

**CHAPTER 5**  
**WATER MANAGEMENT STRATEGIES**  
**AND CONSERVATION**  
**RECOMMENDATIONS**

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## **5 WATER MANAGEMENT STRATEGIES AND CONSERVATION RECOMMENDATIONS**

A water management strategy is a plan to meet an identified water need for additional water by an entity, which can mean increasing the total water supply or maximizing an existing supply, including through reducing demand. When a water management strategy project is implemented, it is intended to develop, deliver, and/or treat additional water supply volumes, or conserve water for an entity (TWDB-Exhibit C General Guidelines-April 2018).

The Far West Texas Water Planning Group (FWTWPG) has identified and evaluated a total of 65 water management strategies. Of this total, 58 strategies are recommended and 10 are designated as alternate strategies. Water management strategies are developed for entities where future water supply needs exist (as required by statute and administrative rules 31 TAC §357.34; 357.35). A need for water is identified when existing water supplies are less than projected water demands for that same water user group (WUG) within any planning decade. In addition, water management strategies were developed for other entities requesting specific water supply projects, even though these entities did not have a projected water supply shortage. All planning analyses applied, and recommendations made in the development of this *Plan* honor all existing water rights, contracts, and option agreements; and have no impact on navigation on any of the Region's surface water streams and rivers.

## 5.1 IDENTIFICATION OF POTENTIALLY FEASIBLE WATER MANAGEMENT STRATEGIES

The first step in developing a list of recommended water management strategies is to take a “big picture” look at possible projects that could reasonably be expected to result in water-supply improvements. As required by TWC §16.053(d)(5) and TAC §357.34(c) the regional water plan shall consider, but not be limited to, the following potentially feasible water management strategies:

1. Conservation
2. Drought management
3. Reuse
4. Management of existing water supplies
5. Conjunctive use
6. Acquisition of available existing water supplies
7. Development of new water supplies
8. Developing regional water supply facilities or providing regional management of water supply facilities
9. Developing large-scale desalination facilities for seawater or brackish groundwater that serve local or regional brackish groundwater production zones identified and designated under TWC §16.060(b)(5)34
10. Developing large-scale desalination facilities for marine seawater that serve local or regional entities
11. Voluntary transfer of water within the region using, but not limited to, contracts, water marketing, regional water banks, sales, leases, options, subordination agreements, and financing agreements
12. Emergency transfer of water under TWC §11.139
13. Interbasin transfers of surface water
14. System optimization
15. Reallocation of reservoir storage to new uses
16. Enhancements of yields
17. Improvements to water quality
18. New surface water supply
19. New groundwater supply
20. Brush control
21. Precipitation enhancement
22. Aquifer storage and recovery
23. Cancellation of water rights
24. Rainwater harvesting

Other potential projects considered for the initial list included:

- appropriate strategies from the *2016 Plan*
- water-loss audits and line replacement
- projects suggested by municipalities through a survey
- projects that are currently or have recently applied to the TWDB for funding

The following process was used by the FWTWPG to identify *potentially feasible water management strategies*.

1. Receive a *Needs Analysis Report* from the TWDB, which provides a comparison of existing water supplies and projected water demands for each water user group (WUG) and wholesale water provider (WWP) in the region. Based on this comparison, the report identifies WUGs and WWPs that are expected to experience needs for additional water supplies within the 50-year time frame of the regional water plan. Using the following process, identify and select potentially feasible water management strategies for each of these entities.
2. Review and consider recommended water management strategies adopted by the water planning group for the *2016 Far West Texas Water Plan*.
3. Review and consider any issues identified in the most current TWDB Water Loss Audit Report, including leak detection and supply side analysis.
4. Solicit current water planning information, including specific water management strategies of interest from WUGs and WWPs with identified needs.
5. Review and consider the most recent Water Supply Management, Water Conservation, and/or Drought Contingency Plans, where available, from WUGs and WWPs with identified needs.
6. Consider potentially feasible water management strategies that may include, but are not limited to (Chapter 357 Subchapter C §357.34):
  - Extended use of existing supplies including:
    - a. System optimization and conjunctive use of water resources
    - b. Reallocation of reservoir storage to new uses
    - c. Voluntary redistribution of water resources including contracts, water marketing, regional water banks, sales, leases, options, subordination agreements, and financing agreements
    - d. Subordination of existing water rights through voluntary agreements
    - e. Enhancement of yields of existing sources
    - f. Improvement of water quality including control of naturally occurring chlorides
    - g. Drought management
  - New supply development including:
    - a. Construction and improvement of surface water and groundwater resources
    - b. Brush control
    - c. Precipitation enhancement
    - d. Desalination
    - e. Water supply that could be made available by cancellation of water rights
    - f. Rainwater harvesting

- g. Aquifer storage and recovery
  - Conservation and drought management measures including demand management
  - Reuse of wastewater
  - Interbasin transfers of surface water
  - Emergency transfers of surface water
- 7. Consider other *potentially feasible water management strategies* suggested by planning group members, stakeholders, and the public.
- 8. Based on the above reviews and considerations, establish a preliminary list of *potentially feasible water management strategies*. At a discussion level, consider the following feasibility concerns for each strategy:
  - Water supply source availability during drought-of-record conditions
  - Cost/benefit
  - Water quality
  - Threats to agriculture and natural resources
  - Impacts to the environment, other water resources, and basin transfers
  - Socio-economic impacts
- 9. Based on the above discussion level analysis, select a final list of *potentially feasible water management strategies* for further technical evaluation using detailed analysis criteria.

Using the above criteria and process, the FWTWPG selected the initial *potentially feasible water management strategies* listed in Table 5-1 for further detailed analysis. As the water management strategy analysis progressed, it became evident that the initial list would require modification of project descriptive names, and the possible addition of new strategies and the elimination or transfer of others. Much time was spent in communication with individual WUGs (municipalities, irrigation districts, etc.) to ensure that the strategies discussion met with their approval. The evaluation and final recommendation of water management strategies are provided in the following Section 5.2.

Although these strategy types were considered by the FWTWPG, not all of them were considered viable options for addressing long-term needs in the region. The FWTWPG does not consider drought management as a feasible strategy to meet long-term growth in demands or current needs. This strategy is considered a temporary measure aimed at conserving available water supplies during times of drought or emergencies. Drought management is most adequately addressed in the region through the implementation of local drought contingency plans. The FWTWPG is supportive of the development and use of these plans during periods of drought or emergency water needs.

**Table 5-1. Far West Texas Potentially Feasible Water Management Strategies**

| County    | Water User Group                                 | WMS# | Strategy  | Source                                       |
|-----------|--|------|---|--|
| Brewster  | Brewster County Other (Marathon WSSService)      | E-1  | Water loss audit and main-line repair                         | Conservation                                 |
|           | Lajitas Municipal Services                       | E-2  | Water loss audit and main-line repair                         | Conservation                                 |
|           | Brewster County Other (Study Butte Terlingua WS) | E-3  | Water loss audit and main-line repair                         | Conservation                                 |
| Culberson | **Culberson County Irrigation                    | E-4a | Conservation - Irrigation scheduling                          | Conservation                                 |
|           |  | E-4b | Conservation - Tailwater reuse                                | Conservation                                 |
|           |  | E-4c | Conservation - Improvements to water district delivery system | Conservation                                 |
|           |  | E-5  | Additional groundwater wells                                  | West Texas Bolsons Aquifer / Wild Horse Flat |
| El Paso   | Town of Anthony                                  | E-6  | Arsenic treatment facility                                    | Mesilla Bolson Aquifer                       |
|           |  | E-7  | Additional groundwater well                                   | Hueco-Mesilla Bolson Aquifer                 |
|           | **El Paso Water                                  | E-8  | Municipal conservation programs                               | Conservation                                 |
|           |  | E-9  | Advanced water purification at the Bustamante WWTP            | Reuse Treated Wastewater                     |
|           |  | E-10 | Expansion of current Hueco Bolson ASR                         | Rio Grande                                   |
|           |  | E-18 | Lower Valley well-head RO                                     | Hueco-Mesilla Bolson Aquifer                 |
|           |  | E-12 | Expansion of the Kay Bailey Hutchison Desal Plant             | Hueco Bolson Aquifer                         |
|           |  | E-13 | Riverside Regulating Reservoir                                | Rio Grande & Stormwater Run-off              |
|           |  | E-14 | Groundwater from Dell City Area (Phase 1)                     | Capitan Reef Complex Aquifer                 |
|           |  | E-15 | Groundwater from Dell City Area (Phase 2)                     | Bone Spring-Victorio Peak Aquifer            |
|           | **Lower Valley Water District                    | E-23 | Public conservation education                                 | Conservation                                 |
|           |  | E-24 | Purchased water from EPW                                      | EPW Blended Source                           |
|           |  | E-25 | Surface water treatment plant & transmission line             | Rio Grande                                   |
|           |  | E-26 | Groundwater from proposed Well field                          | Other Aquifer / Rio Grande Alluvium          |
|           |  | E-27 | Groundwater from proposed Well field                          | Hueco Bolson Aquifer                         |

**Table 5-1. (Continued) Far West Texas Potentially Feasible Water Management Strategies**

| County                                | Water User Group   | WMS#                         | Strategy   | Source   |
|---------------------------------------|--|------------------------------|--|--|
| El Paso                               |  | E-28                         | Wastewater treatment facility and ASR                                      | Reuse Treated Wastewater                                   |
|                                       | **Horizon Regional MUD   | E-29                         | Water loss audit and main-line repair                                      | Conservation   |
|                                       |  | E-30                         | Public conservation education  | Conservation   |
|                                       |  | E-31                         | Additional wells & expansion of desal plant                                | Hueco Bolson & Other Aquifer / Rio Grande Alluvium Aquifer |
|                                       | Haciendas Del Norte WID  | E-32                         | Water loss audit and main-line repair                                      | Conservation   |
|                                       | East Montana WS  | E-33                         | Water loss audit and main-line repair                                      | Conservation   |
|                                       | El Paso County Tornillo WID  | E-34                         | Additional groundwater well & transmission line                            | Hueco Bolson Aquifer                                       |
|                                       |  | E-35                         | Arsenic treatment facility   | Hueco Bolson Aquifer                                       |
|                                       | **El Paso County Other (Vinton Hills)                                  | E-36                         | Public conservation education  | Conservation   |
|                                       |  | E-37                         | Purchased water from EPW   | EPW Blended Source   |
|                                       |  | E-38                         | High capacity water lines for improved distribution of water from EPW      | EPW Blended Source   |
|                                       | **El Paso County Irrigation (EPCWID #1)                                | E-39                         | Irrigation scheduling  | Rio Grande Run-of-River                                    |
|                                       |  | E-40                         | Tailwater reuse  | Rio Grande Run-of-River                                    |
|                                       |  | E-41                         | Improvements to water district delivery system                             | Rio Grande Run-of-River                                    |
|                                       | **El Paso County Manufacturing   | E-42                         | Manufacturing Conservation   | Conservation   |
|                                       |  | E-43                         | Purchased water from EPW   | EPW Blended Source   |
|                                       | **El Paso County Mining  | E-44                         | Mining Conservation  | Conservation   |
| E-45                                  |  | Additional groundwater wells | Hueco-Mesilla Bolson Aquifer   |  |
| **El Paso County Steam Electric Power | E-46   | Power Conservation           | Conservation   |  |
|                                       | E-47   | Purchased water from EPW     | EPW Blended Source   |  |
| Hudspeth                              | Hudspeth County Other (Dell City)                                      | E-48                         | Brackish groundwater desal facility  | Bone Spring-Victorio Peak Aquifer                          |
|                                       | Hudspeth County Other (Fort Hancock WCID)                              | E-49                         | Additional well & RO treatment facility                                    | Hueco-Mesilla Bolson Aquifer                               |
|                                       | **Hudspeth County Other (City of Sierra Blanca - Hudspeth Co. WCID #1) | E-50                         | Public conservation education  | Conservation   |
|                                       |  | E-51                         | Additional transmission line to supply connections outside of the District | West Texas Bolsons Aquifer / Salt Basin                    |
|                                       | **Hudspeth County Mining   | E-52                         | Mining Conservation  | Conservation   |
| E-53                                  |  | Additional groundwater well  | West Texas Bolsons Aquifer / Eagle Flat                                    |  |



**Table 5-1. (Continued) Far West Texas Potentially Feasible Water Management Strategies**

| <b>County</b> | <b>Water User Group</b>                     | <b>WMS#</b> | <b>Strategy</b>  | <b>Source</b>                                 |
|---------------|---|-------------|--|---|
| Jeff Davis    | Fort Davis WSC                              | E-54        | Additional transmission line to connect Fort Davis WSC to Fort Davis Estates | Igneous Aquifer                               |
|               | Jeff Davis County Other (Town of Valentine) | E-55        | Additional groundwater well  | West Texas Bolsons Aquifer / Salt Basin       |
| Presidio      | **City of Presidio                          | E-56        | Water loss audit and main-line repair  | Conservation                                  |
|               |   | E-57        | Additional groundwater well  | West Texas Bolsons Aquifer / Presidio-Redford |
| Terrell       | **Terrell County Mining                     | E-58        | Mining Conservation  | Conservation                                  |

\*\* WUGs with supply needs

## 5.2 EVALUATION AND RECOMMENDATION OF WATER MANAGEMENT STRATEGIES

### 5.2.1 Strategy Evaluation Procedure

The strategy evaluation procedure is designed to provide a side-by-side comparison such that all strategies can be assessed based on the same quantifiable factors as shown in Tables 5-2, 5-3 and 5-4. An explanation of the qualitative and quantifiable rankings is provided in Appendix 5B. All strategy analyses recognize and protect existing water rights, water contracts, and option agreements. For planning purposes, it is assumed that all strategies experience a two percent water loss over the life of the strategy project. Specific factors considered in each Table were:

#### Table 5-2

- Quantity of new water supply produced
- Total capital cost
- Chemical quality
- Reliability of supply
- Impacts to water, agricultural, and natural resources, and to ecologically unique stream segments

#### Table 5-3

- Financial cost (total capital cost, annual cost, and cost per acre-foot)

#### Table 5-4

- Environmental impacts
  - Environmental water needs
  - Wildlife habitat
  - Cultural resources
  - Environmental water quality
  - Inflows to bays and estuaries

Cost evaluations for all strategies include capital cost, debt service, and annual operating and maintenance (O&M) expenses and are estimated based on September 2018 US dollars. Capital costs consider construction costs, engineering and feasibility studies, legal assistance, financing, bond counsel and contingencies, permitting and mitigation, land purchase not associated with mitigation, easement costs, and purchase of water rights. The length of debt service is 20 years unless otherwise stated. An annual unit cost is also calculated based on the O&M cost per acre-foot of water supplied. The TWDB Unified Costing Tool was used for all strategy evaluations except for when specific municipalities provided engineering design studies that included cost estimates.

Water quality is recognized as an important component in this 50-year water plan. To ensure that this *Plan* fully considers water quality, the Federal Clean Water Act and the State Clean Rivers Program were reviewed and considered when developing water management strategies and water quality impacts. Development of water management strategies were also guided by the principal that the designated water quality and related water uses described in the Water Quality Management Plans (WQMPs) of TCEQ and

the Texas State Soil and Water Conservation Board (TSSWCB) were improved or maintained. TCEQ's WQMP is tied to the State's water quality assessments that identify and direct planning for implementation measures that control and/or prevent priority water quality problems. Elements contained in the WQMP include effluent limitations of wastewater facilities, total maximum daily loads (TMDLs), nonpoint source management controls, identification of designated management agencies, and ground water and source water protection planning. TSSWCB's WQMP is a site-specific plan developed through and approved by soil and water conservation districts for agricultural or silvicultural lands. The plan includes appropriate land treatment practices, production practices, management measures, and technologies.

The FWTWPG relied on Management Supply Factors calculated and supplied by TWDB in the consideration of water-supply needs to be generated in the development of water management strategies. A Management Supply Factor is the combined total of existing and future supply divided by the total projected demand and may be used to take into account uncertainties in population, water supply and demand, and other impactful conditions. Management Supply Factors are shown for all WUGs in a table provided in the Executive Summary. Management Supply Factors for Major Water Providers are as follows:

| <u>MWP Name</u>                             | <u>Management Supply Factor</u> |             |             |             |             |             |
|---|---------------------------------|-------------|-------------|-------------|-------------|-------------|
|   | <u>2020</u>                     | <u>2030</u> | <u>2040</u> | <u>2050</u> | <u>2060</u> | <u>2070</u> |
| <u>El Paso Water</u>                        | <u>1.2</u>                      | <u>1.1</u>  | <u>1.2</u>  | <u>1.2</u>  | <u>1.2</u>  | <u>1.2</u>  |
| <u>Horizon Regional MUD</u>                 | <u>2.6</u>                      | <u>1.9</u>  | <u>1.5</u>  | <u>1.2</u>  | <u>1.1</u>  | <u>0.9</u>  |
| <u>Lower Valley Water District</u>          | <u>5.2</u>                      | <u>4.7</u>  | <u>4.3</u>  | <u>3.9</u>  | <u>3.6</u>  | <u>3.4</u>  |
| <u>El Paso County Irrigation (EPCWID#1)</u> | <u>1</u>                        | <u>1</u>    | <u>1</u>    | <u>1</u>    | <u>1</u>    | <u>1</u>    |

The development of water management strategies is intended to assist entities with their future water supply needs based on drought-of-record conditions. Recommendations of the Drought Preparedness Council for the 2016 Plans consisted of four activities: (1) Drought Monitoring; (2) Impact Assessment; (3) Research and Educational Programs; and (4) Drought Mitigation Strategies. For the current 2021 Plan, the Council prepared a drought-chapter outline to be followed by all Regions to ensure similar procedures were followed statewide in the preparation of Drought Chapter 7. Also, WUGs conservation and drought management plans (see Chapters 5 and 7) were reviewed to identify potential strategies that are currently under consideration by the entity.

El Paso Water's water management strategies (E-10 through E-23) are described as "Integrated Strategies" meaning that the operation of the entire water supply system is not dependent on any one or more individual facilities, but rather draws from each source at a rate that is optimal for the entire system under the existing circumstances. Although the strategy facilities will work together to provide necessary supplies, each strategy is independent of the others and does not rely on or mutually exclude any other strategy. All other strategies in this *Plan* likewise do not rely on or mutually exclude any other strategies.

### **5.2.2 Emphasis on Conservation and Reuse**

In terms of recommending strategies to meet future water needs, it is most practical and often most economical to consider potential conservation and reuse projects. Conservation generally includes best management practices that are undertaken either voluntarily by water customers or as mandated by a

water supplier. Conservation savings are the result of “active” water conservation strategies that conserve water over and beyond what would happen anyway as a result of “passive” water conservation measures that stem from federal and state legislation requiring more efficient plumbing fixtures in new building construction. Existing WUG conservation and drought management plans were reviewed, and conservation strategies selected for this *Plan* were often identified from these plans.

Reported municipal use generally includes a variable amount of water that does not reach the intended consumer due to water leaks in the distribution lines, unauthorized consumption, storage tank overflows, and other wasteful factors. For some communities, attending to these issues can be a proactive conservation strategy that may result in significant water savings.

Over the last few years, the TWDB has seen a growing number of requests from municipalities throughout Texas to finance smart meters and advanced metering infrastructure (AMI). This technology allows meters to be read electronically via a fixed network that enables two-way communication with the utility system. More importantly, AMI’s biggest advancement is the ability to monitor meters in real time to obtain more accurate data on water usage throughout the system. With the distribution network in constant communication, leaks and water loss can be detected earlier. This technological upgrade is more efficient than its counterpart, the automatic meter readers (AMR), that are still widely used and require meters to be manually read.

Reuse of treated wastewater is also an excellent strategy for producing additional water supplies from existing developed sources, or for use in areas where drinking water is not required such as irrigation. Reuse strategies were particularly considered for El Paso Water.

### **5.2.3 Water Loss Audit Strategies**

To address the lack of information on water loss, the 78th Texas Legislature passed House Bill 3338, which requires retail public utilities that provide potable water to perform and file with the TWDB a water audit computing the utility's most recent annual system water loss every five years (see further discussion in Chapter 1 Section 1.9). Entities reporting more than a 10 percent water loss were selected to receive a water-loss audit and line replacement strategy.

Across Far West Texas, it is estimated that around 373 acre-feet of supply could be obtained through a water loss audits and leak repairs program in 2020. The reliability of this supply is low due to uncertainty associated with estimated savings and the extent to which this strategy relies on individual utilities to adopt a water loss audits and leak repairs program, which can be costly and time intensive, especially for smaller users. Due to the relatively high costs of implementing this strategy, especially for smaller or rural water user groups, this strategy may not be feasible.

System water audits and water loss programs are effective methods of accounting for all water usage by a public utility within its service area. The structured approach of a water audit allows a utility to reliably track water uses and provide the information to address unnecessary water and revenue losses. The resulting information from a water audit will be valuable in setting performance indicators and in establishing goals and priorities for cost-effectively reducing water losses. By adopting this Best Management Practice (BMP), utilities will more frequently implement water auditing and loss reduction techniques than required by HB 3338. A more detailed description of this best management practice is available in TWDB Report 362, Water Conservation Best Management Practices Guide, and in the TWDB Water Loss Manual, or at <https://www.twdb.texas.gov/conservation/BMPs/index.asp> and

<https://www.twdb.texas.gov/conservation/resources/waterloss-resources.asp>. The reliability of this water savings is contingent on the aggressive implementation of this BMP and the public's willingness to do their part.

#### **5.2.4 Assessment of ASR Potential**

Texas Water Code §16.053(e)(10) requires that “if a RWPA has significant identified water needs, the RWPG shall provide a specific assessment of the potential for aquifer storage and recovery (ASR) projects to meet those needs”. The FWTWPG considers municipal utilities as the only WUGs in the Far West Texas Region that would have the resources available to initiate an ASR project; and that the threshold for “significant” identified water needs are defined by the FWTWPG as any municipal utility with greater than 20,000 acre-feet per year need over the 50-year planning horizon. This horizon only occurs with El Paso Water. All other municipal water needs are at a less significant level. El Paso Water is currently exercising an ASR project, and an expansion of this project is a recommended water management strategy in this *Plan*.

#### **5.2.5 Direct Reuse Strategies**

Direct reuse strategies are developed for the City of Alpine, El Paso Water, and Lower Valley Water District. The City of Alpine will generate a 30 percent increase in the total allowable direct-reuse volume (25 acre-feet per year). El Paso Water's three “advanced water purification” projects come online during varying decades and will generate new supplies at rates calculated into their facility engineering design. Likewise, the Lower Valley Water District strategy includes a new treatment facility capable of generating the specified volume of direct-reuse supply. The volumes of new water supply made available by these projects are intended to satisfy a significant portion of new water demands generated from population growth.

#### **5.2.6 Recommended Water Management Strategies**

The strategy evaluation procedure, as described in Section 5.2.1 above, was followed on each of the potentially feasible strategies selected in Table 5-1. Some potential strategies were determined to not meet guideline standards and were thus eliminated. Also, several new strategies were introduced and were subsequently evaluated. Upon completion of the evaluation phase, the FWTWPG reviewed evaluation criteria and selected the final water management strategies listed in Table 5-2.

Seawater desalination, a major alternative water management solution for the coastal portion of Texas, was not selected for consideration in the Far West Texas Water Planning Region as the nearest direct point of origin for a seawater source is more than 300 miles from the easternmost border of the Far West Texas Region, and is thus not rationally economically feasible.

Third-party social and economic impacts resulting from voluntary redistributions of water, including impacts of moving water from rural and agricultural areas were considered. There are only two strategies (E-16 and E-17) owned by El Paso Water that are impacted by this analysis. Strategy E-16 moves water from currently irrigated farmland in Culberson County to El Paso to El Paso County. This farmland is currently owned by El Paso Water and, therefore, the conversion of use from irrigation to municipal is El

Paso Water’s decision. Strategy E-17 moves water from the Dell City area of Hudspeth County to El Paso County. El Paso Water is purchasing land and water rights from willing landowners, and therefore the conversion of use from irrigation to municipal is voluntary.

A comparative listing of all water management strategies that the FWTWPG subsequently recommends in total for inclusion in the 2021 Far West Texas Water Plan is provided in Table 5-2. Table 5-3 provides a breakdown of the cost estimate for each strategy, and Table 5-4 shows potential impacts of enacting each strategy. Strategy evaluations are presented in Appendix 5A at the end of this chapter. The total capital cost for development of all water management strategies is \$2,109,343,105.

To adequately consider the unique challenges faced by municipal and industrial water users in El Paso County, a conjunctive approach was used to establish feasible strategies capable of identifying sufficient future supplies to meet the needs of El Paso Water, the largest wholesale water provider in the county.

The evaluation of some irrigation strategies for El Paso and Hudspeth Counties differs slightly in that these strategies consider recommended management practices and are discussed in detail in a regional planning study titled *Evaluation of Irrigation Efficiency Strategies for Far West Texas: Feasibility, Water Savings and Cost Considerations (2009)*.

### **5.2.7 Alternate Water Management Strategies**

Alternate water management strategies are projects that are not part of the package of Recommended strategies, but can be substituted for any Recommended strategy that is later determined to be non-viable. Alternate water management strategies are evaluated in the same way as Recommended strategies based on criteria specified in [31 TAC §357.7(a)(7-9, 12)] and are tabulated along with “Recommended” strategies in Tables 5-2, 5-3 and 5-4. Upon conclusion of a thorough evaluation process, the FWTWPG identified seventy-nine Alternate water management strategies for El Paso Water and one for the mining category in Terrell County.

### **5.2.8 Unmet Needs**

Sufficient water management strategy supplies are recommended to meet the identified projected needs of all water user groups (WUGs) in the Region except for the irrigation category in El Paso and Culberson Counties, and for the mining category in El Paso and Terrell Counties. Chapter 4 Table 4-7 provides a list of the anticipated shortages (needs) for these entities.

The El Paso County WID#1 depends on flow in the Rio Grande as its primary irrigation supply source, and during drought-of-record conditions this source is significantly diminished or nonexistent. There are no other supply sources that can be tapped to make up the total needed volume of supply when the Rio Grande is at this stage. Culberson County irrigation unmet needs appear starting in the 2040 decade even with conservation considerations. The local Culberson County Groundwater Conservation District is monitoring water levels in the aquifer and will support local irrigators in realizing potential future shortage potentials.

Mining unmet needs in El Paso County do not appear until the 2060 decade. Groundwater use of local aquifers are significantly controlled by existing municipal and irrigation needs and therefore, future supplies available for mining use may rely on mining companies contracting for future water from existing users. Mining unmet needs in Terrell County result from pumping limitations set by the Terrell

County Groundwater Conservation District. A change in DFC and MAG availabilities in future planning cycles, or by a rule modification by the District could make more water supplies available in the future.

### **5.2.9 Unqualified Strategies**

The TWDB requires that water management strategies listed in regional water plans develop “new” water supplies to be applicable for SWIFT funding. Projects that involve items such as; replacing and/or repairing old infrastructure, and wastewater collection and treatment do not qualify. However, the TWDB offers many other types of financing options. Additional details pertaining to the different types of grants and loans offered can be accessed here: <https://www.twdb.texas.gov/financial/index.asp>.

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**Table 5-2. Summary of Recommended and Alternate Water Management Strategy Evaluations**  
(All strategies are in the Rio Grande River Basin)

| County                         | Water User Group                                 | Strategy  | Source                                       | Strategy ID | Strategy Supply (Acre-Feet/Year) |       |        |        |        |              | Total Capital Cost (Table 5-3) | Quantity <sup>1</sup> | Quality <sup>2</sup> | Reliability <sup>3</sup> | Strategy Impacts <sup>4</sup> |                        |                   |                                     |
|--------------------------------|--|---|--|-------------|----------------------------------|-------|--------|--------|--------|--------------|--------------------------------|-----------------------|----------------------|--------------------------|-------------------------------|------------------------|-------------------|-------------------------------------|
|                                |  |   |  |             | 2020                             | 2030  | 2040   | 2050   | 2060   | 2070         |                                |                       |                      |                          | Water Resources               | Agricultural Resources | Natural Resources | Ecologically Unique Stream Segments |
|                                |  |   |  |             |                                  |       |        |        |        |              |                                |                       |                      |                          | (1-5)                         | (1-5)                  | (1-5)             | (1-5)                               |
| Brewster                       | City of Alpine                                   | Modification to wastewater treatment facility & irrigation system | Direct Non-Potable Reuse                     | E-1         |                                  | 25    | 25     | 25     | 25     | 25           | \$2,318,000                    | NA                    | 3                    | 1                        | 1                             | 2                      | 1                 | 2                                   |
|                                |  | Irrigation and recharge application of captured rainwater runoff  | Demand Reduction                             | E-2         |                                  | 70    | 70     | 70     | 70     | 70           | \$1,296,000                    | NA                    | 3                    | 1                        | 1                             | 2                      | 1                 | 2                                   |
|                                | Marathon WSSService                              | Water loss audit and main-line repair                             | Demand Reduction                             | E-3         | 12                               | 12    | 12     | 12     | 12     | 12           | \$255,000                      | NA                    | NA                   | NA                       | 1                             | 2                      | 2                 | 2                                   |
|                                | Lajitas Municipal Services                       | Water loss audit and main-line repair                             | Demand Reduction                             | E-4         | 51                               | 51    | 51     | 51     | 51     | 51           | \$2,545,000                    | NA                    | NA                   | NA                       | 1                             | 2                      | 2                 | 2                                   |
|                                | Brewster County Other (Study Butte Terlingua WS) | Water loss audit and main-line repair                             | Demand Reduction                             | E-5         | 25                               | 25    | 25     | 25     | 25     | 25           | \$3,054,000                    | NA                    | NA                   | NA                       | 1                             | 2                      | 2                 | 2                                   |
| Culberson                      | *Culberson County Irrigation                     | Irrigation scheduling   | Demand Reduction                             | E-6         | 107                              | 107   | 107    | 107    | 107    | 107          | \$0                            | 3                     | NA                   | NA                       | 1                             | 1                      | 1                 | 2                                   |
|                                |  | Additional groundwater wells                                      | West Texas Bolsons Aquifer / Upper Salt Flat | E-7         | 333                              | 333   | 333    | 333    | 333    | 333          | \$510,000                      | 1                     | 3                    | 1                        | 3                             | 1                      | 2                 | 2                                   |
| El Paso                        | Town of Anthony                                  | Arsenic treatment facility  | Mesilla Bolson Aquifer                       | E-8         | 2,800                            | 2,800 | 2,800  | 2,800  | 2,800  | 2,800        | \$10,334,000                   | NA                    | 1                    | 1                        | NA                            | NA                     | NA                | 2                                   |
|                                |  | Additional groundwater well                                       | Hueco-Mesilla Bolson Aquifer                 | E-9         | 960                              | 960   | 960    | 960    | 960    | 960          | \$1,913,000                    | NA                    | 2                    | 1                        | 3                             | 2                      | 2                 | 2                                   |
|                                | *El Paso Water                                   | Municipal conservation programs                                   | Demand Reduction                             | E-10        | 4,950                            | 5,530 | 5,080  | 9,940  | 13,140 | 17,820       | \$1,070,000                    | 2                     | NA                   | NA                       | 1                             | NA                     | NA                | 2                                   |
|                                |  | Advanced water purification at the Bustamante WWTP                | Direct Potable Reuse                         | E-11        | 8,500                            | 9,200 | 9,900  | 10,600 | 10,600 | 10,600       | \$100,361,400                  | 3                     | 1                    | 1                        | 2                             | 2                      | 2                 | 2                                   |
|                                |  | Hueco Bolson artificial recharge                                  | Hueco Bolson Aquifer                         | E-14        |                                  | 5,000 | 5,000  | 5,000  | 5,000  | 5,000        | \$38,003,000                   | 3                     | 2                    | 2                        | 1                             | 2                      | 3                 | 2                                   |
|                                |  | Groundwater from Dell City Area (Phase 1)                         | Capitan Reef Complex Aquifer                 | E-16        |                                  |       | 4,475  | 4,475  | 4,475  | 4,475        | \$569,357,000                  | 3                     | 1                    | 1                        | 2                             | 5                      | 2                 | 2                                   |
|                                |  | Groundwater from Dell City Area (Phase 2)                         | Bone Spring-Victorio Peak Aquifer            | E-17        |                                  |       |        | 10,000 | 10,000 | 10,000       | \$320,226,000                  | 3                     | 1                    | 1                        | 2                             | 5                      | 2                 | 2                                   |
|                                | *El Paso Water ALTERNATE STRATEGIES              | Treatment and reuse of agricultural drain water                   | Agricultural drain water                     | E-18        |                                  |       | 2,700  | 2,700  | 2,700  | 2,700        | \$21,466,000                   | 3                     | 2                    | 2                        | 1                             | 2                      | 2                 | 2                                   |
|                                |  | Expansion of the Kay Bailey Hutchison Desal Plant                 | Hueco Bolson Aquifer                         | E-13        |                                  |       |        |        | 5,000  | 5,000        | \$26,490,000                   | 3                     | 1                    | 1                        | 2                             | 2                      | 2                 | 2                                   |
|                                |  | Expansion of Canutillo Mesilla Bolson Well Field                  | Hueco-Mesilla Bolson Aquifer                 | E-19        |                                  | 7,760 | 11,640 | 15,520 | 19,400 | 23,280       | \$6,444,000                    | 2                     | 1                    | 1                        | 3                             | 2                      | 2                 | 2                                   |
| Riverside Regulating Reservoir |  | Rio Grande & Stormwater Run-off                                   | E-15   |             |                                  | 3,250 | 3,250  | 3,250  | 3,250  | \$6,754,036  | 3                              | 2                     | 2                    | 2                        | 2                             | 1                      | 2                 |                                     |
|                                | Lower Valley well head RO                        | Rio Grande Alluvium Aquifer                                       | E-20   |             |                                  | 5,000 | 5,000  | 5,000  | 5,000  | \$52,681,000 | 3                              | 1                     | 1                    | 3                        | 2                             | 2                      | 2                 |                                     |

**Table 5-2. (Continued) Summary of Recommended and Alternate Water Management Strategy Evaluations**  
 (All strategies are in the Rio Grande River Basin)

| County                                 | Water User Group                       | Strategy  | Source                                      | Strategy ID | Strategy Supply (Acre-Feet/Year) |        |        |        |        |           | Total Capital Cost (Table 5-3) | Quantity <sup>1</sup> | Quality <sup>2</sup> | Reliability <sup>3</sup> | Strategy Impacts <sup>4</sup> |                        |                   |                                     |   |
|--|--|---|---|-------------|----------------------------------|--------|--------|--------|--------|-----------|--------------------------------|-----------------------|----------------------|--------------------------|-------------------------------|------------------------|-------------------|-------------------------------------|---|
|  |  |   |   |             | 2020                             | 2030   | 2040   | 2050   | 2060   | 2070      |                                |                       |                      |                          | Water Resources               | Agricultural Resources | Natural Resources | Ecologically Unique Stream Segments |   |
|  |  |   |   |             |                                  |        |        |        |        |           |                                |                       |                      |                          | (1-5)                         | (1-5)                  | (1-5)             | (1-5)                               |   |
| El Paso                                | *El Paso Water<br>ALTERNATE STRATEGIES | Expansion of Jonathan Rogers WTP  | Rio Grande                                  | E-21        |                                  |        | 6,500  | 6,500  | 6,500  | 6,500     | \$88,679,000                   | 3                     | 1                    | 2                        | 2                             | 2                      | 2                 | 2                                   |   |
|  |  | Conjunctive treatment of groundwater and surface water at the Upper Valley WWTP | Rio Grande                                  | E-22        |                                  | 10,000 | 10,000 | 10,000 | 10,000 | 10,000    | \$72,873,000                   | 3                     | 1                    | 2                        | 2                             | 2                      | 2                 | 2                                   | 2 |
|  |  | Advanced water purification at the Haskell Street RWP                           | Direct Potable Reuse                        | E-12        |                                  |        |        |        |        | 10,000    | \$189,356,000                  | 3                     | 1                    | 1                        | 2                             | 2                      | 2                 | 2                                   | 2 |
|  |  | Advanced water purification at the Fred Hervey WWTP                             | Direct Potable Reuse                        | E-23        |                                  |        | 10,000 | 10,000 | 10,000 | 10,000    | \$140,394,000                  | 3                     | 1                    | 1                        | 2                             | 2                      | 2                 | 2                                   | 2 |
|  | *Lower Valley Water District           | Public conservation education   | Demand Reduction                            | E-24        | 57                               | 66     | 74     | 83     | 92     | 100       | \$0                            | 3                     | NA                   | NA                       | 1                             | NA                     | NA                | 2                                   | 2 |
|  |  | Purchase water from EPW   | EPW Blended Source                          | E-26        | 1,344                            | 2,185  | 3,012  | 3,895  | 4,785  | 5,632     | \$0                            | 2                     | 1                    | 1                        | 2                             | 2                      | 2                 | 2                                   | 2 |
|  |  | Surface water treatment plant & transmission line                               | Rio Grande                                  | E-27        |                                  | 5,000  | 5,000  | 5,000  | 5,000  | 5,000     | \$74,338,000                   | 2                     | 1                    | 2                        | 2                             | 5                      | 2                 | 2                                   | 2 |
|  |  | Groundwater from proposed Well field  | Rio Grande Alluvium Aquifer                 | E-28        |                                  | 6,800  | 6,800  | 6,800  | 6,800  | 6,800     | \$39,236,000                   | 1                     | 1                    | 1                        | 3                             | 2                      | 2                 | 2                                   | 2 |
|  |  | Groundwater from proposed Well field  | Hueco Bolson Aquifer                        | E-29        |                                  | 6,800  | 6,800  | 6,800  | 6,800  | 6,800     | \$36,110,000                   | 1                     | 1                    | 1                        | 3                             | 2                      | 2                 | 2                                   | 2 |
|  |  | Wastewater treatment facility and ASR   | Reuse Treated Wastewater                    | E-30        |                                  | 5,589  | 5,589  | 5,589  | 5,589  | 5,589     | \$23,509,000                   | 1                     | 2                    | 1                        | 1                             | 2                      | 2                 | 2                                   | 2 |
|  | *Horizon Regional MUD                  | Water loss audit and main-line repair   | Demand Reduction                            | E-31        | 197                              | 274    | 346    | 418    | 487    | 551       | \$255,000                      | 3                     | NA                   | NA                       | 1                             | 2                      | 2                 | 2                                   | 2 |
|  |  | Public conservation education   | Demand Reduction                            | E-32        | 79                               | 110    | 140    | 169    | 196    | 222       | \$0                            | 3                     | NA                   | NA                       | 1                             | NA                     | NA                | 2                                   | 2 |
|  |  | Additional wells & expansion of desalination plant                              | Hueco Bolson & Rio Grande Alluvium Aquifers | E-33        | 16,786                           | 16,786 | 16,786 | 16,786 | 16,786 | 16,786    | \$71,809,000                   | 2                     | 1                    | 1                        | 3                             | 2                      | 2                 | 2                                   | 2 |
|  | Haciendas Del Norte WID                | Water loss audit and main-line repair   | Demand Reduction                            | E-34        | 12                               | 13     | 15     | 16     | 17     | 19        | \$764,000                      | NA                    | NA                   | NA                       | 1                             | 2                      | 2                 | 2                                   | 2 |
|  | East Montana WS                        | Water loss audit and main-line repair   | Demand Reduction                            | E-35        | 41                               | 46     | 50     | 54     | 59     | 63        | \$1,018,000                    | NA                    | NA                   | NA                       | 1                             | 2                      | 2                 | 2                                   | 2 |
|  | El Paso County Tornillo WID            | Additional groundwater well & transmission line                                 | Hueco Bolson Aquifer                        | E-36        | 333                              | 333    | 333    | 333    | 333    | 333       | \$2,060,000                    | NA                    | 1                    | 1                        | 3                             | 2                      | 2                 | 2                                   | 2 |
|  | *El Paso County Other (Vinton Hills)   | Public conservation education   | Demand Reduction                            | E-37        | 0                                | 0      | 0      | 4      | 5      | 5         | \$0                            | 3                     | NA                   | NA                       | 1                             | NA                     | NA                | 2                                   | 2 |
|  |  | Purchase water from EPW   | EPW Blended Source                          | E-38        |                                  |        |        | 10     | 73     | 133       | \$0                            | 1                     | 1                    | 1                        | 2                             | 2                      | 2                 | 2                                   | 2 |
| *El Paso County Irrigation (EPCWID #1) | Irrigation scheduling                  | Demand Reduction  | E-40  | 1,740       | 1,740                            | 1,740  | 1,740  | 1,740  | 1,740  | \$102,595 | 3                              | NA                    | NA                   | 1                        | 1                             | 2                      | 2                 | 2                                   |   |

**Table 5-2. (Continued) Summary of Recommended and Alternate Water Management Strategy Evaluations**  
 (All strategies are in the Rio Grande River Basin)

| County     | Water User Group  | Strategy  | Source  | Strategy ID | Strategy Supply (Acre-Feet/Year) |        |        |        |        |        | Total Capital Cost (Table 5-3) | Quantity <sup>1</sup> | Quality <sup>2</sup> | Reliability <sup>3</sup> | Strategy Impacts <sup>4</sup> |                        |                   |                                     |
|------------|---|---|---|-------------|----------------------------------|--------|--------|--------|--------|--------|--------------------------------|-----------------------|----------------------|--------------------------|-------------------------------|------------------------|-------------------|-------------------------------------|
|            |   |   |   |             | 2020                             | 2030   | 2040   | 2050   | 2060   | 2070   |                                |                       |                      |                          | Water Resources               | Agricultural Resources | Natural Resources | Ecologically Unique Stream Segments |
|            |   |   |   |             |                                  |        |        |        |        |        |                                |                       |                      |                          | (1-5)                         | (1-5)                  | (1-5)             | (1-5)                               |
| El Paso    | *El Paso County Irrigation (EPCWID #1)                                | Tailwater reuse   | Demand Reduction                              | E-41        | 1,723                            | 1,723  | 1,723  | 1,723  | 1,723  | 1,723  | \$973,368                      | 3                     | NA                   | NA                       | 1                             | 1                      | 2                 | 2                                   |
|            |   | Improvements to water district delivery system                    | Demand Reduction                              | E-42        | 25,000                           | 25,000 | 25,000 | 25,000 | 25,000 | 25,000 | \$157,777,783                  | 1                     | NA                   | NA                       | 1                             | 1                      | 2                 | 2                                   |
|            |   | Riverside Regulating Reservoir                                    | Rio Grande & Stormwater Run-off               | E-43        |                                  | 3,250  | 3,250  | 3,250  | 3,250  | 3,250  | \$6,754,036                    | 3                     | 3                    | 2                        | 2                             | 1                      | 1                 | 2                                   |
|            |   | New Wasteway 32 River Diversion Pumping Point                     | Rio Grande                                    | E-44        | 5,000                            | 5,000  | 5,000  | 5,000  | 5,000  | 5,000  | \$4,055,887                    | 3                     | 3                    | 2                        | 1                             | 1                      | 2                 | 2                                   |
|            | *El Paso County Manufacturing   | Purchase water from EPW   | EPW Blended Source                            | E-46        |                                  | 860    | 860    | 860    | 860    | 860    | \$0                            | 1                     | 3                    | 1                        | 2                             | 2                      | 2                 | 2                                   |
|            | *El Paso County Mining  | Additional groundwater wells                                      | Hueco-Mesilla Bolson Aquifer                  | E-48        | 4,251                            | 4,251  | 4,251  | 4,251  | 4,251  | 4,251  | \$1,208,000                    | 2                     | 3                    | 1                        | 3                             | 2                      | 2                 | 2                                   |
|            | *El Paso County Steam Electric Power                                  | Purchase water from EPW   | EPW Blended Source                            | E-50        | 7,260                            | 7,260  | 7,260  | 7,260  | 7,260  | 7,260  | \$0                            | 1                     | 3                    | 1                        | 2                             | 2                      | 2                 | 2                                   |
| Hudspeth   | Hudspeth County Other (Dell City)                                     | Brackish groundwater desal facility                               | Bone Spring-Victorio Peak Aquifer             | E-51        |                                  | 111    | 111    | 111    | 111    | 111    | \$1,636,000                    | NA                    | 1                    | 1                        | 2                             | 2                      | 2                 | 2                                   |
|            | *Hudspeth County Other (City of Sierra Blanca - Hudspeth Co. WCID #1) | Public conservation education                                     | Demand Reduction                              | E-52        | 1                                | 2      | 2      | 2      | 2      | 2      | \$0                            | NA                    | NA                   | NA                       | 1                             | 2                      | 2                 | 2                                   |
|            |   | Replace water-supply line from Van Horn                           | West Texas Bolsons Aquifer / Wild Horse Flat  | E-53        |                                  | 39     | 39     | 39     | 28     | 0      | \$18,432,000                   | NA                    | NA                   | NA                       | 1                             | 2                      | 2                 | 2                                   |
|            |   | Local groundwater well  | Diablo Plateau Aquifer                        | E-54        | 16                               | 16     | 16     | 16     | 16     | 16     | \$940,000                      | NA                    | 1                    | 1                        | 3                             | 2                      | 2                 | 2                                   |
|            |   | Groundwater well NE of Van Horn                                   | West Texas Bolsons Aquifer / Wild Horse Flat  | E-55        | 39                               | 39     | 39     | 39     | 39     | 0      | \$2,132,000                    | NA                    | 1                    | 1                        | 2                             | 2                      | 2                 | 2                                   |
|            |   | Groundwater well West of Van Horn                                 | Diablo Plateau Aquifer                        | E-56        | 39                               | 39     | 39     | 39     | 39     | 39     | \$636,000                      | NA                    | 2                    | 1                        | 3                             | 2                      | 2                 | 2                                   |
|            | *Hudspeth County Mining   | Additional groundwater well                                       | West Texas Bolsons Aquifer / Eagle Flat       | E-58        | 219                              | 219    | 219    | 219    | 219    | 219    | \$306,000                      | 1                     | 3                    | 1                        | 3                             | 2                      | 2                 | 2                                   |
| Jeff Davis | Fort Davis WSC  | Additional groundwater well                                       | Igneous Aquifer                               | E-59        | 274                              | 274    | 274    | 274    | 274    | 274    | \$584,000                      | NA                    | 1                    | 1                        | 3                             | 2                      | 2                 | 2                                   |
|            |   | Transmission line to connect Fort Davis WSC to Fort Davis Estates | Igneous Aquifer                               | E-60        |                                  | 114    | 114    | 114    | 114    | 114    | \$1,671,000                    | NA                    | NA                   | NA                       | NA                            | 2                      | 2                 | 2                                   |
|            | Jeff Davis County Other (Town of Valentine)                           | Additional groundwater well                                       | West Texas Bolsons Aquifer / Salt Basin       | E-61        | 129                              | 129    | 129    | 129    | 129    | 129    | \$783,000                      | NA                    | 1                    | 1                        | 3                             | 2                      | 2                 | 2                                   |
| Presidio   | City of Presidio  | Water loss audit and main-line repair                             | Demand Reduction                              | E-62        | 35                               | 37     | 38     | 41     | 43     | 45     | \$509,000                      | NA                    | NA                   | NA                       | 1                             | 2                      | 2                 | 2                                   |
|            |   | Additional groundwater well                                       | West Texas Bolsons Aquifer / Presidio-Redford | E-63        | 120                              | 120    | 120    | 120    | 120    | 120    | \$5,509,000                    | NA                    | 1                    | 1                        | 3                             | 2                      | 2                 | 2                                   |
| Terrell    | *Terrell County Mining ALTERNATE STRATEGY                             | Additional groundwater wells                                      | Edwards-Trinity (Plateau) Aquifer             | E-65        | 470                              | 470    | 470    | 470    | 470    | 470    | \$921,000                      | 2                     | 1                    | 3                        | 3                             | 2                      | 2                 | 2                                   |

\* WUG with a projected future supply deficit. (See Table 4-1 for list of shortages) and See Appendix 5B for quantification description of impact ranges.

**Table 5-3. Summary of Recommended and Alternate Water Management Strategy Cost**

| County   | Water User Group                                  | Strategy   | 2021 Strategy ID | Total Capital Cost** | Total Annual Cost |              |              |              |              |              | Cost per Acre-Foot/Year |         |         |         |         |         |
|--|---|--|------------------|----------------------|-------------------|--------------|--------------|--------------|--------------|--------------|-------------------------|---------|---------|---------|---------|---------|
|  |   |  |                  |                      | 2020              | 2030         | 2040         | 2050         | 2060         | 2070         | 2020                    | 2030    | 2040    | 2050    | 2060    | 2070    |
| Brewster   | City of Alpine                                    | Modification to wastewater treatment facility & irrigation system                    | E-1              | \$2,318,000          |                   | \$223,000    | \$223,000    | \$60,000     | \$60,000     | \$60,000     |                         | \$8,920 | \$8,920 | \$2,400 | \$2,400 | \$2,400 |
|  |   | Irrigation application of captured rainwater runoff                                  | E-2              | \$1,296,000          |                   | \$114,000    | \$114,000    | \$23,000     | \$23,000     | \$23,000     |                         | \$1,520 | \$1,520 | \$307   | \$307   | \$307   |
|  | Brewster County Other (Marathon WSService)        | Water loss audit and main-line repair  | E-3              | \$255,000            | \$18,000          | \$18,000     | \$18,000     | \$18,000     | \$18,000     | \$18,000     | \$1,500                 | \$1,500 | \$1,500 | \$1,500 | \$1,500 | \$1,500 |
|  | Lajitas Municipal Services                        | Water loss audit and main-line repair  | E-4              | \$2,545,000          | \$179,000         | \$179,000    | \$179,000    | \$179,000    | \$179,000    | \$179,000    | \$3,510                 | \$3,510 | \$3,510 | \$3,510 | \$3,510 | \$3,510 |
|  | Brewster County Other (Study Butte Terlingua WS)  | Water loss audit and main-line repair  | E-5              | \$3,054,000          | \$215,000         | \$215,000    | \$215,000    | \$215,000    | \$215,000    | \$215,000    | \$8,600                 | \$8,600 | \$8,600 | \$8,600 | \$8,600 | \$8,600 |
| Culberson  | *Culberson County Irrigation                      | Conservation - Irrigation scheduling   | E-6              | \$0                  | \$0               | \$0          | \$0          | \$0          | \$0          | \$0          | \$0                     | \$0     | \$0     | \$0     | \$0     | \$0     |
|  |   | Additional groundwater wells   | E-7              | \$510,000            | \$54,000          | \$54,000     | \$18,000     | \$18,000     | \$18,000     | \$18,000     | \$162                   | \$162   | \$54    | \$54    | \$54    | \$54    |
| El Paso  | Town of Anthony                                   | Arsenic treatment facility   | E-8              | \$10,334,000         | \$1,574,000       | \$1,574,000  | \$847,000    | \$847,000    | \$847,000    | \$847,000    | \$562                   | \$562   | \$302   | \$302   | \$302   | \$302   |
|  |   | Additional groundwater well  | E-9              | \$1,913,000          | \$192,000         | \$192,000    | \$72,000     | \$72,000     | \$72,000     | \$72,000     | \$200                   | \$200   | \$65    | \$65    | \$65    | \$65    |
|  | *El Paso Water                                    | Municipal conservation programs (1)  | E-10             | \$1,071,000          | \$1,071,000       | \$1,071,000  | \$1,071,000  | \$1,071,000  | \$1,071,000  | \$1,071,000  | \$216                   | \$194   | \$211   | \$108   | \$82    | \$60    |
|  |   | Advanced water purification at the Bustamante WWTP (3)                               | E-11             | \$100,361,400        | \$5,070,600       | \$5,070,600  | \$2,565,000  | \$2,565,000  | \$2,565,000  | \$2,565,000  | \$1,255                 | \$1,255 | \$474   | \$474   | \$474   | \$474   |
|  |   | Hueco Bolson Artificial Recharge (4)   | E-14             | \$38,003,000         | --                | \$2,367,000  | \$2,367,000  | \$416,000    | \$416,000    | \$416,000    | --                      | \$473   | \$473   | \$251   | \$251   | \$251   |
|  |   | Groundwater from Dell City Area (Phase 1) (13)                                       | E-16             | \$569,357,000        | --                | --           | \$46,984,000 | \$46,984,000 | \$6,923,000  | \$6,923,000  | --                      | --      | \$4,698 | \$4,698 | \$692   | \$692   |
|  |   | Groundwater from Dell City Area (Phase 2) (13)                                       | E-17             | \$320,226,000        | --                | --           | --           | \$38,010,000 | \$38,010,000 | \$15,479,000 | --                      | --      | --      | \$3,801 | \$3,801 | \$1,548 |
|  | *El Paso Water ALTERNATE STRATEGIES               | Treatment and reuse of agricultural drain water (5)                                  | E-18             | \$21,466,000         | --                | --           | \$2,538,000  | \$2,538,000  | \$1,028,000  | \$1,028,000  | --                      | --      | \$940   | \$940   | \$381   | \$381   |
|  |   | Expansion of the Kay Bailey Hutchison Desal Plant (8)                                | E-13             | \$26,490,000         | --                | --           | --           | --           | \$4,441,000  | \$4,441,000  | --                      | --      | --      | --      | \$888   | \$888   |
|  |   | Riverside Regulating Reservoir (12)  | E-15             | \$6,754,036          | --                | --           | \$475,221    | \$475,221    | \$77,120     | \$77,120     | --                      | --      | \$368   | \$368   | \$51    | \$51    |
|  |   | Expansion of Canutillo Mesilla Bolson Well Field (6)                                 | E-19             | \$6,444,000          | --                | \$521,000    | \$521,000    | \$68,000     | \$68,000     | \$68,000     | --                      | \$537   | \$537   | \$70    | \$70    | \$70    |
|  |   | Lower Valley well head RO (7)  | E-20             | \$52,681,000         | --                | --           | \$6,995,000  | \$6,995,000  | \$3,288,000  | \$3,288,000  | --                      | --      | \$1,399 | \$1,399 | \$658   | \$658   |
|  |   | Expansion of Jonathan Rogers WTP (11)  | E-21             | \$88,679,000         | --                | --           | \$9,000,000  | \$9,000,000  | \$2,761,000  | \$2,761,000  | --                      | --      | \$1,385 | \$1,385 | \$425   | \$425   |
|  |   | Conjunctive treatment of groundwater and surface water at the Upper Valley WWTP (14) | E-22             | \$72,873,000         | --                | \$8,476,000  | \$8,476,000  | \$3,714,000  | \$3,714,000  | \$3,714,000  | --                      | \$848   | \$848   | \$347   | \$347   | \$347   |
|  |   | Advanced water purification at the Haskell WWTP (2)                                  | E-12             | \$189,356,000        | --                | --           | --           | --           | --           | \$13,323,000 | --                      | --      | --      | --      | --      | --      |
| Advanced water purification at the Fred Hervey WWTP (15) | E-23  | \$140,394,000  | --               | --                   | \$17,957,000      | \$17,957,000 | \$8,079,000  | \$8,079,000  | --           | --           | \$1,796                 | \$1,796 | \$808   | \$808   |         |         |
| *Lower Valley Water District                             | Public conservation education                     | E-24   | \$0              | \$595,000            | \$595,000         | \$538,000    | \$538,000    | \$538,000    | \$538,000    | \$5,950      | \$5,950                 | \$570   | \$570   | \$570   | \$570   |         |
|  | Purchased water from EPW                          | E-26   | \$0              | \$591,000            | \$961,000         | \$1,325,000  | \$1,714,000  | \$2,105,000  | \$2,478,000  | \$436        | \$436                   | \$436   | \$436   | \$436   | \$436   |         |
|  | Surface water treatment plant & transmission line | E-27   | \$74,338,000     |                      | \$7,455,000       | \$7,455,000  | \$2,225,000  | \$2,225,000  | \$2,225,000  |              | \$1,491                 | \$1,491 | \$445   | \$445   | \$445   |         |

**Table 5-3. (Continued) Summary of Recommended and Alternate Water Management Strategy Cost**

| County                               | Water User Group  | Strategy  | 2021 Strategy ID | Total Capital Cost** | Total Annual Cost |              |              |             |             |             | Cost per Acre-Foot/Year |          |          |         |         |         |
|--------------------------------------|---|---|------------------|----------------------|-------------------|--------------|--------------|-------------|-------------|-------------|-------------------------|----------|----------|---------|---------|---------|
|                                      |   |   |                  |                      | 2020              | 2030         | 2040         | 2050        | 2060        | 2070        | 2020                    | 2030     | 2040     | 2050    | 2060    | 2070    |
| El Paso                              | *Lower Valley Water District  | Groundwater from proposed Well field            | E-28             | \$39,236,000         |                   | \$10,232,000 | \$10,232,000 | \$7,471,000 | \$7,471,000 | \$7,471,000 |                         | \$1,505  | \$1,505  | \$1,099 | \$1,099 | \$1,099 |
|                                      |   | Groundwater from proposed Well field            | E-29             | \$36,108,000         |                   | \$9,996,000  | \$9,996,000  | \$7,455,600 | \$7,455,600 | \$7,455,600 |                         | \$1,470  | \$1,470  | \$1,096 | \$1,096 | \$1,096 |
|                                      |   | Wastewater treatment facility and ASR           | E-30             | \$23,509,000         |                   | \$2,839,000  | \$2,839,000  | \$1,185,000 | \$1,185,000 | \$1,185,000 |                         | \$508    | \$508    | \$212   | \$212   | \$212   |
|                                      | *Horizon Regional MUD   | Water loss audit and main-line repair           | E-31             | \$255,000            | \$18,000          | \$18,000     | \$18,000     | \$18,000    | \$18,000    | \$18,000    | \$91                    | \$66     | \$52     | \$43    | \$37    | \$33    |
|                                      |   | Public conservation education                   | E-32             | \$0                  | \$19,714          | \$25,467     | \$23,917     | \$23,153    | \$22,509    | \$22,033    | \$248                   | \$231    | \$171    | \$137   | \$115   | \$99    |
|                                      |   | Additional wells & expansion of desal plant     | E-33             | \$71,809,000         | \$15,031,000      | \$15,031,000 | \$9,978,000  | \$9,978,000 | \$9,978,000 | \$9,978,000 | \$895                   | \$895    | \$594    | \$594   | \$594   | \$594   |
|                                      | Haciendas Del Norte WID   | Water loss audit and main-line repair           | E-34             | \$764,000            | \$54,000          | \$54,000     | \$54,000     | \$54,000    | \$764,000   | \$54,000    | \$4,500                 | \$4,154  | \$3,600  | \$3,375 | \$3,176 | \$2,842 |
|                                      | East Montana WS   | Water loss audit and main-line repair           | E-35             | \$1,018,000          | \$72,000          | \$72,000     | \$72,000     | \$72,000    | \$72,000    | \$72,000    | \$1,756                 | \$1,565  | \$1,440  | \$1,333 | \$1,220 | \$1,143 |
|                                      | El Paso County Tornillo WID   | Additional groundwater well & transmission line | E-36             | \$2,060,000          | \$0               | \$0          | \$225,000    | \$225,000   | \$80,000    | \$80,000    | \$676                   | \$676    | \$676    | \$676   | \$240   | \$240   |
|                                      | *EL Paso County Other (Vinton Hills)                                  | Public conservation education                   | E-37             | \$0                  | \$883             | \$1,119      | \$1,059      | \$1,028     | \$1,002     | \$982       | \$919                   | \$878    | \$678    | \$551   | \$464   | \$404   |
|                                      |   | Purchased water from EPW                        | E-38             | \$0                  | --                | --           | --           | \$15,000    | \$80,000    | \$143,000   | --                      | --       | --       | \$1,041 | \$1,041 | \$1,041 |
|                                      | *El Paso County Irrigation (EPCWID #1)                                | Irrigation scheduling                           | E-40             | \$0                  | \$102,595         | \$102,595    | \$102,595    | \$102,595   | \$102,595   | \$102,595   | \$59                    | \$59     | \$59     | \$59    | \$59    | \$59    |
|                                      |   | Tailwater reuse                                 | E-41             | \$0                  | \$973,368         | \$973,368    | \$973,368    | \$973,368   | \$973,368   | \$973,368   | \$565                   | \$565    | \$565    | \$565   | \$565   | \$565   |
|                                      |   | Improvements to water district delivery system  | E-42             | \$157,777,783        | \$216,155         | \$216,155    | \$216,155    | \$216,155   | \$216,155   | \$216,155   | \$9                     | \$9      | \$9      | \$9     | \$9     | \$9     |
|                                      |   | Riverside Regulating Reservoir                  | E-43             | \$6,754,036          |                   | \$475,221    | \$475,221    | \$77,120    | \$77,120    | \$77,120    |                         | \$368    | \$368    | \$51    | \$51    | \$51    |
|                                      | New Wasteway 32 River Diversion Pumping Point                         | E-44  | \$4,055,887      | \$348,861            | \$348,861         | \$55,235     | \$55,235     | \$55,235    | \$55,235    | \$18        | \$18                    | \$3      | \$3      | \$3     | \$3     |         |
| *El Paso County Manufacturing        | Purchased water from EPW  | E-46  | \$0              | --                   | \$1,049,000       | \$1,049,000  | \$1,049,000  | \$1,049,000 | \$1,049,000 | --          | \$1,168                 | \$1,168  | \$1,168  | \$1,168 | \$1,168 |         |
| *El Paso County Mining               | Additional groundwater wells  | E-48  | \$1,208,000      | \$173,000            | \$173,000         | \$88,000     | \$88,000     | \$88,000    | \$88,000    | \$41        | \$41                    | \$21     | \$21     | \$21    | \$21    |         |
| *El Paso County Steam Electric Power | Purchased water from EPW  | E-50  | \$0              | \$951,000            | \$951,000         | \$951,000    | \$951,000    | \$951,000   | \$951,000   | \$131       | \$131                   | \$131    | \$131    | \$131   | \$131   |         |
| Hudspeth                             | Hudspeth County Other (Dell City)                                     | Brackish groundwater desal facility             | E-51             | \$1,636,000          |                   | \$329,000    | \$329,000    | \$214,000   | \$214,000   | \$214,000   |                         | \$2,964  | \$2,964  | \$1,928 | \$1,928 | \$1,928 |
|                                      | *Hudspeth County Other (City of Sierra Blanca - Hudspeth Co. WCID #1) | Public conservation education                   | E-52             | \$0                  | \$571             | \$622        | \$587        | \$583       | \$576       | \$575       | \$402                   | \$412    | \$386    | \$381   | \$374   | \$371   |
|                                      |   | Replace water-supply line from Van Horn         | E-53             | \$18,432,000         |                   | \$1,454,000  | \$1,454,000  | \$157,000   | \$157,000   |             |                         | \$37,282 | \$37,282 | \$4,026 | \$4,026 |         |
|                                      |   | Additional groundwater well (local option)      | E-54             | \$914,000            | \$134,000         | \$134,000    | \$70,000     | \$70,000    | \$70,000    | \$70,000    | \$8,375                 | \$8,375  | \$4,375  | \$4,375 | \$4,375 | \$4,375 |
|                                      |   | Groundwater well NE of Van Horn                 | E-55             | \$2,132,000          | \$171,000         | \$171,000    | \$21,000     | \$21,000    | \$21,000    | \$21,000    | \$4,385                 | \$4,385  | \$538    | \$538   | \$538   |         |
|                                      |   | Groundwater well West of Van Horn               | E-56             | \$636,000            | \$52,000          | \$52,000     | \$7,000      | \$7,000     | \$7,000     | \$7,000     | \$1,333                 | \$1,333  | \$179    | \$179   | \$179   | \$179   |
| *Hudspeth County Mining              | Additional groundwater well   | E-58  | \$306,000        | \$32,000             | \$32,000          | \$10,000     | \$10,000     | \$10,000    | \$10,000    | \$146       | \$146                   | \$46     | \$46     | \$46    | \$46    |         |

**Table 5-3. (Continued) Summary of Recommended and Alternate Water Management Strategy Cost**

| County     | Water User Group                            | Strategy   | 2021 Strategy ID | Total Capital Cost** | Total Annual Cost |           |           |           |           |           | Cost per Acre-Foot/Year |         |         |       |       |       |       |
|------------|---|--|------------------|----------------------|-------------------|-----------|-----------|-----------|-----------|-----------|-------------------------|---------|---------|-------|-------|-------|-------|
|            |   |  |                  |                      | 2020              | 2030      | 2040      | 2050      | 2060      | 2070      | 2020                    | 2030    | 2040    | 2050  | 2060  | 2070  |       |
| Jeff Davis | Fort Davis WSC                              | Additional groundwater well  | E-59             | \$584,000            | \$78,000          | \$78,000  | \$37,000  | \$37,000  | \$37,000  | \$37,000  | \$285                   | \$285   | \$135   | \$135 | \$135 | \$135 |       |
|            |   | Additional transmission line to connect Fort Davis WSC to Fort Davis Estates | E-60             | \$1,671,000          |                   | \$144,000 | \$144,000 | \$26,000  | \$26,000  | \$26,000  |                         | \$1,263 | \$1,263 | \$228 | \$228 | \$228 | \$228 |
|            | Jeff Davis County Other (Town of Valentine) | Additional groundwater well  | E-61             | \$783,000            | \$74,000          | \$74,000  | \$19,000  | \$19,000  | \$19,000  | \$19,000  | \$574                   | \$574   | \$147   | \$147 | \$147 | \$147 | \$147 |
| Presidio   | City of Presidio                            | Water loss audit and main-line repair  | E-62             | \$509,000            | \$36,000          | \$36,000  | \$36,000  | \$36,000  | \$36,000  | \$36,000  | \$1,029                 | \$973   | \$947   | \$878 | \$837 | \$800 | \$800 |
|            |   | Additional groundwater well  | E-63             | \$5,509,000          | \$490,000         | \$490,000 | \$102,000 | \$102,000 | \$102,000 | \$102,000 | \$4,083                 | \$4,083 | \$850   | \$850 | \$850 | \$850 | \$850 |
| Terrell    | *Terrell County Mining ALTERNATE STRATEGY   | Additional groundwater wells   | E-65             | \$921,000            | \$78,000          | \$78,000  | \$13,000  | \$13,000  | \$13,000  | \$13,000  | \$166                   | \$166   | \$28    | \$28  | \$28  | \$28  | \$28  |

\* WUGs with a projected future supply deficit. (See Table 4-1 for list of shortages)

\*\* Total Capital Costs are estimated based on September 2018 US dollars.

**Table 5-4. Summary of Recommended and Alternate Water Management Strategy Environmental Assessments (Rio Grande River Basin)**

| County                           | Water User Group                                 | Strategy  | Strategy ID | Environmental Impact Factors ** |         |                    |               |   | Area Impacted and Resulting Conditions  |   |
|----------------------------------|--|---|-------------|---------------------------------|---------|--------------------|---------------|---|---|---|
|                                  |  |   |             | Water Needs                     | Habitat | Cultural Resources | Water Quality | Bays & Estuaries ***  |   |   |
|                                  |  |   |             | (1-5)                           | (1-5)   | (1-5)              | (1-5)         | (1-5)   |   |   |
| Brewster                         | City of Alpine                                   | Modification to wastewater treatment facility & irrigation system | E-1         | 1                               | 1       | 2                  | 1             | NA  | Intended to reduce water use.   |   |
|                                  |  | Irrigation application of captured rainwater runoff               | E-2         | 1                               | 1       | 2                  | 1             | NA  | Intended to reduce water use. Temporary land disturbance during construction of facilities.   |   |
|                                  | Brewster County Other Marathon WSSService        | Water loss audit and main-line repair                             | E-3         | 2                               | 2       | 2                  | 2             | NA  | Intended to reduce water loss.  |   |
|                                  | Lajitas Municipal Services                       | Water loss audit and main-line repair                             | E-4         | 2                               | 2       | 2                  | 2             | NA  | Intended to reduce water loss.  |   |
|                                  | Brewster County Other (Study Butte Terlingua WS) | Water loss audit and main-line repair                             | E-5         | 2                               | 2       | 2                  | 2             | NA  | Intended to reduce water loss.  |   |
| Culberson                        | *Culberson County Irrigation                     | Irrigation scheduling   | E-6         | 2                               | 2       | 2                  | 2             | NA  | Intended to reduce water use.   |   |
|                                  |  | Additional groundwater wells                                      | E-7         | 2                               | 3       | 2                  | 2             | NA  | Temporary land disturbance during drilling of well and construction of connecting pipeline.   |   |
| El Paso                          | Town of Anthony                                  | Arsenic treatment facility  | E-8         | 2                               | 3       | 2                  | 2             | NA  | Temporary land disturbance during construction of facilities.   |   |
|                                  |  | Additional groundwater well                                       | E-9         | 2                               | 3       | 2                  | 2             | NA  | Temporary land disturbance during drilling of well and construction of connecting pipeline.   |   |
|                                  | *El Paso Water                                   | Municipal conservation programs                                   | E-10        | 2                               | 2       | 2                  | 2             | NA  | Intended to reduce water use.   |   |
|                                  |  | Advanced purified water at the Bustamante WWTP                    | E-11        | 2                               | 3       | 2                  | 2             | NA  | Temporary land disturbance during construction of facilities.   |   |
|                                  |  | Hueco Bolson Artificial Recharge                                  | E-14        | 2                               | 1       | 2                  | 2             | NA  | Six spreading basins will be excavated on EPWU property, which will temporarily hold surface water for infiltration.  |   |
|                                  |  | Groundwater from Dell City Area (Phase 1)                         | E-16        | 2                               | 3       | 2                  | 2             | NA  | Temporary land disturbance during drilling of well and construction of connecting pipeline.   |   |
|                                  |  | Groundwater from Dell City Area (Phase 2)                         | E-17        | 2                               | 3       | 2                  | 2             | NA  | Temporary land disturbance during drilling of well and construction of connecting pipeline.   |   |
|                                  | *El Paso Water ALTERNATE STRATEGIES              | Treatment and reuse of agricultural drain water                   | E-18        | 2 and 3                         | 2       | 2                  | 2             | 2   | NA  | Temporary land disturbance during construction of facilities. Reduced water in drains may occur.                |
|                                  |  | Advanced water purification at the Haskell WWTP                   | E-12        | 2                               | 3       | 2                  | 2             | 2   | NA  | Temporary land disturbance during construction of facilities.   |
|                                  |  | Expansion of the Kay Bailey Hutchison Desal Plant                 | E-13        | 2                               | 3       | 2                  | 2             | 2   | NA  | Temporary land disturbance during drilling of well and construction of connecting pipeline and plant expansion. |
|                                  |  | Expansion of Canutillo Mesilla Bolson Well Field                  | E-19        | 2                               | 3       | 2                  | 2             | 2   | NA  | Temporary land disturbance during drilling of well and construction of connecting pipeline and plant expansion. |
| Riverside Regulating Reservoir   |  | E-15  | 1 and 3     | 1 and 3                         | 2       | 2                  | 2             | NA  | Construction of a 4,100 acre-foot ring levy regulating reservoir. Formally the location of several wastewater disposal ponds. Surface water impoundment habitat will be created; however, a minor amount of flood overflow will be diverted from downstream flow. |   |
| Lower Valley well head RO        |  | E-20  | 2           | 3                               | 2       | 2                  | 2             | NA  | Temporary land disturbance during drilling of well and construction of connecting pipeline and plant expansion.   |   |
| Expansion of Jonathan Rogers WTP | E-21   | 2   | 3           | 2                               | 2       | 2                  | NA            | Temporary land disturbance during construction of facilities. |   |   |

**Table 5-4. (Continued) Summary of Recommended and Alternate Water Management Strategy Environmental Assessments (Rio Grande River Basin)**

| County  | Water User Group                       | Strategy  | Strategy ID | Environmental Impact Factors ** |         |                    |               |   | Area Impacted and Resulting Conditions  |
|---|--|---|-------------|---------------------------------|---------|--------------------|---------------|---|---|
|   |  |   |             | Water Needs                     | Habitat | Cultural Resources | Water Quality | Bays & Estuaries ***  |   |
|   |  |   |             | (1-5)                           | (1-5)   | (1-5)              | (1-5)         | (1-5)   |   |
| El Paso                                       | *El Paso Water ALTERNATE STRATEGIES    | Conjunctive treatment of groundwater and surface water at the Upper Valley WWTP | E-22        | 2                               | 3       | 2                  | 2             | NA  | Temporary land disturbance during construction of facilities.   |
|   |  | Advanced water purification at the Fred Hervey WWTP                             | E-23        | 2                               | 3       | 2                  | 2             | NA  | Temporary land disturbance during construction of facilities.   |
|   | *Lower Valley Water District           | Public conservation education   | E-24        | 2                               | 2       | 2                  | 2             | NA  | Intended to reduce water use.   |
|   |  | Purchased water from EPWU   | E-26        | 2                               | 2       | 2                  | 2             | NA  | Causes no change in existing conditions.  |
|   |  | Surface water treatment plant & transmission line                               | E-27        | 2                               | 3       | 2                  | 2             | NA  | Temporary land disturbance during construction of facilities.   |
|   |  | Groundwater from proposed Well field  | E-28        | 2                               | 3       | 2                  | 2             | NA  | Temporary land disturbance during drilling of well and construction of connecting pipeline.   |
|   |  | Groundwater from proposed Well field  | E-29        | 2                               | 3       | 2                  | 2             | NA  | Temporary land disturbance during drilling of well and construction of connecting pipeline.   |
|   |  | Wastewater treatment facility and ASR   | E-30        | 2                               | 2       | 3                  | 2             | NA  | Temporary land disturbance during construction of facilities.   |
|   | *Horizon Regional MUD                  | Water loss audit and main-line repair   | E-31        | 2                               | 3       | 2                  | 2             | NA  | Temporary land disturbance during construction of facilities.   |
|   |  | Public conservation education   | E-32        | 2                               | 2       | 2                  | 2             | NA  | Intended to reduce water use.   |
|   |  | Additional wells & expansion of desal plant                                     | E-33        | 2                               | 3       | 2                  | 2             | NA  | Temporary land disturbance during drilling of nine well and construction of connecting pipeline and plant expansion.  |
|   | Haciendas Del Norte WID                | Water loss audit and main-line repair   | E-34        | 2                               | 2       | 2                  | 2             | NA  | Intended to reduce water loss.  |
|   | East Montana WS                        | Water loss audit and main-line repair   | E-35        | 2                               | 2       | 2                  | 2             | NA  | Intended to reduce water loss.  |
|   | El Paso County Tornillo WID            | Additional groundwater well & transmission line                                 | E-36        | 2                               | 3       | 2                  | 2             | NA  | Temporary land disturbance during drilling of well and construction of connecting pipeline.   |
|   | *EL Paso County Other (Vinton Hills)   | Public conservation education   | E-37        | 2                               | 3       | 2                  | 2             | NA  | Intended to reduce water use.   |
|   |  | Purchased water from EPW  | E-38        | 2                               | 2       | 2                  | 2             | NA  | Causes no change in existing conditions.  |
|   | *El Paso County Irrigation (EPCWID #1) | Irrigation scheduling   | E-40        | 2                               | 3       | 2                  | 2             | NA  | Intended to reduce water use.   |
|   |  | Tailwater reuse   | E-41        | 2                               | 2       | 2                  | 2             | NA  | Intended to reduce water use.   |
|   |  | Improvements to water district delivery system                                  | E-42        | 2                               | 3       | 2                  | 2             | NA  | Minor land disturbance will occur as existing canals are concrete lined.  |
|   |  | Riverside Regulating Reservoir  | E-43        | 1 and 3                         | 1 and 3 | 2                  | 2             | NA  | Construction of a 4,100 acre-foot ring levy regulating reservoir. Formally the location of several wastewater disposal ponds. Surface water impoundment habitat will be created; however, a minor amount of flood overflow will be diverted from downstream flow. |
| New Wasteway 32 River Diversion Pumping Point |  | E-44  | 2           | 3                               | 2       | 2                  | NA            | Intended to reduce water loss. Minor land disturbance will occur as existing canals are concrete lined. |   |



**Table 5-4. (Continued) Summary of Recommended and Alternate Water Management Strategy Environmental Assessments (Rio Grande River Basin)**

| County                  | Water User Group  | Strategy   | Strategy ID | Environmental Impact Factors ** |         |                    |               |   | Area Impacted and Resulting Conditions  |
|-------------------------|---|--|-------------|---------------------------------|---------|--------------------|---------------|---|---|
|                         |   |  |             | Water Needs                     | Habitat | Cultural Resources | Water Quality | Bays & Estuaries ***  |   |
|                         |   |  |             | (1-5)                           | (1-5)   | (1-5)              | (1-5)         | (1-5)   |   |
| El Paso                 | *El Paso County Manufacturing   | Purchased water from EPW   | E-46        | 2                               | 2       | 2                  | 2             | NA  | Causes no change in existing conditions.  |
|                         | *El Paso County Mining  | Additional groundwater wells   | E-48        | 2                               | 3       | 2                  | 2             | NA  | Temporary land disturbance during drilling of well and construction of connecting pipeline. |
|                         | *El Paso County Steam Electric Power                                  | Purchased water from EPW   | E-50        | 2                               | 2       | 2                  | 2             | NA  | Causes no change in existing conditions.  |
| Hudspeth                | Hudspeth County Other (Dell City)                                     | Brackish groundwater desal facility  | E-51        | 2                               | 2       | 2                  | 2             | NA  | Causes no change in existing conditions.  |
|                         | *Hudspeth County Other (City of Sierra Blanca - Hudspeth Co. WCID #1) | Public conservation education  | E-52        | 2                               | 2       | 2                  | 2             | NA  | Intended to reduce water use.   |
|                         |   | Replace water-supply line from Van Horn                                      | E-53        | 2                               | 2       | 2                  | 2             | NA  | Temporary land disturbance during construction of connecting pipeline.                      |
|                         |   | Local groundwater well   | E-54        | 2                               | 2       | 2                  | 2             | NA  | Temporary land disturbance during drilling of well and construction of connecting pipeline. |
|                         |   | Groundwater well NE of Van Horn  | E-55        | 2                               | 3       | 2                  | 2             | NA  | Temporary land disturbance during drilling of well and construction of connecting pipeline. |
|                         |   | Groundwater well West of Van Horn  | E-56        | 2                               | 3       | 2                  | 2             | NA  | Temporary land disturbance during drilling of well and construction of connecting pipeline. |
| *Hudspeth County Mining | Additional groundwater well   | E-58   | 2           | 3                               | 2       | 2                  | NA            | Temporary land disturbance during drilling of well and construction of connecting pipeline. |   |
| Jeff Davis              | Fort Davis WSC  | Additional groundwater well  | E-59        | 2                               | 3       | 2                  | 2             | NA  | Temporary land disturbance during drilling of well and construction of connecting pipeline. |
|                         |   | Additional transmission line to connect Fort Davis WSC to Fort Davis Estates | E-60        | 2                               | 2       | 2                  | 2             | NA  | Temporary land disturbance during construction of connecting pipeline.                      |
|                         | Jeff Davis County Other (Town of Valentine)                           | Additional groundwater well  | E-61        | 2                               | 3       | 2                  | 2             | NA  | Temporary land disturbance during drilling of well and construction of connecting pipeline. |
| Presidio                | City of Presidio  | Water loss audit and main-line repair  | E-62        | 2                               | 2       | 2                  | 2             | NA  | Intended to reduce water loss.  |
|                         |   | Additional groundwater well  | E-63        | 2                               | 3       | 2                  | 2             | NA  | Temporary land disturbance during drilling of well and construction of connecting pipeline. |
| Terrell                 | *Terrell County Mining ALTERNATE STRATEGY                             | Additional groundwater wells   | E-65        | 2                               | 3       | 2                  | 2             | NA  | Temporary land disturbance during drilling of well and construction of connecting pipeline. |

\* WUGs with a projected future supply deficit. (See Table 4-1 for list of shortages)

\*\* Strategy impact range: 1 = Positive; 2 = No New; 3 = Minimal Negative; 4 = Moderate Negative; 5 = Significant Negative (See Appendix 5B for quantification description of impact ranges)

\*\*\* All strategies occur beyond the distance of potential impact to flows into the coastal bay and estuary systems.

## 5.3 WATER CONSERVATION

Water conservation is one of the most important components of water supply management. According to the 2017 State Water Plan, the state’s existing water supply is not sufficient to meet all future demands during times of drought. To meet the water demand in the year 2070, Texas would need to provide 8.9 million acre-feet of additional supplies, including water savings through conservation. Conservation was by far the most recommended strategy in all 16 regional water plans that formed the basis of the 2017 State Water Plan. Recognizing its impact, setting realistic goals and aggressively enforcing implementation may significantly extend the time when new supplies and associated infrastructure are needed. This chapter explores conservation opportunities and provides a road map for integrating conservation planning into long-range water supply management goals.

### 5.3.1 Water Conservation Overview

The Texas Water Development Board (TWDB) defines ‘conservation’ as those practices, techniques, programs, and technologies that will protect water resources, reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water, or increase the recycling or reuse of water so that a water supply is made available for future or alternative uses. The mission of the water conservation staff is to provide leadership, planning, financial assistance, information and education for water conservation processes in Texas.

Effective conservation programs implement best management practices to try to meet the targets and goals identified within the plan and are important to water conservation planning for all entities such as: municipal, agricultural, industrial, and commercial. Water conservation management planning implemented by municipalities, water providers, and other water users supersede recommendations in this *Plan* and are considered consistent with this *Plan*.

The TWDB and the Texas State Soil and Water Conservation Board (TSSWCB) jointly conducted a study of ways to improve or expand water conservation efforts in Texas. The results of that study are available in a joint 2018 report titled “An Assessment of Water Conservation in Texas, Prepared for the 85<sup>th</sup> Texas Legislature”

([http://www.twdb.texas.gov/publications/reports/special\\_legislative\\_reports/doc/TWDBTSSWCB\\_80th.pdf](http://www.twdb.texas.gov/publications/reports/special_legislative_reports/doc/TWDBTSSWCB_80th.pdf)) and contains the following:

- An assessment of both agricultural and municipal water conservation issues;
- Information on existing conservation efforts by the TWDB and the TSSWCB;
- Information on existing conservation efforts by municipalities receiving funding from the TWDB, as specified in water conservation plans submitted by the municipalities as part of their applications for assistance;
- A discussion of future conservation needs;
- An analysis of programmatic approaches and funding for additional conservation efforts;
- An assessment of existing statutory authority and whether changes are needed to more effectively promote and fund conservation projects; and
- An assessment of the TWDB’s agricultural water conservation program.

In addition, the TWDB in 2015 received funding from the Texas Legislature and hired a firm to perform a research project with the intent of measuring and quantifying the municipal water conservation efforts statewide. Interviews were conducted in each of the 16 regional planning areas with two primary goals: 1) Assist regional planners and the TWDB to quantify ongoing municipal conservation activities throughout the state and estimate regional water savings from activities adopted by the utilities; 2) To provide individual utilities with detailed reports and recommendations that will assist them to meet their own water conservation goals.

The TWDB Statewide Municipal Water Conservation Quantification Project surveyed two of the 22 municipalities within the Far West Texas region. Surveyed entities were El Paso Water and Horizon Regional MUD. Although only two entities were surveyed, these participating utilities portion of the recommended conservation supply accounts for approximately 94 percent of the annual savings to meet the 2070 supply volume for municipal water conservation region wide.

The report highlights a variety of conservation activities these two utilities have implemented and made recommendations to continue the effort, however it is not required by statute and administrative rules (31 TAC §357.34; 357.35) to develop strategies based on the findings of this report.

The Far West Texas water planning group has included the TWDB Statewide Municipal Water Conservation Quantification Project report as Appendix 5C and considers the document to be a valid resource for integrating conservation planning into long-range water supply management goals.

Texas Water Code §11.1271 requires water conservation plans for all municipal and industrial water users with surface water rights of 1,000 acre-feet per year or more and irrigation water users with surface water rights of 10,000 acre-feet per year or more. Also, all entities with 3,300 or more connections and/or a financial obligation with TWDB greater than \$500,000 are required to submit water conservation plans. Water conservation plans of three entities in Far West Texas that meet these criteria were reviewed for this *Plan* including El Paso Water, El Paso County Water Improvement District No.1, and Hudspeth County Conservation and Reclamation District No.1. Water conservation plans are also required for all other water users applying for a State water right and may also be required for entities seeking State funding for water supply projects.

### 5.3.2 Model Water Conservation Plans

Water Conservation Plan forms are available from TCEQ in WordPerfect and PDF formats. The forms for the following entity types listed below are available at:

<http://www.twdb.texas.gov/conservation/municipal/plans/index.asp>

[http://www.tceq.state.tx.us/permitting/water\\_supply/water\\_rights/conserve.html](http://www.tceq.state.tx.us/permitting/water_supply/water_rights/conserve.html) You can receive a print copy of a form by calling 512/239-4691 or by email to [wras@tceq.texas.gov](mailto:wras@tceq.texas.gov).

**Municipal Use** – Utility Profile and Water Conservation Plan Requirements for Municipal Water Use by Public water Suppliers (TCEQ-10218) [Word](#)

**Wholesale Public Water Suppliers** – Profile and Water Conservation Plan Requirements for Wholesale Public Water Suppliers (TCEQ-20162) [Word](#)

**Industrial Use** – Industrial Water Conservation Plan (TCEQ-20839) [Word](#)

**Mining Use** – Mining Water Conservation Plan (TCEQ-20840) [Word](#)

**Agricultural Uses** – Agriculture Water Conservation Plan-Non-Irrigation (TCEQ-10541) [Word](#)  
System Inventory and Water Conservation Plan for Individually-Operated Irrigation System (TCEQ-10238) [Word](#)

System Inventory and Water Conservation Plan for Agricultural Water Suppliers Providing Water to More Than One User (TCEQ-10244) [Word](#)

### 5.3.3 State Water Conservation Programs and Guides

The TWDB provides a significant amount of information and services pertaining to water conservation that can be accessed at: <http://www.twdb.texas.gov/conservation/municipal/plans/index.asp>

Likewise, water conservation tips developed by the TCEQ and made available through their Take Care of Texas educational campaign can be accessed at the following website:  
<http://takecareoftexas.org/conservation-tips/conserve-our-water>

### Water-Saving Plumbing Fixture Program

The Texas Legislature created the Water-Savings Plumbing Fixture Program in 1992 to promote water conservation. Manufacturers of plumbing fixtures sold in Texas must comply with the Environmental Performance Standards for Plumbing Fixtures, which requires all plumbing fixtures such as showerheads, toilets and faucets sold in Texas to conform with specific water use efficiency standards.

As of January 1, 2014, Texas (HB 2667) mandates all toilets and urinals sold in Texas must meet new efficiency standards.

- Bath faucets cannot exceed 2.2 gallons per minute (GPM)
- Showerheads cannot exceed 2.5 gallons per minute (GPM)
- Kitchen faucets cannot exceed 2.2 gallons per minute (GPM)
- Toilets cannot exceed 1.28 gallons per flush (GPF)
- Urinals cannot exceed 0.5 gallons per flush (GPF)

Since more water is used in the bathroom than any other place in the home, water-efficient plumbing fixtures play an integral role in reducing water consumption, wastewater production, and consumers' water bills. It is estimated that switching to water-efficient fixtures can save the average household between \$50 and \$100 per year on water and sewer bills. Many hotels and office buildings find that water-efficient fixtures can save 20 percent on water and wastewater costs.

The EPA's WaterSense program labels water-efficient products that meet most of the criteria above, and on average are certified to use at 20 percent less water than legacy fixtures. Their website also provides a product search tool and a rebate finder, and can be accessed here: <https://www.epa.gov/watersense>

### Water Conservation Best Management Practices

The 78<sup>th</sup> Texas Legislature under Senate Bill 1094 created the Texas Water Conservation Implementation Task Force and charged the group with reviewing, evaluating, and recommending optimum levels of

water use efficiency and conservation for the State. The TWDB and TCEQ in coordination with the Water Conservation Advisory Council prepared TWDB Report 362, Water Conservation Best Management Practices Guides for agricultural, commercial, institutional, and industrial water users. In addition, guides were developed for both municipal and wholesale water providers. These suggested BMPs are structured for delivering a conservation measure or series of measures that are useful, proven, cost-effective, and generally accepted among conservation experts. Each BMP structure has several elements that describe the efficiency measures, implementation techniques, schedule of implementation, scope, water savings estimating procedures, cost effectiveness considerations, and references to assist end-users in implementation. These documents can be accessed at the following TWDB website:

[http://www.twdb.texas.gov/publications/reports/numbered\\_reports/doc/R362\\_BMPGuide.pdf](http://www.twdb.texas.gov/publications/reports/numbered_reports/doc/R362_BMPGuide.pdf)

An update to the introduction in TWDB Report 362 can be found here:

<http://www.twdb.texas.gov/conservation/BMPs/Ubmps/doc/MiniGuide.pdf?d=19543.519999831915>

### Public Water Conservation Education

Public education may be one of the most productive actions that can result in the greatest amount of water savings. Most citizens are willing to actively do their part to conserve water once the need is communicated and how to accomplish the most benefit is explained. Numerous state, county, and academic agencies provide educational material and demonstrations. Groundwater conservation districts also provide water conservation activities.

The TWDB provides a significant amount of information and services pertaining to water conservation that can be accessed at: <http://www.twdb.texas.gov/conservation/municipal/plans/index.asp>

Likewise, water conservation tips developed by the TCEQ and made available through their Take Care of Texas educational campaign can be accessed at the following website:

<http://takecareoftexas.org/conservation-tips/conserve-our-water>

TPWD also offers programs geared toward the appreciation and conservation of the state's outdoor natural resources (<https://tpwd.texas.gov/landwater/water/conservation/>) which include:

- Freshwater Inflows and Estuaries
- Coastal Studies
- River Studies
- Texas Gulf Ecological Management Sites

Education of our youth may be one of the best ways to spread the word about conservation of water. The TWDB provides excellent educational programs for all grade levels K-12th. Information pertaining to this program can be accessed at: <https://www.twdb.texas.gov/conservation/education/kids/index.asp>.

The Groundwater Conservation Districts in the Plateau Region have water conservation management goals that include:

- Publishing conservation articles in local newspapers;
- Providing conservation presentations and demonstrations at county shows;
- Conducting school programs relating to conservation issues; and
- Working with river authorities to promote the clean rivers program.

**5.3.4 Regional Conservation Water Management Strategies**

Many of the recommended water management strategies listed in Table 5-2 are classified as “Conservation”. Conservation strategies are considered the first method of management when considering meeting future water needs. Conservation strategies include:

- Water loss audit and main-line repair
- Public conservation awareness
- Municipal supply conservation distribution
- Specified Irrigation, manufacturing and mining conservation practices

The 2021 Far West Texas Water Plan recommends the following 24 conservation related strategies presented in Table 5-5.

**Table 5-5. Summary of Recommended Conservation Water Management Strategy Evaluations**

| County          | Water User Group                                 | Strategy  | 2021 Strategy ID | Strategy Supply (Acre-Feet/Year) |       |       |       |        |        |
|-----------------|--|---|------------------|----------------------------------|-------|-------|-------|--------|--------|
|                 |  |   |                  | 2020                             | 2030  | 2040  | 2050  | 2060   | 2070   |
| Brewster        | City of Alpine                                   | Irrigation application of captured rainwater runoff | E-2              | 70                               | 70    | 70    | 70    | 70     | 70     |
|                 | Brewster County Other Marathon WSSService        | Water loss audit and main-line repair               | E-3              | 12                               | 12    | 12    | 12    | 12     | 12     |
|                 | Lajitas Municipal Services                       | Water loss audit and main-line repair               | E-4              | 51                               | 51    | 51    | 51    | 51     | 51     |
|                 | Brewster County Other (Study Butte Terlingua WS) | Water loss audit and main-line repair               | E-5              | 25                               | 25    | 25    | 25    | 25     | 25     |
| Culberson       | Culberson County Irrigation                      | Irrigation scheduling                               | E-6              | 107                              | 107   | 107   | 107   | 107    | 107    |
| El Paso         | City of El Paso (EPW)                            | Municipal conservation programs                     | E-10             | 4,950                            | 5,530 | 5,080 | 9,950 | 13,140 | 17,820 |
|                 | Lower Valley Water District                      | Public conservation education                       | E-24             | 57                               | 66    | 74    | 83    | 92     | 100    |
|                 |  | Install loop lines inside existing connections      | E-25             |                                  |       |       |       |        |        |
|                 | Horizon Regional MUD                             | Water loss audit and main-line repair               | E-31             | 197                              | 274   | 346   | 418   | 487    | 551    |
|                 |  | Public conservation education                       | E-32             | 79                               | 110   | 140   | 169   | 196    | 222    |
|                 | Haciendas del Norte WID                          | Water loss audit and main-line repair               | E-34             | 12                               | 13    | 15    | 16    | 17     | 19     |
| East Montana WS | Water loss audit and main-line repair            | E-35  | 41               | 46                               | 50    | 54    | 59    | 63     |        |

**Table 5-5. (Continued) Summary of Recommended Conservation Water Management Strategy Evaluations**

| County                              | Water User Group   | Strategy                                       | 2021 Strategy ID | Strategy Supply (Acre-Feet/Year) |        |        |        |        |        |
|-------------------------------------|--|--|------------------|----------------------------------|--------|--------|--------|--------|--------|
|                                     |  |  |                  | 2020                             | 2030   | 2040   | 2050   | 2060   | 2070   |
| El Paso                             | El Paso County Other   | Public conservation education                  | E-37             | 2                                | 3      | 3      | 4      | 5      | 5      |
|                                     | *El Paso County Irrigation (EPCWID #1)                               | Irrigation scheduling                          | E-40             | 1,740                            | 1,740  | 1,740  | 1,740  | 1,740  | 1,740  |
|                                     |  | Tailwater reuse                                | E-41             | 1,723                            | 1,723  | 1,723  | 1,723  | 1,723  | 1,723  |
|                                     |  | Improvements to water district delivery system | E-42             | 25,000                           | 25,000 | 25,000 | 25,000 | 25,000 | 25,000 |
|                                     | EL Paso County Manufacturing   | Manufacturing Conservation                     | E-45             | 0                                | 430    | 430    | 430    | 430    | 430    |
|                                     | El Paso County Mining  | Mining Conservation                            | E-47             | 278                              | 370    | 466    | 569    | 680    | 807    |
| El Paso County Steam Electric Power | Steam Electric Power Conservation                                    | E-49   | 3,630            | 3,630                            | 3,630  | 3,630  | 3,630  | 3,630  |        |
| Hudspeth                            | Hudspeth County Other (City of Sierra Blanca - Hudspeth Co. WCID #1) | Public conservation education                  | E-52             | 1                                | 2      | 2      | 2      | 2      | 2      |
|                                     |  | Replace water-supply line from Van Horn        | E-53             | 39                               | 39     | 39     | 39     | 39     | 39     |
|                                     | Hudspeth County Mining   | Mining Conservation                            | E-57             | 29                               | 25     | 28     | 30     | 31     | 33     |
| Presidio                            | City of Presidio   | Water loss audit and main-line repair          | E-62             | 35                               | 37     | 38     | 41     | 43     | 45     |
| Terrell                             | Terrell County Mining  | Mining Conservation                            | E-64             | 72                               | 88     | 83     | 62     | 44     | 29     |

### 5.3.5 Gallons Per Capita Daily Goals

Effective municipal conservation can best be monitored in terms of reduction in gallons per day per capita (gpcd). The FWTWPG recommends the gpcd reduction goals listed in Table 5-6, which provides a listing of projected gpcd reductions anticipated as water efficiency and recommended conservation savings occur on a decadal basis. Entities listed in the table with higher gpcds than 200 are likely impacted by water loss issues in their distribution systems. It is highly recommended that these entities take advantage of a water-loss audit to guide needed repairs.

**Table 5-6. Gallons Per Capita Daily Goals**

| Water User Group                         | Base GPC D 2020 | Adjusted 2020 GPCD | Adjusted 2030 GPCD | Adjusted 2040 GPCD | Adjusted 2050 GPCD | Adjusted 2060 GPCD | Adjusted 2070 GPCD |
|--|-----------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Alpine                                   | 294             | 285                | 281                | 277                | 275                | 275                | 275                |
| Anthony                                  | 173             | 162                | 159                | 157                | 156                | 156                | 156                |
| County-Other, Brewster                   | 147             | 113                | 111                | 108                | 107                | 107                | 107                |
| County-Other, Culberson                  | 164             | 154                | 150                | 148                | 146                | 146                | 146                |
| County-Other, El Paso                    | 165             | 154                | 149                | 147                | 147                | 146                | 146                |
| County-Other, Hudspeth                   | 104             | 92                 | 88                 | 85                 | 84                 | 84                 | 84                 |
| County-Other, Jeff Davis                 | 141             | 132                | 128                | 124                | 122                | 122                | 122                |
| County-Other, Presidio                   | 147             | 137                | 132                | 129                | 129                | 128                | 128                |
| County-Other, Terrell                    | 118             | 107                | 102                | 102                | 102                | 102                | 102                |
| East Biggs Water System                  | 67              | 60                 | 60                 | 60                 | 60                 | 60                 | 60                 |
| East Montana Water System                | 118             | 109                | 106                | 104                | 103                | 103                | 102                |
| El Paso County Tornillo WID              | 97              | 89                 | 87                 | 85                 | 83                 | 83                 | 83                 |
| El Paso County WCID#4                    | 91              | 82                 | 78                 | 74                 | 73                 | 72                 | 72                 |
| El Paso Water                            | 144             | 132                | 128                | 127                | 124                | 122                | 122                |
| Esperanza Water Service                  | 150             | 140                | 136                | 133                | 132                | 131                | 131                |
| Federal Correctional Institution La Tuna | 197             | 188                | 185                | 183                | 182                | 182                | 181                |
| Fort Bliss Water Service                 | 175             | 164                | 159                | 157                | 157                | 156                | 156                |
| Fort Davis WSC                           | 218             | 209                | 206                | 203                | 201                | 201                | 201                |
| Hacienda Del Norte WID                   | 152             | 143                | 140                | 138                | 137                | 137                | 136                |
| Horizon Regional MUD                     | 141             | 133                | 131                | 130                | 130                | 130                | 130                |
| Hudspeth County WCID#1                   | 143             | 133                | 129                | 126                | 125                | 124                | 124                |
| Lajitas Municipal Services               | 179             | 170                | 166                | 162                | 160                | 160                | 160                |
| Lower Valley Water District              | 107             | 96                 | 91                 | 89                 | 88                 | 88                 | 88                 |
| Marathon Water Supply & Sewer Service    | 258             | 249                | 245                | 241                | 239                | 239                | 239                |
| Marfa                                    | 249             | 238                | 234                | 231                | 230                | 230                | 230                |
| Paseo Del Este MUD#1                     | 125             | 116                | 113                | 111                | 110                | 110                | 109                |
| Presidio                                 | 130             | 119                | 116                | 113                | 112                | 112                | 112                |
| Terrell County WCID#1                    | 194             | 183                | 178                | 178                | 178                | 178                | 178                |
| Van Horn                                 | 266             | 243                | 239                | 239                | 239                | 239                | 239                |



El Paso Water decadal projection is provided by the Utility as illustrated in El Paso Water Strategy E-9 in Appendix 5A. All other utilities in the Plan have acceptable gpcds considering implementation of recommended water management strategies.

### 5.3.6 Municipal Conservation

El Paso Water (EPW) is the largest supplier of municipal water in Far West Texas, supplying approximately 72 percent of all municipal needs in 2020. The City of El Paso through EPW has been implementing an aggressive water conservation program for the past two decades and has reduced the per capita demand from 200 gpcd in 1990 to a current level of less than 130 gpcd. The overall per capita potable water use for EPW and its wholesale customers, including steam electric and industrial use, was about 130 gpcd in 2013. EPW intends to continue its aggressive water conservation efforts and estimates that demand can be reduced by about 3 gpcd per decade by conservation efforts. The continuation of the conservation effort is a key component of the El Paso Integrated Water Management Strategy discussed in Chapter 5.

El Paso Water maintains a robust conservation website that provides conservation tips, a guide to native plants, a step-by-step guide on how to use your water meter to check for leaks, a water use calculator, and several other topics that focus on conservation. <https://www.epwater.org/conservation>

El Paso's Tech2O Learning Center has numerous educational exhibits geared towards school-aged students that focus on conservation, groundwater, desalination, xeriscape and several other topics. They maintain a conservation website, provide classroom activities for elementary, middle and high school, and offer Water Smart workshops for the public and for educators. <https://www.tech2o.org/>

### 5.3.7 Irrigation Conservation

Irrigation represents approximately 5765 percent of all the water used in Far West Texas. Most of this water is diverted from the Rio Grande and is applied to crops on farms located along the Rio Grande floodplain in El Paso, Hudspeth, and Presidio Counties. During significantly dry periods, insufficient water is available in upstream reservoirs to meet the full permitted allotments, and farmers in these areas have generally approached this situation by reducing acreage irrigated, changing types of crops planted, or possibly not planting crops until water becomes available during the following season. In some cases, farmers may benefit from management practices described in Chapter 5, which are a mixture of site-specific management, educational, and physical procedures that have proven to be effective and are cost-effective for conserving water.

The implementation of water conservation programs that are cost effective, meet state mandates, and result in permanent real reductions in water use will be a challenge for the citizens of Far West Texas. Smaller communities that lack financial and technical resources will be particularly challenged and will look to the State for assistance. Irrigation conservation may result in significant reductions in water use. However, without financial and technical assistance, it is unlikely that aggressive irrigation conservation programs will be implemented.

Staff of the Texas AgriLife Research Center at El Paso evaluated the applicability, water savings potential, implementation feasibility, and cost effectiveness of seventeen irrigated agriculture water conservation practices in Far West Texas during both drought and full water supply conditions. Agricultural, hydrologic, engineering, economic, and institutional conditions are identified and examined

for the three largest irrigated agricultural areas which account for over 90 percent of total irrigated agricultural acreage in Far West Texas. Factors considered in evaluating conservation strategies included water sources, use, water quality, cropping patterns, current irrigation practices, delivery systems, technological alternatives, market conditions and operational constraints.

The overall conclusion is that very limited opportunities exist for significant additional water conservation in Far West Texas irrigated agriculture. The primary reasons can be summarized by:

- the most effective conservation practices have already been implemented and associated water savings realized throughout the region;
- reduced water quality and the physical nature of gravity flow delivery limit or prohibit implementation of higher efficiency pressurized irrigation systems;
- increased water use efficiency upstream has the net effect of reducing water supplies and production of downstream irrigators; and,
- water conservation implementation costs for many practices exceed the agricultural value and benefits of any water saved.

Those practices that suggest economic efficient additional water conservation included lining or pipelining district canals and the very small potential for additional irrigation scheduling and tail water recovery systems. In nearly all cases, these practices have been adopted if applicable, further emphasizing the very limited opportunities for additional conservation. If these strategies were implemented, the water conserved would satisfy a small percentage of the projected unmet agricultural water demand in 2060 during drought-of-record conditions.

The full report on the irrigation conservation analysis is available at

[http://www.twdb.texas.gov/publications/reports/contracted\\_reports/doc/0704830690\\_RegionE/TxAgriLifeResearchIrrigationEfficiency-FinalReport.pdf](http://www.twdb.texas.gov/publications/reports/contracted_reports/doc/0704830690_RegionE/TxAgriLifeResearchIrrigationEfficiency-FinalReport.pdf).

### **5.3.8 Manufacturing Conservation**

Most groundwater used for manufacturing in El Paso County is for petroleum refining. Refinery water consumption depends primarily on which of three configurations (cracking, light coking, and heavy coking) is utilized. These processes consume 14 to 20 gallons of water per barrel of crude processed.

Water consumption at most refineries includes cooling water evaporation loss, water embedded with product, steam trap losses, steam vent losses firewater main leaks to ground, evaporation from usage during maintenance, and evaporation from open water ponds in the wastewater treatment plant.

Recent improved practices across the industry include the following:

- Monitoring of steam used to purge and disperse flare tips
- Replacing turbines that vent steam to the atmosphere with non-vented options
- Capturing blowdown water from boilers in lower-pressure drum and cooling before sending to WWTP
- Identifying and minimizing steam leaks
- Rerouting steam traps that vent to ground to condensate recovery headers, and

- Capturing steam lost through top of de-aerators.

### 5.3.9 Water Loss Audit and Main-line Repair

Reported municipal use generally includes a variable amount of water that does not reach the intended consumer due to water leaks in the distribution lines, unauthorized consumption, storage tank overflows, and other wasteful factors. For some communities, attending to these issues can be a proactive conservation strategy that may result in significant water savings.

To address the lack of information on water loss, the 78<sup>th</sup> Texas Legislature passed House Bill 3338, which required retail public utilities that provide potable water to perform and file with the TWDB a water audit computing the utility's most recent annual system water loss every five years. In response to the mandate of House Bill 3338, TWDB developed a water audit methodology for utilities to quantify water losses, standardize water loss reporting and help measure water efficiency. This TWDB report 376 titled 'Water Loss Audit Manual for Texas Utilities' can be accessed at:

<http://www.twdb.texas.gov/conservation/municipal/waterloss/index.asp> A summary of the first audit, An Analysis of Water Loss as Reported by Public Water Suppliers – 2007 was provided to the Far West Texas Water Planning Group (FWTWPG) for consideration in developing water supply management strategies. This document can be accessed from the TWDB website in its entirety at:

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[https://www.twdb.texas.gov/publications/reports/contracted\\_reports/doc/0600010612\\_WaterLossinTexas.pdf](https://www.twdb.texas.gov/publications/reports/contracted_reports/doc/0600010612_WaterLossinTexas.pdf)

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[https://www.twdb.texas.gov/publications/reports/contracted\\_reports/doc/0600010612\\_waterlossintexas\\_appendix.pdf](https://www.twdb.texas.gov/publications/reports/contracted_reports/doc/0600010612_waterlossintexas_appendix.pdf)

Table 1-2 in Chapter 1, Section 1.9 provides a listing of reported utility audits performed in Far West Texas in 2010.

### Water Loss Audit Resources

The TWDB provides a significant amount of information and services pertaining to water loss audit that can be accessed at: <https://www.twdb.texas.gov/conservation/resources/waterloss-resources.asp>.

Additional resources and appropriate forms provided by TWDB include:

[Water Audit Worksheet Instructions](#)

[Guidelines for Setting a Target Infrastructure Leakage Index \(ILL\)](#)

[Water Loss Manual for Texas Utilities \(Updated March 2008\)](#)

[Main Line Water Loss Calculator](#)

[Monthly Water Loss Report](#)

[Leak Detection Equipment Loan Form](#)

[Ultrasonic Flow Meter Equipment Loan Form](#)

[Troubleshooting for Negative Water Loss Audit Components](#)

Over the last few years, smart meters and advanced metering infrastructure (AMI) have become quite popular. AMI meters allow real-time monitoring of water usage. The AMI systems can help pinpoint water loss and allows for more interactive and responsive water management by the water provider. A growing number of cities (including Dallas and Granbury) are requesting SWIFT funding to help with the installation of updated AMI.

### **5.3.10 Water User Group Conservation Management Plans**

In the consideration of regional conservation, the Far West Texas Water Planning Group reviewed active water conservation management plans provided to the planning group by the following entities.

#### **Public Supply Entities**

- City of Alpine - *Water Conservation Management Plan* <http://www.cityofalpine.com/>
- Dell City – *Water Conservation and Drought Contingency Plan*
- El Paso County WCID #4 – *Drought Contingency Plan*
- El Paso Water Utilities – *EPWU Water Conservation Management Plan* <https://www.epwater.org/>
- Esperanza Water Service Company – *Drought Contingency Plan*
- Fort Bliss WSC – *Water Conservation Management Plan* <http://www.asusinc.com>
- Fort Davis WSC – *Drought Contingency Plan* <http://www.fortdavis.com>
- Fort Davis Estates – *Drought Contingency Plan*
- Green Acres/River View Water Works – *Drought Contingency Plan*
- Horizon Regional MUD – *Water Conservation Management Plan* <http://horizonregional.com/>
- Lajitas Utility Company – *Drought Contingency Plan*
- Lower Valley Water District – *Water Conservation Management Plan* <http://www.lvwd.org/>
- Marfa City Water Works – *Water Conservation Management Plan*
- Marathon Water Supply and Sewer Service Corp. – *Drought Contingency Plan*
- City of Presidio – *Water Conservation Management Plan* <http://presidiotx.us/>
- City of Sanderson – *Comprehensive Plan* <http://www.sandersonchamber.com/>
- Study Butte WSC – *Drought Contingency Plan*
- Terrell County WCID No.1 – *Water Conservation Management Plan*  
<http://www.sandersontx.info/services/tcwcid.html>
- Turf Water System – *Drought Contingency Plan*
- Town of Anthony – *Water Conservation Management Plan* <http://www.anthonytexas.org/>
- Town of Valentine – *Drought Contingency Plan*
- Town of Van Horn – *Water Conservation and Drought Contingency Plan*  
<https://www.vanhorn texas.org/>

Villa Alegre Estates – *Drought Contingency Plan*

Vinton Hills Water System – *Drought Contingency Plan*

Vinton Village Estates – *Drought Contingency Plan*

Village of Vinton – <http://www.vintontx.govoffice2.com/>

### **Irrigation Districts**

El Paso County Water Improvement District No.1 – *Management Plan* <http://www.epcwid1.org/>

Hudspeth County Conservation and Reclamation District No.1 – *Management Plan*

### **5.3.11 Groundwater Conservation Districts Management Plans**

The Texas Legislature has established a process for local management of groundwater resources through Groundwater Conservation Districts. The Districts are charged with managing groundwater by providing for the conservation, preservation, protection, recharging and prevention of waste of groundwater within their jurisdictions. An elected board governs these districts and establishes rules, programs and activities specifically designed to address local problems and opportunities. Texas Water Code §36.0015 states, in part, “Groundwater Conservation Districts created as provided by this chapter are the State’s preferred method of groundwater management.” Six districts are currently in operation within the planning region:

- Brewster County Groundwater Conservation District
- Culberson County Groundwater Conservation District
- Hudspeth County Underground Water Conservation District#1
- Jeff Davis County Underground Water Conservation District
- Presidio County Underground Water Conservation District
- Terrell County Groundwater Conservation District

In recent sessions, the Texas Legislature has redefined the way groundwater is to be managed by Groundwater Management Areas [http://www.twdb.texas.gov/groundwater/management\\_areas/index.asp](http://www.twdb.texas.gov/groundwater/management_areas/index.asp). The joint planning process is summarized in Chapter 1, Section 1.1.5.

As part of the joint planning process, groundwater conservation districts are responsible for determining the desired future conditions within a management area. Desired future conditions are defined in Title 31, Part 10, §35601. (6) of the Texas Administrative Code as “the desired, quantified condition of groundwater resources (such as water levels, spring flows, or volumes) within a management area at one or more specified future times as defined by participating groundwater conservation districts.” Desired future conditions are implemented to help meet the planning goal for the conservation of water that is to be used for future uses. The following link provides information on desired future conditions. [http://www.twdb.texas.gov/groundwater/management\\_areas/DFC.asp](http://www.twdb.texas.gov/groundwater/management_areas/DFC.asp).

The Brewster, Culberson, Hudspeth, Jeff Davis and Presidio districts are in GMA 4. Terrell County Groundwater Conservation District is in GMA 7. As of August 13, 2010, *desired future conditions* have been adopted for the following aquifers: Capitan Reef, Edwards Trinity, Marathon, Rustler, Igneous, Upper Salt Basin, Bone Springs-Victorio Peak, West Texas Bolsons and Presidio-Redford Bolson.

### 5.3.11.1 Brewster County Groundwater Conservation District

The Brewster County Groundwater Conservation District (<http://westtexasgroundwater.com/>) was confirmed in 2001 and serves all of Brewster County, the largest county in the State. The mission of the District is to manage, protect, and conserve the groundwater resources of Brewster County, while protecting private property rights and promoting constructive and sustainable development in the county. The table below presents the adopted DFCs for the aquifers in Brewster County. The approved [2015 Management Plan is available here](#).

#### Adopted Desired Future Conditions for Brewster County

| Aquifer | Capitan Reef Complex | Edwards-Trinity (Plateau) | Igneous          | Marathon        | Rustler              |
|---------|----------------------|---------------------------|------------------|-----------------|----------------------|
| DFC     | 0-foot drawdown      | 3-foot drawdown           | 10-foot drawdown | 0-foot drawdown | Aquifer non-relevant |

### 5.3.11.2 Culberson County Groundwater Conservation District

The Culberson County Groundwater Conservation District was confirmed in May 1998 and occupies the southwestern half of Culberson County. Aquifers managed by the District primarily include the Wild Horse Flat, Michigan Flat, and Lobo Flat of the West Texas Bolsons, and the Capitan Reef. The table below presents the adopted DFCs for the aquifers in Culberson County. The approved 2019 Management Plan can be accessed at:

[http://www.twdb.texas.gov/groundwater/docs/GCD/culbersongcd/culbersongcd\\_mgmt\\_plan2014.pdf](http://www.twdb.texas.gov/groundwater/docs/GCD/culbersongcd/culbersongcd_mgmt_plan2014.pdf).

#### Adopted Desired Future Conditions for Culberson County

| Aquifer | Capitan Reef Complex | Edwards-Trinity (Plateau) | Igneous          | West Texas Bolsons | Upper Salt Basin     |
|---------|----------------------|---------------------------|------------------|--------------------|----------------------|
| DFC     | 50-foot drawdown     | Aquifer non-relevant      | 66-foot drawdown | 78-foot drawdown   | Aquifer non-relevant |

### 5.3.11.3 Hudspeth County Underground Water Conservation District #1

The Hudspeth County Underground Water Conservation District #1 was created in 1956 and is in the Dell Valley irrigation area of northeast Hudspeth County, with the Community of Dell City lying approximately in the center of the District. The principal aquifer in the District is the Bone Spring-Victorio Peak. The District recently installed eight continuous water-level recorders and has placed flow gauges on irrigation wells. The table presents the adopted DFCs for the aquifer in Hudspeth County. [The latest District management plan adopted in May of 2013October of 2018 can be accessed here](#).

#### Adopted Desired Future Conditions for Hudspeth County

| Aquifer | Bone Spring – Victorio Peak | Capitan Reef Complex |
|---------|-----------------------------|----------------------|
| DFC     | 0-foot drawdown             | Aquifer non-relevant |

### 5.3.11.4 Jeff Davis County Underground Water Conservation District

The Jeff Davis County Underground Water Conservation District was formed in August 1994 (HB 2866) and includes all of Jeff Davis County. Primary aquifers managed by the District include the Ryan Flat and Lobo Flat of the West Texas Bolsons and the Davis Mountains Igneous. District activities include the registration of all new wells and the permitting of wells that can produce 25,000 gallons per day or

more. State well-construction standards are enforced, and water levels are monitored in 28 observation wells located in high use areas. The District is involved in a wellhead protection program with the Fort Davis Water Supply Corp. and provides educational programs for schools and the public. The table presents the adopted DFCs for the aquifers in Jeff Davis County. [The latest District management plan adopted in 2019 can be accessed here.](#)

#### Adopted Desired Future Conditions for Jeff Davis County

|                |                           |                  |                    |                      |                      |                      |
|----------------|---------------------------|------------------|--------------------|----------------------|----------------------|----------------------|
| <b>Aquifer</b> | Edwards-Trinity (Plateau) | Igneous          | West Texas Bolsons | Pecos Valley         | Capitan Reef Complex | Rustler              |
| <b>DFC</b>     | Aquifer non-relevant      | 20-foot drawdown | 72-foot drawdown   | Aquifer non-relevant | Aquifer non-relevant | Aquifer non-relevant |

#### 5.3.11.5 Presidio County Underground Water Conservation District

Presidio County residents approved the formation of the Presidio County Underground Water Conservation District in an election held August 31, 1999. Primary aquifers to be managed in the District include the Presidio-Redford Bolson, the Ryan Flat West Texas Bolson, and the Davis Mountains Igneous. District activities include well permitting, recharge enhancement, and public education. The table presents the adopted DFCs for the aquifers in Presidio County. [The latest District management plan adopted in January of 2015 can be accessed here.](#)

#### Adopted Desired Future Conditions for Presidio County

|                |                  |                            |                    |
|----------------|------------------|----------------------------|--------------------|
| <b>Aquifer</b> | Igneous          | Presidio – Redford Bolsons | West Texas Bolsons |
| <b>DFC</b>     | 14-foot drawdown | 72-foot drawdown           | 72-foot drawdown   |

#### 5.3.11.6 Terrell County Groundwater Conservation District

The creation of the Terrell County Groundwater Conservation District was approved and confirmed by the voters of Terrell County at the confirmation election held on November 6, 2012. The Edwards-Trinity (Plateau) Aquifer is the primary aquifer managed by the district. The district accomplishes its objectives by working to lessen interference between water wells, minimize drawdown of groundwater levels, prevent the waste of groundwater, and reduce the degradation of groundwater quality. The District is focused on helping the local economy maintain and improve its current condition. District activities include the protection of existing wells, permitting of new wells and public education. The table presents the adopted DFCs for the aquifer in Terrell County. [The approved management plan adopted October 2018 can be accessed here.](#)

#### Adopted Desired Future Conditions for Terrell County

|                |                           |
|----------------|---------------------------|
| <b>Aquifer</b> | Edwards-Trinity (Plateau) |
| <b>DFC</b>     | 2-foot drawdown           |

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