Sterling County Underground Water Conservation District

Management Plan 2005-2010

Amended: December 12, 2005

Table of Contents

District Mission

The Sterling County Underground Water Conservation District strives to provide for the conservation, preservation, protection, recharge, prevention of waste and pollution, and efficient use of groundwater within the district. Groundwater integrity, the main purpose for the district, is preserved through monitoring of water levels, water quality analysis, and remediation of any contamination. The District also endeavors to maintain groundwater ownership and rights of the owners of the land and their lessees as provided in the Texas Water Code §36.002.

Time Period for this Plan

This plan becomes effective upon adoption by the Board of Directors and approval the Texas Water Development Board. The plan remains in effect for ten years after the date of Board adoption and TWDB approval, or until a revised or amended plan is adopted and approved.

Statement of Guiding Principles

The District acknowledges that groundwater resources of the region are of vital importance for the economic benefit of the citizens of Sterling County and the region. Integrity and ownership of groundwater are also recognized as important in the management of this precious resource. The primary goal of the District is to preserve the integrity of the groundwater in the county from any potential contamination including oil and gas production and related activities. This is accomplished as the District sets objectives to provide for the conservation, preservation, protection, recharge, prevention of waste and pollution, and efficient use of water within the district.

General Description

The citizens of Sterling County, accepting the importance of protecting the integrity of groundwater from potential contamination from the vast amount of oil and gas production and associated activities and the necessity of local control of groundwater resources, introduced legislation in the 70th Regular Legislative Session (1987) for creation of the District. The District was confirmed the same year. Government of the District is by a five member locally elected board serving staggered four year terms.

Current Board of Directors:

Jack Clark, Chairman	Jim Terry, Vice-Chairman	
Josh Gaines , Secretary	Herbert McCaleb	Mackey McEntire

Location and Extent

The Sterling County UWCD has an areal extent of 616,101 acres (963 square miles) in Sterling and Tom Green Counties located in the west-central part of Texas. Elevation ranges from approximately 2,200 to 2,700 feet above mean sea level. Total population is approximately 1400 including the County Seat, Sterling City (population 996).

The District overlies the Edwards-Trinity (Plateau) and Dockum aquifers and is included in the Upper Colorado Region of the Colorado River Basin.

Regional Cooperation and Coordination

The passage of HB 1763, 79th Regular Legislative Session (2005) mandated regional cooperation between districts for the management of future conditions of the aquifers in the State. However, the District has cooperated with other districts on a regional basis for the past seventeen years to improve local management of groundwater resources. The District has also been an active member of the Texas Alliance of Groundwater Districts for the past seventeen years to exchange ideas, develop or influence programs for the management, conservation, protection, and development of groundwater.

West Texas Regional Groundwater Alliance

In 1988, four groundwater conservation districts; Coke County UWCD, Glasscock County UWCD, Irion County WCD, and Sterling County UWCD signed an original Cooperative Agreement to coordinate activities to provide for the wise use of groundwater resources and the maximum beneficial use of local taxpayer dollars. As new districts were created, they too signed the Cooperative Agreement. In the fall of 1996, the original Cooperative Agreement was redrafted creating the West Texas Regional Groundwater Alliance.

The regional alliance now consists of sixteen locally created and locally funded groundwater conservation districts that encompass approximately 16.6 million acres or 18.95 thousand square miles in Region F and GMA 7. This region is as diverse as the State of Texas and due to this diversity, each member district provides it's own unique management programs to best serve its

constituents.

Current member districts include:

Coke County UWCD	Emerald UWCD	Glasscock GCD	Hickory UWCD # 1
Hill Country UWCD	Irion County WCD	Kimble County GCD	Lipan-Kickapoo WCD
Lone Wolf GCD	Menard County UCD	Middle Pecos GCD	Plateau UWC & SD
Santa Rita UWCD	Sterling County UWCD	Sutton County UWCD	Wes-Tex GCD

This Alliance was created because the local districts have a common objective to facilitate the conservation, preservation, and beneficial use of water and related resources. Local districts monitor water-related activities which include but are not limited to the State's largest industries of farming and ranching and oil and gas production. The Alliance provides coordination essential to the activities of these member districts as they monitor these activities in order to accomplish their objectives.

West Texas Weather Modification Association

In 1996, in response to the landowners of seven groundwater conservation districts, the West Texas Weather Modification Association was formed for the purpose of providing weather modification (cloud seeding) for rainfall enhancement throughout the geographical region of its members. The target area of the Association includes all of seven counties and part of another for a total area of nearly 6.7 million acres or 10.4 thousand square miles of West Texas.

Current membership includes:

City of San Angelo	Plateau UWC & SD
Emerald UWCD	Santa Rita UWCD
Glasscock GCD	Sterling County UWCD
Irion County WCD	Sutton County UWCD

Understanding the importance of increased amounts of rainfall in the region, this Association was formed to provide benefits from enhanced rainfall which include a reduction of groundwater withdrawals, increase in runoff, increase in agricultural productivity with the resulting economic impact for the region, provide additional recharge, and increase spring flow. These benefits are not only realized within the region but also downwind and down stream of the target area.

Regional Water Planning

The District has been active in attending the Region F, Regional Water Planning Group Meetings to provide input in developing and adopting both the 2001 and 2006 Regional plans.

Groundwater Management Area

Groundwater Management Area 7 covers all or part of thirty-three counties and includes twenty-one groundwater conservation districts. These GCD's manage groundwater resources at the local level in all or part of twenty-four counties within GMA 7 and surrounding areas. The District will work with the other GCD's to determine the future desires condition of the aquifer.

Edwards-Trinity (Plateau) Aquifer

The Edwards-Trinity (Plateau) aquifer underlies the Edwards Plateau east of the Pecos River and consists of saturated sediments of lower Cretaceous age Trinity Group formations and overlying limestones and dolomites of the Comanche Peak, Edwards, and the Georgetown formations. The aquifer generally exists under water table conditions, however, where it is fully saturated and a zone of low permeability occurs, artesian conditions may exist. Springs issuing from the aquifer form the headwaters for several eastward and southerly flowing rivers. The water levels have generally remained constant or have fluctuated only with seasonal precipitation.

Natural chemical quality of groundwater ranges from fresh to slightly saline. The water is typically hard and may vary widely in concentrations of dissolved solids made up mostly of calcium and bicarbonate. Water quality of the springs is typically excellent.[1]

Dockum Aquifer

The Dockum group underlies the Cretaceous formations in the northwestern Edwards Plateau region. The primary water-bearing zone is commonly called the "Santa Rosa" and consists of up to 700 feet of sand and conglomerate interbedded with layers of silt and shale. Concentrations of dissolved solids range from 1,000 ml/l in the eastern outcrop to more than 20,000 ml/l in the deeper parts of the western part of the aquifer. High sodium concentrations pose salinity problems in irrigated land

[1] Water For Texas, Today and Tomorrow, August 1997, Texas Water Development Board.

and often exceed safe drinking water standards for municipal water supplies.[2]

Recharge by precipitation occurs in areas where Dockum Group sediments are exposed to the surface mainly in eastern New Mexico. The Santa Rosa Sandstone is in hydraulic contact with the overlying Edwards/Trinity (Plateau) aquifer in parts of Crockett, Irion, Reagan, Sterling, Tom Green and Upton counties and water quality analysis suggest some movement from the Edwards/Trinity (Plateau) aquifer.[3]

[2] Ibid

[3] TWDB Report 359, The Groundwater Resources of the Dockum Aquifer in Texas

Groundwater Resource Estimates

Estimates of groundwater availability, usage, supplies, recharge, storage, and future demands are from data supplied by the 2006 Region F Regional Water Plan, the Texas Water Development Board, and as otherwise noted. Use of TWDB estimates does not constitute endorsement by the District. These estimates will be used until alternate numbers are determined through additional data collection.

Historic Groundwater Use (expressed as acre-feet)[4]

Historic groundwater use is the total amount of groundwater used within the district including the Edwards/Trinity (Plateau) and other aquifers.

Use	1999	2000	2001	2002	2003	Average
Municipal	317	324	292	289	262	297
Irrigation	697	637	681	717	633	673
Mining	560	560	560	560	560	560
Livestock	292	292	369	323	196	294
Total	**1,866**	**1,813**	**1,902**	**1,889**	**1,651**	**1,824**

Estimated Groundwater Recharge From Precipitation (expressed as acre-feet)

The estimated groundwater recharge from precipitation was determined in a run of the Edwards-Trinity (Plateau) GAM Run 05-37 by the Texas Water Development Board. No recharge from precipitation for the Dockum occurs within the district.[5]

River Basin	Aquifer	2000	2010	2020
Colorado	Edwards-Trinity (Plateau)	10,335	10,539	10,539
Colorado	Dockum	0	0	0
	Total Precipitation Recharge	**10,335**	**10,539**	**10,539**

[4] TWDB Water Use Survey Database

[5] TWDB Report 359, The Groundwater Resources of the Dockum Aquifer in Texas

Estimated Lateral Inflow and Outflow

An Edwards-Trinity (Plateau) GAM water budget run, including the lateral inflow and outflow, was requested from the Texas Water Development Board. Inflows and outflows are total amounts from surrounding areas and cross-formation flow to the Dockum as determined by the Edwards-Trinity (Plateau) GAM Run 05-37.

Aquifer	2000	2010	2020
Edwards-Trinity			
Inflows	1,708	1,550	1,504
Outflows	(4,483)	(3,890)	(3,827)
Dockum			
Inflow	135	109	56
Outflow	(1,312)	(1,291)	(1,300)
Total Lateral Flows	**(3,952)**	**(3,522)**	**(3,567)**

Projected Surface Water Supply

The total projected available surface water supplies are from Table 4, 2002 State Water Plan. This is essentially the same as the three permitted surface water rights for168 ac/ft per year.[6]

Use	2000	2010	2020
Irrigation	65	67	68
Livestock	99	99	99
Total	**164**	**166**	**167**

[6] Texas Commission on Environmental Quality, San Angelo, TX.

Projected Groundwater Demands (expressed as acre-feet)[7]

These projected groundwater demands will be used to determine projected groundwater supply. There are some differences between the 2002 State Plan and the 2006 Region F Regional Plan, but the District considers the 2006 data to be more reflective of actual conditions for planning purposes.

Use	Average	2010	2020
Municipal	297	349	377
Irrigation	673	648	621
Mining	560	590	600
Livestock	294	503	503
Total	**1,824**	**2,090**	**2,101**

Estimated Discharge to Spring Flow (expressed as acre-feet)

Historic spring flow from the Edwards/Trinity (Plateau) GAM Run 05-37 was established as 6,183 ac/ft/yr. This represents all springs and seeps within the district as represented by the model. Although spring flow or seepage may occur along the margin of the Edwards/Trinity (Plateau) aquifer only projected surface water supply or permitted water right amounts are considered for this plan. The North Concho River and Sterling Creek both flow intermittently and are the only "permanent" surface water flow in the District. Other spring flow or seeps, which normally occur only during wet periods, remain on the surface in small amounts and for limited distance before evaporating or percolating into the soil profile and is not available.

Estimated discharge to spring flow for the Edwards-Trinity (Plateau) is assumed to be equal to the projected surface water supply without consideration other possible spring flow or seeps. There is no estimated discharge to spring flow for the Dockum. Except for spring flow, there is no discharge to surface water.

[7] Chapter 2, 2006 Region F Regional Water Plan

Aquifer	2000	2010	2020
Edwards-Trinity	164	166	167
Dockum	0	0	0
Total	**164**	**166**	**167**

Projected Water Demand

The total projected demand on water supplies from Table 2, 2002 State Water Plan.

Use	2000	2010	2020
Municipal	315	329	333
Irrigation	886	851	817
Mining	570	422	405
Livestock	571	571	571
Total	**2,342**	**2,173**	**2,126**

Projected Available Groundwater Supply (expressed as acre-feet)

Although the managed available groundwater has not been established by the future desired condition of the aquifer, the District recognizes the importance of maintaining groundwater availability for residents and maintaining spring flow and limits availability to effective recharge or sustainability.

In the Region F Regional Water Plan, January 2001, and also in the 2006 Plan, the region was divided into three availability categories: 1) limited to annual effective recharge only, 2) annual recharge plus an annual amount equal to 75 percent of the retrievable storage over 50 years, and 3) annual recharge plus an annual storage depletion equal to 75 percent of the retrievable storage over 100 years.[8] The District is in "the limited to annual effective recharge" category.

[8] 2006 Region F Regional Water Plan

During the development of groundwater availability for the 2006 Region F Regional Water Plan, the groundwater consultant requested the "recharge input file" from the Texas Water Development Board and ran the Edwards-Trinity (Plateau) GAM to determine recharge. Further assumptions were made, since the region had been experiencing drought conditions since 1992 and water level measurements did not start to rise until November, 2004 after an exceptional year for rainfall, that sustainable availability should only be half of total recharge or "drought recharge".

The District participated in a two year recharge study through Region F to provide recharge estimates for a portion of the Edwards-Trinity (Plateau). This study has not been completed to date. Water levels continue to be measured on a monthly basis to provide additional data for future recharge studies and Edwards-Trinity (Plateau) GAM runs.

Adhering to the principle that demand should not exceed recharge to maintain dependable and sufficient groundwater supplies for future generations, the District's projected available groundwater supply is limited to drought recharge. It is also assumed that with drought recharge the inflows and outflows would be reduced by at lease one third.

Projected Available Groundwater Supplies			
	Average	**2010**	**2020**
Drought Recharge	5,168	5,270	5,270
Lateral Inflows (outside the district and Dockum)	1,216	1,095	1,028
Less Projected Groundwater Demand	(1,824)	(2,090)	(2,101)
Less Discharge to Spring Flow	(164)	(166)	(167)
Less Lateral Outflows (outside the district and Dockum)	(3,825)	(3,236)	(3,384)
Total	**571**	**873**	**646**

Enhancement of Recharge and Availability

The District supports precipitation enhancement, recharge enhancement and brush control as management practices to maintain and improve groundwater supplies and quality in the District and region. Benefits practices can be summed up in a study done by Texas Tech University: "Private benefits include enhanced crop yields, livestock production due to forage increases and reduced irrigation cost. Social benefits include enhanced runoff, increased reservoir levels, downwind

benefits, secondary regional benefits (multiplier impact), improved water quality and reduced aquifer depletion." [9]

Weather Modification

Recharge of the aquifers is achieved through rainfall infiltration and can be enhanced by increasing the amount of precipitation received annually through weather modification (cloud seeding). Rainfall enhancement has been conducted by the Colorado River Municipal Water District, located in Big Spring, since 1970 with documented average 23% rainfall increase .[10] The City of San Angelo conducted a program from 1985-1989 which resulted in a 26% rainfall increase. [11]

In 1996 the District joined six groundwater conservation districts in forming the West Texas Weather Modification Association to conduct rainfall enhancement program for a target area that currently encompassing approximately 6.7 million acres. The program has since obtained the equipment and personnel necessary and conducts a year around program with most operations between April and May. There were 46 operational days with 109 clouds seeded for the period of April, 18 through October 30, 2004 evaluated for the entire target area with an overall result average of very good. The District received an additional 125,725 ac/ft or 2.51" of rainfall during the period.[12]

Under ideal conditions with 100% grass cover, 16% of rainfall absorbed into the ground surface infiltrates beyond the root zone for potential recharge.[13] Type and amount of ground surface covered by brush, rainfall event type (slow soaking or hard), and amount of rainfall per event will alter the amount of estimated recharge. The average rainfall for the District is18.38 in/yr and 9.98 in the growing season[14] from May through September when the majority of weather modification activities occur. A modest 10% increase (one inch) of rainfall during the growing season would result in a reduction of pumpage for all users, potential increase in runoff, increased productivity of crops and rangeland (thus improving the economy of the district and region), provide additional moisture infiltration below the root zone available for recharge, and increased spring flow. One inch of rainfall distributed over the entire District is equal to 49,938 ac-ft of rainwater. Estimated recharge

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[9] Weather Modification: Private and Social Benefits and Costs, Texas Tech University, Lubbock, TX, August 1996

[10] "1995 Weather Modification Program", Colorado River Municipal Water District, Report 95-1.

[11] "Three Rainfall Augmentation Programs in Texas", The Journal of Weather Modification, April 1987.

[12] West Texas Weather Modification 2004 Final Report

[13] "How an Increase or Reduction in Juniper Cover Alters Rangeland Ecology" and Justin W. Hester, 1997 Juniper Symposium, Technical Report 97-1, Texas A&M Research and Extension Service.

[14] U.S. Department of Agriculture, Soil Conservation Service - Soil Survey of Sterling County Texas.

is calculated using the formula:

rainfall(in) ÷ 12 X acres X % infiltration rate = recharge

Using an infiltration rate of 2%[15], increased rainfall would result in additional potential recharge as follows:

Increase During Growing Season (Average 9.98 in, May-Sept.)	10% Increase (1.0 in)	15% Increase (1.5 in)	25% Increase (2.51 in)
Additional Recharge Potential in ac-ft	1,027	1,540	2,577

Recharge Enhancement

Recharge enhancing facilities would be beneficial to the District and region in improving groundwater quality and quantity. There is insufficient data, and lack of funding to obtain data, to indicate areas where recharge structures would enhance recharge. As data and funding become available, the District will consider building recharge enhancement structures.

There are no available estimates of potential recharge from recharge enhancement facilities.

Brush Control

Brush control can be accomplished by mechanical control, prescribed burn, chemical application, or combination of these methods. The control of mesquite and juniper, and other undesirable plants would allow more rainfall to reach the soil surface. Benefits would include more rainfall absorption into the soil, increased productivity of rangeland (and resulting economic impact), and increased amount of moisture available to infiltrate as recharge.

A large mature juniper has an evapotranspiration rate of about 33 gal/day.[16] This same mature juniper allows roughly 25% of rainfall to reach the soil surface due to canopy and litter interception and only 2% to infiltrate beyond the root zone for potential recharge. Approximately 16% of rainfall is available for deep infiltration with 100% grass coverage.[17]

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[15] TWDB Edwards/Trinity GAM calibrations

[16] "Biology and Ecology of Redberry Juniper", 1997 Juniper Symposium, Technical Report 97-1, Texas A&M Research and Extension Service

[17] "How an Increase or Reduction in Juniper Cover Alters Rangeland Ecology" and Justin W. Hester, 1997 Juniper Symposium, Technical Report 97-1, Texas A&M Research and Extension Service

The following table demonstrates the water balance on rangeland at the Texas Agricultural Experiment Station, Sonora, TX.[18]

	100% Grass	70% Grass 12% Oak 18% Juniper	40% Grass 24% Oak 36% Juniper
Rainfall (inches)	22.6	22.6	22.6
Interception Loss (inches)	3.0	6.3	9.6
Water Reaching the Soil (inches)	19.6	16.3	13.0
Runoff (inches)	0.2	0.2	0.2
Water Going into the Soil (inches)	19.4	16.1	12.8
Evapotranspiration (inches)	15.7	15.8	12.8
Deep Drainage (Recharge) (inches)	**3.7**	**0.3**	**0.0**
Moderate Stocking Rate (animal units/sec)	34	22	11

Brush cover reduces potential recharge through canopy and litter interception of rainfall thus limiting available moisture for soil absorption and runoff. Brush control would allow more rainfall to reach the soil surface increasing available moisture for absorption into the soil and resulting in potential increase of deep infiltration and recharge.

The District had an estimated 75% brush cover in 1999 which has been reduced to 50% with implementation of the State Brush Control Program.[19] This reduction in brush cover has resulted in draws, creeks and the Middle Concho now running. Water levels also indicate that brush demand on the aquifer has been reduced. The Upper Colorado River Authority is currently evaluating water levels and runoff to determine the effect of the brush reduction on the aquifer and stream flow area and region wide.

Utilizing the data for deep drainage with from the Texas Agriculture Experiment Station, Sonora, assuming that 60% brush cover is the point at which deep drainage ceases, not taking into account the difference in brush type and coverage, soil type, amount and type of rainfall, and topography between Sutton and Sterling Counties, assuming that brush coverage and reduction is consistent

[18] Ibid

[19] Texas Soil and Water Conservation Board, Brush Office - San Angelo

throughout the district, and using 2004 average rainfall of 27.60 inches[20], the corresponding 33% reduction in brush cover from the state program could potentially result in an additional recharge of:

	33% Brush Reduction (0.43% deep drainage increase)
Recharge Potential in ac-ft	6,093

Total Estimated Enhanced Recharge

In 2004 both the rainfall enhancement program and the brush control program were active in the district. Combined effect of both programs would result in the private and social benefits stated above and provide for an estimated additional recharge potential of:

	25% Increase (2.51 in)
Rainfall Enhancement for 2004	2,577
33% Brush Reduction with average 2004 rainfall of 27.60 inches	6,093
Total	**8,670**

Both the rainfall enhancement and brush control programs should be continued. Funding for both from the State level is necessary to continue the positive effects that both programs have accomplished. Both are necessary tools to increase the water supplies and boost economic benefits of the District, Region and State.

Consideration of Management Strategies

The District would consider water management strategies developed and adopted in the State Water Plan, however there are no applicable strategies from the 2002 State Water Plan. The District works closely with the regional planning group in preparation and adoption the Region F, 2006 Regional Water Plan. Any new water management strategies developed and adopted by the State Water Plan will be considered when applicable.

[20] 2004 Rainfall records collected by the District

Management of Groundwater Supplies

The District will monitor groundwater resources within the District to promote the conservation, preservation, protection, enhanced recharge, prevention or waste and pollution, and ensuring efficient use of the resource while seeking to maintain its integrity and the economic viability of all resource user groups, public and private. 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 would result in a reduction of groundwater use and/or enhanced recharge. An observation network shall be maintained in order to monitor changing quality and groundwater levels within the District. The District will employ all technical resources at its disposal and within budget constraints to evaluate the resources available within the District and to determine the effectiveness of management or conservation measures.

Actions, Procedures, Performance and Avoidance for Plan Implementation

The District will implement the provisions of this plan and will utilize the provisions of this plan as a guide for determining the direction and/or priority for all District activities. All operations of the District and all agreements entered into by the District will be consistent with the provisions of this plan.

The District has adopted rules for the management of groundwater resources and will amend those rules as necessary pursuant to TWC Chapter 36 and the provisions of this plan. All rules will be adhered to and enforced. The promulgation and enforcement of the rules will be based on the best technical evidence available.

The District shall treat all citizens with equality. Citizens may apply to the District for discretion in enforcement of the rules on grounds of adverse economic effect or unique local character. In granting discretion to any rule, the Board shall consider the potential for adverse effect on adjacent landowners. The exercise of said discretion by the Board, shall not be construed as limiting the power of the Board. The District will seek cooperation in the implementation of this plan and the management of groundwater supplies within the District.

Methodology for Tracking Progress

The methodology that the District will use to trace it's progress on an annual basis in achieving it's management goals will be as follows. The District holds a regular monthly Board Meeting for the

purpose of conducting District business. Each month, the Managers Report will reflect the number of meetings attended, number of water analysis samples collected and analyzed, resulting action regarding potential contamination or remediation of actual contamination, water levels monitored, reports on any school or civic group programs, fluid injection permit applications, and other matters of district importance. The District manager will prepare and present an annual report to the Board of Directors on District performance in regards to achieving management goals and objectives (during first monthly Board of Directors meeting each fiscal year, beginning January 1, 2001). The annual report will be maintained on file at the District Office.

Coordination With Surface Water Entities

There are no surface water management entities within the District.

Goals, Management Objectives and Performance Standards

The District recognizes the importance of public education to encourage efficient use, implement conservation practices, prevent waste, and preserve the integrity of groundwater.

Goal 1.0 - Control and Prevent the Waste of Groundwater

1.1. Management Objective
Each year the District will publish at least one article on conservation measures and wasteful practices and the availability of programs for civic groups. Each year the District will provide, upon request, all informational materials and programs available for local civic groups to improve public awareness of conservation measures and wasteful practices.

1.1a. Performance Standard
Number of articles published each year.

1.1b. Performance Standard
Number of informational materials and programs requested and provided each year.

1.2. Management Objective
Each year the District will make a written or personal contact with school administrators(s) or science department head(s) on the availability of District resources. Each year the District will cooperate with all schools within the district in providing all available information and programs on water conservation practices, water quality analysis, or other water issues, when requested.

1.2a. Performance Standard
Number of written or personal contacts each year.

1.2b. Performance Standard
Number of informational materials or programs requested and provided each year.

Goal 2.0 - Providing for the Efficient Use of Groundwater

2.1. Management Objective

Each year the District will publish at least one article on efficient water use and availability of information materials. Each year the District will provide, upon request, all available information on water conservation practices for the efficient use of water. These will include but are not limited to publications from the Texas Water Development Board, Texas Natural Resource Conservation Commission, Texas Agricultural Extension Service, and other sources.

2.1a. Performance Standard

Number of articles published each year.

2.1b. Performance Standard

Number of informational materials requested and distributed each year.

2.2. Management Objective

Each year the District will publish at least one article on the availability of water analysis services. Each year the District will perform a water quality analysis for residents of the District upon request.

2.2a. Performance Standard

Number of articles published each year.

2.2b. Performance Standard

Number of water analysis requested and performed each year.

2.3. Management Objective

Each year the District will collect at least two water samples, for partial chemical analysis, to monitor for possible contamination problems which would jeopardize the integrity of the groundwater.

2.3a. Performance Standard

Number of samples collected and analyzed each year.

2.3b. Performance Standard

Number of contamination problems each year.

2.4. Management Objective

Each year, the District will monitor water levels in ten selected wells within the District and report the levels to the TWDB.

2.4a. Performance Standard

Number of water levels taken and reported each year.

Goal 3.0 - Natural Resource Issues Impacting Groundwater

3.1. Management Objective

The District participates financially on a per acre basis in the West Texas Weather Modification Association for the purpose of enhancing rainfall for reduction of groundwater use, increased recharge of the aquifers, and economic benefit. Each year the District participates in the WTWMA, representatives will attend 85% of the WTWMA Board Meetings.

3.1a. Performance Standard

Number of WTWMA Board Meetings attended each year.

3.2. Management Objective

Each year the District will make a written or personal contact with school administration(s) or science department head(s) on the availability of information resources on weather modification and tours of the WTWMA Office and facilities.

3.2a. Performance Standard

Number of written or personal contacts each year.

3.3 .Management Objective

Each year the District will continue to monitor the San Angelo Standard Times and Sterling Courier public/legal notices and the for all "Notice of Application for Fluid Injection Well Permit" and the Sterling County Clerk's Office for all "Application for Fluid Injection Well Permit".

3.3a. Performance Standard

Number of newspaper notices and permit applications reviewed each year.

3.4. Management Objective

The District will continue to determine if the "Application for Fluid Injection Well Permit" poses any threat to the integrity of groundwater or if the source of the water supply is of potable quality on an individual basis. The District will file an objection and/or a request for a public hearing for all applications determined to pose a threat to the integrity of groundwater or if the source of the water supply is of potable quality.

3.4a. Performance Standard
Number of objections and/or hearing requests filed.

Goal 4.0 -Drought Conditions

4.1 Management Objective
The District will monitor the Palmer Drought Severity Index (PDSI) by Texas Climatic Divisions at least twice yearly. If PDSI indicates that the District will experience severe drought conditions, the District will notify all public water suppliers within the District.

4.1a Performance Standard
Number of times the PDSI was monitored each year.

4.1b Performance Standard
Number of times public water suppliers contacted.

Goal 5.0 - Conservation

5.1 Management Objective
This objective is closely related to Goals 1 and 2 on efficient use and waste. Conservation is the non wasteful and efficient use of a resource. Conservation measures will be included in the articles on efficient use and waste. The management objectives of this goal are the same as the management objectives of Goals 1 and 2.

5.1a Performance Standard
Identical to Performance Standards 1.1a, 1.1b, 1.2a, 1.2b, 2.1a, and 2.1b.

Goal 6.0 - Brush Control

6.1 Management Objective
Each year the District will measure ten water levels for the Upper Colorado River Authority

to assist in determining the effectiveness of brush control within the District and area.

6.1a Performance Standard

Number of water levels taken for and provided to the Upper Colorado River Authority each year.

Goal 7.0 - Precipitation Enhancement

7.1 Management Objective

This objective is the same as Goal 3 on natural resources. The District participates in the West Texas Weather Modification Association to provide precipitation enhancement for an eight county area.

7.1a. Performance Standard

Identical to Performance Standard 3.1a.

Management Goals Determined Not-Applicable

Goal 8.0 - Control and Prevention of Subsidence

The rigid geologic framework of the region precludes significant subsidence from occurring. This management goal is not applicable to the operations of the District.

Goal 9.0 - Conjunctive Surface Water Management Issues

There are no surface water management entities within the District. This management goal is not applicable to the operations of the District.

Goal 10.0 - Recharge Enhancement

The District recognizes the importance of recharge enhancement. However, at this time there is not sufficient data nor adequate funding to accomplish this goal.

Goal 11.0 - Rainwater Harvesting

There is not sufficient annual rainfall in the District to make rainwater harvesting economically feasible.

Goal 12.0 - Desired Future Condition(s) of Aquifer(s)

At this time GMA 7 has not determined the future desired condition for the aquifers within the district.

Definitions and Concepts

“Board” - the Board of Directors of the Sterling County Underground Water Conservation District.

“District” - the Sterling County Underground Water Conservation District.

“Effective recharge” - the amount of water that enters the aquifer and is available for development

“Groundwater” - means water percolating below the surface of the earth.

“Integrity” - means the preservation of groundwater quality.

“Natural Recourse Issues” - includes groundwater integrity preservation

“Ownership” - pursuant to TWC Chapter 36, §36.002, means the recognition of the rights of the owners of the land pertaining to groundwater.

“Recharge” - the addition of water to an aquifer.

“Surface Water Entity” - TWC Chapter 15 Entities with authority to store, take, divert, or supply surface water for use within the boundaries of a district.

“TCEQ” - Texas Commission on Environmental Quality

“TWDB” - Texas Water Development Board.

"Waste" - as defined in TWC Chapter 36, §36.001(8), as amended.

“Well” - means an artificial excavation that is dug or drilled for the purpose of producing groundwater.