Groundwater Management Plan

Prepared for:

Middle Pecos
Groundwater Conservation District
Pecos County, Texas

Adopted October 19, 2010

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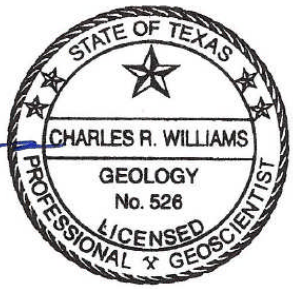

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Bar-W GROUNDWATER EXPLORATION

October 19, 2010

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District Mission

The Middle Pecos Groundwater Conservation District (the District) is committed to manage and protect the groundwater resources of The District. The District was created to help maintain a sustainable, adequate, reliable, cost effective and high quality source of groundwater to promote the vitality, economy and environment of the District. The District will work with and for the citizens of the District and cooperate with other local, regional and State agencies involved in the study and management of groundwater resources.

Purpose of Management Plan

In 1997 the 75th Texas Legislature established a statewide comprehensive regional water planning initiative with the enactment of Senate Bill 1 (SB1). Among the provisions of SB1 were amendments to Chapter 36 of the Texas Water Code requiring groundwater conservation districts to develop a groundwater management plan that shall be submitted to the Texas Water Development Board (TWDB) for approval. The groundwater management plan was specified to contain estimates on the availability of groundwater in the district, details of how the district would manage groundwater, and management goals for the district. In 2001 the 77th Texas Legislature further clarified the water planning and management provisions of SB1 with the enactment of Senate Bill 2 (SB2).

The requirements of the Chapter 36 Texas Water Code provisions for groundwater management plan development are specified in 31 Texas Administrative Code Chapter 356 of the TWDB Rules. This plan fulfills all requirements for groundwater management plans in SB1, SB2, Chapter 36 Texas Water Code, and TWDB rules.

Time Period of Management Plan

This plan shall be in effect for a period of five years from the date of approval by TWDB, unless a new or amended management plan is adopted by the District Board of Directors and approved by TWDB. The management plan will be readopted with or without changes by the District Board and submitted to TWDB for approval at least every five years.

Middle Pecos Groundwater Conservation District

The District was created in 1999. The creation of the District is recorded in Chapter 1331 of the Acts of the 76th Texas Legislature (SB 1911). This act enabled the District to function in a limited capacity until the creation of the District was fully validated in the 77th Legislature. The validation of the District is recorded in Chapter 1299 of the Acts of

the 77th Texas Legislature (HB 1258). The District was confirmed by local election held in Pecos County on November 5, 2002.
The District boundaries are coterminous with the boundaries of Pecos County, Texas. The District is bounded by Reeves, Ward, Crane, Crockett, Terrell, Brewster, and Jeff Davis counties. As of the plan date, groundwater conservation districts (GCDs) that bound the District are in Jeff Davis, Brewster, and Crockett Counties. The GCDs neighboring the District are: Brewster County GCD, Jeff Davis County Underground Water Conservation District (UWCD), and Crockett County GCD. Fig.1

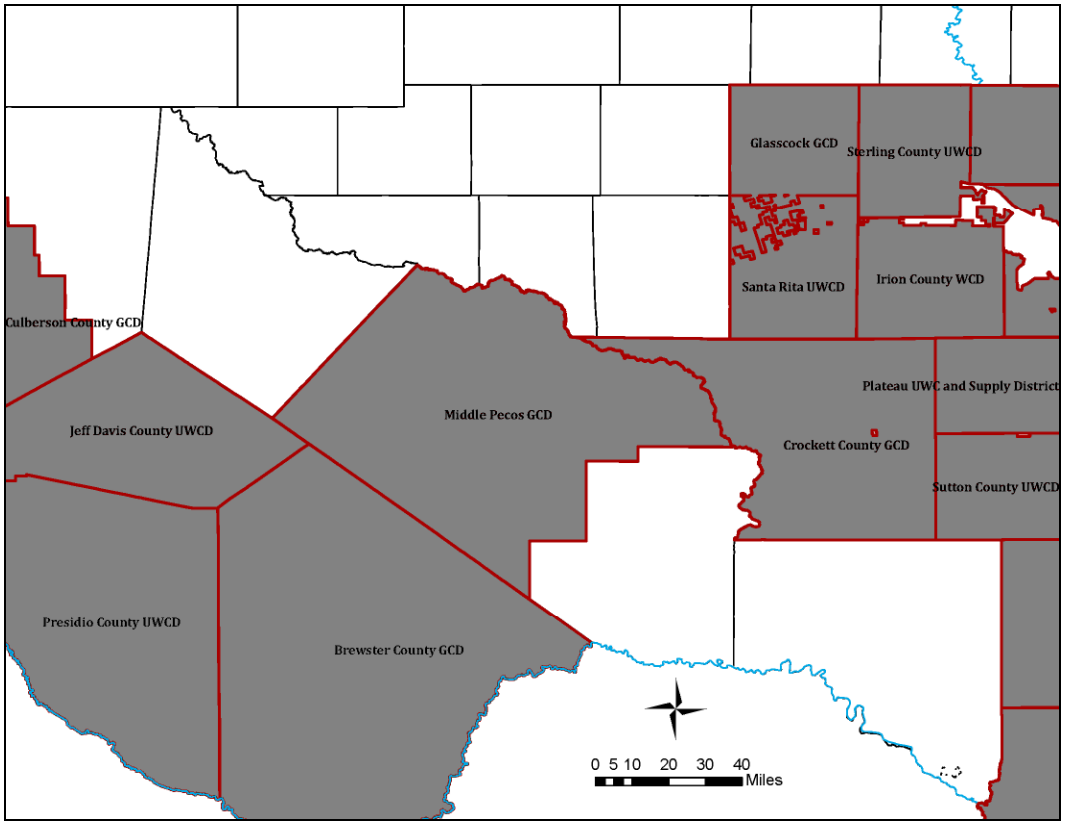

Figure1, Neighboring Districts to Middle Pecos Groundwater Conservation District

Most of the District is in Groundwater Management Area (GMA) 7, with the northern part of the District in GMA 3. Chapter 36 of the Texas Water Code authorizes the District to co-ordinate its management of groundwater with other GCDs in both GMA 7 and GMA 3. The District is currently the only GCD in GMA 3. The other GCDs that are located in GMA 7 are: Crockett County GCD, Santa Rita UWCD (Reagan), Irion County Water Conservation District (WCD), Glasscock GCD, Sterling County UWCD, Lone Wolf GCD (Mitchell), Wes-Tex GCD (Nolan), Coke County UWCD, Lipan-Kickapoo WCD (Tom Green, Concho, and Runnels), Hickory UWCD No. 1 (McCulloch, San Saba, and Mason), Menard County UWD, Hill Country UWCD (Gillespie), Kimble County GCD, Plateau Underground Water Conservation and Supply District (Schleicher), Sutton County UWCD, Real-Edwards Conservation and Reclamation District, Uvalde County UWCD, Edwards Aquifer Authority and Kinney County GCD. Fig. 2

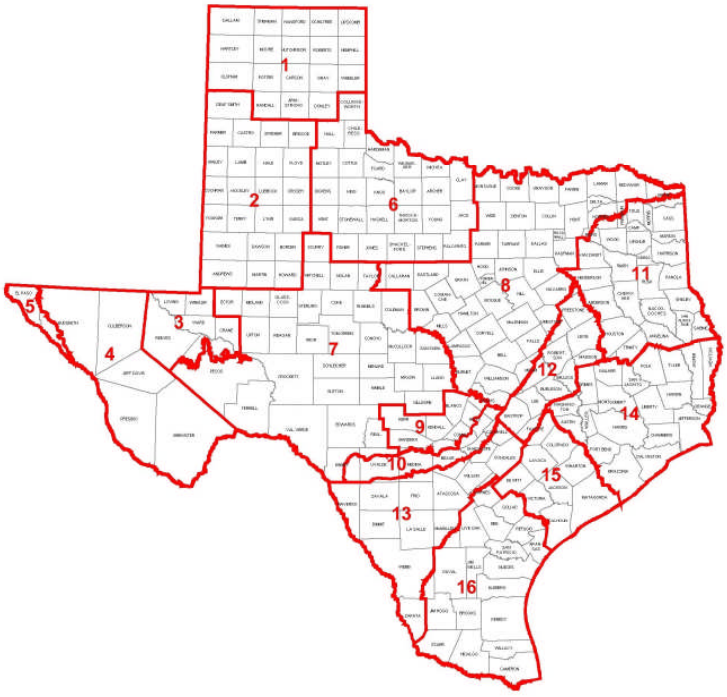

Figure 2, Groundwater Management Areas in Texas

The District Board of Directors is composed of eleven members elected to staggered four-year terms. Two directors are elected from each of the four county precincts, one director is elected at-large, one director is elected from the City of Iraan and one director is elected from the City of Fort Stockton. The Board of Directors holds regular meetings, at least quarterly. Meetings of the Board of Directors are public meetings noticed and held in accordance with public meeting requirements.

Authority of the District

The District derives its authority to manage groundwater use within the District by virtue of the powers granted and authorized in the District enabling act HB 1258 of the 77th Texas Legislature (Appendix A). The District, acting under authority of the enabling legislation, assumes all the rights and responsibilities of a groundwater conservation district specified in Chapter 36 of the Texas Water Code. The District has developed rules specifying the bounds of due process governing District actions. (Appendix C).

Groundwater Resources of the District

There are 5 sources of groundwater recognized by TWDB in the District. Two of these sources; the Edwards-Trinity (Plateau) aquifer and the Pecos Valley are classified as major aquifers by TWDB. (Fig. 3) The other three sources of groundwater; the Rustler Formation, the Dockum aquifer and the Capitan Reef Complex are classified as minor aquifers by TWDB. (Fig. 4)

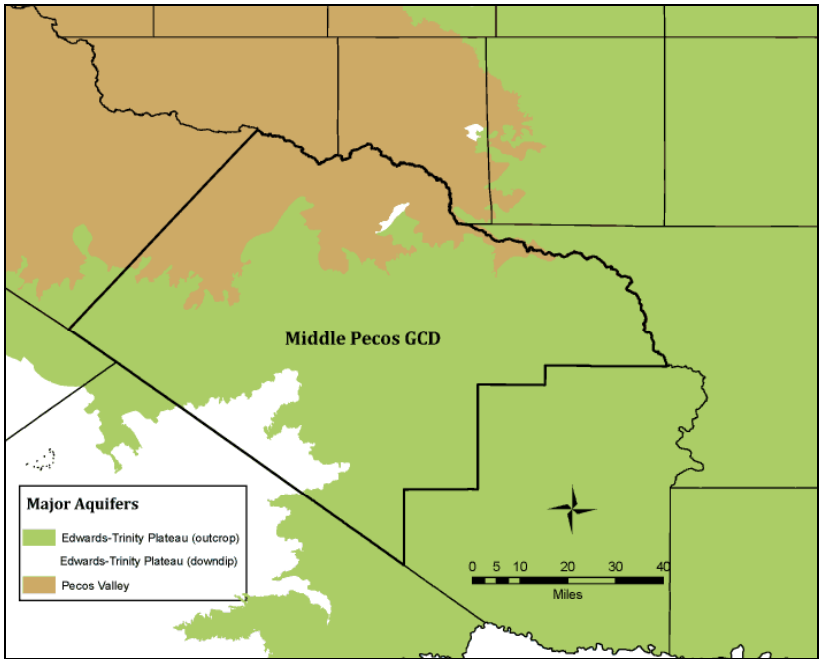

Figure 3, Major Aquifers in Middle Pecos GCD

A major aquifer is defined by TWDB as a source of groundwater that is capable of producing large quantities of groundwater or that produces groundwater over a large area. A minor aquifer is defined as an aquifer that produces small quantities of groundwater or produces groundwater in a limited area. The distinction of a source of groundwater as a major or minor aquifer may have no bearing on the importance of a source of groundwater to a particular locality.

The groundwater sources in the District may produce both fresh and moderately saline (brackish) water. The geologic origins of the groundwater sources of the District cover a broad range of geologic time. Listed in ascending order by geologic age, these sources and their ages are: Rustler Formation and Capitan Reef Complex (Permian), Dockum aquifer (Triassic), Edwards-Trinity (Plateau) aquifer (Cretaceous), and Pecos Valley (Cenozoic). The geologic age of the various sources of groundwater in the District and the geologic history of Pecos County have a bearing on the structure of the groundwater sources of the District and their relationships.

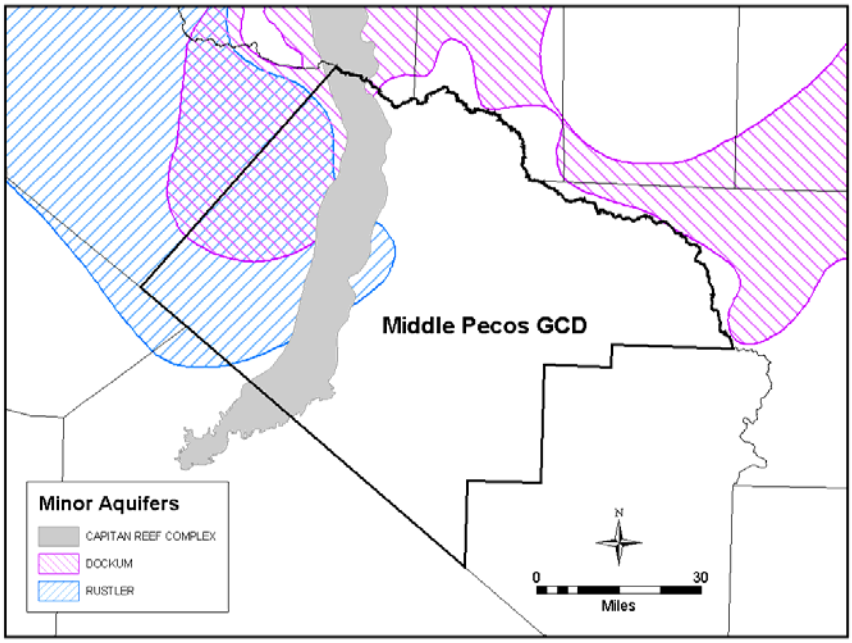

Figure 4, Minor Aquifers in Middle Pecos GCD

Aquifer Relationships in the Western Portion of the District

Parts of the District lie within the Delaware and Val Verde Basins. These basins were centers of sediment deposition at various times in geologic history. Near the end of Permian time, the seas of the Delaware Basin became shallow and restricted. This resulted in high evaporation rates of the sea water and allowed the deposition of very large amounts of evaporite minerals such as Halite (Sodium Chloride - NaCl), Anhydrite (Calcium Sulfate – $CaSO_4$) and Gypsum (Calcium Sulfate – $CaSO_4+H_2O$). (Rees and Buckner, 1980)

In Cretaceous time, seas again advanced and deposited significant amounts of additional sediment that covered the Permian evaporite mineral deposits. When the Cretaceous seas eventually withdrew, fresh groundwater percolated through the Permian evaporite deposits. The groundwater percolation dissolved much of the evaporite minerals beneath the overlying Cretaceous rocks taking away much of their support. The unsupported Cretaceous rocks subsided with extensive faulting and folding. (Fig. 5) The areas where the Cretaceous rocks subsided were filled with erosional material from the nearby volcanic activity associated with the formation of the Davis Mountains. (Rees and Buckner, 1980)

The western portion of the District lies within the Delaware Basin. In the area bounded generally by the Capitan Reef Complex, the Edwards-Trinity (Plateau) aquifer is covered and dissected by the Pecos Valley aquifer. In this area water is commingled between the two aquifers. The water quality in this area is affected mainly by sulfates from water

percolating upward from the Rustler aquifer. Water that is recharged by infiltration on the Rustler outcrops in highlands to the west of the District leeches anhydrite and gypsum as it moves down-gradient into the District. The faulted and collapsed condition of the rocks of the Edwards-Trinity (Plateau) aquifer allows the sulfate laden water to infiltrate relatively easily. In the portion of the District which lies outside of the Delaware Basin, the Edwards-Trinity (Plateau) aquifer is undisturbed. (Rees and Buckner, 1980) (Fig 5)

Aquifer Descriptions

Capitan Reef Aquifer – The Capitan Reef aquifer is a Permian age reef complex on the eastern and western margins of the Delaware Basin. Within the District the aquifer occurs as a generally north-south trending strip approximately 10 to 20 miles wide. This strip is part of a trend which runs from northern Brewster County to the New Mexico state line through Pecos, Ward and Winkler Counties. The aquifer is composed of various cavernous limestone formations that make up the reef complex. The Capitan Reef aquifer outcrops in the Glass Mountains but is deeply buried below the Edwards-Trinity (Plateau) aquifer in other parts of the District. The aquifer may be 1,500 to 2,000 feet thick and up to 3,600 feet deep. Water quality in the Capitan Reef aquifer may be fresh near the mountain outcrop areas but may be moderately saline in other areas. Because of the cavernous nature of the aquifer, well yields may be high with a generally high availability of groundwater. The Capitan Reef aquifer has been little studied in Texas. (Ashworth, 1990) (Guyton, 2003)

Rustler aquifer – The Rustler aquifer is made up of the Permian age Rustler Formation. The Rustler Formation is approximately 200 to 500 feet thick. It is mostly dolomite and anhydrite but has sand and conglomerate at its base and also contains some shale and limestone. From outcrops in Culberson County the Rustler aquifer dips into the subsurface to the east. It is deformed by folding and may not produce groundwater in all areas. The Rustler is recharged by runoff infiltration in the outcrop areas but age-dating of the water may indicate that more water is recharged by cross-formation flow than from infiltration. The water quality of the Rustler aquifer is moderately saline. Well yields may vary from low to high. The Rustler aquifer is relatively deeply buried in the District and contributes water to the Edwards-Trinity (Plateau) and Pecos Valley aquifers. The principal use of the Rustler aquifer is for irrigation and oil field uses. The Rustler aquifer is not well understood and has been little studied. (Guyton, 2003)

Dockum Aquifer – The Dockum aquifer is composed of the Triassic age formations of the Dockum Group; the Santa Rosa and Tecovas Formations within the District. The aquifer has upper and lower shale sections with a fine grained sand in the middle often referred to as the “Santa Rosa” sand. The Dockum aquifer occurs only under artesian conditions in a limited area of the north western part of the District. It receives recharge from infiltration of runoff in the outcrop areas but may only receive cross-formation recharge within the area of the District. In areas where the Dockum aquifer is hydraulically connected to the Pecos Valley aquifer, the two units have been referred to as the Allurosa aquifer. Water quality in the Dockum aquifer within the District is slightly (3,000 mg/l) to moderately (5,000 mg/l) saline with a generally low productivity of wells. (Rees and Buckner, 1980) (Ashworth, 1990) (Guyton, 2003)

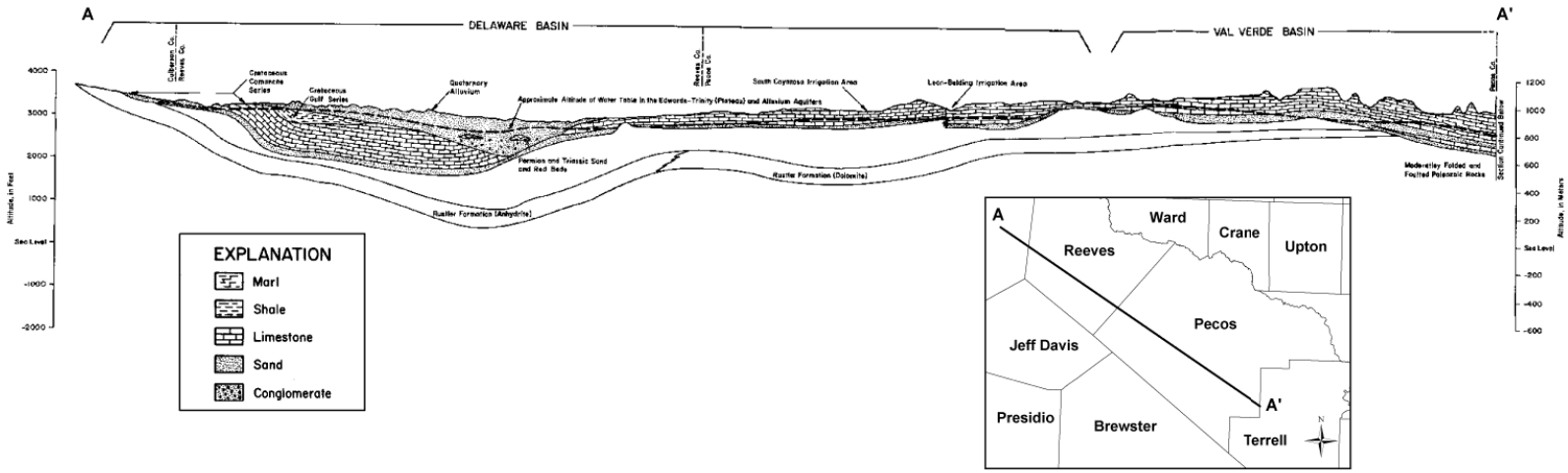

Figure 5, Geologic Cross Section of Reeves and Pecos Counties (Rees and Buckner, 1980)

Edwards-Trinity (Plateau) Aquifer – The Edwards-Trinity (Plateau) aquifer is of Cretaceous age and consists of the Edwards Group limestones and the sands and limestone of the Trinity Group. Within the District the Edwards Group is currently considered to consist of the Segovia and Fort Terrett Formations, but other terminology conventions may be applied to the Edwards Group. (BEG, 1975, 1981, 1982) The Trinity Group consists of the Maxon Sand, the Glen Rose Limestone and may include a basal conglomerate. (Rees and Buckner, 1980) The aquifer may be up to 1,200 feet in thickness and produces small to moderately large quantities of fresh to slightly saline (3,000 mg/l) water. The Edwards-Trinity (Plateau) aquifer is hydraulically connected to the Rustler and Pecos Valley aquifers in the western part of the District. (Ashworth, 1990)

Pecos Valley Aquifer – Consists of up to 1,500 feet of unconsolidated to partially consolidated sand, silt, clay and caliche. The alluvial fill material of the aquifer had two main deposition centers; the Pecos trough and the Monument Draw trough. The aquifer is a principal source of irrigation supply in the northern and western portions of the District. The water quality is fresh to moderately (5,000 mg/l) saline and well yields may be high. The Pecos Valley aquifer is hydraulically connected to the Rustler and Edwards-Trinity (Plateau) aquifers in the western part of the District. (Ashworth, 1990)

System	Geologic Unit	Hydrologic Unit
Quaternary	Alluvial Fill Material	Pecos Valley aquifer
Cretaceous	Edwards Group	Edwards-Trinity (Plateau) aquifer
	Trinity Group	
Triassic	Santa Rosa and Tecovas Formations (may be undifferentiated)	Dockum aquifer
Permian	Rustler Formation	Rustler aquifer
	Capitan Reef Complex	Capitan Reef aquifer

Figure 6, Water-bearing Geologic and Hydrologic Units of Pecos County, Modified from Rees and Buckner, 1980; Ashworth, 1990

Geomorphology of the District

The topography of the District ranges from nearly level to gently undulating in the northern half and hilly to mountainous in the southern half. The eastern and central portions of the District are on the edge of the Edwards Plateau and are marked by mesas of varying sizes with intervening arroyos. Hills become more rounded and valleys more pronounced with generally undulating terrain further west. The northern part of the District slopes generally toward the Pecos River. Elevation ranges from about 2,200 feet above mean sea level (amsl) near the Pecos River to about 5,200 feet amsl in the mountains. All drainages flow to the Pecos River. The Pecos River flows continuously, but other streams in the county flow only after infrequent torrential rains. Springs were at one time an important water source for the area, but many no longer flow. (Rives 1980 and TSHA 2002)

Managed Available Groundwater in the District

Managed available groundwater is defined in TWC §36.001 as "the amount of water that may be permitted by a district for beneficial use in accordance with the desired future condition of the aquifer." The desired future condition of the aquifer may only be determined through joint planning with other groundwater conservation districts (GCDs) in the groundwater management area (GMA) or GMAs in which the District is located as required in TWC §36.108. The District is located in GMAs 3 and 7. The GCDs of GMAs 3 and 7 have completed the joint planning process and adopted desired future condition for the following aquifers in Pecos County:

GMA-3

- Edwards-Trinity(Plateau)/Pecos Valley aquifers
- Dockum aquifer
- Capitan Reef aquifer
- Rustler aquifer

GMA-7

- Edwards-Trinity(Plateau)/Pecos Valley aquifers
- Capitan Reef aquifer
- Rustler aquifer
- Lower Dockum aquifer

While GMAs 3 and 7 have completed the joint planning process, the District is unable to present a final value for the managed available groundwater in the aquifers of Pecos County as of the date of this plan, because TWDB has not yet provided the final values. The desired future conditions of aquifers as adopted by GMAs 3 and 7 are given below. The estimates of groundwater availability the District developed for use in the GMA-3 and GMA-7 processes are presented below for each aquifer in the District. TWDB does not allow the District to refer to this information as the "managed available groundwater" of the aquifer.

For the purposes of managing groundwater within the boundaries of the District and pursuant to Chapter 36 of the Texas Water Code, the District used the desired future conditions of the aquifers as a benchmark to estimate groundwater availability in the aquifers of the District (in lieu of the official managed available groundwater values from TWDB which are not available as of the date of this plan). The desired future conditions were identified through the GMA process and deliberations by GMAs 3 and 7. The District identified the amount of groundwater use sustainable under the adopted desired future conditions for the aquifers through participation in GMAs 3 and 7 for use in the District's management plan until the managed available groundwater values for the aquifers are provided by TWDB. The District's estimates of groundwater availability for the Edwards-Trinity (Plateau), Pecos Valley and Dockum aquifers were developed using the TWDB groundwater availability models (GAMs) for those aquifers. The District used other calculations to estimate groundwater availability under the adopted desired future conditions for the Capitan Reef aquifer and the Rustler aquifer.

Edwards-Trinity (Plateau)and Pecos Valley Aquifers

To assess groundwater availability, the District participated in the GMA 3 and 7 requests that TWDB perform a series of simulations using the most recent 1-layer version of the TWDB Groundwater Availability Model (GAM) for the Edwards-Trinity (Plateau) aquifer and Pecos Valley aquifer. The series of GAM simulations iteratively applied varying amounts of groundwater pumping from the aquifer over a predictive period. Pumping was varied, until the amount of pumping that could be sustained by the aquifer without exceeding the desired future conditions was identified.

a. Desired Future Conditions

The desired future conditions for the Edwards-Trinity (Plateau) and Pecos Valley aquifers of Pecos County, as follows:

GMA 7 – Indexed to 2010 conditions, the combined aquifer draw down over 50 years should not exceed 11 feet when averaged over the entire portion of Pecos County where the Edwards-Trinity (Plateau) and Pecos Valley aquifers occur within GMA 7 and 7 feet when averaged over the areas where the aquifers occur in GMA-7 overall.

GMA 3 – Indexed to 2010 conditions, the combined aquifer draw down over 50 years should not exceed 12 feet when averaged over the entire portion of Pecos County where the Edwards-Trinity (Plateau) and Pecos Valley aquifers occur within GMA-3 and 28 feet when averaged over the areas where the aquifers occur in GMA-3 overall.

The District estimates of the selected management conditions related to draw down in the Edwards-Trinity and Pecos Valley Aquifers are based on GAM-run 09-35 of version 3 (single-layer model):

- Scenario 10 for GMA-7 (results presented by TWDB July 29, 2010)
- Scenario 11 for GMA-3 (results presented by TWDB August 9, 2010)

b. Groundwater Availability*

The estimated total groundwater availability for the Edwards-Trinity (Plateau) and Pecos Valley aquifers in MPGCD is 240,000 acre-feet per year which is based on the amounts of groundwater that could be pumped while maintaining the selected management conditions in each aquifer management zone discussed above. In determining the volume of water available for permitting, a total of 2,000 acre-feet per year is allocated for exempt well users. This leaves a total of **238,000 acre-feet per year as the groundwater available for permitting for the Edwards-Trinity (Plateau) and Pecos Valley aquifers.** The groundwater availability in GMAs 3 and 7 is given below:

GMA-7 Portion of Pecos County:

- 122,000 acre-feet per year

GMA-3 Portion of Pecos County:

- 118,000 acre-feet per year

*: The District estimates of groundwater availability in the Edwards-Trinity (Plateau) and Pecos Valley Aquifers are based on TWDB spatial distribution of simulated pumping in GAM-run 09-35 of version 3 (single-layer model):

- Scenario 10 for GMA-7 (results presented by TWDB July 29, 2010)
- Scenario 11 for GMA-3 (results presented by TWDB August 9, 2010)

However, all presented values are approximate, as of the date of this Plan; TWDB has not provided the District with the Managed Available Groundwater values for GMAs 3 and 7, as simulated in the above referenced GAM-run scenarios.

C. Management Zones for the Edwards-Trinity (Plateau) and Pecos Valley Aquifers

The District may establish groundwater management zones in the principal areas of irrigation (or other groundwater demand) and pertinent surrounding areas of Pecos County, as described below:

1) The Leon-Belding Irrigation Area and the vicinity of the City of Fort Stockton to include the outlets of Comanche Springs. The area is generally bounded by the TWDB Edwards-Trinity (Plateau) / Pecos Valley Aquifer GAM-Grid cells that contain the following sets of latitude and longitude coordinates: (30.90321 N, -102.8566 W); (30.85306 N, -102.8928 W); (30.69796 N, -103.15137 W). The specific GAM-grid cells composing the management zone are given in Appendix G.
2) The Bakersfield Irrigation Area. The area is generally bounded by the TWDB Edwards-Trinity (Plateau) / Pecos Valley Aquifer GAM-Grid cells that contain the following sets of latitude and longitude coordinates (except where cells are truncated by intersection with the Pecos County-line): (31.05667 N, -102.3717 W); (30.8992 N, -102.28911 W); (30.95167 N, -102.1653 W); (30.96833 N, -102.2169 W). The specific GAM-grid cells used to compose the management zone are given in Appendix G.
3) The Coyanosa Irrigation Area. The area is generally bounded by the TWDB Edwards-Trinity (Plateau) / Pecos Valley Aquifer GAM-Grid cells that contain the following sets of latitude and longitude coordinates (except where cells are truncated by intersection with the Pecos County-line): (31.1805 N, 103.0202 W); (31.3169 N, 103.0511 W); (31.2097 N, 103.0026 W); (31.1105 N, 102.9924 W); (31.1025 N, 103.1022 W); (31.1834 N, 103.1347 W). The specific GAM-grid cells used to compose the management zone are given in Appendix G.

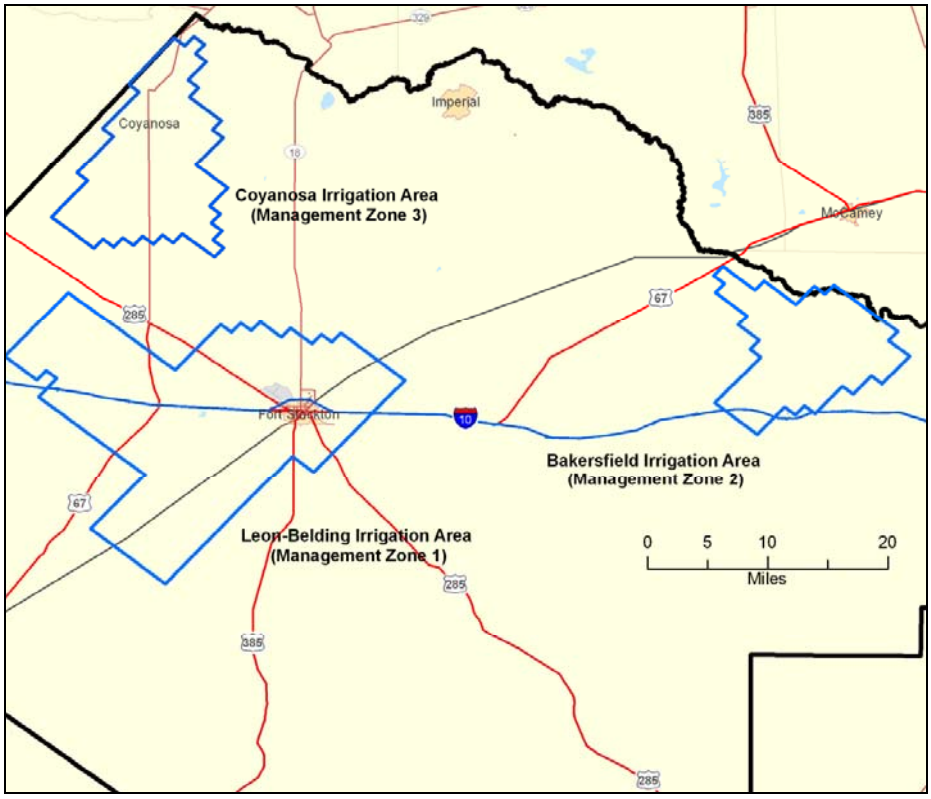

Figure 7, Groundwater Management Zones in MPGCD

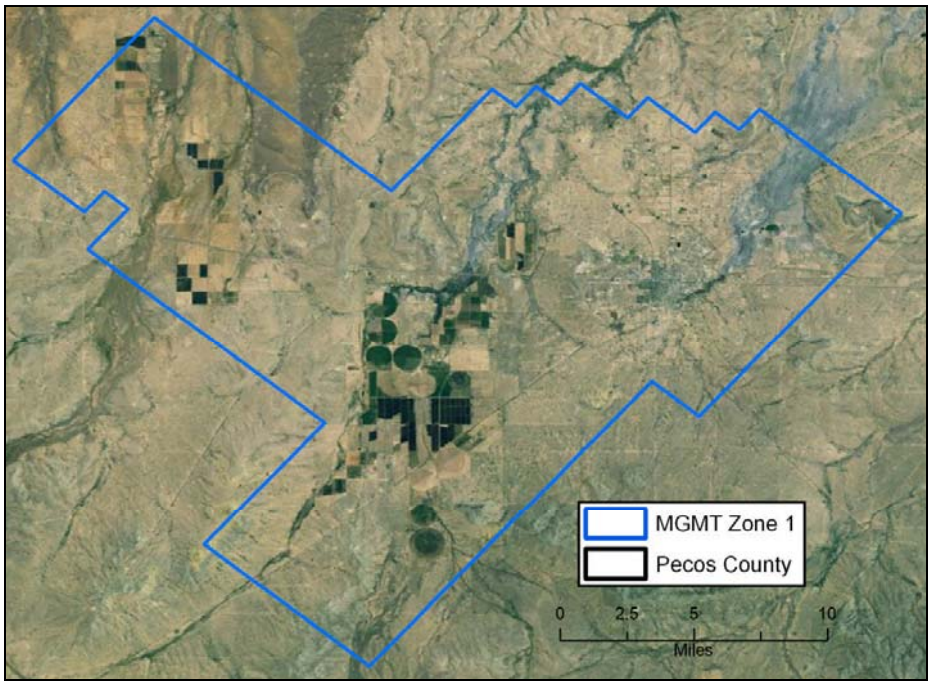

Figure 8, Groundwater Management Zone 1 in MPGCD

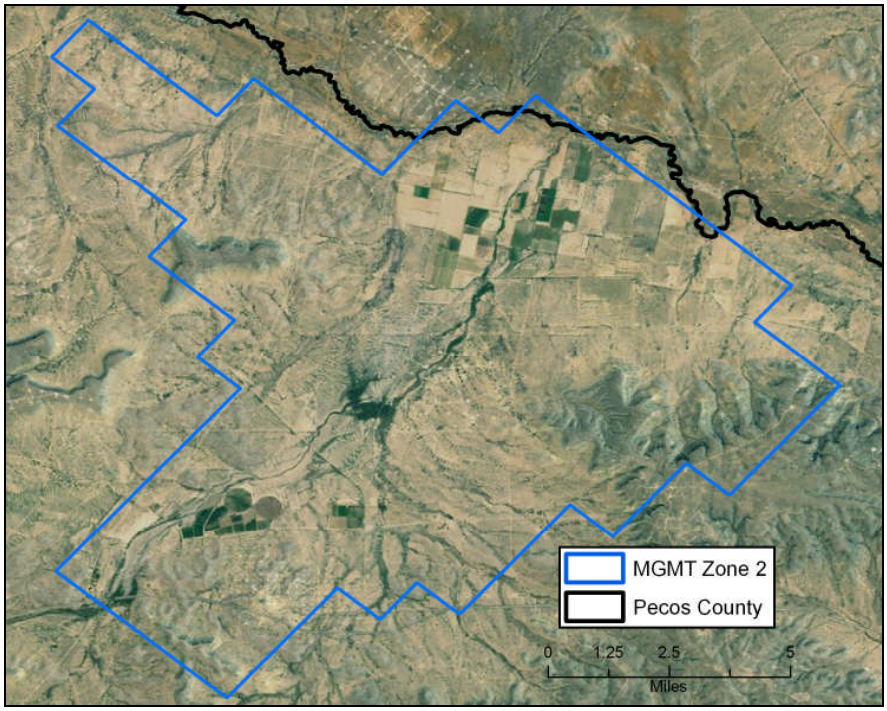

Figure 9, Groundwater Management Zone 2 in MPGCD

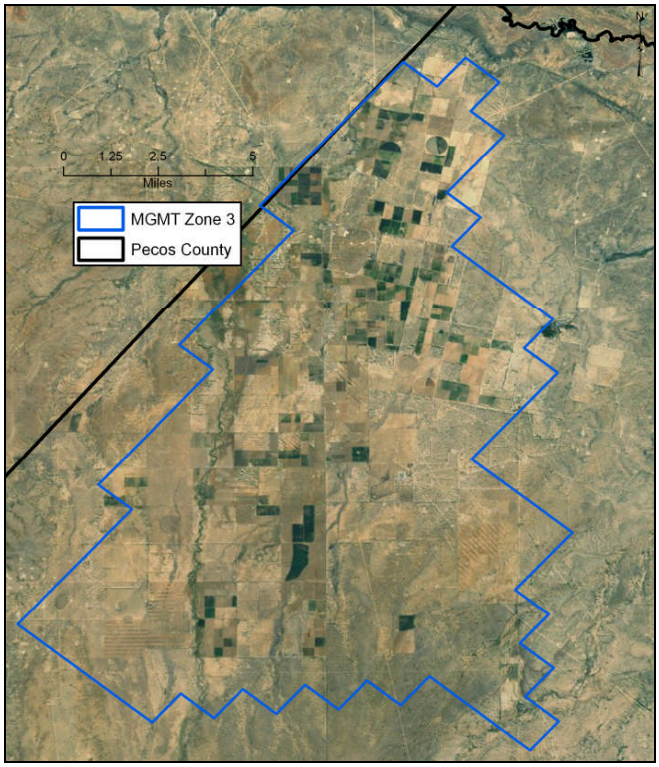

Figure 10, Groundwater Management Zone 3 in MPGCD

The District recognizes that groundwater use in the areas of principal groundwater demand in the District has the potential to result in localized aquifer draw down sufficient to possibly impair the DFCs of the aquifer in District as a whole (within each GMA). In each Management Zone described about a center of groundwater demand, the District seeks to avoid impairment of the adopted DFCs for the District as a whole (within the portions of the District in each of GMAs 3 and 7) by establishing benchmarks of sustainable groundwater use over time in the District Rules. The benchmarks of sustainable groundwater use over time established in the District Rules for each groundwater management zone may be based on the rates of change and the amounts of average aquifer draw-down described by the results of Scenario 10 of GAM-run 09-35 of version 3 (single-layer model) for the GMA-7 portion of MPGCD and Scenario 11 for the GMA 3 portion of MPGCD or other information such as water-level data. The assessment of the change in average draw-down values over time will be indexed to year 2010 water levels to be consistent with the adopted DFCs of the Edwards-Trinity (Plateau) and Pecos Valley aquifers. By managing the change in aquifer water levels over time in the management zones, the District can provide for the sustainability of the aquifers and avoid impairment of the aquifer DFCs established by the GMAs.

Capitan Reef Aquifer

As of the date of this plan; a TWDB GAM for the Capitan Reef Aquifer has not been released. To assess groundwater availability, a spreadsheet model was developed. The model uses estimates of: the area of the aquifer recharge (unconfined) and the artesian (confined) zones; the annual amount of aquifer use (pumping, where pumping is assumed to be approximately equal to recharge); and the coefficient of storage of the aquifer in the confined and unconfined zones to predict the annual volume of water that could be produced from the aquifer and result in a specified amount of aquifer draw-down after 50 years. Predictions are made for the unconfined and confined zones of the aquifer within MPGCD. Predictions of the estimated annual amount of groundwater that could be produced in the unconfined zone and confined zone of the aquifer are summed for presentation. Aquifer-zone area estimates in Pecos County are from the TWDB GIS shape-files for the Capitan Reef aquifer. Estimates of the annual aquifer use are from estimates developed by MPGCD. The coefficients of storage values are reasonable estimates. Pumping was increased, until the amount of pumping that could be sustained by the aquifer without exceeding the selected management conditions. Details of the groundwater availability estimates for the Capitan Reef aquifer are given in Appendix F.

a. Desired Future Conditions

The Desired Future Condition describes the maintenance of the water levels expressed as an average draw down value for each aquifer zone where they occur in MPGCD over a 50-year horizon (2010-2060) at or above the levels specified below. *The desired future conditions are intended to define sustainable use by establishing management goals for each aquifer.* The District applied the spreadsheet models in 2010. The average draw-down values are indexed to year 2010 water levels. By maintaining the aquifer water levels the District can provide for the sustainability of the aquifer. The following 50-year

criteria (rounded to the nearest foot) were applied to the individual aquifer zones in each county to assess the amounts of sustainable use:

Unconfined Zone (GMA 7):

- Approximately 15 feet average draw down across the area of occurrence of the aquifer zone over 50-years

Confined Zone (GMA 3 and GMA 7):

- Approximately 200 feet average draw down across the area of occurrence of the aquifer zone over 50-years

b. Groundwater Availability*

The estimated total groundwater availability for the Capitan Reef aquifer in MPGCD is 11,122 acre-feet per year which is based on the amounts of groundwater that could be pumped while maintaining the selected management conditions in the aquifer subdivisions discussed above. In determining the volume of water available for permitting, 100 acre-feet per year is allocated for exempt well users. This leaves **11,022 acre-feet per year as the groundwater available for permitting for the Capitan Reef aquifer**.

A summary is given by GMA and aquifer zone below:

Unconfined Zone:

- 1,287 acre-feet per year (80 acre-feet per year reserved for exempt use)

Confined Zone in GMA 3:

- 1,361 acre-feet per year (10 acre-feet per year reserved for exempt use)

Confined Zone in GMA 7:

- 8,474 acre-feet per year (10 acre-feet per year reserved for exempt use)

*: The District estimates of groundwater availability related to draw down in the Capitan Reef Aquifer are based on the 2-D model. However, as of the date of this Plan, TWDB has not provided the District with the Managed Available Groundwater values for the aquifer in GMAs 3 and 7.

Rustler Aquifer

As of the date of this plan; a TWDB GAM for the Rustler Aquifer has not been released. To assess groundwater availability, a spreadsheet model was developed. The model uses estimates of the area of the artesian (confined) zone in MPGCD; the annual amount of aquifer use (pumping, where pumping is assumed to be approximately equal to aquifer inflow); and the coefficient of storage of the aquifer in the confined zone to predict the annual volume of water that could be produced from the aquifer and result in a specified amount of aquifer draw-down after 50 years. Predictions are made for the confined zone of the aquifer within MPGCD. The predictions of the estimated annual amount of

groundwater that could be produced in the confined zone of the aquifer are summed for presentation. Aquifer-zone area estimates in Pecos County are from the TWDB GIS shape-files for the Rustler aquifer. Estimates of the annual aquifer use are from estimates developed by MPGCD. The coefficients of storage values are reasonable estimates. Pumping was increased, until the amount of pumping that could be sustained by the aquifer without exceeding the selected management conditions. Details of the estimates of groundwater availability for the Rustler aquifer are given in Appendix F.

a. Desired Future Conditions

The Desired Future Condition describes the maintenance of the water levels expressed as an average draw down value for each section of aquifer where they occur in MPGCD over a 50-year horizon (2010-2060) at or above the levels specified below. *The desired future conditions are intended to define sustainable use by establishing management goals for each aquifer.* The District applied the spreadsheet models in 2010. The average draw-down values are indexed to year 2010 water levels. By maintaining the aquifer water levels the District can provide for the sustainability of the aquifer. The following 50-year criteria (rounded to the nearest foot) were applied to the individual aquifer zones in each county to assess the amounts of sustainable use:

Confined Zone in GMA 3 and GMA 7:

- Approximately 300 feet average draw down across the area of occurrence of the aquifer zone over 50-years

b. Groundwater Availability*

The estimated total groundwater availability for the Rustler aquifer in MPGCD is 10,508 acre-feet per year which is based on the amounts of groundwater that could be pumped while maintaining the selected management conditions in the aquifer subdivisions discussed above. In determining the volume of water available for permitting, 100 acre-feet per year is allocated for exempt well users. This leaves **10,408 acre-feet per year as the groundwater available for permitting for the Rustler aquifer**.

A summary is given by GMA and aquifer zone below:

Confined Zone in GMA 3:

- 3,466 acre-feet per year (50 acre-feet per year reserved for exempt use)

Confined Zone in GMA 7:

- 7,042 acre-feet per year (50 acre-feet per year reserved for exempt use)

*: The District estimates of groundwater availability related to draw down in the Rustler Aquifer are based on the 2-D model. However, as of the date of this Plan, TWDB has not provided the District with the Managed Available Groundwater values for the aquifer in GMAs 3 and 7.

Dockum Aquifer

To assess groundwater availability, the District requested through GMAs-3 and 7 that TWDB perform a series of simulations using the TWDB's Groundwater Availability Model (GAM) for the Dockum aquifer. The series of GAM simulations iteratively applied varying amounts of groundwater pumping from the aquifer over a predictive period. Pumping was varied, until the amount of pumping that could be sustained by the aquifer without exceeding the selected management conditions was identified.

a. Desired Future Conditions

The Desired Future Condition describes the maintenance of the water levels expressed as an average draw down value for the aquifer where it occurs in MPGCD over a 50-year horizon (2010-2060) at or above the levels specified below. *The selected management conditions are intended to define sustainable use by establishing management goals for each aquifer.* The average draw-down values are indexed to year 2010 water levels. By maintaining the aquifer water levels the District can provide for the sustainability of the aquifer. The following 50-year criteria (rounded to the nearest foot) were applied to the individual aquifer zones in each county to assess the amounts of sustainable use:

Confined Zone in GMA 3:

- Approximately 47 feet average draw down across the area of occurrence of the aquifer zone over 50-years

Confined Zone in GMA 7:

- Draw down is not to exceed approximately 4 feet on average across the area of occurrence of the aquifer zone by year 2060

b. Groundwater Availability*

The estimated total groundwater availability for the Dockum aquifer in MPGCD is 18,000 acre-feet per year which is based on the amounts of groundwater that could be pumped while maintaining the selected management conditions in the aquifer discussed above. In determining the volume of water available for permitting, 100 acre-feet per year is allocated for exempt well users. This leaves **17,900 acre-feet per year as the groundwater available for permitting for the Dockum aquifer**.

A summary is given below:

GMAs 3 and 7:

- 18,000 acre-feet per year (100 acre-feet per year reserved for exempt use)

*: The District estimates of groundwater availability related to draw down in the Dockum Aquifer are based on the revised Base Condition scenario of GAM-Task 10-025, 2010 (presented August 9, 2010). However, as of the date of this Plan, TWDB has not provided the District with the Managed Available Groundwater values for the aquifer in GMA 3 or a specific distribution of pumping between GMAs 3 and 7 as simulated in the above referenced GAM-run scenario.

Estimate of the Annual Amount of Groundwater Use in the District

To estimate the annual amount of groundwater being used in the District, the District has relied on the TWDB Annual Water use Survey Data. In past years responses to the TWDB survey was voluntary. As a result, the TWDB water use survey data is subject to variations in the completeness or accuracy of the data. The estimate of the amount of groundwater being used in the District on an annual basis is 43,378 acre-feet per year. The estimate is from the TWDB Annual Water Use Survey for the Year 2003 which is the most recent data available. TWDB data on estimated groundwater use is available from 1980 to 2003, excepting 1981 to 1983 when no data was collected. Details of the estimate of the total amount of groundwater use are presented in Appendix D.

In addition to presentation of the TWDB Annual Water use Survey Data, MPGCD assisted TWDB in developing estimates of the use of groundwater for agricultural and related irrigation. MPGCD reviewed the TWDB irrigation use estimates and provided corrections or additions to the TWDB estimates based on site-specific data developed by the District. The 2009 estimated total groundwater use for irrigation is approximately 115,650 acre-feet per year. Details of the estimate of the 2009 total irrigation use of groundwater use are presented in Appendix D.

Estimate of the Annual Amount of Natural or Artificial Recharge to the Groundwater Resources within the District

The estimated annual amount of recharge to the groundwater resources of the District is 115,484 acre-feet per year. This estimate is based in part on data from Table 3-1 on page 3-5 of the Region F Regional Water Plan text and gives recharge estimates for the Pecos Valley, Edwards-Trinity (Plateau) and Dockum aquifers in the District. The estimates of annual recharge for the Capitan Reef and Rustler aquifers were developed by the District.

In the TWDB rules concerning groundwater management plans, recharge is defined as "The addition of water from precipitation or runoff by seepage or infiltration to an aquifer from the land surface, streams, or lakes directly into a formation or indirectly by way of leakage from another formation." This definition precludes the inclusion of down-gradient movement of water in an aquifer in the estimate of recharge. Neither the Rustler aquifer nor the Dockum aquifer has an outcrop within the District and cannot receive recharge by infiltration. As of the date of this plan the District has not located an estimate or an estimated rate of inter-formation leakage that recharges these aquifers.

Aquifer	Annual Recharge
Capitan Reef	824
Pecos Valley	14,115
Dockum	0
Edwards-Trinity (Plateau)	140,509
Rustler	0

Table 1, Annual Recharge Estimates for Pecos County in Acre-feet per Year

Estimates of Annual Recharge to the Edwards-Trinity, Pecos Valley and Dockum Aquifers are from TWDB GR08-75. Estimates of Annual Recharge to the Capitan Reef and Rustler Aquifers are from MPGCD calculations.

As of the date of this plan, no published estimates on the annual amount of recharge or estimates of the rate of infiltration for recharge of the Capitan Reef aquifer have been identified. Published estimates on the rate of recharge infiltration for portions of the Edwards-Trinity (Plateau) aquifer near the outcrop of the Capitan Reef aquifer may be applicable. Published estimates recharge rates for the Edwards-Trinity Plateau aquifer are available for Pecos County, Anaya 2002, and Crockett County, Inglehart 1967. The range of these estimates is 4 percent of annual precipitation for Pecos County to 1.6 percent for Crockett County. Because the actual rate of infiltration recharge for the Capitan Reef aquifer is unknown the District has chosen to use a mid-range assumptive rate of 2.8 percent of annual precipitation.

The Capitan Reef aquifer has an estimated area of outcrop within the District of 22,279 acres. The assumed rate of infiltration of 2.8 percent of annual precipitation was applied to the average annual precipitation for this area of the District (16 inches per year). (USDA-NRCS, 1999) The District estimates the annual recharge to the Capitan Reef aquifer to be 824 ac-ft per year. The details of the District calculation of the estimated recharge to the Capitan Reef aquifer are included in Appendix E.

How the Natural or Artificial Recharge in the District May be Increased

The natural or artificial recharge in the District might be increased by the construction of small retention structures on ephemeral streams to impound storm-water run-off.

Estimates of the Annual Volume of Water Discharging from Aquifers to Springs and Other Surface Water in the District

Estimated Annual Discharge of Groundwater to Surface	
Aquifer	**Discharge in Acre-Feet per Year**
Edwards-Trinity (Plateau)	**31,222**
Pecos Valley	**9,804**
Dockum	**0**

Table 2, Estimated Discharge of Aquifers to Surface Water Systems in the District
Note: surface water systems may include springs and any surface water body including lakes, streams and rivers
Source of Estimates: TWDB GAM Run 08-75

Estimates of the Annual Volume of Flow Into and Out of the District Within Each Aquifer and Between Aquifers in the District, if a Groundwater Availability Model is Available

Groundwater Movement	Aquifer	Flow in Acre-Feet per Year
Estimated Annual Flow into the District Within Each Aquifer	Edwards-Trinity (Plateau)	32,993
	Pecos Valley	3,441
	Dockum	554
Estimated Annual Flow out of the District Within Each Aquifer	Edwards-Trinity (Plateau)	74,562
	Pecos Valley	4,538
	Dockum	302
Estimated Net Annual Flow Between Aquifers	Edwards-Trinity to Pecos Valley	8,891
	Overlying Units to Dockum	582

Table 3, Estimated Flow Into, Out of and Between Aquifers in the District
Source of Estimates: TWDB GAM Run 08-75

Estimate of the Projected Total Water Demand within the District

Estimates of projected water demand are based on anticipated patterns of population growth and migration that are applied to standardized estimated water use rates for the recognized categories of water use. Estimates of projected annual total water demand represent a need for water that may ultimately be met by a supply of surface water or groundwater. The estimation of projected total water demand is the first step in determining the adequacy of a regional system of water supply. The estimate of projected total water demand within the District in the year 2010 is 85,897 acre-feet.

WUG	2010	2020	2030	2040	2050	2060
County-Other	702	722	731	730	726	712
Fort Stockton	3,267	3,397	3,461	3,481	3,479	3,411
Iraan	452	469	478	480	479	470
Irrigation	79,681	78,436	77,191	75,945	74,700	73,475
Livestock	1,239	1,239	1,239	1,239	1,239	1,239
Manufacturing	2	2	2	2	2	2
Mining	159	158	158	158	158	158
Pecos County WCID #1	395	403	401	399	395	387
Projected Demand in acre-feet/year =	**85,897**	**84,826**	**83,661**	**82,434**	**81,178**	**79,854**

Table 4, Estimates of Projected Water Demands in Pecos County
The source of these estimates is Volume 3 of the 2007 State Water Planning Database.

Estimate of Projected Surface Water Supplies

Estimates of projected surface water supplies represent the estimated capacity of surface water supply systems to deliver water to meet user needs on an annual basis. Generally, estimates of projected water supplies are compared with estimates of projected demand to determine if the existing infrastructure is capable of meeting the expected needs of a water user group. The annual water delivery capacity of different water systems in different areas may not be estimated by the same methods. The estimate of projected surface water supplies in the District for the year 2010 is 6,054 acre-feet.

The projected surface water supplies of a water user group may significantly exceed the amount of water actually used by the user because the user groups have additional or redundant capacity. This is particularly true of municipal water user groups where redundant capacity is built in to the system to insure a constant supply of water.

Pecos County Projected Surface Water Supplies in Acre-Feet per Year							
WUG	**Source**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Irrigation	Pecos River (run-of-river)	4,444	4,444	4,444	4,444	4,444	4,444
Irrigation	Red Bluff Reservoir	1,558	1,558	1,558	1,558	1,558	1,558
Livestock	Local Supply	52	52	52	52	52	52
Total Surface Water Supplies =		6,054	6,054	6,054	6,054	6,054	6,054

Table 5, Estimates of Projected Surface Water Supplies in Pecos County
The source of these estimates is Volume 3 of the 2007 State Water Planning Database.

Identified Water Needs of Water User Groups

Estimates of identified water needs for water represent the projected shortages of water for water user groups beyond the existing water supplies of the water user groups. Where water needs are identified for a water user group; a water management strategy must be developed by the Regional Water Planning Group in which the water user group is located that will result in sufficient additional water supplies to meet the identified needs. The estimates of identified water needs are from Volume 3 of the 2007 State Water Planning Database.

Identified Water Surplus or Deficits (Need) – Needs Shown as Negative (-) Values						
WUG	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
County Other	0	0	0	0	0	0
Fort Stockton	2,646	2,516	2,452	2,432	2,434	2,502
Iraan	115	98	89	87	88	97
Irrigation	2,902	4,147	5,392	6,638	7,883	9,108
Livestock	1	1	1	1	1	1
Manufacturing	1	1	1	1	1	1
Mining	127	128	128	128	128	128
Pecos Co. WCID #1	83	75	77	79	83	91
Total Needs =	**0**	**0**	**0**	**0**	**0**	**0**

Table 6, Identified Water Needs in Pecos County in Acre-feet per Year

Water Management Strategies to Meet Needs of Water User Groups

Water Management Strategies are the projects recommended by Regional Water Planning Groups that are intended to develop the amount of additional water supplies indicated as necessary to meet the identified water needs (projected shortages) of specific water user groups beyond their existing water supplies. The Water Management Strategies recommended by Regional Water Planning Groups may develop additional supplies of surface water or groundwater. The table presenting the recommended Water Management Strategies for Pecos County is from Volume 3 of the 2007 State Water Planning Database.

Recommended Water Management Strategies for Pecos County Water User Groups								
WUG	**Strategy**	**Source**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Irrigation	Conservation	Conservation	0	6,300	12,600	12,600	12,600	12,600
Total Water Mgt Strategies (ac-ft/year)=			**0**	**6,300**	**12,600**	**12,600**	**12,600**	**12,600**

Table 7, Water Management Strategies Recommended for Pecos County

How the Groundwater Management Plan Considers Water Supply Needs and Water Management Strategies in a Manner Not in Conflict with the State Water Plan

The 2007 State Water Plan identifies no groundwater-based Water Management Strategies to meet the identified needs of the 8 Water User Groups located within MPGCD. None of the 8 Water User Groups has Identified Water Needs in the 2007 State Water Plan. The only Water Management Strategy recommended in the 2007 State Water Plan for Pecos County Water User Groups is Irrigation Conservation which is projected to provide up to12,600 acre-feet per year of conservation water savings. There are no Water Management Strategies recommended in the 2007 State Water Plan for Water User Groups supplied from Pecos County.

Details on How the District Will Manage Groundwater in the District

The District will manage the supply of groundwater within the District in order to conserve the resource while seeking to maintain the economic viability of all resource user groups, public and private. The District seeks to manage the groundwater resources of the District as practicably as possible in a sustainable manner through the development of the Desired Future Conditions of Aquifers within the District. The Texas Legislature established that groundwater conservation districts are the preferred method of groundwater management in Section 36.0015 of the Texas Water Code. The District will cooperate with the other Groundwater Conservation Districts in the Groundwater Management Areas which Pecos County is located. In consideration of the economic and cultural activities occurring within the District, the District will identify and engage in such activities and practices, that if implemented may result in the conservation of groundwater in the District. The District will manage groundwater resources through

rules developed and implemented in accordance with Chapter 36 of the Texas Water Code and the provisions of the District Enabling Act recorded in Chapter 1299 of the Acts of the 77th Texas Legislature (HB 1258). The District will require that any well constructed as an exempt well under activities regulated by the Texas Railroad Commission (TRC) and later converted to another use not regulated by the TRC will be required to seek a permit for the use of groundwater in the District if the converted use of the well is otherwise not exempted from permitting under the Texas Water Code or Rules of the District.

An observation well network may be established and maintained in order to monitor changing storage conditions of groundwater supplies within the District. When a monitoring well network has been established the District will make a regular assessment of water supply and groundwater storage conditions and will report those conditions to the District Board of Directors and to the public. The District may undertake, as necessary, investigations of the groundwater resources within the District and will make the results of investigations available to the public upon adoption by the District Board of Directors. The District will co-operate with investigations of the groundwater resources of the District undertaken by other local political subdivisions or agencies of the State of Texas.

In order to better manage groundwater resources the District may establish management zones for all sources of groundwater within the District. In each management zone the District may:

a) Establish Desired Future Conditions and authorize the production of groundwater
b) Determine and implement the proportional reductions of the use of groundwater for all classes of groundwater use that are established by the District in order to maintain the established Desired Future Conditions of the management zone.
c) Allow for the transfer of the permitted right to use groundwater if a process is established in the District rules

Section 36.116 of the Texas Water Code provides that the District may use the management zones to adopt different rules for each:

a) Aquifer
b) Aquifer subdivision
c) Geologic formation
d) Geographic area in which any part of a through c above may occur within the District

For the purpose of managing the use of groundwater within the District, the District may address the use of groundwater in the aquifers in the District as a whole or within any management zone established by the District in order that the Desired Future Condition of the aquifer or aquifer subdivision in which the use occurs is not impaired. In furtherance of the District management of groundwater, the District may also establish any other criteria by Rule, as a threshold of use beyond which withdrawals from the aquifer or aquifer subdivision in excess of the threshold may result in a specified undesirable or injurious condition to the aquifer or aquifer subdivision. If the District

determines that the Desired Future Conditions or other criteria established by the District are being or may imminently be impaired with reasonable certainty, the District may take such actions or implement such conservation measures as may be necessary to restore the aquifer or aquifer subdivision to conditions which do not impair the Desired Future Conditions or other criteria established by the District under this section for the aquifer or aquifer subdivision.

The District will use the available estimates of groundwater recharge, movement and Managed Available Groundwater within the District in exercising the statutory responsibility of managing the groundwater in the District. As more information on groundwater conditions in the District becomes available, the District may use that information to refine the specific methodology by which the District will seek to sustainably manage the groundwater in the District.

The annual amount of water used from an aquifer or aquifer subdivision in the District or in a management zone established by the District will be averaged over a period of years specified in the District rules to aid in determining if the Managed Available Groundwater value or the Desired Future Condition has been exceeded. If the Desired Future Condition of an aquifer or aquifer subdivision in the District or a management zone is found to have been exceeded the District may implement proportional reductions in the permitted use of groundwater in the District or management zone to reduce the levels of use in order to maintain the Desired Future Condition. The District will implement proportional reductions in the permitted use of groundwater only to the extent that is required to maintain the Desired Future Condition in an aquifer, aquifer subdivision or a management zone.

The District rules will specify the methodology by which the District will track the usage of groundwater from an aquifer or aquifer subdivision in the District or a management zone to determine whether the sustainable use has been exceeded. The District rules will specify the methodology by which the District will implement any proportional reductions in the permitted use of groundwater in the District. All District actions with regard to proportional reductions of the permitted use of groundwater will be taken in noticed public meetings and in accord with the District rules.

The District has implemented rules establishing a claims process in which the District required existing or historic users of groundwater to obtain historic use permits. The claims process was intended to protect existing use as provided for in Section 36.113(e) of the Texas Water Code. To the extent practicable while remaining consistent with this plan, the District's existing and historic use permit process and period will preserve historic use as provided in Section 36.116(b) of the Texas Water Code.

The District will protect the existing and historical use of groundwater that occurred in the District prior to the effective date of the rules establishing the claims process. To obtain a historic use permit, an existing or historic user had to prove the maximum annual amount of groundwater that the user put towards a beneficial use during an existing and historic use period established in the District rules. The protection extended to historic

use permit holders is achieved by imposing more restrictive permit conditions on new permit applications. In extending this protection to historic use permit holders the District established limitations that:

a) Apply to all subsequent new applications for the permitted use of groundwater and applications for the increased use of groundwater by holders of historic user permits regardless of the type or location of use
b) Bear a reasonable relationship to the District's management plan
c) Are reasonably necessary to protect existing use and maintain established Desired Future Conditions of aquifers, aquifer subdivisions or management established by the District.

The District may adopt rules to regulate groundwater withdrawals by means of spacing and/or production limits. The District may deny a well construction permit or limit groundwater withdrawals in accordance with the guidelines stated in the rules of the District. In making a determination to deny a permit or reduce the amount of groundwater withdrawals authorized in an existing permit, the District will weigh the public benefit in managing the aquifer to be derived from the denial of a groundwater withdrawal permit or the reduction of the amount of authorized groundwater withdrawals against the individual hardship imposed by the permit denial or authorization reduction.

The relevant factors to be considered in making a determination to deny a permit or limit groundwater withdrawals may include:

a) The rules of the District
b) The distribution of groundwater resources in the aquifers or aquifer subdivisions of the District or any management zones established by the District
c) The economic hardship resulting from grant or denial of a permit or the terms prescribed by the permit

In pursuit of the District's mission of protecting the resource, the District may require reduction of groundwater withdrawals. To achieve this purpose, the District may, at the Boards discretion amend or revoke any permits after notice and hearing. The determination to seek the amendment, reduction or revocation of a permit by the District will be based on aquifer conditions observed by the District. The District will, when necessary, enforce the terms and conditions of permits and the rules of the District by enjoining the permit holder in a court of competent jurisdiction as provided for in Texas Water Code Chapter 36.102.

The District will establish rules for the proportional reduction of the permitted use of groundwater in the District that will recognize the following priorities of use:

1) Exempt users with particular consideration to livestock and domestic use
2) Holders of historic use of groundwater permits
3) Holders of non-historic groundwater use permits

The District may employ technical resources at its disposal, as needed, to evaluate the resources available within the District and to determine the effectiveness of regulatory or conservation measures. In consideration of particular individual, localized or District-wide conditions the District may allow the production in a management zone to exceed

the sustainable amount for a period of time considered necessary by the District. The exercise of this discretion by the District shall not be construed as limiting the authority of the District in any other matter. A public or private user may appeal to the Board for discretion in enforcement of the provisions of a reduction in the permitted use of groundwater on grounds of adverse economic hardship or unique local conditions. The exercise of said discretion by the Board shall not be construed as limiting the power of the Board.

Actions, Procedures, Performance and Avoidance Necessary to Effectuate the Plan

The District will implement the provisions of this management plan and will utilize the objectives of the plan as a guide for District actions, operations and decision-making. The District will ensure that planning efforts, activities and operations are consistent with the provisions of this plan.

The District will adopt rules in accordance with Chapter 36 of the Texas Water Code and all rules will be followed and enforced. The development of rules will be based on the scientific information and technical evidence available to the District.

The District will encourage cooperation and coordination in the implementation of this plan. All operations and activities will be performed in a manner that encourages the cooperation of the citizens of the District and with the appropriate water management entities at the state, regional and local level.

Methodology for Tracking the District's Progress in Achieving Management Goals

The General Manager of the District will prepare and submit an annual report (Annual Report) to the District Board of Directors. The Annual Report will include an update on the District's performance in achieving the management goals contained in this plan. The general manager will present the Annual Report to the Board of Directors within one hundred twenty (120) days following the completion of the District's Fiscal Year, currently the District fiscal year ends on September 30 of each calendar year. A copy of the annual audit of District financial records will be included in the Annual Report. The District will maintain a copy of the Annual Report on file for public inspection at the District offices, upon adoption by the Board of Directors.

Management Goals

1. Providing for the Most Efficient Use of Groundwater in the District

1.1 <u>Objective</u> – Each year, the District will require all new exempt or permitted wells that are constructed within the boundaries of the District to be registered with the District in accordance with the District rules.

1.1 <u>Performance Standard</u> – Each Year the number of exempt and permitted wells registered by the District for the year will be incorporated into the Annual Report submitted to the Board of Directors of the District.

2. Controlling and Preventing the Waste of Groundwater in the District

2.1 <u>Objective</u> – Each year, the District will make an evaluation of the District Rules to determine whether any amendments are recommended to decrease the amount of waste of groundwater within the District.

2.1 <u>Performance Standard</u> – The District will include a discussion of the annual evaluation of the District Rules and the determination of whether any amendments to the rules are recommended to prevent the waste of groundwater in the Annual Report of the District provided to the Board of Directors.

2.2 <u>Objective</u> – Each year, the District will provide information to the public on eliminating and reducing wasteful practices in the use of groundwater either by a page on groundwater waste reduction or a link to information on groundwater waste reduction on the District's website or by providing an article on eliminating and reducing wasteful practices to a newspaper of general circulation in the District for potential publication.

2.2 <u>Performance Standard</u> – Each year, a copy of the information provided on groundwater waste reduction on the District's website or a copy of the article provided to a newspaper of general circulation in the District will be included in the District's Annual Report to be given to the District Board of Directors.

3. Controlling and Preventing Subsidence

This Management Goal is not Applicable to the District.

4. Conjunctive Surface Water Management Issues

4.1 Objective – Each year, the District will participate in the regional planning process by being represented at the Region F Regional Water Planning Group meetings.

4.1 Performance Standard – The attendance of a District representative to at least 50 percent of the Region F Regional Water Planning Group meetings will be noted in the Annual Report presented to the District Board of Directors.

5. Natural Resource Issues That Affect the Use and Availability of Groundwater or are Affected by the Use of Groundwater

5.1 Objective – Each year the District will monitor the permitting and integrity testing of salt-water or waste-disposal injection wells permitted by the Texas Railroad Commission within the District.

5.1a Performance Standard – Each year, a summary of the salt-water or waste-disposal injection wells permitted by the Texas Railroad Commission within the District will be included in the Annual Report submitted to the District Board of Directors.

5.1b Performance Standard – Each year a summary of the results of the integrity tests performed on the salt-water or waste-disposal injection wells permitted by the Texas Railroad Commission to operate within the District will be included in the Annual Report submitted to the District Board of Directors.

5.2 Objective – Each year the District will monitor the discharge of Comanche and related springs or acquire the monitoring data on spring discharge developed by others.

5.2 Performance Standard – Each year, a summary of the timing of the appearance of the seasonal spring-discharge, an estimate of the annual volume of discharge from Comanche and related springs and a discussion comparing the most recent estimates of spring-discharge to previous estimates will be included in the Annual Report submitted to the District Board of Directors.

5.3 Objective – From year 2010, each third year, the District will assess the changes in the quantity of the discharge of Comanche and related springs and recommend to the Board of Directors whether any conservation measures are necessary to maintain the discharge of Comanche and related springs.

5.3 Performance Standard – From year 2010, each third year, a summary of the assessment of the changes in the quantity of annual seasonal spring-discharge and any recommendations for conservation measures to be considered for implementation will be included in the Annual Report submitted to the District Board of Directors.

6) Addressing Drought Conditions

6.1 Objective – Each month, the District will download available drought information, for the counties in the District, from available websites on the internet..

6.1 Performance Standard – Quarterly, the District will make an assessment of the status of drought in the District and prepare a quarterly briefing for the Board of Directors. The downloaded maps, reports and information will be included with copies of the quarterly briefing in the District Annual Report to the Board of Directors.

7. Addressing

A. Conservation

7A.1 Objective – The District will submit an article annually, regarding water conservation for publication to at least one newspaper of general circulation in Pecos County.

7A.1 Performance Standard – A copy of the article submitted by the District for publication to a newspaper of general circulation in Pecos County regarding water conservation will be included in the Annual Report to the Board of Directors.

B. Recharge Enhancement

This management goal is not applicable to the District.

C. Rainwater Harvesting

7C.1 Objective – The District will post an article or a link to an article annually, regarding rainwater harvesting on the District website www.middlepecosgcd.org

7C.1 Performance Standard – A copy of the article posted on the District website regarding rainwater harvesting will be included in the Annual Report to the Board of Directors.

D. Precipitation Enhancement

This management goal is not applicable to the District.

E. Brush Control

This management goal is not applicable to the District.

8. Addressing in a Quantitative Manner the Desired Future Conditions (DFC) of the Groundwater Resources in the District

8.1 Objective – Each year, the District will collect at least 5 water-level measurements from the District monitor wells located in the portion of the District located within GMA-7.

8.1a Performance Standard – Each year, the District will post the water-level measurements collected from the portion of the District within GMA-7 and identify the aquifer from which the measurement is taken, in the Annual Report to the Board of Directors.

8.1b Performance Standard – Each year, the District will include a discussion of the change in water-levels in each aquifer for which a Desired Future Condition is established by GMA-7, in the Annual Report to the Board of Directors.

8.1c Performance Standard – Each five years, the District will include a discussion of the change in water-levels in each aquifer for which a Desired Future Condition is established by GMA-7 comparing the change to the incremental time-appropriate change in water-levels indicated by the established Desired Future Condition of the aquifer, in the Annual Report to the Board of Directors.

8.2 Objective – Each year, the District will collect at least 5 water-level measurements from the District monitor wells located in the portion of the District located within GMA-3.

8.2a Performance Standard – Each year, the District will post the water-level measurements collected from the portion of the District within GMA-3 and identify the aquifer from which the measurement is taken, in the Annual Report to the Board of Directors.

8.2b Performance Standard – Each year, the District will include a discussion of the change in water-levels in each aquifer for which a Desired Future Condition is established by GMA-3, in the Annual Report to the Board of Directors.

8.3c Performance Standard – Each five years, the District will include a discussion of the change in water-levels in each aquifer for which a Desired Future Condition is established by GMA-3 comparing the change to the incremental time-appropriate change in water-levels indicated by the established Desired Future Condition of the aquifer, in the Annual Report to the Board of Directors.

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