

FINAL PLAN

CHAPTER 6: IMPACTS OF REGIONAL WATER PLAN AND CONSISTENCY WITH PROTECTION OF RESOURCES

Rio Grande Regional Water Plan

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PREPARED FOR

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List of Abbreviations

ac-ft	Acre-Feet
ac-ft/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

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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 (ac-ft) of Class A irrigation water rights and 2.5 ac-ft Class B water rights to 1 ac-ft 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 (ac-ft/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)	(262,194)
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)
Webb County						

Irrigation	2030	2040	2050	2060	2070	2080
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 (ac-ft/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 was provided by the Texas Water Development Board (TWDB) prior to final plan adoption. It is included as Appendix 6A.

The socioeconomic impact reports for all 16 planning regions were divided into two components. The first of these is the economic impact module which addressed the potential impacts of unmet water demands on losses to regional economies resulting from reduced economic output caused by agricultural, industrial, or commercial water shortages. For the Rio Grande Region, this portion of the report predicts what would occur if, in any given year, the Drought of Record recurs and the water demands anticipated in Chapter 2 of this Plan cannot be met by the firm supplies shown in Chapter 3. Economic baseline data used in the analysis was generated from available year 2021 data using the economic impact modeling software IMPLAN (Impact for Planning Analysis) distributed by the IMPLAN Group.

Additionally, methodology for socioeconomic impact analyses for the 2026 Regional Water Plans was provided by the TWDB as the second component of this analysis. The IMPLAN model estimates direct and indirect impacts to business, industry and agriculture, using output elasticities which were chosen to correlate the magnitude of the shortage as a percentage of the total demand to the resulting economic impact. Elasticities measure the relationship between a percentage reduction in water availability and a percentage reduction in output. For example, shortages of 0 to 5 percent of the total demand were not expected to cause any reduction in output. Water shortages of between 5 and 40 percent were expected to see linear reductions in output for every 1 percent of unmet need, reaching the 100 percent negative impact level at 40 percent water shortage.

The socioeconomic impacts analysis examined multiple potential impacts of unmet water needs, including repercussions to tax revenues, income, employment, population, and school enrollment. The results of the study indicate showed overall potential income losses of \$2.82 billion in 2030 for municipal, mining, manufacturing, and irrigated agriculture if needs are not met during a 1-year drought period, increasing to \$2.9 billion in 2070 before falling to \$288 million in 2080. The majority of those losses are for Mining, with only \$239 million of the losses being for the other categories. Unmet needs would result in the loss of an estimated 11,500 jobs, a population reduction of 1,653 people, and a decline in school enrollment of 302 students in 2030. Meeting the water needs of these water use categories through the development of water management strategies (Chapter 5) will reduce or eliminate these potential future losses.

Please note that in August 2025, the TWDB provided an addendum to the report (included in Appendix 6A), detailing that “after the release of the socioeconomic impact analysis regional reports, the TWDB determined that a portion of the multi-faceted socio-economic impact estimates likely include upwardly biased impact results...The net effect is believed to overstate large projected income losses, jobs at risk, and tax collections within the manufacturing sector. This likely impacts a number of the sixteen planning regions but cannot be conclusively determined prior to planning groups needing to adopt their final regional water plans.” In addition, in September 2025, TWDB staff provided some additional information stating “Upon further review by our agency economist, it appears likely that our irrigation adverse impact estimates, especially in the vegetable, fruit, and sugar cane sectors, are too low. We will explore improving the methodology used in estimating the irrigation sector impacts for the next regional water supply planning cycle to develop the 2031 regional water plans. If Region M feels it is appropriate to address this identified issue they certainly can in their final adopted plan”. Because irrigation is an

important economic sector within the Rio Grande Regional Water Planning Area, the Rio Grande RWPG would like to note this clarification with respect to Appendix 6A.

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Appendix 6A. Socioeconomic Impacts of Projected Water Shortages for the Rio Grande (Region M) Regional Water Planning Area

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