	$1,084,000
Fiscal Services (2%)	$1,084,000
Pipeline Contingency (15%)	$1,267,000
All Other Facilities Contingency (20%)	$9,152,000
Environmental & Archaeology Studies and Mitigation	$191,000
Land Acquisition and Surveying (67 acres)	$450,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$2,383,000
TOTAL COST OF PROJECT	**$75,778,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$5,326,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
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)	$258,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$2,938,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (1453442 kW-hr @ 0.09 $/kW-hr)	$131,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$8,738,000**
Available Project Yield (acft/yr)	560
Annual Cost of Water ($ per acft), based on PF=1	$15,604
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$6,093
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$47.88
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$18.70

KC Jacobson *8/9/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
North Alamo WSC - Delta WTP Expansion Phase 1

Cost based on ENR CCI 13485.67 for September 2023 and
a PPI of 278.502 for September 2023

Item	***Estimated Costs for Facilities***
Water Treatment Plant (4 MGD)	$14,620,000
TOTAL COST OF FACILITIES	**$14,620,000**
- Planning (3%)	$439,000
- Design (7%)	$1,023,000
- Construction Engineering (1%)	$146,000
Legal Assistance (2%)	$292,000
Fiscal Services (2%)	$292,000
All Other Facilities Contingency (20%)	$2,924,000
Land Acquisition and Surveying (2 acres)	$1,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$642,000
TOTAL COST OF PROJECT	**$20,379,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$1,434,000
Reservoir Debt Service (3.5 percent, 40 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
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$1,174,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$2,608,000**
Available Project Yield (acft/yr)	4,480
Annual Cost of Water ($ per acft), based on PF=0	$582
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$262
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$1.79
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.80

Note: One or more cost element has been calculated externally

KC Jacobson *8/9/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
North Alamo WSC - Delta WTP Expansino Phase 2

Cost based on ENR CCI 13485.67 for September 2023 and
a PPI of 278.502 for September 2023

Item	***Estimated Costs for Facilities***
Water Treatment Plant (1.5 MGD)	$8,706,000
TOTAL COST OF FACILITIES	**$8,706,000**
- Planning (3%)	$261,000
- Design (7%)	$609,000
- Construction Engineering (1%)	$87,000
Legal Assistance (2%)	$174,000
Fiscal Services (2%)	$174,000
All Other Facilities Contingency (20%)	$1,741,000
Land Acquisition and Surveying (1 acres)	$1,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$382,000
TOTAL COST OF PROJECT	**$12,135,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$854,000
Reservoir Debt Service (3.5 percent, 40 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
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$823,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$1,677,000**
Available Project Yield (acft/yr)	1,680
Annual Cost of Water ($ per acft), based on PF=0	$998
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$490
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$3.06
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$1.50

Note: One or more cost element has been calculated externally

KC Jacobson *8/9/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Olmito WSC - WTP Expansion

Cost based on ENR CCI 13485.67 for September 2023 and
a PPI of 278.502 for September 2023

Item	*Estimated Costs for Facilities*
Water Treatment Plant (1 MGD)	$7,523,000
TOTAL COST OF FACILITIES	**$7,523,000**
- Planning (3%)	$226,000
- Design (7%)	$527,000
- Construction Engineering (1%)	$75,000
Legal Assistance (2%)	$150,000
Fiscal Services (2%)	$150,000
All Other Facilities Contingency (20%)	$1,505,000
Environmental & Archaeology Studies and Mitigation	$3,000
Land Acquisition and Surveying (1 acres)	$0
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$331,000
TOTAL COST OF PROJECT	**$10,490,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$738,000
Reservoir Debt Service (3.5 percent, 40 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
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$752,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$1,490,000**
Available Project Yield (acft/yr)	1,120
Annual Cost of Water ($ per acft), based on PF=0	$1,330
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$671
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$4.08
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$2.06

Note: One or more cost element has been calculated externally

KC Jacobson *8/9/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
East Rio Hondo WSC - FM 2925 Water Transmission Line

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 (0 MGD)	$798,000
Transmission Pipeline (12 in. dia., 11.3 miles)	$13,218,000
Integration, Relocations, Backup Generator & Other	$7,000
TOTAL COST OF FACILITIES	**$14,023,000**
- Planning (3%)	$421,000
- Design (7%)	$982,000
- Construction Engineering (1%)	$140,000
Legal Assistance (2%)	$280,000
Fiscal Services (2%)	$280,000
Pipeline Contingency (15%)	$1,983,000
All Other Facilities Contingency (20%)	$161,000
Environmental & Archaeology Studies and Mitigation	$370,000
Land Acquisition and Surveying (142 acres)	$1,004,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$639,000
TOTAL COST OF PROJECT	**$20,283,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$1,427,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$132,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$20,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (115283 kW-hr @ 0.09 $/kW-hr)	$10,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$1,589,000**
Available Project Yield (acft/yr)	30
Annual Cost of Water ($ per acft), based on PF=1	$52,967
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$5,400
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$162.52
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$16.57

LFL *8/19/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
El Jardin WSC - Distribution Pipeline Replacement

Cost based on ENR CCI 13485.67 for September 2023 and
a PPI of 278.502 for September 2023

Item	***Estimated Costs for Facilities***
Transmission Pipeline (8 in. dia., 64.8 miles)	$56,398,000
TOTAL COST OF FACILITIES	**$56,398,000**
- Planning (3%)	$1,692,000
- Design (7%)	$3,948,000
- Construction Engineering (1%)	$564,000
Legal Assistance (2%)	$1,128,000
Fiscal Services (2%)	$1,128,000
Pipeline Contingency (15%)	$8,460,000
Environmental & Archaeology Studies and Mitigation	$1,943,000
Land Acquisition and Surveying (790 acres)	$506,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$4,925,000
TOTAL COST OF PROJECT	**$80,692,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$5,678,000
Reservoir Debt Service (3.5 percent, 40 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
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (1177 kW-hr @ 0.09 $/kW-hr)	$100
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$5,678,100**
Available Project Yield (acft/yr)	11
Annual Cost of Water ($ per acft), based on PF=1	$516,191
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$9
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$1,583.89
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.03

Note: One or more cost element has been calculated externally

LFL *8/20/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
HCID#6 - Expansion of Service Area

Cost based on ENR CCI 13485.67 for September 2023 and
a PPI of 278.502 for September 2023

Item	***Estimated Costs for Facilities***
Off-Channel Storage/Ring Dike (Conservation Pool 400 acft, acres)	$6,096,000
Intake Pump Stations (0 MGD)	$2,060,000
Transmission Pipeline (None)	$9,416,000
TOTAL COST OF FACILITIES	**$17,572,000**
- Planning (3%)	$527,000
- Design (7%)	$1,230,000
- Construction Engineering (1%)	$176,000
Legal Assistance (2%)	$351,000
Fiscal Services (2%)	$351,000
Pipeline Contingency (15%)	$1,412,000
All Other Facilities Contingency (20%)	$1,631,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$757,000
TOTAL COST OF PROJECT	**$24,007,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$1,091,000
Reservoir Debt Service (3.5 percent, 40 years)	$398,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$94,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$51,000
Dam and Reservoir (1.5% of Cost of Facilities)	$91,000
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$1,725,000**
Available Project Yield (acft/yr)	1,120
Annual Cost of Water ($ per acft), based on PF=0	$1,540
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$211
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$4.73
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.65

Note: One or more cost element has been calculated externally

LFL *8/28/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
McAllen - Raw Water Line Project with HCID #1

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 (0 MGD)	$820,000
Transmission Pipeline (8 in. dia., 0.8 miles)	$726,000
Integration, Relocations, Backup Generator & Other	$8,000
TOTAL COST OF FACILITIES	**$1,554,000**
- Planning (3%)	$47,000
- Design (7%)	$109,000
- Construction Engineering (1%)	$16,000
Legal Assistance (2%)	$31,000
Fiscal Services (2%)	$31,000
Pipeline Contingency (15%)	$109,000
All Other Facilities Contingency (20%)	$166,000
Environmental & Archaeology Studies and Mitigation	$56,000
Land Acquisition and Surveying (15 acres)	$68,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$71,000
TOTAL COST OF PROJECT	**$2,258,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$158,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
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)	$21,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (133487 kW-hr @ 0.09 $/kW-hr)	$12,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$198,000**
Available Project Yield (acft/yr)	800
Annual Cost of Water ($ per acft), based on PF=1	$248
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$50
Annual Cost of Water ($ 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	$0.15

Note: One or more cost element has been calculated externally

LFL *8/16/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Rio Hondo - Emergency Interconnects

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 (1.1 MGD)	$1,705,000
Transmission Pipeline (16-18 in. dia., 2.5 miles)	$3,507,000
Integration, Relocations, Backup Generator & Other	$19,000
TOTAL COST OF FACILITIES	**$5,231,000**
- Planning (3%)	$157,000
- Design (7%)	$366,000
- Construction Engineering (1%)	$52,000
Legal Assistance (2%)	$105,000
Fiscal Services (2%)	$105,000
Pipeline Contingency (15%)	$526,000
All Other Facilities Contingency (20%)	$345,000
Environmental & Archaeology Studies and Mitigation	$140,000
Land Acquisition and Surveying (40 acres)	$286,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$238,000
TOTAL COST OF PROJECT	**$7,551,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$530,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$35,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$43,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (306849 kW-hr @ 0.09 $/kW-hr)	$27,600
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$635,600**
Available Project Yield (acft/yr)	20
Annual Cost of Water ($ per acft), based on PF=1	$31,780
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$5,280
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$97.51
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$16.20

LFL *8/13/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Brownsville - Banco Morales 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***
Off-Channel Storage/Ring Dike (Conservation Pool 1227 acft, 60 acres)	$8,558,000
Intake Pump Stations (0 MGD)	$858,000
Transmission Pipeline (12 in. dia., 0.3 miles)	$481,000
Integration, Relocations, Backup Generator & Other	$9,000
TOTAL COST OF FACILITIES	**$9,906,000**
- Planning (3%)	$297,000
- Design (7%)	$693,000
- Construction Engineering (1%)	$99,000
Legal Assistance (2%)	$198,000
Fiscal Services (2%)	$198,000
Pipeline Contingency (15%)	$72,000
All Other Facilities Contingency (20%)	$1,885,000
Environmental & Archaeology Studies and Mitigation	$403,000
Land Acquisition and Surveying (68 acres)	$425,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$462,000
TOTAL COST OF PROJECT	**$14,638,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$137,000
Reservoir Debt Service (3.5 percent, 40 years)	$594,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$5,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$21,000
Dam and Reservoir (1.5% of Cost of Facilities)	$128,000
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (155181 kW-hr @ 0.09 $/kW-hr)	$14,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$899,000**
Available Project Yield (acft/yr)	140
Annual Cost of Water ($ per acft), based on PF=1	$6,421
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$1,200
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$19.70
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$3.68

Jaime Burke *10/11/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Alamo - New Fresh Groundwater Well

Cost based on ENR CCI 13485.67 for September 2023 and
a PPI of 278.502 for September 2023

Item	*Estimated Costs for Facilities*
Well Fields (Wells, Pumps, and Piping)	$1,714,000
TOTAL COST OF FACILITIES	**$1,714,000**
- Planning (3%)	$51,000
- Design (7%)	$120,000
- Construction Engineering (1%)	$17,000
Legal Assistance (2%)	$34,000
Fiscal Services (2%)	$34,000
All Other Facilities Contingency (20%)	$343,000
Environmental & Archaeology Studies and Mitigation	$15,000
Land Acquisition and Surveying (5 acres)	$7,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$76,000
TOTAL COST OF PROJECT	**$2,411,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$170,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$17,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (258379 kW-hr @ 0.09 $/kW-hr)	$23,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$210,000**
Available Project Yield (acft/yr)	1,120
Annual Cost of Water ($ per acft), based on PF=0	$188
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$36
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$0.58
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.11

Jaime Burke *10/19/2024*

Cost Estimate Summary ***Water Supply Project Option*** ***September 2023 Prices*** ***County-Other,Cameron - Expanded Groundwater 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***
Well Fields (Wells, Pumps, and Piping)	$7,738,000
Water Treatment Plant (2.2 MGD)	$180,000
TOTAL COST OF FACILITIES	**$7,918,000**
- Planning (3%)	$238,000
- Design (7%)	$554,000
- Construction Engineering (1%)	$79,000
Legal Assistance (2%)	$158,000
Fiscal Services (2%)	$158,000
All Other Facilities Contingency (20%)	$1,584,000
Environmental & Archaeology Studies and Mitigation	$272,000
Land Acquisition and Surveying (32 acres)	$224,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$364,000
TOTAL COST OF PROJECT	**$11,549,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$813,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$77,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$108,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (906311 kW-hr @ 0.09 $/kW-hr)	$82,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$1,080,000**
Available Project Yield (acft/yr)	2,500
Annual Cost of Water ($ per acft), based on PF=0	$432
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$107
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$1.33
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.33
Jaime Burke	*10/19/2024*

Cost Estimate Summary ***Water Supply Project Option*** ***September 2023 Prices*** ***County-Other, Starr - Additional Fresh Groundwater Wells***	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$1,165,000
Water Treatment Plant (0.4 MGD)	$51,000
TOTAL COST OF FACILITIES	**$1,216,000**
- Planning (3%)	$36,000
- Design (7%)	$85,000
- Construction Engineering (1%)	$12,000
Legal Assistance (2%)	$24,000
Fiscal Services (2%)	$24,000
All Other Facilities Contingency (20%)	$243,000
Environmental & Archaeology Studies and Mitigation	$11,000
Land Acquisition and Surveying (3 acres)	$12,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$55,000
TOTAL COST OF PROJECT	**$1,718,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$121,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$12,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$31,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (201954 kW-hr @ 0.09 $/kW-hr)	$18,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$182,000**
Available Project Yield (acft/yr)	400
Annual Cost of Water ($ per acft), based on PF=0	$455
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$153
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$1.40
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.47
Jaime Burke	*10/19/2024*

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *County-Other, Webb - Additional Fresh Groundwater Wells*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$11,240,000
Storage Tanks (Other Than at Booster Pump Stations)	$1,252,000
Two Water Treatment Plants (0.5 MGD and 0.5 MGD)	$125,000
TOTAL COST OF FACILITIES	**$12,617,000**
- Planning (3%)	$379,000
- Design (7%)	$883,000
- Construction Engineering (1%)	$126,000
Legal Assistance (2%)	$252,000
Fiscal Services (2%)	$252,000
All Other Facilities Contingency (20%)	$2,523,000
Environmental & Archaeology Studies and Mitigation	$443,000
Land Acquisition and Surveying (75 acres)	$300,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$578,000
TOTAL COST OF PROJECT	**$18,353,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$1,291,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$125,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$75,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (139131 kW-hr @ 0.09 $/kW-hr)	$13,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$1,504,000**
Available Project Yield (acft/yr)	1,120
Annual Cost of Water ($ per acft), based on PF=0	$1,343
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$190
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$4.12
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.58
Jaime Burke	*10/21/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Edcouch - New Groundwater 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***
Intake Pump Stations (0 MGD)	$764,000
Transmission Pipeline (8 in. dia., 4 miles)	$3,483,000
Well Fields (Wells, Pumps, and Piping)	$2,079,000
Water Treatment Plant (0.5 MGD)	$63,000
Integration, Relocations, Backup Generator & Other	$6,000
TOTAL COST OF FACILITIES	**$6,395,000**
- Planning (3%)	$192,000
- Design (7%)	$448,000
- Construction Engineering (1%)	$64,000
Legal Assistance (2%)	$128,000
Fiscal Services (2%)	$128,000
Pipeline Contingency (15%)	$522,000
All Other Facilities Contingency (20%)	$582,000
Environmental & Archaeology Studies and Mitigation	$172,000
Land Acquisition and Surveying (50 acres)	$316,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$582,000
TOTAL COST OF PROJECT	**$9,529,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$670,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$56,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$19,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$38,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (194508 kW-hr @ 0.09 $/kW-hr)	$18,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$801,000**
Available Project Yield (acft/yr)	500
Annual Cost of Water ($ per acft), based on PF=1	$1,602
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$262
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$4.92
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.80

Jaime Burke *10/21/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Hidalgo - Expand Existing Groundwater Wells

Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023

Item	*Estimated Costs for Facilities*
Well Fields (Wells, Pumps, and Piping)	$2,565,000
Water Treatment Plant (0.3 MGD)	$47,000
TOTAL COST OF FACILITIES	**$2,612,000**
- Planning (3%)	$78,000
- Design (7%)	$183,000
- Construction Engineering (1%)	$26,000
Legal Assistance (2%)	$52,000
Fiscal Services (2%)	$52,000
All Other Facilities Contingency (20%)	$522,000
Environmental & Archaeology Studies and Mitigation	$94,000
Land Acquisition and Surveying (10 acres)	$72,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$120,000
TOTAL COST OF PROJECT	**$3,811,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$268,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$26,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$28,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (34564 kW-hr @ 0.09 $/kW-hr)	$3,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$325,000**
Available Project Yield (acft/yr)	300
Annual Cost of Water ($ per acft), based on PF=0	$1,083
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$190
Annual Cost of Water ($ 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	$0.58

Jaime Burke *10/21/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Rio Hondo - New Groundwater 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***
Intake Pump Stations (0 MGD)	$881,000
Transmission Pipeline (10 in. dia., 1 miles)	$1,500,000
Well Fields (Wells, Pumps, and Piping)	$3,786,000
Integration, Relocations, Backup Generator & Other	$10,000
TOTAL COST OF FACILITIES	**$6,177,000**
- Planning (3%)	$185,000
- Design (7%)	$432,000
- Construction Engineering (1%)	$62,000
Legal Assistance (2%)	$124,000
Fiscal Services (2%)	$124,000
Pipeline Contingency (15%)	$225,000
All Other Facilities Contingency (20%)	$935,000
Environmental & Archaeology Studies and Mitigation	$130,000
Land Acquisition and Surveying (22 acres)	$69,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$275,000
TOTAL COST OF PROJECT	**$8,738,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$614,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$53,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$22,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (441546 kW-hr @ 0.09 $/kW-hr)	$40,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$729,000**
Available Project Yield (acft/yr)	1,120
Annual Cost of Water ($ per acft), based on PF=1	$651
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$103
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$2.00
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.32

Note: One or more cost element has been calculated externally

Jaime Burke *10/21/2024*

Cost Estimate Summary ***Water Supply Project Option*** ***September 2023 Prices*** ***Rio Hondo - New Groundwater 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***
Intake Pump Stations (0 MGD)	$881,000
Transmission Pipeline (10 in. dia., 1 miles)	$1,500,000
Well Fields (Wells, Pumps, and Piping)	$3,786,000
Integration, Relocations, Backup Generator & Other	$10,000
TOTAL COST OF FACILITIES	**$6,177,000**
- Planning (3%)	$185,000
- Design (7%)	$432,000
- Construction Engineering (1%)	$62,000
Legal Assistance (2%)	$124,000
Fiscal Services (2%)	$124,000
Pipeline Contingency (15%)	$225,000
All Other Facilities Contingency (20%)	$935,000
Environmental & Archaeology Studies and Mitigation	$130,000
Land Acquisition and Surveying (22 acres)	$69,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$275,000
TOTAL COST OF PROJECT	**$8,738,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$614,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$53,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$22,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (441546 kW-hr @ 0.09 $/kW-hr)	$40,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$729,000**
Available Project Yield (acft/yr)	1,040
Annual Cost of Water ($ per acft), based on PF=1	$701
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$111
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$2.15
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.34
Note: One or more cost element has been calculated externally	
Jaime Burke	*10/21/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Webb County Water Utility - Expanded Groundwater 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***
Well Fields (Wells, Pumps, and Piping)	$2,428,000
Water Treatment Plant (0.2 MGD)	$39,000
TOTAL COST OF FACILITIES	**$2,467,000**
- Planning (3%)	$74,000
- Design (7%)	$173,000
- Construction Engineering (1%)	$25,000
Legal Assistance (2%)	$49,000
Fiscal Services (2%)	$49,000
All Other Facilities Contingency (20%)	$493,000
Environmental & Archaeology Studies and Mitigation	$66,000
Land Acquisition and Surveying (10 acres)	$41,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$112,000
TOTAL COST OF PROJECT	**$3,549,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$250,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
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)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$23,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (23443 kW-hr @ 0.09 $/kW-hr)	$2,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$299,000**
Available Project Yield (acft/yr)	180
Annual Cost of Water ($ per acft), based on PF=0	$1,661
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$272
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$5.10
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.84

Jaime Burke *10/21/2024*

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Weslaco - Groundwater Blending*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$1,343,000
TOTAL COST OF FACILITIES	**$1,343,000**
- Planning (3%)	$40,000
- Design (7%)	$94,000
- Construction Engineering (1%)	$13,000
Legal Assistance (2%)	$27,000
Fiscal Services (2%)	$27,000
All Other Facilities Contingency (20%)	$269,000
Environmental & Archaeology Studies and Mitigation	$38,000
Land Acquisition and Surveying (4 acres)	$30,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$62,000
TOTAL COST OF PROJECT	**$1,943,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$137,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
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)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (77915 kW-hr @ 0.09 $/kW-hr)	$7,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$157,000**
Available Project Yield (acft/yr)	560
Annual Cost of Water ($ per acft), based on PF=0	$280
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$36
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$0.86
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.11
Jaime Burke	*10/21/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Agua SUD - New Brackish Groundwater Treatment Plant - Phase 1

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 (0 MGD)	$1,161,000
Transmission Pipeline (14 in. dia., 0.2 miles)	$238,000
Well Fields (Wells, Pumps, and Piping)	$8,923,000
Storage Tanks (Other Than at Booster Pump Stations)	$2,545,000
Water Treatment Plant (2.5 MGD)	$33,630,000
Integration, Relocations, Backup Generator & Other	$21,000
TOTAL COST OF FACILITIES	**$46,518,000**
- Planning (3%)	$1,396,000
- Design (7%)	$3,256,000
- Construction Engineering (1%)	$465,000
Legal Assistance (2%)	$930,000
Fiscal Services (2%)	$930,000
Pipeline Contingency (15%)	$36,000
All Other Facilities Contingency (20%)	$9,256,000
Environmental & Archaeology Studies and Mitigation	$159,000
Land Acquisition and Surveying (21 acres)	$151,000
Interest During Construction (3.5% for 1.5 years with a 0.5% ROI)	$3,076,000
TOTAL COST OF PROJECT	**$66,173,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$4,655,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$117,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$29,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$6,550,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (603995 kW-hr @ 0.09 $/kW-hr)	$54,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$11,405,000**
Available Project Yield (acft/yr)	2,800
Annual Cost of Water ($ per acft), based on PF=1	$4,073
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$2,411
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$12.50
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$7.40

Note: One or more cost element has been calculated externally

A. Smiley *10/24/2024*

Cost Estimate Summary	
Water Supply Project Option	
September 2023 Prices	
Agua SUD - New Brackish Groundwater Treatment Plant - Phase 2	
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 (0 MGD)	$1,161,000
Transmission Pipeline (14 in. dia., 0.2 miles)	$238,000
Well Fields (Wells, Pumps, and Piping)	$8,923,000
Storage Tanks (Other Than at Booster Pump Stations)	$2,545,000
Water Treatment Plant (2.5 MGD)	$33,630,000
Integration, Relocations, Backup Generator & Other	$21,000
TOTAL COST OF FACILITIES	**$46,518,000**
- Planning (3%)	$1,396,000
- Design (7%)	$3,256,000
- Construction Engineering (1%)	$465,000
Legal Assistance (2%)	$930,000
Fiscal Services (2%)	$930,000
Pipeline Contingency (15%)	$36,000
All Other Facilities Contingency (20%)	$9,256,000
Environmental & Archaeology Studies and Mitigation	$159,000
Land Acquisition and Surveying (21 acres)	$151,000
Interest During Construction (3.5% for 1.5 years with a 0.5% ROI)	$3,076,000
TOTAL COST OF PROJECT	**$66,173,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$4,655,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$117,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$29,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$6,550,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (603995 kW-hr @ 0.09 $/kW-hr)	$54,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$11,405,000**
Available Project Yield (acft/yr)	2,800
Annual Cost of Water ($ per acft), based on PF=1	$4,073
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$2,411
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$12.50
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$7.40
Note: One or more cost element has been calculated externally	
A. Smiley	*10/24/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Alamo - Brackish Goundwater 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***
Well Fields (Wells, Pumps, and Piping)	$2,353,000
Water Treatment Plant (1 MGD)	$24,115,000
TOTAL COST OF FACILITIES	**$26,468,000**
- Planning (3%)	$794,000
- Design (7%)	$1,853,000
- Construction Engineering (1%)	$265,000
Legal Assistance (2%)	$529,000
Fiscal Services (2%)	$529,000
All Other Facilities Contingency (20%)	$5,294,000
Environmental & Archaeology Studies and Mitigation	$51,000
Land Acquisition and Surveying (6 acres)	$43,000
Interest During Construction (3.5% for 1.5 years with a 0.5% ROI)	$1,747,000
TOTAL COST OF PROJECT	**$37,573,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$2,644,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
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)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$4,697,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (161451 kW-hr @ 0.09 $/kW-hr)	$15,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$7,380,000**
Available Project Yield (acft/yr)	896
Annual Cost of Water ($ per acft), based on PF=0	$8,237
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$5,286
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$25.27
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$16.22

Note: One or more cost element has been calculated externally

A. Smiley *10/23/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Eagle Pass - Brackish Groundwater Desalanation

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 (0 MGD)	$3,792,000
Transmission Pipeline (20 in. dia., 30 miles)	$49,178,000
Transmission Pump Station(s) & Storage Tank(s)	$5,262,000
Well Fields (Wells, Pumps, and Piping)	$24,882,000
Water Treatment Plant (4.7 MGD)	$47,280,000
Integration, Relocations, Backup Generator & Other	$253,000
TOTAL COST OF FACILITIES	**$130,647,000**
- Planning (3%)	$3,919,000
- Design (7%)	$9,145,000
- Construction Engineering (1%)	$1,306,000
Legal Assistance (2%)	$2,613,000
Fiscal Services (2%)	$2,613,000
Pipeline Contingency (15%)	$7,377,000
All Other Facilities Contingency (20%)	$16,294,000
Environmental & Archaeology Studies and Mitigation	$1,232,000
Land Acquisition and Surveying (145 acres)	$852,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$5,712,000
TOTAL COST OF PROJECT	**$181,710,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$12,768,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$758,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$190,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$9,209,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (4912485 kW-hr @ 0.09 $/kW-hr)	$442,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$23,367,000**
Available Project Yield (acft/yr)	5,210
Annual Cost of Water ($ per acft), based on PF=1	$4,485
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$2,034
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$13.76
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$6.24

Note: One or more cost element has been calculated externally

K. Snyder *10/28/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
ERHWSC - North Cameron Regional WTP Wellfield Expansion

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 (0 MGD)	$729,000
Transmission Pipeline (20 in. dia., 10.5 miles)	$18,559,000
Well Fields (Wells, Pumps, and Piping)	$4,013,000
Storage Tanks (Other Than at Booster Pump Stations)	$2,545,000
Integration, Relocations, Backup Generator & Other	$2,000
TOTAL COST OF FACILITIES	**$25,848,000**
- Planning (3%)	$775,000
- Design (7%)	$1,809,000
- Construction Engineering (1%)	$258,000
Legal Assistance (2%)	$517,000
Fiscal Services (2%)	$517,000
Pipeline Contingency (15%)	$2,784,000
All Other Facilities Contingency (20%)	$1,458,000
Environmental & Archaeology Studies and Mitigation	$412,000
Land Acquisition and Surveying (49 acres)	$349,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$1,129,000
TOTAL COST OF PROJECT	**$35,856,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$2,523,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$251,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$18,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (128268 kW-hr @ 0.09 $/kW-hr)	$12,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$2,804,000**
Available Project Yield (acft/yr)	1,389
Annual Cost of Water ($ per acft), based on PF=1	$2,019
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$202
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$6.19
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.62

K. Snyder *10/25/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
ERHWSC - North Cameron Regional WTP Wellfield Expansion

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 (0 MGD)	$729,000
Transmission Pipeline (20 in. dia., 10.5 miles)	$18,559,000
Well Fields (Wells, Pumps, and Piping)	$4,013,000
Storage Tanks (Other Than at Booster Pump Stations)	$2,545,000
Integration, Relocations, Backup Generator & Other	$2,000
TOTAL COST OF FACILITIES	**$25,848,000**
- Planning (3%)	$775,000
- Design (7%)	$1,809,000
- Construction Engineering (1%)	$258,000
Legal Assistance (2%)	$517,000
Fiscal Services (2%)	$517,000
Pipeline Contingency (15%)	$2,784,000
All Other Facilities Contingency (20%)	$1,458,000
Environmental & Archaeology Studies and Mitigation	$412,000
Land Acquisition and Surveying (49 acres)	$349,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$1,129,000
TOTAL COST OF PROJECT	**$35,856,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$2,523,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$251,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$18,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (128268 kW-hr @ 0.09 $/kW-hr)	$12,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$2,804,000**
Available Project Yield (acft/yr)	1,290
Annual Cost of Water ($ per acft), based on PF=1	$2,174
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$218
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$6.67
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.67

K. Snyder *10/25/2024*

Cost Estimate Summary ***Water Supply Project Option*** ***September 2023 Prices*** ***East Rio Hondo WTP - Brackish Desal Wellfield and RO at NRWTP and MASWTP***	
Cost based on ENR CCI 13485.67 for September 2023 and ***a PPI of 278.502 for September 2023***	
Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$8,146,000
Two Water Treatment Plants (4 MGD and 1.6 MGD)	$71,066,000
TOTAL COST OF FACILITIES	**$79,212,000**
- Planning (3%)	$2,376,000
- Design (7%)	$5,545,000
- Construction Engineering (1%)	$792,000
Legal Assistance (2%)	$1,584,000
Fiscal Services (2%)	$1,584,000
All Other Facilities Contingency (20%)	$15,842,000
Environmental & Archaeology Studies and Mitigation	$168,000
Land Acquisition and Surveying (16 acres)	$109,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$3,485,000
TOTAL COST OF PROJECT	**$110,697,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$7,789,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
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)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$13,841,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (400256 kW-hr @ 0.09 $/kW-hr)	$36,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$21,747,000**
Available Project Yield (acft/yr)	3,136
Annual Cost of Water ($ per acft), based on PF=1	$6,935
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$4,451
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$21.28
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$13.66
K. Snyder	*10/25/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
East Rio Hondo WTP - Brackish Desal Wellfield and RO at NRWTP and MASWTP

Cost based on ENR CCI 13485.67 for September 2023 and
a PPI of 278.502 for September 2023

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$8,146,000
Two Water Treatment Plants (4 MGD and 1.6 MGD)	$71,066,000
TOTAL COST OF FACILITIES	**$79,212,000**
- Planning (3%)	$2,376,000
- Design (7%)	$5,545,000
- Construction Engineering (1%)	$792,000
Legal Assistance (2%)	$1,584,000
Fiscal Services (2%)	$1,584,000
All Other Facilities Contingency (20%)	$15,842,000
Environmental & Archaeology Studies and Mitigation	$168,000
Land Acquisition and Surveying (16 acres)	$109,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$3,485,000
TOTAL COST OF PROJECT	**$110,697,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$7,789,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
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)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$13,841,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (400256 kW-hr @ 0.09 $/kW-hr)	$36,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$21,747,000**
Available Project Yield (acft/yr)	2,776
Annual Cost of Water ($ per acft), based on PF=2	$7,834
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$5,028
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$24.04
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$15.43

K. Snyder *10/25/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
East Rio Hondo WSC - Expansion of MASWTP

Cost based on ENR CCI 13485.67 for September 2023 and
a PPI of 278.502 for September 2023

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$3,646,000
Water Treatment Plant (1 MGD)	$7,523,000
TOTAL COST OF FACILITIES	**$11,169,000**
- Planning (3%)	$335,000
- Design (7%)	$782,000
- Construction Engineering (1%)	$112,000
Legal Assistance (2%)	$223,000
Fiscal Services (2%)	$223,000
All Other Facilities Contingency (20%)	$2,234,000
Environmental & Archaeology Studies and Mitigation	$52,000
Land Acquisition and Surveying (4 acres)	$29,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$493,000
TOTAL COST OF PROJECT	**$15,652,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$1,101,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
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)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$752,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (266112 kW-hr @ 0.09 $/kW-hr)	$24,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$1,913,000**
Available Project Yield (acft/yr)	1,120
Annual Cost of Water ($ per acft), based on PF=1	$1,708
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$725
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$5.24
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$2.22

K. Snyder *10/25/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
East Rio Hondo WSC - Expansion of MASWTP

Cost based on ENR CCI 13485.67 for September 2023 and
a PPI of 278.502 for September 2023

Item	*Estimated Costs for Facilities*
Well Fields (Wells, Pumps, and Piping)	$3,646,000
Water Treatment Plant (1 MGD)	$7,523,000
TOTAL COST OF FACILITIES	**$11,169,000**
- Planning (3%)	$335,000
- Design (7%)	$782,000
- Construction Engineering (1%)	$112,000
Legal Assistance (2%)	$223,000
Fiscal Services (2%)	$223,000
All Other Facilities Contingency (20%)	$2,234,000
Environmental & Archaeology Studies and Mitigation	$52,000
Land Acquisition and Surveying (4 acres)	$29,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$493,000
TOTAL COST OF PROJECT	**$15,652,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$1,101,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
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)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$752,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (266112 kW-hr @ 0.09 $/kW-hr)	$24,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$1,913,000**
Available Project Yield (acft/yr)	988
Annual Cost of Water ($ per acft), based on PF=1	$1,936
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$822
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$5.94
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$2.52

K. Snyder *10/25/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
La Feria - Brackish Groundwater 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***
Well Fields (Wells, Pumps, and Piping)	$4,271,000
Water Treatment Plant (1 MGD)	$24,115,000
TOTAL COST OF FACILITIES	**$28,386,000**
- Planning (3%)	$852,000
- Design (7%)	$1,987,000
- Construction Engineering (1%)	$284,000
Legal Assistance (2%)	$568,000
Fiscal Services (2%)	$568,000
All Other Facilities Contingency (20%)	$5,677,000
Environmental & Archaeology Studies and Mitigation	$74,000
Land Acquisition and Surveying (9 acres)	$63,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$1,250,000
TOTAL COST OF PROJECT	**$39,709,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$2,794,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$43,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$4,697,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (339673 kW-hr @ 0.09 $/kW-hr)	$31,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$7,565,000**
Available Project Yield (acft/yr)	1,120
Annual Cost of Water ($ per acft), based on PF=1	$6,754
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$4,260
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$20.73
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$13.07

Note: One or more cost element has been calculated externally

A. Smiley *10/24/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Lyford - Brackish Groundwater 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***
Well Fields (Wells, Pumps, and Piping)	$3,405,000
Water Treatment Plant (0.5 MGD)	$12,059,000
TOTAL COST OF FACILITIES	**$15,464,000**
- Planning (3%)	$464,000
- Design (7%)	$1,082,000
- Construction Engineering (1%)	$155,000
Legal Assistance (2%)	$309,000
Fiscal Services (2%)	$309,000
All Other Facilities Contingency (20%)	$3,093,000
Environmental & Archaeology Studies and Mitigation	$29,000
Land Acquisition and Surveying (4 acres)	$25,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$681,000
TOTAL COST OF PROJECT	**$21,611,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$1,521,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$34,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$2,349,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (97736 kW-hr @ 0.09 $/kW-hr)	$9,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$3,913,000**
Available Project Yield (acft/yr)	560
Annual Cost of Water ($ per acft), based on PF=1	$6,988
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$4,271
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$21.44
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$13.11

Note: One or more cost element has been calculated externally

A. Smiley *10/24/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
McAllen - Brackish Groundwater 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***
Well Fields (Wells, Pumps, and Piping)	$11,470,000
Water Treatment Plant (6 MGD)	$55,833,000
TOTAL COST OF FACILITIES	**$67,303,000**
- Planning (3%)	$2,019,000
- Design (7%)	$4,711,000
- Construction Engineering (1%)	$673,000
Legal Assistance (2%)	$1,346,000
Fiscal Services (2%)	$1,346,000
All Other Facilities Contingency (20%)	$13,461,000
Environmental & Archaeology Studies and Mitigation	$158,000
Land Acquisition and Surveying (19 acres)	$137,000
Interest During Construction (3.5% for 1.5 years with a 0.5% ROI)	$4,444,000
TOTAL COST OF PROJECT	**$95,598,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$6,726,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$115,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$10,874,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (1040122 kW-hr @ 0.09 $/kW-hr)	$94,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$17,809,000**
Available Project Yield (acft/yr)	6,720
Annual Cost of Water ($ per acft), based on PF=1	$2,650
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$1,649
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$8.13
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$5.06

Note: One or more cost element has been calculated externally

A. Smiley *10/24/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Mission - Brackish Groundwater 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***
Well Fields (Wells, Pumps, and Piping)	$8,879,000
Water Treatment Plant (3 MGD)	$36,802,000
TOTAL COST OF FACILITIES	**$45,681,000**
- Planning (3%)	$1,370,000
- Design (7%)	$3,198,000
- Construction Engineering (1%)	$457,000
Legal Assistance (2%)	$914,000
Fiscal Services (2%)	$914,000
All Other Facilities Contingency (20%)	$9,136,000
Environmental & Archaeology Studies and Mitigation	$125,000
Land Acquisition and Surveying (15 acres)	$106,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$2,012,000
TOTAL COST OF PROJECT	**$63,913,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$4,497,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$89,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$7,168,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (433925 kW-hr @ 0.09 $/kW-hr)	$39,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$11,793,000**
Available Project Yield (acft/yr)	2,688
Annual Cost of Water ($ per acft), based on PF=1	$4,387
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$2,714
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$13.46
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$8.33

Note: One or more cost element has been calculated externally

A. Smiley *10/24/2024*

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *North Alamo WSC - Delta Area Brackish Groundwater 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***
Well Fields (Wells, Pumps, and Piping)	$5,672,000
Water Treatment Plant (2 MGD)	$30,458,000
TOTAL COST OF FACILITIES	**$36,130,000**
- Planning (3%)	$1,084,000
- Design (7%)	$2,529,000
- Construction Engineering (1%)	$361,000
Legal Assistance (2%)	$723,000
Fiscal Services (2%)	$723,000
All Other Facilities Contingency (20%)	$7,226,000
Environmental & Archaeology Studies and Mitigation	$78,000
Land Acquisition and Surveying (9 acres)	$67,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$1,590,000
TOTAL COST OF PROJECT	**$50,511,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$3,554,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
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)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$5,932,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (461368 kW-hr @ 0.09 $/kW-hr)	$42,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$9,585,000**
Available Project Yield (acft/yr)	2,240
Annual Cost of Water ($ per acft), based on PF=1	$4,279
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$2,692
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$13.13
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$8.26
Note: One or more cost element has been calculated externally	
A. Smiley	*10/24/2024*

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *North Alamo WSC - Delta Area Brackish Groundwater 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***
Well Fields (Wells, Pumps, and Piping)	$5,672,000
Water Treatment Plant (2 MGD)	$30,458,000
TOTAL COST OF FACILITIES	**$36,130,000**
- Planning (3%)	$1,084,000
- Design (7%)	$2,529,000
- Construction Engineering (1%)	$361,000
Legal Assistance (2%)	$723,000
Fiscal Services (2%)	$723,000
All Other Facilities Contingency (20%)	$7,226,000
Environmental & Archaeology Studies and Mitigation	$78,000
Land Acquisition and Surveying (9 acres)	$67,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$1,590,000
TOTAL COST OF PROJECT	**$50,511,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$3,554,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
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)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$5,932,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (461368 kW-hr @ 0.09 $/kW-hr)	$42,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$9,585,000**
Available Project Yield (acft/yr)	2,080
Annual Cost of Water ($ per acft), based on PF=1	$4,608
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$2,900
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$14.14
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$8.90
Note: One or more cost element has been calculated externally	
A. Smiley	*10/24/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Primera - Brackish Groundwater 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*
Well Fields (Wells, Pumps, and Piping)	$6,418,000
Storage Tanks (Other Than at Booster Pump Stations)	$1,784,000
Water Treatment Plant (1 MGD)	$24,115,000
TOTAL COST OF FACILITIES	**$32,317,000**
- Planning (3%)	$970,000
- Design (7%)	$2,262,000
- Construction Engineering (1%)	$323,000
Legal Assistance (2%)	$646,000
Fiscal Services (2%)	$646,000
All Other Facilities Contingency (20%)	$6,463,000
Environmental & Archaeology Studies and Mitigation	$87,000
Land Acquisition and Surveying (11 acres)	$77,000
Interest During Construction (3.5% for 1.5 years with a 0.5% ROI)	$2,135,000
TOTAL COST OF PROJECT	**$45,926,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$3,231,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$82,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$4,697,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (339673 kW-hr @ 0.09 $/kW-hr)	$31,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$8,041,000**
Available Project Yield (acft/yr)	1,120
Annual Cost of Water ($ per acft), based on PF=1	$7,179
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$4,295
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$22.03
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$13.18

Note: One or more cost element has been calculated externally

A. Smiley *10/24/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Primera - Brackish Groundwater 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***
Well Fields (Wells, Pumps, and Piping)	$6,418,000
Storage Tanks (Other Than at Booster Pump Stations)	$1,784,000
Water Treatment Plant (1 MGD)	$24,115,000
TOTAL COST OF FACILITIES	**$32,317,000**
- Planning (3%)	$970,000
- Design (7%)	$2,262,000
- Construction Engineering (1%)	$323,000
Legal Assistance (2%)	$646,000
Fiscal Services (2%)	$646,000
All Other Facilities Contingency (20%)	$6,463,000
Environmental & Archaeology Studies and Mitigation	$87,000
Land Acquisition and Surveying (11 acres)	$77,000
Interest During Construction (3.5% for 1.5 years with a 0.5% ROI)	$2,135,000
TOTAL COST OF PROJECT	**$45,926,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$3,231,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$82,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$4,697,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (339673 kW-hr @ 0.09 $/kW-hr)	$31,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$8,041,000**
Available Project Yield (acft/yr)	1,120
Annual Cost of Water ($ per acft), based on PF=1	$7,179
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$4,295
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$22.03
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$13.18

Note: One or more cost element has been calculated externally

A. Smiley *10/24/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
San Benito - Brackish Groundwater Blending

Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$971,000
TOTAL COST OF FACILITIES	**$971,000**
- Planning (3%)	$29,000
- Design (7%)	$68,000
- Construction Engineering (1%)	$10,000
Legal Assistance (2%)	$19,000
Fiscal Services (2%)	$19,000
All Other Facilities Contingency (20%)	$194,000
Environmental & Archaeology Studies and Mitigation	$24,000
Land Acquisition and Surveying (3 acres)	$20,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$45,000
TOTAL COST OF PROJECT	**$1,399,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$98,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
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)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (130749 kW-hr @ 0.09 $/kW-hr)	$12,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$120,000**
Available Project Yield (acft/yr)	560
Annual Cost of Water ($ per acft), based on PF=0	$214
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$39
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$0.66
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.12

A. Smiley *10/24/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
San Juan - Brackish Groundwater Well and 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***
Well Fields (Wells, Pumps, and Piping)	$4,631,000
Water Treatment Plant (1 MGD)	$24,115,000
TOTAL COST OF FACILITIES	**$28,746,000**
- Planning (3%)	$862,000
- Design (7%)	$2,012,000
- Construction Engineering (1%)	$287,000
Legal Assistance (2%)	$575,000
Fiscal Services (2%)	$575,000
All Other Facilities Contingency (20%)	$5,749,000
Environmental & Archaeology Studies and Mitigation	$100,000
Land Acquisition and Surveying (11 acres)	$79,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$1,268,000
TOTAL COST OF PROJECT	**$40,253,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$2,832,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$46,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$4,697,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (563034 kW-hr @ 0.09 $/kW-hr)	$51,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$7,626,000**
Available Project Yield (acft/yr)	1,120
Annual Cost of Water ($ per acft), based on PF=0	$6,809
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$4,280
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$20.89
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$13.13

Jaime Burke *10/23/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
San Juan - WTP No. 1 Upgrade, Expansion, and Brackish Groundwater 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***
Well Fields (Wells, Pumps, and Piping)	$9,068,000
Water Treatment Plant (3 MGD)	$36,802,000
TOTAL COST OF FACILITIES	**$45,870,000**
- Planning (3%)	$1,376,000
- Design (7%)	$3,211,000
- Construction Engineering (1%)	$459,000
Legal Assistance (2%)	$917,000
Fiscal Services (2%)	$917,000
All Other Facilities Contingency (20%)	$9,174,000
Environmental & Archaeology Studies and Mitigation	$171,000
Land Acquisition and Surveying (19 acres)	$135,000
Interest During Construction (3.5% for 1.5 years with a 0.5% ROI)	$3,034,000
TOTAL COST OF PROJECT	**$65,264,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$4,592,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
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)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$7,168,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (1279997 kW-hr @ 0.09 $/kW-hr)	$115,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$11,966,000**
Available Project Yield (acft/yr)	3,360
Annual Cost of Water ($ per acft), based on PF=0	$3,561
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$2,195
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$10.93
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$6.73

Jaime Burke *10/23/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Sharyland WSC - Water Well and RO Unit at WTP No. 2

Cost based on ENR CCI 13485.67 for September 2023 and
a PPI of 278.502 for September 2023

Item	*Estimated Costs for Facilities*
Well Fields (Wells, Pumps, and Piping)	$8,131,000
Water Treatment Plant (0.8 MGD)	$19,292,000
TOTAL COST OF FACILITIES	**$27,423,000**
- Planning (3%)	$823,000
- Design (7%)	$1,920,000
- Construction Engineering (1%)	$274,000
Legal Assistance (2%)	$548,000
Fiscal Services (2%)	$548,000
All Other Facilities Contingency (20%)	$5,485,000
Environmental & Archaeology Studies and Mitigation	$139,000
Land Acquisition and Surveying (15 acres)	$108,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$1,212,000
TOTAL COST OF PROJECT	**$38,480,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$2,707,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
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)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$3,758,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (236068 kW-hr @ 0.09 $/kW-hr)	$21,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$6,567,000**
Available Project Yield (acft/yr)	900
Annual Cost of Water ($ per acft), based on PF=0	$7,297
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$4,289
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$22.39
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$13.16

Jaime Burke *10/23/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Sharyland WSC - Water Well and RO Unit at WTP No.3

Cost based on ENR CCI 13485.67 for September 2023 and
a PPI of 278.502 for September 2023

Item	*Estimated Costs for Facilities*
Well Fields (Wells, Pumps, and Piping)	$8,131,000
Water Treatment Plant (0.8 MGD)	$19,292,000
TOTAL COST OF FACILITIES	**$27,423,000**
- Planning (3%)	$823,000
- Design (7%)	$1,920,000
- Construction Engineering (1%)	$274,000
Legal Assistance (2%)	$548,000
Fiscal Services (2%)	$548,000
All Other Facilities Contingency (20%)	$5,485,000
Environmental & Archaeology Studies and Mitigation	$139,000
Land Acquisition and Surveying (15 acres)	$108,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$1,212,000
TOTAL COST OF PROJECT	**$38,480,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$2,707,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
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)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$3,758,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (236068 kW-hr @ 0.09 $/kW-hr)	$21,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$6,567,000**
Available Project Yield (acft/yr)	900
Annual Cost of Water ($ per acft), based on PF=0	$7,297
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$4,289
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$22.39
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$13.16

Jaime Burke *10/23/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Southmost RWA - Southmost RWA Brackish Wellfield Expansion

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 (0 MGD)	$845,000
Transmission Pipeline (10 in. dia., 0.5 miles)	$500,000
Well Fields (Wells, Pumps, and Piping)	$1,938,000
Integration, Relocations, Backup Generator & Other	$9,000
TOTAL COST OF FACILITIES	**$3,292,000**
- Planning (3%)	$99,000
- Design (7%)	$230,000
- Construction Engineering (1%)	$33,000
Legal Assistance (2%)	$66,000
Fiscal Services (2%)	$66,000
Pipeline Contingency (15%)	$75,000
All Other Facilities Contingency (20%)	$558,000
Environmental & Archaeology Studies and Mitigation	$41,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$145,000
TOTAL COST OF PROJECT	**$4,605,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$323,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
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)	$21,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (294782 kW-hr @ 0.09 $/kW-hr)	$27,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$395,000**
Available Project Yield (acft/yr)	980
Annual Cost of Water ($ per acft), based on PF=1	$403
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$73
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$1.24
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.23

K. Snyder *10/25/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Southmost RWA - Southmost RWA Brackish Wellfield Expansion

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 (0 MGD)	$811,000
Transmission Pipeline (24 in. dia., 0.5 miles)	$946,000
Well Fields (Wells, Pumps, and Piping)	$1,938,000
Integration, Relocations, Backup Generator & Other	$7,000
TOTAL COST OF FACILITIES	**$3,702,000**
- Planning (3%)	$111,000
- Design (7%)	$259,000
- Construction Engineering (1%)	$37,000
Legal Assistance (2%)	$74,000
Fiscal Services (2%)	$74,000
Pipeline Contingency (15%)	$142,000
All Other Facilities Contingency (20%)	$551,000
Environmental & Archaeology Studies and Mitigation	$41,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$162,000
TOTAL COST OF PROJECT	**$5,153,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$362,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$29,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$20,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (271588 kW-hr @ 0.09 $/kW-hr)	$24,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$435,000**
Available Project Yield (acft/yr)	901
Annual Cost of Water ($ per acft), based on PF=1	$483
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$81
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$1.48
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.25

K. Snyder *10/25/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Southmost RWA - Southmost RWA Wellfield and WTP Expansion (Phase 3)

Cost based on ENR CCI 13485.67 for September 2023 and
a PPI of 278.502 for September 2023

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$13,531,000
Water Treatment Plant (2.2 MGD)	$31,727,000
TOTAL COST OF FACILITIES	**$45,258,000**
- Planning (3%)	$1,358,000
- Design (7%)	$3,168,000
- Construction Engineering (1%)	$453,000
Legal Assistance (2%)	$905,000
Fiscal Services (2%)	$905,000
All Other Facilities Contingency (20%)	$9,052,000
Environmental & Archaeology Studies and Mitigation	$26,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$1,987,000
TOTAL COST OF PROJECT	**$63,112,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$4,441,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$135,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$6,179,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (152915 kW-hr @ 0.09 $/kW-hr)	$14,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$10,769,000**
Available Project Yield (acft/yr)	2,464
Annual Cost of Water ($ per acft), based on PF=0	$4,371
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$2,568
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$13.41
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$7.88

K. Snyder *10/25/2024*

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Southmost RWA - Southmost RWA Wellfield and WTP Expansion (Phase 3)*	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$13,531,000
Water Treatment Plant (2.2 MGD)	$31,727,000
TOTAL COST OF FACILITIES	**$45,258,000**
- Planning (3%)	$1,358,000
- Design (7%)	$3,168,000
- Construction Engineering (1%)	$453,000
Legal Assistance (2%)	$905,000
Fiscal Services (2%)	$905,000
All Other Facilities Contingency (20%)	$9,052,000
Environmental & Archaeology Studies and Mitigation	$26,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$1,987,000
TOTAL COST OF PROJECT	**$63,112,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$4,441,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$135,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$6,179,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (152915 kW-hr @ 0.09 $/kW-hr)	$14,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$10,769,000**
Available Project Yield (acft/yr)	2,372
Annual Cost of Water ($ per acft), based on PF=0	$4,540
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$2,668
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$13.93
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$8.19
K. Snyder	*10/25/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Southmost RWA - Southmost RWA Wellfield and WTP Expansion (Phase 4)

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 (0 MGD)	$2,271,000
Transmission Pipeline (30 in. dia., 0.5 miles)	$1,139,000
Well Fields (Wells, Pumps, and Piping)	$32,163,000
Water Treatment Plant (12.5 MGD)	$92,466,000
Integration, Relocations, Backup Generator & Other	$56,000
TOTAL COST OF FACILITIES	**$128,095,000**
- Planning (3%)	$3,843,000
- Design (7%)	$8,967,000
- Construction Engineering (1%)	$1,281,000
Legal Assistance (2%)	$2,562,000
Fiscal Services (2%)	$2,562,000
Pipeline Contingency (15%)	$171,000
All Other Facilities Contingency (20%)	$25,391,000
Environmental & Archaeology Studies and Mitigation	$371,000
Land Acquisition and Surveying (69 acres)	$48,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$5,631,000
TOTAL COST OF PROJECT	**$178,922,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$12,585,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$334,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$57,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$18,009,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (2121676 kW-hr @ 0.09 $/kW-hr)	$191,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$31,176,000**
Available Project Yield (acft/yr)	14,000
Annual Cost of Water ($ per acft), based on PF=1	$2,227
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$1,328
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$6.83
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$4.07

K. Snyder *10/25/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Southmost RWA - Southmost RWA Wellfield and WTP Expansion (Phase 4)

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 (0 MGD)	$2,271,000
Well Fields (Wells, Pumps, and Piping)	$32,163,000
Water Treatment Plant (12.5 MGD)	$92,466,000
Integration, Relocations, Backup Generator & Other	$56,000
TOTAL COST OF FACILITIES	**$126,956,000**
- Planning (3%)	$3,809,000
- Design (7%)	$8,887,000
- Construction Engineering (1%)	$1,270,000
Legal Assistance (2%)	$2,539,000
Fiscal Services (2%)	$2,539,000
All Other Facilities Contingency (20%)	$25,391,000
Environmental & Archaeology Studies and Mitigation	$371,000
Land Acquisition and Surveying (69 acres)	$48,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$5,582,000
TOTAL COST OF PROJECT	**$177,392,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$12,477,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$322,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$57,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$18,009,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (2121676 kW-hr @ 0.09 $/kW-hr)	$191,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$31,056,000**
Available Project Yield (acft/yr)	12,840
Annual Cost of Water ($ per acft), based on PF=1	$2,419
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$1,447
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$7.42
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$4.44

K. Snyder *10/25/2024*

Cost Estimate Summary ***Water Supply Project Option*** ***September 2023 Prices*** ***Laguna Madre Water District - Seawater 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***
Intake Pump Stations (10.5 MGD)	$9,323,000
Transmission Pipeline (30 in. dia., 0.4 miles)	$863,000
Water Treatment Plant (5 MGD)	$80,781,000
Integration, Relocations, Backup Generator & Other	$72,000
TOTAL COST OF FACILITIES	**$91,039,000**
- Planning (3%)	$2,731,000
- Design (7%)	$6,373,000
- Construction Engineering (1%)	$910,000
Legal Assistance (2%)	$1,821,000
Fiscal Services (2%)	$1,821,000
Pipeline Contingency (15%)	$129,000
All Other Facilities Contingency (20%)	$18,035,000
Environmental & Archaeology Studies and Mitigation	$60,000
Land Acquisition and Surveying (12 acres)	$86,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$3,996,000
TOTAL COST OF PROJECT	**$127,001,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$8,931,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$9,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$233,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$12,117,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (1174924 kW-hr @ 0.09 $/kW-hr)	$106,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$21,396,000**
Available Project Yield (acft/yr)	5,600
Annual Cost of Water ($ per acft), based on PF=1	$3,821
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$2,226
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$11.72
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$6.83
K. Snyder	*9/17/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Hildago County Drainage District No. 1 - Delta Panchita 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***
Off-Channel Storage/Ring Dike (Conservation Pool 235 acft, 25 acres)	$4,436,000
Intake Pump Stations (5.3 MGD)	$8,603,000
Transmission Pipeline (18 in. dia., 3.8 miles)	$5,752,000
Advanced Water Treatment Facility (5 MGD)	$42,724,000
Integration, Relocations, Backup Generator & Other	$65,000
TOTAL COST OF FACILITIES	**$61,580,000**
- Planning (3%)	$1,847,000
- Design (7%)	$4,311,000
- Construction Engineering (1%)	$616,000
Legal Assistance (2%)	$1,232,000
Fiscal Services (2%)	$1,232,000
Pipeline Contingency (15%)	$863,000
All Other Facilities Contingency (20%)	$11,166,000
Environmental & Archaeology Studies and Mitigation	$307,000
Land Acquisition and Surveying (78 acres)	$523,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$5,436,000
TOTAL COST OF PROJECT	**$89,113,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$5,792,000
Reservoir Debt Service (3.5 percent, 40 years)	$315,000
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)	$215,000
Dam and Reservoir (1.5% of Cost of Facilities)	$67,000
Water Treatment Plant	$0
Advanced Water Treatment Facility	$5,568,000
Pumping Energy Costs (1060332 kW-hr @ 0.09 $/kW-hr)	$95,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$12,110,000**
Available Project Yield (acft/yr)	5,600
Annual Cost of Water ($ per acft), based on PF=1	$2,163
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$1,072
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$6.64
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$3.29

Jaime Burke *10/12/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Hildago County Drainage District No. 1 - Santa Cruz 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***
Off-Channel Storage/Ring Dike (Conservation Pool 4621 acft, 418 acres)	$16,704,000
Intake Pump Stations (5.3 MGD)	$10,448,000
Transmission Pipeline (18 in. dia., 6 miles)	$9,358,000
Advanced Water Treatment Facility (5 MGD)	$42,724,000
Integration, Relocations, Backup Generator & Other	$90,000
TOTAL COST OF FACILITIES	**$79,324,000**
- Planning (3%)	$2,380,000
- Design (7%)	$5,553,000
- Construction Engineering (1%)	$793,000
Legal Assistance (2%)	$1,586,000
Fiscal Services (2%)	$1,586,000
Pipeline Contingency (15%)	$1,404,000
All Other Facilities Contingency (20%)	$13,993,000
Environmental & Archaeology Studies and Mitigation	$2,906,000
Land Acquisition and Surveying (498 acres)	$3,269,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$7,327,000
TOTAL COST OF PROJECT	**$120,121,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$6,350,000
Reservoir Debt Service (3.5 percent, 40 years)	$1,395,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$94,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$261,000
Dam and Reservoir (1.5% of Cost of Facilities)	$251,000
Water Treatment Plant	$0
Advanced Water Treatment Facility	$5,568,000
Pumping Energy Costs (1468787 kW-hr @ 0.09 $/kW-hr)	$132,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$14,051,000**
Available Project Yield (acft/yr)	5,600
Annual Cost of Water ($ per acft), based on PF=1	$2,509
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$1,126
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$7.70
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$3.46

Jaime Burke *10/12/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Hildago County Drainage District No. 1 - Engleman 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*
Off-Channel Storage/Ring Dike (Conservation Pool 280 acft, 25 acres)	$4,639,000
Intake Pump Stations (0.9 MGD)	$4,059,000
Transmission Pipeline (10 in. dia., 4 miles)	$4,049,000
Advanced Water Treatment Facility (0.85 MGD)	$10,180,000
Integration, Relocations, Backup Generator & Other	$7,000
TOTAL COST OF FACILITIES	**$22,934,000**
- Planning (3%)	$688,000
- Design (7%)	$1,605,000
- Construction Engineering (1%)	$229,000
Legal Assistance (2%)	$459,000
Fiscal Services (2%)	$459,000
Pipeline Contingency (15%)	$607,000
All Other Facilities Contingency (20%)	$3,777,000
Environmental & Archaeology Studies and Mitigation	$312,000
Land Acquisition and Surveying (79 acres)	$539,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$2,056,000
TOTAL COST OF PROJECT	**$33,665,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$1,875,000
Reservoir Debt Service (3.5 percent, 40 years)	$328,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$41,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$101,000
Dam and Reservoir (1.5% of Cost of Facilities)	$70,000
Water Treatment Plant	$0
Advanced Water Treatment Facility	$1,218,000
Pumping Energy Costs (117998 kW-hr @ 0.09 $/kW-hr)	$11,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$3,644,000**
Available Project Yield (acft/yr)	900
Annual Cost of Water ($ per acft), based on PF=1	$4,049
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$1,601
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$12.42
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$4.91

Jaime Burke *10/12/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Agua SUD - East WWTP Indirect 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***
Intake Pump Stations (0 MGD)	$1,005,000
Transmission Pipeline (10 in. dia., 3.5 miles)	$6,368,000
Water Treatment Plant (1 MGD)	$5,599,000
Integration, Relocations, Backup Generator & Other	$16,000
TOTAL COST OF FACILITIES	**$12,988,000**
- Planning (3%)	$390,000
- Design (7%)	$909,000
- Construction Engineering (1%)	$130,000
Legal Assistance (2%)	$260,000
Fiscal Services (2%)	$260,000
Pipeline Contingency (15%)	$955,000
All Other Facilities Contingency (20%)	$1,324,000
Environmental & Archaeology Studies and Mitigation	$292,000
Land Acquisition and Surveying (48 acres)	$306,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$579,000
TOTAL COST OF PROJECT	**$18,393,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$1,293,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$64,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$25,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$560,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (258603 kW-hr @ 0.09 $/kW-hr)	$23,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$1,965,000**
Available Project Yield (acft/yr)	1,120
Annual Cost of Water ($ per acft), based on PF=1	$1,754
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$600
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$5.38
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$1.84

Note: One or more cost element has been calculated externally

J Burke *9/17/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
La Feria - Non-Potable Wastewater Effluent 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***
Intake Pump Stations (0 MGD)	$473,000
Transmission Pipeline (6 in. dia., 0.5 miles)	$399,000
Storage Tanks (Other Than at Booster Pump Stations)	$1,024,000
Water Treatment Plant (0.2 MGD)	$2,041,000
Integration, Relocations, Backup Generator & Other	$1,000
TOTAL COST OF FACILITIES	**$3,938,000**
- 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%)	$60,000
All Other Facilities Contingency (20%)	$708,000
Environmental & Archaeology Studies and Mitigation	$58,000
Land Acquisition and Surveying (13 acres)	$88,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$177,000
TOTAL COST OF PROJECT	**$5,620,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$395,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
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)	$12,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$204,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (17352 kW-hr @ 0.09 $/kW-hr)	$2,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$627,000**
Available Project Yield (acft/yr)	170
Annual Cost of Water ($ per acft), based on PF=1	$3,688
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$1,365
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$11.32
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$4.19

KC Jacobson *6/28/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
San Benito - Indirect Non-Potable Reuse of Treated Effluent

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 (0 MGD)	$1,091,000
Transmission Pipeline (8 in. dia., 2 miles)	$1,857,000
Integration, Relocations, Backup Generator & Other	$19,000
TOTAL COST OF FACILITIES	**$2,967,000**
- Planning (3%)	$89,000
- Design (7%)	$208,000
- Construction Engineering (1%)	$30,000
Legal Assistance (2%)	$59,000
Fiscal Services (2%)	$59,000
Pipeline Contingency (15%)	$279,000
All Other Facilities Contingency (20%)	$222,000
Environmental & Archaeology Studies and Mitigation	$59,000
Land Acquisition and Surveying (24 acres)	$128,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$133,000
TOTAL COST OF PROJECT	**$4,233,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$296,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$19,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$27,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (315090 kW-hr @ 0.09 $/kW-hr)	$28,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$370,000**
Available Project Yield (acft/yr)	1,120
Annual Cost of Water ($ per acft), based on PF=1	$330
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$66
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$1.01
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.20

KC Jacobson *7/1/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
San Benito - 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***
Intake Pump Stations (0 MGD)	$1,236,000
Transmission Pipeline (8 in. dia., 3 miles)	$4,389,000
Storage Tanks (Other Than at Booster Pump Stations)	$1,784,000
Advanced Water Treatment Facility (1 MGD)	$11,976,000
Integration, Relocations, Backup Generator & Other	$25,000
TOTAL COST OF FACILITIES	**$19,410,000**
- Planning (3%)	$582,000
- Design (7%)	$1,359,000
- Construction Engineering (1%)	$194,000
Legal Assistance (2%)	$388,000
Fiscal Services (2%)	$388,000
Pipeline Contingency (15%)	$658,000
All Other Facilities Contingency (20%)	$3,004,000
Environmental & Archaeology Studies and Mitigation	$90,000
Land Acquisition and Surveying (44 acres)	$243,000
Interest During Construction (3.5% for 2 years with a 0.5% ROI)	$1,709,000
TOTAL COST OF PROJECT	**$28,025,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$1,970,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$62,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$31,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$1,433,000
Pumping Energy Costs (412768 kW-hr @ 0.09 $/kW-hr)	$37,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$3,533,000**
Available Project Yield (acft/yr)	1,120
Annual Cost of Water ($ per acft), based on PF=1	$3,154
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$1,396
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$9.68
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$4.28

KC Jacobson *7/1/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
ERHWSC - Surface WTP Phase II with Inter-Basin Transfer

Cost based on ENR CCI 13485.67 for September 2023 and
a PPI of 278.502 for September 2023

Item	***Estimated Costs for Facilities***
Water Treatment Plant (2.3 MGD)	$10,599,000
TOTAL COST OF FACILITIES	**$10,599,000**
- Planning (3%)	$318,000
- Design (7%)	$742,000
- Construction Engineering (1%)	$106,000
Legal Assistance (2%)	$212,000
Fiscal Services (2%)	$212,000
All Other Facilities Contingency (20%)	$2,120,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$466,000
TOTAL COST OF PROJECT	**$14,775,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$1,040,000
Reservoir Debt Service (3.5 percent, 40 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
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$935,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$1,975,000**
Available Project Yield (acft/yr)	2,500
Annual Cost of Water ($ per acft), based on PF=0	$790
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$374
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$2.42
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$1.15

KC Jacobson *8/9/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Elsa - WTP Expansion

Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023

Item	***Estimated Costs for Facilities***
Transmission Pipeline (10 in. dia., 2.4 miles)	$2,554,000
Water Treatment Plant (1 MGD)	$7,523,000
Integration, Relocations, Backup Generator & Other	$12,000
TOTAL COST OF FACILITIES	**$10,089,000**
- Planning (3%)	$303,000
- Design (7%)	$706,000
- Construction Engineering (1%)	$101,000
Legal Assistance (2%)	$202,000
Fiscal Services (2%)	$202,000
Pipeline Contingency (15%)	$383,000
All Other Facilities Contingency (20%)	$1,507,000
Environmental & Archaeology Studies and Mitigation	$72,000
Land Acquisition and Surveying (35 acres)	$195,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$447,000
TOTAL COST OF PROJECT	**$14,207,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$999,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$26,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$752,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (202173 kW-hr @ 0.09 $/kW-hr)	$18,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$1,795,000**
Available Project Yield (acft/yr)	1,120
Annual Cost of Water ($ per acft), based on PF=1	$1,603
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$711
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$4.92
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$2.18

KC Jacobson *8/9/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Laredo - El Pico WTP Phase 1 Expansion

Cost based on ENR CCI 13485.67 for September 2023 and
a PPI of 278.502 for September 2023

Item	***Estimated Costs for Facilities***
Water Treatment Plant (25 MGD)	$57,022,000
TOTAL COST OF FACILITIES	**$57,022,000**
- Planning (3%)	$1,711,000
- Design (7%)	$3,992,000
- Construction Engineering (1%)	$570,000
Legal Assistance (2%)	$1,140,000
Fiscal Services (2%)	$1,140,000
All Other Facilities Contingency (20%)	$11,404,000
Environmental & Archaeology Studies and Mitigation	$76,000
Land Acquisition and Surveying (13 acres)	$84,000
Interest During Construction (3.5% for 1.5 years with a 0.5% ROI)	$3,761,000
TOTAL COST OF PROJECT	**$80,900,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$5,692,000
Reservoir Debt Service (3.5 percent, 40 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
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$3,992,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$9,684,000**
Available Project Yield (acft/yr)	28,000
Annual Cost of Water ($ per acft), based on PF=0	$346
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$143
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$1.06
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.44

Note: One or more cost element has been calculated externally

KC Jacobson *8/9/2024*

Cost Estimate Summary ***Water Supply Project Option*** ***September 2023 Prices*** ***Laredo - El Pico WTP Phase 2 Expansion***	
Cost based on ENR CCI 13485.67 for September 2023 and ***a PPI of 278.502 for September 2023***	
Item	***Estimated Costs for Facilities***
Water Treatment Plant (25 MGD)	$57,022,000
TOTAL COST OF FACILITIES	**$57,022,000**
- Planning (3%)	$1,711,000
- Design (7%)	$3,992,000
- Construction Engineering (1%)	$570,000
Legal Assistance (2%)	$1,140,000
Fiscal Services (2%)	$1,140,000
All Other Facilities Contingency (20%)	$11,404,000
Environmental & Archaeology Studies and Mitigation	$76,000
Land Acquisition and Surveying (13 acres)	$84,000
Interest During Construction (3.5% for 1.5 years with a 0.5% ROI)	$3,761,000
TOTAL COST OF PROJECT	**$80,900,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$5,692,000
Reservoir Debt Service (3.5 percent, 40 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
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$3,992,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$9,684,000**
Available Project Yield (acft/yr)	28,000
Annual Cost of Water ($ per acft), based on PF=0	$346
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$143
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$1.06
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.44
KC Jacobson	*8/9/2024*

Cost Estimate Summary ***Water Supply Project Option*** ***September 2023 Prices*** ***Laredo - El Pico WTP Phase 3 Expansion***	
Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023	
Item	***Estimated Costs for Facilities***
Water Treatment Plant (30 MGD)	$66,425,000
TOTAL COST OF FACILITIES	**$66,425,000**
- Planning (3%)	$1,993,000
- Design (7%)	$4,650,000
- Construction Engineering (1%)	$664,000
Legal Assistance (2%)	$1,329,000
Fiscal Services (2%)	$1,329,000
All Other Facilities Contingency (20%)	$13,285,000
Environmental & Archaeology Studies and Mitigation	$91,000
Land Acquisition and Surveying (15 acres)	$100,000
Interest During Construction (3.5% for 1.5 years with a 0.5% ROI)	$4,381,000
TOTAL COST OF PROJECT	**$94,247,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$6,631,000
Reservoir Debt Service (3.5 percent, 40 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
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$4,650,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$11,281,000**
Available Project Yield (acft/yr)	33,600
Annual Cost of Water ($ per acft), based on PF=0	$336
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$138
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$1.03
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.42
KC Jacobson	*8/9/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Laredo - El Pico WTP Phase 4 Expansion

Cost based on ENR CCI 13485.67 for September 2023 and
a PPI of 278.502 for September 2023

Item	*Estimated Costs for Facilities*
Water Treatment Plant (30 MGD)	$66,425,000
TOTAL COST OF FACILITIES	**$66,425,000**
- Planning (3%)	$1,993,000
- Design (7%)	$4,650,000
- Construction Engineering (1%)	$664,000
Legal Assistance (2%)	$1,329,000
Fiscal Services (2%)	$1,329,000
All Other Facilities Contingency (20%)	$13,285,000
Environmental & Archaeology Studies and Mitigation	$91,000
Land Acquisition and Surveying (15 acres)	$100,000
Interest During Construction (3.5% for 1.5 years with a 0.5% ROI)	$4,381,000
TOTAL COST OF PROJECT	**$94,247,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$6,631,000
Reservoir Debt Service (3.5 percent, 40 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
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$4,650,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$11,281,000**
Available Project Yield (acft/yr)	33,600
Annual Cost of Water ($ per acft), based on PF=0	$336
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$138
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$1.03
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.42

KC Jacobson *8/9/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
North Alamo WSC - Water Treatment Plant No. 5 and Waterline Expansion

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 (0 MGD)	$2,383,000
Transmission Pipeline (16 in. dia., 4.2 miles)	$6,349,000
Water Treatment Plant (4 MGD)	$14,620,000
Integration, Relocations, Backup Generator & Other	$70,000
TOTAL COST OF FACILITIES	**$23,422,000**
- Planning (3%)	$703,000
- Design (7%)	$1,639,000
- Construction Engineering (1%)	$234,000
Legal Assistance (2%)	$468,000
Fiscal Services (2%)	$468,000
Pipeline Contingency (15%)	$952,000
All Other Facilities Contingency (20%)	$3,415,000
Environmental & Archaeology Studies and Mitigation	$125,000
Land Acquisition and Surveying (58 acres)	$342,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$1,031,000
TOTAL COST OF PROJECT	**$32,799,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$2,303,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$64,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$60,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$1,174,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (1146254 kW-hr @ 0.09 $/kW-hr)	$103,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$3,704,000**
Available Project Yield (acft/yr)	4,480
Annual Cost of Water ($ per acft), based on PF=1	$827
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$313
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$2.54
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.96

Note: One or more cost element has been calculated externally

KC Jacobson *8/9/2024*

Cost Estimate Summary Water Supply Project Option September 2023 Prices Brownsville - Matamoros Weir and 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***
Dam and Reservoir (Conservation Pool 6000 acft, 300 acres)	$9,173,000
TOTAL COST OF FACILITIES	**$9,173,000**
- Planning (3%)	$275,000
- Design (7%)	$642,000
- Construction Engineering (1%)	$92,000
Legal Assistance (2%)	$183,000
Fiscal Services (2%)	$183,000
All Other Facilities Contingency (20%)	$1,835,000
Environmental & Archaeology Studies and Mitigation	$1,823,000
Land Acquisition and Surveying (300 acres)	$1,841,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$522,000
TOTAL COST OF PROJECT	**$16,569,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$0
Reservoir Debt Service (3.5 percent, 40 years)	$776,000
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
Dam and Reservoir (1.5% of Cost of Facilities)	$138,000
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$914,000**
Available Project Yield (acft/yr)	2,035
Annual Cost of Water ($ per acft), based on PF=0	$449
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$68
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$1.38
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.21
Jaime Burke	*10/11/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
McAllen - Expand Existing Groundwater Supply Phase I

Cost based on ENR CCI 13485.67 for September 2023 and a PPI of 278.502 for September 2023

Item	*Estimated Costs for Facilities*
Well Fields (Wells, Pumps, and Piping)	$1,246,000
Water Treatment Plant (0.5 MGD)	$63,000
TOTAL COST OF FACILITIES	**$1,309,000**
- Planning (3%)	$39,000
- Design (7%)	$92,000
- Construction Engineering (1%)	$13,000
Legal Assistance (2%)	$26,000
Fiscal Services (2%)	$26,000
All Other Facilities Contingency (20%)	$262,000
Environmental & Archaeology Studies and Mitigation	$27,000
Land Acquisition and Surveying (3 acres)	$21,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$59,000
TOTAL COST OF PROJECT	**$1,874,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$132,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$12,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$38,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (89493 kW-hr @ 0.09 $/kW-hr)	$8,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$190,000**
Available Project Yield (acft/yr)	500
Annual Cost of Water ($ per acft), based on PF=0	$380
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$116
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$1.17
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.36

Jaime Burke *10/21/2024*

Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *McAllen - Expand Existing Groundwater Supply 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***
Well Fields (Wells, Pumps, and Piping)	$2,569,000
Water Treatment Plant (0.9 MGD)	$94,000
TOTAL COST OF FACILITIES	**$2,663,000**
- Planning (3%)	$80,000
- Design (7%)	$186,000
- Construction Engineering (1%)	$27,000
Legal Assistance (2%)	$53,000
Fiscal Services (2%)	$53,000
All Other Facilities Contingency (20%)	$533,000
Environmental & Archaeology Studies and Mitigation	$52,000
Land Acquisition and Surveying (6 acres)	$41,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$120,000
TOTAL COST OF PROJECT	**$3,808,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$268,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$26,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$57,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (180125 kW-hr @ 0.09 $/kW-hr)	$16,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$367,000**
Available Project Yield (acft/yr)	1,000
Annual Cost of Water ($ per acft), based on PF=0	$367
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$99
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$1.13
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.30
Jaime Burke	*10/21/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Mercedes - Expand Existing Groundwater 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***
Well Fields (Wells, Pumps, and Piping)	$1,295,000
Water Treatment Plant (0.5 MGD)	$63,000
TOTAL COST OF FACILITIES	**$1,358,000**
- Planning (3%)	$41,000
- Design (7%)	$95,000
- Construction Engineering (1%)	$14,000
Legal Assistance (2%)	$27,000
Fiscal Services (2%)	$27,000
All Other Facilities Contingency (20%)	$272,000
Environmental & Archaeology Studies and Mitigation	$27,000
Land Acquisition and Surveying (3 acres)	$21,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$62,000
TOTAL COST OF PROJECT	**$1,944,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$137,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
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)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$38,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (100822 kW-hr @ 0.09 $/kW-hr)	$9,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$197,000**
Available Project Yield (acft/yr)	560
Annual Cost of Water ($ per acft), based on PF=0	$352
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$107
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$1.08
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.33

Jaime Burke *10/21/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Military Highway WSC - Expand Existing Groundwater 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
Well Fields (Wells, Pumps, and Piping)	$1,295,000
Water Treatment Plant (0.5 MGD)	$63,000
TOTAL COST OF FACILITIES	**$1,358,000**
- Planning (3%)	$41,000
- Design (7%)	$95,000
- Construction Engineering (1%)	$14,000
Legal Assistance (2%)	$27,000
Fiscal Services (2%)	$27,000
All Other Facilities Contingency (20%)	$272,000
Environmental & Archaeology Studies and Mitigation	$27,000
Land Acquisition and Surveying (3 acres)	$21,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$62,000
TOTAL COST OF PROJECT	**$1,944,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$137,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
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)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$38,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (100822 kW-hr @ 0.09 $/kW-hr)	$9,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$197,000**
Available Project Yield (acft/yr)	560
Annual Cost of Water ($ per acft), based on PF=0	$352
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$107
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$1.08
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.33

Jaime Burke *10/21/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Brownsville Public Utilities Board - Seawater Desalination Demonstration

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 (5.3 MGD)	$6,342,000
Transmission Pipeline (18 in. dia., 0.1 miles)	$86,000
Water Treatment Plant (2.5 MGD)	$44,597,000
Integration, Relocations, Backup Generator & Other	$35,000
TOTAL COST OF FACILITIES	**$51,060,000**
- Planning (3%)	$1,532,000
- Design (7%)	$3,574,000
- Construction Engineering (1%)	$511,000
Legal Assistance (2%)	$1,021,000
Fiscal Services (2%)	$1,021,000
Pipeline Contingency (15%)	$13,000
All Other Facilities Contingency (20%)	$10,195,000
Environmental & Archaeology Studies and Mitigation	$42,000
Land Acquisition and Surveying (7 acres)	$49,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$2,242,000
TOTAL COST OF PROJECT	**$71,260,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$5,012,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$1,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$159,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$6,690,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (577409 kW-hr @ 0.09 $/kW-hr)	$52,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$11,914,000**
Available Project Yield (acft/yr)	2,800
Annual Cost of Water ($ per acft), based on PF=1	$4,255
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$2,465
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$13.06
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$7.56

K. Snyder *9/16/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Brownsville Public Utilities Board - Seawater Desalination Implementation

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 (52.6 MGD)	$32,144,000
Transmission Pipeline (60 in. dia., 0.1 miles)	$339,000
Water Treatment Plant (22.5 MGD)	$285,993,000
Integration, Relocations, Backup Generator & Other	$347,000
TOTAL COST OF FACILITIES	**$318,823,000**
- Planning (3%)	$9,565,000
- Design (7%)	$22,318,000
- Construction Engineering (1%)	$3,188,000
Legal Assistance (2%)	$6,376,000
Fiscal Services (2%)	$6,376,000
Pipeline Contingency (15%)	$51,000
All Other Facilities Contingency (20%)	$63,697,000
Environmental & Archaeology Studies and Mitigation	$2,000
Land Acquisition and Surveying (17 acres)	$5,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$13,977,000
TOTAL COST OF PROJECT	**$444,378,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$31,242,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
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)	$804,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$42,899,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (5693878 kW-hr @ 0.09 $/kW-hr)	$512,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$75,464,000**
Available Project Yield (acft/yr)	28,000
Annual Cost of Water ($ per acft), based on PF=1	$2,695
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$1,579
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$8.27
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$4.85

K. Snyder *9/16/2024*

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Eagle Pass - 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
Well Fields (Wells, Pumps, and Piping)	$24,365,000
Water Treatment Plant (3 MGD)	$32,557,000
TOTAL COST OF FACILITIES	**$56,922,000**
- Planning (3%)	$1,708,000
- Design (7%)	$3,985,000
- Construction Engineering (1%)	$569,000
Legal Assistance (2%)	$1,138,000
Fiscal Services (2%)	$1,138,000
All Other Facilities Contingency (20%)	$11,384,000
Environmental & Archaeology Studies and Mitigation	$689,000
Land Acquisition and Surveying (90 acres)	$531,000
Interest During Construction (3.5% for 1.5 years with a 0.5% ROI)	$3,806,000
TOTAL COST OF PROJECT	**$81,870,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$5,760,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$244,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$2,777,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (347727 kW-hr @ 0.09 $/kW-hr)	$31,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$8,812,000**
Available Project Yield (acft/yr)	3,360
Annual Cost of Water ($ per acft), based on PF=1	$2,623
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$908
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$8.05
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$2.79

Jaime Burke *10/11/2024*

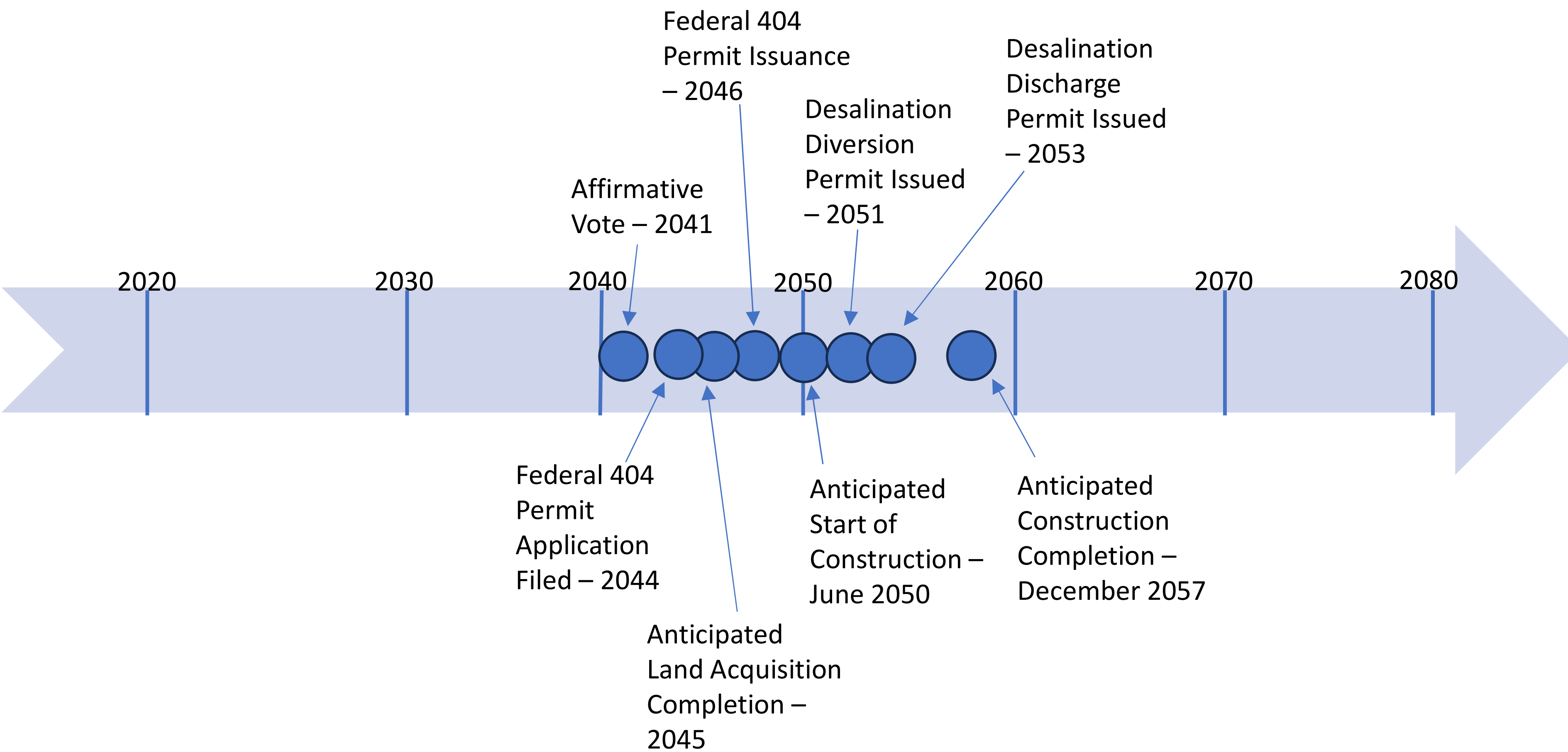
Appendix 5E. Implementation Status of Certain WMSs

Appendix 5E - Documentation of the Implementation Status of Certain WMSs (see Exhibit C Section 2.5.2.7)

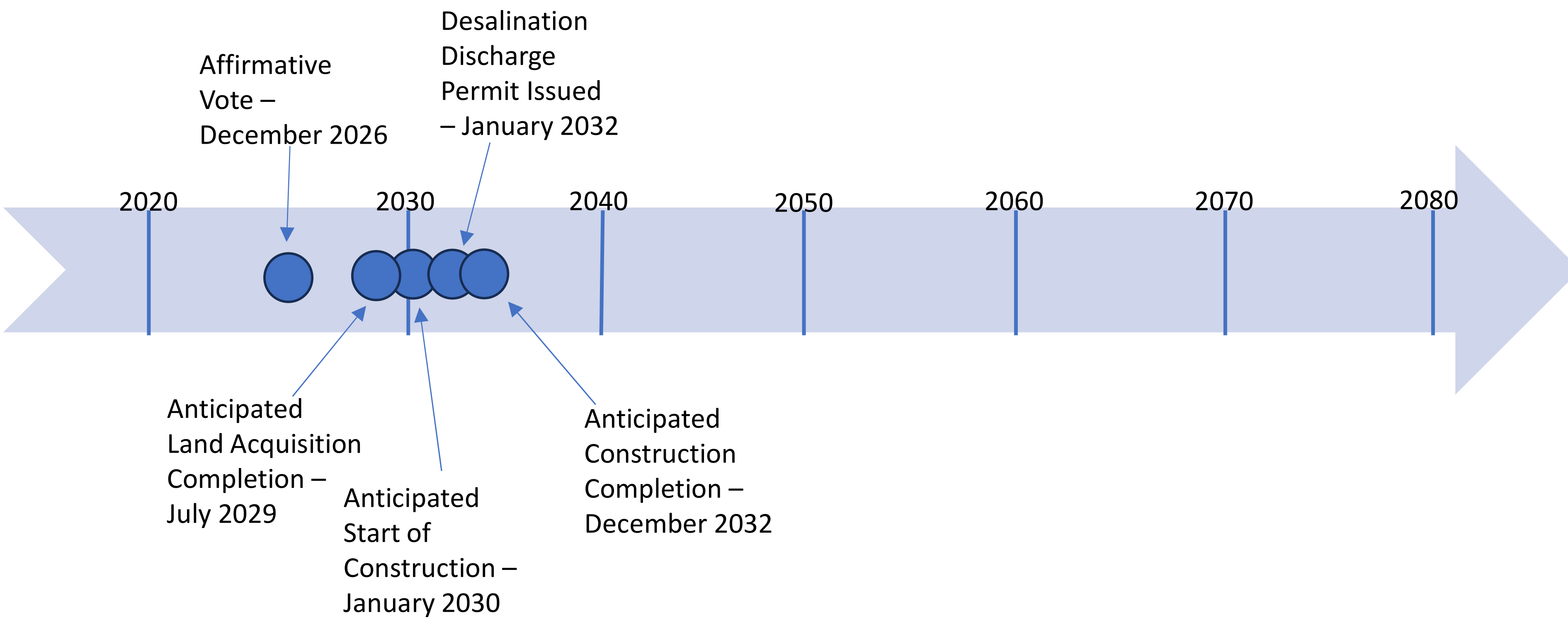
REGIONAL WATER PLAN WMS/PROJECT DATA						ANTICIPATED/ESTIMATED (OR ACTUAL[1]) IMPLEMENTATION ACTIVITIES AND DATES																	
						SPONSOR AUTHORIZATION	PERMITTING STATUS (as applicable)									PLANNING, DESIGN, AND CONSTRUCTION STATUS						TOTAL FUNDS EXPENDED TO DATE	Other significant activities completed (summary)
							STATE WATER RIGHT STATUS				FEDERAL 404 PERMIT STATUS (if applicable)		DESALINATION PERMIT STATUS		OTHER KEY PERMITS	GEOTECH/DESIGN	LAND ACQUISITION		CONSTRUCTION				
Water Management Strategy/Project Name	Project Sponsor	WMS Project Sponsor Region	Online Decade	Capital Cost	Anticipated Footprint Acreage (acres)	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)	
Southside WWTP Potable Reuse	Brownsville	M	2050	$74,668,000	40	2041	N/A	N/A	N/A	N/A	2044	2046	2051	2053	Building, Environmental Assessment, Pretreatment (0% completed)	Geotechnical-0%; feasibility-0%; design-0%; pilot study-0%	0%	2045	Jun-50	0%	Dec-57	0	None
Southmost RWA Phase 4 SRWA Wellfield and WTP Expansion	Southmost RWA	M	2030	$177,392,000	595	Dec-26	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Jan-32	Building, Environmental Assessment, Pretreatment (0% completed)	Geotechnical-0%; feasibility-0%; design-0%	0%	Jul-29	Jan-30	0	Dec-32	0	None
Laguna Madre Water District Seawater Desalination Plant	Laguna Madre Water District	M	2030	$127,001,000	10.3	5/22/2024	Dec-24	Jan-25	Jun-25	Aug-25	5/14/2024	Sep-25	Sep-25	Jun-25	Department of the Army License to construct Intake Structure & concentrate outfall pipeline located within Brazos Island Harbor Channel Project to be submitted to Real Estate Division and completed after approval by USACE Regulatory Division	Engineering Feasibility Report accepted on 11/25/2024 that meets the requirements of Reclamation's Directives and Standards (WTR 11-01). Pilot Study and Design phase is proceeding at this time through SWIFT project number 51089.	50%	Jan-25	Feb-26	0%	Nov-27	$1.63	Laguna Madre Desalination Intake and Industrial Discharge Modelling Study completed by US Army Corps of Engineers on 1/26/2024 to support Industrial Discharge Permit.

FOOTNOTE 1 : ANY DATE ENTERED THAT IS PRIOR TO ADOPTION OF THE REGIONAL WATER PLAN IS ASSUMED TO BE AN 'ACTUAL' DATE

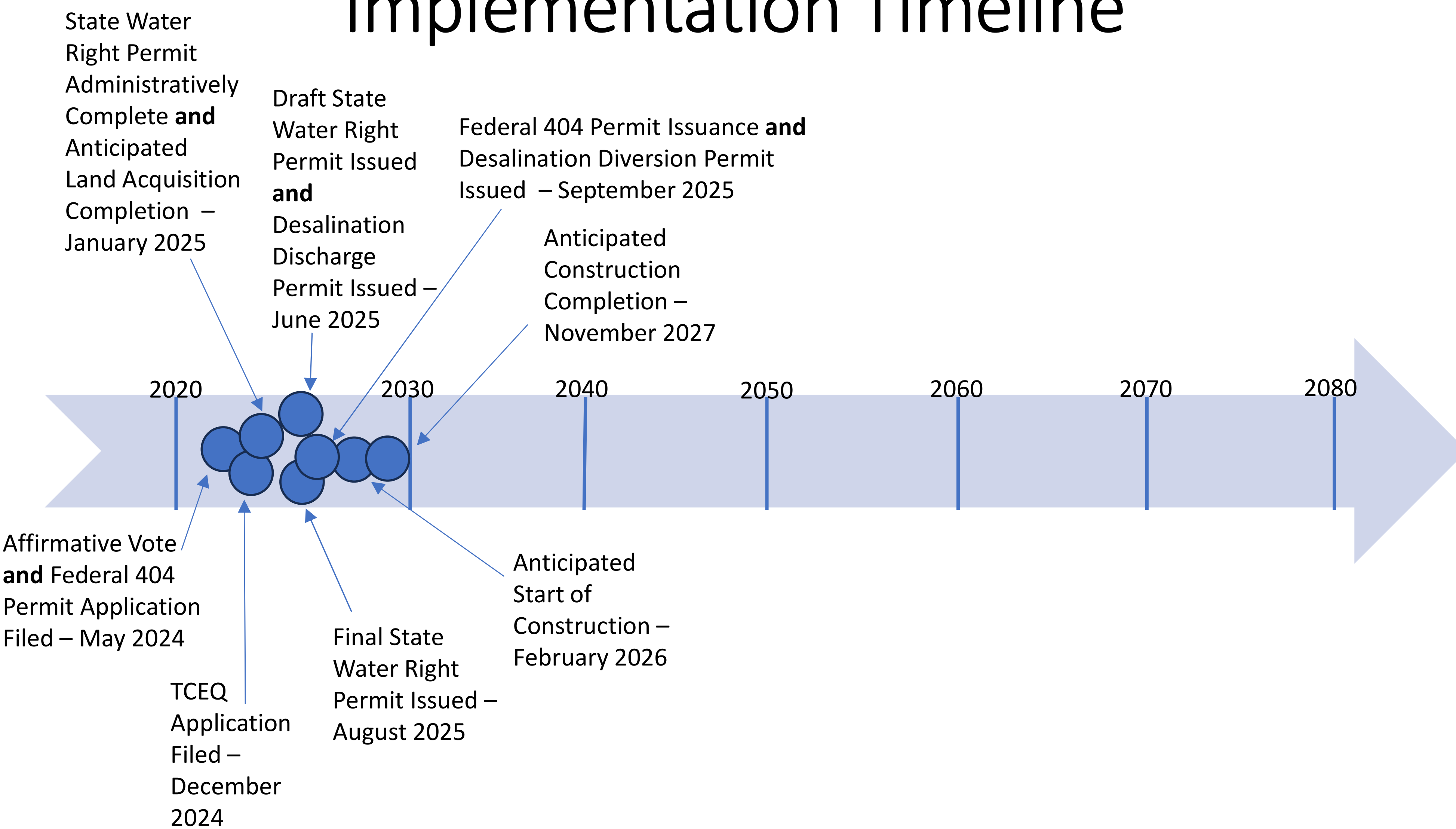
Brownsville Southside WWTP Potable Reuse Implementation Timeline



Southmost RWA
Phase 4 SRWA Wellfield and WTP Expansion
Implementation Timeline



Laguna Madre Water District Seawater Desalination Plant Implementation Timeline



INITIALLY PREPARED PLAN

CHAPTER 6: IMPACTS OF REGIONAL WATER PLAN AND CONSISTENCY WITH PROTECTION OF RESOURCES

Rio Grande Regional Water Plan

B&V PROJECT NO. 411250

PREPARED FOR

Rio Grande Regional Water Planning Group

1 MARCH 2025

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List of Abbreviations

acft	Acre-Feet
acft/yr	Acre-Feet per Year
ID	Irrigation District
MAG	Modeled Available Groundwater
RWP	Regional Water Plan
TCEQ	Texas Commission on Environmental Quality
TDS	Total Dissolved Solids
TWDB	Texas Water Development Board
WMS	Water Management Strategy
WUG	Water User Group
WWTP	Wastewater Treatment Plant

6.0 Impacts of Regional Water Plan and Consistency with Protection of Resources

6.1 Impacts of Water Management Strategies

Impacts of the seven major water management strategies (WMSs) recommended in the Regional Water Plan (RWP) are discussed below.

6.1.1 Reuse

6.1.1.1 Potable

These strategies result in lower wastewater effluent flows, which cause a reduction in organic levels in the receiving streams. However, less water is also discharged to the local watershed, which can reduce the quantity of water available for other users and environmental flows and can reduce assimilative capacity used by downstream wastewater treatment plant (WWTP) dischargers.

Many of the locations where potable reuse was recommended are in the Nueces-Rio Grande Basin, but the source waters are predominantly from the Rio Grande. Wastewater reuse projects will primarily impact the flows into the drainage network, including the Arroyo Colorado. Water rights holders along the Arroyo Colorado and other drainage canals in the Nueces-Rio Grande Basin could potentially be impacted, including irrigators, some shrimp farming, and other aquaculture. Potable reuse may be used as an alternative to securing groundwater as a second source of water, so potable reuse could reduce the potential demand on groundwater.

If potable reuse projects involve storing the effluent in a raw water reservoir prior to treatment, water quality of the reservoir may be impacted. If membrane treatment, such as reverse osmosis, is used as a part of the advanced treatment process to meet potable water quality requirements, options for discharge of the waste stream will need to consider minimizing impacts to the receiving environment.

Because potable reuse projects are being utilized by municipal areas using water that is already within the utility's boundaries, no third-party social and economic impacts should be associated with voluntary redistributions of water. Similarly, no impacts should be on navigation.

6.1.1.2 Non-Potable

For non-potable reuse used for irrigation purposes, a potential to accumulate byproducts, such as salts and other minerals, in the soil may be present in runoff water. Non-potable reuse by other non-municipal users such as steam-electric power generation and manufacturing can greatly reduce the demands on freshwater sources and reduce the impacts, such as increased return water temperatures, of using freshwater.

Third-party social and economic impacts resulting from voluntary redistributions of water and navigation impacts are the same as for potable reuse, described above.

6.1.2 Brackish Groundwater and Seawater Desalination

Surface water discharge of concentrate from brackish groundwater desalination facilities will increase concentrations of total dissolved solids (TDS) in receiving streams. Many of the facilities that are currently treating brackish groundwater dispose of concentrate in the drainage canal network in the Nueces-Rio Grande Basin. This network of canals is usually brackish, and discharges into the Laguna

Madre, parts of which are naturally hypersaline. The greatest recent threat to wildlife in the Lower Laguna Madre has been increased inflows of low-salinity water. Facilities planning to use deep-well injection for their concentrate would likely inject it in formations hundreds of feet below the level that fresh/brackish groundwater will be withdrawn. Therefore, negligible impact to groundwater supplies is likely. However, deep well injection of the concentrate removes it from the hydrologic cycle, reducing the availability for future use. For seawater desalination facilities, concentrate will be blended with the effluent stream from an existing wastewater treatment plan, in order to dilute it to levels that are consistent with discharge quality requirements.

As with any groundwater development project, a potential exists that will affect the quality of the aquifer as more water is withdrawn from it. Land subsidence may be a byproduct of increased groundwater pumping. All recommended groundwater strategies are within the determined groundwater availability of each particular aquifer.

The majority of recommended brackish groundwater desalination projects are being utilized by municipal areas using water that is already within the utility's boundaries, so no third-party social and economic impacts exist that result from voluntary redistributions of water for those projects. One recommended desalination project does bring water from another county in a rural area. The impacts to that area should be limited because of a surplus of groundwater and limited projected growth in the county. The volume of water transferred from the rural area is small compared to the overall availability of the aquifer.

No impacts to navigation are anticipated.

6.1.3 Fresh Groundwater

Water quality concerns from fresh groundwater projects are minimal; however, as with any groundwater development project, a potential exists that will affect the quality of the aquifer as more water is withdrawn from it. As with brackish groundwater development, land subsidence may be a byproduct of fresh groundwater pumping. All recommended groundwater strategies are within the determined groundwater availability of each particular aquifer.

Because fresh groundwater projects are being utilized by municipal areas using water that is already within the utility's boundaries, no third-party social and economic impacts exist that result from voluntary redistributions of water. Similarly, no impacts should be on navigation.

6.1.4 Facilities Expansion including Surface Water Treatment and Distribution and Transmission

Water quality impacts from new or expanded treatment and distribution facilities are expected to be negligible.

Because facility expansion projects are being utilized by municipal areas using water that is already within the utility's boundaries, no third-party social and economic impacts exist that result from voluntary redistributions of water. Similarly, no impacts should be on navigation.

In some cases, additional water would need to be purchased in order to provide water for these expansions, likely by converting water right classifications. The impacts of conversion of water right classifications are discussed in Subsection 6.1.7.

6.1.5 Storage Reservoirs

Water quality impacts from new storage reservoirs are expected to be negligible in the Rio Grande Basin. In the Nueces-Rio Grande Basin, the storage reservoirs that capture and beneficially use tailwater and precipitation runoff would reduce the freshwater impact on the Laguna Madre, which would benefit the local plant life by maintaining the salinity.

In general, storage reservoirs that utilize existing water rights should not create additional impacts to the system, although variations to instream flows could be expected to occur. The creation of storage would increase the available surface water available for water users in the region and extend supplies during periods of drought.

The recommended storage reservoirs should not have any third-party social and economic impacts resulting from voluntary redistributions of water. Similarly, no impacts should be on navigation.

6.1.6 Advanced Municipal Water Conservation

Advanced Municipal Water Conservation focuses partially on decreasing water usage, which results in lowered flow to WWTPs. However, wastewater influent flows typically have the same organic loading, resulting in higher concentrations of organic pollutants that can require WWTP upgrades to meet regulatory requirements for the WWTP discharge.

Advanced Municipal Water Conservation can reduce billing revenue received by water and wastewater utilities. Education and customer buy-in is required to implement successful conservation, and it can be difficult to follow these programs with a rate increase. Recommendations for how to manage these programs can include preliminary evaluation of potential rate impacts prior to initiating conservation programming and changes to the rate structures that incentivize conservation.[1]

In addition to utility revenue issues, wastewater utilities may also experience changes in the amount, location, and other characteristics of sewage which require adjusting treatment processes or collections infrastructure and operations.

No third-party social and economic impacts exist that result from voluntary redistributions of water or to navigation associated with this strategy.

6.1.7 Conversion of Water Right Classification

This strategy involves converting irrigation water rights to municipal water rights as land is converted from agricultural and rural uses to urban uses. The intent of this strategy is to provide additional municipal and industrial water from the areas that are already being urbanized and not to take any additional irrigation water rights from land that would still require them.

The Texas Commission on Environmental Quality (TCEQ) rules establish conversion ratios of 2 acre-feet (acft) of Class A irrigation water rights and 2.5 acft Class B water rights to 1 acft of municipal water rights. Therefore, if the infrastructure that was previously used to convey an amount of water associated with irrigation water rights is later used to convey water for the converted municipal water rights, a lesser amount of water would be conveyed. This would result in less available push water. Because of the current structure and condition of irrigation district (ID) conveyance systems, more water may need

[1] Examining conservation-oriented water pricing and programs through an energy lens (2017). Kate Zerrenner Jaclyn Rambarran. http://blogs.edf.org/energyexchange/files/2017/12/conservation-rates-white-paper-Final.pdf.

to be diverted to convey municipal deliveries to the end user. However, if the recommended improvements to ID conveyance systems are implemented, this effect would be minimized.

Conversion of water rights from irrigation to municipal uses comes with urbanization and an overall reduction in the irrigated acreage shown in Table 6-1. An evaluation of the economic impacts of unmet needs in irrigation will be included in Appendix 6A as part of the final adopted 2026 RWP.

Table 6-1 Estimated Reduction in Irrigated Acreage as a Result of Urbanization (Number of Acres)

County	2030	2040	2050	2060	2070	2080
Cameron	6,948	13,896	20,844	27,792	34,738	41,409
Hidalgo	10,155	20,310	30,464	40,620	50,772	60,521
Maverick	1,981	3,961	5,942	7,922	9,903	11,804
Starr	107	215	322	429	536	639
Webb	215	431	648	863	1,079	1,286
Willacy	2,424	4,848	7,273	9,697	12,121	14,448
Zapata	56	112	168	224	280	333

6.2 Protection of Resources

All the recommendations in the RWP are consistent with the laws and requirements that protect the water within the region. The amount of water used for recommended strategies are within the limitations of the water availability model for surface water and the groundwater availability model for all aquifers.

The Rio Grande supports extensive wildlife habitat and migration corridors. Although no required minimum environmental flows for the river exist within the Region M planning area, it is important to avoid actions that would negatively impact the Rio Grande and natural resources. According to evaluations performed to date, the recommended strategies would not significantly alter the water quality of the Rio Grande or the Arroyo Colorado, which is the receiving stream for most runoff in the Lower Rio Grande Valley. The net amount of water diverted from the Rio Grande would not be increased by the implementation of the recommended strategies. It is not anticipated that any recommendations would result in major threats to agriculture, natural resources, or navigation.

6.2.1 Impacts to Agricultural Resources

Agricultural resources may be impacted by the 2026 RWP through the conversion of agricultural land uses to well fields, water treatment facilities, pipelines, or other appurtenant structures.

To evaluate potential impacts on agricultural resources, construction impacts for each of the WMSs were estimated based on the acreage of agricultural land impacted according to TPWD mapping. Impacts are described for each recommended WMS in Chapter 5. Overall, construction activities for the combined WMSs have the potential to affect 110 acres of agricultural land (i.e., row crops, grass farms, and orchards).

6.3 Unmet Needs

Region M does not have municipal unmet needs. However, the Irrigation and Mining non-municipal water user groups (WUGs), as detailed below, do have unmet needs.

6.3.1 Irrigation

As detailed in Table 6-2, if Region M experiences extensive drought years, irrigation would exhibit unmet needs. The water rights system in the Amistad-Falcon Reservoir system is structured such that municipal water rights are protected, and irrigation water rights have lower reliability in years of limited supply. Limited supplies in the reservoirs may occur because of drought or because of a deficit in deliveries from Mexico under the 1944 treaty governing the Rio Grande/Rio Bravo.

Irrigators implement conservation to increase their efficiency with available water, but increased efficiency does not decrease the overall demand for irrigation water. WMSs included in the balance calculation are Irrigation District Conservation, On-Farm Conservation, and Biological Control of Arundo Donax.

Table 6-2 Irrigation Supply Balance in Counties with Unmet Needs (acft/yr)

Irrigation	2030	2040	2050	2060	2070	2080
Cameron County						
Supplies	157,896	157,788	157,678	157,426	157,095	156,665
Demand	519,972	502,725	485,479	468,233	450,987	433,744
Need(-)/Surplus(+)	(362,076)	(344,937)	(327,801)	(310,807)	(293,892)	(277,079)
Balance After WMS	(353,599)	(334,864)	(315,289)	(295,840)	(276,502)	(257,240)
Hidalgo County						
Supplies	235,306	235,132	234,958	234,552	233,971	233,324
Demand	666,560	644,451	622,343	600,236	578,127	556,024
Need(-)/Surplus(+)	(431,254)	(409,319)	(387,385)	(365,684)	(344,156)	(322,700)
Balance After WMS	(413,474)	(386,326)	(356,607)	(324,516)	(293,024)	(262,184)
Maverick County						
Supplies	38,137	38,108	38,080	38,011	37,915	37,805
Demand	59,725	57,744	55,763	53,782	51,801	49,820
Need(-)/Surplus(+)	(21,588)	(19,636)	(17,683)	(15,771)	(13,886)	(12,015)
Balance After WMS	(20,436)	(16,575)	(12,566)	(8,609)	(4,694)	(807)
Starr County						
Supplies	2,424	2,423	2,421	2,416	2,409	2,399
Demand	23,109	22,342	21,576	20,809	20,043	19,277
Need(-)/Surplus(+)	(20,685)	(19,919)	(19,155)	(18,393)	(17,634)	(16,878)
Balance After WMS	(20,283)	(19,517)	(18,753)	(17,991)	(17,232)	(16,476)

Irrigation	2030	2040	2050	2060	2070	2080
Webb County						
Supplies	10,610	10,607	10,605	10,601	10,599	10,597
Demand	6,742	6,737	6,732	6,719	6,700	6,675
Need(-)/Surplus(+)	(3,348)	(3,019)	(2,689)	(2,367)	(2,052)	(1,742)
Balance After WMS	(3,896)	(3,767)	(3,437)	(3,115)	(2,800)	(2,490)
Willacy County						
Supplies	20,063	20,048	20,032	19,998	19,947	19,892
Demand	96,412	93,215	90,017	86,819	83,621	80,424
Need(-)/Surplus(+)	(76,349)	(73,167)	(69,985)	(66,821)	(63,674)	(60,532)
Balance After WMS	(72,964)	(77,142)	(72,711)	(68,315)	(63,944)	(59,586)
Zapata County						
Supplies	1,223	1,222	1,221	1,218	1,215	1,209
Demand	4,936	4,773	4,609	4,445	4,281	4,117
Need(-)/Surplus(+)	(3,713)	(3,551)	(3,388)	(3,227)	(3,066)	(2,908)
Balance After WMS	(3,603)	(3,541)	(3,378)	(3,217)	(3,056)	(2,898)
Total Unmet Need*	**(888,255)**	**(841,732)**	**(782,741)**	**(721,603)**	**(661,252)**	**(600,874)**
* Summation of unmet needs only; does not include surplus						

6.3.2 Mining

Mining exhibits unmet needs in drought years for Maverick County in 2030 to 2070 (Table 6-3). The water rights system in the Amistad-Falcon Reservoir system is structured such that municipal water rights are protected, and irrigation and mining water rights have lower reliability in years of limited supply. Limited supplies in the reservoirs may occur because of drought or because of a deficit in deliveries from Mexico under the 1944 treaty governing the Rio Grande/Rio Bravo. Industrial Conservation best management practices were recommended for every industrial WUG.

Table 6-3 Mining Supply Balance in Counties with Unmet Needs (acft/yr)

Mining	2030	2040	2050	2060	2070	2080
Maverick County						
Supplies	1,294	1,293	1,292	1,290	1,223	1,219
Demand	4,898	4,898	4,898	4,898	4,898	2
Need(-)/Surplus(+)	(3,604)	(3,605)	(3,606)	(3,608)	(3,675)	1,380
Balance After WMS	(3,114)	(3,115)	(3,116)	(3,118)	(3,185)	0
Total Unmet Need*	**(3,114)**	**(3,115)**	**(3,116)**	**(3,118)**	**(3,185)**	**0**
* Summation of unmet needs only; does not include surplus						

6.4 Socioeconomic Impacts of Unmet Needs

A socioeconomic impact analysis will be provided by the Texas Water Development Board (TWDB) prior to final plan adoption. It will be included as Appendix 6A.

Appendix 6A. Socioeconomic Impacts of Projected Water Shortages for the Rio Grande (Region M) Regional Water Planning Area

To be included as part of the final plan.

INITIALLY PREPARED PLAN

CHAPTER 7: DROUGHT RESPONSE INFORMATION, ACTIVITIES, AND RECOMMENDATIONS

Rio Grande Regional Water Plan

BV PROJECT NO. 411250

PREPARED FOR

Rio Grande Regional Water Planning Group

1 MARCH 2025

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acft	Acre-Feet
acft/yr	Acre-Feet per Year
DCP	Drought Contingency Plan
DMI	Domestic, Municipal, and Industrial
DOR	Drought of Record
DWDOR	Drought Worse Than the Drought of Record
IBWC	International Boundary Water Commission
MUD	Municipal Utility District
PDSI	Palmer Drought Severity Index
RWP	Regional Water Plan
RWPG	Regional Water Planning Group
SUD	Special Utility District
TCEQ	Texas Commission on Environmental Quality
TWDB	Texas Water Development Board
WAM	Water Availability Model
WCID	Water Control and Improvement District
WCP	Water Conservation Plan
WMS	Water Management Strategy
WSC	Water Supply Corporation
WSOC	Water Supply Option Contracts
WTP	Water Treatment Plant
WUG	Water User Group
WW	Water Works
WWP	Wholesale Water Provider

7.0 Drought Response Information, Activities, and Recommendations

7.1 Droughts of Record in the Regional Water Planning Area

Region M relies heavily on water from the Rio Grande, managed through Amistad and Falcon Reservoirs, although brackish and fresh groundwater provide supplemental and locally critical supplies. Response to drought varies across the region depending on the primary source of water and type of water use.

Since the last planning cycle, the period of record for the Water Availability Model (WAM) was updated to include 2000 through 2018. Severe drought has affected Region M in the period of record of the WAM (1940 through 2018). The drought record helps to understand the firm yield from the Amistad-Falcon Reservoir system. The firm yield has decreased based on the new period of record.

Because of the unique mechanism for fulfillment of water rights of the Rio Grande system, and the heavy reliance on that source, drought impacts Region M somewhat differently than other regions. In addition, a significant portion of the water used in Region M comes from the Mexican side of the Rio Grande watershed.

Drought and other circumstances can contribute to a water shortage, which is any situation when there is less supply of water than there is demand for water. Shortages can be the result of low rainfall, operational decisions, higher than normal temperatures, or growing populations causing increased demand. Drought preparation and response can help to mitigate the impacts of these shortages by finding ways to reduce demands and supplement supplies in response to water shortages.

The Drought Preparedness Council submitted recommendations to all Regional Water Planning Groups (RWPGs) on February 8, 2024. The Council encouraged the RWPGs to (1) consider planning for drought conditions worse than the drought of record (DWDOR) (including scenarios that reflect greater rainfall deficits and/or higher surface temperatures), (2) incorporate projected future reservoir evaporation rates in their assessments of future surface water availability, and (3) identify utilities that reported having less than 180 days of available water supply. These recommendations have been considered in the development of this chapter.

This chapter consolidates the existing information on current drought preparation and response activities for Region M and makes recommendations where needed.

7.1.1 Current Drought of Record

The drought of record (DOR) is the basis of the firm yield projection for each surface water supply. The DOR identifies the worst drought during the period of record, and the firm yield is the supply that can be expected from that river or system in that most severe drought scenario. The Rio Grande WAM includes hydrologic information from 1940 through 2018.

This planning cycle, the DOR has changed due to an update to the Texas Commission on Environmental Quality (TCEQ) Rio Grande Water Availability Model to extend the period of record through 2018. The new drought of record modeled for both the combined reservoir system and the US portion spans the late 1990s to the early 2000s: June 1994 (6/1994) to August 2003 (8/2003) for the US portion (9 years, 2 month); and January 1994 (1/1994) to May 2003 (5/2003) for the combined system (9 years, 4 months). Refer to Figure 7-1.

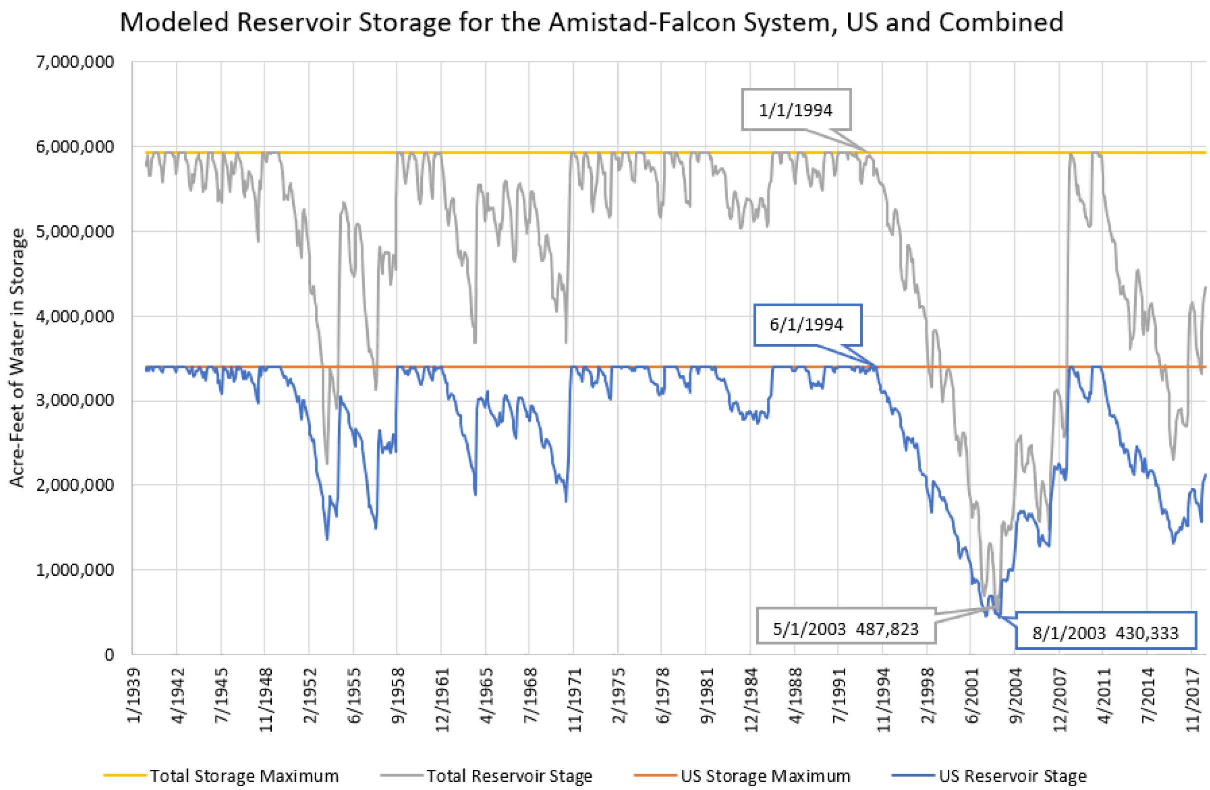

Figure 7-1 Modeled Reservoir Storage for the Amistad-Falcon System, United States and Combined

The WAM takes into account inflows from both Mexican and US tributaries associated with the DOR, volumes and locations of demands along the river, channel losses along the river, and other factors. The deliveries from Mexico are not modeled according to the 1944 treaty, which establishes a minimum 350,000 acre-feet/year (acft/yr) to be delivered to the United States; the deliveries are modeled according to historical supplies and demands rather than assuming that the treaty obligation will be met in full each year. Firm yield decreases slightly each decade from reduced reservoir capacity due to sedimentation.

The hydrologic record in the Rio Grande WAM is used to predict firm yield over the planning horizon, given in Table 7-1.

Table 7-1 Firm Yield Projections, Amistad-Falcon Reservoir System 2030-2080 (Acre-feet/year)

	2030	2040	2050	2060	2070	2080
Amistad-Falcon Reservoir System	1,001,776	1,001,268	1,000,760	999,553	997,821	995,863

7.1.2 Potential Droughts of Record

The naturalized flow record that is used in the WAM is one way to evaluate the scale and duration of drought. Other measures and indicators of drought can be used to compare recent years with the historical record. In the past couple of years, reservoirs levels in the Amistad-Falcon Reservoir have been low. A lack of deliveries from Mexico are leading to drought restriction conditions, but there has been no determination yet to whether this could result in a potential new DOR.

7.1.2.1 Drought Indices

Drought indices have been developed to assess the effects of drought through parameters, including severity, duration, and spatial extent. One of the first comprehensive efforts using precipitation and temperature for estimating a region's moisture was the Palmer Drought Severity Index (PDSI). Index values range from up to 10, indicating wetter-than-normal conditions, and as low as -10 for severe drought. The PDSI includes values across the country through 2023, which makes it a valuable addition to drought analysis. Graphs for yearly PDSI values for Texas Climate Divisions 9 and 10 (Figure 7-2) show more recent and severe droughts in the 21st century than the drought of the 1950s, but over a shorter duration for Region M (Figure 7-3 and Figure 7-4).

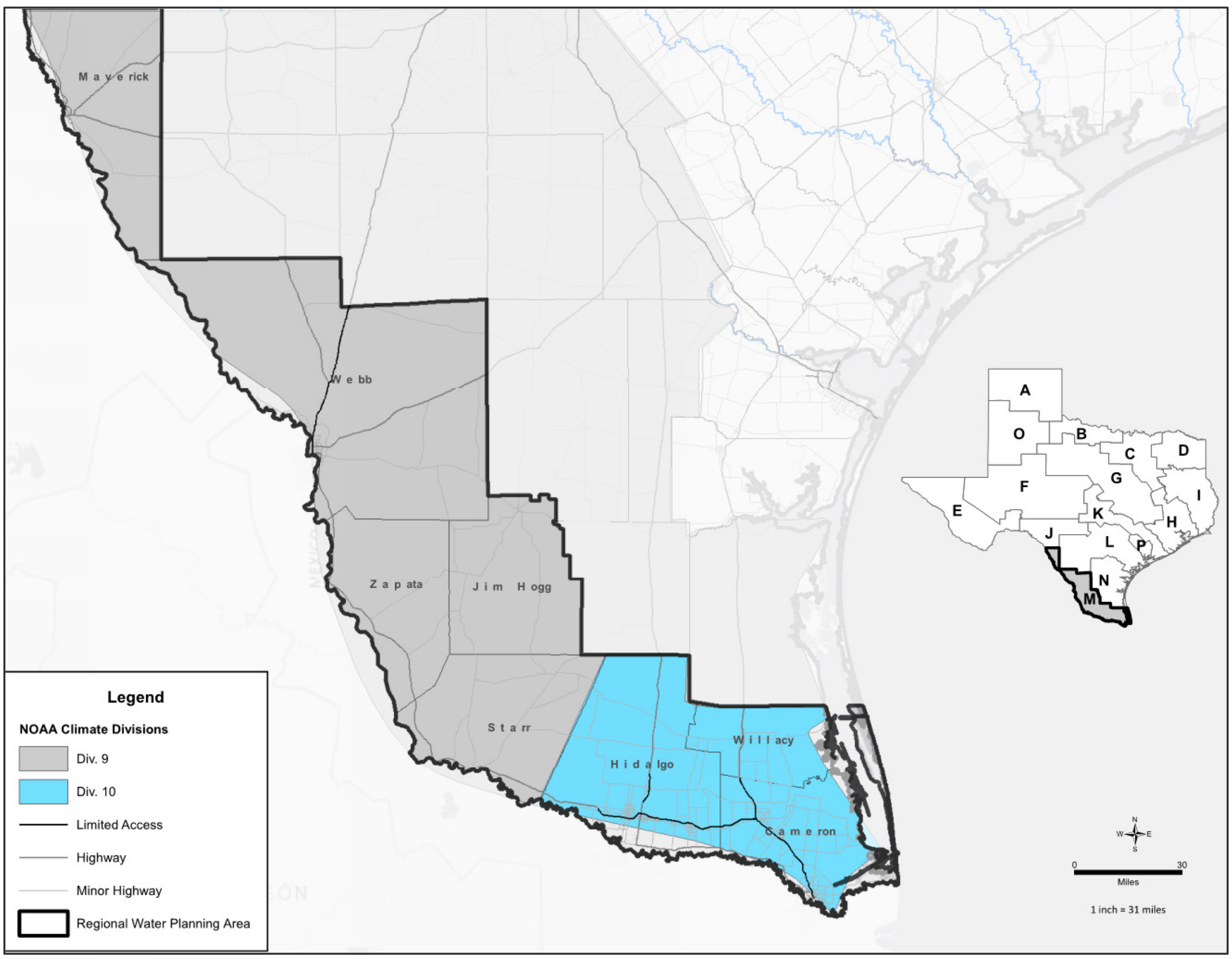

Figure 7-2 **National Oceanic and Atmospheric Administration Climate Divisions 9 and 10**

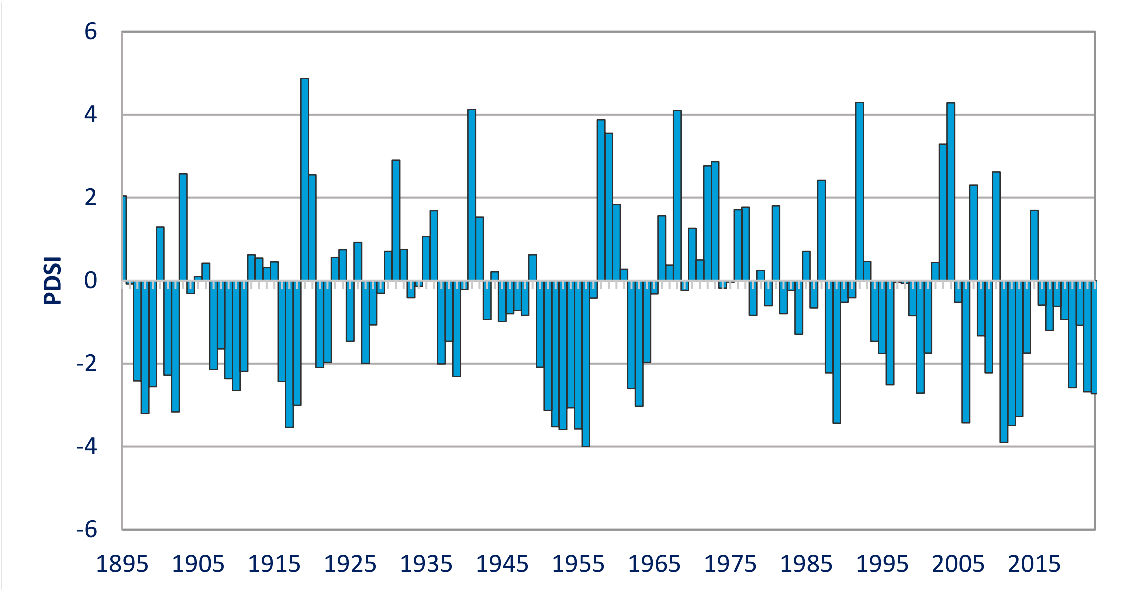

Figure 7-3 Palmer Drought Severity Index for Division 9

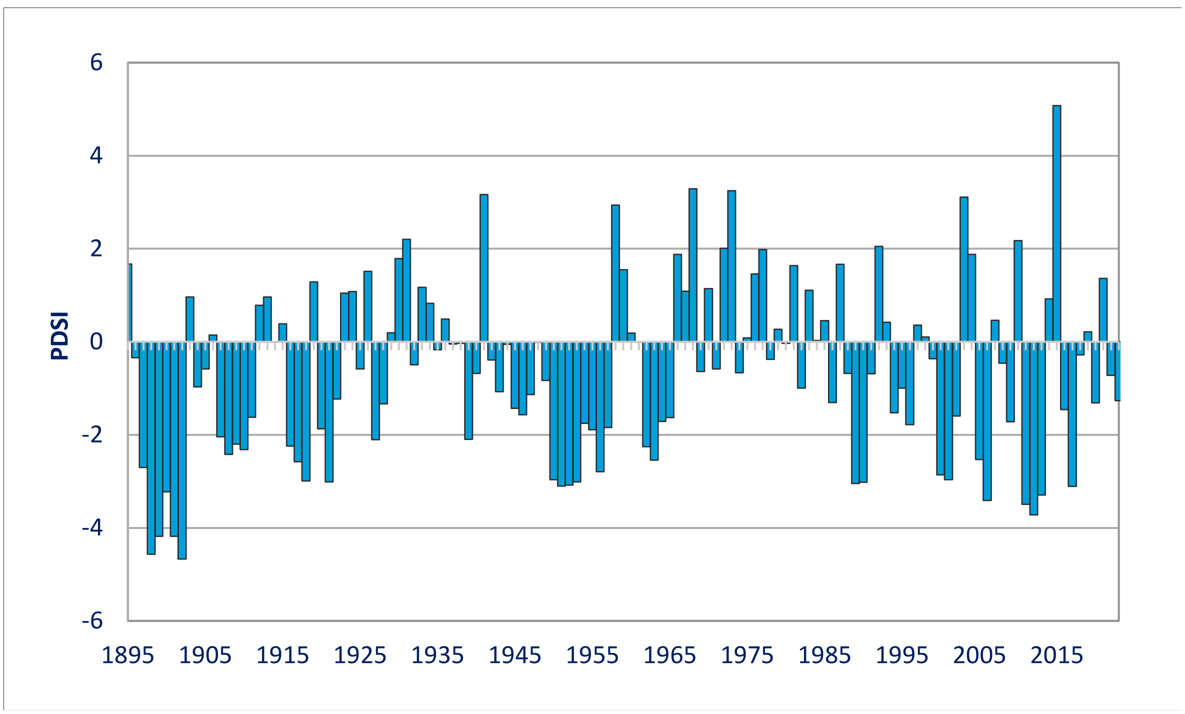

Figure 7-4 Palmer Drought Severity Index for Division 10

7.2 Uncertainty and Droughts Worse Than the Drought of Record

For the 2026 Regional Water Planning cycle, a new Rio Grande WAM was released by TCEQ with a period of record extended out through 2018. This created a new DOR for the region and significantly decreased the firm yield of Amistad-Falcon Reservoir System.

The Rio Grande RWPG recognizes that there is known, unquantified uncertainty associated with estimating population, water demands, hydrologic conditions, and Water Management Strategy (WMS) firm yields, as well as the current trends of the reservoir firm yields and the decreased inflows from tributaries on both the US side and Mexican side. On a regionwide basis, the Rio Grande RWPG considered planning for uncertainty and DWDOR, such as incorporation of forecasting tools and climate models to evaluate supplies or application of a safety factor. However, the Rio Grande RWPG chose not to plan for uncertainty or DWDOR on a regional scale at this time because forecasting tools have not been able to provide the resolution needed for water planning on a regional basis.

Additionally, the Rio Grande RWPG recognizes the uncertainty of the water deliveries from Mexico. On November 7, 2024, the United States and Mexico International Boundary Water Commissions signed Minute 331 which focused on improving reliability and predictability of Rio Grande water deliveries. The Minute, which comes amid growing water scarcity on both sides of the Rio Grande, recognizes the importance to the United States of incorporating Texas water deliveries in the annual allocation plans of Mexico's water managers. During the current cycle, which began on October 25, 2020, Mexico has delivered a total of 425,405 acre-feet (acft). Mexico's obligation under the treaty is to deliver 1.75 million acft by October 24, 2025, absent extraordinary drought or a serious infrastructure accident.

While planning measures to address a DWDOR have not been included on a regionwide basis, several entities have recommended strategies and projects in this plan that will provide them with a secondary source of water, such as potable reuse or groundwater, in order to continue to plan for times when surface water availability may be limited.

In the event of a near-term onset of a DWDOR, water user groups (WUGs) and wholesale water providers (WWPs) without adequate management supplies could potentially implement various measures and responses that would likely be available and capable of providing additional demand reductions or additional water supply capacities to withstand the DWDOR.

The following provides examples of demand management and water supply measures that could be implemented during a DWDOR:

- Demand Management Measures:
  - For WUGs and WWPs that do not already have the Drought Management WMS included as a Recommended strategy in the Regional Water Plan (RWP): Implement Drought Management reductions associated with outdoor watering restrictions, conversion of irrigated crops to dry farming, or temporary suspension of water use.
  - For WUGs and WWPs with the Drought Management WMS included as a Recommended strategy in the RWP: Implement additional drought management measures beyond those in the plan.

- Water Supply Measures:
  - Pursue new direct potable reuse to extend existing supplies.
  - Pursue new groundwater well.
  - Pursue new brackish groundwater well with desalination.
  - Pursue new plan to blend brackish groundwater with existing water supply without additional desalination.
  - Implement new or existing emergency interconnects with other water providers.
  - Purchase hauled water via trucked water systems.

7.3 Current Drought Preparations and Response

7.3.1 Overview

All WUGs in Region M can prepare for drought by participating in the regional planning process, which plans for long-term supplies that are reliable for the DOR. The regional planning process attempts to meet projected water demands during a drought of severity equivalent to the DOR. Statewide, increased efforts in recent years have established both long-term drought management strategies to avoid shortages and Drought Contingency Plans (DCPs) to plan for temporary water supply shortages and other water supply emergencies.

The TCEQ requires that anyone applying for a water right, irrigation districts, wholesale public water suppliers, and all retail public water suppliers serving 3,300 connections or more submit a DCP to the TCEQ. Public water suppliers serving fewer than 3,300 connections are required to have a DCP on file but are not required to submit it to TCEQ. May 1, 2024, was the most recent deadline for DCP submittals.

All the entities that are required to submit a DCP, as well as all users of 1,000 acft or more domestic, municipal, or industrial (DMI) surface water rights and 10,000 acft or more of irrigation surface water rights, are required to submit a Water Conservation Plan (WCP) to TCEQ and Texas Water Development Board (TWDB).

Because of these requirements and recent drought conditions, many communities in the Rio Grande Region have addressed drought preparedness and water conservation planning. A complete list of the DCPs that have been submitted to TCEQ as of October 2024 is shown in Table 7-2.

DCPs for retail or wholesale water suppliers are required to include the following:

- Specific, quantified targets for water use reductions;
- Drought response stages;
- Triggers to begin and end each stage;
- Supply management measures;
- Demand management measures;
- Descriptions of drought indicators;
- Notification procedures;

- Enforcement procedures;
- Procedures for granting exceptions;
- Public input to the plan;
- Ongoing public education;
- Adoption of plan; and
- Coordination with the RWPG.

Utilities within Region M may have implemented drought contingency measures in response to drought conditions during this planning cycle, as the combined storage of the Amistad-Falcon Reservoir System dropped below 20% in 2024. The TCEQ Rio Grande Watermaster now provides reports that list both the combined ownership percentage of capacity and the U.S. usable storage percent of capacity, which may be less than 20% even if the combined ownership is greater than 20%.

Table 7-2 Submitted Drought Contingency Plans

Entity	Drought Contingency Plan Date
Agua Special Utility District (SUD)	4/8/2024
Alamo	4/16/2024
Bayview Irrigation District No. 11	5/6/2019
Brownsville Irrigation District	1/24/2024
Brownsville Public Utilities Board	4/1/2024
Cameron County Irrigation District No. 2	5/1/2024
Cameron County Irrigation District No. 6	3/14/2024
Delta Lake Irrigation District	1/3/2024
Donna	6/7/2022
Donna Irrigation District	5/3/2024
Eagle Pass Water Works (WW) System	2/2/2022
East Rio Hondo WSC	2/1/2024
Edinburg	5/1/2024
El Jardin Water Supply Corporation	5/1/2014
Engelman Irrigation District	7/22/2022
Harlingen Irrigation District	8/1/2024
Harlingen Waterworks System	10/1/2024
Hidalgo	5/1/2024
Hidalgo County Irrigation District No. 1	10/19/2023
Hidalgo County Irrigation District No. 2	9/1/2022
Hidalgo County Irrigation District No. 5	4/30/2019
Hidalgo County Irrigation District No. 6	6/24/2024

Entity	Drought Contingency Plan Date
Hidalgo County Irrigation District No. 9	9/15/2020
Hidalgo County Irrigation District No. 13	4/22/2019
Hidalgo Water Improvement District No. 3*	5/15/2024
La Feria Irrigation District	5/1/2019
Laguna Madre Water District	9/14/2022
Laredo	4/1/2024
Maverick County Water Control and Improvement District (WCID) No. 1	5/1/2019
McAllen, McAllen Public Utility	4/24/2023
Mercedes	5/31/2024
Military Highway WSC	4/25/2024
Mission Public Works Department	8/1/2024
North Alamo WSC	9/17/2019
Pharr	5/20/2024
Rio Grande City	5/28/2019
Roma	4/1/2024
San Benito	5/1/2024
San Juan	4/19/2024
Santa Cruz Irrigation District No. 15*	5/29/2024
Sharyland WSC	10/17/2024
Southmost Regional Water Authority	4/24/2019
United Irrigation District	5/9/2024
Weslaco	5/23/2019
Zapata County WW	8/30/2024

*In January 2025, Hidalgo County Water Improvement District No. 3 and Santa Cruz Water Control and Improvement District No. 15 consolidated into Hidalgo County Consolidated Water Control and Improvement District.

7.3.2 Drought Response Triggers

Drought response varies from entity to entity, primarily between groundwater and surface water sources, and those who serve customers with raw water, and those who deliver treated water. For irrigation districts, which deliver raw surface water, the response to drought is largely determined by the Rio Grande water right system. For treated water suppliers, triggers are specific to their users' demand in relation to treatment capacity, wellfield capacity, or the account balance on DMI water rights held.

7.3.2.1 Irrigation Districts

The TCEQ Rio Grande operating rules determine how the United States' share of usable surface water stored in Amistad and Falcon Reservoirs is apportioned among water right holders in the Region M planning area. A 225,000 acft storage pool within the reservoir is replenished at the beginning of each month for DMI water right accounts, although the TCEQ Rio Grande Watermaster may have some discretion in this because in December 2024, 55,000 acft was added to the storage pool to reach 280,000 acft. After the DMI Reserve is re-established, the end of month account balances for Class A and Class B accounts is reserved, then a 75,000 acft Operating Reserve is met. The Operating Reserve may fluctuate between 75,000 acft and zero but cannot go below zero. In the history of the Watermaster Program, the DMI reserves have always been replenished in full, but the water available annually for Class A and B water rights is often significantly less than the annual maximum authorization of those water rights. Class A and B water rights absorb the impacts of drought on the reservoir system by having less than 100 percent reliability.

Irrigation districts deliver a significant portion of the water used in the Lower Rio Grande Valley (Cameron, Hidalgo, Willacy, and Starr Counties) and Maverick County. The majority of Rio Grande water rights are delivered by irrigation districts. Farmers pay an annual flat rate assessment that entitles them to receive irrigation water on the basis of acreage. When an irrigation district crosses its drought trigger, it goes on water allocation. This means that the district's available water is allocated to their active flat rate acreage.

Each water district has slightly different rules when on allocation; in some cases, water is allowed to be sold between farmers in their district, or farmers may consolidate their allocation on a portion of their land, leaving other areas for dry land farming. These measures allow farmers to adjust to anticipated water shortages.

A summary of the drought triggers and responses as listed by the irrigation districts that submitted DCPs at the time of writing is shown in Appendix 7A.

7.3.2.2 Retail Public Water Suppliers

Although some cities rely on groundwater exclusively or groundwater comprises a part of their supply, most cities in Region M rely on surface water from the Rio Grande. Because the DMI Reserve has priority in the Amistad-Falcon Reservoir system, municipal rights have historically been considered "guaranteed" in their full authorized diversion volume.

Those entities who deliver treated water generally developed triggers that were either based on the remaining municipal water rights available to the city for that year or the capacities of their treatment plants, so that high demands on the plants trigger a conservation stage. The conditions of the reservoirs are occasionally listed among triggers in public water supply DCPs but have little bearing on the availability of municipal water. One issue, though, is that when farmers have water shortages from lower levels in the reservoirs, there is less water in the canal pushing through the municipal water, which can result in additional delivery losses for municipal entities. The conservation stages for cities included limitations on car washing and lawn watering, ranging from voluntary in early stages to some fines or other penalties in later stages.

A summary of the drought triggers and responses as listed in the DCPs for cities and water supply corporations at the time of writing is included as Appendix 7B.

7.4 Existing and Potential Emergency Interconnects

7.4.1 Information Collection Methodology

In accordance with Texas Administrative Code (TAC) (31 TAC 357.42(d)), the RWPG has collected high-level information on existing interconnects. Most water users in Region M are located along the Rio Grande or along canals that convey Rio Grande water. In a sense, the region is highly interconnected.

The distribution system for raw Rio Grande water includes the reservoir system and the 23 Irrigation districts, many of which are either interconnected or have high potential to be connected. The RWPG has previously reached out through representatives of the Lower Rio Grande Valley Water District Managers Association to the district managers for information about interconnects between raw water systems.

7.4.2 Local Drought Contingency Plans with Emergency Interconnects

Although utilization of emergency interconnects was not included in the DCPs that were reviewed, Table 7-3 shows the known interconnections between public water supply systems and whether the connections are used for regular service or only in emergencies. Detailed information about these interconnections was previously submitted securely to the Executive Administrator of the TWDB.

Table 7-3 Emergency Interconnections Between Public Water Supply Systems

Public Water Supply System	Interconnects	Type of Connection
Agua SUD	La Joya	One-way emergency interconnect
	Peñitas, Palmview, Sullivan City, Mission	All within Agua SUD service area
East Rio Hondo WSC	Harlingen WW	Connection for regular service with capacity to increase in emergencies
	City of Los Fresnos	Connection for regular service
	Olmito WSC	Connection for regular service with capacity to increase in emergencies
	North Cameron Regional	Connection for regular service
	Combes	Emergency Interconnect
Harlingen WW	La Feria	Emergency Interconnect
	Combes	5 connections for regular service
	Primera	2 connections for regular service
	San Benito	Emergency Interconnect
	Palm Valley	2 connections for regular service
	East Rio Hondo WSC	Connection for regular service
	Military Highway WSC	Connection for regular service

Public Water Supply System	Interconnects	Type of Connection
McAllen	Edinburg	Used only during times of high demand
	Pharr	Used only during times of high demand
	Mission	Used only during times of high demand
	Hidalgo	Used only during times of high demand
	Hidalgo County Irrigation District No. 1, Hidalgo County Irrigation District No. 2, Hidalgo County Water Improvement District No. 3*, United Irrigation District	McAllen receives raw water from these districts
Military Highway WSC	Harlingen WW (see above)	
	Los Indios, Progreso, San Juan	Military Highway serves these entities
North Alamo WSC	Mercedes	Emergency interconnect
	Sebastian Municipal Utility District (MUD)	Emergency interconnect
	Lyford	Emergency interconnect
	Raymondville	Emergency interconnect
	Edcouch	Emergency interconnect
	Elsa	Emergency interconnect
	La Villa	Emergency interconnect
	Donna	Connection for regular service
	Edinburg	2 connections for regular service
	Military Highway WSC	Connection for regular service
	Quiet Village Utilities	Connection for regular service
	Port Mansfield PUD	Connection for regular service
	Delta Lake ID, Donna Irrigation District, Hidalgo County Irrigation District No. 2, Hidalgo County Irrigation District No. 1, East Rio Hondo WSC	North Alamo WSC receives raw water from these districts
Olmito WSC	Los Fresnos	Two-Way emergency interconnect
	Valley MUD No. 2	Two-Way emergency interconnect
Zapata County Waterworks	Zapata County Water Control & Improvement District No. 16	Connection for regular service
Brownsville Public Utilities Board	El Jardin WSC	Connection for regular service
Laguna Madre Water District	Laguna Vista, Port Isabel, South Padre Island	Connection for regular service

Public Water Supply System	Interconnects	Type of Connection
Valley MUD No. 2	Military Highway WSC	Emergency interconnect
	Olmito WSC	Emergency interconnect
	Southmost Regional Water Authority	Connection for regular service
	Rancho Viejo	Connection for regular service
Rio Grande City	Rio WSC	Connection for regular service
Roma	Escobares	Connection for regular service
Weslaco	Mercedes	Emergency interconnect

*In January 2025, Hidalgo County Water Improvement District No. 3 and Santa Cruz Water Control and Improvement District No. 15 consolidated into Hidalgo County Consolidated Water Control and Improvement District.

7.5 Emergency Responses to Local Drought Conditions or Loss of Municipal Supply

Municipal WUGs that are of concern for emergency drought response are identified as those that have a population of 7,500 or less and have a sole source of water, even if that water is provided by a wholesale water provider, or in the case of the Rio Grande region, if those entities receive waters from the Amistad-Falcon Reservoir System from multiple irrigation districts. For purposes of this evaluation, entities evaluated for emergency responses to local drought conditions or loss of municipal supply were assumed to have 180 days or less of remaining supply. Additionally, all “county-other” WUGs are considered.

WUGs that meet these criteria are shown in Table 7-4, with population projections for 2030 and current suppliers. Most of these districts rely exclusively on water from the Amistad-Falcon Reservoir System and have no secondary source available to them (the districts that provide surface water are listed as the “Current Supply”). Those that indicate their sole supply is groundwater are generally geographically constrained and limited to local groundwater supplies. Three of the entities listed in Table 7-4, Elsa, Siesta Shores WCID, and Zapata County WCID Hwy 16 East, are municipal public water systems that reported to the TCEQ with less than 180 days of water between January 2016 and November 2023. The fourth additional entity, Zapata County Water Works, is not in Table 7-4 because it does not meet the population criteria but reported to TCEQ with less than 180 days of water during that time period.

Table 7-4 WUGs Identified for Emergency Drought Response Evaluation

County	Entity	2030 Population	Current Supply (1)	Current Supply (2)
Cameron	Combes	3,041	Harlingen Irrigation District - Cameron County 1	
Cameron	County-Other	26,712	Surface Water (various)	Groundwater (various)
Cameron	La Feria	6,210	La Feria Irrigation District	

County	Entity	2030 Population	Current Supply [1]	Current Supply [2]
Cameron	Olmito WSC	7,329	Cameron County Irrigation District No. 6	
Cameron	Palm Valley	1,308	Harlingen Irrigation District No. 1	
Cameron	Rio Hondo	1,711	Cameron County Irrigation District No. 2	
Cameron	Santa Rosa	2,947	La Feria Irrigation District	
Hidalgo	County-Other	27,570	Donna Irrigation District - Hidalgo County 1	Surface Water (various)
Hidalgo	Edcouch	2,552	Hidalgo County Irrigation District No. 9	North Alamo WSC emergency interconnect
Hidalgo	Elsa	4,659	Hidalgo County Irrigation District No. 9	North Alamo WSC emergency interconnect
Hidalgo	Hidalgo County MUD No. 1	5,256	Hidalgo County Irrigation District No. 1	
Hidalgo	La Joya	4,764	Hidalgo County Irrigation District No. 16	Agua SUD one-way emergency interconnect
Hidalgo	La Villa	2,092	Hidalgo County Irrigation District No. 9	North Alamo WSC emergency interconnect
Jim Hogg	County-Other	1,194	Local groundwater	
Jim Hogg	Jim Hogg County Water Control & Improvement District No. 2	3,482	Gulf Coast groundwater	
Maverick	County - Other	1,328	Surface water (various)	Groundwater (various)
Starr	County - Other	4,359	Surface water (various)	Groundwater (various)
Starr	El Sauz WSC	1,708	Rio Grande City	
Starr	El Tanque WSC	1,385	Rio Grande City	
Starr	Union WSC	7,207	Surface water	
Webb	County - Other	12,504	Surface water (various)	Groundwater (various)

County	Entity	2030 Population	Current Supply [1]	Current Supply [2]
Webb	Mirando City WSC	268	Gulf Coast Groundwater	
Willacy	County - Other	4,665	Surface water (various)	Groundwater (various)
Willacy	Lyford	1,992	Delta Lake Irrigation District	North Alamo WSC emergency interconnect
Willacy	Port Mansfield Public Utility District	358	North Alamo WSC	
Willacy	Sebastian MUD	1,410	La Feria Irrigation District	North Alamo WSC emergency interconnect
Zapata	County - Other	1,162	Surface water (various)	Groundwater (various)
Zapata	Falcon Rural WSC	377	Surface water	
Zapata	Zapata County San Ygnacio and Ramireño	388	Self-supplied surface water	
Zapata	Siesta Shores WCID	1,552	Surface water	
Zapata	Zapata County WCID - Hwy 16 East	547	Surface water	

7.5.1.1 Sole Source: Surface Water

Entities that depend entirely on surface water in Region M are very common. If shortages occur as a result of having insufficient water rights to meet demand or to deliver water, water market and provisions allow for entities to purchase water. Special provisions enable purchase of emergency water. It is recommended that all WUGs procure sufficient water rights or long-term contracts to meet projected demands when feasible. Additionally, access to off-channel storage reservoirs, storage tanks, or additional sources of water (groundwater, reuse, etc.) for sole-source utilities may provide increased resilience.

7.5.1.1.1 Interconnections

Interconnections between utilities build greater resilience by providing utilities an alternate source of treated water if either system is damaged or fails. Entities that experience push water requirements when irrigation deliveries are curtailed may also benefit from both raw and treated water interconnects, which could allow districts and utilities to coordinate and consolidate deliveries in a limited number of canals.

7.5.1.1.2 Water Quality

Any emergency that impacts the quality of the water in the Rio Grande has the potential to cause significant harm to the region. Because contamination could be released from either the United States or Mexican side of the river, there is an additional level of uncertainty regarding potential contaminants. In the past, releases into Rio Grande tributaries were identified only by a widespread fish kill. No emergency response plan is currently in place to handle the release of contaminants into the Rio Grande.

In addition, drought in the region leads to low flows in the rivers and streams. Low flow in the Rio Grande leads to a concentration of pollutants, such as bacteria, nutrients, and TDS. In the tidal section, low flow rates lead to saltwater intrusion which can create high salinity levels.

As mentioned in detail in Chapter 3, a binational effort is underway to improve and protect water quality in the Lower Rio Grande below Falcon Dam to the Gulf of Mexico that currently experiences bacteria levels that have at times been higher than recommended for approved water uses of the river. The effort, the Lower Rio Grande Water Quality Initiative, is intended to serve as a pilot project to develop the binational mechanisms necessary to improve water quality throughout the Rio Grande.

Regular water quality testing and reporting is already in place in some locations to alert farmers of high total dissolved solids in the river. This type of system could be expanded upon to provide regular reports of water quality to utility managers and agencies such as IBWC and TCEQ. This kind of water quality analysis is complicated by the fact that the potential contaminants are not known in many cases. Understanding the timing of contaminant transport through the system could allow entities to pump enough water to fill reservoirs before the contaminant has reached that location. However, the success of this approach is contingent on timely information about releases. At a minimum, information must be communicated to utilities and to the public in an accurate and timely manner so that safe drinking water can be provided immediately.

7.5.1.1.3 Recommendations

Long-term recommendations for entities that rely solely on surface water include expansion of alternate water supplies, including fresh and brackish groundwater where available. Emergency recommendations are listed in Table 7-5.

Table 7-5 Recommended Emergency Water Shortage Responses: Surface Water Dependent WUGs

Emergency Shortage	Responses
Insufficient Surface Water Rights	• Purchase surface water. • Highest stage drought restrictions. • Long term: purchase DMI water rights, add storage, add a groundwater source.
Water Treatment Plant Failure	• Interconnects with other systems. • Truck in water. • Highest stage drought restrictions. • Long term: facility improvements, system evaluation, and phased improvement plan.

Emergency Shortage	Responses
Rio Grande Contamination	• Immediate testing. • Pumping and storage of safe water to any existing storage facilities. • Interconnects with systems that have alternate supplies. • Truck in water. • Emergency communication with boil water or other guidance to customers. • Highest stage drought restrictions. • Long term: emergency response plan including communications, provision of safe water to critical facilities, etc.

7.5.1.2 Sole Source: Groundwater

Utilities that depend exclusively on groundwater tend to be isolated from other sources and other cities. For instance, Hebbronville is over 30 miles from the nearest city, Falfurrias. For entities that are dependent on groundwater, the entities are encouraged to actively monitor water levels in wells, especially in high-demand periods. Water levels can be used to trigger drought responses, and to guide expansion of wellfields or deepening of wells. Additionally, groundwater quality may be an indicator of decreasing availability from a well or wellfield.

Emergency responses for entities that rely solely on groundwater are shown in Table 7-6.

Table 7-6 Recommended Emergency Water Shortage Responses: Groundwater Dependent WUGs

Emergency Shortage	Responses
Insufficient Well Production	• Highest stage drought restrictions. • Deepen wells (if possible). • Interconnects with other systems (if possible). • Truck in water. • Long term: facility improvements, system evaluation, and phased improvement plan.
Water Treatment Plant Failure	• Highest stage drought restrictions. • Interconnects with other systems (if possible). • Truck in water. • Long term: facility improvements, system evaluation, and phased improvement plan.
Groundwater Quality	• Immediate testing. • Highest stage drought restrictions. • Additional emergency treatment (if possible). • Interconnects with other systems (if possible). • Truck in water. • Long term: supply or treatment facility improvements, system evaluation, and phased improvement plan.

7.6 Region-Specific Drought Response Recommendations and Model Drought Contingency Plans

The drought response recommendations made for each water source in the following subsections should be considered in the development of drought response preparations. The TCEQ has prepared model DCPs for wholesale and retail water suppliers to provide guidance and suggestions to entities regarding the preparation of DCPs. Not all items in the model will apply to every system's situation, but the overall model can be used as a starting point for most entities. The Rio Grande RWPG suggests that the TCEQ model DCPs be used for entities wishing to develop a new DCP. The TCEQ model DCPs and WCPs are included for all WUG types in Appendix 7C. The TCEQ model DCPs can be found on TCEQ's website: (https://www.tceq.texas.gov/permitting/water_rights/wr_technical-resources/contingency.html)

7.6.1 Amistad-Falcon Reservoir System Drought Response Recommendations

Water supplies from the Amistad-Falcon reservoir system are managed with a unique operating and water rights system, which reserves a significant portion of the reservoir to effectively guarantee DMI water rights and fills irrigation and mining water right accounts as water is available to that storage pool.

This system ensures that, even in the worst recorded drought, a municipal or industrial WUG may divert its full annual authorized diversion each year. If a municipal or industrial WUG has sufficient water rights to meet its needs, and a reasonable means of delivering the water from the diversion point to the point of need, there should be no issues getting that water in a year similar to the DOR.

Water shortages among municipal WUGs can result from a range of scenarios (discussed in Subsection 7.2.2) including insufficient water rights, issues with water rights account budgeting, delivery issues, and water treatment or storage issues. The primary impact of drought on municipal utilities that rely on the Amistad-Falcon reservoir system is an increase in demands, and not a reduction of supplies, although for this planning cycle, as irrigation water diminishes it is challenging to deliver the DMI water when a lack of push water from irrigation occurs.

7.6.1.1 DMI Water Rights Holders

Utilities and industrial users in Region M experience drought under the following scenarios, described in Table 7-7 with recommendations specific to each.

Table 7-7 Municipal Shortage Scenarios and Recommendations

Shortage Scenario and Triggers	Recommended Responses
Insufficient Water Rights to Meet Demand. An entity may have sufficient treatment capacity to meet its demands but have insufficient water rights to meet drought year demands. Triggers should be based on useable balance calculations and monthly/weekly demand projections. When the balance of water available for the remainder of the year does not exceed the demand projections by a reasonable margin, severe drought response should be implemented. When the projected demands exceed the balance of water, critical drought response should be implemented.	**Best Practices:** Use of water rights should be managed carefully, and cities should track their useable balance over the year compared with seasonal/monthly demand projections. This will allow a city to implement conservation measures early in the year to stay within its water budget. It is recommended that any city that projects a shortage should purchase water rights when feasible. **Severe Conditions:** Request voluntary municipal and industrial conservation, limit unnecessary municipal usage, consider billing rate incentives for conservation in severe drought periods, and purchase water as it is available. **Critical Conditions:** Implement mandatory municipal and industrial water use restrictions, restrict nonessential municipal water use, consider billing rate incentives for conservation in critical drought periods, and purchase water as it is available.
Water Treatment Plant Capacity. Municipal utilities with sufficient water rights may experience a shortage if, during their peak demand months, the capacity of the water treatment plant (WTP) is not sufficient to meet permit requirements. Triggers should be based on daily treatment volumes and TCEQ WTP capacity rules. When 85% capacity is reached for 3 consecutive days, severe drought response should be implemented. When 95% capacity is reached, critical drought response should be implemented.	**Best Practices:** Conservation programs can reduce demands on the WTP. The long-term solution is expansion of WTPs' capacity and interconnections with other facilities. **Severe Conditions:** Request voluntary municipal and industrial conservation, limit unnecessary municipal usage, consider billing rate incentives for conservation in severe drought periods, and utilize emergency interconnects. **Critical Conditions:** Implement mandatory municipal and industrial water use restrictions, restrict nonessential municipal water use, consider billing rate incentives for conservation in critical drought periods, and utilize emergency interconnects.
Push Water. Even with sufficient water rights to meet demands and to cover normal delivery losses, some municipalities, especially those who receive surface water from irrigation districts that serve mostly irrigation water users, may need additional water to meet minimum operational requirements in the district conveyance system if irrigation water is curtailed. Triggers should be based on (1) the requirement of irrigation water to deliver DMI water in a given district, (2) the useable balance available to irrigators in the district, and whether those irrigators are on allocation, and (3) the storage capacity available to the utility. Severe drought restrictions should be implemented if stored water is at or within a small margin of the projected demands before the next feasible delivery from the district. Critical drought restrictions should be implemented if water in storage is less than the projected demands before the next feasible delivery from the district.	**Best Practices:** First, utilities should have a clear communication plan in place with the irrigation district that alerts the city when irrigation water users may be put on allocation. This may include a drought trigger associated with Amistad/Falcon reservoir storage levels and the useable balance of irrigation accounts in the district. Second, utilities should evaluate their current conveyance methods to see if there are alternate canals or districts that may be able to serve their systems in the case of a push water shortage. Third, where possible, entities should increase their raw water storage to allow for more time between deliveries that need to be timed to coincide with irrigation deliveries. Last, interconnections and emergency agreements with other utilities and other sources are recommended. **Severe Conditions:** Request voluntary municipal and industrial conservation, limit unnecessary municipal usage, consider billing rate incentives for conservation in severe drought periods, utilize emergency interconnects, and identify water that may be available for purchase as push water. **Critical Conditions:** Implement mandatory municipal and industrial water use restrictions, restrict nonessential municipal water use, consider billing rate incentives for conservation in critical drought periods, utilize emergency interconnects, and identify water that may be available for purchase as push water.

7.6.1.2 Irrigation and Mining Water Rights Holders

Farmers can respond to drought through planning, crop selection, highly efficient operations, and on-farm demand reduction strategies (such as narrow border citrus and drip irrigation). Farmers and irrigation districts should maintain useable balance calculations and monitor reservoir levels to facilitate planning. Selection of crops, in conjunction with available demand reduction strategies, can allow farmers to maximize their yield in years of drought. Crop selection tools that take current costs and market values into account have been made available to farmers in the High Plains and could be updated with information specific to the region.

Cooperation with the irrigation districts to increase the operational and conveyance efficiency could yield a significant amount of water to farmers. This is discussed as a water management strategy in Chapter 5.

Mining water use, including oil and gas drilling, can be decreased by close controls of leaks and spills, on-site reuse, and new technology or approaches that require less water. Because mining water rights are subject to the same decrease in reliability in drought years, mining water users are highly encouraged to identify and implement water conservation measures. Both irrigation and mining water demand can be scaled according to available water, and alternate sources, such as reuse or groundwater, may be used when surface water is scarce.

7.6.2 Groundwater Supply Drought Response Recommendations

Many users in Region M rely on groundwater as their main source of supply. The aquifers and subsections of aquifers within Region M exhibit a broad range of drought response characteristics, which require specific drought triggers and responses to be developed for each situation. In general, groundwater wells may be impacted by increased pumping in the area and by decreasing recharge resulting from drought. Insufficient groundwater or groundwater of acceptable quality may result in a shortage.

For general drought preparedness, wells should regularly be monitored for changing water levels and changes in quality. If required, additional temporary treatment may need to be implemented to meet drinking water standards. It is important to understand what temporary treatment options may be used in the case of a shortage. Additional wells and emergency rehabilitation or deepening of existing wells can help to increase supplies in a shortage.

Under severe conditions, established when supplies may be insufficient to meet demands within 60 days or decrease in well productivity or quality, it is recommended that municipal utility managers request voluntary municipal and industrial conservation, limit unnecessary municipal usage, consider billing rate incentives for conservation in severe drought periods, and utilize any available emergency interconnects.

Under critical conditions, established when demands are expected to exceed supplies within 30 days, it is recommended that city utility managers implement mandatory municipal and industrial water use restrictions, restrict nonessential municipal water use, consider billing rate incentives for conservation in critical drought periods, and utilize emergency interconnects. In the most extreme cases, trucking in water may be the best alternative to meet immediate needs.

7.7 Drought Management Water Management Strategies

Drought WMSs, such as voluntary or mandatory drought water restrictions, are those which are intended to be implemented only in times of drought. While conservation as a whole may be implemented as a long-term strategy, the ability of a WUG to reduce demands in times of severe water shortage can enable reliable delivery of water at levels that maintain near-term health and safety.

It has been demonstrated across the state that municipal WUGs that focus on reducing discretionary outdoor water use first in response to drought and avoid water use reductions in the commercial and manufacturing use sectors, may find drought management to be economically viable and cost-competitive with other WMS. Drought WMS may be economically viable as an interim strategy to meet near-term needs through demand reduction until such time as economically viable long-term water supplies can be developed. For planning purposes, it is important that a utility understand the amount of demand reduction that can be expected when drought restrictions are put in place.

All WMS are discussed in more detail in Chapter 5.

7.7.1 Recommended Drought Management WMS

The main drought management WMS that was considered for Region M included strategies intended to reduce demand, which is intended to make the region more resilient to drought. The drought management WMS that was evaluated for all possible municipal WUGs is as follows:

- Municipal Drought Management. Water demand reductions, by voluntary or mandatory restrictions, were considered for all municipal WUGs with a need in any decade, and for entities required to develop and submit a DCP.
- In addition, several municipal WUGs have looked into direct potable reuse or groundwater strategies to add a secondary source of supply that would be available even when surface water availability is reduced. While not officially a drought management strategy, these types of recommended strategies will help increase supplies during conditions of drought.

7.7.1.1 Municipal Drought Management WMS

Water demand reductions, by voluntary or mandatory restrictions, were recommended for all municipal WUGs with needs and/or municipal WUGs that are required to submit a DCP to TCEQ. The RWP is representative of the worst historical drought conditions, and municipal water utilities in Region M and across the state have successfully integrated water demand reduction into their DCPs as a way to respond to drought. Subsection 7.2.2.2 includes examples of drought triggers and responses from municipal water utilities in Region M.

The RWPG has determined that 5 percent demand reduction is an attainable demand reduction for any utility with a municipal need in any decade, and for entities required to develop and submit a DCP. This reduction has been applied to all municipal WUGs with a need in any decade and/or that are required to submit a DCP to TCEQ.

The demand reduction was not applied to WUGS that do not have municipal water demands or to County-Other WUGs. In cases where entities are required to develop and submit a DCP but are not considered a WUG or WWP, or they do not have municipal water demands, the percent reduction was not applied.

7.7.2 Drought Management WMS Not Recommended

An approach to water marketing known as "dry year option contracts" or "water supply option contracts" (WSOC) may reduce the impact on agricultural production while providing drought supplies for other uses. This concept involves temporary transfers of irrigation water to provide secure water supplies to non-agricultural users during droughts. This option would transfer water to other users when needed while preserving the water for agriculture during normal water supply situations. In Texas, WSOC is a practice in the Edwards Aquifer area to provide water for endangered species and San Antonio water users during drought.

The Lower Rio Grande Valley and Region M have some unique institutional, hydrologic, and economic conditions that would need to be addressed to provide seller and buyer incentives to enter into a WSOC. Unlike many other areas of the Western United States, water rights are held by the irrigation districts rather than farmers. Given this and the generally low price of agricultural water, farmers have little incentive to conserve water except in drought and lack the ability to sell water conserved by more efficient irrigation methods or fallowing land such as for WSOC payments. While the potential exists for irrigation districts to enter into a WSOC with another user, irrigation districts would need to work with farmers and pass through exercise payments to make WSOCs feasible from the farmer's point of view. In addition, with the generally low cost of irrigation district water, the purchase of this water may be the lowest cost to urban providers and other users compared to alternative sources such as desalination or reuse.

Urban demand has the highest priority in drought conditions, and therefore, urban communities may feel little need to have WSOCs unless there is concern about the agricultural community and/or irrigation district welfare. This strategy would require significant legislative changes and is not recommended at this time.

7.8 Other Considerations and Recommendations

7.8.1 Relevant Recommendations from Drought Preparedness Council

In February 2024, the Drought Preparedness Council recommended that regional water planning groups identify utilities within their boundaries that reported to the TCEQ having less than 180 days of available water supply during the current or preceding planning cycle. The following WUGs reported to the TCEQ having less than 180 days of available water supply between 2016 and 2023: Elsa, Siesta Shores WCID, Zapata County Water Works, and Zapata County WCID Hwy 16 East.

The Drought Preparedness Council also encouraged RWPGs to incorporate projected future reservoir evaporation rates in their assessments of future surface water availability. Historical reservoir evaporation rates are incorporated into WAMs that the Rio Grande RWPG uses to determine surface water availability. However, projected future reservoir evaporation rates would require development of climate models with resolution needed for water planning on a regional basis. The Rio Grande RWPG understands that incorporation of down scaled climate models is being considered for inclusion in WAMs, which would incorporate projected future reservoir evaporation rates.

Finally, the Drought Preparedness Council encourages regional water planning groups to consider planning for drought conditions worse than the drought of record, including scenarios that reflect greater rainfall deficits and/or higher surface temperatures. The Rio Grande RWPG's response to this item is discussed in Section 7.2.

7.8.2 Recommendations Regarding Counteractive Variations in Drought Response Strategies

Unnecessary or counterproductive variations in drought response strategies may impede drought response efforts. Counterproductive examples include entities having different stages, triggers, and responses that may have been counterproductive to the efforts of drought response and negatively impact local resources. Furthermore, municipalities have drought triggers that are set on varying reservoir levels, and if they have municipal water rights, these water rights are not affected by reservoir levels. Setting drought response stages or triggers with respect to the budgeting of water rights rather than reservoir levels could prove to be more beneficial for drought response strategies for entities in the region. In addition, if an entity enacts a drought response faster than other entities, the action complicated connections. Entity coordination of drought response triggers could mitigate some counteractive variations in drought response strategies. Lastly, a measure to assist in mitigating the counterproductive measures associated with push water would be for entities to coordinate the timing of the utilization of push water to decrease excess water used in distribution canals.

7.8.3 Other Drought Management Measures

Livestock water supplies are from both groundwater and surface water in Region M. In a drought scenario, it is important that windmill pumps that fill stock ponds and tanks be used only when needed, rather than allowed to run at all times. Agricultural and livestock demands may be significantly increased in severe drought, which can impact groundwater supplies. In addition to careful management of water supplies, drought relief programs may be pursued to assist with livestock demands in a severe drought, including the emergency Haying and Grazing Program.

Appendix 7A. Summary of Drought Response Triggers – Irrigation District Drought Contingency Plans

ENTITY	DATE		
Donna Irrigation District	May 5, 2024	TRIGGERS:	Water allocations for irrigators go into effect when the district's irrigation account contains a less then two (2) year supply of water, to be determined by the board.
		ACTIONS:	The total water allocated to the irrigation district by the Watermaster will be distributed to active accounts within district. No allocation account may have more than one acre foot of allocation. Water allocation will be based on 6" per acre for flood irrigation and 3" per acre for drip and sprinklered irrigation.
Brownsville Irrigation District	January 12, 2024	TRIGGERS:	Water assignments are initiated upon approval of the board.
		ACTIONS:	Each irrigation user shall be assigned three irrigations or 1 acre-foot of water for each acre planted in the previous year. As additional water supplies become available to the district, water will be equally distributed as described in Section 11.039 in the Texas Water Code.
Hidalgo County Irrigation District No. 16	May 2, 2024	TRIGGERS:	Upon approval of the board, water allocation will go into effect then the district has an estimated maximum 18-month supply or an estimated minimum of 1-year supply of estimated irrigation water use remaining in its water allocation allocated by the Watermaster.
		ACTIONS:	Water will be allocated on an equivalent volume basis , with four (4) hours of irrigation is equivalent to one (1) acre feet of water, based on flat rate. No more than six (6) hours of irrigation water per acre shall be held in an allocation account at any one time. Transfers of allotments from one flat rate tract owned by irrigation user to another flat rate tract owned by the same irrigation used are permitted and must be authorized. Irrigation water obtained from outside the district must receive authorization from the Watermaster.
United Irrigation District	May 9, 2024	TRIGGERS:	Upon approval of the board, water allocation will go into effect then the district has an estimated maximum 18-month supply or an estimated minimum of 1-year supply of estimated irrigation water use remaining in its water allocation allocated by the Watermaster.
		ACTIONS:	Water will be allocated on an equivalent volume basis , with four (4) hours of irrigation is equivalent to one (1) acre feet of water, based on flat rate. No more than six (6) hours of irrigation water per acre shall be held in an allocation account at any one time. Transfers of allotments from one flat rate tract owned by irrigation user to another flat rate tract owned by the same irrigation used are permitted and must be authorized. Irrigation water obtained from outside the district must receive authorization from the Watermaster. Water allocated to the district for use within its boundaries may not be transferred for use outside district boundaries.

ENTITY	DATE		
Hidalgo County Irrigation District No. 6	June 24, 2024	TRIGGERS:	Upon approval of the board, water allocation will go into effect when water allocated to Irrigation District No. 6 for irrigation by the Rio Grande Watermaster amounts to a two (2) year supply.
		ACTIONS:	Water will be allocated on a pro-rata-per-acre basis to the compliant acreage. Transfer of allotment within (but not outside) the district, with the consent of the allotee, will be permitted. During periods of water shortage and drought, HCID#6 will allocate two acre feet per active acre. An active acre is defined as an acre that is current on flat rate and has irrigated at least once in the prior two calendar years.
Harlingen Irrigation District	August 14, 2024	TRIGGERS:	Upon approval of the board, water allocation will go into effect when (1) the storage balance in the district's irrigation water rights account has declined to a one irrigation per acre level; and (2) the board determines that there is not sufficient water to complete the traditional crop year.
		ACTIONS:	The total water allocated to the irrigation district by the Watermaster will be equally divided among flat-rate customers. The amount of water charged per irrigation to each acre irrigated will be based on a running average water duty per acre irrigated or an amount deemed fair by the Board of Directors. Customers are encouraged to use meters supplied and maintained by the District. Water allotment may be transferred within the boundaries of the district; no water may be transferred to land outside the district. Water can be transferred from outside the district to within.
Hidalgo Co. Water Improvement District No. 3	May 15, 2024	TRIGGERS:	Upon approval of the board, water allocation will go into effect when the district's total water right from the Rio Grande Watermaster amounts to less than 1 year supply as determined by the board.
		ACTIONS:	Water is pro-rated to irrigable land on which all flat rate assessment is paid in accordance with the district's Water Allocation Program. Additionally water will be equally distributed on a pro-rate acreage basis to active irrigation accounts. When the Water Allocation Program is in effect, the District will not supply Out of District water except in accordance with policy adopted as a result of its US Bureau of Reclamation WaterSMART Grant. The need for "Push Water" does not exist in this district.
Santa Cruz Irrigation District No. 15	May 29, 2024	TRIGGERS:	Allocation will become effective, upon board approval, when the combined storage in the Amistad and Falcon Reservoirs is at or less than 80% of storage capacity for the district water balance.
		ACTIONS:	Each user is allocated three irrigations or 2 acre-feet of water for each flat rate acre for which taxes, fees, and charges have been paid. Transfer within the district is allowed. Transfer from outside of the district to a user in the district is allowed, but transfers out of the district are not allowed.

ENTITY	DATE		
Maverick County Water Control and Improvement District No. 1	April 26, 2019	TRIGGERS:	Water is allocated on an equal basis to all paid accounts at all times during shortages or during full water supplies through a custom computer program. Water allocation policy will remaining effect on a continual basis.
		ACTIONS:	The General Manager will send out a newsletter when the District's Irrigation water rights account has devlined to 25,000 acft feet. Water allocation irrigation accounts shall be the same parcels of land identified by ownership for flat rate assessment purposes. Additional water allocated to the district will be equally distributed on a pro-rata flat rate acreage basis to those eligible. All water allocated is based on a 33% transportation loss and the balance is allocated on an equal basis up to a full allocation of 45 inches per acre. Transfer within the district is allowed. Transfer from outside of the district to a user in the district is allowed, but transfers out of the district are not allowed.
Engelman Irrigation District	July 22, 2022	TRIGGERS:	Upon approval of the Board, water allocation will be come effective when the water allocated to the district for irrigation by the Watermaster amounts to two and a half (2.5) acre foot per compliant acre or less, it will be allocated on a pro rate per acre basis to the compliant acreage.
		ACTIONS:	Water allocation amounts will depends on the amountof water allocated to the district per irrigation, or one allocation unit, unles water deliveries to the land are metered. Transfer within the district is allowed. Transfer from outside of the district to a user in the district is allowed, but transfers out of the district are not allowed.
Cameron County Irrigation District No. 2	May 1, 2024	TRIGGERS:	Upon approval of the board, water allocation will become effective when the usable balance in the district's irrigation water right account reaches 42,000 acre-feet.
		ACTIONS:	Each irrigation use shall be allocated one irrigation per irrigated acre, from each flat rate acre on which assessments have been paid. Metered water deliveries will be charged based on actual measured use. Allocated water may be transferred within the boundaries of the district from one irrigation account to another. Water many not be transferred to land owned by the landowner outside the district boundaires. Water from outside the district may be transferred by a landowner for use within the district.
Hidalgo County Irrigation District No. 2	September 1, 2022	TRIGGERS:	Water allocation will go into effect when the district's total irrigation water account storage balance in the Watermaster records amount to a maximum of 2 irrigations for each flat rate acre in which all flat rate is paid and current.
		ACTIONS:	Water is allogated in an amount reasonably sufficient for allocation to users, the additional water allocated in the district will be equally distributed to those irrigation accounts having a balance of less than 2 irrigations (1.33 acre feet equivalent) based upon flat rate or net floodway acreage. A water allotment may be transferred within the boundaries of the district from one irrigation account to another. A water allotment may not be transferred to land by a landowner outside the district boundaries.

ENTITY	DATE		
La Feria Irrigation District	May 20, 2019	TRIGGERS:	Upon approval of the board, water allocation becomes effective when the storage balance in the water rights account reaches an amount less than or equal to two irrigations for each flat rate acre.
		ACTIONS:	Each user is allocated one irrigation or 1 acre-foot of water, if metered, for each flat rate acre. Transfer within the district is allowed. Transfer from outside of the district to a user in the district is allowed.
Delta Lake ID	January 14, 2024	TRIGGERS:	Upon approval of the board, water allocation will become effective when (1) the storage balance in the district's irrigation water rights account reaches 50,000 acre-feet and/or (2) the board determines that there is not sufficient water to complete the traditional crop year.
		ACTIONS:	Water allocated to irrigation accounts shall be the same parcels of land as identified by ownership for flat rate assessments purposes. Additional water allocated to the district will be distributed to the eligible district's users on a pro-rata flat rate acreage basis. The amoung of water that will be charged to water allotment will be based on meter readings turned in from the canal rider. Transfer within the district is allowed. Transfer from outside of the district to a user in the district is allowed. Transfer from within the district to outside the district is prohibited.
Hidalgo County Irrigation District 1	October 19, 2023	TRIGGERS:	When the Watermaster initiates diversions on the basis of allocations, the district's board of directors determines the total allocation available to the district and stored in the Falcon/Amistad Reservoir System is less than 2.5 acre-feet/year of the estimated active parcels of land.
		ACTIONS:	The district initiates allocation of water to active irrigation users, on a pro-rata basis, provided that no parcel receives an allocation that will result in an account balance exceeding 1.83 acre-feet per acre. Water allotment may be transferred within the boundaries of the district, and outside the district, as determined by the Board.
Cameron County Irrigation District 6	March 14, 2024	TRIGGERS:	Upon approval of the board, water allocation will become effective when (1) the storage balance in the district's irrigation water rights account reaches 14,500 acre-feet and the storage levels in the Amistad and Falcon Reservoirs are below 20% at the beginning of the year. The water allocation will not be triggered by a negative allocation from the TCEQ Water Master and (2) the board determines that there may not sufficient water to complete the the crop year.
		ACTIONS:	As water is allocated to the District's irrigation account by the Rio Grande Water Master, in an amount sufficient for allocation, the additional water allocated to the District will be equally distributed to a pro-rata flat rate acreage basis to thos irrigation accounts eligible to the water allocation.

ENTITY	DATE		
Hidalgo-Cameron County Irrigation District 9	August 30, 2022	TRIGGERS:	Upon approval of the Board, water allocation will be come effective when the storage balance in the district's irrigation water rights account reaches an amount equivalent to 2 irrigations for each flat rate acre in which all flat rate assessments are paid and current.
		ACTIONS:	Each irrifation user shal be allocated up to 2 irrigations or 1 acre-feet of water each flat rate acre on which all taxes, fees, and charges have been paid. The average amount of water applied per irrigatied acre in the District consists of 6 inches. As additional water supplies become available to the District in an amount reasonably sufficient for allocationm the additional water made available will be equally distributed on a pro rata basis to those irrigation users having an account balance of less than 2 irrigations for each flat rate acre.

Appendix 7B. Summary of Drought Response Triggers - Retail Public Water Supplier Drought Contingency Plans

AGUA SUD		4/11/2024
Basis of Drought	Water demand/WTP Capacity and reservoir levels.	
Drought Stage	**TRIGGERS:**	**ACTIONS:**
Stage 1	(1) Combined storage of Amistad/Falcon Reservoirs is equal to or less than 40% storage capacity; (2) any drinking WTP is operating at or above 80% of their total daily capacity for three (3) or more consecutive days; (3) water system's pumps are operating at or above 80% of their total daily capacity for three (3) or more consecutive days.	The following restrictions are in place: means and schedule for irrigation, except for hand-held hoses, faucet-filled buckets, watering cans of five (5) gallons or less, or drip irrigation systems; means and schedule for the washing of motor vehicles, except on the premises of car wash or service stations and if the health, safety, and welfare of the public are contingent upon frequent vehicle cleansing; filling of pools is prohibited except during designated schedule; operation of ornamental fountains or ponds is prohibited except when needed to support aquatic life or for those equipped with a recirculation system; use of water from hydrants shall be limited to maintaining public health, safety, and welfare; irrigation of golf courses and parks is prohibited except by hand-held hose, and only during designated schedule. The following uses are nonessential and are prohibited: washing of impervious surfaces or buildings; use of water for dust control; flushing gutters or permitting water to run or accumulate; failure to repair a controllable leak(s); and any waste of water.
Stage 2	(1) Combined storage of Amistad/Falcon Reservoirs is equal to or less than 30% storage capacity; (2) any drinking WTP is operating at or above 85% of their total daily capacity for three (3) or more consecutive days; (3) water system's pumps are operating at or above 85% of their total daily capacity for three (3) or more consecutive days.	The following restrictions are in place: means and schedule for irrigation; means and schedule for the washing of motor vehicles, except on the premises of car wash or service stations and if the health, safety, and welfare of the public are contingent upon frequent vehicle cleansing; filling of pools is prohibited except during designated schedule; operation of ornamental fountains or ponds is prohibited except when needed to support aquatic life or for those equipped with a recirculation system; use of water from hydrants shall be limited to maintaining public health, safety, and welfare; irrigation of golf courses and parks is prohibited unless they use a water source other than that of the district. The following uses are nonessential and are prohibited: washing of impervious surfaces or buildings; use of water for dust control; flushing gutters or permitting water to run or accumulate; failure to repair a controllable leak(s); and any waste of water.

Stage 3	(1) Combined storage of Amistad/Falcon Reservoirs is equal to or less than 22% storage capacity; (2) any drinking WTP is operating at or above 90% of their total daily capacity for three (3) or more consecutive days; (3) water system's pumps are operating at or above 90% of their total daily capacity for three (3) or more consecutive days.	The following restrictions are in place: means and schedule for irrigation; means and schedule for the washing of motor vehicles, except on the premises of car wash or service stations and if the health, safety, and welfare of the public are contingent upon frequent vehicle cleansing; filling of pools is prohibited; operation of ornamental fountains or ponds is prohibited except when needed to support aquatic life or for those equipped with a recirculation system; use of water from hydrants shall be limited to maintaining public health, safety, and welfare; irrigation of golf courses and parks is prohibited unless they use a water source other than that of the district; no applications for new, additional, expanded or increased-in-size water service connections, meters, lines, etc., shall be allowed or approved. The following uses are nonessential and are prohibited: washing of impervious surfaces or buildings; use of water for dust control; flushing gutters or permitting water to run or accumulate; failure to repair a controllable leak(s); and any waste of water. Customers to pay a water surcharge.
Stage 4	(1) Combined storage of Amistad/Falcon Reservoirs is equal to or less than 20% storage capacity; (2) any drinking WTP is operating at or above 95% of their total daily capacity for three (3) or more consecutive days; (3) water system's pumps are operating at or above 95% of their total daily capacity for three (3) or more consecutive days. District Manager may implement Stage 4 water restrictions if an immediate reduction of water use if required to protect the health and safety and/or integrity of the water system,.	The following are prohibited: Irrigation of landscaped areas; all outdoor use of water; use of water to wash motor vehicles; use of water to fill swimming pools; operation of any ornamental fountain or pond, except when necessary to support aquatic life or for those that are equipped with a recirculation system; use of water from hydrants or flush valves, except when necessary to maintain public health, safety, and welfare; use of water for irrigation of parks, golf courses, and green belt areas, unless utilizing a water sources other than that of the district; washing of impervious surfaces or buildings; use of water for dust control; flushing of gutters or permitting water to run or accumulate in gutters or street; failing to repair controllable leak(s); any waster of water; no applications for new, additional, expanded or increased-in-size water service connections, meters, lines, etc., shall be allowed or approved; customers to pay a water surcharge.

BROWNSVILLE PUB		4/1/2024
Basis of Drought	Water demand, supply, reservoir level, system break/failure or contamination.	
Drought Stage	**TRIGGERS:**	**ACTIONS:**
Stage 1	Automatically initiated on May 1 each year. The General Manager, CEO, and Mayor of Brownsville, may initiate Stage 1 when one or more of the following occur: (1) Watermaster advises entity that a water shortage is possible due to reduction of water levels in the Amistad and Falcon Reservoirs; (2) level of water stored in Amistad and Falcon Reservoirs reaches 51% or 1.66 million acre-feet; (3) line breaks, or pump system failure; (4) peak demand on Brownsville PUB's water distribution and/or treatment plants is nearing capacity levels.	Customer shall voluntarily conserve water and adhere to the following: means and schedule of irrigation; practice water conservation and minimize or discontinue water use for non-essential purposes; reductions in fire hydrant and sewer line flushing. Actions to be taken by Brownsville PUB: work with major water users to voluntarily reduce water use where possible; conduct public information programs to educate customers.
Stage 2	(1) Analysis of water supply and demand indicates the City of Brownsville/Brownsville PUB's annual water allotment may be exhausted; (2) level of water stored in reservoirs reaches 25% or 834,000 acre-feet; (3) line breaks, or pump system failure; (4) peak demand on Brownsville PUB's water distribution and/or treatment plants is nearing capacity levels; (5) contamination of the water supply and/or transmission and distribution system.	All Stage 1 restrictions shall remain in effect except: means and schedule of irrigation; washing of motor vehicles is prohibited except on designated watering days; watering golf courses will be based on the water management plan developed by the golf courses and approved by the General Manager; restaurants are prohibited from serving water to non-employees except when requested by the patron. The following are defined as non-essential and are prohibited: washing of impervious surfaces or buildings; use for dust control; flushing gutters or permitting water to run or accumulate in any gutter or street; failing to repair controllable leak(s).

Stage 3	(1) Analysis of water supply and demand indicates the City of Brownsville/Brownsville PUB's annual water allotment may be exhausted; (2) level of water stored in reservoirs reaches 15% or 504,600 acre-feet; (3) line breaks, or pump system failure; (4) peak demand on Brownsville PUB's water distribution and/or treatment plants is nearing capacity levels; (5) contamination of the water supply and/or transmission and distribution system; (6) inability of Brownsville PUB to maintain or replenish adequate volumes of water in storage.	All Stage 1 and 2 restrictions shall remain in effect except: means and schedule for irrigation; washing of motor vehicles is allowed once per week on designated days; fundraising car washes are prohibited; use of water from hydrants will be limited to firefighting related activities; adding to water to pools is prohibited, except to maintain structural integrity; operation of ornamental fountains or ponds is prohibited except where necessary to support aquatic life or for those equipped with a water recirculation system; use of water from recreational ponds and lakes is prohibited.
Stage 4	(1) Major line breaks, or pump or system failures occur; (2) natural or man-made contamination of water supply and/or transmission and distribution system; (3) significant decrease or lack of water supply.	All Stage 1, 2, and 3 shall remain in effect except: all landscape watering is prohibited; new plantings of landscaping plants are prohibited; use of water to wash motor vehicles is prohibited; filling of pools is prohibited; addition of water to a maintenance level in any outdoor or indoor fountain or pond is prohibited; customer to pay a water surcharge.

CITY OF DONNA		3/10/2022
Basis of Drought	Water demand/ WTP capacity, system failure, limitations, and contamination.	
Drought Stage	**TRIGGERS:**	**ACTIONS:**
Stage 1	Total daily water demand equals or exceeds 82.2% of the system's safe operating capacity for three (3) days.	Customers shall be requested to voluntarily adhere to the following restrictions: means and schedule of irrigation; practice water conservation and minimize or discontinue water use for non-essential purposes.
Stage 2	Total daily water demand equals or exceeds 86.6% of the system's safe operating capacity for three (3) days.	The following restrictions are in place: means and schedule for irrigation, except for hand-held hoses, faucet-filled buckets, watering cans of five (5) gallons or less, or drip irrigation systems; means and schedule for the washing of motor vehicles, except on the premises of car wash or service stations and if the health, safety, and welfare of the public are contingent upon frequent vehicle cleansing; filling of pools is prohibited except during designated schedule; operation of ornamental fountains or ponds is prohibited except when needed to support aquatic life or for those equipped with a recirculation system; use of water from hydrants shall be limited to maintaining public health, safety, and welfare; restaurants are prohibited from serving water to patrons except upon request of the patron; irrigation of golf courses is prohibited, except if the golf course utilizes a water source other than that provided by the City of Donna. The following uses are nonessential and are prohibited: washing of impervious surfaces or buildings; use of water for dust control; flushing gutters or permitting water to run or accumulate; failure to repair a controllable leak(s).
Stage 3	Total daily water demand equals or exceeds 91.1% of the system's safe operating capacity for three (3) days.	All Stage 2 restrictions shall remain in effect, except: means and schedule of irrigation; hose-end sprinklers is prohibited; watering of golf course tees is prohibited unless the golf course utilizes a water source other than that provided by the City of Donna; use of water for construction purposes from designated fire hydrants to be discontinued.

Stage 4	Total daily water demand equals or exceeds 95.5% of the system's safe operating capacity for three (3) days.	All Stage 2 and 3 restrictions shall remain in effect, except: means and schedule of irrigation; hose-end sprinklers and permanently installed automatic sprinkler systems are prohibited; washing of motor vehicles, except on the premises of car wash or service stations and if the health, safety, and welfare of the public are contingent upon frequent vehicle cleansing is prohibited; filling of pools is prohibited; operation of ornamental fountains or ponds is prohibited except when needed to support aquatic life or for those equipped with a recirculation system; no application for new, additional, expanded, or increased-in-size water service connections, meters, lines, etc., shall be approved.
Stage 5	(1) Major water line breaks, or pump or system failures occur; (2) natural or man-made contamination of the water supply source(s).	All Stage 2, 3, and 4 restrictions shall remain in effect, except: irrigation of landscaped areas is prohibited; use of water to wash motor vehicles is prohibited.

EAGLE PASS WATER WORKS SYSTEM		2/22/2022
Basis of Drought	Water demand/WTP capacity, distribution pressure, system failure, limitations, and contamination.	
Drought Stage	**TRIGGERS:**	**ACTIONS:**
Stage 1	(1) Daily water demand exceeds 85% (16,150,000 gallons per day) of the rated plant capacity for three consecutive days; (2) distribution pressure remains below 45 psi for more than six (6) consecutive days; (3) Level of Amistad Dam falls below 30% of reservoir storage capacity.	Customers are requested to voluntarily limit irrigation by following the designated irrigation schedule; major commercial water users are requested to voluntary reduce water use; during winter months, water users are requested to insulated pipes; continue normal practice of utilizing reclaimed water for irrigation of golf course, as available.
Stage 2	(1) Daily water demand exceeds 90% (17,100,000 gallons per day) of the rated plant capacity for three consecutive days; (2) distribution pressure remains below 43 psi for more than six (6) consecutive days; (3) Level of Amistad Dam falls below 25% of reservoir storage capacity.	All Stage 1 restrictions shall remain in effect, except: car washing, window washing, and pavement washing is prohibited except when a bucket is used; street washing, fire hydrant flushing, filling swimming pools, and athletic fields watering are prohibited.
Stage 3	(1) Daily water demand exceeds 95% (18,050,000 gallons per day) of the rated plant capacity for three consecutive days; (2) distribution pressure remains below 40 psi for more than six (6) consecutive days; (3) Level of Amistad Dam falls below 20% of reservoir storage capacity; (4) contamination of the supply sources; (5) system outage due to the failure or damage of major water system components..	All Stage 1 and 2 restrictions shall remain in effect, except: all outdoor water use is prohibited; limits will be set on water use for both commercial and residential users.

EAST RIO HONDO WSC		2/12/2024
Basis of Drought	Water demand/WTP Capacity, reservoir levels, and system contamination or failure	
Drought Stage	**TRIGGERS:**	**ACTIONS:**
Stage 1	(1)Falcon and Amistad Reservoirs reach 30% of capacity as determined by the Texas Commission on Environmental Quality (TCEQ); (2) Cameron County Irrigation District #2 or other irrigation district suppliers provide notice to ERHWSC that they will disallow farm irrigation water use within 60-90 days.	Customers shall voluntarily conserve water and adhere to the following: minimize irrigation of landscaped areas and lawns; practice water conservation and to minimize or discontinue water use for non-essential purposes. ERHWSC will employ the following measures: recycle backwash water to the headworks of the plant or reservoir after decanting the settled water away from the settles sludge; flushing of water mains will be conducted when customer complaints of taste and odor are reported, and when insufficient chlorine residuals are measured near the flush valve; provide public education; proactively pursue alternative water sources to avoid push water system losses.
Stage 2	(1) Cameron County Irrigation District #2 or other irrigation district suppliers provide notice to ERHWSC that they will disallow farm irrigation water use; (2) distribution system pressures fall below 35 psi requirements due to system demand for two consecutive days; (3) ERHWSC consumer demand exceeds 85% of system capacity for 15 days out of any consecutive 30 day period.	All Stage 1 best management practices remain in effect. The following restrictions are in effect: means and schedule of irrigation, except by means of hand-held hose, a faucet filled bucket or watering can, or drip irrigation system; washing of motor vehicles is prohibited except by means of hand-held bucket, or hand-held hose equipped with a positive shutoff nozzle; operation of ornamental fountains or ponds is prohibited except where necessary to support aquatic life; use of water from flush valves shall be limited to fire fighting or other activates necessary to maintain water quality, public health, safety, and welfare, except that use of water from designated flush valves for construction; non essential uses should be eliminated; customers to pay a water surcharge.
Stage 3	(1) Major water line breaks, or pump or system failures occur; (2) natural or man-made contamination of the water supply source(s); rapidly occurring low-pressure conditions (less than 20 psi) due to any reason.	All Stage 2 restrictions shall remain in effect except: irrigation of landscaped areas is prohibited; use of water to wash motor vehicles is prohibited; filling pools is prohibited; customers to pay a water surcharge. The following supply best management practices are in effect: interconnections with other water utility systems will be utilized to the maximum extent possible; emergency supplies for repair of water lines of all sizes and valves in the distribution system and water plants are maintained in stock for use; back-up raw water, chemical feed, and high service pumps are maintained in running condition at the water plants at all times; ERHWSC will attempt to notify all major water users of emergency conditions and request water usage to be eliminated or minimized.

EDINBURG		5/1/2024
Basis of Drought	Water demand/WTP Capacity, reservoir levels, and system contamination or failure	
Drought Stage	**TRIGGERS:**	**ACTIONS:**
Stage 1	Held at all times except during Stage 2, 3, 4, and 5 conditions.	Customers of the city utility are requested to voluntarily limit the amount of water used to that amount absolutely necessary for health, business, and irrigation. Notice of such request shall be given by the City Manager
Stage 2	Water demand reaches or exceeds 85% of delivery capacity for (3) consecutive days and combined Regional Reservoir levels of Amistad/Falcon reach 23% of capacity.	The following restrictions shall apply to all persons: irrigating outside of designated irrigation days based on addresses; irrigating utilizing individual sprinklers or sprinkler systems; washing of automobiles, trucks, trailers, boats, airplanes, and other types of mobile equipment; washing or sprinkling of foundations; refilling or adding of water to residential swimming and wading pools; operating ornamental fountains or other similar structures; using potable water for irrigation of golf greens and tees, public parks and grounds; using water from fire hydrants other than
Stage 3	Water demand reaches or exceeds 90% of delivery capacity for (3) consecutive days and combined Regional Reservoir levels of Amistad/Falcon reach 18% of capacity.	The following restrictions shall apply to all persons: designated irrigation days, outdoor irrigation outside of designated times; permanently installed, automatic sprinkler systems; commercial nurseries, commercial sod farmers, and similarly situated establishments operating outside of designated day and times; watering of golf tee areas with water except treated wastewater effluent, reused, or raw irrigation water; washing of automobiles, trucks, trailers, boats, airplanes, and other types of mobile equipment outside of designated irrigation days; washing or sprinkling of foundations outside of designated irrigation days; refilling or adding of water to residential swimming and wading pools outside of designated irrigation days; operation of any ornamental fountain or other structure
Stage 4	Water demand reaches or exceeds 95% of delivery capacity for three (3) consecutive days and combined Regional Reservoir levels of Amistad/Falcon reach 13% of capacity.	The following restrictions shall apply to all persons: designated irrigation days, outdoor irrigation outside of designated times; permanently installed, automatic sprinkler systems; commercial nurseries, commercial sod farmers, and similarly situated establishments operating outside of designated day and times; watering of golf tee areas with water except treated wastewater effluent, reused, or raw irrigation water; washing of automobiles, trucks, trailers, boats, airplanes, and other types of mobile equipment outside of designated irrigation days; washing or sprinkling of foundations; refilling or adding of water to residential swimming and wading pools; operation of any ornamental fountain or other structure making similar use of water; use of water from fire hydrants outside of
Stage 5	Water demand reaches or exceeds 100% of delivery capacity at any time and combined Regional Reservoir levels of Amistad/Falcon reach 10% of capacity.	The following restrictions shall apply to all persons: designated irrigation days, outdoor irrigation outside of designated times; operation of permanently installed, automatic sprinkler systems; operation of commercial nurseries, commercial sod farmers, and similarly situated establishments; watering of golf tee areas with water except treated wastewater effluent, reused, or raw irrigation water; washing of automobiles, trucks, trailers, boats, airplanes, and other types of mobile equipment ; washing or sprinkling of foundations; refilling or adding of water to residential swimming and wading pools; operation of any ornamental fountain or other structure making similar use of water; use of

EL JARDIN WATER SUPPLY CORPORTION		6/26/2002
Basis of Drought	Water demand/ WTP capacity, reservoir levels, system contamination or failure	
Drought Stage	**TRIGGERS:**	**ACTIONS:**
Stage 1	Automatically initiated every year on May 1st, or at other times, as determined by the General Manager if one or more of the following occur: (1) the Watermaster advises Brownsville OUB that a water shortage is possible due to reduction of water levels in Amistad and Falcon Reservoirs; (2) level of water stored in reservoirs reaches 51% or 1.66 million acre-feet; (3) line breaks, or pump system failure; (4) peak demand on Brownsville PUB's water distribution and/or treatment plants is nearing capacity levels.	Customers shall voluntarily conserve water and adhere to the following restrictions: curtailment of all non-essential water use; means and schedule of irrigation; no washing of impervious surfaces and no run off in streets or drain ditches; repair all plumping leaks as quickly as possible; means and schedule for irrigation; minimize or discontinue water use for non-essential purposes.
Stage 2	(1) Analysis of water supply and demand indicates the City of Brownsville/Brownsville PUB's annual water allotment may be exhausted; (2) level of water stored in reservoirs reaches 25% or 834,000 acre-feet; (3) line breaks, or pump system failure; (4) peak demand on Brownsville PUB's water distribution and/or treatment plants is nearing capacity levels; (5) contamination of the water supply and/or transmission and distribution system.	The following restrictions shall apply: means and schedule of irrigation; washing of motor vehicles is prohibited except on designated watering days and on the premises of a car wash or service station; filling pools is prohibited except on designated watering days; operation of ornamental fountains or ponds is prohibited except where necessary to support aquatic life or those equipped with a recirculation system; restaurants are prohibited from serving water to patrons except upon request of the patron. The following are defined as non-essential and are prohibited: (1) The wash down of impervious surfaces or buildings; use for dust control; flushing gutters or permitting water to run or accumulated in a gutter or street; failure to repair a controllable leak(s).
Stage 3	(1) Analysis of water supply and demand indicates the City of Brownsville/Brownsville PUB's annual water allotment may be exhausted; (2) level of water stored in reservoirs reaches 15% or 504,600 acre-feet; (3) line breaks, or pump system failure; (4) peak demand on Brownsville PUB's water distribution and/or treatment plants is nearing capacity levels; (5) contamination of the water supply and/or transmission and distribution system; (6) inability of Brownsville PUB to maintain or replenish adequate volumes of water in storage.	All Stage 2 requirement shall remain in effect except: means and schedule of irrigation.

Stage 4	(1) Major line breaks, or pump or system failures occur; (2) natural or man-made contamination of water supply and/or transmission and distribution system.	All Stage 2 and 3 requirements shall remain in effect except: irrigation of landscaped areas is prohibited at all times; use of water to wash motor vehicles is prohibited; filling pools is prohibited at all times; ornamental fountains or ponds are prohibited at all times; no application for new, additional, expanded, or increased-in-size water service connections, meters, lines, etc., shall be approved.
Stage 5	Authorized by the General Manager in the event that water shortage conditions threaten the public health, safety, and welfare.	Water to be allocated and customers to pay a water surcharge.

CITY OF ELSA		5/31/2022
Basis of Drought	Water demand/WTP Capacity, reservoir levels, and system contamination or failure	
Drought Stage	**TRIGGERS:**	**ACTIONS:**
Stage 1	Water use has reached 60% of maximum daily supply capacity (>1.55 MGD)	Customers are requested to voluntarily adhere to the following measures: limit irrigation to designated watering days and times; irrigate without significant runoff; follow designated schedule for washing vehicles; do not use potable water for washing impervious services, or for dust control.
Stage 2	(1) Drought conditions are declared for the county; (2) water levels in Falcon lake Reservoir drop below 80% of conservation levels; (3) daily water consumption exceeds 70% of daily supply capacity (>1.81 MGD) for 10 days.	The following are restricted: means and schedule for irrigation, except for hand-held hoses, faucet filled buckets or watering cans of five (5) gallons or less, or drip irrigation systems; means and schedule for washing vehicles, except if the health, safety, and welfare of the public is contingent upon vehicle cleansing; filling of pools is prohibited except on designated watering days and times; operation of ornamental fountains or pons is prohibited except when supporting aquatic life, or when equipped with a circulation system; use of water from fire hydrants shall be limited to firefighting; restaurants are prohibited from serving water, except upon request of the patron. The following uses are defined as non-essential and are prohibited: (1) washing of impervious surfaces. or buildings; use of water for dust control; flushing gutters or permitting water to run or accumulate; and failure to repair controllable leak(s).
Stage 3	(1) Extreme drought conditions are officially declared for the county; (2) water levels in Falcon Lake Reservoir drop below 70% of conservation levels; (3) raw water supply drops 10% below projected needs; (4) daily water conservation exceeds 80% of daily supply capacity (>2.06 MGD) for 10 days.	All Stage 2 restrictions shall remain in effect except: means and schedule of irrigation; the use of water for construction purposes from designated fire hydrants under special permit is to be discontinued.
Stage 4	(1) Emergent drought conditions are officially declared for the county; (2) water levels in Falcon Lake Reservoir drop below 60% of conservation levels; (3) raw water supply drops 30% below projected needs; (4) daily water conservation exceeds 90% of daily supply capacity (>2.32 MGD) for 10 days.	Addition water to swimming pools is prohibited; means and schedule of irrigation is restricted; washing of motor vehicles not occurring on the premises of a car wash or service station and not in the immediate interest of public health, safety, and welfare is prohibited; carwashes and service stations shall only operate during designated hours; operation of ornamental fountains or ponds is prohibited, except when necessary to support aquatic life or where such are equipped with a circulation system; no application for new, additional, expanded, or increased-in-size water service connections, meters, lines, etc., shall be approved.

Stage 5	(1) Total daily demand equals or exceeds 100% of the system plant capacity; (2) major water line breaks, or pump or system failures occur; (3) natural or man-made contamination of the water supply source.	All requirements of Stage 2, 3, and 4 shall remain in effect except: irrigation of landscaped areas is absolutely prohibited; and use of water to wash any motor vehicle is absolutely prohibited.

HARLINGEN WATERWORKS SYSTEM		10/1/2024
Basis of Drought	Supply/capacity, reservoir levels, system outages or failures.	
Drought Stage	**TRIGGERS:**	**ACTIONS:**
Stage 1	Level of water stored in Amistad and Falcon reservoirs reaches 20% capacity.	Customers shall be notified and asked to voluntarily comply with the irrigation schedule.
Stage 2	(1) Level of water stored in Amistad and Falcon reservoirs is below 15% capacity; (2) days remaining in year is more than 80% of projected days of water rights remaining; (3) three (3) day average water demand exceed 90% of total functional treatment capacity.	The following restrictions shall be applied: means and schedule for irrigation; filling of pools shall be limited to designated watering days; washing of moto vehicles shall be limited to designated watering days by means of hand-held bucket or hose with a positive shutoff nozzle; motor vehicle washing shall be done at any time on the premises of a commercial car wash or service station; operation of ornamental fountains or ponds shall be limited to designated watering days, except where necessary to support aquatic life or those equipped with a recirculation system; use of fire hydrants shall be limited to firefighting or related activities; use of potable water for the irrigation of golf courses shall be limited to watering days, except if the golf course utilizes a water source other than that provided by HWWS. Customers are requested to minimize or discontinue water use for the following non-essential purposes: washing of impervious surfaces or buildings; use of water for dust control; flushing gutters to permitting water to run or accumulate in the gutter or street; and failure to repair a controllable leak(s). For wholesale customers, the General Manager will: request that they initiate measures to reduce non-essential water use, except that they may use a different watering schedule; initiate monthly contact with customer to discuss supply and/or demand and the possibility of curtailment; and will provide a report as necessary to media with information regarding current water conditions.

Stage 3	(1) Level of water stored in Amistad and Falcon reservoirs is below 15% capacity; (2) days remaining in year is more than 90% of projected days of water rights remaining; (3) three (3) day average water demand exceed 95% of total functional treatment capacity.	All Stage 2 restrictions shall apply, except: : means and schedule for irrigation; use of hose-end sprinklers is prohibited; filling of pools shall be limited to designated watering days; washing of motor vehicles shall be limited to designated watering days by means of hand-held bucket or hose with a positive shutoff nozzle; motor vehicle washing shall be done at any time on the premises of a commercial car wash or service station; operation of ornamental fountains or ponds shall is prohibited, except where necessary to support aquatic life or those equipped with a recirculation system; use of fire hydrants for construction purposes under special permit is to be discontinued, except for the amount necessary for the actual construction of structures; watering of golf course tees is prohibited, except if the golf course utilizes a water source other than that provided by HWWS; golf course greens and fairways shall only be watered on designated days. The following are defined as non-essential purposes and are prohibited: washing of impervious surfaces or buildings; use of water for dust control; flushing gutters to permitting water to run or accumulate in the gutter or street; and failure to repair a controllable leak(s). For wholesale customers, the General Manager will: request that they initiate measures to reduce non-essential water use, except that they may use a different watering schedule; initiate the implementation of curtailment of water deliveries; and will provide a report as necessary to media with information regarding current water conditions.
Stage 4	(1) Major water conveyance, pumping, treatment, or storage infrastructure failures occur, which cause unprecedented loss of capability to provide water service; (2) natural or man-made contamination of water source; (3) combined volume in Amistad and Falcon reservoirs is below 5% capacity; (4) days remaining in the year are more than 100% of projected days of water rights remaining; (5) one (1) day water demand exceeds 98% of total functional treatment capacity.	All Stage 3 restrictions shall apply except: irrigation of landscaped areas is prohibited, except for the direct need to protect and preserve the health, safety, and welfare of the public; washing of motor vehicles is prohibited; filling pools is prohibited; watering of golf courses is prohibited, unless the golf course uses a water source other than potable water provided by HWWS; operation of ornamental fountains or ponds is prohibited, except where necessary to protect aquatic life; the General Manager is authorized to deny any new, additional, expanded, or increased-in-size water service connections, meters, lines, etc. For wholesale customers, the following actions shall be taken: assess the severity of the problem and identify actions needed to solve problem; inform utility director of each wholesale water customer and suggest actions; General Manager may initiate curtailment of water deliveries in accordance with Texas Water Code §11.039; customers to pay water surcharges; if appropriate, notify city, county, or state emergency response officials; undertake necessary actions; prepare a post-event assessment report.

CITY OF HIDALGO		5/1/2024
Basis of Drought	WTP supply/capacity, daily water demand, storage tank levels, water pressure, system failure, and TCEQ mandates.	
Drought Stage	**TRIGGERS:**	**ACTIONS:**
Stage 1	(1) Water systems produces >1.86 MGD for three (3) consecutive days; and (2) elevated tanks fail to fill at night.	The City of Hidalgo will send public service announcements to customers, and repair leaks on a daily basis and reduce flushing of mains to once per month. Customers are asked to voluntarily adhere to the following restrictions: means and schedule of irrigation; practice conservation and minimize or discontinue water use for non-essential purposes.
Stage 2	(1) Total daily water demand equals or exceeds 2.17 MGD for ten consecutive days; and (2) elevated storage tank levels do not refill above 65% at night.	The following restrictions shall apply: means and schedule of irrigation, except by means of hand-held hose, faucet filled bucket, watering can of five (5) gallons or less, or drip irrigation system; washing of motor vehicles is prohibited except on designated watering days and times, by means of hand-held bucket or hand-held hose equipped with a positive shutoff nozzle; vehicle washing may be done at all times on the premises of a commercial car wash or commercial service station; filling of pools is prohibited except on designated watering days and hours; operation of ornamental fountains or ponds is prohibited except where necessary to support aquatic life or for those equipped with a recirculation system; use of water from hydrants shall be limited to firefighting; restaurants are prohibited from serving water to patrons except upon request of the patron. The following are defined as non-essential and are prohibited: washing of impervious surfaces or buildings; use of water for dust control; flushing gutters or permitting water to run or accumulate in any gutter or street; failure to repair a controllable leak(s).
Stage 3	(1) Total daily water demand equals or exceeds 2.79 MGD for ten consecutive days; and (2) elevated storage tank levels do not refill above 30% at night; or (3) water pressure levels are not maintained above 35 psi throughout the entire system.	All Stage 2 restrictions shall remain in effect, except: means and schedule of irrigation; use of hose-end sprinklers is prohibited at all times.

Stage 4	(1) Total daily water demand equals or exceeds 3.096 MG for five consecutive days; (2) elevated storage tank levels do not refill above 20%; (3) or recorded water pressure drops below 30 psi for more than 12 hours throughout the system due to system mechanical failures; and (4) our alternative water supplies are unusable or unavailable.	All Stage 2 and 3 restrictions shall remain in effect except: means and schedule of irrigation; use of hose-end sprinklers or permanently installed automatic sprinkler systems is prohibited; washing of motor vehicles not occurring on the premises of a commercial car wash or service station, and not in the immediate interest of public health, safety, and welfare, is prohibited; vehicle washing at car washes and service stations shall only occur during designated hours; filling of pools is prohibited; operation of ornamental fountains or pools is prohibited except where necessary to support aquatic life or those equipped with a recirculation system; no application for new, additional, expanded, or increased-in-size water service connections, meters, lines, etc., shall be approved.
Stage 5	(1) Major waterline breaks, or pump system failures occur; (2) natural or man-made disaster affecting the water supply sources; (3) TCEQ mandates or directives to conserve water resources	All Stage 2, 3, and 4 restrictions shall remain in effect, except: irrigation of landscape areas is prohibited; and washing of motor vehicles is prohibited.

LAGUNA MADRE WATER DISTRICT		9/14/2022
Basis of Drought	Reservoir levels and system contamination or failure	
Drought Stage	**TRIGGERS:**	**ACTIONS:**
Stage 1	Level of combined storage in Amistad and Falcon Reservoirs reaches 50% or below.	Customers are requested to voluntarily conserve water and adhere to the following restrictions: means and schedule of landscape irrigation; minimize or discontinue water use for non-essential purposes. District intends to implement the use of alternative supply source(s); purchases additional water right to keep allocation higher than demand.
Stage 2	Level of combined storage in Amistad and Falcon Reservoirs reaches 40% or below.	The following restrictions shall apply: means and schedule of landscape irrigation, except by means of hand-held hose, a faucet filled bucket, watering can of five (5) gallons or less, or drip irrigation system; means and schedule for washing motor vehicles, except on premises of car wash or service station; filling of pools is prohibited except on designated watering days; operation of any ornamental fountain or pond is prohibited except when necessary to support aquatic life or those equipped with a recirculation system; use of water from hydrants shall be limited to fire fighting or other activities necessary to maintain public health, safety, and welfare; watering of golf courses is prohibited except on designated watering days; restaurants are prohibited from serving water to patrons except upon request of the patron. The following uses of water are defined as non-essential and are prohibited: (1) washing of impervious covers and buildings; (2) use of water for dust control; (3) flushing gutters or permitting water to run or accumulate in any gutter or street; and (5) failure to repair a controllable leak(s).
Stage 3	Level of combined storage in Amistad and Falcon Reservoirs reaches 25% or below.	All Stage 2 restrictions shall remain in effect except: means and schedule of irrigation; hose-end sprinklers are prohibited.
Stage 4	Level of combined storage in Amistad and Falcon Reservoirs reaches 15% or below.	All Stage 2 and 3 restrictions shall remain in effect except: means and schedule of irrigation; washing of motor vehicles not occurring on the premises of car wash or service station and not in the immediate interest of public health, safety, and welfare is prohibited; filling pools is prohibited; operation of ornamental fountains or ponds are prohibited except where necessary to support aquatic life or those where such are equipped with a recirculation system; no application for new, additional, expanded, or increased-in-size water service connections, meters, lines, etc., shall be approved.
Stage 5	General Manager 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 (2) natural or man-made contamination of the water supply source(s).	All Stage 2, 3, and 4 restrictions shall remain in effect except: irrigation of landscaped areas is prohibited; and use of water to wash any motor vehicle is prohibited.

CITY OF LAREDO		4/1/2024
Basis of Drought	average Amistad Reservoir capacity, Amistad/Falcon combined Reservoir capacity, and/or water treatment plant capacity	
Drought Stage	**TRIGGERS:**	**ACTIONS:**
Stage 1	1. Water treatment plant capacity has reached or exceeded 85% of delivery capacity for 4 consecutive days; 2. The Amistad Reservoir is at 51% storage capacity or higher; or 3. The combined capacity of the Amistad/Falcon reservoirs is 70% or higher capacity.	Customers shall adhere to mandatory conservation measure and adhere to the prescribed restrictions on certain water uses: • A public announcement will be designed to increase customer awareness of water conservation and encourage the most efficient use of water; • Reduce landscape water consumption at all City of Laredo facilities by 10%; • Increase targeted outreach to high consumption customers to urge water use reductions; • Implement mandatory restrictions on certain non-essential water use (i.e. lawn irrigation, vehicle washing at home, golf courses).
Stage 2	1. Water treatment plant capacity has reached or exceeded 90% of delivery capacity for 3 consecutive days; 2. The Amistad Reservoir between 25% and 50% storage capacity; or 3. The combined capacity of the Amistad/Falcon reservoirs is between 21% and 69% capacity.	Customers shall adhere to mandatory conservation measure and adhere to the prescribed restrictions on certain water uses: • A public announcement will be designed to increase customer awareness of water conservation and encourage the most efficient use of water; • Reduce landscape water consumption at all City of Laredo facilities by 20%; • Increase targeted outreach to high consumption customers to urge water use reductions; • Implement mandatory restrictions on certain non-essential water use (i.e. lawn irrigation, vehicle washing at home, golf courses); • Reduce routine line flushing; • Reduce routine fire hydrant flushing.
Stage 3	1. Water treatment plant capacity has reached or exceeded 95% of delivery capacity for 2 consecutive days; 2. The Amistad Reservoir is lower than 25% storage capacity; 3. The combined capacity of the Amistad/Falcon reservoirs is lower than 20% capacity; or 4. The Rio Grande's water levels are not high enough for collection through the intake.	Customers shall adhere to mandatory conservation measure and adhere to the prescribed restrictions on certain water uses: • A public announcement will be designed to increase customer awareness of water conservation and encourage the most efficient use of water; • Reduce landscape water consumption at all City of Laredo facilities by 20%; • Increase targeted outreach to high consumption customers to urge water use reductions; • Implement mandatory restrictions on certain non-essential water use (i.e. lawn irrigation, vehicle washing at home, golf courses); • Reduce routine line flushing; • Reduce routine fire hydrant flushing.

Stage 4	1. Water treatment plant capacity has reached or exceeded 95% of delivery capacity for 5 consecutive days; 2. The Amistad Reservoir is lower than 20% storage capacity; 3. The combined capacity of the Amistad/Falcon reservoirs is lower than 15% capacity; or 4. The Rio Grande's water levels are not high enough for collection through the intake. 5. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service; 6. Natural or man-made contamination of the water supply source(s); or 7. Water from the Rio Grande is unable to be pumped into water treatment plant system due to extreme drought conditions and depletion of the Rio Grande.	Customers shall adhere to mandatory conservation measure and adhere to the prescribed restrictions on certain water uses: • A public announcement will be designed to increase customer awareness of water conservation and encourage the most efficient use of water; • Increase targeted outreach to high consumption customers to urge water use reductions; • Implement mandatory restrictions on certain non-essential water use (i.e. lawn irrigation, vehicle washing at home, golf courses); • Flushing is prohibited except for dead end mains and only between the hours of 9 p.m. and 3 p.m. Emergency interconnects or alternative supply arrangements shall be initiated. All meter shall be read as often as necessary to insure compliance with this program for the benefit of all customers.

CITY OF LOS FRESNOS		4/9/2024
Basis of Drought	Water demand/WTP Capacity, reservoir levels, and system contamination or failure	
Drought Stage	**TRIGGERS:**	**ACTIONS:**
Stage 1	Customers shall voluntarily conserve water and adhere to prescribed restrictions on certain water uses.	Customers shall be requested to voluntarily limit the means and schedule of irrigation; non-essential uses; practice conservation.
Stage 2	(1) Water levels in Amistad and Falcon Reservoirs reach 30%; (2) average daily water use is approaching 90% of system capacity; (3) net storage in City's raw water reservoirs is at 50% and continually decreasing on a daily basis; (4) usage of water rights available based on the quarterly capacity is exceeded; (5) capacity to transport and/or treat water has been affected; (6) the distribution capacity to customers is approaching maximum availability.	The following are restricted: means and schedule of irrigation, except by means of hand-held hose, faucet filled bucket, watering can of five (5) gallons or less, or drip irrigation system; means and schedule of washing motor vehicles, except those for the benefit of the public's health, safety, and welfare; filling pools is prohibited except on designated watering days; irrigation of golf course greens, tees, and fairways is prohibited except on designated watering days and hours, except for facilities that utilize water from a source other than the City of Los Fresnos. The following are recommended to scale back or eliminate use: washing of impervious covers, or structures; use of water for dust control; flushing gutters; failure to repair controllable leaks.
Stage 3	(1) Water levels in Amistad and Falcon Reservoirs reach 25%; (2) average daily water use is approaching 90% of system capacity for three consecutive days; (3) net storage in City's raw water reservoirs is at 25% and continually decreasing on a daily basis; (4) availability of raw water is low; (5) usage of water rights available based on quarterly capacity is exceeded; (6) water pressure in the distribution system is approaching 40 psi.	All Stage 2 restrictions shall remain in effect except: means and schedule of irrigation; defective plumbing is prohibited; watering of golf course tees are prohibited; operation of ornamental fountains or ponds is prohibited, except when necessary to support aquatic life or are equipped with a recirculation system; use of water from hydrants shall be limited to firefighting; landscape irrigation variances are available. The following non-essential uses are prohibited: washing of impervious covers or buildings; use of water for dust control; flushing gutters or permitting water to run or accumulate in gutter or street; failure to repair controllable leak(s).

Stage 4	(1) Water levels in Amistad and Falcon Reservoirs reach 15%; (2) major problem with water system, or unexpected circumstance; (3) net storage in City's raw water reservoirs is at 15% and continually decreasing on a daily basis; (4) water demand is exceeding the system's capacity on a regular basis; (5) Rio Grande River level at which the River Pumps cannot pump the daily raw water demand; (6) all raw water is being pumped from the City's Storage Reservoirs and all replenishment of Raw Water Reservoirs has stopped; (7) usage of water right available based on quarterly capacity is exceeded; (8) contamination of water supply and/or transmission and distribution system.	All Stage 2 and 3 restrictions shall remain in effect except: means and schedule of irrigation; washing of motor vehicles not occurring on the premises of a car wash or service station and not in the immediate interest of public health, safety, and welfare is prohibited; car washes and service stations shall only operate during designated hours; filling pools is prohibited; use of fire hydrants for any other purpose than firefighting is prohibited; industrial customers are required to implement an individual water conservation plan; if the customer already has a new service connection, a new water service connection is prohibited; restaurants are prohibited from servicing water to patrons except upon request by patron; the use of water for the expansion of nursery facilities is prohibited; no application for new, additional, expanded, or increased-in-size water service connections, meters, lines, etc., shall be approved by the City Manager.
Stage 5	(1) Major water line breaks, or pump or system failures occur; (2) natural or man-made contamination of water supply source(s).	All Stage 2, 3, and 4 restrictions shall remain in effect except: irrigation of landscaped areas is absolutely prohibited; use of water to wash any motor vehicle is prohibited.
Stage 6	(1) Major water line breaks, or pump or system failures occur; (2) natural or man-made contamination of water supply source(s).	Water to be allocated, and customers to pay a water surcharge.

CITY OF MCALLEN		4/25/2023
Basis of Drought	Water demand/WTP Capacity, reservoir levels, and system contamination or failure	
Drought Stage	**TRIGGERS:**	**ACTIONS:**
Stage 1	In effect at all times.	Customers are asks to voluntarily conserve water, and limit the amount used and only use the amount absolutely necessary for health, business, and irrigation.
Stage 2	(1) Water demand reaches or exceed 85% of delivery capacity for three (3) consecutive days; (2) reservoir levels of Amistad/Falcon reach 25% of capacity.	The following are restricted: means and schedule of irrigation, except by drip method or use of hand-held buckets; means and schedule of motor vehicle washing, except when done on the premises of a carwash or service station; washing of foundations is prohibited, except during designated days and times; filling pools is prohibited, excepted on designated days and times; operation of ornamental fountains or structures is prohibited , except those with a recycling system; watering of golf course fairways is prohibited; irrigation of golf greens and tees is prohibited except during designated days and times; use of water from fire hydrants shall be limited to firefighting; no bulk water sales shall be made from the City or other sources. The following are defined as waste of water and are absolutely prohibited: (1) allowing irrigation water to run off into a gutter, ditch, or drain; (2) failure to repair a controllable leak; (3) washing of impervious surfaces, except to alleviate immediate fire hazards.
Stage 3	(1) Water demand reaches or exceed 90% of delivery capacity for three (3) consecutive days; (2) reservoir levels of Amistad/Falcon reach 15% of capacity.	All Stage 2 restrictions shall remain in effect except: means and schedule for irrigation; watering of golf fairways is prohibited unless done with treated wastewater, reclaimed water, or well water; customers to pay a water surcharge.

Stage 4	(1) Water demand reaches or exceed 95% of delivery capacity for three (3) consecutive days; (2) reservoir levels of Amistad/Falcon reach 10% of capacity.	All Stage 3 restrictions shall remain in effect except: irrigation schedule; washing of motor vehicles not occurring on immediate premises of carwashes and service stations is prohibited, except on designated irrigation days and only on the owners of such vehicles; car washes and service stations in the immediate interest of the public health, safety and welfare shall be limited to 50% of their monthly average usage;
Stage 5	(1) Water demand reaches or exceed 100% of delivery capacity for three (3) consecutive days; (2) reservoir levels of Amistad/Falcon reach 5% of capacity.	All Stage 4 restrictions shall remain in effect except that: no applications for new, additional, further expanded, or increased-in-size water service connections, meters, lines, etc., shall me allowed, approved, or installed except as approved by the Public Utility Board; all allocations of water use to non-essential industrial and commercial customers shall be reduced to amounts established by the Public Utility Board; maximum monthly water use allocation for residential customers may be established with revised rate schedules and penalties; irrigation is permitted only by: (1) handheld or faucet-filled bucket, (2) continuously handheld hoses, and (3) drip irrigation during the hours from 6-8 AM once ever ten days; washing of motor vehicles not occurring on the premises of carwashes or service stations are prohibited; customers to pay a water surcharge.

MILITARY HIGHWAY WSC		4/25/2024
Basis of Drought		
Drought Stage	**TRIGGERS:**	**ACTIONS:**
Stage 1	Stage I water allocation measures may be implemented when one or more of the following conditions exist: 1) Water consumption has reached 80 percent of daily maximum supply for three (3) consecutive days. 2) Water supply is reduced to a level that is only 20 percent greater than the average consumption for the previous month. 3) 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.	Military Highway WSC in order to manage limited water supplies and/or reduce water demand will reduce or discontinue flushing of water mains and activate use of alternative supply source(s). Utilization of alternative water sources and/or alternative delivery mechanisms: Alternative water source(s) for Military Highway WSC are Inter-connection with other water supply systems (City of Pharr) and Purchased water (City of Harlingen, City of Weslaco, East Rio Hondo WSC and Brownsville Public Utilities Board). Voluntary Water Use Restrictions: 1) Alternate day, time of day, or duration restrictions for outside water usage allowed. (System will notify Customers which restriction is in effect) 2) The system will reduce flushing operations. 3) Reduction of customers' water use will be encouraged through notices on bills or other method.
Stage 2	when one or more of the following conditions exist: 1) Water consumption has reached 90 percent of the amount available for three consecutive days. 2) The water level in any of the water storage tanks cannot be replenished for three (3) consecutive days.	Military Highway WSC, in order to manage limited water supplies and/or reduce water demand, will discontinue flushing of water mains and irrigation of landscaped areas. Water Use Restrictions: Under threat of penalty for violation, the following water use restrictions shall apply to all persons: 1) All outside water use is prohibited (except for a livestock or other exemption or variance granted under this section). 2) Make public service announcements as conditions change via local media (TV, radio, newspapers, etc.).

Stage 3	when one of the following conditions exist: 1) 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. 2) Water consumption of 95 percent or more of the maximum available for three (3) consecutive days. 3) Water consumption of 100 percent of the maximum available and the water storage levels in the system drop during one 24-hour period. 4) Natural or man-made contamination of the water supply source(s). 5) The declaration of a state of disaster due to drought conditions in a county or counties served by the Corporation. 6) Reduction of wholesale water supply due to drought conditions. 7) Other unforeseen events which could cause imminent health or safety risks to the public.	Military Highway WSC, in order to manage limited water supplies and/or reduce water demand, will discontinue flushing of water mains and irrigation of landscaped areas. Water Use Restrictions: All requirements of Stage 2 shall remain in effect during Stage 3 except: 1) All outside watering prohibited. 2) Water use will be restricted to a percentage of each member's prior month usage. This percentage may be adjusted as needed according to demand on the system. Notice of this amount will be sent to each customer. 3) Corporation shall continue enforcement and educational efforts.
Stage 4		

MISSION PUBLIC WORKS DEPARTMENT		9/25/2023
Basis of Drought	Reservoir levels, system failure, limitations, and contamination.	
Drought Stage	**TRIGGERS:**	**ACTIONS:**
Stage 1	Determined by the City Manager.	Customers are requested to voluntarily limit the irrigation of landscaped areas to designated watering days and times, and to practice water conservation and minimize or discontinue water use for non-essential purposes.
Stage 2	(1) Total daily water demand equals or exceeds 21.0 MG for five consecutive days; or (2) 22.0 MG on a single day; and (3) continually falling treated water reservoir levels which do not refill above 65% in a 24-hour period	The following restrictions are in place: means and schedule for irrigation, except for hand-held hoses, faucet-filled buckets, watering cans of five (5) gallons or less, or drip irrigation systems; means and schedule for the washing of motor vehicles, except on the premises of car wash or service stations and if the health, safety, and welfare of the public are contingent upon frequent vehicle cleansing; filling of pools is prohibited except during designated schedule; operation of ornamental fountains or ponds is prohibited except when needed to support aquatic life or for those equipped with a recirculation system; use of water from hydrants shall be limited to maintaining public health, safety, and welfare; restaurants are prohibited from serving water to patrons except upon request of the patron. The following uses are nonessential and are prohibited: washing of impervious surfaces or buildings; use of water for dust control; flushing gutters or permitting water to run or accumulate; failure to repair a controllable leak(s); and any waste of water.
Stage 3	(1) Total daily water demand equals or exceeds 22.0 MG for five consecutive days; or (2) 23.0 MG on a single day; and (3) continually falling treated water reservoir levels which do not refill above 55% in a 24-hour period	All Stage 2 restrictions shall remain in effect, except: means and schedule of irrigation; use of hose-end sprinklers is prohibited.

Stage 4	(1) Total daily water demand equals or exceeds 23.0 MG for five consecutive days; or (2) 24.0 MG on a single day; and (3) continually falling treated water reservoir levels which do not refill above 45 percent in a 24-hour period	The following restrictions are in place: means and schedule for irrigation; hose-end sprinklers or permanently installed automatic sprinkler systems are prohibited; washing of motor vehicles, except on the premises of car wash or service stations and if the health, safety, and welfare of the public are contingent upon frequent vehicle cleansing, is prohibited; filling of pools is prohibited; operation of ornamental fountains or ponds is prohibited except when needed to support aquatic life or for those equipped with a recirculation system; no application for new, additional, expanded, or increased-in-size water service connections, meters, lines, etc., shall be approved.
Stage 5	(1) Major waterline breaks; or (2) pump or system failures occur; (3) natural or man-made contamination of the water supply source(s).	All restrictions of Stage 2, 3, and 4 shall remain in effect, except: irrigation of landscaped areas is absolutely prohibited; use of water to wash any motor vehicles is prohibited.
Stage 6	(1) Total daily water demand equals or exceeds 24.5 MG for five consecutive days; or (2) 25.5 MG on a single day; and (3) continually falling treated water reservoir levels which do not refill above 35 percent in a 24-hour period; or (4) water pressure drops below 30 psi for more than 12 hours throughout the system.	Water to be allocated; customers to pay a water surcharge.

NORTH ALAMO WSC		9/17/2019
Basis of Drought	Reservoir levels, system failure, limitations, and contamination.	
Drought Stage	**TRIGGERS:**	**ACTIONS:**
Stage 1	Level of water stored in Amistad and Falcon Reservoirs reaches 49%.	Customers to be notified that a potential water shortage may exist later in the year, and that they should use water conservation practices and ensure their plumbing fixtures and facilities are working properly. Industrial, wholesale, and certain commercial customers shall be required to develop and submit to their corporation their Water Rationing Plans, to be approved by the management staff and the Board of Directors.
Stage 2	Level of water stored in Amistad and Falcon Reservoirs reaches 40%.	Customers to be notified to voluntarily conserve water; Corporation owned facilities and operations to be placed on mandatory conservation practices; voluntarily comply with the means and schedule for irrigation.
Stage 3	Level of water stored in Amistad and Falcon Reservoirs reaches 23%.	Customers to be notified to that mandatory conservation practices are in place; Corporation owned facilities and operations to continue mandatory conservation practices; means and schedule for irrigation is mandatory; water allowed to run off into gutters or streets is prohibited; use of potable water to irrigate land is prohibited; noncommercial washing of motor vehicles must be done during designated days and times, and only done with a handheld hose with a positive shut-off nozzle, hand-held bucket, or can with a capacity of 5 gallons or less; commercial washing of motor vehicles must be done on the premises of a commercial washing facility; washing of impervious surfaces is prohibited; exterior washing of buildings is prohibited; continued use of defective plumbing is prohibited use of fire hydrants for any purpose other than firefighting is prohibited; use of water for dust control is prohibited; industrial, wholesale, and certain commercial customers shall be required to implement their Water Rationing Plans previously submitted and approved.
Stage 4	(1) Level of water stored in Amistad and Falcon Reservoirs reaches 13%; (2) supply source contamination; (3) water production of distribution system limitations; (4) system outage due to the failure or damage of major water system components.	All nonessential uses of water are prohibited; a pro rata curtailment of water deliveries to wholesale water customers will be imposed as provided in Texas Water Code, 11.039; no application for new, additional, expanded, or increased-in-size water service connections shall be allowed or approved, except as approved by the Review Committee; maximum amounts of monthly water usage and the accompanying surcharges may be revised; General Manager is authorized to take other actions necessary, such as system pressure reductions.

CITY OF PHARR		4/20/2024
Basis of Drought	Water demand, supply, reservoir level, system break/failure or contamination.	
Drought Stage	**TRIGGERS:**	**ACTIONS:**
Stage 1	Total daily water demand equals or exceeds 7.50 MGD for five (5) consecutive days, based on the "safe" operating capacity of water supply facilities or Hidalgo County's Stage 1 target.	Customers are requested to voluntarily conserve water by adhering to the following restrictions: means and schedule for landscape irrigation, except by means of hand-held hose or drip irrigation systems; means and schedule for washing motor vehicles; discontinue use of ornamental water feature fountains.
Stage 2	Total daily water demand equals or exceeds 13.0 MGD for three (3) consecutive days, based on the "safe" operating capacity of water supply facilities or Hidalgo County's Stage 2 target.	The following restrictions are in place: means and schedule for irrigation, except by means of hand-held hose or drip irrigation; means and schedule for washing of motor vehicles; discontinue use of ornamental water features, unless made to recirculate water; failure to control "waste water" is prohibited.
Stage 3	Continually falling treated water reservoir levels which do not refill above 75% overnight based on an evaluation of minimum treated water storage required to avoid system outage or Hidalgo County's Stage 3 target.	All Stage 2 restrictions shall remain effect except: means and schedule of irrigation; watering or golf course tees is prohibited unless golf course utilizes a water source other than that provided by Hidalgo Irrigation District #2; use of water for construction purposes from designated fire hydrants under special permit is to be discontinued; high-pressure washer for cleaning impervious surfaces if prohibited.
Stage 4	Water supply available from Hidalgo Irrigation District #2 is at 30% of the total water rights or Hidalgo County's Stage 4 target.	All Stage 2 and 3 restrictions shall remain in effect except: means and schedule of irrigation; filling of pools is prohibited; washing of motor vehicles is prohibited unless on the premises of car wash or service stations and in the immediate interest of public health, safety, and welfare; steam cleaner prohibited for cleaning of driveway, sidewalk, or entryway; operation of ornamental fountains or ponds is prohibited except when necessary to support aquatic life or for those equipped with a recirculation system; no application for new, additional, expanded, or increased-in-size water service connections, meters, lines, etc., shall be approved.
Stage 5	(1) Major water line breaks, or pump or system failures occur; (2) natural or man-made contamination of water supply source(s); (3) Hidalgo County's Stage 5 target.	All Stage 2, 3, and 4 restrictions shall remain in effect except: irrigation of landscaped areas is prohibited; and use of water to wash motor vehicles is prohibited.

Stage 6	Hidalgo County's Stage 6 target.	Customers to pay a water surcharge.

RIO GRANDE CITY		5/28/2019
Basis of Drought	WTP capacity/demand, reservoir levels, system outages or failures.	
Drought Stage	**TRIGGERS:**	**ACTIONS:**
Stage 1	Water use has reached 60% of maximum daily supply capacity (>6.6 MGD).	Customers are asked to voluntarily practice water conservation and minimize or discontinue use for non-essential purposes, and implement the following restrictions: means and schedule of irrigation; irrigation of landscaped areas should occur without significant runoff; means and schedule for washing of motor vehicles; discontinue use of potable water for washing of impervious surfaces, or for dust control.
Stage 2	(1) Drought conditions are officially declared for the county; (2) water levels in Falcon Lake Reservoir drop below 80% of conservation levels; and (3) the daily water consumption exceeds 70% of daily supply capacity (>7.7 MGD) for ten days.	The following restrictions shall apply: means and schedule of irrigation, except by means of hand-held hose, faucet filled bucket, watering can of five (5) gallons or less, or drip irrigation system; washing of motor vehicles is prohibited except on designated watering days and times, by means of hand-held bucket or hand-held hose equipped with a positive shutoff nozzle; vehicle washing may be done at all times on the premises of a commercial car wash or commercial service station; filling of pools is prohibited except on designated watering days and hours; operation of ornamental fountains or ponds is prohibited except where necessary to support aquatic life or for those equipped with a recirculation system; use of water from hydrants shall be limited to firefighting; restaurants are prohibited from serving water to patrons except upon request of the patron. The following are defined as non-essential and are prohibited: washing of impervious surfaces or buildings; use of water for dust control; flushing gutters or permitting water to run or accumulate in any gutter or street; failure to repair a controllable leak(s).
Stage 3	(1) Emergency drought conditions are officially declared for the county; (2) water levels in Falcon Lake Reservoir drop below 70% of conservation levels; (3) raw water supply drops 10% below projected needs; and (4) the daily water consumption exceeds 80% of daily supply capacity (>8.8 MGD) for ten days.	All Stage 2 restrictions shall remain in effect, except: means and schedule of irrigation; use of hose-end sprinklers is prohibited at all times; use of water for construction purposes from designated fire hydrants under special permit is to be discontinued.

Stage 4	(1) Emergency drought conditions are officially declared for the county; (2) water levels in Falcon Lake Reservoir drop below 60% of conservation levels; (3) raw water supply drops 30% below projected needs; and (4) the daily water consumption exceeds 90% of daily supply capacity (>9.9 MGD) for ten days.	All Stage 2 and 3 restrictions shall remain in effect, except: the filling of pools is prohibited; means and schedule of irrigation; use of hose-end sprinklers or permanently installed automatic sprinkler systems are prohibited at all times; use of water to wash motor vehicles not occurring on the premises of a commercial car wash or service station, and not in the immediate interest of public health, safety, and welfare, is prohibited; operation of ornamental fountains or ponds is prohibited, except where necessary o support aquatic life or those equipped with a circulation system; no application for new, additional, expanded, or increased-in-size water service connections, meters, lines, etc., shall be approved.
Stage 5	(1) Total daily demand equals or exceeds 100% of the system plant capacity; (2) major water line breaks, or pump or system failures occur; (3) natural or man-made contamination of the water supply source.	All Stage 2, 3, and 4 restrictions shall remain in effect, except: irrigation of landscaped areas is prohibited; and use of water to wash any motor vehicle is prohibited.

CITY OF ROMA		4/15/2024
Basis of Drought	WTP capacity being used, reservoir levels, system outages or failures.	
Drought Stage	**TRIGGERS:**	**ACTIONS:**
Stage 1	(1) Average daily use reaches 4.65 mgd (90% of plant capacity) for five (5) consecutive days. (2) Falcon and Amistad conservation level between 26% and 51%.	Customers shall be requested to voluntarily limit water usage to that amount absolutely necessary for health, business and irrigation. Under voluntary restrictions, the following uses of water constitute water of water and are prohibited: (1) allowing irrigation water to run off into a gutter, ditch or drain; and (2) failure to repair a controllable leak.
Stage 2	(1) Average daily use reaches 4.90 mgd (95% of plant capacity) for five (5) consecutive days; or (2) Falcon and Amistad conservation level between 20% and 25%.	All Stage 1 restrictions shall remain in effect except that: restriction on means and schedule for irrigation, except by drip or half-held hose; commercial nurseries are exempt from Stage 2 restrictions but will be asked to voluntarily curtail nonessential water use; restriction on means and schedule of the washing of motor vehicles, except commercial carwashes or service stations; restriction on schedule of refilling swimming pools; the operation of ornamental fountains, except those with a recycling system, are prohibited; irrigation of golf course fairway is prohibited; use of water for parks and plazas is prohibited outside the mandated schedule; irrigation using hose-end sprinklers or automatic sprinkler systems for athletic field is prohibited except during designated hours; and no bulk water sales shall be made from the City or other sources.
Stage 3	(1) Average daily water use reaches 5.15 mgd (100% of plant capacity) for five (5) consecutive days; or (2) Falcon and Amistad conservation level is between 15% and 20%.	All stage 2 restrictions shall remain in effect except further restrictions on means and schedule for irrigation, except by drip or hand-held buckets; watering of athletic fields using hose-end sprinklers or automatic sprinkler systems is prohibited except during designated hours; watering of golf fairway areas is prohibited unless with treated wastewater, reuse water, or well water; customers to pay a water surcharge.
Stage 4	(1) Average daily water use reaches 5.15 mgd (100% of plant capacity) for five (5) consecutive days; or (2) Falcon and Amistad conservation level is between 10% and 15%.	All Stage 2 and 3 restrictions shall remain in effect except further restrictions on means and schedule for irrigation, and athletic field irrigation using hose-end sprinklers or automatic sprinkler systems; washing of motor vehicles is prohibited except during strict schedule, and carwashes and commercial service stations in the immediate interest of the public health and safety shall be limited to 5% of their average monthly usage; commercial nurseries shall follow strict schedule; adding water to swimming pools is prohibited; the operation of ornamental fountains is prohibited; customers to pay a water surcharge.

Stage 5	(1) Average daily water use reaches 5.15 mgd (100% of plant capacity) for five (5) consecutive days; (2) Falcon and Amistad conservation level is less than 10%; (3) the imminent or actual failure of a major component of the system, causes and immediate health or safety hazard; (4) water supply contamination prevents delivery of treated water safe for public use; or (5) water levels in the distribution system storage tanks drop to levels such that service pumps cannot pump daily water demand.	All Stage 2, 3, and 4 restrictions shall remain in effect except that: no applications for new, additional, expanded, or increased-in-size water service connections, meters, lines, etc., are allowed, except as approved by the City Council; all allocations of water use to non-essential Industrial and Commercial customers shall be reduced to amounts established by the City Manager and/or Water Advisory Council; the maximum monthly water use allocation for residential customers may be established with revied rate schedules and penalties by the City; irrigation by hose-end sprinklers or automatic sprinkler systems is prohibited; irrigation using hand-held hoses or drip irrigation systems is permitted during strict schedule; irrigation of athletic fields is prohibited; washing of motor vehicles not occurring upon immediate premises of carwashes or service stations and not in the immediate interest of the public health, safety and welfare shall be prohibited; customers to pay a water surcharge.

CITY OF SAN BENITO		5/20/2024
Basis of Drought	Water demand/WTP Capacity	
Drought Stage	**TRIGGERS:**	**ACTIONS:**
Stage 1	When the level of U.S. water stored in Amistad and Falcon Reservoirs, as determined by the international Boundary and Water Commission, reaches 51% of	The City Manager shall notify, by public announcement and publication of notice, customers of the water system of the City of San Benito to voluntarily conserve and limit their use of water.
Stage 2	When the level of U.S. water stored in Amistad and Falcon Reservoirs, as determined by the international Boundary and Water Commission, reaches 25% of capacity.	The City Manager shall notify, by public announcement and publication of notice, customers of the water system of the City of San Benito to mandatory conserve and limit their use of water. All municipal operations shall be placed on mandatory conservation. Measures include watering and irrigation schedule, washing of automobiles and other equipment
Stage 3	When the level of U.S. water stored in Amistad and Falcon Reservoirs, as determined by the international Boundary and Water Commission, reaches 15% of capacity.	The City Manager shall notify, by public announcement and publication of notice, customers of the water system of the City of San Benito to mandatory conserve and limit their use of water. All municipal operations shall be placed on mandatory conservation. Measures include watering and irrigation schedule, washing of automobiles and other equipment permitted with hand help hose or bucket, limited use of ornamental fountains, dust control, washdown of hard surfaces, and pool filling are all prohibited.
Stage 4	When the level of U.S. water stored in Amistad and Falcon Reservoirs, as determined by the international Boundary and Water Commission, reaches 10% of capacity.	All nonessential water uses or uses not necessary to maintain the public health, safety and welfare are prohibited. Nonessential water uses are defined to include the watering of grass, trees, plants, and other vegetation, the non commercial washing of automobiles, trucks, trailers, boats, airplanes and other auto mobile equipment, and the use of fountains or artificial waterfalls. No applications for new, additional expanded, or increased in size water service facilities of any kind shall be approved excepts if approved by the city commission. Surcharges applicable to residential and nonresidential customers.

CITY OF SAN JUAN		4/19/2024
Basis of Drought	Water demand/WTP Capacity	
Drought Stage	**TRIGGERS:**	**ACTIONS:**
Stage 1	In place at all times.	Customers shall voluntarily limit amount of water used to that amount absolutely necessary for health, business, and irrigation.
Stage 2	(1) Agricultural use of irrigation water is discontinued; and/or (2) demand on the city's system is at 3.7 MGD for three consecutive days.	The following restrictions are in place: means and schedule for irrigation, except by means of hand-held hose or drip irrigation system; means and schedule for washing of motor vehicles; use of ornamental water features are prohibited, unless provisions are made for recirculation of water; failure to prevent or control waste of water is prohibited.
Stage 3	(1) Water storage in Falcon and Amistad reservoirs is reduced by 50% by the Watermaster; and/or (2) demand on the city's system is at 4.1 MGD for three consecutive days.	The following restrictions are in place: means and schedule for irrigation; means and schedule for washing of motor vehicles; use of ornamental water features are prohibited, unless provisions are made for recirculation of water; failure to prevent or control waste of water is prohibited.
Stage 4	(1) Municipal allocation are reduced to 75% of full municipal allocations by the Watermaster; (2) demand on the city's system is at 4.5 MGD for three consecutive days.	All Stage 3 restrictions shall remain in place, except: means and schedule of irrigation; washing of motor vehicles not on the premises of carwashes is prohibited, except on designated irrigation days; means and schedule for commercial nursery watering; customers to pay a water surcharge.
Stage 5	(1) Municipal allocation are reduced to 80% of full municipal allocations by the Watermaster; (2) demand on the city's system is at 4.8 MGD for three consecutive days.	All Stage 4 restrictions shall remain in place, except: no application for new, additional, further expanded, or increased-in-size water service connections, meters, lines, etc., shall be allowed of approved, except as approved by City Commission; irrigation is only permitted by (1) continuous use of a handheld hose, (2) handheld or faucet filled bucket, (3) and (3) drip irrigation; customers to pay a water surcharge.

SHARYLAND WSC		10/17/2024
Basis of Drought	Reservoir capacity, system failure or contamination	
Drought Stage	**TRIGGERS:**	**ACTIONS:**
Stage 1	Water level in Amistad and Falcon Reservoirs above 40.1% storage capacity.	Customers shall be asked to voluntarily limit the amount of water used and only use the amount absolutely necessary for health, business, and irrigation.
Stage 2	Water level in Amistad and Falcon Reservoirs reach 40% storage capacity and/or water demand reaches or exceeds 85% of delivery capacity for three (3) consecutive days.	The following restrictions apply: Watering schedule on certain days between 6pm and 10am for irrigation, washing of automobiles, trucks, trailers, boats, and airplanes, refilling swimming pools, washing or sprinkling foundations, operations of ornamental fountains; use of water from fire hydrants is restricted to fire suppression only.
Stage 3	Water level in Amistad and Falcon Reservoirs reach 30% storage capacity and/or water demand reaches or exceeds 90% of delivery capacity for three (3) consecutive days.	All Stage 2 restrictions remain in effect in addition to: Watering schedule on certain days between 7pm and 9am for irrigation, washing of automobiles, trucks, trailers, boats, and airplanes, refilling swimming pools, operations of ornamental fountains; washing or sprinkling foundations is prohibited; use of water from fire hydrants is restricted to fire suppression only.
Stage 4	Water level in Amistad and Falcon Reservoirs reach 20% storage capacity and/or water demand reaches or exceeds 95% of delivery capacity for three (3) consecutive days.	All Stage 3 restrictions remain in effect in addition to: Watering schedule on certain days between 8pm and 6am for irrigation; washing of automobiles, trucks, trailers, boats, and airplanes when not in the immediate interest of public health and safety is prohibited; refilling swimming pools is prohibited, except to maintains pools structure integrity; operations of ornamental fountains is prohibited; watering golf course fairways, greens, and tee boxes is prohibited

Stage 5	Water level in Amistad and Falcon Reservoirs reach 15% storage capacity and/or water demand reaches or exceeds 100% of delivery capacity at any time.	All Stage 4 restrictions remain in effect in addition to: No applications for new, additional, further expanded, or increased in size water service facilities of any kind shall be allowed; no bult water sales when transported by tanker truck; restaurants only serve water on request; Irrigation only allowed by hand held or faucet filled bucket, handheld hoses with auto shutoff, or drip irrigation; water user conservation fee applies to all users.
Stage 6	(1) Demand exceeds plant production capacity ; (2) raw water delivery system failure or contamination; (3) system outage due to major water system component failure	All Stage 4 restrictions remain in effect in addition to: all landscape irrigation, vehicle washing, pool filling, misters/cooling's sprays, and additional measures deemed as water waste are prohibited. water user conservation fee applies to all users.

CITY OF WESLACO		5/23/2019
Basis of Drought	WTP demand/capacity being used, reservoir levels, system outages, contamination, or failures.	
Drought Stage	**TRIGGERS:**	**ACTIONS:**
Stage 1	(1) Water level in Amistad and Falcon reservoirs reaches 51% or 1,660,000 AF (or below); (2) water demand projections for the year suggest that the City's available water rights may be used at 95%.	Customers shall be notified and requested to voluntarily reduce consumption of water.
Stage 2	(1) Water level in Amistad and Falcon reservoirs reaches 25% or 834,600 AF (or below); (2) water demand projections for the year suggest that the City's available water rights may be used at 98%; (3) a natural or man made condition causes system-wide problems and the normal and customary level of water service may be diminished for a period of time.	The following restrictions shall apply: means and schedule of irrigation, except by means of hand-held hose, faucet filled bucket, watering can, or drip irrigation system; washing of motor vehicles is prohibited except by means of hand-held bucket or pail; commercial car wash establishments shall use minimum practical water settings; filling of pools is prohibited except on designated watering days and hours; operation of ornamental fountains or ponds is prohibited except for those equipped with a recirculation system; use of water from hydrants shall be limited to firefighting; washing of impervious surfaces or buildings is prohibited; use of water for dust control is prohibited; permitting or maintaining of defective plumbing is prohibited; allowing water to run off yards or plants into gutters or streets is deemed a waste of water and is prohibited; use of potable water by a golf course for irrigation is prohibited, except during designated days and hours.

Stage 3	(1) Water level in Amistad and Falcon reservoirs reaches 15% or 504,600 MAF (or below); (2) water demand projections for the year suggest that the City's available water rights may be used at 100%; (3) a natural or man made condition causes system-wide problems and the normal and customary level of water service may be diminished for a period of time.	The following restrictions shall apply: New service connections to the City's water system are prohibited; use of water to serve a customer in a restaurant is prohibited, unless requested by the customer; use of water for the expansion of commercial nursery facilities is prohibited; use of water for scenic and recreational ponds and lakes is prohibited; use of water to fill pools is prohibited; use of water to put new agricultural land into production is prohibited; use of water for new planting or landscaping is prohibited; no application for new, additional, further expanded, or increased-in-size water service connection, meter lines, etc., shall be allowed, approved, or installed except as approved by the City Manager; industrial and commercial users to be required to implement an individual curtailment plan; maximum monthly use for residential customers is 15,000 gallons; customers to pay a water surcharge.

ZAPATA COUNTY		11/16/2022
Basis of Drought	Water demand/WTP Capacity of the Zapata County Water Control and Improvement District Hwy 16 East	
Drought Stage	**TRIGGERS:**	**ACTIONS:**
Stage 1	Mild Water Shortage Conditions between May 1st through September 30th of each year.	Customers shall be requested to voluntarily conserve water and adhere to the prescribed restrictions on non-essential water use.
Stage 2	Moderate Water Shortage Conditions - initiated when Falcon Lake level drops below 275 ft above sea level or daily water demand exceeds 60% of supply capacity for three consecutive days.	Zapata County Water Control and Improvement District Hwy 16 East will reduce or discontinue flushing of water mains and irrigation of landscaped areas.
Stage 3	Severe Water Shortage Conditions - initiated when Falcon Lake level drops below 265 ft above sea level or daily water demand exceeds 70% of supply capacity for three consecutive days.	All requirements of Stage 2 shall remain in effect except irrigation of landscaped areas shall be limited to designated watering days and periods; the use of water for construction purposes from designated fire hydrants under special permit is to be discontinued.
Stage 4	Critical Water Shortage - initiated when Falcon Lake level drops below 260 ft above sea level or daily water demand exceeds 80% of supply capacity for three consecutive days.	All requirements of Stage 2 and 3 shall remain in effect except irrigation of landscaped area shall be limited to designated watering days and periods, the use of water to wash any motor vehicle, motorbike, trailer, airplane or other vehicle not occurring on the premises of a commercial car wash is prohibited; the filling, refilling, or adding of water to swimming pools, wading pools, and Jacuzzi-type pools is prohibited; operation of any aesthetic water consumption is prohibited; no application for new, additional, expanded, or increased-in-size water service connections, meters, service lines, pipeline extensions, mains, or water service facilities or any kind shall be approved.

Stage 5	Emergency Water Shortage Conditions - when the Manager, or his/her designee, determines that a water supply emergency exists based on: 1. Major water line brakes, or pump or system failures occur, which cause unprecedented loss of capability to provide water service; or 2. Natural or man-made contaminating of the water supply source(s).	All requirements of Stage 2, 3, and 4 except: Irrigation of landscaped areas is absolutely prohibited. Use of water to wash any moto vehicle, motorbike, boat, trailer, airplane or other vehicle is absolutely prohibited.
Stage 6	Water Allocation - Manager determines there are water shortage conditions that threaten public health, safety, and welfare.	Customers shall be required to comply with the water allocation plan, including surcharges, and restrictions for Stage 5 until triggering events have ceased to exist for a period of 3 consecutive days.

Appendix 7C. TCEQ Model DCPs and WCPs

Texas Commission on Environmental Quality
Water Availability Division
MC-160, P.O. Box 13087 Austin, Texas 78711-3087
Telephone (512) 239-4691, FAX (512) 239-2214

Drought Contingency Plan for a Retail Public Water Supplier

This form is provided as a model of a drought contingency plan for a retail public water supplier. If you need assistance in completing this form or in developing your plan, please contact the Conservation Staff of the Resource Protection Team in the Water Availability Division at (512) 239-4691.

Drought Contingency Plans must be formally adopted by the governing body of the water provider and documentation of adoption must be submitted with the plan. For municipal water systems, adoption would be by the city council as an ordinance. For other types of publicly-owned water systems (example: utility districts), plan adoption would be by resolution of the entity's board of directors adopting the plan as administrative rules. For private investor-owned utilities, the drought contingency plan is to be incorporated into the utility's rate tariff. Each water supplier shall provide documentation of the formal adoption of their drought contingency plan.

Name:	______________________________
Address:	______________________________
Telephone Number:	( ) Fax: ( )
Water Right No.(s):	______________________________
Regional Water Planning Group:	______________________________
Form Completed by:	______________________________
Title:	______________________________
Person responsible for implementation:	Phone: ( )
Signature:	Date: / /

Section I: Declaration of Policy, Purpose, and Intent

In order to conserve the available water supply and protect the integrity of water supply facilities, with particular regard for domestic water use, sanitation, and fire protection, and to protect and preserve public health, welfare, and safety and minimize the adverse impacts of water supply shortage or other water supply emergency conditions, the ________________________ (*name of your water supplier*) hereby adopts the following regulations and restrictions on the delivery and consumption of water.

Water uses regulated or prohibited under this Drought Contingency Plan (the Plan) are considered to be non-essential and continuation of such uses during times of water shortage or other emergency water supply condition are deemed to constitute a waste of water which subjects the offender(s) to penalties as defined in Section X of this Plan.

Section II: Public Involvement

Opportunity for the public to provide input into the preparation of the Plan was provided by the _________________________ (*name of your water supplier*) by means of ____________________ _____________________________ (*describe methods used to inform the public about the preparation of the plan and provide opportunities for input; for example, scheduling and providing public notice of a public meeting to accept input on the Plan*).

Section III: Public Education

The _________________________ (*name of your water supplier*) will periodically provide the public with information about the Plan, including information about the conditions under which each stage of the Plan is to be initiated or terminated and the drought response measures to be implemented in each stage. This information will be provided by means of ____ (*describe methods to be used to provide information to the public about the Plan; for example, public events, press releases or utility bill inserts*).

Section IV: Coordination with Regional Water Planning Groups

The service area of the _________________________ (*name of your water supplier*) is located within the _________________________ (*name of regional water planning area or areas*) and _________________________ (*name of your water supplier*) has provided a copy of this Plan to the _________________________ (*name of your regional water planning group or groups*).

Section V: Authorization

The _________________________ (*designated official; for example, the mayor, city manager, utility director, general manager, etc.*), or his/her designee is hereby authorized and directed to implement the applicable provisions of this Plan upon determination that such implementation is necessary to protect public health, safety, and welfare. The _________________________ (*designated official*) or his/her designee shall have the authority to initiate or terminate drought or other water supply emergency response measures as described in this Plan.

Section VI: Application

The provisions of this Plan shall apply to all persons, customers, and property utilizing water provided by the _________________________ (*name of your water supplier*). The terms “person” and “customer” as used in the Plan include individuals, corporations, partnerships, associations, and all other legal entities.

Section VII: Definitions

For the purposes of this Plan, the following definitions shall apply:

<u>Aesthetic water use</u>: water use for ornamental or decorative purposes such as fountains, reflecting pools, and water gardens.

<u>Commercial and institutional water use</u>: water use which is integral to the operations of commercial and non-profit establishments and governmental entities such as retail establishments, hotels and motels, restaurants, and office buildings.

<u>Conservation</u>: those practices, techniques, and technologies that reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water or increase the recycling and reuse of water so that a supply is conserved and made available for future or alternative uses.

<u>Customer</u>: any person, company, or organization using water supplied by _________________________ (*name of your water supplier*).

Domestic water use: water use for personal needs or for household or sanitary purposes such as drinking, bathing, heating, cooking, sanitation, or for cleaning a residence, business, industry, or institution.

Even number address: street addresses, box numbers, or rural postal route numbers ending in 0, 2, 4, 6, or 8 and locations without addresses.

Industrial water use: the use of water in processes designed to convert materials of lower value into forms having greater usability and value.

Landscape irrigation use: water used for the irrigation and maintenance of landscaped areas, whether publicly or privately owned, including residential and commercial lawns, gardens, golf courses, parks, and rights-of-way and medians.

Non-essential water use: water uses that are not essential nor required for the protection of public, health, safety, and welfare, including:

(a) irrigation of landscape areas, including parks, athletic fields, and golf courses, except otherwise provided under this Plan;
(b) use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle;
(c) use of water to wash down any sidewalks, walkways, driveways, parking lots, tennis courts, or other hard-surfaced areas;
(d) use of water to wash down buildings or structures for purposes other than immediate fire protection;
(e) flushing gutters or permitting water to run or accumulate in any gutter or street;
(f) use of water to fill, refill, or add to any indoor or outdoor swimming pools or Jacuzzi-type pools;
(g) use of water in a fountain or pond for aesthetic or scenic purposes except where necessary to support aquatic life;
(h) failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s); and
(i) use of water from hydrants for construction purposes or any other purposes other than fire fighting.

Odd numbered address: street addresses, box numbers, or rural postal route numbers ending in 1, 3, 5, 7, or 9.

Section VIII: Criteria for Initiation and Termination of Drought Response Stages

The _________________________ (*designated official*) or his/her designee shall monitor water supply and/or demand conditions on a _________________________ (*example: daily, weekly, monthly*) basis and shall determine when conditions warrant initiation or termination of each stage of the Plan, that is, when the specified "triggers" are reached.

The triggering criteria described below are based on:
____.
(*Provide a brief description of the rationale for the triggering criteria; for example, triggering criteria / trigger levels based on a statistical analysis of the vulnerability of the water source under drought of record conditions, or based on known system capacity limits*).

Utilization of alternative water sources and/or alternative delivery mechanisms:

Alternative water source(s) for _________________________ (*name of utility*) is/are:
____.

(Examples: Other well(s), Inter-connection with other system, Temporary use of a non-municipal water supply, Purchased water, Use of reclaimed water for non-potable purposes, etc.).

Stage 1 Triggers -- MILD Water Shortage Conditions

Requirements for initiation
Customers shall be requested to voluntarily conserve water and adhere to the prescribed restrictions on certain water uses, defined in Section VII Definitions, when ____.
(*Describe triggering criteria / trigger levels; see examples below*).

Following are examples of the types of triggering criteria that might be used in one or more successive stages of a drought contingency plan. The public water supplier may devise other triggering criteria and an appropriate number of stages tailored to its system. One or a combination of the criteria selected by the public water supplier must be defined for each drought response stage, but usually not all will apply.

Example 1: *Annually, beginning on May 1 through September 30.*

Example 2: *When the water supply available to the ________________________ (name of your water supplier) is equal to or less than ___________ (acre-feet, percentage of storage, etc.).*

Example 3: *When, pursuant to requirements specified in the ________________________ (name of **your** water supplier) wholesale water purchase contract with ________________________ (name of your wholesale water supplier), notification is received requesting initiation of Stage 1 of the Drought Contingency Plan.*

Example 4: *When flows in the ________________________ (name of stream or river) are equal to or less than ____________ cubic feet per second.*

Example 5: *When the static water level in the ________________________ (name of your water supplier) well(s) is equal to or less than __________ feet above/below mean sea level.*

Example 6: *When the specific capacity of the ________________________ (name of your water supplier) well(s) is equal to or less than _______ percent of the well's original specific capacity.*

Example 7: *When total daily water demand equals or exceeds __________ million gallons for ____________ consecutive days of _______________ million gallons on a single day (example: based on the safe operating capacity of water supply facilities).*

Example 8: *Continually falling treated water reservoir levels which do not refill above ________ percent overnight (example: based on an evaluation of minimum treated water storage required to avoid system outage).*

Requirements for termination
Stage 1 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ____________ (*example: 3*) consecutive days.

Stage 2 Triggers – MODERATE Water Shortage Conditions

<u>Requirements for initiation</u>
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 ____ (*describe triggering criteria; see examples in Stage 1*).

<u>Requirements for termination</u>
Stage 2 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of __________ (*example: 3*) consecutive days. Upon termination of Stage 2, Stage 1, or the applicable drought response stage based on the triggering criteria, becomes operative.

Stage 3 Triggers – SEVERE Water Shortage Conditions

<u>Requirements for initiation</u>
Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses for Stage 3 of this Plan when ______________________________________ (*describe triggering criteria; see examples in Stage 1*).

<u>Requirements for termination</u>
Stage 3 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of __________ (*example: 3*) consecutive days. Upon termination of Stage 3, Stage 2, or the applicable drought response stage based on the triggering criteria, becomes operative.

Stage 4 Triggers – CRITICAL Water Shortage Conditions

<u>Requirements for initiation</u>
Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses for Stage 4 of this Plan when ____ (*describe triggering criteria; see examples in Stage 1*).

<u>Requirements for termination</u>
Stage 4 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of __________ (*example: 3*) consecutive days. Upon termination of Stage 4, Stage 3, or the applicable drought response stage based on the triggering criteria, becomes operative.

Stage 5 Triggers – EMERGENCY Water Shortage Conditions

<u>Requirements for initiation</u>
Customers shall be required to comply with the requirements and restrictions for Stage 5 of this Plan when _________________________ (*designated official*), 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**

2. Natural or man-made contamination of the water supply source(s).

<u>Requirements for termination</u>
Stage 5 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of __________ (*example: 3*) consecutive days.

Stage 6 Triggers – WATER ALLOCATION

Requirements for initiation
Customers shall be required to comply with the water allocation plan prescribed in Section IX of this Plan and comply with the requirements and restrictions for Stage 5 of this Plan when ____ (*describe triggering criteria, see examples in Stage 1*).

Requirements for termination - Water allocation may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of _________ (*example: 3*) consecutive days.

Note: The inclusion of WATER ALLOCATION as part of a drought contingency plan may not be required in all cases. For example, for a given water supplier, an analysis of water supply availability under drought of record conditions may indicate that there is essentially no risk of water supply shortage. Hence, a drought contingency plan for such a water supplier might only address facility capacity limitations and emergency conditions (example: supply source contamination and system capacity limitations).

Section IX: Drought Response Stages
The ________________________ (*designated official*), or his/her designee, shall monitor water supply and/or demand conditions on a daily basis and, in accordance with the triggering criteria set forth in Section VIII of this Plan, shall determine that a mild, moderate, severe, critical, emergency or water shortage condition exists and shall implement the following notification procedures:

Notification
Notification of the Public:
The ________________________ (*designated official*) or his/ her designee shall notify the public by means of:

Examples:
publication in a newspaper of general circulation,
direct mail to each customer,
public service announcements,
signs posted in public places
take-home fliers at schools.

Additional Notification:
The ________________________ (*designated official*) or his/ her designee shall notify directly, or cause to be notified directly, the following individuals and entities:

Examples:
Mayor / Chairman and members of the City Council / Utility Board
Fire Chief(s)
City and/or County Emergency Management Coordinator(s)
County Judge & Commissioner(s)
State Disaster District / Department of Public Safety
TCEQ *(required when* mandatory *restrictions are imposed)*
Major water users
Critical water users, i.e. hospitals
Parks / street superintendents & public facilities managers

Note: The plan should specify direct notice only as appropriate to respective drought stages.

Stage 1 Response – MILD Water Shortage Conditions

<u>Target</u>: Achieve a voluntary __________ percent reduction in __________________________ (*example: total water use, daily water demand, etc.*).

<u>Best Management Practices for Supply Management</u>:

D*escribe additional measures, if any, to be implemented directly by (name of your water supplier) to manage limited water supplies and/or reduce water demand. Examples include: system water loss control, activation and use of an alternative supply source(s); use of reclaimed water for non-potable purposes.*

<u>Voluntary Water Use Restrictions for Reducing Demand</u>:

(a) Water customers are requested to voluntarily limit the irrigation of landscaped areas to Sundays and Thursdays for customers with a street address ending in an even number (0, 2, 4, 6 or 8), and Saturdays and Wednesdays for water customers with a street address ending in an odd number (1, 3, 5, 7 or 9), and to irrigate landscapes only between the hours of midnight and 10:00 a.m. and 8:00 p.m. to midnight on designated watering days.

(b) All operations of the __________________________ (*name of your water supplier*) shall adhere to water use restrictions prescribed for Stage 1 of the Plan.

(c) Water customers are requested to practice water conservation and to minimize or discontinue water use for non-essential purposes.

Stage 2 Response – MODERATE Water Shortage Conditions

<u>Target</u>: Achieve a __________ percent reduction in __________________________ (*example: total water use, daily water demand, etc.*).

<u>Best Management Practices for Supply Management</u>:

Describe additional measures, if any, to be implemented directly by __________________________ (name of your water supplier) to manage limited water supplies and/or reduce water demand. Examples include: system water loss control, reduced or discontinued irrigation of public landscaped areas; use of an alternative supply source(s); use of reclaimed water for non-potable purposes.

<u>Water Use Restrictions for Demand Reduction</u>:
Under threat of penalty for violation, the following water use restrictions shall apply to all persons:

(a) Irrigation of landscaped areas with hose-end sprinklers or automatic irrigation systems shall be limited to Sundays and Thursdays for customers with a street address ending in an even number (0, 2, 4, 6 or 8), and Saturdays and Wednesdays for water customers with a street address ending in an odd number (1, 3, 5, 7 or 9), and irrigation of landscaped areas is further limited to the hours of 12:00 midnight until 10:00 a.m. and between 8:00 p.m. and 12:00 midnight on designated watering days. However, irrigation of landscaped areas is permitted at anytime if it is by means of a hand-held hose, a faucet filled bucket or watering can of five (5) gallons or less, or drip irrigation system.

(b) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle is prohibited except on designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8:00 p.m. and 12:00 midnight. Such washing, when allowed, shall be done with a hand-held bucket or a hand-held hose equipped with a positive shutoff nozzle for quick rises. Vehicle washing may be done at any time on the immediate premises of a commercial car wash or commercial service station. Further, such washing may be exempted from these regulations if the health, safety, and welfare of the public is contingent upon frequent vehicle cleansing, such as garbage trucks and vehicles used to transport food and perishables.

(c) Use of water to fill, refill, or add to any indoor or outdoor swimming pools, wading pools, or Jacuzzi-type pools is prohibited except on designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8 p.m. and 12:00 midnight.

(d) Operation of any ornamental fountain or pond for aesthetic or scenic purposes is prohibited except where necessary to support aquatic life or where such fountains or ponds are equipped with a recirculation system.

(e) Use of water from hydrants shall be limited to fire fighting, related activities, or other activities necessary to maintain public health, safety, and welfare, except that use of water from designated fire hydrants for construction purposes may be allowed under special permit from the _________________________ (*name of your water supplier*).

(f) Use of water for the irrigation of golf course greens, tees, and fairways is prohibited except on designated watering days between the hours 12:00 midnight and 10:00 a.m. and between 8 p.m. and 12:00 midnight. However, if the golf course utilizes a water source other than that provided by the _________________________ (*name of your water supplier*), the facility shall not be subject to these regulations.

(g) All restaurants are prohibited from serving water to patrons except upon request of the patron.

(h) The following uses of water are defined as non-essential and are prohibited:

1. wash down of any sidewalks, walkways, driveways, parking lots, tennis courts, or other hard-surfaced areas;
2. use of water to wash down buildings or structures for purposes other than immediate fire protection;
3. use of water for dust control;
4. flushing gutters or permitting water to run or accumulate in any gutter or street; and
5. failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s).

Stage 3 Response – SEVERE Water Shortage Conditions

Target: Achieve a _________ percent reduction in _________________________ (*example: total water use, daily water demand, etc.*).

Best Management Practices for Supply Management:

Describe additional measures, if any, to be implemented directly by _________________________ (name of your water supplier) to manage limited water supplies and/or reduce water demand. Examples include: system water loss control, *reduced or discontinued irrigation of public landscaped areas; use of an alternative supply source(s); use of reclaimed water for non-potable purposes.*

Water Use Restrictions for Demand Reduction:
All requirements of Stage 2 shall remain in effect during Stage 3 except:

(a) Irrigation of landscaped areas shall be limited to designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8 p.m. and 12:00 midnight and shall be by means of hand-held hoses, hand-held buckets, drip irrigation, or permanently installed automatic sprinkler system only. The use of hose-end sprinklers is prohibited at all times.

(b) The watering of golf course tees is prohibited unless the golf course utilizes a water source other than that provided by the _________________________ (*name of your water supplier*).

(c) The use of water for construction purposes from designated fire hydrants under special permit is to be discontinued.

Stage 4 Response – CRITICAL Water Shortage Conditions

Target: Achieve a __________ percent reduction in _________________________ (*example: total water use, daily water demand, etc.*).

Best Management Practices for Supply Management:

Describe additional measures, if any, to be implemented directly by _________________________ (name of your water supplier) to manage limited water supplies and/or reduce water demand. Examples include: system water loss control, reduced or discontinued irrigation of public landscaped areas; use of an alternative supply source(s); use of reclaimed water for non-potable purposes.

Water Use Restrictions for Reducing Demand:
All requirements of Stage 2 and 3 shall remain in effect during Stage 4 except:

(a) Irrigation of landscaped areas shall be limited to designated watering days between the hours of 6:00 a.m. and 10:00 a.m. and between 8:00 p.m. and 12:00 midnight and shall be by means of hand-held hoses, hand-held buckets, or drip irrigation only. The use of hose-end sprinklers or permanently installed automatic sprinkler systems are prohibited at all times.

(b) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle not occurring on the premises of a commercial car wash and commercial service stations and not in the immediate interest of public health, safety, and welfare is prohibited. Further, such vehicle washing at commercial car washes and commercial service stations shall occur only between the hours of 6:00 a.m. and 10:00 a.m. and between 6:00 p.m. and 10 p.m.

(c) The filling, refilling, or adding of water to swimming pools, wading pools, and Jacuzzi-type pools is prohibited.

(d) Operation of any ornamental fountain or pond for aesthetic or scenic purposes is prohibited except where necessary to support aquatic life or where such fountains or ponds are equipped with a recirculation system.

(e) No application for new, additional, expanded, or increased-in-size water service connections, meters, service lines, pipeline extensions, mains, or water service facilities of any kind shall be approved, and time limits for approval of such applications are hereby suspended for such time as this drought response stage or a higher-numbered stage shall be in effect.

Stage 5 Response – EMERGENCY Water Shortage Conditions

Target: Achieve a __________ percent reduction in _________________________ (*example: total water use, daily water demand, etc.*).

Best Management Practices for Supply Management:

Describe additional measures, if any, to be implemented directly by _________________________ (name of your water supplier) to manage limited water supplies and/or reduce water demand. Examples include: system water loss control, reduced or discontinued irrigation of public landscaped areas; use of an alternative supply source(s); use of reclaimed water for non-potable purposes.

Water Use Restrictions for Reducing Demand:
All requirements of Stage 2, 3, and 4 shall remain in effect during Stage 5 except:

(a) Irrigation of landscaped areas is absolutely prohibited.

(b) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle is absolutely prohibited.

Stage 6 Response – WATER ALLOCATION

In the event that water shortage conditions threaten public health, safety, and welfare, the _________________________ (*designated official*) is hereby authorized to allocate water according to the following water allocation plan:

Single-Family Residential Customers

The allocation to residential water customers residing in a single-family dwelling shall be as follows:

Persons per Household	Gallons per Month
1 or 2	6,000
3 or 4	7,000
5 or 6	8,000
7 or 8	9,000
9 or 10	10,000
11 or more	12,000

"Household" means the residential premises served by the customer's meter. "Persons per household" include only those persons currently physically residing at the premises and expected to reside there for the entire billing period. It shall be assumed that a particular customer's household is comprised of two (2) persons unless the customer notifies the _________________________ (*name of your water supplier*) of a greater number of persons per household on a form prescribed by the _________________________ (*designated official*). The _________________________ (*designated official*) shall give his/her best effort to see that such forms are mailed, otherwise provided, or made available to every residential customer. If, however, a customer does not receive such a form, it shall be the customer's responsibility to go to the _________________________ (*name of your water supplier*) offices to complete and sign the form claiming more than two (2) persons per household. New customers may claim more persons per household at the time of applying for water service on the form prescribed by the _________________________ (*designated official*). When the number of persons per household increases so as to place the customer in a different allocation category, the customer may notify the _________________________ (*name of water supplier*) on such form and the change will be implemented in the next practicable billing period. If the number of persons in a household is reduced, the customer shall notify the _________________________ (*name of your water supplier*) in writing within two (2) days. In prescribing the method for claiming more than two (2) persons per household, the _________________________ (*designated official*) shall adopt methods to insure the accuracy of the claim. Any person who knowingly, recklessly, or with criminal negligence falsely reports the number of persons in a household or fails to timely notify the _________________________ (*name of your water supplier*) of a reduction in the number of person in a household shall be fined not less than $__________.

Residential water customers shall pay the following surcharges:

$__________ for the first 1,000 gallons over allocation.
$__________ for the second 1,000 gallons over allocation.
$__________ for the third 1,000 gallons over allocation.
$__________ for each additional 1,000 gallons over allocation.

Surcharges shall be cumulative.

Master-Metered Multi-Family Residential Customers

The allocation to a customer billed from a master meter which jointly measures water to multiple permanent residential dwelling units (example: apartments, mobile homes) shall be allocated 6,000 gallons per month for each dwelling unit. It shall be assumed that such a customer's meter serves two dwelling units unless the customer notifies the _________________________ (*name of your water supplier*) of a greater number on a form prescribed by the _________________________ (*designated official*). The _________________________ (*designated official*) shall give his/her best effort to see that such forms are mailed, otherwise provided, or made available to every such customer. If, however, a customer does not receive such a form, it shall be the customer's responsibility to go to the _________________________ (*name of your water supplier*) offices to complete and sign the form claiming more than two (2) dwellings. A dwelling unit may be claimed under this provision whether it is occupied or not. New customers may claim more dwelling units at the time of applying for water service on the form prescribed by the _________________________ (*designated official*). If the number of dwelling units served by a master meter is reduced, the customer shall notify the _________________________ (*name of your water supplier*) in writing within two (2) days. In prescribing the method for claiming more than two (2) dwelling units, the _________________________ (*designated official*) shall adopt methods to insure the accuracy of the claim. Any person who knowingly, recklessly, or with criminal negligence falsely reports the number of dwelling units served by a master meter or fails to timely notify the _________________________ (*name of your water supplier*) of a reduction in the number of person in a household shall be fined not less than $__________. Customers billed from a master meter under this provision shall pay the following monthly surcharges:

$__________ for 1,000 gallons over allocation up through 1,000 gallons for each dwelling unit.
$__________, thereafter, for each additional 1,000 gallons over allocation up through a second 1,000 gallons for each dwelling unit.
$__________, thereafter, for each additional 1,000 gallons over allocation up through a third 1,000 gallons for each dwelling unit.
$__________, thereafter for each additional 1,000 gallons over allocation.

Surcharges shall be cumulative.

Commercial Customers

A monthly water allocation shall be established by the _________________________ (*designated official*), or his/her designee, for each nonresidential commercial customer other than an industrial customer who uses water for processing purposes. The non-residential customer's allocation shall be approximately __________ (*example: 75%*) percent of the customer's usage for corresponding month's billing period for the previous 12 months. If the customer's billing history is shorter than 12 months, the monthly average for the period for which there is a record shall be used for any monthly period for which no history exists. Provided, however, a customer, __________percent of whose monthly usage is less than __________ gallons, shall be allocated __________ gallons. The _________________________ (*designated official*) shall give his/her best effort to see that notice of each non-residential customer's allocation is mailed to such customer. If, however, a customer does not receive such notice, it shall be the customer's responsibility to contact the _________________________ (*name of your water supplier*) to determine the allocation. Upon request of the customer or at the initiative of the _________________________ (*designated official*), the allocation may be reduced or increased if, (1) the designated period does not accurately reflect the customer's normal water usage, (2) one nonresidential customer agrees to transfer part of its allocation to another nonresidential customer, or (3) other objective evidence demonstrates that the designated allocation is inaccurate under present conditions. A customer may appeal an allocation established hereunder to the _________________________ (*designated official or alternatively, a special water allocation review committee*). Nonresidential commercial customers shall pay the following surcharges:

Customers whose allocation is __________ gallons through __________ gallons per month:

$__________ per thousand gallons for the first 1,000 gallons over allocation.
$__________ per thousand gallons for the second 1,000 gallons over allocation.
$__________ per thousand gallons for the third 1,000 gallons over allocation.
$__________ per thousand gallons for each additional 1,000 gallons over allocation.

Customers whose allocation is __________ gallons per month or more:

__________times the block rate for each 1,000 gallons in excess of the allocation up through 5 percent above allocation.
__________times the block rate for each 1,000 gallons from 5 percent through 10 percent above allocation.
__________times the block rate for each 1,000 gallons from 10 percent through 15 percent above allocation.
__________times the block rate for each 1,000 gallons more than 15 percent above allocation.

The surcharges shall be cumulative. As used herein, "block rate" means the charge to the customer per 1,000 gallons at the regular water rate schedule at the level of the customer's allocation.

Industrial Customers

A monthly water allocation shall be established by the _________________________ (*designated official*), or his/her designee, for each industrial customer, which uses water for processing purposes. The industrial customer's allocation shall be approximately __________ (*example: 90%*) percent of the customer's water usage baseline. Ninety (90) days after the initial imposition of the allocation for industrial customers, the industrial customer's allocation shall be further reduced to __________ (*example: 85%*) percent of the customer's water usage baseline. The industrial customer's water use baseline will be computed on the average water use for the __________ month period ending prior to the date of implementation of Stage 2 of the Plan. If the industrial water customer's billing history is shorter than __________ months, the monthly average for the period for which there is a record shall be used for any monthly period for which no billing history exists. The _________________________ (*designated official*) shall give his/her best effort to see that notice of each industrial customer's allocation is mailed to such customer. If, however, a customer does not receive such notice, it shall be the customer's responsibility to contact the _________________________ (*name of your water supplier*) to determine the allocation, and the allocation shall be fully effective notwithstanding the lack of receipt of written notice. Upon request of the customer or at the initiative of the _________________________ (*designated official*), the allocation may be reduced or increased, (1) if the designated period does not accurately reflect the customer's normal water use because the customer had shutdown a major processing unit for repair or overhaul during the period, (2) the customer has added or is in the process of adding significant additional processing capacity, (3) the customer has shutdown or significantly reduced the production of a major processing unit, (4) the customer has previously implemented significant permanent water conservation measures such that the ability to further reduce water use is limited, (5) the customer agrees to transfer part of its allocation to another industrial customer, or (6) if other objective evidence demonstrates that the designated allocation is inaccurate under present conditions. A customer may appeal an allocation established hereunder to the _________________________ (*designated official or alternatively, a special water allocation review committee*). Industrial customers shall pay the following surcharges:

Customers whose allocation is __________ gallons through __________ gallons per month:

$__________ per thousand gallons for the first 1,000 gallons over allocation.
$__________ per thousand gallons for the second 1,000 gallons over allocation.
$__________ per thousand gallons for the third 1,000 gallons over allocation.
$__________ per thousand gallons for each additional 1,000 gallons over allocation.

Customers whose allocation is __________ gallons per month or more:

__________times the block rate for each 1,000 gallons in excess of the allocation up through 5 percent above allocation.
__________times the block rate for each 1,000 gallons from 5 percent through 10 percent above allocation.
__________times the block rate for each 1,000 gallons from 10 percent through 15 percent above allocation.
__________times the block rate for each 1,000 gallons more than 15 percent above allocation.

The surcharges shall be cumulative. As used herein, "block rate" means the charge to the customer per 1,000 gallons at the regular water rate schedule at the level of the customer's allocation.

Section X: Enforcement

(a) No person shall knowingly or intentionally allow the use of water from the _________________________ (*name of your water supplier*) for residential, commercial, industrial, agricultural, governmental, or any other purpose in a manner contrary to any provision of this Plan, or in an amount in excess of that permitted by the drought response stage in effect at the time pursuant to action taken by _________________________ (*designated official*), or his/her designee, in accordance with provisions of this Plan.

(b) Any person who violates this Plan is guilty of a misdemeanor and, upon conviction shall be punished by a fine of not less than __________ dollars ($__________) and not more than __________ dollars ($__________). Each day that one or more of the provisions in this Plan is violated shall constitute a separate offense. If a person is convicted of three or more distinct violations of this Plan, the _________________________ (*designated official*) shall, upon due notice to the customer, be authorized to discontinue water service to the premises where such violations occur. Services discontinued under such circumstances shall be restored only upon payment of a re-connection charge, hereby established at $__________, and any other costs incurred by the _________________________ (*name of your water supplier*) in discontinuing service. In addition, suitable assurance must be given to the _________________________ (*designated official*) that the same action shall not be repeated while the Plan is in effect. Compliance with this plan may also be sought through injunctive relief in the district court.

(c) Any person, including a person classified as a water customer of the _________________________ (*name of your water supplier*), in apparent control of the property where a violation occurs or originates shall be presumed to be the violator, and proof that the violation occurred on the person's property shall constitute a rebuttable presumption that the person in apparent control of the property committed the violation, but any such person shall have the right to show that he/she did not commit the violation. Parents shall be presumed to be responsible for violations of their minor children and proof that a violation, committed by a child, occurred on property within the parents' control shall constitute a rebuttable presumption that the parent committed the violation, but any such parent may be excused if he/she proves that he/she had previously directed the child not to use the water as it was used in violation of this Plan and that the parent could not have reasonably known of the violation.

(d) Any employee of the _________________________ (*name of your water supplier*), police officer, or other _________________________ employee designated by the _________________________ (*designated official*), may issue a citation to a person he/she reasonably believes to be in violation of this Ordinance. The citation shall be prepared in duplicate and shall contain the name and address of the alleged violator, if known, the offense charged, and shall direct him/her to appear in the _________________________ (*example: municipal court*) on the date shown on the citation for which the date shall not be less than 3 days nor more than 5 days from the date the citation was issued. The alleged violator shall be served a copy of the citation. Service of the citation shall be complete upon delivery of the citation to the alleged violator, to an agent or employee of a violator, or to a person over 14 years of age who is a member of the violator's immediate family or is a resident of the violator's residence. The alleged violator shall appear in _________________________ (*example: municipal court*) to enter a plea of guilty or not guilty for the violation of this Plan. If the alleged violator fails to appear in _________________________ (*example: municipal court*), a warrant for his/her arrest may be issued. A summons to appear may be issued in lieu of an arrest warrant. These cases shall be expedited and given preferential setting in _________________________ (*example: municipal court*) before all other cases.

Section XI: Variances

The _________________________ (*designated official*), or his/her designee, may, in writing, grant temporary variance for existing water uses otherwise prohibited under this Plan if it is determined that failure to grant such variance would cause an emergency condition adversely affecting the health, sanitation, or fire protection for the public or the person requesting such variance and if one or more of the following conditions are met:

(a) Compliance with this Plan cannot be technically accomplished during the duration of the water supply shortage or other condition for which the Plan is in effect.
(b) Alternative methods can be implemented which will achieve the same level of reduction in water use.

Persons requesting an exemption from the provisions of this Ordinance shall file a petition for variance with the _________________________ (*name of your water supplier*) within 5 days after the Plan or a particular drought response stage has been invoked. All petitions for variances shall be reviewed by the _________________________ (*designated official*), or his/her designee, and shall include the following:

(a) Name and address of the petitioner(s).
(b) Purpose of water use.
(c) Specific provision(s) of the Plan from which the petitioner is requesting relief.
(d) Detailed statement as to how the specific provision of the Plan adversely affects the petitioner or what damage or harm will occur to the petitioner or others if petitioner complies with this Ordinance.
(e) Description of the relief requested.
(f) Period of time for which the variance is sought.
(g) Alternative water use restrictions or other measures the petitioner is taking or proposes to take to meet the intent of this Plan and the compliance date.
(h) Other pertinent information.

Texas Commission on Environmental Quality
Water Availability Division
MC-160, P.O. Box 13087 Austin, Texas 78711-3087
Telephone (512) 239-4691, FAX (512) 239-2214

Model Drought Contingency Plan for an Irrigation District

This form is provided as a model of a drought contingency plan for an irrigation district. If you need assistance in completing this form or in developing your plan, please contact the Conservation Staff of the Resource Protection Team in the Water Availability Division at (512) 239-4691.

Drought Contingency Plans must be formally adopted by the governing body of the irrigation district and documentation of adoption must be submitted with the plan. An example resolution can be found at the end of this form.

Irrigation District:	____________________
Address:	____________________
Telephone Number:	( ) __________ Fax: ( ) __________
Water Right No.(s):	____________________
Regional Water Planning Group:	____________________
Form Completed by:	____________________
Title:	____________________
Person responsible for implementation:	__________ Phone: ( ) __________
Signature:	__________ Date: / / __________

Section I: Declaration of Policy, Purpose, and Intent

The Board of Directors of the ________________________ (*name of irrigation district*) deems it to be in the interest of the District to adopt Rules and Regulations governing the equitable and efficient allocation of limited water supplies during times of shortage. These Rules and Regulations constitute the District's drought contingency plan required under Section 11.1272, Texas Water Code, *Vernon's Texas Codes Annotated*, and associated administrative rules of the Texas Commission on Environmental Quality (Title 30, Texas Administrative Code, Chapter 288).

Section II: User Involvement

Opportunity for users of water from the ________________________ (*name of irrigation district*) was provided by means of ____ (*describe methods used to inform water users about the preparation of the plan and opportunities for input; for example, scheduling and providing notice of a public meeting to accept user input on the plan*).

Section III: User Education

The _________________________ (*name of irrigation district*) will periodically provide water users with information about the Plan, including information about the conditions under which water allocation is to be initiated or terminated and the district's policies and procedures for water allocation. This information will be provided by means of _____________________________________ (*example: describe methods to be used to provide water users with information about the Plan; for example, by providing copies of the Plan and by posting water allocation rules and regulations on the district's public bulletin board*).

Section IV: Authorization

The _________________________ (*example: general manager*) is hereby authorized and directed to implement the applicable provision of the Plan upon determination by the Board that such implementation is necessary to ensure the equitable and efficient allocation of limited water supplies during times of shortage.

Section V: Application

The provisions of the Plan shall apply to all persons utilizing water provided by the _________________________ (*name of irrigation district*). The term "person" as used in the Plan includes individuals, corporations, partnerships, associations, and all other legal entities.

Section VI: Initiation of Water Allocation

The _________________________ (*designated official*) shall monitor water supply conditions on a _________________________ (*example: weekly, monthly*) basis and shall make recommendations to the Board regarding irrigation of water allocation. Upon approval of the Board, water allocation will become effective when _____________________________________ (*describe the criteria and the basis for the criteria*):

Below are examples of the types of triggering criteria that might be used; singly or in combination, in an irrigation district's drought contingency plan:

Example 1: **Water in storage in the _________________________ (*name of reservoir*) is equal to or less than _______________ (*acre-feet and/or percentage of storage capacity*).**

Example 2: **Combined storage in the _________________________ (*name or reservoirs*) reservoir system is equal to or less than _______________ (*acre-feet and/or percentage of storage capacity*).**

Example 3: **Flows as measured by the U.S. Geological Survey gage on the _________________________ (*name of reservoir*) near _________________________, Texas reaches _______________ cubic feet per second (cfs).**

Example 4: **The storage balance in the district's irrigation water rights account reaches ______________ acre-feet.**

Example 5: **The storage balance in the district's irrigation water rights account reaches an amount equivalent to _______________ (*number*) irrigations for each flat rate acre in which all flat rate assessments are paid and current.**

Example 6: **The _________________________ (*name of entity supplying water to the irrigation district*) notifies the district that water deliveries will be limited to _______________ acre-feet per year (*i.e. a level below that required for unrestricted irrigation*).**

Section VII: Termination of Water Allocation

The district's water allocation policies will remain in effect until the conditions defined in Section IV of the Plan no longer exist and the Board deems that the need to allocate water no longer exists.

Section VIII: Notice

Notice of the initiation of water allocation will be given by notice posted on the District's public bulletin board and by mail to each _________________________ (*example: landowner, holders of active irrigation accounts, etc.*).

Section IX: Water Allocation

(a) In identifying **specific, quantified targets** for water allocation to be achieved during periods of water shortages and drought, each irrigation user shall be allocated ______________ irrigations or ______________ acre-feet of water each flat rate acre on which all taxes, fees, and charges have been paid. The water allotment in each irrigation account will be expressed in acre-feet of water.

Include explanation of water allocation procedure. For example, in the Lower Rio Grande Valley, an "irrigation" is typically considered to be equivalent to eight (8) inches of water per irrigation acre; consisting of six (6) inches of water per acre applied plus two (2) inches of water lost in transporting the water from the river to the land. Thus, three irrigations would be equal to 24 inches of water per acre or an allocation of 2.0 acre-feet of water measured at the diversion from the river.

(b) As additional water supplies become available to the District in an amount reasonably sufficient for allocation to the District's irrigation users, the additional water made available to the District will be equally distributed, on a pro rata basis, to those irrigation users having ____.

Example 1: An account balance of less than ______________ irrigations for each flat rate acre (*i.e.* ______________ *acre-feet*).

Example 2: An account balance of less than ______________ acre-feet of water for each flat rate acre.

Example 3: An account balance of less than ______________ acre-feet of water.

(c) The amount of water charged against a user's water allocation will be ______________ (*example: eight inches*) per irrigation, or one allocation unit, unless water deliveries to the land are metered. Metered water deliveries will be charges based on actual measured use. In order to maintain parity in charging use against a water allocation between non-metered and metered deliveries, a loss factor of ______________ percent of the water delivered in a metered situation will be added to the measured use and will be charged against the user's water allocation. Any metered use, with the loss factor applied, that is less than eight (8) inches per acre shall be credited back to the allocation unit and will be available to the user. It shall be a violation of the Rules and Regulations for a water user to use water in excess of the amount of water contained in the user's irrigation account.

(d) Acreage in an irrigation account that has not been irrigated for any reason within the last two (2) consecutive years will be considered inactive and will not be allocated water. Any landowner whose land has not been irrigated within the last two (2) consecutive years, may, upon application to the District expressing intent to irrigate the land, receive future allocations. However, irrigation water allocated shall be applied only upon the acreage to which it was allocated and such water allotment cannot be transferred until there have been two consecutive years of use.

Section X: Transfers of Allotments

(a) A water allocation in an active irrigation account may be transferred within the boundaries of the District from one irrigation account to another. The transfer of water can only be made by the landowner's agent who is authorized in writing to act on behalf of the landowner in the transfer of all or part of the water allocation from the described land of the landowner covered by the irrigation account.

(b) A water allocation may not be transferred to land owned by a landowner outside the District boundaries.

or

A water allocation may be transferred to land outside the District's boundaries by paying the current water charge as if the water was actually delivered by the District to the land covered by an irrigation account. The amount of water allowed to be transferred shall be stated in terms of acre-feet and deducted from the landowner's current allocation balance in the irrigation account. Transfers of water outside the District shall not affect the allocation of water under Section VII of these Rules and Regulations.

(c) Water from outside the District may not be transferred by a landowner for use within the District.

or

Water from outside the District may be transferred by a landowner for use within the District. The District will divert and deliver the water on the same basis as District water is delivered, except that a _______________ percent conveyance loss will be charged against the amount of water transferred for use in the District as the water is delivered.

Section XI: Penalties

Any person who willfully opens, closes, changes or interferes with any headgate or uses water in violation of these Rules and Regulations, shall be considered in violation of Section 11.0083, Texas Water Code, *Vernon's Texas Codes Annotated*, which provides for punishment by fine of not less than $10.00 nor more than $200.00 or by confinement in the county jail for not more than thirty (30) days, or both, for each violation, and these penalties provided by the laws of the State and may by enforced by complaints filed in the appropriate court jurisdiction in __________________________ County, all in accordance with Section 11.083; and in addition, the District may pursue a civil remedy in the way of damages and/or injunction against the violation of any of the foregoing Rules and Regulations.

Section XII: Severability

It is hereby declared to be the intention of the Board of Directors of the __________________________ (*name of irrigation district*) that the sections, paragraphs, sentences, clauses, and phrases of this Plan shall be declared unconstitutional by the valid judgment or decree of any court of competent jurisdiction, such unconstitutionality shall not affect any of the remaining phrases, clauses, sentences, paragraphs, and sections of this Plan, since the same would not have been enacted by the Board without the incorporation into this Plan of any such unconstitutional phrase, clause, sentence, paragraph, or section.

Section XIII: Authority

The foregoing rules and regulations are adopted pursuant to and in accordance with Sections 11.039, 11.083, 11.1272; Section 49.004; and Section 58.127-130 of the Texas Water Code, *Vernon's Texas Codes Annotated.*

Section XIV: Effective Date of Plan

The effective date of this Rule shall be five (5) days following the date of Publication hereof and ignorance of the Rules and Regulations is not a defense for a prosecution for enforcement of the violation of the Rules and Regulations.

EXAMPLE RESOLUTION FOR ADOPTION OF A DROUGHT CONTINGENCY PLAN

RESOLUTION NO. __________

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE ___________________ (name of water supplier) ADOPTING A DROUGHT CONTINGENCY PLAN.

WHEREAS, the Board recognizes that the amount of water available to the ____________ (*name of water supplier*) and its water utility customers is limited and subject to depletion during periods of extended drought;

WHEREAS, the Board recognizes that natural limitations due to drought conditions and other acts of God cannot guarantee an uninterrupted water supply for all purposes;

WHEREAS, Section 11.1272 of the Texas Water Code and applicable rules of the Texas Commission on Environmental Quality require all public water supply systems in Texas to prepare a drought contingency plan; and

WHEREAS, as authorized under law, and in the best interests of the customers of the _________________ (*name of water supply system*), the Board deems it expedient and necessary to establish certain rules and policies for the orderly and efficient management of limited water supplies during drought and other water supply emergencies;

NOW THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE _________________ (*name of water supplier*):

SECTION 1. That the Drought Contingency Plan attached hereto as Exhibit A and made part hereof for all purposes be, and the same is hereby, adopted as the official policy of the ________________ (*name of water supplier*).

SECTION 2. That the _______________ (*example: general manager*) is hereby directed to implement, administer, and enforce the Drought Contingency Plan.

SECTION 3. That this resolution shall take effect immediately upon its passage.

DULY PASSED BY THE BOARD OF DIRECTORS OF THE _______________, ON THIS __ day of ______________, 20__.

____
President, Board of Directors

ATTESTED TO:

____
Secretary, Board of Directors

Texas Commission on Environmental Quality
Water Availability Division
MC-160, P.O. Box 13087 Austin, Texas 78711-3087
Telephone (512) 239-4691, FAX (512) 239-2214

Drought Contingency Plan for a Wholesale Public Water Supplier

This form is provided as a model of a drought contingency plan for a wholesale public water supplier. If you need assistance in completing this form or in developing your plan, please contact the Conservation Staff of the Resource Protection Team in the Water Availability Division at (512) 239-4691.

Drought Contingency Plans must be formally adopted by the governing body of the water provider and documentation of adoption must be submitted with the plan. For example, adoption by a city council as an ordinance or by resolution of the entity's board of directors adopting the plan as administrative rules.

Name:	____________________
Address:	____________________
Telephone Number:	( ) Fax: ( )
Water Right No.(s):	____________________
Regional Water Planning Group:	____________________
Form Completed by:	____________________
Title:	____________________
Person responsible for implementation:	Phone: ( )
Signature:	Date: / /

Section I: Declaration of Policy, Purpose, and Intent

In order to conserve the available water supply and/or to protect the integrity of water supply facilities, with particular regard for domestic water use, sanitation, and fire protection, and to protect and preserve public health, welfare, and safety and minimize the adverse impacts of water supply shortage or other water supply emergency conditions, the ________________________ (*name of your water supplier*) adopts the following Drought Contingency Plan (the Plan).

Section II: Public Involvement

Opportunity for the public and wholesale water customers to provide input into the preparation of the Plan was provided by ________________________ (*name of your water supplier*) by means of ____ (*describe methods used to inform the public and wholesale customers about the preparation of the plan and opportunities for input; for example, scheduling and proving public notice of a public meeting to accept input on the Plan*).

Section III: Wholesale Water Customer Education

The _________________________ (*name of your water supplier*) will periodically provide wholesale water customers with information about the Plan, including information about the conditions under which each stage of the Plan is to be initiated or terminated and the drought response measures to be implemented in each stage. This information will be provided by means of ____ (*example: describe methods to be used to provide customers with information about the Plan; for example, providing a copy of the Plan or periodically including information about the Plan with invoices for water sales*).

Section IV: Coordination with Regional Water Planning Groups

The water service area of the _________________________ (name of your water supplier) is located within the _________________________ (*name of regional water planning area or areas*) and the _________________________ (*name of your water supplier*) has provided a copy of the Plan to the _________________________ (*name of your regional water planning group or groups*).

Section V: Authorization

The _________________________ (*designated official; for example, the general manager or executive director*), or his/her designee, is hereby authorized and directed to implement the applicable provisions of this Plan upon determination that such implementation is necessary to protect public health, safety, and welfare. The _________________________ or his/her designee, shall have the authority to initiate or terminate drought or other water supply emergency response measures as described in this Plan.

Section VI: Application

The provisions of this Plan shall apply to all customers utilizing water provided by the _________________________ (*name of your water supplier*). The terms "person" and "customer" as used in the Plan include individuals, corporations, partnerships, associations, and all other legal entities.

Section VII: Criteria for Initiation and Termination of Drought Response Stages

The _________________________ (*designated official*), or his/her designee, shall monitor water supply and/or demand conditions on a (*example: weekly, monthly*) basis and shall determine when conditions warrant initiation or termination of each stage of the Plan. Customer notification of the initiation or termination of drought response stages will be made by mail or telephone. The news media will also be informed.

The triggering criteria described below are based on: ____.
(*provide a brief description of the rationale for the triggering criteria; for example, triggering criteria are based on a statistical analysis of the vulnerability of the water source under drought of record conditions).*

Utilization of alternative water sources and/or alternative delivery mechanisms:

Alternative water source(s) for _________________________ (*name of utility*) is/are: ____.
(Examples: Other well(s), Inter-connection with other system, Temporary use of a non-municipal water supply, Purchased water, Use of reclaimed water for non-potable purposes, etc.).

Stage 1 Triggers -- MILD Water Shortage Conditions

Requirements for initiation – The _________________________ (*name of your water supplier*) will recognize that a mild water shortage condition exists when ____ (*describe triggering criteria, see examples below).*

> ***Below are examples of the types of triggering criteria that might be used in a wholesale water supplier's drought contingency plan.*** *The wholesale water supplier may devise other triggering criteria and an appropriate number of stages tailored to its system; however, the plan must contain a minimum of three drought stages.* ***One or a combination of such criteria may be defined for each drought response stage:***
>
> > ***Example 1: Water in storage in the _________________________ (name of reservoir) is equal to or less than _______________ (acre-feet and/or percentage of storage capacity).***
> >
> > ***Example 2: When the combined storage in the _________________________ (name of reservoirs) is equal to or less than _______________ (acre-feet and/or percentage of storage capacity).***
> >
> > ***Example 3: Flows as measured by the U.S. Geological Survey gage on the _________________________ (name of river) near _________________________, Texas reaches _______________ cubic feet per second (cfs).***
> >
> > ***Example 4: When total daily water demand equals or exceeds _______________ million gallons for _______________ consecutive days or _______________ million gallons on a single day.***
> >
> > ***Example 5: When total daily water demand equals or exceeds _______________ percent of the safe operating capacity of _______________ million gallons per day for _______________ consecutive days or _______________ percent on a single day.***

Requirements for termination - Stage 1 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of _______________ (*example: 30*) consecutive days. The _________________________ (*name of water supplier*) will notify its wholesale customers and the media of the termination of Stage 1.

Stage 2 Triggers -- MODERATE Water Shortage Conditions

Requirements for initiation – The _________________________ (*name of your water supplier*) will recognize that a moderate water shortage condition exists when ____ (*describe triggering criteria*).

Requirements for termination - Stage 2 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of _______________ (*example: 30*) consecutive days. Upon termination of Stage 2, Stage 1, or the applicable drought response stage based on the triggering criteria, becomes operative. The _________________________ (*name of your water supplier*) will notify its wholesale customers and the media of the termination of Stage 2.

Stage 3 Triggers -- SEVERE Water Shortage Conditions

Requirements for initiation – The _________________________ (*name of your water supplier*) will recognize that a severe water shortage condition exists when ____ (*describe triggering criteria; see examples in Stage 1*).

Requirements for termination - Stage 3 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of __________ (*example: 30*) consecutive days. Upon termination of Stage 3, Stage 2, or the applicable drought response stage based on the triggering criteria, becomes operative. The _________________________ (*name of your water supplier*) will notify its wholesale customers and the media of the termination of Stage 3.

Stage 4 Triggers -- CRITICAL Water Shortage Conditions

Requirements for initiation - The _________________________ (*name of your water supplier*) will recognize that an emergency water shortage condition exists when ____ (*describe triggering criteria*; *see examples below*).

Example 1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service; or

Example 2. Natural or man-made contamination of the water supply source(s).

Requirements for termination - Stage 4 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of _______________ (*example: 30*) consecutive days. The _________________________ (*name of your water supplier*) will notify its wholesale customers and the media of the termination of Stage 4.

Section VIII: Drought Response Stages

The _________________________ (*designated official*), or his/her designee, shall monitor water supply and/or demand conditions and, in accordance with the triggering criteria set forth in Section VII, shall determine that mild, moderate, severe, or critical water shortage conditions exist or that an emergency condition exists and shall implement the following actions:

Stage 1 Response -- MILD Water Shortage Conditions

Target: Achieve a voluntary _______________ percent reduction in _________________________ (*example: total water use, daily water demand, etc.*).

Best Management Practices for Supply Management:

Describe additional measures, if any, to be implemented directly by _________________________ (designated official), or his/her designee(s), to manage limited water supplies and/or reduce water demand. Examples include modifying reservoir operations procedures, interconnection with another water system, and use of reclaimed water for nonpotable purposes.

Water Use Restrictions for Reducing Demand:

(a) The _________________________ (*designated official*), or his/her designee(s), will contact wholesale water customers to discuss water supply and/or demand conditions and will request that wholesale water customers initiate voluntary measures to reduce water use (*example: implement Stage 1 or appropriate stage of the customer's drought contingency plan*).

(b) The _________________________ (*designated official*), or his/her designee(s), will provide a weekly report to news media with information regarding current water supply and/or demand conditions, projected water supply and demand conditions if drought conditions persist, and consumer information on water conservation measures and practices.

Stage 2 Response -- MODERATE Water Shortage Conditions

Target: Achieve a _______________ percent reduction in _________________________ (*example: total water use, daily water demand, etc.*).

Best Management Practices for Supply Management:

Describe additional measures, if any, to be implemented directly by ________________________ (designated official), or his/her designee(s), to manage limited water supplies and/or reduce water demand. Examples include modifying reservoir operations procedures, interconnection with another water system, and use of reclaimed water for non-potable purposes.

Water Use Restrictions for Reducing Demand:

(a) The ________________________ (*designated official*), or his/her designee(s), will request wholesale water customers to initiate mandatory measures to reduce non-essential water use (*example: implement Stage 2 or appropriate stage of the customer's drought contingency plan*).

(b) The ________________________ (*designated official*), or his/her designee(s), will initiate weekly contact with wholesale water customers to discuss water supply and/or demand conditions and the possibility of pro rata curtailment of water diversions and/or deliveries.

(c) The ________________________ (*designated official*), or his/her designee(s), will further prepare for the implementation of pro rata curtailment of water diversions and/or deliveries by preparing a monthly water usage allocation baseline for each wholesale customer.

(d) The ________________________ (*designated official*), or his/her designee(s), will provide a weekly report to news media with information regarding current water supply and/or demand conditions, projected water supply and demand conditions if drought conditions persist, and consumer information on water conservation measures and practices.

Stage 3 Response -- SEVERE Water Shortage Conditions

Target: Achieve a ______________ percent reduction in ________________________ (*example: total water use, daily water demand, etc.*).

Best Management Practices for Supply Management:

Describe additional measures, if any, to be implemented directly by ________________________ (designated official), or his/her designee(s), to manage limited water supplies and/or reduce water demand. Examples include modifying reservoir operations procedures, interconnection with another water system, and use of reclaimed water for non-potable purposes.

Water Use Restrictions for Reducing Demand:

(a) The ________________________ (*designated official*), or his/her designee(s), will contact wholesale water customers to discuss water supply and/or demand conditions and will request that wholesale water customers initiate additional mandatory measures to reduce non-essential water use (example: implement Stage 3 or appropriate stage of the customer's drought contingency plan).

(b) The ________________________ (*designated official*), or his/her designee(s), will initiate pro rata curtailment of water diversions and/or deliveries for each wholesale customer.

(c) The ________________________ (*designated official*), or his/her designee(s), will provide a weekly report to news media with information regarding current water supply and/or demand conditions, projected water supply and demand conditions if drought conditions persist, and consumer information on water conservation measures and practices.

Stage 4 Response -- EMERGENCY Water Shortage Conditions

Whenever emergency water shortage conditions exist as defined in Section VII of the Plan, the _________________________ (*designated official*) shall:

1. Assess the severity of the problem and identify the actions needed and time required to solve the problem.
2. Inform the utility director or other responsible official of each wholesale water customer by telephone or in person and suggest actions, as appropriate, to alleviate problems (*example: notification of the public to reduce water use until service is restored*).
3. If appropriate, notify city, county, and/or state emergency response officials for assistance.
4. Undertake necessary actions, including repairs and/or clean-up as needed.
5. Prepare a post-event assessment report on the incident and critique of emergency response procedures and actions.

Section IX: Pro Rata Curtailment

In the event that the triggering criteria specified in Section VII of the Plan for Stage 3 – Severe Water Shortage Conditions have been met, the _________________________ (*designated official*) is hereby authorized to initiate allocation of water supplies on a pro rata basis in accordance with Texas Water Code, §11.039.

Section X: Contract Provisions

The _________________________ (*name of your water supplier*) will include a provision in every wholesale water contract entered into or renewed after adoption of the plan, including contract extensions, that in case of a shortage of water resulting from drought, the water to be distributed shall be divided in accordance with Texas Water Code, §11.039.

Section XI: Enforcement

Example of surcharge:
During any period when either mandatory water use restrictions or pro rata allocation of available water supplies are in effect, wholesale customers shall pay the following surcharges on excess water diversions and/or deliveries:

_______ times the normal water charge per acre-foot for water diversions and/or deliveries in excess of the monthly allocation from ______________ percent through ______________ percent above the monthly allocation.

Examples of fines and/or discontinuation of service:
Mandatory water use restrictions or pro rata allocation of available water supplies may be imposed during drought stages and emergency water management actions. These water use restrictions will be enforced by warnings and penalties as follows:

- On the first violation, customers will be notified by written notice that they have violated the mandatory water use restriction.
- If the first violation has not been corrected after ten (10) days from the written notice, _________________________ (*name of your water supplier*) may assess a fine up to $______________ per violation.
- _________________________ (*name of your water supplier*) may install a flow restricting device in

the line to limit the amount of water which will pass through the meter in a 24-hour period. The utility may charge the customer for the actual cost of installing and removing the flow restricting device, not to exceed fifty dollars ($50.00);

- _________________________ (*name of your water supplier*) maintains the right, at any violation or action level, to disconnect irrigation systems and/or suspend water services to a customer for public safety issues with reconnection fees and possible citations.
- Subsequent violations of the plan shall result in increased fines or upon the occurrence of ______________ violations, after notice, the discontinuation of services. Services discontinued under this provision shall be restored only upon payment of a reconnection fee and any other costs incurred by the utility in discontinuing service.

Section XII: Variances

The _________________________ (*designated official*), or his/her designee, may, in writing, grant a temporary variance to the pro rata water allocation policies provided by this Plan if it is determined that failure to grant such variance would cause an emergency condition adversely affecting the public health, welfare, or safety and if one or more of the following conditions are met:

(a) Compliance with this Plan cannot be technically accomplished during the duration of the water supply shortage or other condition for which the Plan is in effect.
(b) Alternative methods can be implemented which will achieve the same level of reduction in water use.

Persons requesting an exemption from the provisions of this Plan shall file a petition for variance with the _________________________ (*designated official*) within 5 days after pro rata allocation has been invoked. All petitions for variances shall be reviewed by the _________________________ (*governing body*), and shall include the following:

(a) Name and address of the petitioner(s).
(b) Detailed statement with supporting data and information as to how the pro rata allocation of water under the policies and procedures established in the Plan adversely affects the petitioner or what damage or harm will occur to the petitioner or others if petitioner complies with this Ordinance.
(c) Description of the relief requested.
(d) Period of time for which the variance is sought.
(e) Alternative measures the petitioner is taking or proposes to take to meet the intent of this Plan and the compliance date.
(f) Other pertinent information.

Variances granted by the _________________________ (*governing body*) shall be subject to the following conditions, unless waived or modified by the _________________________ (*governing body*) or its designee:

(a) Variances granted shall include a timetable for compliance.
(b) Variances granted shall expire when the Plan is no longer in effect, unless the petitioner has failed to meet specified requirements.

No variance shall be retroactive or otherwise justify any violation of this Plan occurring prior to the issuance of the variance.

Section XIII: Severability

It is hereby declared to be the intention of the _________________________ (*governing body of your water supplier*) that the sections, paragraphs, sentences, clauses, and phrases of this Plan are severable and, if any phrase, clause, sentence, paragraph, or section of this Plan shall be declared unconstitutional by the valid judgment or decree of any court of competent jurisdiction, such unconstitutionality shall not affect any of the remaining phrases, clauses, sentences, paragraphs, and sections of this Plan, since the same would not have been enacted by the ________________________ (*governing body of your water supplier*) without the incorporation into this Plan of any such unconstitutional phrase, clause, sentence, paragraph, or section.

Texas Commission on Environmental Quality
Water Availability Division
MC-160, P.O. Box 13087 Austin, Texas 78711-3087
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Utility Profile and Water Conservation Plan Requirements for Municipal Water Use by Retail Public Water Suppliers

This form is provided to assist retail public water suppliers in water conservation plan assistance in completing this form or in developing your plan, please contact the Conservation staff of the Resource Protection Team in the Water Availability Division at (512) 239-4691.

Water users can find best management practices (BMPs) at the Texas Water Development Board's website http://www.twdb.texas.gov/conservation/BMPs/index.asp. The practices are broken out into sectors such as Agriculture, Commercial and Institutional, Industrial, Municipal and Wholesale. BMPs are voluntary measures that water users use to develop the required components of Title 30, Texas Administrative Code, Chapter 288. BMPs can also be implemented in addition to the rule requirements to achieve water conservation goals.

Contact Information

Name of Water Supplier:	Click to add text	
Address:		
Telephone Number:	( )	Fax: ( )
Water Right No.(s):		
Regional Water Planning Group:		
Water Conservation Coordinator (or person responsible for implementing conservation program):		Phone: ( )
Form Completed by:		
Title:		
Signature:		Date: / /

A water conservation plan for municipal use by retail public water suppliers must include the following requirements (as detailed in 30 TAC Section 288.2). If the plan does not provide information for each requirement, you must include in the plan an explanation of why the requirement is not applicable.

Utility Profile

I. POPULATION AND CUSTOMER DATA

A. Population and Service Area Data

1. Attach a copy of your service-area map and, if applicable, a copy of your Certificate of Convenience and Necessity (CCN).

2. Service area size (in square miles):

   (Please attach a copy of service-area map)

3. Current population of service area:

4. Current population served for:

   a. Water

   b. Wastewater

5. Population served for previous five years:

Year	*Population*

6. Projected population for service area in the following decades:

Year	*Population*
2020	
2030	
2040	
2050	
2060	

7. List source or method for the calculation of current and projected population size.

B. Customer Data

Senate Bill 181 requires that uniform consistent methodologies for calculating water use and conservation be developed and available to retail water providers and certain other water use sectors as a guide for preparation of water use reports, water conservation plans, and reports on water conservation efforts. A water system must provide the most detailed level of customer and water use data available to it, however, any new billing system purchased must be capable of reporting data for each of the sectors listed below. More guidance can be found at: http://www.twdb.texas.gov/conservation/doc/SB181Guidance.pdf

1. Quantified 5-year and 10-year goals for water savings:

	Historic 5-year Average	*Baseline*	*5-year goal for year*	*10-year goal for year*
Total GPCD				
Residential GPCD				
Water Loss GPCD				
Water Loss Percentage				

Notes:
Total GPCD = (Total Gallons in System ÷ Permanent Population) ÷ 365
Residential GPCD = (Gallons Used for Residential Use ÷ Residential Population) ÷ 365
Water Loss GPCD = (Total Water Loss ÷ Permanent Population) ÷ 365
Water Loss Percentage = (Total Water Loss ÷ Total Gallons in System) x 100; or (Water Loss GPCD ÷ Total GPCD) x 100

2. Current number of active connections. Check whether multi-family service is counted as ☐ Residential or ☐ Commercial?

Treated Water Users	*Metered*	*Non-Metered*	*Totals*
Residential			
Single-Family			
Multi-Family			
Commercial			
Industrial/Mining			
Institutional			
Agriculture			
Other/Wholesale			

3. List the number of new connections per year for most recent three years.

Year			
Treated Water Users			
Residential			
Single-Family			
Multi-Family			
Commercial			
Industrial/Mining			
Institutional			
Agriculture			
Other/Wholesale			

4. List of annual water use for the five highest volume customers.

Customer	*Use (1,000 gal/year)*	*Treated or Raw Water*

II. WATER USE DATA FOR SERVICE AREA

A. *Water Accounting Data*

1. List the amount of water use for the previous five years (in 1,000 gallons).

   Indicate whether this is ☐ diverted or ☐ treated water.

Year					
Month					
January					
February					
March					
April					
May					
June					
July					
August					
September					
October					
November					
December					
Totals					

2. Describe how the above figures were determined (e.g, from a master meter located at the point of a diversion from the source or located at a point where raw water enters the treatment plant, or from water sales).

3. Amount of water (in 1,000 gallons) delivered/sold as recorded by the following account types for the past five years.

Year					
Account Types					
Residential					
Single-Family					
Multi-Family					
Commercial					
Industrial/Mining					
Institutional					
Agriculture					
Other/Wholesale					

4. List the previous records for water loss for the past five years (the difference between water diverted or treated and water delivered or sold).

Year	*Amount (gallons)*	*Percent %*

B. *Projected Water Demands*

1. If applicable, attach or cite projected water supply demands from the applicable Regional Water Planning Group for the next ten years using information such as population trends, historical water use, and economic growth in the service area over the next ten years and any additional water supply requirements from such growth.

III. WATER SUPPLY SYSTEM DATA

A. *Water Supply Sources*

1. List all current water supply sources and the amounts authorized (in acre feet) with each.

Water Type	*Source*	*Amount Authorized*
Surface Water		

Groundwater	______	______
Other	______	______

B. Treatment and Distribution System (if providing treated water)

1. Design daily capacity of system (MGD):

2. Storage capacity (MGD):

   a. Elevated

   b. Ground

3. If surface water, do you recycle filter backwash to the head of the plant?

   ☐ Yes ☐ No If yes, approximate amount (MGD):

IV. WASTEWATER SYSTEM DATA

A. Wastewater System Data (if applicable)

1. Design capacity of wastewater treatment plant(s) (MGD):

2. Treated effluent is used for ☐ on-site irrigation, ☐ off-site irrigation, for ☐ plant wash-down, and/or for ☐ chlorination/dechlorination.

   If yes, approximate amount (in gallons per month):

3. Briefly describe the wastewater system(s) of the area serviced by the water utility. Describe how treated wastewater is disposed. Where applicable, identify treatment plant(s) with the TCEQ name and number, the operator, owner, and the receiving stream if wastewater is discharged.

B. Wastewater Data for Service Area (if applicable)

1. Percent of water service area served by wastewater system: %

2. Monthly volume treated for previous five years (in 1,000 gallons):

Year					
Month					
January					
February					
March					
April					

May					
June					
July					
August					
September					
October					
November					
December					
Totals					

Water Conservation Plan

In addition to the utility profile, please attach the following as required by Title 30, Texas Administrative Code, §288.2. Note: If the water conservation plan does not provide information for each requirement, an explanation must be included as to why the requirement is not applicable.

A. *Record Management System*

The water conservation plan must include a record management system which allows for the classification of water sales and uses in to the most detailed level of water use data currently available to it, including if possible, the following sectors: residential (single and multi-family), commercial.

B. *Specific, Quantified 5 & 10-Year Targets*

The water conservation plan must include specific, quantified five-year and ten-year targets for water savings to include goals for water loss programs and goals for municipal use in gallons per capita per day. Note that the goals established by a public water supplier under this subparagraph are not enforceable. These goals must be updated during the five-year review and submittal.

C. *Measuring and Accounting for Diversions*

The water conservation plan must include a statement about the water suppliers metering device(s), within an accuracy of plus or minus 5.0% in order to measure and account for the amount of water diverted from the source of supply.

D. *Universal Metering*

The water conservation plan must include and a program for universal metering of both customer and public uses of water, for meter testing and repair, and for periodic meter replacement.

E. *Measures to Determine and Control Water Loss*

The water conservation plan must include measures to determine and control water loss (for example, periodic visual inspections along distribution lines; annual or monthly audit of the water system to determine illegal connections; abandoned services; etc.).

F. *Continuing Public Education & Information*

The water conservation plan must include a description of the program of continuing public education and information regarding water conservation by the water supplier.

G. *Non-Promotional Water Rate Structure*

The water supplier must have a water rate structure which is not "promotional," i.e., a rate structure which is cost-based and which does not encourage the excessive use of water. This rate structure must be listed in the water conservation plan.

H. *Reservoir Systems Operations Plan*

The water conservation plan must include a reservoir systems operations plan, if applicable, providing for the coordinated operation of reservoirs owned by the applicant within a common watershed or river basin in order to optimize available water supplies.

I. Enforcement Procedure and Plan Adoption

The water conservation plan must include a means for implementation and enforcement, which shall be evidenced by a copy of the ordinance, rule, resolution, or tariff, indicating official adoption of the water conservation plan by the water supplier; and a description of the authority by which the water supplier will implement and enforce the conservation plan.

J. Coordination with the Regional Water Planning Group(s)

The water conservation plan must include documentation of coordination with the regional water planning groups for the service area of the public water supplier in order to ensure consistency with the appropriate approved regional water plans.

K. Plan Review and Update

A public water supplier for municipal use shall review and update its water conservation plan, as appropriate, based on an assessment of previous five-year and ten-year targets and any other new or updated information. The public water supplier for municipal use shall review and update the next revision of its water conservation plan not later than May 1, 2009, and every five years after that date to coincide with the regional water planning group. The revised plan must also include an implementation report.

VI. ADDITIONAL REQUIREMENTS FOR LARGE SUPPLIERS

Required of suppliers serving population of 5,000 or more or a projected population of 5,000 or more within the next ten years:

A. Leak Detection and Repair

The plan must include a description of the program of leak detection, repair, and water loss accounting for the water transmission, delivery, and distribution system in order to control unaccounted for uses of water.

B. Contract Requirements

A requirement in every wholesale water supply contract entered into or renewed after official adoption of the plan (by either ordinance, resolution, or tariff), and including any contract extension, that each successive wholesale customer develop and implement a water conservation plan or water conservation measures using the applicable elements in this chapter. If the customer intends to resell the water, the contract between the initial supplier and customer must provide that the contract for the resale of the water must have water conservation requirements so that each successive customer in the resale of the water will be required to implement water conservation measures in accordance with the provisions of this chapter.

VII. ADDITIONAL CONSERVATION STRATEGIES

Any combination of the following strategies shall be selected by the water supplier, in addition to the minimum requirements of 30 TAC §288.2(1), if they are necessary in order to achieve the stated water conservation goals of the plan. The commission may require by commission order that any of the following strategies be implemented by the water supplier if the commission determines that the strategies are necessary in order for the conservation plan to be achieved:

1. Conservation-oriented water rates and water rate structures such as uniform or increasing block rate schedules, and/or seasonal rates, but not flat rate or decreasing block rates;

2. Adoption of ordinances, plumbing codes, and/or rules requiring water conserving plumbing fixtures to be installed in new structures and existing structures undergoing substantial modification or addition;

3. A program for the replacement or retrofit of water-conserving plumbing fixtures in existing structures;

4. A program for reuse and/or recycling of wastewater and/or graywater;

5. A program for pressure control and/or reduction in the distribution system and/or for customer connections;

6. A program and/or ordinance(s) for landscape water management;

7. A method for monitoring the effectiveness and efficiency of the water conservation plan; and

8. Any other water conservation practice, method, or technique which the water supplier shows to be appropriate for achieving the stated goal or goals of the water conservation plan.

VIII. WATER CONSERVATION PLANS SUBMITTED WITH A WATER RIGHT APPLICATION FOR NEW OR ADDITIONAL STATE WATER

Water Conservation Plans submitted with a water right application for New or Additional State Water must include data and information which:

1. support the applicant's proposed use of water with consideration of the water conservation goals of the water conservation plan;

2. evaluates conservation as an alternative to the proposed appropriation; and

3. evaluates any other feasible alternative to new water development including, but not limited to, waste prevention, recycling and reuse, water transfer and marketing, regionalization, and optimum water management practices and procedures.

Additionally, it shall be the burden of proof of the applicant to demonstrate that no feasible alternative to the proposed appropriation exists and that the requested amount of appropriation is necessary and reasonable for the proposed use.

Texas Commission on Environmental Quality

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System Inventory and Water Conservation Plan for Agricultural Water Suppliers Providing Water to More Than One User

This form is provided to assist entities in developing a water conservation plan for agricultural water suppliers providing water to more than one user. If you need assistance in completing this form or in developing your plan, please contact the Conservation staff of the Resource Protection Team in the Water Availability Division at (512) 239-4691.

Additional resources such as best management practices (BMPs) are available on the Texas Water Development Board's website http://www.twdb.texas.gov/conservation/BMPs/index.asp. The practices are broken out into sectors such as Agriculture, Commercial and Institutional, Industrial, Municipal and Wholesale. BMPs are voluntary measures that water users use to develop the required components of Title 30, Texas Administrative Code, Chapter 288. BMPs can also be implemented in addition to the rule requirements to achieve water conservation goals.

Contact Information

Name: Click to add text

Address: __________

Telephone Number: ( ) __________ Fax: ( ) __________

Form Completed By: __________

Title: __________

Signature: __________ Date: / /

A water conservation plan for agriculture use (for a system providing agricultural water to more than one user) must include the following requirements (as detailed in 30 TAC Section 288.4). If the plan does not provide information for each requirement, you must include in the plan an explanation of why the requirement is not applicable.

I. BACKGROUND DATA

A. *Structural Facilities (Supplier's water storage, conveyance, and delivery structures)*

1. Description of service area:

2. Total miles of main canals and pipelines:

3. Total miles of lateral canals and pipelines:

4. Description of canal construction:
    a. Miles of unlined canals
    b. Miles of lined canals
    c. Miles of enclosed pipelines
    d. Other
5. Description of canal conditions and recent or planned improvements:

6. Reservoir capacity, if applicable:

7. Description of pumps and pumping stations:

8. Description of meters and/or measuring devices:

9. Description of customer gates and measuring devices:

10. Description of any other structural facilities not covered above:

B. Management Practices

1. Total water available to district (in acre-feet/year):
    a. Maximum water rights allocation to district:
    b. Water right number(s):
    c. Other water contracted to be delivered by district:

2. Average annual water diverted by district (in acre-feet/year):
3. Average annual water delivered to customers (in acre-feet/year):
4. Delivery efficiency (percentage):

5. Historical diversion and deliveries for the previous three years (in acre-feet/year):

Year	*Total Water Diverted Annually*	*Irrigation Water Delivered Annually*	*Municipal Water Delivered Annually*	*Total Water Delivered Annually*	*Estimated Delivery Efficiency (%)*
Average					

6. Description of practices and/or devices used to account for water deliveries:

7. Water pricing policy:

8. Operating rules and policies which encourage water conservation (if a separate document, include it as an attachment to the Water Conservation Plan):

9. Provide specific, quantified 5-year and 10-year targets for water savings or system efficiency below, including maximum allowable losses for the storage and distribution system. Water savings may be represented in acre-feet or in water use efficiency.

   Quantified 5-year and 10-year targets for water savings and water loss:

   5-year goal:
   Water savings in acre-feet or water use efficiency %
   Water loss

   10-year goal:
   Water savings in acre-feet or water use efficiency %
   Water loss

10. Describe the practice(s) and/or device(s) which will be utilized to measure and account for the amount of water diverted from the source(s) of supply:

11. Describe the monitoring and record management program for water deliveries, sales, and losses:

12. Describe any programs that will be used for water loss control, leak detection, and repair:

13. Describe any program for customer assistance in the development of on-farm water conservation and pollution prevention plans and/or measures:

14. Describe any other water conservation practice, method, or technique which the supplier shows to be appropriate for achieving conservation (if applicable):

C. User profile

1. Total number of acres or square miles in service area:
2. Average number of acres irrigated annually:
3. Projected number of acres to be irrigated in 10 years:
4. Number of active customers taking delivery of water by the system:
5. Total irrigation water delivered annually (in acre-feet):
6. Types of crops grown by customers:

7. Types of irrigation systems used by customers:

8. Types of drainage systems used by customers:

9. Any additional relevant information on irrigation customers:

10. List of municipal customers and number of acre-feet allocated annually:

11. List of industrial and other large customers and number of acre-feet allocated annually:

D. Additional Requirements

In addition to the above information, please attach the following as required by Title 30, Texas Administrative Code, §288.4(3).

1. A requirement in every wholesale water supply contract entered into or renewed after official adoption of the plan (by either ordinance, resolution, or tariff), and including any contract extension, that each successive wholesale customer develop and implement a water conservation plan or water conservation measures using the applicable elements in 30 TAC Chapter 288. If the customer intends to resell the water, then the contract between the initial supplier and customer must provide that the contract for the resale of the water must have water conservation requirements so that each successive customer in the resale of the water will be required to implement water conservation measures in accordance with applicable provisions of 30 TAC Chapter 288.

2. Evidence of official adoption of the water conservation plan and goals, by ordinance, rule, resolution, or tariff, indicating that the plan reflects official policy of the supplier.

3. Documentation of coordination with the Regional Water Planning Group(s) in order to ensure consistency with the appropriate approved regional water plan(s).

II. Water Conservation Plans submitted with a Water Right Application for New or Additional State Water

Water Conservation Plans submitted with a water right application for New or Additional State Water must include data and information which:

1. support the applicant's proposed use of water with consideration of the water conservation goals of the water conservation plan;

2. evaluates conservation as an alternative to the proposed appropriation; and

3. evaluates any other feasible alternative to new water development including, but not limited to, waste prevention, recycling and reuse, water transfer and marketing, regionalization, and optimum water management practices and procedures.

Additionally, it shall be the burden of proof of the applicant to demonstrate that no feasible alternative to the proposed appropriation exists and that the requested amount of appropriation is necessary and reasonable for the proposed use.

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Telephone (512) 239-4691, FAX (512) 239-2214

Utility Profile and Water Conservation Plan Requirements for Wholesale Public Water Suppliers

This form is provided to assist wholesale public water suppliers in water conservation plan development. If you need assistance in completing this form or in developing your plan, please contact the Conservation staff of the Resource Protection Team in the Water Availability Division at (512) 239-4691.

Water users can find best management practices (BMPs) at the Texas Water Development Board's website http://www.twdb.texas.gov/conservation/BMPs/index.asp. The practices are broken out into sectors such as Agriculture, Commercial and Institutional, Industrial, Municipal and Wholesale. BMPs are voluntary measures that water users use to develop the required components of Title 30, Texas Administrative Code, Chapter 288. BMPs can also be implemented in addition to the rule requirements to achieve water conservation goals.

Contact Information

Name: Click to add text ____________________

Address: ____________________

Telephone Number: (   ) ____________ Fax: (   ) ____________

Water Right No.(s): ____________________

Regional Water Planning Group: ____________________

Person responsible for implementing conservation program: ____________ Phone: (   ) ____________

Form Completed By: ____________________

Title: ____________________

Signature: ____________ Date: /   /

A water conservation plan for wholesale public water suppliers must include the following requirements (as detailed in 30 TAC Section 288.5). If the plan does not provide information for each requirement, you must include in the plan an explanation of why the requirement is not applicable.

Utility Profile

I. WHOLESALE SERVICE AREA POPULATION AND CUSTOMER DATA

A. Population and Service Area Data:

1. Service area size (in square miles):

   (Please attach a copy of service-area map)

2. Current population of service area:

3. Current population served for:

   a. Water

   b. Wastewater

4. Population served for previous five years:

Year	*Population*

5. Projected population for service area in the following decades:

Year	*Population*
2020	
2030	
2040	
2050	
2060	

6. List source or method for the calculation of current and projected population size.

B. Customer Data

List (or attach) the names of all wholesale customers, amount of annual contract, and amount of annual use for each customer for the previous year:

Wholesale Customer	*Contracted Amount (Acre-feet)*	*Previous Year Amount of Water Delivered (acre-feet)*

II. WATER USE DATA FOR SERVICE AREA

A. *Water Delivery*

Indicate if the water provided under wholesale contracts is treated or raw water and the annual amounts for the previous five years (in acre feet):

Year	*Treated Water*	*Raw Water*
Totals		

B. Water Accounting Data

1. Total amount of water diverted at the point of diversion(s) for the previous five years (in acre-feet) for all water uses:

Year					
Month					
January					
February					
March					
April					
May					
June					
July					
August					
September					
October					
November					
December					

Totals	______	______	______	______	______

2. Wholesale population served and total amount of water diverted for **municipal use** for the previous five years (in acre-feet):

Year	*Total Population Served*	*Total Annual Water Diverted for Municipal Use*

C. *Projected Water Demands*

If applicable, project and attach water supply demands for the next ten years using information such as population trends, historical water use, and economic growth in the service area over the next ten years and any additional water supply requirements from such growth.

III. WATER SUPPLY SYSTEM DATA

A. *Projected Water Demands*

List all current water supply sources and the amounts authorized (in acre feet) with each.

Water Type	*Source*	*Amount Authorized*
Surface Water		
Groundwater		
Other		

B. *Treatment and Distribution System (if providing treated water)*

1. Design daily capacity of system (MGD):

2. Storage capacity (MGD):
   a. Elevated
   b. Ground

3. Please attach a description of the water system. Include the number of treatment plants, wells, and storage tanks

IV. WASTEWATER SYSTEM DATA

A. *Wastewater System Data (if applicable)*

1. Design capacity of wastewater treatment plant(s) (MGD):

2. Briefly describe the wastewater system(s) of the area serviced by the wholesale public water supplier. Describe how treated wastewater is disposed. Where applicable, identify treatment plant(s) with the TCEQ name and number, the operator, owner, and the receiving stream if wastewater is discharged.

B. *Wastewater Data for Service Area (if applicable)*

1. Percent of water service area served by wastewater system: %

2. Monthly volume treated for previous five years (in 1,000 gallons):

Year					
Month					
January					
February					
March					
April					
May					
June					
July					
August					
September					
October					
November					
December					
Totals					

Water Conservation Plan

In addition to the description of the wholesaler's service area (profile from above), a water conservation plan for a wholesale public water supplier must include, at a minimum, additional information as required by Title 30, Texas Administrative Code, Chapter 288.5. Note: If the water conservation plan does not provide information for each requirement an explanation must be included as to why the requirement is not applicable.

A. *Specific, Quantified 5 & 10-Year Targets*

The water conservation plan must include specific, quantified 5-year and 10-year targets for water savings including, where appropriate, target goals for municipal use in gallons per capita per day for the wholesaler's service area, maximum acceptable water loss, and the basis for the development of these goals. Note that the goals established by a wholesale water supplier under this subparagraph are not enforceable. These goals must be updated during the 5-year review and submittal.

B. *Measuring and Accounting for Diversions*

The water conservation plan must include a description as to which practice(s) and/or device(s) will be utilized to measure and account for the amount of water diverted from the source(s) of supply.

C. *Record Management Program*

The water conservation plan must include a monitoring and record management program for determining water deliveries, sales, and losses.

D. *Metering/Leak-Detection and Repair Program*

The water conservation plan must include a program of metering and leak detection and repair for the wholesaler's water storage, delivery, and distribution system.

E. *Contract Requirements for Successive Customer Conservation*

The water conservation plan must include a requirement in every water supply contract entered into or renewed after official adoption of the water conservation plan, and including any contract extension, that each successive wholesale customer develop and implement a water conservation plan or water conservation measures using the applicable elements of Title 30 TAC Chapter 288. If the customer intends to resell the water, then the contract between the initial supplier and customer must provide that the contract for the resale of the water must have water conservation requirements so that each successive customer in the resale of the water will be required to implement water conservation measures in accordance with the provisions of this chapter.

F. *Reservoir Systems Operations Plan*

The water conservation plan must include a reservoir systems operations plan, if applicable, providing for the coordinated operation of reservoirs owned by the applicant within a common watershed or river basin. The reservoir systems operations plan shall include optimization of water supplies as one of the significant goals of the plan.

G. *Enforcement Procedure and Official Adoption*

The water conservation plan must include a means for implementation and enforcement, which shall be evidenced by a copy of the ordinance, rule, resolution, or tariff, indicating official adoption of the water conservation plan by the water supplier; and a description of the authority by which the water supplier will implement and enforce the conservation plan.

H. *Coordination with the Regional Water Planning Group(s)*

The water conservation plan must include documentation of coordination with the regional water planning groups for the service area of the wholesale water supplier in order to ensure consistency with the appropriate approved regional water plans.

Example statement to be included within the water conservation plan:

The service area of the _____________ (name of water supplier) is located within the ___________ (name of regional water planning area or areas) and ___________ (name of water supplier) has provided a copy of this water conservation plan to the ____________ (name of regional water planning group or groups).

I. *Plan Review and Update*

A wholesale water supplier shall review and update its water conservation plan, as appropriate based on an assessment of previous 5-year and 10-year targets and any other new or updated information. A wholesale water supplier shall review and update the next revision of its water conservation plan no later than May 1, 2009, and every five years after that date to coincide with the regional water planning group. The revised plan must also include an implementation report.

V. ADDITIONAL CONSERVATION STRATEGIES

Any combination of the following strategies shall be selected by the water wholesaler, in addition to the minimum requirements of 30 TAC §288.5(1), if they are necessary in order to achieve the stated water conservation goals of the plan. The commission may require by commission order that any of the following strategies be implemented by the water supplier if the commission determines that the strategies are necessary in order for the conservation plan to be achieved:

1. Conservation-oriented water rates and water rate structures such as uniform or increasing block rate schedules, and/or seasonal rates, but not flat rate or decreasing block rates;

2. A program to assist agricultural customers in the development of conservation, pollution prevention and abatement plans;

3. A program for reuse and/or recycling of wastewater and/or graywater;

4. Any other water conservation practice, method, or technique which the wholesaler shows to be appropriate for achieving the stated goal or goals of the water conservation plan.

VI. WATER CONSERVATION PLANS SUBMITTED WITH A WATER RIGHT APPLICATION FOR NEW OR ADDITIONAL STATE WATER

Water Conservation Plans submitted with a water right application for New or Additional State Water must include data and information which:

1. support the applicant's proposed use of water with consideration of the water conservation goals of the water conservation plan;

2. evaluates conservation as an alternative to the proposed appropriation; and

3. evaluates any other feasible alternative to new water development including, but not limited to, waste prevention, recycling and reuse, water transfer and marketing, regionalization, and optimum water management practices and procedures.

Additionally, it shall be the burden of proof of the applicant to demonstrate that no feasible alternative to the proposed appropriation exists and that the requested amount of appropriation is necessary and reasonable for the proposed use.

Texas Commission on Environmental Quality
Water Availability Division
MC-160, P.O. Box 13087 Austin, Texas 78711-3087
Telephone (512) 239-4691, FAX (512) 239-2214

Industrial / Mining Water Conservation Plan

This form is provided to assist entities in developing a water conservation plan for industrial water use. If you need assistance in completing this form or in developing your plan, please contact the Conservation staff of the Resource Protection Team in the Water Availability Division at (512) 239-4691.

Additional resources such as best management practices (BMPs) are available on the Texas Water Development Board's website http://www.twdb.texas.gov/conservation/BMPs/index.asp. The practices are broken out into sectors such as Agriculture, Commercial and Institutional, Industrial, Municipal and Wholesale. BMPs are voluntary measures that water users use to develop the required components of Title 30, Texas Administrative Code, Chapter 288. BMPs can also be implemented in addition to the rule requirements to achieve water conservation goals.

Contact Information

Name: Click to add text ____________________

Address: ____________________

Telephone Number: ( ) ____________ Fax: ( ) ____________

Form Completed By: ____________________

Title: ____________________

Signature: ____________ Date: / /

A water conservation plan for industrial use must include the following requirements (as detailed in 30 TAC Section 288.3). If the plan does not provide information for each requirement, you must include in the plan an explanation of why the requirement is not applicable.

I. BACKGROUND DATA

A. *Water Use*

1. Annual diversion appropriated or requested (in acre-feet):

2. Maximum diversion rate (cfs):

B. *Water Sources*

1. Please indicate the maximum or average annual amounts of water currently used and anticipated to be used (in acre-feet) for industrial purposes:

Source	*Water Right No.(s)*	*Current Use*	*Anticipated Use*
Surface Water			
Groundwater			
Purchased			
Total			

2. How was the surface water data and/or groundwater data provided in B(1) obtained?

   Master meter ; Customer meter ; Estimated ; Other

3. Was purchased water raw or treated?

   If both, % raw ; % treated ; and Supplier(s)

C. *Industrial Information*

1. Major product(s) or service(s) produced by applicant:

2. North American Industry Classification System (NAICS):

II. WATER USE AND CONSERVATION PRACTICES

A. *Water Use in Industrial Processes*

Production Use	*% Groundwater*	*% Surface Water*	*% Saline Water*	*% Treated Water*	*Water Use (in acre-ft)*
Cooling, condensing, & refrigeration					
Processing, washing, transport					
Boiler feed					
Incorporated into product					
Other					

Facility Use	*% Groundwater*	*% Surface Water*	*% Saline Water*	*% Treated Water*	*Water Use (in acre-ft)*
Cooling tower(s)					
Pond(s)					
Once through					
Sanitary & drinking water					
Irrigation & dust control					

1. Was fresh water recirculated at this facility? ☐ Yes ☐ No
2. Provide a detailed description of how the water will be utilized in the industrial process.
3. Estimate the quantity of water consumed in production processes and is therefore unavailable for reuse, discharge, or other means of disposal.
4. Monthly water consumption for previous year (in acre-feet).

Month	*Diversion Amount*	*% of Water Returned (If Any)*	*Monthly Consumption*
January			
February			
March			
April			
May			
June			
July			
August			

September			
October			
November			
December			
Totals			

5. Projected monthly water consumption for next year (in acre-feet).

Month	*Diversion Amount*	*% of Water Returned (If Any)*	*Monthly Consumption*
January			
February			
March			
April			
May			
June			
July			
August			
September			
October			
November			
December			
Totals			

B. Specific and Quantified Conservation Goal

Water conservation goals for the industrial sector are generally established either for (1) the amount of water recycled, (2) the amount of water reused, or (3) the amount of water not lost or consumed, and therefore is available for return flow.

1. Water conservation goal (water use efficiency measure)

Type of goal(s):

% reused water

% of water not consumed and therefore returned

Other (specify)

2. Provide specific, quantified 5-year and 10-year targets for water savings and the basis for development of such goals for this water use/facility.

   Quantified 5-year and 10-year targets for water savings:

   a. 5-year goal:

   b. 10-year goal:

3. Describe the device(s) and/or method(s) used to measure and account for the amount of water diverted from the supply source, and verify the accuracy is within plus or minus 5%.

4. Provide a description of the leak-detection and repair, and water-loss accounting measures used.

5. Describe the application of state-of-the-art equipment and/or process modifications used to improve water use efficiency.

6. Describe any other water conservation practice, method, or technique which the user shows to be appropriate for achieving the stated goal or goals of the water conservation plan:

III. Water Conservation Plans submitted with a Water Right Application for New or Additional State Water

Water Conservation Plans submitted with a water right application for New or Additional State Water must include data and information which:

1. support the applicant's proposed use of water with consideration of the water conservation goals of the water conservation plan;

2. evaluates conservation as an alternative to the proposed appropriation; and

3. evaluates any other feasible alternative to new water development including, but not limited to, waste prevention, recycling and reuse, water transfer and marketing, regionalization, and optimum water management practices and procedures.

Additionally, it shall be the burden of proof of the applicant to demonstrate that no feasible alternative to the proposed appropriation exists and that the requested amount of appropriation is necessary and reasonable for the proposed use.

INITIALLY PREPARED PLAN

CHAPTER 8: POLICY RECOMMENDATIONS AND UNIQUE SITES

Rio Grande Regional Water Plan

B&V PROJECT NO. 411250

PREPARED FOR

Rio Grande Regional Water Planning Group

1 MARCH 2025

BLACK & VEATCH

Table of Contents

LIST OF FIGURES

List of Abbreviations

acft	Acre-Feet
acft/yr	Acre-Feet per Year
BPUB	Brownsville Public Utilities Board
BRACS	Brackish Resources Aquifer Characterization
IBWC	International Boundary Water Commission
ID	Irrigation District
RGV	Rio Grande Valley
RWP	Regional Water Plan
RWPG	Regional Water Planning Group
SB	Senate Bill
SWIFT	State Water Implementation Fund for Texas
TCEQ	Texas Commission on Environmental Quality
TNRCC	Texas Natural Resource Conservation Commission
TPWD	Texas Parks and Wildlife Department
TWDB	Texas Water Development Board
USFWS	US Fish and Wildlife Service
WAC	Watermaster Advisory Committee
WAM	Water Availability Model
WMS	Water Management Strategy

8.0 Policy Recommendations and Unique Sites

In addition to making recommendations regarding strategies for meeting current and future water needs, Texas Water Development Board (TWDB) rules for Senate Bill (SB) 1 regional planning allow the regional water planning groups (RWPGs) to include recommendations in the regional water plan (RWP) with regard to legislative designation of ecologically unique streams, sites for future reservoir development, and policy issues. The Rio Grande RWPG elected to consider recommendations in each of these areas, which are presented in this chapter.

8.1 Designation of Ecologically Unique Stream Segments

TWDB rules for SB 1 regional water planning describe the process by which RWPGs may prepare and submit recommendations for legislative designation of ecologically unique river and stream segments. This process involves the Rio Grande RWPG, the Texas Parks and Wildlife Department (TPWD), the TWDB, and ultimately, the Texas Legislature. According to SB 1, the Rio Grande RWPG may recommend legislative designation of river or stream segments within the region as “ecologically unique.”

TWDB rules provide that the RWPGs forward any recommendations regarding legislative designation of ecologically unique streams to the TPWD and include TPWD’s written evaluation of such recommendations in the adopted RWP. The recommendation of the RWPG is then to be considered by the TWDB for inclusion in the state water plan. Finally, the Texas Legislature will consider any recommendations presented in the state water plan regarding designation of stream segments as ecologically unique.

8.1.1 Criteria for Designation of Ecologically Unique Stream Segments

TWDB rules also specify the following criteria that are to be applied in the evaluation of potential ecologically unique river or stream segments:

- **Biological Function:** Stream segments that display significant overall habitat value, including both quantity and quality, considering the degree of biodiversity, age and uniqueness observed, and including terrestrial, wetland, aquatic, or estuarine habitats;
- **Hydrologic Function:** Stream segments that are fringed by habitats that perform valuable hydrologic functions relating to water quality, flood attenuation, flow stabilization, or groundwater recharge and discharge;
- **Riparian Conservation Areas:** Stream segments that are fringed by significant areas in public ownership, including state and federal refuges, wildlife management areas, preserves, parks, mitigation areas or other areas held by governmental organizations for conservation purposes, or segments that are fringed by other areas managed for conservation purposes under a governmentally-approved conservation plan;
- **High Water Quality/Exceptional Aquatic Life/High Aesthetic Value:** Stream segments and spring resources that are significant because of unique or critical habitats and exceptional aquatic life uses dependent upon or associated with high water quality; and/or
- **Threatened or Endangered Species/Unique Communities:** Sites along streams where water development projects would have significant detrimental effects on state- or federally-listed threatened and endangered species, and sites along segments that are significant because of the presence of unique, exemplary, or unusually extensive natural communities.

8.1.2 Candidate Stream Segments

To assist each of the 16 RWPGs, the TPWD developed a list of candidate stream segments in each region that appear to meet the criteria for designation as ecologically unique. For the Rio Grande Region, TPWD prepared a report entitled Ecologically Significant River and Stream Segments of Region M, Regional Water Planning Area (May 2000), that presents information on four stream segments within the region that meet one or more of the following criteria for designation as ecologically unique:[1]

1. **Arroyo Colorado**: This tidal segment of the Arroyo Colorado (Texas Natural Resource Conservation Commission [TNRCC] classified segment 2201) runs just upstream of Port of Harlingen to its confluence with Laguna Madre in Willacy/Cameron Counties.
   - Biological Function - Priority riparian and extensive freshwater wetland habitats displays significant overall habitat value.
   - Riparian Conservation Area - Laguna Atascosa National Wildlife Refuge; Las Palomas Wildlife Management Area.
2. **Las Moras Creek**: From the confluence with the Rio Grande in Maverick County upstream to the Maverick/Kinney County line.
   - High Water Quality/Exceptional Aquatic Life/High Aesthetic Value - Ecoregion stream; high water quality, diverse benthic macroinvertebrate community[2].
   - Threatened or Endangered Species/Unique Communities - Proserpine shiner (SOC/St.T)[3].
3. **Rio Grande**: From the confluence with the Gulf of Mexico in Cameron County upstream to Falcon Dam in Starr County (TNRCC classified stream segments 2301 and 2302).
   - Biological Function: Priority bottomland habitat; extensive freshwater and estuarine wetland habitats[4].
   - Riparian Conservation Area - Not just one, but nine unique locations in the Rio Grande Valley (RGV). Each site of the World Birding Center has its own attractions for both the first time visitor and expert birder.
   - High Water Quality/Exceptional Aquatic Life/High Aesthetic Value - High water quality and exceptional aquatic life use[5]; diverse benthic macroinvertebrate community[6].
   - Threatened or Endangered Species/Unique Communities - Blackfin goby (SOC/St.T)[7]; unique Black Mangrove Series community; unique Texas Palmetto Series habitat[8].

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[1] https://tpwd.texas.gov/landwater/water/conservation/water_resources/water_quantity/sigsegs/regionm.phtml.
[2] Bayer, C.W., J.R. Davis, S.R. Twidwell, R. Kleinsasser, G. Linam, K. Mayes, and E. Hornig. 1992. Texas aquatic ecoregion project: an assessment of least disturbed streams (draft). Texas Water Commission, Austin, Texas.
[3] Hubbs, C., R.J. Edwards, and G.P. Garrett. 1991. An annotated checklist of the freshwater fishes of Texas, with keys to identification of species. Texas Journal of Science 43: 1-56.
[4] Bauer, J., R. Frye, B. Spain. 1991. A natural resource survey for proposed reservoir sites and selected stream segments in Texas. TPWD, Austin, Texas.
[5] TNRCC. 1996. Texas surface water quality standards. TNRCC, Austin, Texas.
[6] Davis, J.R. 1998. Personal communication. TNRCC, Austin, Texas.
[7] Hubbs, C., R.J. Edwards, and G.P. Garrett. 1991. An annotated checklist of the freshwater fishes of Texas, with keys to identification of species. Texas Journal of Science 43: 1-56.
[8] Texas Organization for Endangered Species. 1992. Endangered, threatened, and watch list of natural communities of Texas. Texas Organization for Endangered Species, Austin, Texas.

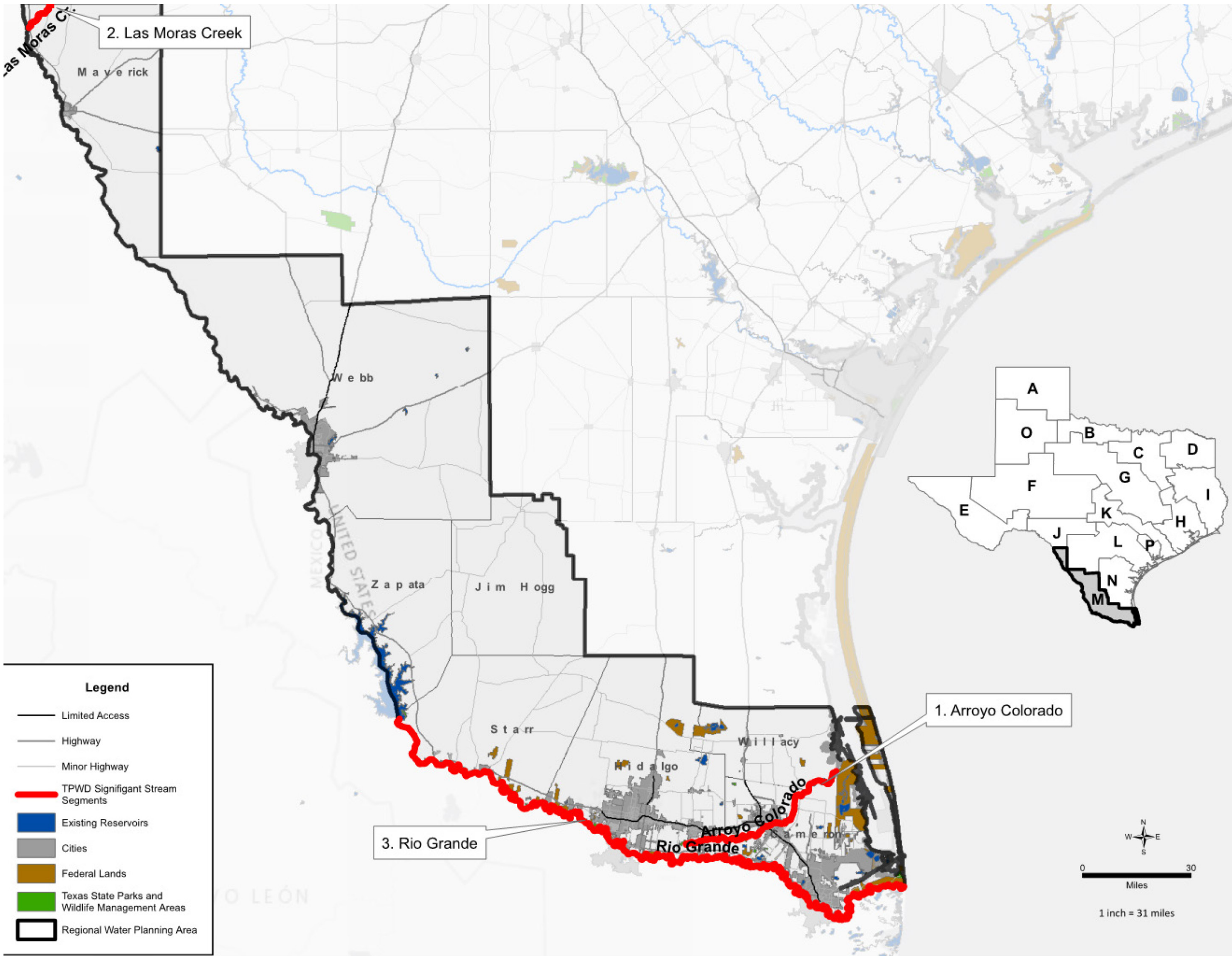

Figure 8-1 TPWD Proposed Ecologically Significant Stream Segments

The Rio Grande RWPG also received suggestions from the US Fish and Wildlife Service (USFWS), Zapata County, and the Texas Shrimp Association through two stakeholder focus group meetings during previous planning cycles. The focus group meetings were held in December 1999 and January 2000, and more than 200 individuals representing local, state, and federal agencies, environmental groups, and other parties with a known interest in the subject received written invitations to attend and provide input.

Action was considered as part of the 2006 planning cycle to accept the designation of the segment of the Rio Grande from the mouth of the Rio Grande upstream to the upstream boundary of the USFWS Tulosa tract. The motion died for a lack of a second. No action has been considered since, including during the 2026 planning cycle.

8.1.3 Recommendation

Lack of action by the Rio Grande RWPG indicates a non-designation of unique stream segments recommendation at this time. It was agreed that the issue could be brought up and considered in the future.

8.2 Reservoir Sites

TWDB rules (31 TAC, Section 357.9) for the preparation of regional water supply plans provide that the RWPGs "…may recommend sites of unique value for construction of reservoirs by including descriptions of the sites, reasons for the unique designation and the expected beneficiaries of the water supply to be developed at the site." TWDB rules further specify that the following criteria be applied to determine whether a site is unique for reservoir construction:

- Site-specific reservoir development is recommended as a specific WMS or in an alternative long-term scenario in an adopted RWP; and
- The location, hydrologic, geologic, topographic, water availability, water quality, environmental, cultural, and current development characteristics or other pertinent factors make the site uniquely suited for the following:
  - Reservoir development to provide water supply for the current planning period; or
  - Where it might reasonably be needed to meet needs beyond the 50 year planning period.

The 1944 Treaty states in Article 5, Section II, that three reservoirs should be constructed on the Rio Grande, but one may be omitted: one between Santa Elena Canyon and the mouth of the Pecos (the approximate location of Amistad Reservoir), one in the section between Eagle Pass and Laredo (no existing dam), and one between Laredo and Roma (Falcon Reservoir). Additional sites have been evaluated since the treaty but have not been found geographically or geologically acceptable.

Three reservoir sites have been considered by the Rio Grande RWPG: (1) the proposed Brownsville Weir and Reservoir; (2) the proposed Banco Morales Reservoir; and (3) the proposed Laredo Low Water Weir. Each project, as well as two others, is briefly discussed below.

8.2.1 Brownsville Weir and Reservoir

An overview of the proposed Brownsville Weir and Reservoir is provided in Chapter 5 of this plan. The City of Brownsville Public Utilities Board (BPUB) has acquired the required state water right permit and the federal Section 10/404 permit for this project. Implementation of the project is a federal project that requires bi-national sponsorship and support from federal agencies, such as the IBWC, and Mexico. Currently, a timetable has not been set for this project.

The Brownsville Weir and Reservoir project is expected to provide approximately 2,035 acre-feet per year (acft/yr) of additional dependable surface water supply for the City of Brownsville. This additional supply will play an important role in meeting Brownsville's projected water supply needs through the planning period. The development of the project is included as a water supply strategy in the first (2001) Rio Grande RWP (Region M) and in the resulting (2002) State Water Plan. The project has continually been included in each ensuing Region M and State Water Plan, including this 2026 Region RWP. Recent discussions with BPUB have noted prioritization of other projects (e.g., Resaca Restoration), which has pushed implementation of the Brownsville Weir and Reservoir to the 2030 decade.

8.2.2 Banco Morales Reservoir

The Banco Morales Reservoir is being proposed by the BPUB as a surface water development project on the Lower Rio Grande in Cameron County. This project is proposed to provide additional dependable water supply for municipal and industrial use for the City of Brownsville by capturing and diverting "excess" flows of US waters in the Rio Grande, as well as storing the city's existing water rights. As it stands now, the excess water is currently allowed to flow through Brownsville and into the Gulf of Mexico. This project provides the opportunity to capture releases from the Rio San Juan. These flows will now have a chance to be captured and stored and pumped to future users. This project is proposed to meet the future municipal and industrial water needs of the BPUB and the region. Existing municipal and industrial water supply sources for BPUB cannot currently satisfy the anticipated future water needs for the region.

The Banco Morales Reservoir project is expected to provide approximately 140 acft/yr of additional dependable surface water supply for the City of Brownsville. The additional supply will play an important role in meeting Brownsville's projected supply needs through the planning period. Similar to the Brownsville Weir and Reservoir above, implementation of the Banco Morales Reservoir is planned for the 2030 decade.

8.2.3 Laredo Low Water Weir

Laredo has been investigating the feasibility of developing a low water weir on the Rio Grande approximately 200 feet downstream of the existing La Bota site. The project will not develop additional water supply. Rather, the project is proposed to improve water quality, provide a diversion location for a new regional water treatment plant, and provide hydroelectric power. Recreational amenities may also be developed. The proposed structure would be 56 feet high, which would provide a water surface elevation below the 100 year floodplain. The design and operation of the structure would not alter the normal flows of the Rio Grande. The weir would store approximately 66,007 acre-feet (acft) of water. Laredo intends to lease water rights for the initial filling of the reservoir.

During the 2021 planning cycle, at the request of Laredo, the Rio Grande RWPG endorsed further investigation of the feasibility of the Laredo low water weir and any potential groundwater recharge associated with the weir. This would include more detailed evaluation of project costs, benefits, impacts, and permitting requirements.

8.2.4 Hidalgo County Drainage District Delta Region Water Management Supply

The drainage district has proposed construction of three reservoirs in northeastern Hidalgo County to capture tailwaters and precipitation runoff for beneficial use, discussed in detail in Chapter 5. The existing and proposed Engleman Reservoirs (77 acres), the proposed Santa Cruz reservoir (418 acres) and the proposed Delta "Panchita" Reservoir (25 acres) are all in the Delta Watershed, which is distinct from other portions of the Nueces-Rio Grande Watershed and impact no downstream water rights. Recently established environmental flow requirements for the Nueces Rio Grande Basin do not place any limitations on the drainageways that will be impacted by this strategy. These reservoirs will allow for better control and management of flows in the drainage network and will allow for the drainage district to treat and distribute a portion of the flows for sale to potential customers. . The proposed Engleman Reservoir would be constructed using a ring dike around a 12-foot depth reservoir, next to the existing Engleman Reservoir. The Santa Cruz reservoir requires construction of a ring dike around a 14-foot depth reservoir adjacent to Lake Edinburg. The existing Panchita control structure and associated weir would be raised for the Delta "Panchita" Reservoir, which is proposed to be 12-feet deep.

8.2.5 United Irrigation District Off-Channel Reservoir

A storage reservoir has been completed between the pump station at the Rio Grande and the first pump station within the United Irrigation District (ID) canal network, which would have a 640 acft storage capacity, as opposed to the estimated 80 acft capacity that was previously available in the main canal. This allows for general operational improvements within the district but will also yield an estimated additional 2,000 acft of supply in a drought of record scenario without any additional water rights. This reservoir will allow United ID to better meet the needs of Region M over the planning horizon and beyond.

8.2.6 Recommendations

The Brownsville-Matamoros Weir and Reservoir has been considered a recommended alternative on the basis of cost, yield, and permitting concerns. The Laredo Low Water Weir may have considerable value as a flood control mechanism but does not meet the requirements to be recommended in the plan because it does not provide an increase in supply. The Banco Morales Reservoir and the United Off-Channel Reservoir have all been recommended by the RWPG. The Delta Region Water Management Supply reservoirs were recommended by the RWPG under the September 2022 Amendment to the 2021 Rio Grande Regional Water Plan and are being reevaluated this cycle.

None of these sites are recommended as unique reservoir sites.

8.3 Legislative Recommendations

TWDB rules provide that RWPs may include "regulatory, administrative, or legislative recommendations that the regional WPG believes are needed and desirable to facilitate the orderly development, management, and conservation of water resources and preparation for and response to drought conditions…." [31 TAC 357.7(a)(10)]

8.3.1 Recommendations on State Issues

1. The RWPG recommends continued evaluation of the connection between the pumping of groundwater and its impact on surface water, specifically the impact of pumping groundwater in the Pecos and Devils River watersheds on the flows into the Rio Grande. For example, current studies indicate that up to one-third of the recharge flows into Amistad Reservoir depend on flow from the Pecos and Devils River valleys and Goodenough Springs, which are shown to be sensitive to groundwater pumping.[9] There is not a Groundwater Conservation District (GWCD) in the area, which could provide a mechanism for local management of these interconnected resources. The RWPG recommends enforcement of current laws and consideration of new laws establishing rules for permitting that acknowledge the impact of groundwater development on surface water. The RWPG recommends the Texas Legislature allocate funding to study the interconnectivity between groundwater pumping and surface water flows.
2. The Lower RGV farmers, as a result of the uncertainty of surface water delivery and the fact that most farmers do not own their own Rio Grande water rights, are limited in their ability to provide collateral for loans for on-farm conservation and improvements. This makes many of the loan programs currently available to farmers in other regions of Texas difficult for farmers in the RGV to access. Additionally, in many cases the types of irrigation conservation measures used in the RGV are installed underground as opposed to aboveground equipment like center pivots used in the High Plains. The TWDB and the State of Texas should work with farmers in the region to develop loan programs that enable on farm water conservation specific to this region.

[9] Green, R.T. and Fratesi, B. and Toll, N. and Bertetti, F. Paul and Nunu, R. (2019). Devils River watershed: Southern Edwards-Trinity Aquifer. 10.1130/2019.1215 (08).

3. There is not a mechanism or entity in the RGV to accept on-farm irrigation conservation loans from the TWDB and to lend those funds to farmers for on-farm water conservation.

4. Stakeholders who depend on the water of the Rio Grande should be involved and informed of state activities related to negotiations with Mexico regarding implementation of the 1944 Treaty.

5. Recent droughts make it imperative that the Rio Grande Water Availability Model (WAM) is continually updated. The naturalized flow record in the current Rio Grande WAM extends from 1940 through 2018. The drought conditions the region has been experiencing over the last few years may be worse than the current drought of record. The state should fully fund updates to the WAM to extend the naturalized flows using the most current data available, every 10 years.

6. The State should continue to consider the impacts of climate change in terms of Regional Water Planning and future water supplies. The US Bureau of Reclamation's Lower Rio Grande Basin Study evaluated climate impacts on the availability, which should be considered in future planning efforts.

7. The State should encourage IBWC to give Mexico delivery credit of the annual minimum 350,000 acft from only the named tributaries as stipulated in the 1944 Treaty during a 5 year cycle or as provided in Minute No. 234 of the IBWC dated December 2, 1969.

8. The State should assist in finding new technical and financial resources to help the region combat Arundo Donax, aquatic weeds, and salt cedar and thus protect its water supplies. The Rio Grande RWPG encourages funding for projects aimed at eradicating Arundo Donax, aquatic weeds, and salt cedar in the Rio Grande watershed and for ongoing long-term brush management activities. The USDA has studied and implemented a biological controls program with costs and quantified water savings, and continued work and monitoring is recommended WMS in this Plan.[10]

9. The State should continue providing technical and financial resources to fully develop the regional groundwater availability models. The Brackish Resources Aquifer Characterization (BRACS) 2014 report for the Lower RVG is an essential resource as brackish groundwater desalination continues to be one of the recommended strategies to meet future needs.[11]

10. The Texas Commission on Environmental Quality (TCEQ) should work with the Rio Grande RWPG to review rules on converting water rights from one use to another and considers appropriate rule amendments, if necessary. As water rights are converted from irrigation to municipal and the WAM is updated, it is recommended that the conversion factor rule and operational rules should be reevaluated. These conversions may have the effect of reducing the water volume demand on the Rio Grande making the reservoir system less efficient. In this regard it is noted that the conversion rule is an administrative rule in that it was not required in the court adjudication in the Valley Water Suit Judgment or in the adjudication case covering the Middle Rio Grande.

11. The RWPG encourages entities within the region to cooperate to resolve water issues through such means as regional water and wastewater utilities. The Rio Grande Regional Water Authority, Southmost Regional Water Authority, and other entities have pursued and, in some cases, constructed regional projects that supply water to multiple cities.

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[10] Goolsby, John. Biological Control of Arundo Donax; and invasive weed of the Rio Grande Basin. USDA, 2007.
[11] Meyer, John E. Brackish Groundwater in the Gulf Coast Aquifer, Lower RGV, Texas, September 2014. TWDB.

12. The formation of GCDs should be encouraged as a means to protect groundwater supplies, which are increasingly being tapped as a new water supply for municipal, industrial use, and mining use. As the aquifers in Region M are more extensively developed, the impact of pumping has started to be seen in spring flows and drawdown. Region M supports new and expanded groundwater districts to protect the regional groundwater resources and recommends that the state provide continued technical assistance regarding formation, structure, and technical basis for GCDs to operate meaningfully.

13. The State should appropriate sufficient funds to the Texas Railroad Commission to allow for capping abandoned oil and gas wells that threaten groundwater supplies.

14. The Texas Legislature should continue to provide technical and financial assistance to implement WMSs identified in the regional water plans. In 2013, the Texas legislature passed House Bill 4 and Senate Joint Resolution 1, which created the State Water Implementation Fund for Texas (SWIFT) and the State Water Implementation Revenue Fund for Texas. Companion legislation, House Bill 1025, provided $2 billion in initial funding for SWIFT from the state's Economic Stabilization Fund. In November 2013, Texas voters approved the funding to support the implementation of projects recommended by the State Water Plan. In 2023, the Texas Legislature passed Senate Bill 28 and Senate Joint Resolution 75, which provided for the creation of the Texas Water Fund. Additionally, Senate Bill 30 authorized a $1 billion appropriation of revenue to the Texas Water Fund. In November of 2023, Texas voters approved Proposition 6, which created the Texas Water Fund. Both funding appropriations have been important to moving water infrastructure projects forward in Texas. The RWPG supports the Texas Legislature providing funding in perpetuity for water projects.

15. The Texas legislature should appropriate funds to continue the regional water planning process.

16. Educational programs for farmers, ID Boards of Directors, and ID employees are recommended and should be supported by the TWDB, TCEQ, and universities in Texas.

17. The Rio Grande Center for Ag Water Efficiency (Texas AWE) flowmeter demonstration and calibration facility is intended to be available as an educational, testing, and calibration resource for districts looking to implement or expand their metering programs. Continued funding and expanded use of these facilities is recommended by the Rio Grande RWPG.

18. Continued evaluation of ID infrastructure is recommended, including the work that has been done by Texas A&M University through the Texas Water Resource Institute and the ID Engineering and Assistance Program. This program has assisted districts in mapping and evaluating the current state of their conveyance systems and rates of urbanization. These measures can assist districts in prioritizing improvements so that the greatest gains are made with the least cost.

19. Since the Watermaster program collects funds through assessed fees, it is recommended that the fund balances be rolled over into the operating budget for the next fiscal year. It is also recommended that the Watermaster Advisory Committee (WAC) continues to oversee the Watermaster budget.

20. It is recommended that the United States be officially recognized as a water user by Mexico and allocate water to the United States as a part of its annual water allocation process.

21. It is recommended that the Texas Legislature provide funding to study the hydrology and inflows of the US tributaries that flow into the Rio Grande.

22. It is recommended that the State encourages municipalities within Region M to have 2 to 3 weeks of storage to limit the need for irrigation districts to charge their systems. It is recommended that the State also identify funding opportunities for those entities that would need to implement.

8.3.2 Recommendations on Federal and International Issues

1. The State of Texas, the US Congress, and the IBWC should renew efforts to ensure that Mexico complies with Minute 309 and set in place means to achieve full compliance with the 1944 Treaty, including enforcement of Minute 234, which addresses the actions required of Mexico to completely eliminate water delivery deficits within specified treaty cycles. Water saved in irrigation conservation projects in Mexico should be dedicated to ensure deliveries to the Rio Grande pursuant to the 1944 Treaty under Article 4B(c) and Minute 309.

2. The United States and Mexico should reinforce the powers and duties of both sections of the IBWC pursuant to Article 24(c) which provides, among other things, for the enforcement of the Treaty and other agreement provisions that "… each Commissioner shall invoke when necessary, the jurisdiction of the Courts or other appropriate agencies of his Country to aid in the execution and enforcement of these powers and duties."

3. Projects funded by national and international agencies to modernize and improve the facilities of water right holders in the Rio Grande Basin should be supported and given priority. In particular, both countries should support continued grant funding for conservation projects and projects that protect water quality.

4. The conservation irrigation projects that are authorized through the Bureau of Reclamation for improvement to the irrigation systems of IDs in the Rio Grande Basin in the United States should be supported, and the US Congress should be encouraged to appropriate money to pay for approved projects. Additionally, the federal government should approve amendments to the Lower Rio Grande Valley Water Resources and Improvement Act of 2000 (Public Law 106-576) to add more projects and authorize funding for them.

5. For purposes of clarity, the IBWC should approve a Minute setting out the definition of "extraordinary drought" as that term is implicitly defined in the second subparagraph of Article 4B(d) as an event that makes it difficult for Mexico " …to make available the run-off of 350,000 acre feet (431,721,000 cubic meters) annually." A drought condition occurs when there is less than 1,050,000 acft annually of runoff waters in the watersheds of the named Mexican tributaries in the 1944 Treaty, measured as water enters the Rio Grande from the named tributaries, of which the US 1/3 share is 350,000 acft. For better water management in the Lower Reach of the Rio Grande, downstream of Anzalduas Dam, both countries should reaffirm operational policies that Mexico continue to take its share of waters through the Anzalduas canal diversion at the Anzalduas Dam or account for its water at that point, including any diversions by Mexico from the proposed Brownsville Weir Project storage, to the extent of its participation in the project and at other points of diversion by Mexico users downstream of Anzalduas Dam.

6. IBWC should continue to convene a bi-national meeting of water planners but include water use stakeholders in both countries within 6 months following completion of the annual water accounting where an annual deficit in flows from the named Mexican tributaries in the 1944 Treaty occurs. This meeting would be designed to share data and information useful in planning for water needs and contingencies in the intermediate future.

7. IBWC should restore the Rio Grande below Fort Quitman, Texas.
8. The IBWC should assume all local and regional financial responsibility for upkeep and maintenance of El Morillo Drain.
9. IBWC should coordinate bilateral efforts to review and evaluate existing sources of data regarding groundwater development in both countries in the Rio Grande Basin below Fort Quitman to the Gulf of Mexico. This effort should be focused on the potential impact on surface water supply in the Rio Grande watershed, with the goal of pursing such actions as may be necessary to evaluate present conditions and promote programs protecting the historical surface water supply in affected regions.
10. Regional watershed planning should be encouraged on both sides of the Rio Grande throughout the basin, including efforts to promote bi-national coordination of long-range water plans and watershed-based plans designed to protect water quality in the river.
11. Interstate compacts between affected states in Mexico, similar to the Rio Grande compact and Pecos River compact between affected states in the United States, which deal with apportionment of available water supply from the Rio Grande and its tributaries to each state consistent with existing domestic and international law, should be encouraged.
12. The Rio Grande RWPG joins with the Far West Texas and Plateau RWPGs to encourage funding for projects aimed at eradicating Arundo Donax, salt cedar, and aquatic weeds in the Rio Grande watershed and for ongoing long-term brush management activities. These activities are not constrained to state or national boundaries and would benefit from widespread support.
13. The Rio Grande RWPG supports US Congressional legislation that authorizes the US State Department to report to Congress periodically on the status of Mexico's deliveries of water to the Rio Grande for US use.
14. The IBWC should give Mexico delivery credit of the annual minimum 350,000 acft from only the named tributaries as stipulated in the 1944 Treaty during a 5 year cycle or as provided in Minute No. 234 of the IBWC dated December 2, 1969.
15. The El Morillo drain system does not currently convey the design flow; the pump station is capable of operating at the design flow, but the channel is not currently capable of conveying the full design flow. The RWPG recommends that the IBWC and CILA make the necessary improvements to convey the design flow. The RWPG also recommends a SCADA system be funded to provide real-time data.
16. The Rio Grande RWPG supports binational efforts to improve and protect water quality in the Rio Grande. Efforts such as the Lower Rio Grande Water Quality Initiative should be continued and supported through grant funding or other discretionary state of federal funding.

8.3.3 Issues Identified in Previous Planning Cycles

In the second round of regional water planning, the TWDB emphasized "input from RWPGs for the policy portion of the 2011 State Water Plan" (Memo from William Mullican, then Deputy Executive Administrator, Office of Planning, July 2, 2003). The Board disseminated an "Initial List of Policy Topics" as a catalyst for discussion among the planning groups. In September 2003, Rio Grande RWPG members ranked each issue on the list as to level of importance in the region's water planning efforts ("not at all important," "somewhat important," "important," and "extremely important").

The policy issues receiving top rankings from Rio Grande RWPG members fell into the following four major categories:

A. International Compliance with the 1944 Treaty.

B. Competing Water Demands Between Agricultural and Municipal Interests:

   i. Sustainable growth, including impacts of growth.

   ii. Assessment of the current water resources regulatory system to meet water management needs of the 21st century.

   iii. Impacts on water supply and quality resulting from conversion of agricultural lands to urban lands.

   iv. Protecting agricultural and rural water supplies, considering economic constraints and competing purposes.

   v. Conservation of agricultural water for additional agricultural use, urban use, or for environmental purposes.

C. Alternative Water Supply/Water Quality:

   i. Integrating water quality and water supply considerations.

   ii. Watershed planning/source water protection.

   iii. Sustainability and groundwater management.

D. Technical and Financial Resources:

   i. State participation.

   ii. Potential funding sources for water supply.

   iii. Retail customer water pricing.

   iv. Incentives for planning implementation.

   v. Improving groundwater availability data.

   vi. Education.

The Rio Grande RWPG also approved a resolution encouraging the formation of GWCDs and greater oversight by sales of groundwater produced from State-owned lands. The group also approved motions supporting the following:

- Capping abandoned oil and gas wells;
- Improving the stretch of the Rio Grande known as the "Forgotten River," which has a significant amount of salt cedar without defined bed and banks. The water flowing downstream in this area, which could be put to beneficial use downstream, is spread over a large area and experiences high loss rates;
- Identifying and eradicating growing stands of salt cedar;
- Continuing efforts to control and manage Arundo; and
- Supporting ongoing Valley Water Summits.

The Rio Grande RWPG continues to believe that these issues are tightly interconnected and that they cannot be discussed, much less resolved, in a vacuum.

Many of the issues and needs of the region arise from the fact that the Rio Grande is an international river whose waters are shared by the United States and Mexico. No other regional water planning area faces this reality. Water right holders in Texas lack any ready recourse to compel Mexico to observe the 1944 Treaty that apportions inflows between the countries. In addition, international protocols impact efforts to address water quality and resolve problems created by aquatic weeds, such as hydrilla and water hyacinth, and other invasive species, including salt cedar.

Currently, Mexico is in a deficit in the current 5 year cycle under the 1944 Treaty, and enforcement mechanisms do not exist for preventing similar situations in the future.

Because of the unique way in which water rights are prioritized along the Rio Grande, the Mexican water debt has first and foremost directly impacted agricultural interests. However, repercussions from the debt also have affected municipal and industrial users. With the few exceptions of the BPUB, Laguna Madre Water District (serving Port Isabel, South Padre Island, and Laguna Vista) and the City of Laredo, municipal users of surface water depend on IDs to pump and convey water supplies to their treatment plants. When irrigation flows are curtailed, municipalities must either find new ways to push raw water or turn to alternative sources.

Brackish groundwater resources have become a viable alternative for municipal suppliers, especially those located at a distance from the Rio Grande. Improvements in desalination technology, coupled with the cost of surface water rights, are making groundwater desalination an economical and reliable option. However, information about the quality and quantity of groundwater supplies in the region is limited (this has been partially addressed by the BRACS study in the LRGV). Furthermore, groundwater in certain parts of the region is threatened by abandoned uncapped oil and gas wells.

IDs are also looking to new technology and improved processes to minimize conveyance and evaporation losses attributable to an aging infrastructure. Districts do not have ready access to low-cost loans that are readily available to municipal suppliers. Several districts have secured funding from the North American Development Bank and the US Bureau of Reclamation, but others cannot meet the local match requirements. Funding from the North American Development Bank is no longer available, and mechanisms for funding are in need of development.

The water debt has created both challenges and opportunities for municipal and irrigation users to work together. The Rio Grande RWPG has supported initiatives such as the Valley Water Summits that bring different interests together to share problems and jointly create solutions.

The WAC also has proven to be an effective forum for addressing issues. Subsequent to the first planning cycle, the committee developed a rule change that freed up water in storage for irrigation use with no detriment to municipal supplies. Operations of the Rio Grande Watermaster are paid entirely by fees levied on water right holders. However, appropriations to the Watermaster are capped at a level that is significantly lower than revenues. As irrigation flows diminish, it makes it difficult for IDs to solely deliver raw water for municipal needs. The need for additional water to “push” the smaller, yet steady, volume of raw municipal water through IDs large conveyance systems may be needed. It would be helpful if municipalities could have a 2 to 3 week storage capacity so that an ID would only have to fill their systems as needed and not have to continuously keep their conveyance systems full.

Particular attention should be directed to rules pertaining to water rights. Currently, when the intended use of irrigation water rights is changed to municipal and industrial use, a conversion factor provided in 30 TAC § 303.43 is applied so that the municipal use after conversion will receive a “definite quantity of water in acre-feet per annum.” This rule is consistent with the treatment of certain municipal, industrial, and domestic allocations approved in the Final Judgment of the Valley Water Suit, which provided for a reserve of 60,000 acft/yr to be held for domestic use and use by cities to support these allocations. This reserve was increased to 225,000 acft/yr, under a conversion rule adopted by the then Texas Water Rights Commission on July 2, 1986, following the conclusion of the Middle Rio Grande Adjudication. Information developed through the WAM and as part of the regional planning process would indicate that this practice should be reviewed with respect to long-term water management practices on the Lower and Middle Rio Grande downstream from Amistad Reservoir. Additional studies are required to analyze the long-term impact of reducing authorized municipal and industrial reserves on two fronts: (1) providing a defined entitlement and (2) promoting water conservation in both Amistad and Falcon Reservoirs.

Finally, international attention also could enhance water quality as well as safety. The funding from the United States is shared between the US section of IBWC and Cameron, Hidalgo, and Willacy Counties. Lower valley water interests were responsible for a significant portion of the construction and upkeep of El Morillo Drain, built in 1969 to divert saline flows before entering into the Rio Grande. The Rio Grande RWPG supports shared responsibility between the United States and Mexican sections of IBWC for the maintenance of El Morillo Drain.

INITIALLY PREPARED PLAN

CHAPTER 9: IMPLEMENTATION AND COMPARISON TO PREVIOUS REGIONAL WATER PLAN

Rio Grande Regional Water Plan

B&V PROJECT NO. 411250

PREPARED FOR

Rio Grande Regional Water Planning Group

1 MARCH 2025

BLACK & VEATCH

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acft/yr	Acre-Feet per Year
BEG	Bureau of Economic Geology
DFC	Desired Future Condition
GAM	Groundwater Availability Model
GMA	Groundwater Management Area
ID	Irrigation District
MAG	Modeled Available Groundwater
RWP	Regional Water Plan
RWPG	Regional Water Planning Group
SRWA	Southmost Regional Water Authority
TSDC	Texas State Data Center
TWDB	Texas Water Development Board
WAM	Water Availability Model
WMS	Water Management Strategy
WUG	Water User Group
WWP	Wholesale Water Provider

9.0 Implementation and Comparison to Previous Regional Water Plan

9.1 Introduction

Each update to the Regional Water Plan (RWP) is an opportunity for the Regional Water Planning Group (RWPG) to evaluate the changes in the region's water use and conservation goals, and to lay out a path toward meeting future water needs. Every 5-year cycle of planning includes re-evaluation of demands, current and future, an update of supplies currently being used, and development of a range of water management strategies (WMSs) that can be used to meet projected needs. This chapter focuses on changes that have occurred since the last plan was adopted, including providing comparison information on the following:

- Population and water demand projections
- Water source availabilities
- Water needs
- WMSs and projects
- Drought response

In addition, this chapter assesses the region's progress towards regionalization as well as provides survey responses on the implementation status of strategies and projects that were recommended in the 2021 Region M Plan.

9.2 Population and Water Demand Projections

For each cycle of regional water planning, the Texas Water Development Board (TWDB) evaluates demographic data and information on agricultural and industrial water usage. This information is used to develop the current demands (base year demands) and to develop an anticipated rate of change to project those demands over the 50-year planning horizon. Population and municipal demand projections are developed for each municipal water user group (WUG), which is defined as any utility or water systems that provide more than 100 acre-feet per year (acft/yr) for municipal use, as well as an aggregated County-Other WUG which combines the remaining county population that does not meet the criteria mentioned above. Non-municipal water use categories for irrigation, livestock, manufacturing, mining, and steam-electric are aggregated into WUGs with developed water demand projections for each county and river basin. Demand projections are developed initially by the TWDB technical staff and are then evaluated by the RWPGs for accuracy and revised if necessary. The demand projection methodology is discussed in detail in Chapter 2.

The Region M planning group approved the draft projections developed by the TWDB for manufacturing, livestock, mining, and steam-electric power generation demands. The TWDB projections for municipal and irrigation demands were revised based on local information and feedback from the municipal WUGs. The total water demand projections for all WUGs over the planning horizon are shown aggregated for the 2021 RWP and the 2026 RWP on Figure 9-1.

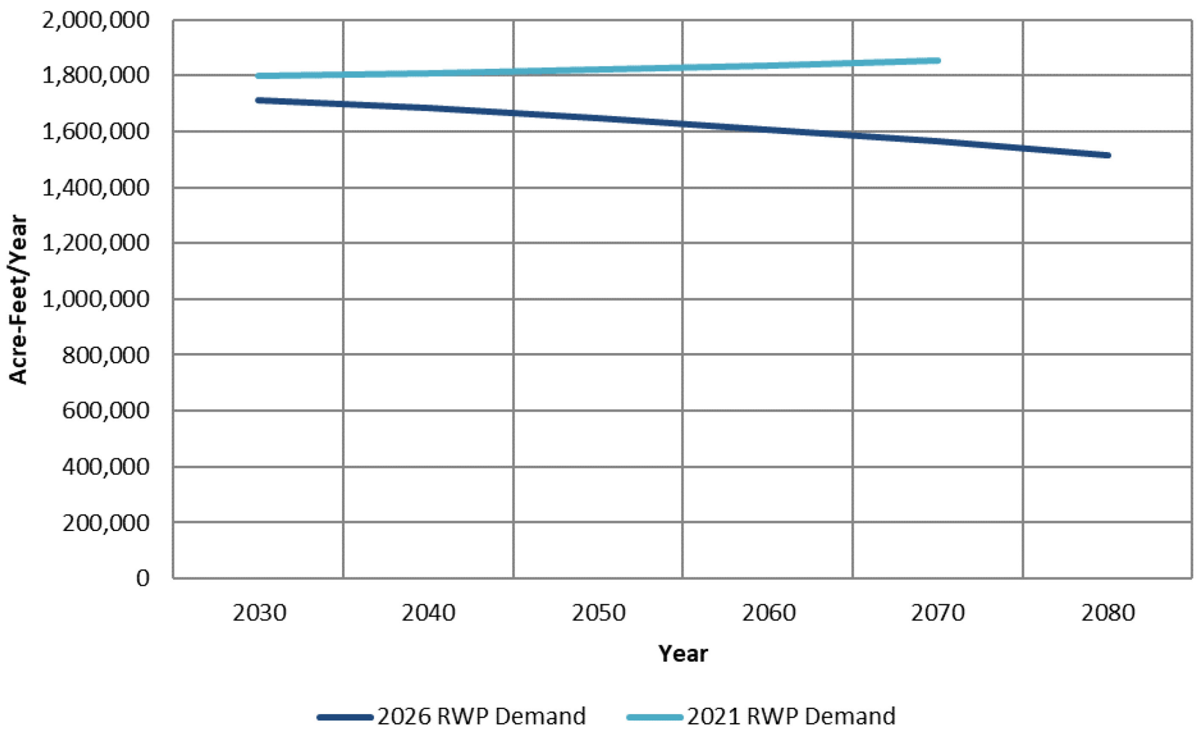

Figure 9-1 Comparison of Regional Demand Projections, 2021 and 2026 RWPs

9.2.1 Population Projections

For the 2021 RWP, the 2010 US Census was used as a basis, and population growth was estimated using demographics and projected birth, death, and migration rates.

Population projections for this cycle were based on the 2020 US Census data. For this reason, the population projections for Region M are lower than in previous cycles. According to demographers at the Pew Research Center, the 2020 Census had a nationwide undercount of 5 percent for Hispanic populations. To address these concerns, the RWPG requested an increase to the county population in Cameron County, Hidalgo County, and Webb County, based on a 5 percent increase to the Hispanic population percent in each county. These are the three counties where municipal WUGs requested revisions to their population projections.

County-level population projections are based on Texas State Data Center (TSDC) Office of the State Demographer county-level population estimates. The base year projections are based on the 2020 census, and projections were developed using demographic trends including birth rates, survival rates, and net migration rates for population cohorts separated by age, gender, and race/ethnicity. TSDC's projections extend to 2050, and the TWDB staff has extended the projection through 2080. Overall, the population for the region increases over the planning horizon, but certain counties do project a decrease in population due to updates to the birth/death and migration rates for each individual county. Refer to Figure 9-2 for a comparison in population projections for the 2021 RWP and 2026 RWP.

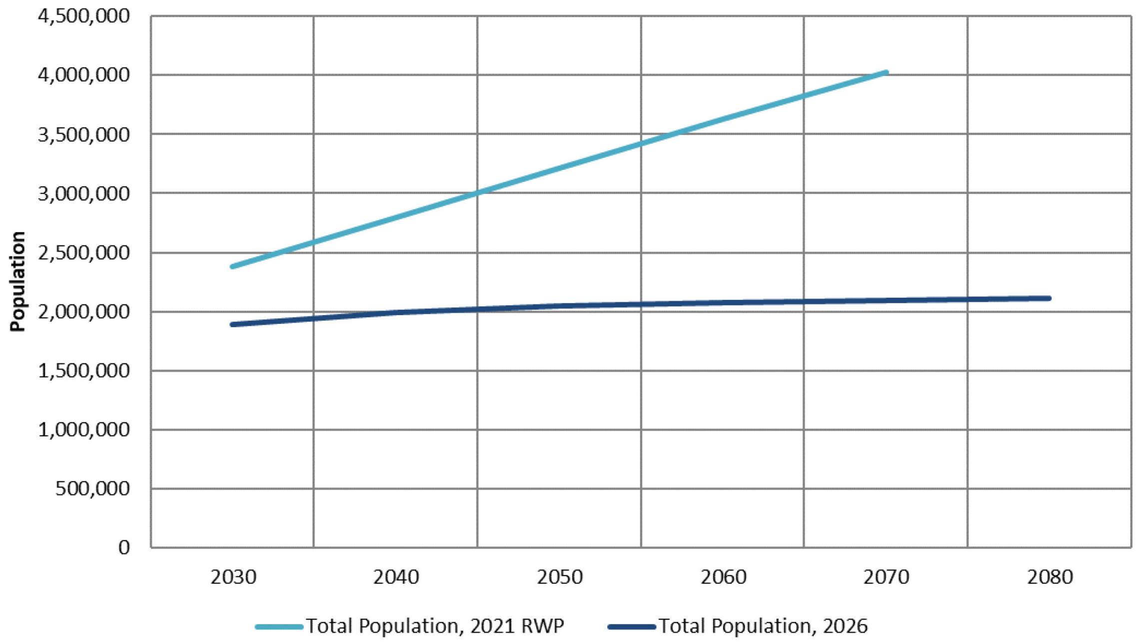

Figure 9-2 Comparison of Population Projections, 2021 and 2026 RWPs

In the updated plan, only a slight change is noted in the distribution of projected population on a county basis, as shown on Figure 9-3.

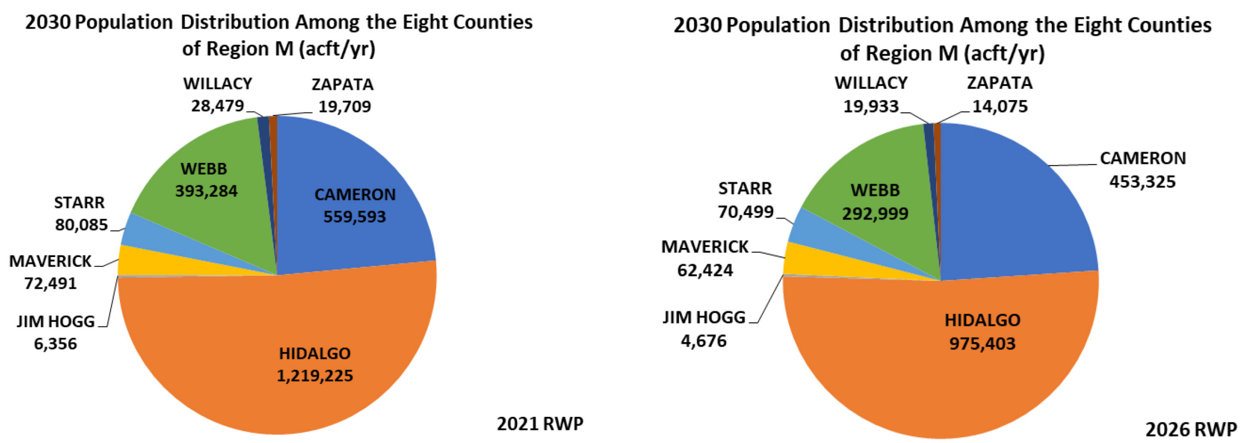

Figure 9-3 Population Projections by County, 2021 and 2026 RWPs

9.2.2 Municipal Water Demand Projections

The municipal demand projections for 2026 are lower and flatter than the 2021 RWP projections (Figure 9-4) because of a lower projected population and lower measured and projected per-capita water use.

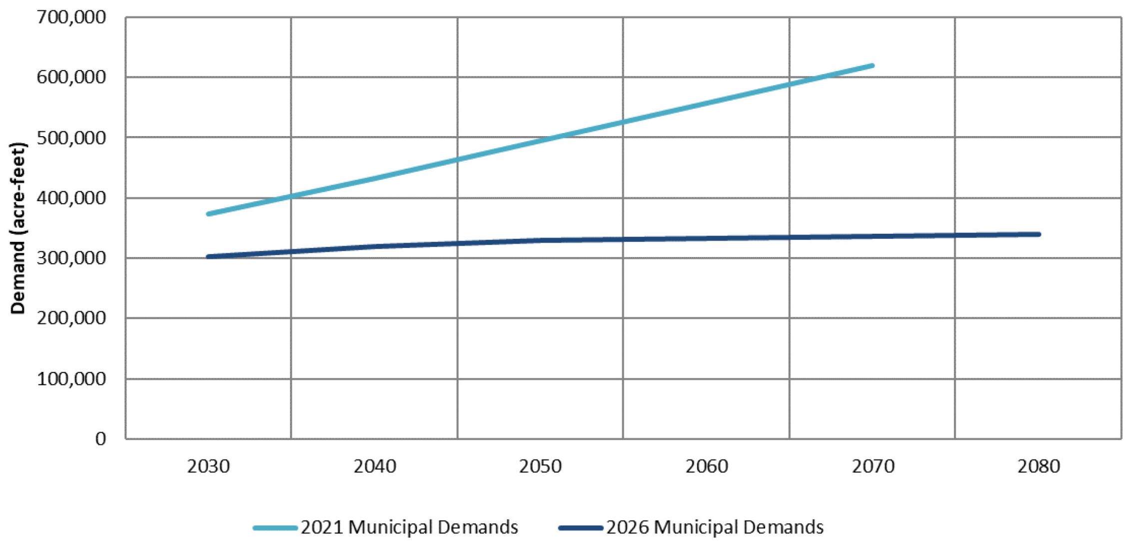

Figure 9-4 Comparison of Municipal Demand Projections, 2021 and 2026 RWPs

9.2.3 Irrigation Demand Projections

Each cycle of planning in Region M has predicted decreasing demand for irrigation water over the planning horizon, based on anticipated urbanization, particularly in Cameron and Hidalgo counties (Figure 9-5).

For the 2026 planning cycle, the Region M RWPG agreed to use the same methodology as in the 2021 Plan. The 2021 irrigation demand projections are based on the TWDB Historical Water Use Estimates[1] for 2011, data provided in May 2017, which was considered representative of a year with high water storage (not supply-limited), and low rainfall (high demand). The rate of change was estimated by the rate of conversion of water rights from irrigation to municipal use across the planning region and was based on Texas Commission on Environmental Quality records of active water rights.[2]

The rate of change that was initially recommended by the TWDB was flat and was determined by the planning group to not be appropriate. The projected increases in municipal demand relate to increasing development and urbanization, which should correlate to decreased irrigated land and it is assumed that water rights will be converted from irrigation use to municipal use. The rate that irrigation water use is projected to decrease can be correlated with the increasing municipal demands, given that there are limited alternative sources for irrigation water. For the purposes of this study, the planning group estimated the rate of decreasing irrigation demand by the inverse of the rate at which municipal water demand increases.

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[1] http://www.twdb.texas.gov/waterplanning/waterusesurvey/estimates/index.asp.

[2] "WRActive" file available https://www.tceq.texas.gov/permitting/water_rights/wr-permitting/wrwud. Previous downloads of the file were dated and a trend analysis performed for the classification of water rights.

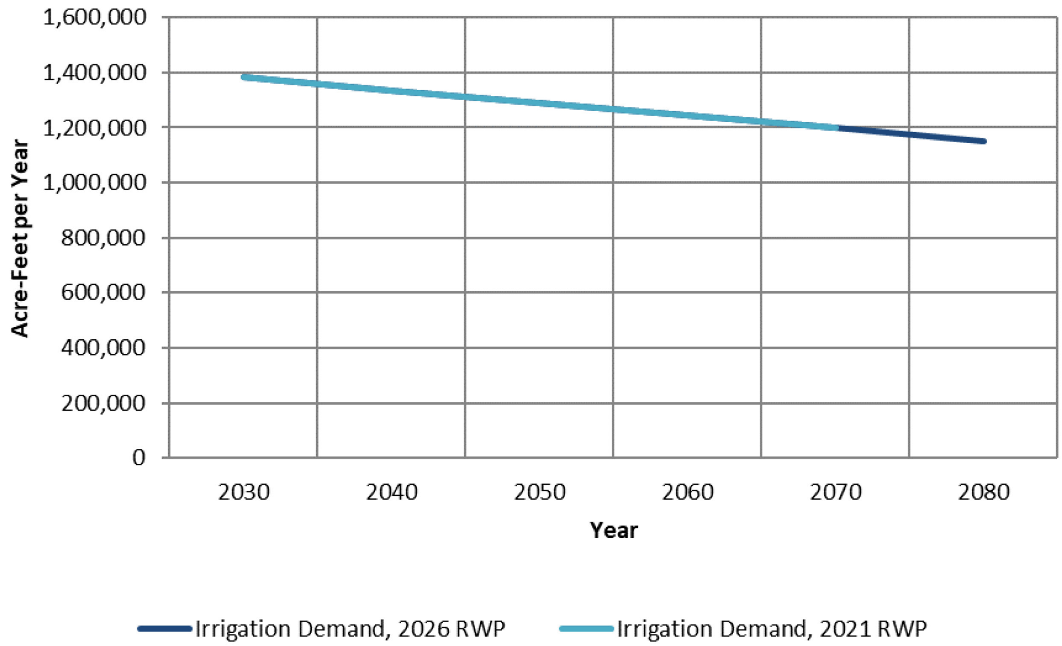

Figure 9-5 Comparison of Irrigation Demand Projections, 2021 and 2026 RWPs

9.2.4 Manufacturing Demand Projections

Manufacturing demands represent a very small portion of the overall regional water demands and are revised upward slightly in this plan (Figure 9-6), with increased in demand occurring primarily in Cameron and Hidalgo counties. The primary manufacturing water users in Region M are related to the agriculture industry and the fishing industry, including vegetable processing.

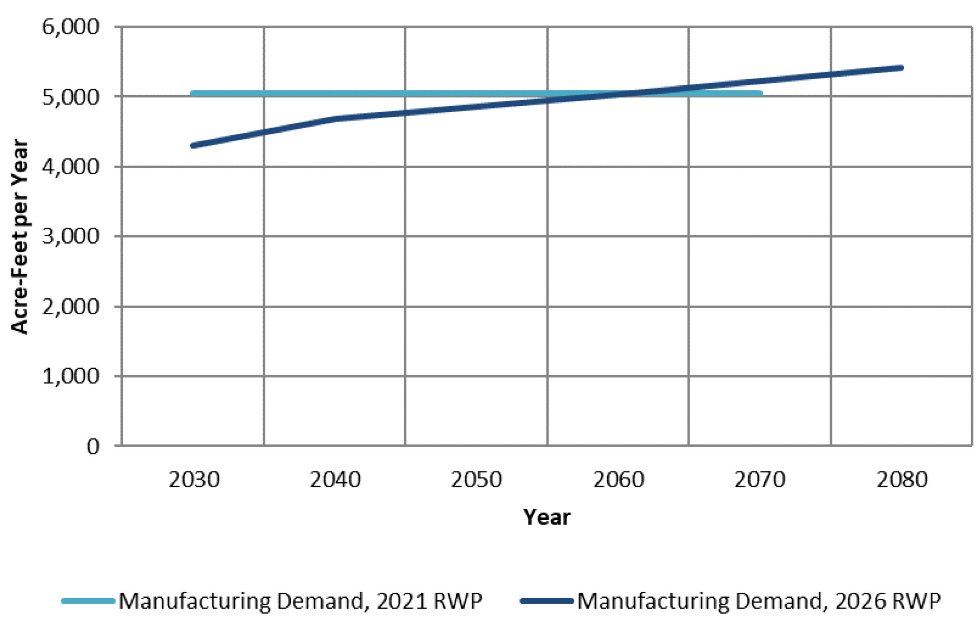

Figure 9-6 Comparison of Manufacturing Demand Projections, 2021 and 2026 RWPs

9.2.5 Mining Demand Projections

The mining demand projections shifted significantly from the 2021 RWP (Figure 9-7). For the 2021 RWP, mining water use estimates were based on the TWDB Annual Water Use Survey and additional oil and gas water use estimates provided by the TWDB using the FracFocus database. Oil and gas water use estimates were then broken down by water source based on a TWDB contracted study, Oil & Gas Water Use in Texas: Update to the 2011 Mining Water Use Report,[3] with the Bureau of Economic Geology (BEG). The BEG estimated recent mining water use and projected the water use across the planning horizon using data collected from trade organizations, government agencies, and other industry representatives. County-level projections were compiled as the sum of individual projections for four sub-sector mining categories: oil and gas, aggregates, coal and lignite, and other.

For the 2026 Plan, mining water use estimates were based on the 2022 TWDB contracted study, Water Use by the Mining Industry in Texas,[4] with the University of Texas BEG. According to TWDB, this study provided a comprehensive and quantitative assessment of mining water use across Texas and identified major mining operations in the state, including oil and gas, aggregates, and coal and lignite. Both historical and current water use were determined, and projections of future water demand were developed for 2030 through 2080 in each major sub-category within the mining sector, highlighting water use for unconventional oil and gas development.

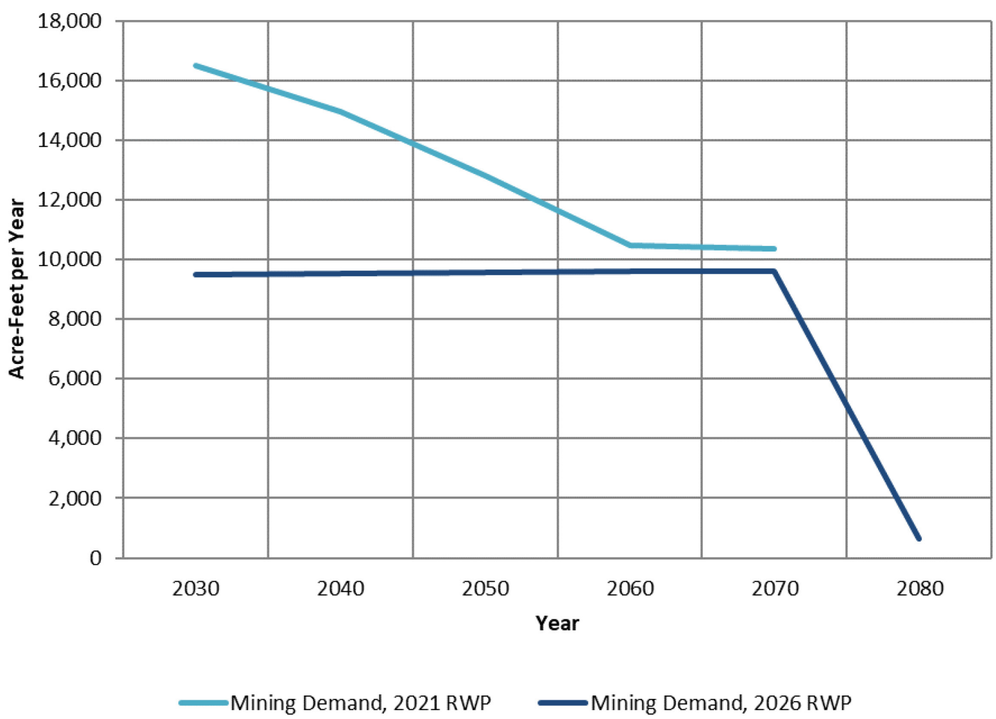

Figure 9-7 Comparison of Mining Demand Projections, 2021 and 2026 RWPs

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[3] Bureau of Economic Geology. Oil & Gas Water Use in Texas: Update to the 2011 Mining Water Use Report. http://www.twdb.texas.gov/publications/reports/contracted_reports/doc/0904830939_2012Update_MiningWaterUse.pdf.

[4] University of Texas Bureau of Economic Geology. Water Use by the Mining Industry in Texas. August 2022. https://www.twdb.texas.gov/waterplanning/data/projections/MiningStudy/doc/Final%20TWDB%20Mining%20Water%20Use%20Report.pdf

9.2.6 Steam-Electric Power Generation Demand Projections

Steam-electric power generation water demand is projected to remain below 1 percent the overall non-municipal water demands in Region M throughout the planning horizon. The steam-electric water demands are projected to be a constant 10,621 acft/yr from 2030 to 2080. The demand projections are lower than those in the 2021 Region M Water Plan, mainly due to the cancellation of two planned facilities associated with Coronado Power Ventures (La Paloma Energy Center). Refer to Figure 9-8 for comparison to the previous cycle.

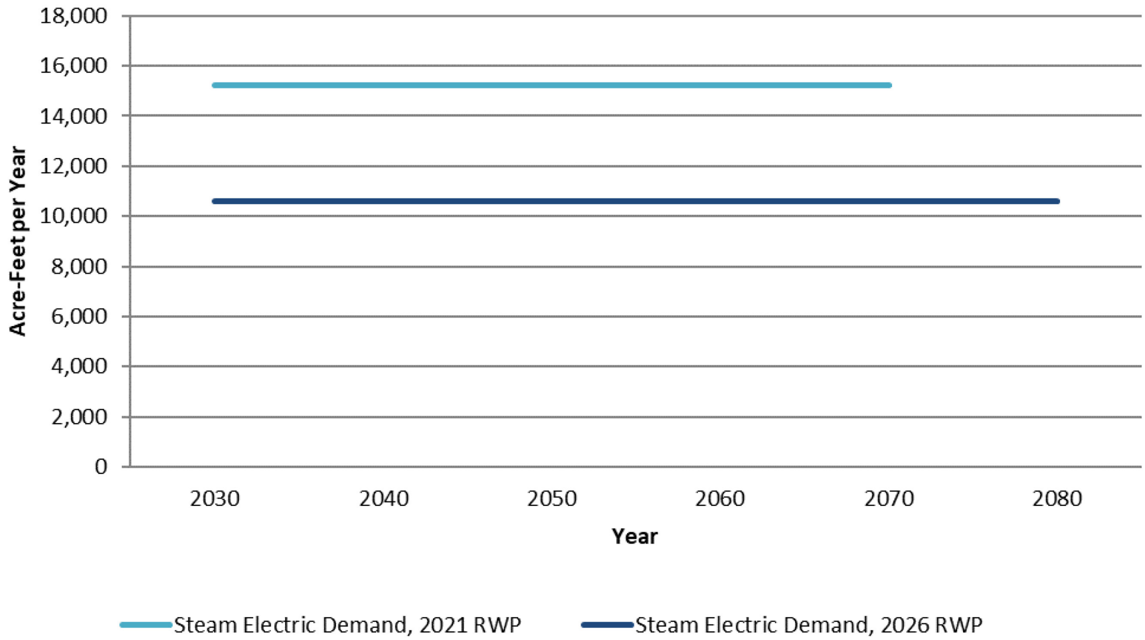

Figure 9-8 Comparison of Steam Electric Demand Projections, 2021 and 2026 RWPs

9.2.7 Livestock Demand Projections

The RWPs since 2001 have estimated livestock demand using the numbers of each type of livestock and estimated water usage for each type. The rate of change has been assumed to be constant in both this plan and the 2021 RWP. The TWDB updated the inventory estimates for broiler chickens for 2015 through 2019, and updated livestock water use estimates for 2015 through 2019 using new per head daily water use for milk cows, chickens, hogs, and goats; these figures were used in developing the livestock water demand projections. The rate of change for projections from the 2021 RWP was then applied to the updated base year. Base year livestock demands in this plan are shown to be slightly lower than the projections from the 2021 RWP, as shown on Figure 9-9.

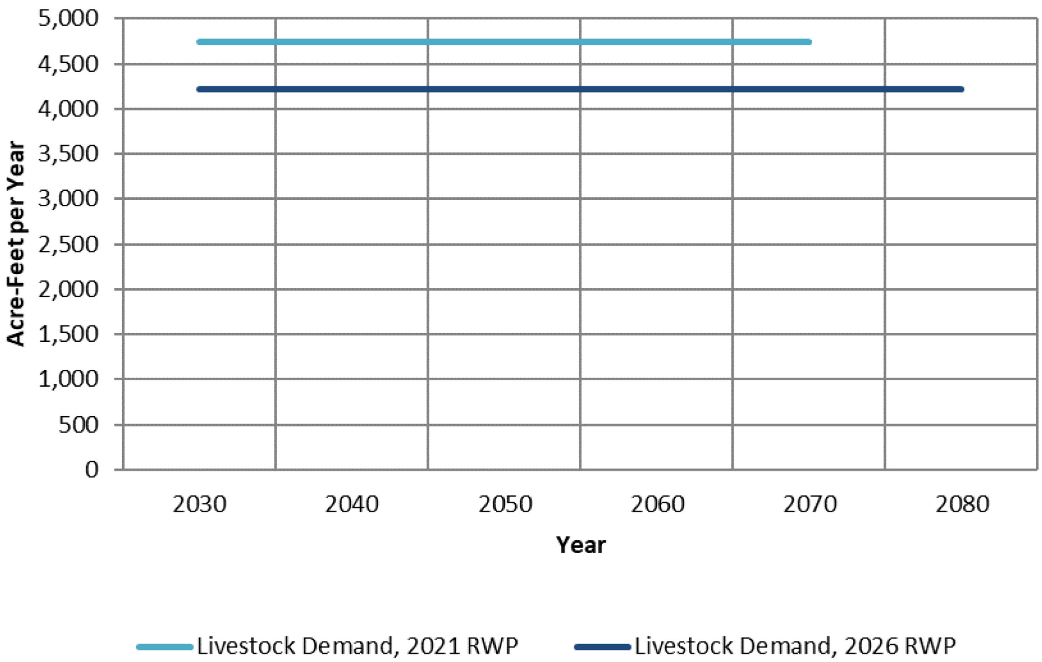

Figure 9-9 Comparison of Livestock Demand Projections, 2021 and 2026 RWPs

9.3 Availability and Supply

The Rio Grande Water Availability Model (WAM) was updated prior to the 2026 planning cycle with the period of record extending out to 2018, which decreased the Amistad-Falcon Reservoir System firm yield values that are used in the planning process. Both the 2021 RWP and 2026 RWP require that all current and future groundwater supplies fit within the modeled available groundwater (MAG) as established by groundwater management area (GMA) 13 and GMA 16.

9.3.1 Rio Grande Water Availability Model

The Rio Grande Water Availability Model (WAM) was updated as described in the Technical Memorandum, such that the current distribution of water rights is included, and the revisions made by Region E to the upper basin are included in the Region M modeling for consistency. Supply from the Amistad-Falcon Reservoir System is expected to decrease as a result of sedimentation, which reduces the overall storage capacity. A sediment loading rate was estimated for each reservoir and the reduction in storage is incorporated into the WAM. Figure 9-10 shows the variation in the firm yield from the Rio Grande WAM in the last two planning cycles.

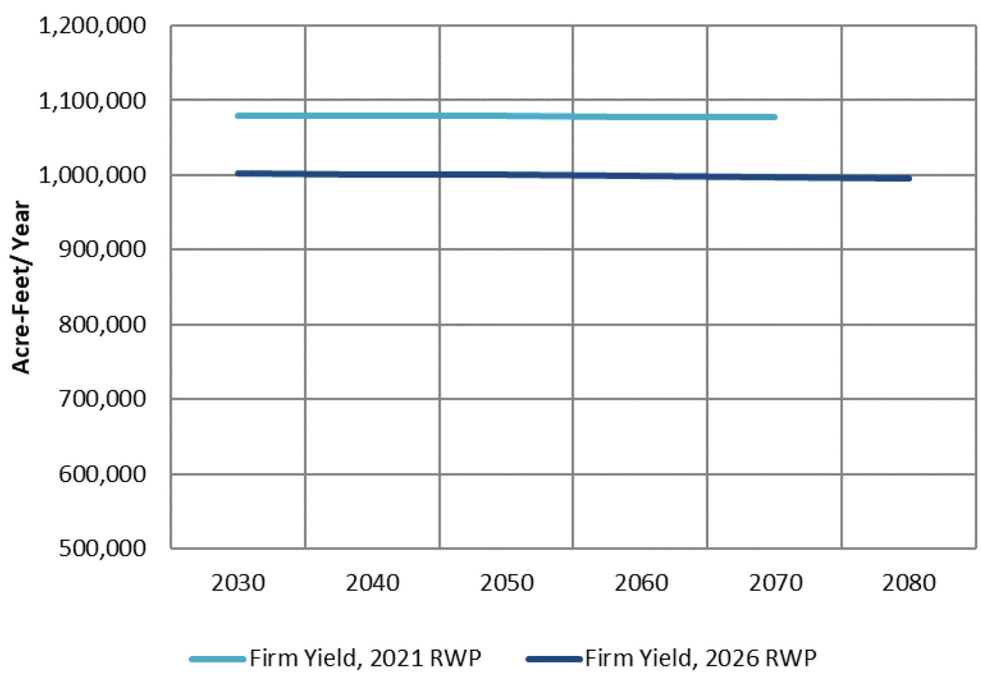

Figure 9-10 Firm Yield Projections for the Amistad-Falcon Reservoir System, 2021 and 2026 RWPs

9.3.2 Groundwater

The 2016 RWP was the first cycle of planning that required that all current and future groundwater usage described in the plan to not exceed the MAG values. GMAs were established across the state to help facilitate local regulation of groundwater. Groundwater can be regulated locally by groundwater conservation districts where they have been formed, but most of Region M is not within a district. The groundwater conservation districts within a single GMA determine the desired future conditions (DFCs) for the aquifers in that area. DFCs are conservation goals associated with a quantifiable measure of aquifer conditions, such as future water levels, water quality, or spring flows that are specified for certain times in the future, i.e., 12 feet of drawdown in 50 years. In the case of Region M, representatives from the existing GCDs in GMA 16 and GMA 13 established the DFCs.

A groundwater availability model (GAM) allows the TWDB to evaluate what amount of groundwater production, on an average annual basis, will achieve the stated DFCs for an aquifer. The current MAGs do not specify water quality, but the supplies are identified as fresh, fresh/brackish, or brackish according to the aquifer and the location within that aquifer (specified by county and river basin).

In some cases, aquifers or parts of aquifers within a GMA are locally important but are not planned for in the same way. Availabilities for these aquifers are developed through the aquifer models but are considered non-MAG availabilities because they are not included in the joint groundwater planning process. The minor and alluvial aquifers in the region, including the Yegua-Jackson aquifer, may produce significant quantities of water that supply relatively small areas.

Region M has two major and one minor aquifer for which groundwater availabilities are provided. Figure 9-11 shows the previous 2030 estimates of groundwater availability for each aquifer that were used in the 2021 RWP (in light blue/on the left), and the current 2030 groundwater availabilities in dark blue on the right. More detailed information about regional groundwater availability is available in Chapter 3.

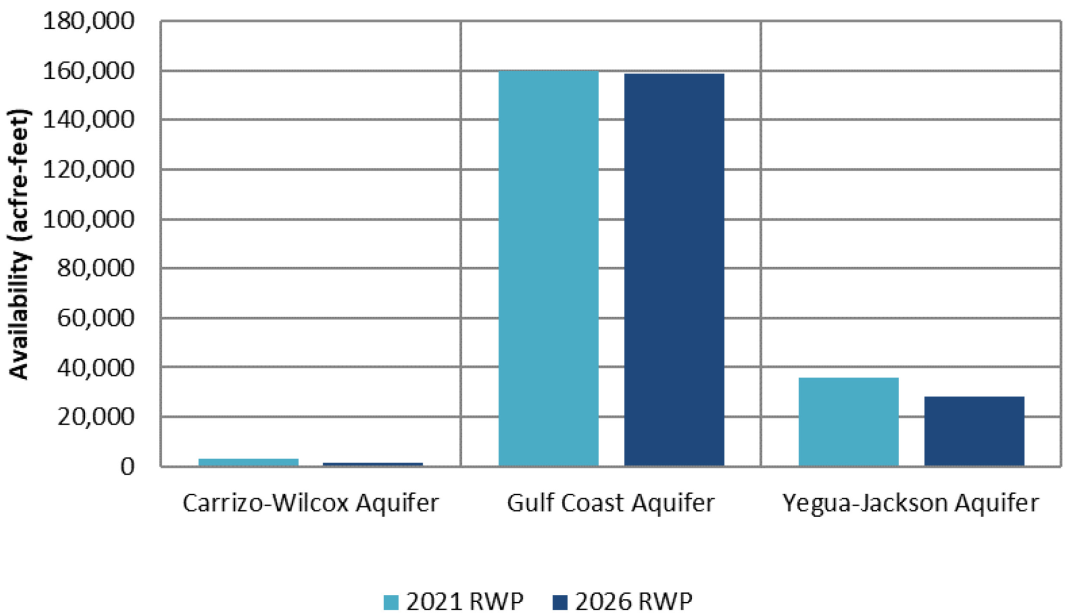

Figure 9-11 2030 Groundwater Availability Estimates, 2021 and 2026 RWPs

9.4 Water Needs

Water needs are determined by comparing the existing supplies to the projected demands in each decade to identify if there is a surplus or a shortage (need). For the 2021 RWP, water needs increased slightly over the planning horizon, due mainly to the municipal demand growth. For the 2026 RWP, because the population growth projections decrease significantly as compared to the 2021 RWP, while the regional water needs are higher in 2030, they decrease over the planning horizon. Figure 9-12 shows the regional water needs comparison for the 2021 RWP and 2026 RWP.

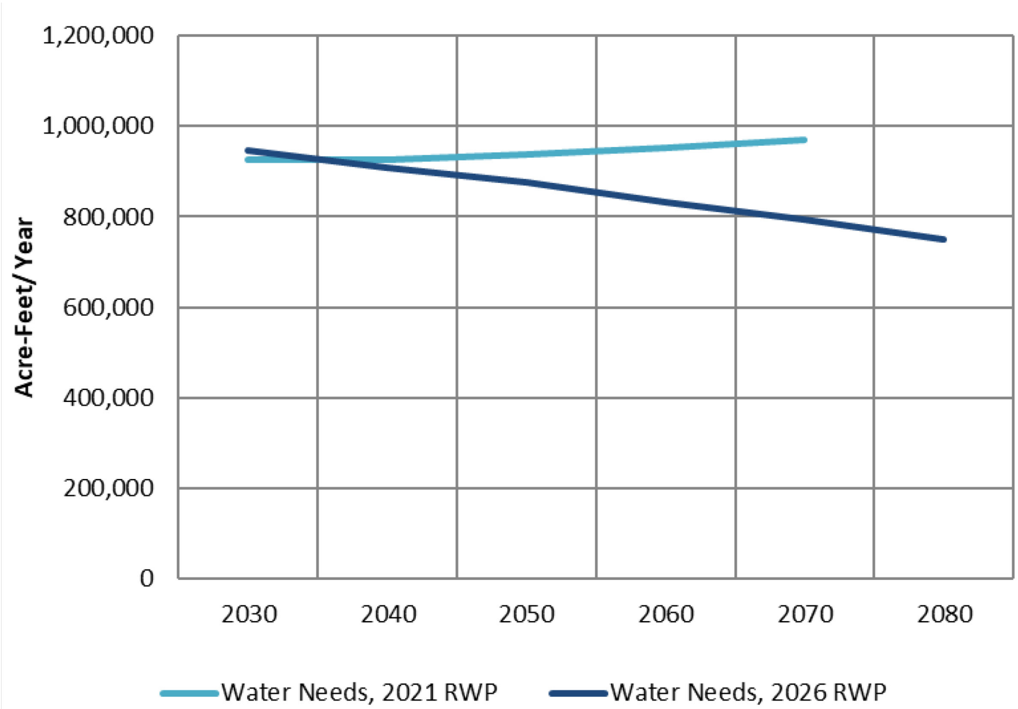

Figure 9-12 Regional Water Needs, 2021 and 2026 RWPs

9.5 Water Management Strategies

Before a RWPG begins the process of identifying potentially feasible WMSs, RWPGs must document the process by which it will list all possible WMSs and identify the strategies that are potentially feasible for meeting a need in the region. On November 1, 2023, the Rio Grande RWPG, after asking for public comments, considered and approved a documented process to identify potentially feasible WMSs for the 2026 Regional Water Planning Cycle.

The Region M potentially feasible WMSs were identified using the following documented process:

1. Current water planning information, including specific WMSs of interest, will be solicited from WUGs and Wholesale Water Providers (WWPs) in Fall 2023.
    a. Solicitation of planning information will include the recommended WMSs in the 2021 Regional Water Plan.
    b. WUGs/WWPs will be encouraged to classify each WMS on their 2021 Plan list as included or rejected for the 2026 Planning Cycle and provide comments, and also to list additional WMSs that will be new for the 2026 Planning Cycle. WUGs/WWPs will be

encouraged to classify each WMS on their draft list as recommended, alternative, or rejected and provide comments.

2. A list of potential WMSs will be prepared based on an initial technical evaluation and needs analysis and the comments received, which will be available for consideration by the RWPG by early 2024.

3. Additional WMSs may be brought forth to the RWPG for consideration until May 2024.

Using the documented process identified above, the Rio Grande RWPG identified Potentially Feasible WMSs for the 2026 RWP, which are listed in Table 9-1. The majority of the WMSs listed in the table are the same as in the 2021 RWP, although in some cases, the WMS from the 2021 RWP has been split into multiple WMS in the 2026 RWP. For example, Municipal Infrastructure Improvements in the 2021 RWP have been split into separate WMSs for Surface Water Treatment, Distribution and Transmission Facilities, and Storage Reservoirs, and Desalination has been split into Brackish Groundwater Desalination and Seawater Desalination.

Table 9-1 2026 Potentially Feasible Water Management Strategies

Potentially Feasible Water Management Strategies
Advanced Municipal Conservation
Irrigation District Conservation
Agricultural (On-Farm) Conservation
Industrial Conservation
Conversion of Water Right Classification
New or Expanded Surface Water Treatment
New or Expanded Distribution and Transmission Facilities Resulting in Increased Supplies
Storage Reservoirs
New or Expanded Fresh Groundwater Supply
New or Expanded Brackish Groundwater Desalination
Seawater Desalination
Reuse
Biological Control of Arundo Donax
Drought Management
Aquifer Storage and Recovery
Regional Water Supply Facilities

Once the list of potentially feasible WMSs was developed, it was used in conjunction with the "Needs Analysis" based on supplies and demands. Advanced municipal conservation, drought management, reuse, irrigation district (ID) improvements, and industrial conservation WMSs were applied to the WUGs and WWPs, and a secondary needs calculation was performed.

These secondary needs were then compared to the submitted, developed, and carried over WMS available to each WUG or WWP. Staying within the bounds of water availability from each source, the WMSs specific to each WUG were selected that could meet the projected need. A detailed description of the "Needs Analysis" is discussed in Chapter 4, and the WMS evaluation process is included in Chapter 5.

Table 9-2 compares the number of each type of WMS that was recommended in the 2021 RWP and the 2026 RWP. The 2021 RWP included 139 recommended WMS projects and 22 alternative WMS projects, whereas the 2026 RWP recommends 233 WMS projects and 19 alternative WMS projects. In many cases, the number of WMS correlates to the number of WMS projects for a particular WMS category. In some cases, the number of WMS may be fewer, particularly if there are multiple phased projects for the WMS. The majority of the increase in projects for the 2026 RWP comes from the inclusion of capital cost conservation measures, such as water line leak detection and repair, and AMI smart meters.

Table 9-2 Comparison of Recommended WMS/WMS Projects from 2021 and 2026 RWPs

Category	Number of Recommended WMS/WMS Projects		Number of Alternative WMS/WMS Projects	
	2026 RWP	2021 RWP	2026 RWP	2021 RWP
Conversion of Water Rights	71	46	-	-
Aquifer Storage and Recovery	-	-	1	1
Brackish Groundwater	21	5	-	-
Fresh Groundwater	9	18	4	5
Irrigation District Conservation	24	24	-	-
On-Farm Conservation	8	8	-	-
Municipal Conservation	73	-	-	-
Municipal Infrastructure Improvements	5	13	-	-
Reuse	13	17	7	5
Seawater Desalination	1	1	2	2
Storage	4	6	1	2
Surface Water Treatment	4	1	4	7

9.5.1 Implementation of Water Management Strategy Projects from the 2021 Regional Water Plan

An implementation survey was conducted as part of the 2026 RWP process, which describes the progress toward implementing projects that were recommended in the 2021 RWP. Appendix 9A includes survey results and project information that were received by sponsors.

9.6 Drought Response

Chapter 7 is dedicated to a discussion of each region's preparations for and response to drought. The previous requirements for the RWPs have been retained, aggregated into this chapter, clarified, and new requirements have been added.

New requirements for the 2026 RWP:

- Removal of the requirement to discuss unnecessary or counterproductive drought response.
- RWPGs to identify rather than recommend drought response triggers and actions.
- New guidance to optionally address droughts worse than drought of record.
- New subsection required to address how the planning group is addressing uncertainty and droughts worse than drought of record (if applicable), and what additional measures not included in the plan could be available during a drought worse than drought of record.

9.7 Assessment of Progress Toward Regionalization

In accordance with 31 Texas Administrative Code §357.45(b), planning groups must "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."

Several WMSs since the 2021 RWP have focused on cooperative agreements among WUGs and WWPs. The ID Conservation WMS is the main recommended WMS in the 2021 RWP and the RWP 2026 RWP that serves more than one WUG. This WMS focuses on improving ID distribution systems to reduce losses and remove infrastructure bottlenecks and providing continued improvement to any ID efficiency and enables more water to convey through the complex systems in the Lower Rio Grande Valley. ID Conservation measures have been implemented since the 2021 RWPG and will continue to be implemented in future year. One other WMS is the Delta Region Water Supply WMS, which proposes to build three reservoirs and water treatment plants that could serve multiple WUGs, although specific WUGs have not been identified yet. This WMS was included in the 2021 RWP as an amendment to the plan and continues to be included in the 2026 RWP as a recommended WMS. Southmost Regional Water Authority (SRWA) has three brackish groundwater desalination WMSs recommended in the 2026 RWP that will likely serve multiple WUGs. Outside of WMSs, SRWA has conducted successful regional groundwater connection studies.

For many years, the Rio Grande RWPA has encouraged cooperation and collaboration among WUGs for the purposes of achieving economies of scales. For example, the Southmost Regional Water Authority utilizes economy of scale to service various independent systems. These WUGs include Brownsville Public Utilities Board, Valley Municipal Utility District, Brownsville Navigation District (i.e., Manufacturing, Cameron in the RWP), Los Fresnos, and Indian Lake (i.e., County-Other, Cameron in the RWP).

This assessment demonstrates that many entities within the Rio Grande RWPA coordinate and collaborate in order to achieve regionalization. Based on the array of collaborative projects and partnerships, the Rio Grande RWPA has been successful in encouraging cooperation among WUGs for the purpose of achieving economies of scale or otherwise incentivizing WMSs that benefit the entire RWPA. The Rio Grande RWPG is committed to encouraging continued cooperation among WUGs and is always looking for ways to achieve economies of scale for the benefit of the region and the state.

Appendix 9A. Implementation Status of Recommended Projects in the 2021 RWP

Planning Region	WMS or WMS Project Name	Database Online Decade	Related Sponsor Entity and/or Benefitting WUGs	Implementation Survey Record Type	Database ID	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 by adding information in this column.	Please select one or more project impediments. If an impediment is not listed, select "Other" and provide information in Column K.	If you selected "Other" in Column J, please provide information about project impediments not shown in the impediment list provided.	What funding type(s) are being used for the project? (Select all that apply)	Optional Comments
M	Advanced Municipal Conservation - Agua SUD	2050	WUG Reducing Demand: Agua SUD	Recommended Demand Reduction Strategy Without WMS Project	18959							
M	Advanced Municipal Conservation - Alamo	2040	WUG Reducing Demand: Alamo	Recommended Demand Reduction Strategy Without WMS Project	19411							
M	Advanced Municipal Conservation - Brownsville	2030	WUG Reducing Demand: Brownsville	Recommended Demand Reduction Strategy Without WMS Project	19251							
M	Advanced Municipal Conservation - Combes	2060	WUG Reducing Demand: Combes	Recommended Demand Reduction Strategy Without WMS Project	19001							
M	Advanced Municipal Conservation - Donna	2050	WUG Reducing Demand: Donna	Recommended Demand Reduction Strategy Without WMS Project	19041							
M	Advanced Municipal Conservation - Eagle Pass	2030	WUG Reducing Demand: Eagle Pass	Recommended Demand Reduction Strategy Without WMS Project	19045							
M	Advanced Municipal Conservation - East Rio Hondo WSC	2040	WUG Reducing Demand: East Rio Hondo WSC	Recommended Demand Reduction Strategy Without WMS Project	19049	Yes	Project/WMS started		Economic feasibility/financing		Private	
M	Advanced Municipal Conservation - Edcouch	2070	WUG Reducing Demand: Edcouch	Recommended Demand Reduction Strategy Without WMS Project	19055							
M	Advanced Municipal Conservation - Edinburg	2040	WUG Reducing Demand: Edinburg	Recommended Demand Reduction Strategy Without WMS Project	19059							
M	Advanced Municipal Conservation - El Jardin WSC	2050	WUG Reducing Demand: El Jardin WSC	Recommended Demand Reduction Strategy Without WMS Project	19067							
M	Advanced Municipal Conservation - El Sauz WSC	2060	WUG Reducing Demand: El Sauz WSC	Recommended Demand Reduction Strategy Without WMS Project	27689							
M	Advanced Municipal Conservation - El Tanque WSC	2040	WUG Reducing Demand: El Tanque WSC	Recommended Demand Reduction Strategy Without WMS Project	27721							
M	Advanced Municipal Conservation - Elsa	2060	WUG Reducing Demand: Elsa	Recommended Demand Reduction Strategy Without WMS Project	19073							
M	Advanced Municipal Conservation - Falcon Rural WSC	2030	WUG Reducing Demand: Falcon Rural WSC	Recommended Demand Reduction Strategy Without WMS Project	27726							
M	Advanced Municipal Conservation - Harlingen	2030	WUG Reducing Demand: Harlingen	Recommended Demand Reduction Strategy Without WMS Project	19077							
M	Advanced Municipal Conservation - Hidalgo	2040	WUG Reducing Demand: Hidalgo	Recommended Demand Reduction Strategy Without WMS Project	19085							
M	Advanced Municipal Conservation - Hidalgo County MUD 1	2050	WUG Reducing Demand: Hidalgo County MUD 1	Recommended Demand Reduction Strategy Without WMS Project	19243							
M	Advanced Municipal Conservation - Jim Hogg County WCID 2	2050	WUG Reducing Demand: Jim Hogg County WCID 2	Recommended Demand Reduction Strategy Without WMS Project	19081							
M	Advanced Municipal Conservation - La Feria	2050	WUG Reducing Demand: La Feria	Recommended Demand Reduction Strategy Without WMS Project	19091							
M	Advanced Municipal Conservation - La Grulla	2030	WUG Reducing Demand: La Grulla	Recommended Demand Reduction Strategy Without WMS Project	19095							
M	Advanced Municipal Conservation - La Joya	2050	WUG Reducing Demand: La Joya	Recommended Demand Reduction Strategy Without WMS Project	19099							
M	Advanced Municipal Conservation - La Villa	2050	WUG Reducing Demand: La Villa	Recommended Demand Reduction Strategy Without WMS Project	19418							
M	Advanced Municipal Conservation - Laguna Madre Water District	2020	WUG Reducing Demand: Laguna Madre Water District	Recommended Demand Reduction Strategy Without WMS Project	27748							
M	Advanced Municipal Conservation - Laredo	2040	WUG Reducing Demand: Laredo	Recommended Demand Reduction Strategy Without WMS Project	19109							
M	Advanced Municipal Conservation - Lyford	2060	WUG Reducing Demand: Lyford	Recommended Demand Reduction Strategy Without WMS Project	27684							
M	Advanced Municipal Conservation - Maverick County	2050	WUG Reducing Demand: Maverick County	Recommended Demand Reduction Strategy Without WMS Project	27716							
M	Advanced Municipal Conservation - McAllen	2030	WUG Reducing Demand: McAllen	Recommended Demand Reduction Strategy Without WMS Project	19117							
M	Advanced Municipal Conservation - Mercedes	2060	WUG Reducing Demand: Mercedes	Recommended Demand Reduction Strategy Without WMS Project	19121							
M	Advanced Municipal Conservation - Military Highway WSC	2040	WUG Reducing Demand: Military Highway WSC	Recommended Demand Reduction Strategy Without WMS Project	19125							
M	Advanced Municipal Conservation - Mirando City WSC	2050	WUG Reducing Demand: Mirando City WSC	Recommended Demand Reduction Strategy Without WMS Project	27694							
M	Advanced Municipal Conservation - Mission	2030	WUG Reducing Demand: Mission	Recommended Demand Reduction Strategy Without WMS Project	19135							
M	Advanced Municipal Conservation - North Alamo WSC	2030	WUG Reducing Demand: North Alamo WSC	Recommended Demand Reduction Strategy Without WMS Project	19141							
M	Advanced Municipal Conservation - Olmito WSC	2030	WUG Reducing Demand: Olmito WSC	Recommended Demand Reduction Strategy Without WMS Project	19149	No	Project/WMS not started	Time is being dedicated to other projects and activities.	Economic feasibility/financing; Shift in timeline		Unknown	
M	Advanced Municipal Conservation - Palm Valley	2030	WUG Reducing Demand: Palm Valley	Recommended Demand Reduction Strategy Without WMS Project	19153							
M	Advanced Municipal Conservation - Pharr	2050	WUG Reducing Demand: Pharr	Recommended Demand Reduction Strategy Without WMS Project	19169							
M	Advanced Municipal Conservation - Port Mansfield PUD	2020	WUG Reducing Demand: Port Mansfield PUD	Recommended Demand Reduction Strategy Without WMS Project	27743							
M	Advanced Municipal Conservation - Primera	2060	WUG Reducing Demand: Primera	Recommended Demand Reduction Strategy Without WMS Project	19179							
M	Advanced Municipal Conservation - Raymondville	2050	WUG Reducing Demand: Raymondville	Recommended Demand Reduction Strategy Without WMS Project	19423							
M	Advanced Municipal Conservation - Rio Grande City	2030	WUG Reducing Demand: Rio Grande City	Recommended Demand Reduction Strategy Without WMS Project	19191							
M	Advanced Municipal Conservation - Rio WSC	2050	WUG Reducing Demand: Rio WSC	Recommended Demand Reduction Strategy Without WMS Project	19195							
M	Advanced Municipal Conservation - Roma	2060	WUG Reducing Demand: Roma	Recommended Demand Reduction Strategy Without WMS Project	19427							
M	Advanced Municipal Conservation - San Benito	2050	WUG Reducing Demand: San Benito	Recommended Demand Reduction Strategy Without WMS Project	19199							
M	Advanced Municipal Conservation - San Juan	2040	WUG Reducing Demand: San Juan	Recommended Demand Reduction Strategy Without WMS Project	19203							
M	Advanced Municipal Conservation - San Ygnacio MUD	2030	WUG Reducing Demand: San Ygnacio MUD	Recommended Demand Reduction Strategy Without WMS Project	19211							
M	Advanced Municipal Conservation - Santa Rosa	2070	WUG Reducing Demand: Santa Rosa	Recommended Demand Reduction Strategy Without WMS Project	19215							
M	Advanced Municipal Conservation - Sharyland WSC	2030	WUG Reducing Demand: Sharyland WSC	Recommended Demand Reduction Strategy Without WMS Project	19219							
M	Advanced Municipal Conservation - Siesta Shores WCID	2050	WUG Reducing Demand: Siesta Shores WCID	Recommended Demand Reduction Strategy Without WMS Project	27711							
M	Advanced Municipal Conservation - Union WSC	2030	WUG Reducing Demand: Union WSC	Recommended Demand Reduction Strategy Without WMS Project	19231							
M	Advanced Municipal Conservation - Valley MUD 2	2020	WUG Reducing Demand: Valley MUD 2	Recommended Demand Reduction Strategy Without WMS Project	27736							
M	Advanced Municipal Conservation - Webb County	2050	WUG Reducing Demand: Webb County	Recommended Demand Reduction Strategy Without WMS Project	27704							
M	Advanced Municipal Conservation - Weslaco	2030	WUG Reducing Demand: Weslaco	Recommended Demand Reduction Strategy Without WMS Project	19235							
M	Advanced Municipal Conservation - Zapata County	2030	WUG Reducing Demand: Zapata County	Recommended Demand Reduction Strategy Without WMS Project	19239							
M	Advanced Municipal Conservation - Zapata County WCID-Hwy 16 East	2030	WUG Reducing Demand: Zapata County WCID-Hwy 16 East	Recommended Demand Reduction Strategy Without WMS Project	27731							
M	Agua SUD - East WWTP Potable Reuse Phase 1	2020	Project Sponsor(s): Agua SUD	Recommended WMS Project	2610							
M	Agua SUD - West WWTP Potable Reuse Phase 1	2020	Project Sponsor(s): Agua SUD	Recommended WMS Project	2365							
M	Agua SUD - West WWTP Potable Reuse Phase 2	2040	Project Sponsor(s): Agua SUD	Recommended WMS Project	2609							
M	Alamo - Brackish Groundwater Desalination Plant	2030	Project Sponsor(s): Alamo	Recommended WMS Project	1120							
M	Alamo - Fresh Groundwater Well	2020	Project Sponsor(s): Alamo	Recommended WMS Project	1601							
M	Arundo Donax Biological Control	2020	WMS Supply Recipient: Irrigation, Cameron	Recommended WMS Supply Without WMS Project	44438							
M	Arundo Donax Biological Control	2020	WMS Supply Recipient: Irrigation, Hidalgo	Recommended WMS Supply Without WMS Project	44458							
M	Arundo Donax Biological Control	2020	WMS Supply Recipient: Irrigation, Maverick	Recommended WMS Supply Without WMS Project	100239							

M	Arundo Donax Biological Control	2020	WMS Supply Recipient: Irrigation, Starr	Recommended WMS Supply Without WMS Project	44455							
M	Arundo Donax Biological Control	2020	WMS Supply Recipient: Irrigation, Webb	Recommended WMS Supply Without WMS Project	100248							
M	Arundo Donax Biological Control	2020	WMS Supply Recipient: Irrigation, Willacy	Recommended WMS Supply Without WMS Project	44449							
M	Arundo Donax Biological Control	2020	WMS Supply Recipient: Irrigation, Zapata	Recommended WMS Supply Without WMS Project	44452							
M	Bayview ID Conservation	2020	Project Sponsor(s): Bayview Irrigation District 11	Recommended WMS Project	2216							
M	Brownsville - Banco Morales Reservoir	2030	Project Sponsor(s): Brownsville	Recommended WMS Project	2343							
M	Brownsville - Non-Potable Water Reuse Pipeline	2030	Project Sponsor(s): Brownsville	Recommended WMS Project	2355							
M	Brownsville - Resaca Restoration	2020	Project Sponsor(s): Brownsville	Recommended WMS Project	2524							
M	Brownsville - Southside WWTP Potable Reuse Phase 1	2050	Project Sponsor(s): Brownsville	Recommended WMS Project	2356							
M	Brownsville - Southside WWTP Potable Reuse Phase 2	2070	Project Sponsor(s): Brownsville	Recommended WMS Project	2607							
M	Brownsville ID Conservation	2020	Project Sponsor(s): Brownsville Irrigation District	Recommended WMS Project	2215							
M	Cameron County ID 2 Conservation	2020	Project Sponsor(s): Cameron County Irrigation District 2	Recommended WMS Project	2218							
M	Cameron County ID 6 Conservation	2020	Project Sponsor(s): Cameron County Irrigation District 6	Recommended WMS Project	2222							
M	Cameron County Water Improvement District 10 Conservation	2020	Project Sponsor(s): Cameron County Irrigation District 10	Recommended WMS Project	2229							
M	County-Other, Cameron - Expanded Groundwater Supply	2020	Project Sponsor(s): Municipal county-other (Cameron)	Recommended WMS Project	2680							
M	County-Other, Starr - Additional Groundwater Wells	2020	Project Sponsor(s): Municipal county-other (Starr)	Recommended WMS Project	2616							
M	County-Other, Webb - Additional Groundwater Wells	2020	Project Sponsor(s): Municipal county-other (Webb)	Recommended WMS Project	1709							
M	Delta Lake ID - ID Conservation	2020	Project Sponsor(s): Delta Lake Irrigation District	Recommended WMS Project	2312							
M	Delta Panchita Reservoir	2030	Project Sponsor(s): Hidalgo County Drainage District 1	Recommended WMS Project	4413							
M	Donna - WTP Expansion, New Raw Water Reservoir, and Raw Water Pump Station	2020	Project Sponsor(s): Donna	Recommended WMS Project	2596							
M	Donna ID Conservation	2020	Project Sponsor(s): Donna Irrigation District-Hidalgo County 1	Recommended WMS Project	2327							
M	Drought Management	2030	WUG Reducing Demand: Agua SUD	Recommended Demand Reduction Strategy Without WMS Project	32141							
M	Drought Management	2020	WUG Reducing Demand: Alamo	Recommended Demand Reduction Strategy Without WMS Project	32164							
M	Drought Management	2030	WUG Reducing Demand: Brownsville	Recommended Demand Reduction Strategy Without WMS Project	32378							
M	Drought Management	2040	WUG Reducing Demand: Donna	Recommended Demand Reduction Strategy Without WMS Project	32171							
M	Drought Management	2020	WUG Reducing Demand: Eagle Pass	Recommended Demand Reduction Strategy Without WMS Project	32169							
M	Drought Management	2030	WUG Reducing Demand: East Rio Hondo WSC	Recommended Demand Reduction Strategy Without WMS Project	32173	Yes	Project/WMS started		Economic feasibility/financing; Water supply constraints		State; Federal; Private	
M	Drought Management	2020	WUG Reducing Demand: Edcouch	Recommended Demand Reduction Strategy Without WMS Project	32175							
M	Drought Management	2020	WUG Reducing Demand: Edinburg	Recommended Demand Reduction Strategy Without WMS Project	32177							
M	Drought Management	2020	WUG Reducing Demand: El Jardin WSC	Recommended Demand Reduction Strategy Without WMS Project	32181							
M	Drought Management	2020	WUG Reducing Demand: El Sauz WSC	Recommended Demand Reduction Strategy Without WMS Project	32201							
M	Drought Management	2020	WUG Reducing Demand: El Tanque WSC	Recommended Demand Reduction Strategy Without WMS Project	32203							
M	Drought Management	2020	WUG Reducing Demand: Elsa	Recommended Demand Reduction Strategy Without WMS Project	32179							
M	Drought Management	2020	WUG Reducing Demand: Hidalgo	Recommended Demand Reduction Strategy Without WMS Project	32218							
M	Drought Management	2020	WUG Reducing Demand: Hidalgo County MUD 1	Recommended Demand Reduction Strategy Without WMS Project	32220							
M	Drought Management	2020	WUG Reducing Demand: La Grulla	Recommended Demand Reduction Strategy Without WMS Project	32232							
M	Drought Management	2020	WUG Reducing Demand: La Joya	Recommended Demand Reduction Strategy Without WMS Project	32234							
M	Drought Management	2020	WUG Reducing Demand: La Villa	Recommended Demand Reduction Strategy Without WMS Project	32236							
M	Drought Management	2020	WUG Reducing Demand: Laguna Madre Water District	Recommended Demand Reduction Strategy Without WMS Project	32230							
M	Drought Management	2050	WUG Reducing Demand: Laredo	Recommended Demand Reduction Strategy Without WMS Project	32238							
M	Drought Management	2020	WUG Reducing Demand: McAllen	Recommended Demand Reduction Strategy Without WMS Project	32257							
M	Drought Management	2040	WUG Reducing Demand: Mercedes	Recommended Demand Reduction Strategy Without WMS Project	32259							
M	Drought Management	2030	WUG Reducing Demand: Military Highway WSC	Recommended Demand Reduction Strategy Without WMS Project	32261							
M	Drought Management	2030	WUG Reducing Demand: Mirando City WSC	Recommended Demand Reduction Strategy Without WMS Project	32284							
M	Drought Management	2020	WUG Reducing Demand: Mission	Recommended Demand Reduction Strategy Without WMS Project	32278							
M	Drought Management	2020	WUG Reducing Demand: North Alamo WSC	Recommended Demand Reduction Strategy Without WMS Project	32290							
M	Drought Management	2030	WUG Reducing Demand: Olmito WSC	Recommended Demand Reduction Strategy Without WMS Project	32292	No	Project/WMS not started	Time is being dedicated to other projects and activities.	Economic feasibility/financing; Shift in timeline		Unknown	
M	Drought Management	2030	WUG Reducing Demand: Pharr	Recommended Demand Reduction Strategy Without WMS Project	32304							
M	Drought Management	2020	WUG Reducing Demand: Port Mansfield PUD	Recommended Demand Reduction Strategy Without WMS Project	32311							
M	Drought Management	2050	WUG Reducing Demand: Primera	Recommended Demand Reduction Strategy Without WMS Project	32316							
M	Drought Management	2020	WUG Reducing Demand: Rio Grande City	Recommended Demand Reduction Strategy Without WMS Project	32323							
M	Drought Management	2020	WUG Reducing Demand: Rio WSC	Recommended Demand Reduction Strategy Without WMS Project	32325							
M	Drought Management	2070	WUG Reducing Demand: San Benito	Recommended Demand Reduction Strategy Without WMS Project	32327							
M	Drought Management	2030	WUG Reducing Demand: San Juan	Recommended Demand Reduction Strategy Without WMS Project	32329							
M	Drought Management	2050	WUG Reducing Demand: Sebastian MUD	Recommended Demand Reduction Strategy Without WMS Project	32331							
M	Drought Management	2020	WUG Reducing Demand: Sharyland WSC	Recommended Demand Reduction Strategy Without WMS Project	32321							
M	Drought Management	2020	WUG Reducing Demand: Siesta Shores WCID	Recommended Demand Reduction Strategy Without WMS Project	32355							
M	Drought Management	2020	WUG Reducing Demand: Union WSC	Recommended Demand Reduction Strategy Without WMS Project	32351							
M	Drought Management	2050	WUG Reducing Demand: Webb County	Recommended Demand Reduction Strategy Without WMS Project	32361							
M	Drought Management	2020	WUG Reducing Demand: Weslaco	Recommended Demand Reduction Strategy Without WMS Project	32363							
M	Drought Management	2020	WUG Reducing Demand: Zapata County	Recommended Demand Reduction Strategy Without WMS Project	32373							
M	Edcouch - New Groundwater Supply	2020	Project Sponsor(s): Edcouch	Recommended WMS Project	1712							
M	Edinburg - Non-Potable Reuse	2030	Project Sponsor(s): Edinburg	Recommended WMS Project	2366							
M	El Jardin WSC - Distribution Pipeline Replacement	2020	Project Sponsor(s): El Jardin WSC	Recommended WMS Project	2428							
M	Engleman ID Conservation	2020	Project Sponsor(s): Engelman Irrigation District	Recommended WMS Project	2234							
M	Engleman Reservoir	2050	Project Sponsor(s): Hidalgo County Drainage District 1	Recommended WMS Project	4415							
M	ERHWSC - FM 2925 Transmission Line	2030	Project Sponsor(s): East Rio Hondo WSC	Recommended WMS Project	2340	Yes	Project/WMS started		Economic feasibility/financing		Private	Parts of the transmission main are built. A large majority is yet to be constructed and will take state or federal funding to do so.
M	ERHWSC - Surface WTP Phase 1	2020	Project Sponsor(s): East Rio Hondo WSC	Recommended WMS Project	2380	Yes	Project/WMS started		Economic feasibility/financing; Shift in timeline		Private	The property for the new plant has been purchased adjacent to a Harlingen Irrigation District reservoir. No upgrades to raw water or treatment facilities have been started.
M	Harlingen ID Conservation	2020	Project Sponsor(s): Harlingen Irrigation District-Cameron County 1	Recommended WMS Project	2294	Yes	Project/WMS started		Economic feasibility/financing; Shift in timeline; Water supply constraints		Unknown	
M	HCID 6 Service Area Expansion	2040	Project Sponsor(s): Hidalgo County Irrigation District 6	Recommended WMS Project	4390							
M	Hidalgo - Expand Existing Groundwater Wells	2040	Project Sponsor(s): Hidalgo	Recommended WMS Project	1715							

M	Hidalgo and Cameron County ID 9 Conservation	2020	Project Sponsor(s): Hidalgo-Cameron County Irrigation District 9	Recommended WMS Project	2354							
M	Hidalgo County ID 1 Conservation	2020	Project Sponsor(s): Hidalgo County Irrigation District 1	Recommended WMS Project	2325							
M	Hidalgo County ID 13 Conservation	2020	Project Sponsor(s): Hidalgo County Irrigation District 13	Recommended WMS Project	2353							
M	Hidalgo County ID 16 Conservation	2020	Project Sponsor(s): Hidalgo County Irrigation District 16	Recommended WMS Project	2306							
M	Hidalgo County ID 2 Conservation	2020	Project Sponsor(s): Hidalgo County Irrigation District 2	Recommended WMS Project	2613							
M	Hidalgo County ID 5 Conservation	2020	Project Sponsor(s): Hidalgo County Irrigation District 5	Recommended WMS Project	2303							
M	Hidalgo County ID 6 Conservation	2020	Project Sponsor(s): Hidalgo County Irrigation District 6	Recommended WMS Project	2304							
M	Hidalgo County WCID 18 Conservation	2020	Project Sponsor(s): Hidalgo County WCID 18	Recommended WMS Project	2310							
M	Hidalgo County WID 19 (Sharyland) Conservation	2020	Project Sponsor(s): Hidalgo County Irrigation District 19	Recommended WMS Project	2315							
M	Hidalgo County WID 3 Conservation	2020	Project Sponsor(s): Hidalgo County WID 3	Recommended WMS Project	2308							
M	Implementation of Industrial Best Management Practices	2020	WUG Reducing Demand: Manufacturing, Cameron	Recommended Demand Reduction Strategy Without WMS Project	11009							
M	Implementation of Industrial Best Management Practices	2020	WUG Reducing Demand: Manufacturing, Hidalgo	Recommended Demand Reduction Strategy Without WMS Project	11025							
M	Implementation of Industrial Best Management Practices	2020	WUG Reducing Demand: Manufacturing, Maverick	Recommended Demand Reduction Strategy Without WMS Project	11045							
M	Implementation of Industrial Best Management Practices	2020	WUG Reducing Demand: Manufacturing, Starr	Recommended Demand Reduction Strategy Without WMS Project	11057							
M	Implementation of Industrial Best Management Practices	2020	WUG Reducing Demand: Manufacturing, Webb	Recommended Demand Reduction Strategy Without WMS Project	11065							
M	Implementation of Industrial Best Management Practices	2020	WUG Reducing Demand: Manufacturing, Zapata	Recommended Demand Reduction Strategy Without WMS Project	31987							
M	Implementation of Industrial Best Management Practices	2020	WUG Reducing Demand: Mining, Cameron	Recommended Demand Reduction Strategy Without WMS Project	11017							
M	Implementation of Industrial Best Management Practices	2020	WUG Reducing Demand: Mining, Hidalgo	Recommended Demand Reduction Strategy Without WMS Project	11027							
M	Implementation of Industrial Best Management Practices	2020	WUG Reducing Demand: Mining, Jim Hogg	Recommended Demand Reduction Strategy Without WMS Project	11039							
M	Implementation of Industrial Best Management Practices	2020	WUG Reducing Demand: Mining, Maverick	Recommended Demand Reduction Strategy Without WMS Project	11047							
M	Implementation of Industrial Best Management Practices	2020	WUG Reducing Demand: Mining, Starr	Recommended Demand Reduction Strategy Without WMS Project	11055							
M	Implementation of Industrial Best Management Practices	2020	WUG Reducing Demand: Mining, Webb	Recommended Demand Reduction Strategy Without WMS Project	11067							
M	Implementation of Industrial Best Management Practices	2020	WUG Reducing Demand: Mining, Willacy	Recommended Demand Reduction Strategy Without WMS Project	11087							
M	Implementation of Industrial Best Management Practices	2020	WUG Reducing Demand: Mining, Zapata	Recommended Demand Reduction Strategy Without WMS Project	11093							
M	Implementation of Industrial Best Management Practices	2020	WUG Reducing Demand: Steam-Electric Power, Cameron	Recommended Demand Reduction Strategy Without WMS Project	11021							
M	Implementation of Industrial Best Management Practices	2020	WUG Reducing Demand: Steam-Electric Power, Hidalgo	Recommended Demand Reduction Strategy Without WMS Project	11029							
M	Implementation of Industrial Best Management Practices	2020	WUG Reducing Demand: Steam-Electric Power, Webb	Recommended Demand Reduction Strategy Without WMS Project	11069							
M	Irrigation, Jim Hogg - Additional Groundwater Wells	2020	Project Sponsor(s): Irrigation (Jim Hogg)	Recommended WMS Project	1718							
M	La Feria - Water Well with RO Unit	2030	Project Sponsor(s): La Feria	Recommended WMS Project	1619							
M	La Feria ID Conservation	2020	Project Sponsor(s): La Feria Irrigation District-Cameron County 3	Recommended WMS Project	2326							
M	Laguna Madre Water District - Potable Reuse	2030	Project Sponsor(s): Laguna Madre Water District	Recommended WMS Project	2368							
M	Laguna Madre Water District - Seawater Desalination Plant	2050	Project Sponsor(s): Laguna Madre Water District	Recommended WMS Project	2474							
M	Laguna Madre Water District - WTP 1 Expansion and Process Improvements	2020	Project Sponsor(s): Laguna Madre Water District	Recommended WMS Project	4382							
M	Laredo - South Laredo WWTP Potable Reuse Phase 1	2040	Project Sponsor(s): Laredo	Recommended WMS Project	2369							
M	Laredo - South Laredo WWTP Potable Reuse Phase 2	2060	Project Sponsor(s): Laredo	Recommended WMS Project	2608							
M	Los Fresnos - WTP Expansion	2020	Project Sponsor(s): Los Fresnos	Recommended WMS Project	4385							
M	Lyford - Brackish Groundwater Well and Desalination	2030	Project Sponsor(s): Lyford	Recommended WMS Project	1674							
M	Maverick County WCID - ID Conservation	2020	Project Sponsor(s): Maverick County WCID 1	Recommended WMS Project	2314	Yes	Project/WMS not started	Awaiting grant approval.	Economic feasibility/financing; Shift in timeline		State; Federal	
M	McAllen - AMI Project	2020	Project Sponsor(s): McAllen	Recommended WMS Project	4386							
M	McAllen - Brackish Groundwater Desalination Plant	2030	Project Sponsor(s): McAllen	Recommended WMS Project	1679							
M	McAllen - North WWTP Potable Reuse Phase 1	2040	Project Sponsor(s): McAllen	Recommended WMS Project	2370							
M	McAllen - North WWTP Potable Reuse Phase 2	2050	Project Sponsor(s): McAllen	Recommended WMS Project	2684							
M	McAllen - Raw Water Line Project	2020	Project Sponsor(s): McAllen	Recommended WMS Project	2336							
M	Mission - Brackish Groundwater Desalination Plant	2030	Project Sponsor(s): Mission	Recommended WMS Project	1680							
M	Mission - WWTP Potable Reuse Phase 1	2020	Project Sponsor(s): Mission	Recommended WMS Project	2373							
M	Mission - WWTP Potable Reuse Phase 2	2050	Project Sponsor(s): Mission	Recommended WMS Project	2689							
M	NaWSC - Delta Area Brackish Groundwater Desalination Plant	2030	Project Sponsor(s): North Alamo WSC	Recommended WMS Project	4375							
M	NAWSC - Delta WTP Expansion Phase 1	2040	Project Sponsor(s): North Alamo WSC	Recommended WMS Project	2381							
M	NAWSC - Delta WTP Expansion Phase 2	2050	Project Sponsor(s): North Alamo WSC	Recommended WMS Project	2606							
M	North Cameron Regional WTP Wellfield Expansion	2030	Project Sponsor(s): East Rio Hondo WSC; North Alamo WSC	Recommended WMS Project	1604	Yes	Project/WMS started		Economic feasibility/financing; Contract/permit constraints		State; Federal; Private	Phase 1 of the NCRWTP expansion has been funded via DWSRF at $19 million. The 2nd NCRWTP Phase expansion and the first transmission main are ranked well on the DWSRF IUP and have been applied for at $28 & $17 million, respectively.
M	Olmito WSC - New Biolac WWTP	2020	Project Sponsor(s): Olmito WSC	Recommended WMS Project	4377	Yes	Project/WMS started				Federal	
M	Olmito WSC - WTP Expansion	2020	Project Sponsor(s): Olmito WSC	Recommended WMS Project	4378	No	Project/WMS not started	WTP expansion is not yet necessary.	Economic feasibility/financing		Unknown	
M	On-Farm Irrigation Conservation	2020	WUG Reducing Demand: Irrigation, Cameron	Recommended Demand Reduction Strategy Without WMS Project	19872							
M	On-Farm Irrigation Conservation	2020	WUG Reducing Demand: Irrigation, Hidalgo	Recommended Demand Reduction Strategy Without WMS Project	19874							
M	On-Farm Irrigation Conservation	2020	WUG Reducing Demand: Irrigation, Jim Hogg	Recommended Demand Reduction Strategy Without WMS Project	19876							
M	On-Farm Irrigation Conservation	2020	WUG Reducing Demand: Irrigation, Maverick	Recommended Demand Reduction Strategy Without WMS Project	19878							
M	On-Farm Irrigation Conservation	2020	WUG Reducing Demand: Irrigation, Starr	Recommended Demand Reduction Strategy Without WMS Project	19880							
M	On-Farm Irrigation Conservation	2020	WUG Reducing Demand: Irrigation, Webb	Recommended Demand Reduction Strategy Without WMS Project	19882							
M	On-Farm Irrigation Conservation	2020	WUG Reducing Demand: Irrigation, Willacy	Recommended Demand Reduction Strategy Without WMS Project	19884							
M	On-Farm Irrigation Conservation	2020	WUG Reducing Demand: Irrigation, Zapata	Recommended Demand Reduction Strategy Without WMS Project	19886							
M	Pharr - Raw Water Reservoir Augmentation	2020	Project Sponsor(s): Pharr	Recommended WMS Project	2374							
M	Primera - RO WTP With Groundwater Well	2030	Project Sponsor(s): Primera	Recommended WMS Project	2359							
M	Rio Grande City - Water Meter Replacement	2020	Project Sponsor(s): Rio Grande City	Recommended WMS Project	2589							
M	Rio Hondo - New Groundwater Supply	2020	Project Sponsor(s): Rio Hondo	Recommended WMS Project	4374							
M	Rio Hondo - Non-Potable Reuse	2020	Project Sponsor(s): Rio Hondo	Recommended WMS Project	4115							
M	Roma - Regional WTP	2030	Project Sponsor(s): Roma	Recommended WMS Project	2595							
M	San Benito - New Groundwater Supply	2030	Project Sponsor(s): San Benito	Recommended WMS Project	2083							
M	San Juan - Brackish Groundwater Well	2030	Project Sponsor(s): San Juan	Recommended WMS Project	4380							
M	San Juan - Potable Reuse	2040	Project Sponsor(s): San Juan	Recommended WMS Project	4379							
M	San Juan - WTP 1 Upgrade, Expansion, and BGD	2030	Project Sponsor(s): San Juan	Recommended WMS Project	2383							
M	Santa Cruz ID Conservation	2020	Project Sponsor(s): Santa Cruz Irrigation District 15	Recommended WMS Project	2328							
M	Santa Cruz Reservoir	2040	Project Sponsor(s): Hidalgo County Drainage District 1	Recommended WMS Project	4414							
M	Sharyland WSC - Well and RO Unit at WTP 2	2030	Project Sponsor(s): Sharyland WSC	Recommended WMS Project	2360							
M	Sharyland WSC - Well and RO Unit at WTP 3	2030	Project Sponsor(s): Sharyland WSC	Recommended WMS Project	2361							
M	Union WSC Meter and Line Replacement	2020	Project Sponsor(s): Union WSC	Recommended WMS Project	2435							
M	United ID Conservation	2020	Project Sponsor(s): United Irrigation District	Recommended WMS Project	2318							
M	Urbanization - Agua SUD	2040	Project Sponsor(s): Agua SUD	Recommended WMS Project	2734							
M	Urbanization - Alamo	2020	Project Sponsor(s): Alamo	Recommended WMS Project	2738							
M	Urbanization - Brownsville	2060	Project Sponsor(s): Brownsville	Recommended WMS Project	4248							
M	Urbanization - Cameron County-Other	2020	Project Sponsor(s): Municipal county-other (Cameron)	Recommended WMS Project	2729							
M	Urbanization - Donna	2020	Project Sponsor(s): Donna	Recommended WMS Project	2597							
M	Urbanization - Eagle Pass	2020	Project Sponsor(s): Eagle Pass	Recommended WMS Project	4141							
M	Urbanization - East Rio Hondo WSC (ERHWSC)	2020	Project Sponsor(s): East Rio Hondo WSC	Recommended WMS Project	2615	No	Project/WMS started		Other; Shift in timeline	Growth is slower than projections. Urbanization will happen on its own with no action by ERHWSC.	Private	
M	Urbanization - Edinburg	2020	Project Sponsor(s): Edinburg	Recommended WMS Project	2740							
M	Urbanization - El Jardin WSC	2020	Project Sponsor(s): El Jardin WSC	Recommended WMS Project	4147							

M	Urbanization - El Sauz WSC	2020	Project Sponsor(s): El Sauz WSC	Recommended WMS Project	4148							
M	Urbanization - El Tanque WSC	2020	Project Sponsor(s): El Tanque WSC	Recommended WMS Project	4149							
M	Urbanization - Elsa	2020	Project Sponsor(s): Elsa	Recommended WMS Project	2741							
M	Urbanization - Harlingen	2050	Project Sponsor(s): Harlingen	Recommended WMS Project	4150							
M	Urbanization - Hidalgo	2020	Project Sponsor(s): Hidalgo	Recommended WMS Project	2742							
M	Urbanization - Hidalgo County MUD 1	2020	Project Sponsor(s): Hidalgo County MUD 1	Recommended WMS Project	4151							
M	Urbanization - Hidalgo County-Other	2020	Project Sponsor(s): Municipal county-other (Hidalgo)	Recommended WMS Project	2735							
M	Urbanization - La Grulla	2020	Project Sponsor(s): La Grulla	Recommended WMS Project	4152							
M	Urbanization - La Joya	2020	Project Sponsor(s): La Joya	Recommended WMS Project	4153							
M	Urbanization - La Villa	2020	Project Sponsor(s): La Villa	Recommended WMS Project	2743							
M	Urbanization - Laguna Madre Water District	2020	Project Sponsor(s): Laguna Madre Water District	Recommended WMS Project	4154							
M	Urbanization - Laredo	2070	Project Sponsor(s): Laredo	Recommended WMS Project	4155							
M	Urbanization - Los Fresnos	2020	Project Sponsor(s): Los Fresnos	Recommended WMS Project	4400							
M	Urbanization - Maverick County-Other	2020	Project Sponsor(s): Municipal county-other (Maverick)	Recommended WMS Project	4127							
M	Urbanization - McAllen	2040	Project Sponsor(s): McAllen	Recommended WMS Project	2745							
M	Urbanization - Mercedes	2050	Project Sponsor(s): Mercedes	Recommended WMS Project	4156							
M	Urbanization - Military Highway WSC	2020	Project Sponsor(s): Military Highway WSC	Recommended WMS Project	2730							
M	Urbanization - Mirando City WSC	2020	Project Sponsor(s): Mirando City WSC	Recommended WMS Project	4157							
M	Urbanization - Mission	2020	Project Sponsor(s): Mission	Recommended WMS Project	2746							
M	Urbanization - North Alamo WSC (NAWSC)	2020	Project Sponsor(s): North Alamo WSC	Recommended WMS Project	4158							
M	Urbanization - Olmito WSC	2030	Project Sponsor(s): Olmito WSC	Recommended WMS Project	2731	No	Project/WMS not started	Time is being dedicated to other projects and activities.	Economic feasibility/financing; Shift in timeline		Unknown	
M	Urbanization - Pharr	2030	Project Sponsor(s): Pharr	Recommended WMS Project	4159							
M	Urbanization - Port Mansfield PUD	2020	Project Sponsor(s): Port Mansfield PUD	Recommended WMS Project	4160							
M	Urbanization - Primera	2050	Project Sponsor(s): Primera	Recommended WMS Project	4161							
M	Urbanization - Rio Grande City	2020	Project Sponsor(s): Rio Grande City	Recommended WMS Project	4163							
M	Urbanization - Rio WSC	2060	Project Sponsor(s): Rio WSC	Recommended WMS Project	4184							
M	Urbanization - Roma	2020	Project Sponsor(s): Roma	Recommended WMS Project	4162							
M	Urbanization - San Benito	2070	Project Sponsor(s): San Benito	Recommended WMS Project	4189							
M	Urbanization - San Juan	2050	Project Sponsor(s): San Juan	Recommended WMS Project	2750							
M	Urbanization - Sebastian MUD	2050	Project Sponsor(s): Sebastian MUD	Recommended WMS Project	4190							
M	Urbanization - Sharyland WSC	2030	Project Sponsor(s): Sharyland WSC	Recommended WMS Project	4192							
M	Urbanization - Siesta Shores WCID	2020	Project Sponsor(s): Siesta Shores WCID	Recommended WMS Project	4191							
M	Urbanization - Starr County-Other	2020	Project Sponsor(s): Municipal county-other (Starr)	Recommended WMS Project	4128							
M	Urbanization - Union WSC	2020	Project Sponsor(s): Union WSC	Recommended WMS Project	4193							
M	Urbanization - Webb County	2050	Project Sponsor(s): Webb County	Recommended WMS Project	4194							
M	Urbanization - Weslaco	2030	Project Sponsor(s): Weslaco	Recommended WMS Project	2749							
M	Urbanization - WWP Reduction - Conversion of Irrigation Water Rights to DMI	2020	WMS Supply Recipient: Donna	Recommended WMS Supply Without WMS Project	95904							
M	Urbanization - Zapata County-Other	2020	Project Sponsor(s): Municipal county-other (Zapata)	Recommended WMS Project	2754							
M	Valley Acres ID Conservation	2020	Project Sponsor(s): Valley Acres Irrigation District	Recommended WMS Project	2257							
M	Webb County Water Utility - Expanded Groundwater Supply	2030	Project Sponsor(s): Webb County	Recommended WMS Project	2643							
M	Weslaco - Groundwater Development and Blending	2020	Project Sponsor(s): Weslaco	Recommended WMS Project	1702							
M	Weslaco - North WWTP Potable Reuse Phase 1	2020	Project Sponsor(s): Weslaco	Recommended WMS Project	2376							
M	Zapata County - New Groundwater Supply	2020	Project Sponsor(s): Zapata County	Recommended WMS Project	1727							

INITIALLY PREPARED PLAN

CHAPTER 10: PUBLIC PARTICIPATION AND PLAN ADOPTION

Rio Grande Regional Water Plan

B&V PROJECT NO. 411250

PREPARED FOR

Rio Grande Regional Water Planning Group

1 MARCH 2025

BLACK & VEATCH

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List of Abbreviations

GMA	Groundwater Management Area
ID	Irrigation District
IPP	Initially Prepared Plan
LRGVDC	Lower Rio Grande Valley Development Council
RWP	Regional Water Plan
RWPG	Regional Water Planning Group
SB	Senate Bill
SJR	Senate Joint Resolution
SWIFT	State Water Implementation Fund for Texas
TAC	Texas Administrative Code
TWDB	Texas Water Development Board
WSC	Water Supply Corporation
WUG	Water User Group

10.0 Public Participation and Plan Adoption

10.1 Public Participation

Public participation is the basis of the regional water planning process initiated by Senate Bill (SB) 1 in 1997. Under Texas Water Development Board (TWDB) rules presented in 31 Texas Administrative Code (TAC) §357, regional water planning groups (RWPGs) must include a broad cross section of stakeholder groups representing communities throughout the region. Voting members of the Rio Grande RWPG as of January 1, 2025, are listed in Table 10-1.

The Rio Grande RWPG abides by the Open Meetings Act[1] and Public Information Act[2], which require members of governmental bodies to participate in education training and open records training pursuant to Sections 551.005 and 552.012 of the Texas Government Code, respectively. These Acts in conjunction determine how open meetings are operated and information is made available to the public. More information can be found on the Office of the Texas Attorney General website (https://www.texasattorneygeneral.gov/). The Rio Grande RWPG met all requirements under the Texas Open Meetings Act and Public Information Act in accordance with Title 31 of the 31 TAC Sections 357.12, 357.21, and 357.50(f).

TWDB rules require RWPGs to have at least one meeting prior to preparation of the regional water plan (RWP), provide ongoing opportunities for public participation during the planning process, and hold at least one public hearing prior to adoption of the initially prepared plan (IPP) RWP. The RWPGs are also required to comply with TWDB rules specifying how and to whom notice of public meetings and public hearings is to be provided.

The Rio Grande RWPG has met and exceeded minimum requirements set by the state for public participation, providing multiple opportunities for public input and for direct participation in the planning process and development of the draft plan. Outreach efforts included the following:

- Contact survey;
- Overview of regional water planning webinar;
- Population and demands survey;
- Evaluation of infeasible projects from the 2021 RWP survey;
- Supplies and strategy survey;
- Water management strategy project implementation surveys;
- Request for updated Drought Contingency Plans;
- Rural outreach letters; and
- Personalized emails to Water User Groups (WUGs) and Wholesale Water Providers regarding needs and the development of individualized strategies.

[1] Office of the Texas Attorney General. "Open Meetings Act." https://www.texasattorneygeneral.gov/open-government/open-meetings-act-training.
[2] Office of the Texas Attorney General. "Public Information Act." https://www.texasattorneygeneral.gov/open-government/governmental-bodies/pia-and-oma-training-resources/public-information-act-training.

The group also identified key groups of stakeholders that represent utilities, irrigation districts (IDs), farmers, and environmental organizations, beyond the individual stakeholders on the planning group, that have participated in development of the plan. The RGRWPG held regular meetings throughout the planning process, generally on a monthly basis. Each meeting provided opportunity for public comment. Meeting schedules, agendas, and minutes were emailed to the planning group and posted on the Region M website, and the meeting dates were listed on the TWDB website. The Rio Grande RWPG's website: www.RioGrandeWaterPlan.org, is a resource for the public on issues of concern to regional water planning and information on the planning process.

Table 10-1 Voting Members of the Region M Planning Group

Interest	Name	Resident County
Public	Tomas Rodriguez Laredo	Webb
Counties	Joe Rathmell County Judge, Zapata	Zapata
	David L. Fuentes Precinct 1 Commissioner, Weslaco	Hidalgo
Municipalities	Jorge Flores Eagle Pass Water Works, Eagle Pass	Maverick
	Marilyn Gilbert Brownsville Public Utilities Board, Brownsville	Cameron
Industries	Donald K. McGhee, Secretary* Hydro Systems, Inc., Harlingen	Cameron
Agriculture	Neal Wilkins, Ph.D. East Wildlife Foundation	Jim Hogg
	Dale Murden Texas Citrus Mutual, Mission	Hidalgo
Environmental	Jaime Flores The Arroyo Colorado Watershed, Weslaco	Hidalgo
Small Business	Carlos Garza AEC Engineering, LLC, Edinburg	Hidalgo
	Nick Benavides* Nick Benavides Co., Laredo	Webb
Electric Generating Utilities	Robert Latham Magic Valley Generation Station	Hidalgo
River Authorities	Jim Darling, Chairman* Rio Grande Regional Water Authority	Hidalgo

<table>
<tr><th>Interest</th><th>Name</th><th>Resident County</th></tr>
<tr><td rowspan="4">Water Districts</td><td>Sonny Hinojosa, Vice-Chairman*</td><td rowspan="2">Hidalgo</td></tr>
<tr><td>Hidalgo County ID No. 2, San Juan</td></tr>
<tr><td>Tom McLemore</td><td rowspan="2">Cameron</td></tr>
<tr><td>Harlingen ID</td></tr>
<tr><td rowspan="2">Water Utilities</td><td>Steven Sanchez</td><td rowspan="2">Hidalgo</td></tr>
<tr><td>North Alamo Water Supply Corporation (WSC)</td></tr>
<tr><td rowspan="4">Groundwater Management Area (GMA)</td><td>Louie Peña</td><td rowspan="2">(GMA 16)</td></tr>
<tr><td>Brush Country GCD</td></tr>
<tr><td>Debbie Farmer</td><td rowspan="2">(GMA 13)</td></tr>
<tr><td>Wintergarden GCD, Carrizo Springs</td></tr>
<tr><td rowspan="4">Other</td><td>Glenn Jarvis</td><td rowspan="2">Hidalgo</td></tr>
<tr><td>Attorney, McAllen</td></tr>
<tr><td>Frank Schuster*</td><td rowspan="2">Hidalgo</td></tr>
<tr><td>Val Verde Vegetable Co., McAllen</td></tr>
<tr><td colspan="3">*Executive Committee</td></tr>
</table>

10.1.1 Rural Outreach

The Rio Grande RWPG supports input from all stakeholder groups in the development of this plan. Throughout the planning cycle, the Rio Grande RWPG offered hybrid in-person/virtual board meetings. As it is important for stakeholders to attend these regular Rio Grande RWPG meetings, this model allowed for a greater attendance across a geographic area.

The Rio Grande RWPG conducted outreach specifically to rural entities in the planning area to support plan development. In March 2024, TWDB identified and compiled a list of 35 entities within the planning area that meet the rural political subdivision definition in accordance with Texas Water Code 15.001(14). As 32 of these entities are also WUGs, these entities also received other surveys and outreach as described in Section 10.1; general response rate to surveys was approximately 30 percent. In May 2024, the Rio Grande RWPG sent letters to these rural entities providing general information regarding Regional and State Water Planning and how to engage with the planning process. The letter also included TWDB resources providing key water supply planning information for the recipient’s county.

10.1.2 Public Hearings and Responses to Comments on Initially Prepared Plan

This IPP was approved and certified for submittal by the voting members of the Rio Grande RWPG at the regularly scheduled meeting on February 5, 2025. The approved IPP will be submitted to the TWDB and made available for review and comment on March 3, 2025, in accordance with §357.21(h)(7). Hard copies and/or electronic versions of the IPP will be made available to county clerks and public libraries throughout the region and on the internet. The Rio Grande RWPG will provide extensive notice of and opportunity for public comment on the IPP. As required by TWDB rule, copies of the draft plan are placed in at least one public library in each county within the regional planning area as well as in the office of the county clerk in each county within the regional planning area (Table 10-2). A copy is also placed at the office of the Lower Rio Grande Valley Development Council (LRGVDC).

Table 10-2 Locations of Public Posting of the Initially Prepared Plan

County	Location
Cameron	Cameron County Clerk's Office, 835 E. Levee St., 3rd Floor, Brownsville, TX 78520
	Brownsville Public Library, 2600 Central Blvd., Brownsville, TX 78520
Hidalgo	Hidalgo County Clerk's Office, 100 N. Closner, Edinburg, TX 78539
	McAllen Public Library, 4001 N. 23rd St., McAllen, TX 78504
Jim Hogg	Jim Hogg County Clerk's Office, 102 E. Tilley, Hebbronville, TX 78361
	Jim Hogg County Library, 210 N. Smith, Hebbronville, TX 78361
Maverick	Maverick County Clerk's Office, 500 Quarry St., Suite 2, Eagle Pass, TX 78852
	Eagle Pass Public Library, 589 E. Main St., Eagle Pass, TX 78852
Starr	Starr County Clerk's Office, 401 N. Britton Ave., Room 201, Rio Grande City, TX 78582
	Rio Grande City Public Library, 591 E. 3rd St., Rio Grande City, TX 78582
Webb	Webb County Clerk's Office, 1110 Victoria St., Suite 201, Laredo, TX 78040
	Laredo Public Library, 1120 E. Calton Rd., Laredo, TX 78041
Willacy	Willacy County Clerk's Office, 576 W. Main Ave., Room 153, Raymondville, TX 78580
	Reber Memorial Library, 193 N. 4th, Raymondville, TX 78580
Zapata	Zapata County Clerk's Office, 200 E. 7th Ave., Suite 138, Zapata, TX 78076
	Zapata County Library, 901 Kennedy St., Zapata, TX 78076

After submittal of the IPP, a public hearing will be scheduled and comments will be accepted for a minimum of 60 days following the public hearing. TWDB, agency, and public comments and responses will be included in an appendix upon final adoption of the RWP.

10.1.3 Final Regional Water Plan Adoption

The 2026 RWP will be certified complete and adopted by a majority vote of the Rio Grande RWPG in Fall 2025 and submitted to the TWDB by October 20, 2025, for approval and integration into the 2027 State Water Plan.

10.2 Facilitation of the Regional Water Planning Process

Facilitation of the regional water planning process for the Rio Grande Region has been provided by the staff of the LRGVDC. In addition to performing administrative duties relating to the management of state funds, the LRGVDC made all arrangements for meetings of the Rio Grande RWPG, which included posting required meeting notices, preparing meeting agendas, and distributing agenda backup materials to members of the Rio Grande RWPG. The LRGVDC recorded all Rio Grande RWPG meetings and prepared the official meeting minutes.

10.3 Inter-regional Coordination Efforts

The Rio Grande Regional Water Planning Area (Region M) is surrounded by three adjacent planning areas, including: Plateau (J), South Central Texas (L), and Coastal Bend (N). Coordination with Far West Texas (E) was required for water availability modeling assumptions related to the hydrologic variance upstream the Rio Grande. The 2026 RWP includes one recommended WMS, Eagle Pass – Brackish Groundwater Desalination, that delivers water from Kinney County (J) to Maverick County (M). To the extent necessary, coordination with each of these regions was accomplished through chair correspondence, RWPG liaisons, and/or technical consultant collaboration. Subjects of coordination, correspondence, or collaboration included water availability and specific WMSs of interest. The Rio Grande RWPG is aware of no inter-regional conflicts involving recommended WMSs included in the 2026 RWP.

10.4 Plan Implementation Issues

A number of key issues will affect whether this plan is successful in achieving its primary purpose – to provide recommendations regarding strategies for meeting the near- and long-term water needs of the Rio Grande Region. Many of these issues are identified and discussed in previous chapters, particularly in association with recommended WMSs and policy issues. Some of the key issues to implementation are discussed in the following subsections.

10.4.1 Additional Planning Studies

The recommendations presented in this RWP are based on planning-level evaluation of projected water demands, water supply, needs, and strategies for meeting future needs. It is important to note that additional, more detailed feasibility evaluations will be necessary before most recommended strategies are implemented. In many cases, feasibility evaluations will need to be followed by engineering design, permitting, environmental impacts assessment, and opportunities for public input. Additional planning and project development activities required for strategy implementation will be the responsibility of project sponsors, often with state and/or federal technical and financial assistance.

10.4.2 Local Water Supply Planning and Implementation

This RWP is best viewed as providing a framework for local action to implement strategies for meeting future water needs and assist the state in developing the State Water Plan. Implementation of strategies recommended for meeting future water needs is a primary responsibility of local water suppliers, which include cities, WSCs, other public water supply entities, and IDs. With or without outside assistance, more detailed feasibility-level planning studies and engineering design is largely the responsibility of local water suppliers. Similarly, the costs of implementing water conservation and water supply strategies will be borne largely by the ratepayers served by local water suppliers. It is therefore essential that a strong commitment is made on the part of the governing bodies and management of local water suppliers to implement the strategies recommended in this plan.

Locally, a great deal of progress has been made with stakeholders working together. The Rio Grande RWPG highly recommends that this continue to aid in the implementation of water strategies throughout the region.

10.4.3 Funding for Plan Implementation

The availability of funding and access to funding for the implementation of recommended WMSs is crucial. The State Water Implementation Fund for Texas (SWIFT) program is enabling further state investment in water projects. In 2023, the 88th Texas Legislature passed SB 28 and Senate Joint Resolution (SJR) 75 providing for the creation of the Texas Water Fund. In addition, SB 30 authorized a one-time, $1 billion supplemental appropriation of general revenue to the Texas Water Fund, contingent on enactment of SB 28 and approval of SJR 75 by voters. Proposition 6 (the proposition for SJR 75), creating the Texas Water Fund to assist in financing water projects in Texas, passed on November 7, 2023, with more than 77 percent in favor.

Of the initial amount appropriated to the Texas Water Fund, the TWDB must allocate no less than 25 percent ($250 million) to the New Water Supply for Texas Fund. The TWDB must also ensure that a portion of the money transferred from the fund is used for the following: a) water infrastructure projects, prioritized by risk or need, for rural political subdivisions and municipalities with a population less than 150,000; b) projects for which all required state or federal permitting has been substantially completed, as determined by the Board; c) the statewide water public awareness program; d) water conservation strategies; and e) water loss mitigation projects. The Executive Administrator proposed to distribute Texas Water Fund funding as shown in Table 10-3.

Table 10-3 Senate Bill 30 Texas Water Fund Allocations

Funding Description	Target Amount
Rural Water Assistance Fund	$195,000,000
Water Loan Assistance Fund	$90,000,000
Statewide water public awareness program	$15,000,000
SWIFT program support	$300,000,000
Potential bond leveraged funding through existing financial assistance programs	$150,000,000
New Water Supply for Texas Fund	$250,000,000
Total	**$1,000,000,000**

Most local water suppliers in the Rio Grande Region are governmental or quasi-governmental entities (e.g., WSCs) that have the authority to charge and collect taxes and/or fees for the services they provide. These entities also have the ability to borrow money for the acquisition of additional water supplies and for water-related infrastructure development and rehabilitation. For the most part, the direct costs for the services provided by these entities should be borne by the individual water users through taxes and/or fees for services.

State and federal loan and grant programs have played a critical role in the financing of water conservation, water supply development, and infrastructure projects. At present, a number of state and federal financial assistance programs for water-related infrastructure projects are available to municipal water suppliers. However, few programs provide financial assistance to IDs for infrastructure improvements, and farmers in the Lower Rio Grande Valley face some difficulty obtaining financing that is available to farmers elsewhere in the state because of the nature of water rights ownership. Because agricultural water conservation is a central element of this RWP – and is essential to maintaining the viability of this sector of the regional economy – the Rio Grande RWPG recommends that new public funding sources be developed to assist IDs and farmers with the implementation of conservation programs.