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. 192863

PREPARED FOR

Rio Grande Regional Water Planning Group

3 MARCH 2020

BLACK & VEATCH

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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

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

6.1 IMPACTS OF WATER MANAGEMENT STRATEGIES

Impacts of the five 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, there is also less water 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.

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.

6.1.1.2 Non-Potable

For non-potable reuse used for irrigation, there is a potential to accumulate byproducts, such as salts and other minerals, in the soil that may be present in runoff water. Non-potable water use 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.

6.1.2 Brackish Desalination

The disposal of concentrate from brackish desalination facilities will increase levels of total dissolved solids (TDS) in the 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.

As with any groundwater development project, there is potential to affect the quality of the aquifer as more water is drawn from it. Land subsidence may be a byproduct of increased groundwater pumping.

6.1.3 Fresh Groundwater

Water quality concerns from fresh groundwater projects are minimal; however, as with any groundwater development project, there is potential to affect the quality of the aquifer as more water is drawn from it. As with brackish groundwater development, land subsidence may be a byproduct of fresh groundwater pumping.

6.1.4 Advanced Water Conservation

Advanced Water Conservation focuses on decreasing water usage, which results in lowered flow to WWTPs. However, wastewater influent flow typically has the same amount of organic waste, which can require WWTP upgrades to maintain target organic levels in the receiving stream.

Advanced 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.

6.1.5 Acquisition of Water Rights through Urbanization

This strategy comprises of 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 seen. 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 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 agricultural to municipal 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 is included in Appendix D.

[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.

Table 6-1 Estimated Reduction in Irrigated Acreage as a Result of Urbanization

CUMULATIVE TOTAL REDUCTION IN IRRIGATED ACREAGE	2020	2030	2040	2050	2060	2070
Cameron	6,916	13,833	20,750	27,666	34,583	41,235
Hidalgo	10,250	20,500	30,750	40,999	51,250	61,108
Maverick	1,961	3,922	5,882	7,843	9,804	11,690
Starr	153	305	458	610	763	909
Webb	307	614	921	1,227	1,534	1,829
Willacy	2,350	4,699	7,049	9,399	11,748	14,008
Zapata	79	159	238	318	397	474

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 there are no required minimum environmental flows for the river, it is important to refrain from negatively impacting the Rio Grande and harming the native wildlife. 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.

6.3 UNMET NEEDS

There are no municipal unmet needs in Region M. However, there are unmet needs in non-municipal water user groups (WUGs).

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. Increased shortages may appear in the balance after WMS as a result of the conversion of irrigation water rights to municipal use via the Urbanization WMS.

Table 6-2 Irrigation Supply Balance in Counties with Unmet Needs (acft/yr)

IRRIGATION	2020	2030	2040	2050	2060	2070
Cameron County						
Supplies	170,620	170,574	170,529	170,483	170,439	170,393
Demand	537,217	519,972	502,725	485,479	468,233	450,987
Need(-)/Surplus(+)	-366,597	-349,398	-332,196	-314,996	-297,794	-280,594
Balance After WMS	-350,974	-335,281	-324,010	-308,522	-290,741	-277,006
Hidalgo County						
Supplies	278,271	278,217	278,143	277,725	277,997	277,923
Demand	688,667	666,560	644,451	622,343	600,236	578,127
Need(-)/Surplus(+)	-410,396	-388,343	-366,308	-344,618	-322,239	-300,204
Balance After WMS	-382,505	-361,559	-343,807	-326,543	-307,629	-287,568
Maverick County						
Supplies	44,012	44,000	43,989	43,977	43,965	43,953
Demand	61,706	59,725	57,744	55,763	53,782	51,801
Need(-)/Surplus(+)	-17,694	-15,725	-13,755	-11,786	-9,817	-7,848
Balance After WMS	-11,975	-11,008	-10,119	-9,312	-8,483	-7,746
Starr County						
Supplies	4,318	4,317	4,316	4,315	4,314	4,313
Demand	23,875	23,109	22,342	21,576	20,809	20,043
Need(-)/Surplus(+)	-19,557	-18,792	-18,026	-17,261	-16,495	-15,730
Balance After WMS	-19,207	-18,574	-17,940	-16,808	-16,673	-16,035
Webb County						
Supplies	10,610	10,607	10,605	10,601	10,599	10,597
Demand	10,425	10,090	9,756	9,421	9,086	8,752
Need(-)/Surplus(+)	185	517	849	1,180	1,513	1,845
Balance After WMS	-684	-432	-181	0	0	0
Willacy County						
Supplies	20,626	20,621	20,735	20,729	20,723	20,718
Demand	99,610	96,412	93,215	90,017	86,819	83,621
Need(-)/Surplus(+)	-78,984	-75,791	-72,480	-69,288	-66,096	-62,903
Balance After WMS	-77,687	-75,647	-73,693	-72,064	-70,639	-69,329
Zapata County						
Supplies	2,074	2,074	2,073	2,073	2,072	2,072

IRRIGATION	2020	2030	2040	2050	2060	2070
Demand	5,100	4,936	4,773	4,609	4,445	4,281
Need(-)/Surplus(+)	-3,026	-2,862	-2,700	-2,536	-2,373	-2,209
Balance After WMS	-2,506	-2,408	-2,313	-2,216	-2,119	-2,020
Total Unmet Need*	**-845,538**	**-804,909**	**-772,063**	**-735,465**	**-696,284**	**-659,704**
* Summation of unmet needs only; does not include surplus						

6.3.2 Manufacturing

Manufacturing in Cameron, Starr, and Zapata Counties are the only counties that exhibit manufacturing unmet needs (Table 6-3). In particular, Cameron County was represented in this plan as severely modeled available groundwater (MAG)-limited; it is assumed that much of the manufacturing demands are met through groundwater. Best management practices were recommended for every industrial WUG.

Table 6-3 Manufacturing Supply Balance in Counties with Unmet Needs (acft/yr)

MANUFACTURING	2020	2030	2040	2050	2060	2070
Cameron County						
Supplies	649	649	649	649	649	649
Demand	1,647	1,846	1,846	1,846	1,846	1,846
Need(-)/Surplus(+)	-998	-1,197	-1,197	-1,197	-1,197	-1,197
Balance After WMS	-832	-1,010	-1,010	-1,010	-1,009	-832
Starr County						
Supplies	74	74	74	74	74	74
Demand	95	116	116	116	116	116
Need(-)/Surplus(+)	-21	-42	-42	-42	-42	-42
Balance After WMS	0	-18	-18	-18	-18	-18
Zapata County						
Supplies	5	5	5	5	5	5
Demand	9	9	9	9	9	9
Need(-)/Surplus(+)	-4	-4	-4	-4	-4	-4
Balance After WMS	-3	-3	-3	-3	-3	-3
Total Unmet Need	**-846**	**-1,044**	**-1,044**	**-1,043)**	**-1,043**	**-1,043**

6.3.3 Mining

Mining exhibit unmet needs in drought years for all counties except Cameron and Zapata Counties (Table 6-4). The water rights system in the Amistad-Falcon Reservoir system is structured so 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.

Table 6-4 Mining Supply Balance in Counties with Unmet Needs (acft/yr)

MINING	2020	2030	2040	2050	2060	2070
Hidalgo County						
Supplies	1,933	1,933	1,932	1,932	1,932	1,931
Demand	2,844	3,620	4,198	4,819	5,532	6,434
Need(-)/Surplus(+)	-911	-1,687	-2,266	-2,887	-3,600	-4,503
Balance After WMS	-627	-1,325	-1,846	-2,405	-3,047	-3,860
Jim Hogg County						
Supplies	93	97	34	53	34	22
Demand	93	97	72	53	34	22
Need(-)/Surplus(+)	0	0	-38	0	0	0
Balance After WMS	0	0	-31	0	0	0
Maverick County						
Supplies	1,394	1,394	1,393	1,393	1,393	1,392
Demand	1,988	2,737	2,933	2,302	1,674	1,217
Need(-)/Surplus(+)	-594	-1,343	-1,540	-909	-281	175
Balance After WMS	-395	-1,069	-1,247	-679	-114	0
Starr County						
Supplies	276	276	276	276	276	276
Demand	571	697	775	858	961	1,091
Need(-)/Surplus(+)	-295	-421	-499	-582	-685	-815
Balance After WMS	-238	-351	-421	-496	-589	-706
Webb County						
Supplies	5,518	5,542	5,565	5,583	5,609	5,608
Demand	10,331	8,047	6,038	4,112	1,846	1,343

MINING	2020	2030	2040	2050	2060	2070
Need(-)/Surplus(+)	-4,813	-2,505	-473	1,471	3,763	4,265
Balance After WMS	-3,780	-1,700	0	0	0	0
Willacy County						
Supplies	0	0	20	20	20	20
Demand	49	51	38	28	18	12
Need(-)/Surplus(+)	-49	-51	-18	-8	2	8
Balance After WMS	-44	-46	-14	-5	0	0
Total Unmet Need*	**-5,084**	**-4,492**	**-3,559**	**-1,703**	**-3,749**	**-4,566**
* Summation of unmet needs only; does not include surplus						

6.3.4 Steam Electric Power Generation

Steam-electric power generation shows unmet need in Hidalgo County (Table 6-5). Steam-electric demand projections are based on projections regarding the location and timing of future facilities. While reuse may be recommended to meet these future needs, the source and suppliers of reuse water may not at this time be identified.

Table 6-5 Steam-Electric Supply Balance in Counties with Unmet Needs (acft/yr)

STEAM ELECTRIC	2020	2030	2040	2050	2060	2070
Hidalgo County						
Supplies	9,746	9,935	10,035	10,035	10,035	10,035
Demand	11,538	11,538	11,538	11,538	11,538	11,538
Need(-)/Surplus(+)	-1,792	-1,603	-1,503	-1,503	-1,503	-1,503
Balance After WMS	-638	-449	-349	-349	-349	-349
Total Unmet Need	**-25**	**-349**	**-249**	**-249**	**-249**	**-249**

6.4 SOCIOECONOMIC IMPACTS OF SHORTAGES

A socioeconomic impact analysis has been provided by the Texas Water Development Board (TWDB) and included as Appendix D.