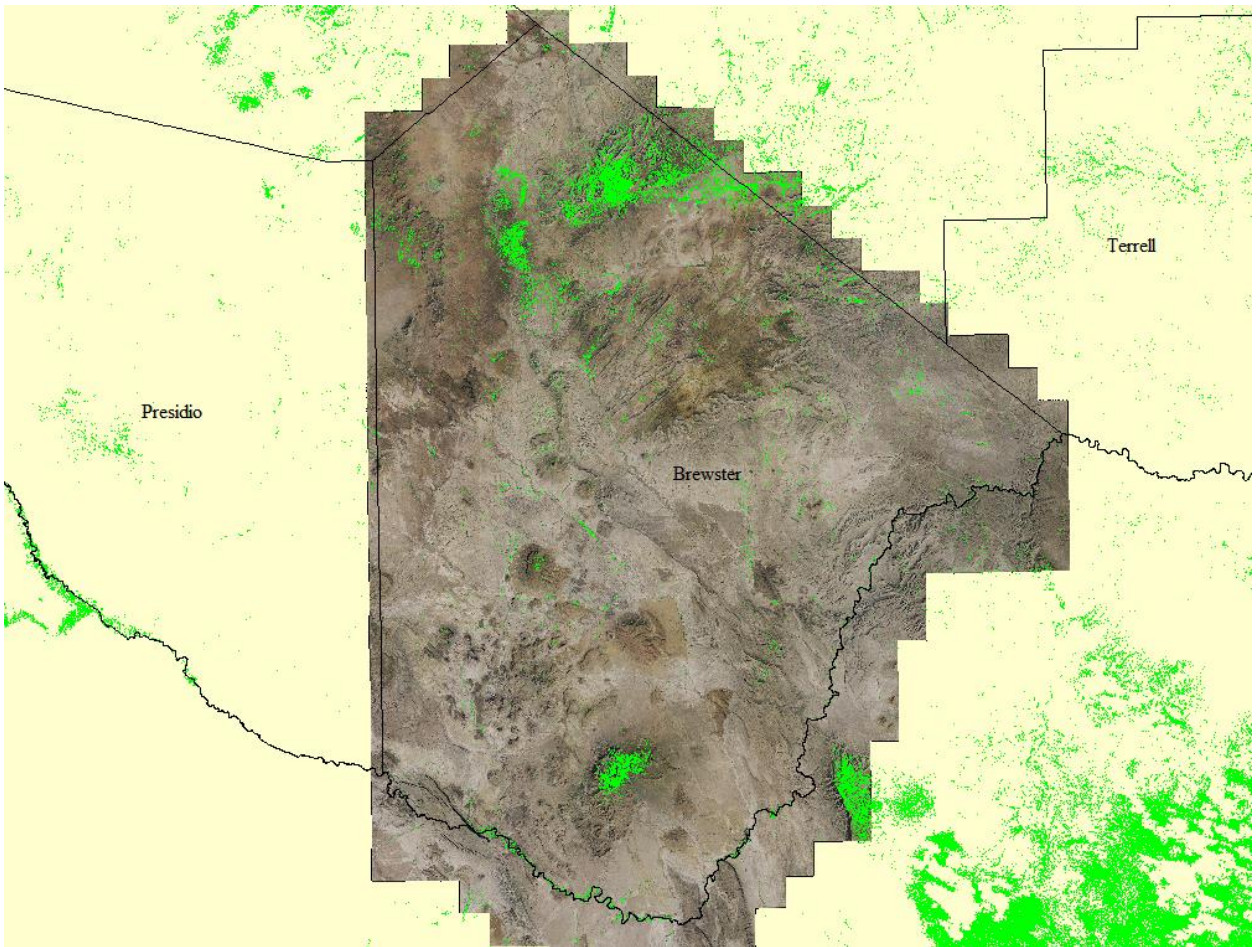


# Brewster County Groundwater Conservation District Groundwater Management Plan



Draft of January 27, 2020

This Management Plan was prepared in accordance with the requirements of Chapter 36 of the Texas Water Code and Title 31, Chapter 356, of the Texas Administrative Code and was made available for public comment prior to adoption by the Board of Directors of the Brewster County Groundwater Conservation District (the “District”).

### **District Purpose and Mission**

The purpose of the District is to provide a locally controlled groundwater district to conserve and preserve groundwater, protect groundwater users, protect groundwater, prevent pollution or waste of groundwater within the boundaries of the District, and regulate the transport of water out of the boundaries of the District. The District has adopted rules to regulate groundwater withdrawals based on principals of reasonable use, correlative rights, and public good to achieve the desired future conditions (DFCs) for the groundwater resources within the District, as those DFCs are agreed upon by Groundwater Management Area 4 (GMA 4).

The mission of the Brewster County Groundwater Conservation District is to manage, protect, and conserve the groundwater resources of Brewster County, Texas while protecting property rights and promoting constructive and sustainable development in Brewster County. The primary goal of the Brewster Groundwater Conservation District in pursuing its mission is the sustainability of the groundwater resources of Brewster County.

### **Statement of Guiding Principles**

The groundwater resources of Brewster County (“the County”) are of vital importance to all citizens, and as the population of the County continues to increase, additional pressure will be placed on the groundwater resources of the County. The District, which is managed and controlled locally, is the most practical means of directing development and preventing over-development of the groundwater resources of the County.

The District can achieve its mission and goals by increasing the quantity and quality of knowledge regarding the groundwater resources of the County, encouraging the most efficient use of groundwater, preserving and improving groundwater quality, and increasing public awareness and education regarding groundwater issues. Believing that local control of local resources is critical to the District’s mission and goal, the District will monitor the activities of the Texas Legislature and of the Far West Texas Water Planning Group, along with the rules and orders of state agencies, which may affect the private ownership, use, and management of groundwater.

The District will work in cooperation with the Jeff Davis County Underground Water Conservation District, the Presidio County Underground Water Conservation District, the Presidio County Groundwater Conservation District, and the Culberson County Groundwater Conservation District to manage and protect those groundwater resources that are shared by any or all of the five counties.

A major threat to the mission of the District is management of the groundwater resources of Brewster County without a thorough understanding of the aquifers and their hydrogeologic properties. This Management Plan will be a tool for the directors of the District and for the managers of the District's water resources, the landowners of Brewster County. The District's directors regard all landowners as the District's partners in managing our groundwater resources.

### **General Description of the District**

The District was created by the citizens of Brewster County through a confirmation election on November 6, 2001. The current Board of Directors ("the Board") are Joan Johnson (Chairman), Tim Leary (Vice Chairman), Homer Mills (Secretary), Ike Roberts, Tom Mangrem, Dr. Kevin Urbanczyk and Ambrosio Valles.

The boundaries of the District are coterminous with those of Brewster County, Texas. The economy of the County and the District is dominated by agriculture, tourism, and Sul Ross State University. Agricultural income is derived primarily from beef cattle production, hunting, and outdoor recreation.

Brewster County, containing 6,193 square miles or almost 4 million acres, is the largest county in Texas. The County is located on the Big Bend of the Rio Grande. It is bounded on the northeast by Terrell and Pecos Counties, on the northwest by Jeff Davis County, on the west by Presidio County, and on the south and southeast by the Republic of Mexico. Alpine, which is located in the northwest part of the County, is the county seat. Other population centers are Marathon, in the northeast part of the County, and Lajitas, Terlingua, and Study Butte, in the south part of the County. Because Brewster County contains Big Bend National Park, Black Gap Wildlife Management Area, and Elephant Mountain Wildlife Management Area, as well as a portion of Big Bend Ranch State Natural Area, almost 25% of the County is publicly owned. The County consists of mountains, canyons, plateaus, valleys, and rolling plains. The altitude of the land surface ranges from 1,355 to 7,825 feet above mean sea level. Brewster County lies within the

drainage systems of the Rio Grande and the Pecos River, which is also a tributary of the Rio Grande.

**1. Estimate of Modeled Available Groundwater - 31 TAC § 356.52(a)(5)(A)**

TWDB GAM Run 16-030 MAG (Appendix A) summarized the Modeled Available Groundwater for the year 2020 based on the GMA 4 Adopted Desired Future Conditions for the time period from 2010 through 2060, which are listed in Table 1 below.

Table 1: Modeled Available Groundwater and Desired Future Conditions Drawdown

| <b>Aquifer</b>  | <b>MAG (af/yr)</b> | <b>DFC Drawdown (ft)</b> |
|-----------------|--------------------|--------------------------|
| Edwards-Trinity | 1,394              | 3                        |
| Capitan Reef    | 583                | 0                        |
| Igneous         | 2,586              | 10                       |
| Marathon        | 7,327              | 0                        |

**2. Amount of Groundwater Being Used 2013 through 2017 – 31 TAC §§ 356.52(a)(5)(B); 356.10(2)**

Municipal water use makes up over 99% of the water use in Brewster County and in the District. The District requires by rule that all groundwater pumped under Production Permits must be metered. The District has issued four (4) Production Permits, for Irrigation, Industrial and Municipal purposes. All non-exempt pumping wells must be equipped with meters approved by the District and pumping data reported to the district annually. For the year 2018, the total amount of permitted non-exempt groundwater pumping reported to the District was 653 acre-feet.

The estimate of the amount of groundwater production in Brewster County for irrigation in 2015 was 403 acre-feet (138 acres or irrigated land), and the estimate of total production from the Igneous Aquifer in Brewster County in 2017 was 2,066 acre-feet (see Table 2).

Table 2: Estimate of 2018 Igneous Aquifer Groundwater Production

| Estimate of 2017 Igneous Aquifer Groundwater Production in Brewster County   |            |
|--|------------|
| Description of Source and Use  | af/yr      |
| 2016 MAG (TWDB Report GR15-030 MAG)  | 2,586      |
| Estimate of Permit Use (2017)  | 110        |
| City of Alpine GW Use Igneous Brewster*  | 1,428      |
| Estimate of Domestic and Livestock (Exempt)**  | 128        |
| Estimate of Unpermitted Non-Exempt Use   | 400        |
| Estimate of Total Use in 2017  | 2,066      |
| <b>Difference (MAG - 2017 Use)</b>   | <b>520</b> |
| *Farwest Texas 2016 Water Plan Sec. 11.2.4. This amount is equal to the amount of water available (capacity) and not the actual production in 2017 |            |
| ** TWDB 2015 Report Projected Exempt Groundwater Use Estimates   |            |

The TWDB estimates of the total amount of groundwater use in 2015 (see Table 3) for Brewster County are 2,814 acre-feet. The estimate for 2016 of 4,702 acre-feet appears to be too large by approximately 1,700 acre-feet.

Table 3: TWDB Estimate of Groundwater and Surface Water Production in Brewster Co.

**BREWSTER COUNTY**

All values are in acre-feet

| Year | Source | Municipal | Manufacturing | Mining | Steam Electric | Irrigation | Livestock | Total |
|------|--------|-----------|---------------|--------|----------------|------------|-----------|-------|
| 2016 | GW     | 3,491     | 0             | 0      | 0              | 915        | 296       | 4,702 |
|      | SW     | 0         | 0             | 0      | 0              | 659        | 16        | 675   |
| 2015 | GW     | 1,940     | 0             | 0      | 0              | 583        | 291       | 2,814 |
|      | SW     | 0         | 0             | 0      | 0              | 1,391      | 15        | 1,406 |
| 2014 | GW     | 1,832     | 0             | 0      | 0              | 1,527      | 286       | 3,645 |
|      | SW     | 0         | 0             | 0      | 0              | 377        | 15        | 392   |
| 2013 | GW     | 2,187     | 0             | 0      | 0              | 329        | 357       | 2,873 |
|      | SW     | 0         | 0             | 0      | 0              | 1,551      | 19        | 1,570 |
| 2012 | GW     | 2,298     | 0             | 0      | 0              | 308        | 303       | 2,909 |
|      | SW     | 0         | 0             | 0      | 0              | 1,466      | 16        | 1,482 |

**3. Amount of Recharge from Precipitation – 31 TAC § 356.52(a)(5)(C)**

The 2019 TWDB report titled “GAM Run 19-0 08: Brewster County Groundwater Conservation District Groundwater Management Plan” contains estimates of recharge from all aquifers within the District. During times of drought and reduced rainfall, the amount of recharge decreases significantly.

The estimated amount of recharge from precipitation is:

|                         |           |
|-------------------------|-----------|
| Igneous Aquifer         | 6,584 af  |
| Edwards-Trinity Aquifer | 29,759 af |
| Capitan Reef Aquifer    | 16,940 af |
| Rustler Aquifer         | 0 af      |

**4. Amount of Water that Discharges to Springs – 31 TAC § 356.52(a)(5)(D)**

The estimated amount of water that Discharges to Springs is:

|                         |           |
|-------------------------|-----------|
| Igneous Aquifer         | 136 af    |
| Edwards-Trinity Aquifer | 31,261 af |
| Capitan Reef Aquifer    | 0 af      |
| Rustler Aquifer         | 0 af      |

**5. Estimate of Annual Volumes of Flow – 31 TAC § 356.52(a)(5)(E)**

The Estimated annual flow into the District are:

|                         |           |
|-------------------------|-----------|
| Igneous Aquifer         | 1,118 af  |
| Edwards-Trinity Aquifer | 15,172 af |
| Capitan Reef Aquifer    | 0 af      |
| Rustler Aquifer         | 15 af     |

The Estimated annual flow out of the District are:

|                         |           |
|-------------------------|-----------|
| Igneous Aquifer         | 1,364 af  |
| Edwards-Trinity Aquifer | 15,730 af |
| Capitan Reef Aquifer    | 29,390 af |
| Rustler Aquifer         | 15 af     |

The Estimated annual flow between aquifers:

|                         |                |
|-------------------------|----------------|
| Igneous Aquifer         | 3,472 af       |
| Edwards-Trinity Aquifer | not applicable |
| Capitan Reef Aquifer    | 16,940 af      |

**6. Projected Surface Water Supply – 31 TAC § 356.52(a)(5)(F)**

Table 4 lists the Projected Surface Water Supply from the TWDB 2017 State Water Plan Data for Brewster County.

Table 4: TWDB Project Surface Water Supply Brewster County

| <b>BREWSTER COUNTY</b>                                     |                      |                  |                                   | All values are in acre-feet |             |             |             |             |             |
|--|----------------------|------------------|-----------------------------------|-----------------------------|-------------|-------------|-------------|-------------|-------------|
| <b>RWPG</b>  | <b>WUG</b>           | <b>WUG Basin</b> | <b>Source Name</b>                | <b>2020</b>                 | <b>2030</b> | <b>2040</b> | <b>2050</b> | <b>2060</b> | <b>2070</b> |
| E  | IRRIGATION, BREWSTER | RIO GRANDE       | RIO GRANDE RUN-OF-RIVER           | 600                         | 600         | 600         | 600         | 600         | 600         |
| E  | LIVESTOCK, BREWSTER  | RIO GRANDE       | RIO GRANDE LIVESTOCK LOCAL SUPPLY | 19                          | 19          | 19          | 19          | 19          | 19          |
| <b>Sum of Projected Surface Water Supplies (acre-feet)</b> |                      |                  |                                   | <b>619</b>                  | <b>619</b>  | <b>619</b>  | <b>619</b>  | <b>619</b>  | <b>619</b>  |

**7. Projected Total Demand for Water –31 TAC § 356.52(a)(5)(G)**

Table 5 lists the Projected Water Demands from the TWDB 2017 State Water Plan Data for Brewster County.

Table 5: TWDB Projected Total Demand for Water for Brewster County

| <b>BREWSTER COUNTY</b>                            |                         |                  |  | All values are in acre-feet |              |              |              |              |              |
|---|-------------------------|------------------|--|-----------------------------|--------------|--------------|--------------|--------------|--------------|
| <b>RWPG</b>                                       | <b>WUG</b>              | <b>WUG Basin</b> |  | <b>2020</b>                 | <b>2030</b>  | <b>2040</b>  | <b>2050</b>  | <b>2060</b>  | <b>2070</b>  |
| E   | ALPINE                  | RIO GRANDE       |  | 1,935                       | 1,944        | 1,936        | 1,934        | 1,937        | 1,940        |
| E   | COUNTY-OTHER, BREWSTER  | RIO GRANDE       |  | 563                         | 583          | 584          | 588          | 591          | 594          |
| E   | IRRIGATION, BREWSTER    | RIO GRANDE       |  | 2,304                       | 2,293        | 2,280        | 2,269        | 2,258        | 2,247        |
| E   | LIVESTOCK, BREWSTER     | RIO GRANDE       |  | 386                         | 386          | 386          | 386          | 386          | 386          |
| E   | MANUFACTURING, BREWSTER | RIO GRANDE       |  | 4                           | 4            | 4            | 4            | 4            | 4            |
| <b>Sum of Projected Water Demands (acre-feet)</b> |                         |                  |  | <b>5,192</b>                | <b>5,210</b> | <b>5,190</b> | <b>5,181</b> | <b>5,176</b> | <b>5,171</b> |

## 8. Water Supply Needs – TAC § 36.1071(e)(4)

The amount of groundwater withdrawals permitted by the District shall be tied to the long-term sustainable amount of recharge to the portion of the aquifer within the District and the groundwater elevation measured in the District’s monitoring well(s) in accordance with the District’s rules, in such a way as to protect the historical and existing uses of groundwater withdrawn from the portion of the Capitan Reef, Edwards-Trinity, Igneous, Marathon, and Santa Elena Aquifers located within the District. The District shall report annually to the Board on the amount of groundwater being withdrawn through non-exempt wells located within the District, measured through the District’s flow metering program, for the quantification of existing and historical use of groundwater within the District’s boundaries, and for the issuance of production permits for all nonexempt wells in operation.

Table 6 lists the Water Supply Needs from the TWDB 2017 State Water Plan Data for Brewster County.

Table 6: TWDB Water Supply Needs for Brewster County

| <b>BREWSTER COUNTY</b>                                 |                         |                  | All values are in acre-feet |             |             |             |             |             |
|--|-------------------------|------------------|-----------------------------|-------------|-------------|-------------|-------------|-------------|
| <b>RWPG</b>  | <b>WUG</b>              | <b>WUG Basin</b> | <b>2020</b>                 | <b>2030</b> | <b>2040</b> | <b>2050</b> | <b>2060</b> | <b>2070</b> |
| E  | ALPINE                  | RIO GRANDE       | 231                         | 222         | 230         | 232         | 229         | 226         |
| E  | COUNTY-OTHER, BREWSTER  | RIO GRANDE       | 503                         | 483         | 482         | 478         | 475         | 472         |
| E  | IRRIGATION, BREWSTER    | RIO GRANDE       | 968                         | 979         | 992         | 1,003       | 1,014       | 1,025       |
| E  | LIVESTOCK, BREWSTER     | RIO GRANDE       | 0                           | 0           | 0           | 0           | 0           | 0           |
| E  | MANUFACTURING, BREWSTER | RIO GRANDE       | 0                           | 0           | 0           | 0           | 0           | 0           |
| <b>Sum of Projected Water Supply Needs (acre-feet)</b> |                         |                  | <b>0</b>                    | <b>0</b>    | <b>0</b>    | <b>0</b>    | <b>0</b>    | <b>0</b>    |

## 9. Water Management Strategies –TWC § 36.1071(e)(4)

The water management strategies for the District include the following strategies obtained from the 2017 State Water Plan:

- Marathon Water Loss Audit and Line Repairs
- Panther Junction BBNP Water Loss Audit and Line Repairs
- Rio Grande Village BBNP Water Loss Audit and Line Repairs



Table 7 lists the amount annual amount of demand reduction from these three strategies. All three strategies are for reduction in groundwater use.

Table 7: TWDB Water Management Strategies for Brewster County

**BREWSTER COUNTY**

WUG, Basin (RWPG)

All values are in acre-feet

| Water Management Strategy   | Source Name [Origin]        | 2020      | 2030      | 2040      | 2050      | 2060      | 2070      |
|---|-----------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>COUNTY-OTHER, BREWSTER, RIO GRANDE (E)</b>                     |                             |           |           |           |           |           |           |
| MARATHON WSSSERVICE - WATER LOSS AUDIT AND MAIN-LINE REPAIR       | DEMAND REDUCTION [BREWSTER] | 65        | 65        | 65        | 65        | 65        | 65        |
| PANTHER JUNCTION BBNP PLT - WATER LOSS AUDIT AND MAIN-LINE REPAIR | DEMAND REDUCTION [BREWSTER] | 2         | 2         | 2         | 2         | 2         | 2         |
| RIO GRANDE VILLAGE BBNP - WATER LOSS AUDIT AND MAIN-LINE REPAIR   | DEMAND REDUCTION [BREWSTER] | 6         | 6         | 6         | 6         | 6         | 6         |
| <b>Sum of Projected Water Management Strategies (acre-feet)</b>   |                             | <b>73</b> | <b>73</b> | <b>73</b> | <b>73</b> | <b>73</b> | <b>73</b> |

**10. Management of Groundwater Supplies - 31 TAC § 356.52(a)(4)**

The District will manage the production of groundwater from the Marathon, Igneous, Capitan Reef, Edwards-Trinity, and Santa Elena Aquifers within the District in a sustainable manner. The District will identify and engage in such practices that, if implemented, would result in more efficient use of groundwater.

**10.5 Management Notice of Procedures**

The District shall prepare an annual report summarizing District activities, to be approved by the Board of Directors during the first quarter of each year. The District’s website will be available to the public. The website will contain a summary of the annual report and information regarding water conservation.

**11. District Rules – TWC § 36.1071(e) (4)**

The District will use the provisions of this plan as guidelines for District activities. Operations of the District, all agreements entered into by the District, and any additional planning activities in which the District participates will be consistent with this plan and with the District’s rules. Hardcopy of the rules, along with the Management Plan submittal are included in the appendix.

**12. Resolution Adopting 2020 Management Plan – 31 TAC § 356.53(a)(3)**

A certified copy of the District Resolution adopting this Management Plan is attached as Appendix B.

**13. Notice of Hearing on 2020 Management Plan – 31 TAC § 356.53(a)(3)**

A hearing notice was published in the *Alpine Avalanche*, a newspaper of general circulation in Brewster County, Texas, on the 25th of June, 2020, and a copy of the published notice is attached as Appendix C. Also enclosed, as Appendices D and E, respectively, are copies of the posted agenda for the hearing and the minutes of the hearing.

**14. Site Specific Information – 31 TAC § 356.52(c)**

Section 19 list references for technical publication describing the characteristics of the groundwater resources within the District.

**15. Management Goals, Objectives, and Performance Standards – 31 TAC § 356.51**

**15.1. Providing the most Efficient Use of Groundwater**

**Management Objective:** Each year the District will provide information to the general public regarding the amount of use and depth to water change of the groundwater in the District.

**Performance Standard:** The District’s website will be updated to include information on the status of groundwater in the District.

**15.2. Controlling and Preventing Waste of Groundwater**

**Management Objective:** The District will inform District water users about efficient use of water and methods to prevent waste.

**Performance Standard:** The District’s website will be updated to include information on conservation methods.

**15.3. Controlling and Preventing Subsidence**

There is no known subsidence (as defined in Chapter 36 of the Texas Water Code) within the District caused by groundwater withdrawals, the geologic formation of the aquifers

within the District precludes significant subsidence from occurring due to groundwater pumping, and this management item is not applicable to the District's Management Plan.

#### **15.4. Addressing Conjunctive Surface Water Management Issues**

There are no known conjunctive surface water management issues within the District, and this management item is not applicable to the District's Management Plan.

#### **15.5. Addressing Natural Resource Issues**

**Management Objective:** Prevent contamination/pollution of the aquifers within the District.

**Performance Standard:** The District will continue to educate the public on contamination/pollution and monitor any reports of contamination with the TCEQ.

#### **15.6. Addressing Drought Conditions**

**Management Objective:** The annual amount of groundwater permitted by the District for withdrawal from the portion of the Capitan Reef, Edwards-Trinity, Igneous, Marathon, and Santa Elena Aquifers located within the District may be curtailed during periods of extreme drought in the recharge zone of the aquifer or because of other conditions that cause significant declines in groundwater surface elevations. Such curtailment may be triggered by the District's Board based on the groundwater elevation measured in the District's monitoring well(s). The District will collect and review drought conditions on a quarterly basis.

**Performance Standard:** The District's annual report will include a report on the District's monitoring well groundwater elevation based on at least one measurement per year and a report on whether the permitted withdrawals were curtailed at any time during the year because of drought conditions.

#### **15.7. Addressing Conservation, Recharge Enhancement, Rainwater Harvesting, Precipitation Enhancement, and Brush Control**

**Management Objective:** The District shall promote the efficient use of conservation techniques.

**Performance Standard:** The District's website will be updated to include information on conservation methods.

**Management Objective:** The District shall work towards finding recharge zones and shall monitor groundwater elevation at a site with an existing well and with the well owner's permission.

**Performance Standard:** The District Manager shall report to the District's board of directors annually regarding the recharge zones and any data available.

**Management Objective:** The District shall promote rainwater harvesting, precipitation enhancement, and brush control.

**Performance Standard:** At the annual report the District shall include articles on rainwater harvesting and brush control on its website.

### **15.8. Modeled Available Groundwater and Desired Future Conditions**

**Management Objective:** The District shall adopt Desired Future Conditions values, based in part on the Modeled Available Groundwater calculated by the TWDB, in accordance with the requirements of Chapter 36 of the Texas Water Code and Title 31, Chapter 356, of the Texas Administrative Code.

**Performance Standard:** The District has participated in the GMA 4 meetings with a minimum of one meeting per year, and will continue to work with GMA 4 and the Texas Water Development Board to determine the amount of Modeled Available Groundwater and the Desired Future Conditions within the District.

## **16. Addressing Desired Future Conditions**

The GMA 4 Resolution 2010-01 set a Desired Future Condition for the Capitan Reef Aquifer of 0 ft, Edwards-Trinity Aquifer of 3 ft, Marathon Aquifer of 0 ft, and Igneous Aquifer of 10 ft of change in the average groundwater elevation at the end of the 50-year planning period in 2060. The following objectives and performance standards will be used to address the District's Desired Future Conditions.

**Objective:** The District will install a water level recorder in at least one monitoring well and manually measure water levels each year in at least one monitoring well within the District and will determine the average groundwater levels annually.

**Performance Standard:** The District's Annual Report will include the water level measurements taken each year for the purpose of measuring water levels to assess the District's progress towards achieving its DFCs.

**Objective:** The District will review and calculate its total amount of groundwater pumped within the District and assess whether the District is on target to meet the DFC submitted to the TWDB based on limiting annual groundwater pumped to the MAG values provided to the District by the TWDB.

**Performance Standard:** The District's Annual Report will include a discussion of the amount of water pumped each year within the District and will evaluate the District's progress in achieving the DFCs of the groundwater resources within the boundaries of the District and whether the District is on track to maintain the DFC estimates over the fifty year planning period.

#### **17. Evidence of Coordination with Surface Water Entity**

There are no surface water entities identified in the 2017 State Water Plan that are located within the District's boundaries.

#### **18. Sharing with Regional Water Planning Group**

Below is a copy of the transmittal letter for the copy of the plan that was hand delivered to the Chair of the Far West Regional Water Planning Group requesting the group's comments regarding this Management Plan.

#### **Copy of Transmittal Letter**

## 19. References

1957, Texas Board of Water Engineers, Bulletin 5712, R.T. Littleton and G.L. Audsley, Groundwater Geology of The Alpine Area, Brewster, Jeff Davis, And Presidio Counties, Texas,

1984 Logan, H.H., (1984), A groundwater recharge project associated with a flood protection plan in Brewster County, Texas, Master Thesis – Texas Christian University, 110 pg. (as cited in Ashworth, 1995).

2004, Texas Water Development Board GAM Report, Beach, J. A., Ashworth, J. B., Finch, Jr., S. T., Chastain-Howley, A., Calhoun, K., Urbanczyk, K. M., Sharp, J. M., and Olson, J., 2004, Groundwater availability model for the Igneous and parts of the West Texas Bolsons (Wild Horse Flat, Michigan Flat, Ryan Flat and Lobo Flat)

2001 Mace, Robert, et al (2001), Aquifers of West Texas, Texas Water Development Board Report No. 356, Austin, Texas, pg.135-152.

2007, LBG Guyton, Well Field Evaluation, City of Alpine, Texas, Phase II Report

2016, Texas Water Development Board, Far West Texas Water Plan.

2017, City of Alpine, Code of Ordinances Chapter 66 Natural Resources.

2017, AW Blair Engineering, Estimate of Agricultural Irrigation Water Use in Brewster County, Texas 2015 Using LANDSAT 8 NDVI Images.

2018, Texas Water Development Board, GAM Run 16-030 MAG: Modeled Available Groundwater for The Aquifers in Groundwater Management Area 4.

2018, AW Blair, Technical Review of Application to Brewster County Groundwater Conservation District for a Groundwater Production Permit GPP-004 in the Northeastern Area of Alpine Plain, Brewster County, Texas

2019, TWDB, GAM Run 19-0 08: Brewster County Groundwater Conservation District Groundwater Management Plan

## **Appendix A – TWDB GAM Run 16-030 MAG**

**Appendix B – Copy of Resolution Adopting Management Plan**

**Resolution of the  
Brewster County Groundwater Conservation District  
(the District)**

Whereas, the District in accordance with Chapter 36 of the Texas Water Code has provided public notice of hearing regarding amendment and adoption of the District’s Groundwater Management Plan;

Whereas, the District has held three public meetings soliciting public comments regarding the proposed draft amended management plan and a quorum of the board was present for all hearings;

Whereas, copies of all written comments regarding the proposed management plan have been provided to each of the District’s Board Members;

Therefore, on the, the Board of Directors adopted the proposed management plan, as amended, and shall send a copy of the plan to the Texas Water Development Board for certification, to the Chair of the Far West Texas Water Planning Group, and to the general managers of each of the groundwater districts within Groundwater Management Area 4 of Texas.

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, President

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Attest: Grant , Secretary



**Appendix C – Notice of Hearing**

**PUBLIC NOTICE OF GROUNDWATER**

**MANAGEMENT PLAN FOR ADOPTION BY THE**

**Brewster County Groundwater Conservation District**

Brewster County Groundwater Conservation District (the District) is proposing to amend the District’s groundwater management plan. Copies of the proposed groundwater management plan are available for review at the District’s Office located at, Texas Monday through Thursday from 9:00 AM to 2:00 PM. To obtain a copy of the management plan or additional information please contact the District office by phone at, by US MAIL at P.O. Box, Texas or by e-mail at \_\_\_\_\_.

As an aid to the District’s Board, any person wishing to comment on the proposed groundwater management plan should give written notice of such comments to the District by. The District will conduct a hearing in and consider adoption of the proposed groundwater management plan at the District’s Board meeting that is scheduled for \_\_\_\_ at 1:00 PM at the District Office located at, Texas. Verbal comments regarding the proposed groundwater management plan will be accepted by the Board during the hearing.

\_\_\_\_\_  
Manager,

**APPENDIX C – Agenda for \_\_\_\_\_ Board Meeting and Hearing on  
Groundwater Management Plan**

**Appendix E - Minutes from \_\_\_\_\_ Hearing**

**Appendix F - Estimated Historical Groundwater Use and 2017 State Water Plan  
Datasets**